



Proposals to accelerate the technological development of Hungary

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Introduction

Last autumn, IVSZ issued a compelling appeal to the digital profession, economic stakeholders, political leaders, and the entire Hungarian public, highlighting the historic opportunity for Hungary in advancing modern technology for businesses and enhancing competitive skills for workers.

In our manifesto, "Association for a Digital Hungary," we underscored, based on both international and domestic research, that if a technology-driven growth trajectory is pursued, the Hungarian economy could realise a GDP surplus of HUF 4 trillion within three years. Moreover, in the long term, the acquisition of advanced digital competencies could secure the stability and efficiency of the economy and the society.

The manifesto outlined four key pillars essential for achieving rapid and effective change:

- digital society, human resources
- digitisation of the sector, technological development of SMEs
- data economy, innovation, startup ecosystem
- digital region, international cooperation

For each of these crucial areas, we developed a series of proposals grounded in detailed, peer-reviewed evidence, forming the basis of our Digital Agenda for Change.

We would like to express our gratitude to everyone who contributed their suggestions and feedback during the preparation of the discussion papers, enabling us to produce this comprehensive technical document encompassing all four pillars.

Pillar 1: Human resources

1. Introduction

Regarding human resources, the primary constraint on the development of Hungary's digital economy remains the **shortage of IT and digital professionals**. This deficit not only explains the low level of digital adoption among Hungarian small businesses but also increasingly poses challenges for large Hungarian enterprises and multinational companies operating in Hungary.

This issue can be examined from various perspectives, with the DESI 2021 report highlighting the most significant gaps in human capital. However, by addressing the issue through the lenses of **training, labour market trends**, employer demands, and employee skills and attitudes, current limitations and potential intervention points can be effectively identified, such as:

- **reforming the education system** to ensure the acquisition of basic digital competencies;
- addressing the low participation in **adult education programmes** aimed at equipping a broader segment of society with essential digital skills;
- enhancing **IT and digital skills training**, promoting careers in IT and STEM fields, reducing dropout rates, and expanding the use of bootcamp training to respond to the anticipated increase in demand for IT professionals;
- **retaining workers** and alleviating shortages through retraining and **engaging workers who are less focused**—recent changes in working conditions and employee expectations, particularly during the pandemic, have made **retaining current staff** and increasing the participation of women and seniors in the workforce significant challenges in the current labour market, beyond the mere scarcity of IT professionals;
- **transforming the work environment and patterns**—future work culture and job roles will require new, attractive, and flexible work environments, with an emphasis on digital nomadism, where physical distance no longer limits employment, thus creating opportunities and competition for labour market participants;
- **digitising HR processes**—efficiency improvements and online solutions are anticipated in recruitment and administrative processes, making the digitisation of HR processes a necessary task for employers.

Considering the current situation and taking into account labour market trends and forecasts, numerous measures, development policy strategies, and interventions have been implemented at both national and EU levels. However, it is now evident that additional programmes are required, building on the lessons learned from previous projects, where the active participation of individuals, economic stakeholders, and the state is crucial.

Aligned with the goals of the EU's Digital Compass initiative¹, the overarching aim of the **Human Resources Pillar is to enhance the digital competency of the population and workforce, to ensure a readily available pool of highly skilled IT and digital professionals, and to strengthen the capacity to respond to labour market trends and challenges**. This is essential to ensure that the development of Hungary's digital economy and society is not impeded by low digital competence levels or a shortage of professionals.

Based on our situation analysis, **we propose the following areas for intervention:**

HUMAN RESOURCES		
EDUCATION AND TRAINING STRATEGY		
Renewing the education system - digital competence minimum	Digital competence development at primary and higher levels	IT and digital skills training
<ul style="list-style-type: none"> • Making DOS 2.0: Building on the experience gained from the DOS adopted five years ago, the goal is to create an educational system and pedagogical environment where students tackle problems both independently and collaboratively, using technology-driven tools. This approach involves a learning and skills development process supported by the teacher in a mentoring role, with a focus on empirical and practical reinforcement. 	<ul style="list-style-type: none"> • Introduction of a uniform DigKomp measurement and certification system • Communication, social sensitisation, motivation • Basic digital competence development in a voucher system • Advanced digital competence development with mixed (market/VT/VNT) funding • Encouraging SMEs to develop the digital skills of their employees • Development and operation of a labour market forecasting system • 	<ul style="list-style-type: none"> • "Program your future! 2030" programme • Training loan scheme for professionals with high level IT and digitalisation skills • Increasing the number of IT and digital professionals available to domestic businesses
LABOUR MARKET/EMPLOYMENT		
HR digitalisation	Jobs of the future	Attract and retain IT talent
<ul style="list-style-type: none"> • Policy lobbying • Communication, sensitisation, motivation: to increase openness to HR IT solutions, to demonstrate organisational integration and their positive impact on organisational processes and business 	<ul style="list-style-type: none"> • Establishment of a methodology centre for the dissemination of new technologies • Communication, sensitisation, motivation: reducing mistrust and increasing openness to part-time and teleworking in domestic companies 	<ul style="list-style-type: none"> • Developing and introducing measures to facilitate access to employment • Support for the recruitment of foreign workers • Increasing the number of female IT professionals and promoting their employment • Developing measures focusing on intergenerational challenges and labour market integration

Other proposals to be developed:

- Large-scale **STEM/ICT scholarship programme** in higher education;
- To **significantly increase participation rates in adult learning**
 - **central budget-supported training to remediate basic competences** in adult education, mainly in literacy, reading, reading comprehension, mathematics and digital literacy;
 - **Income tax allowance for employees** participating in training;
 - introduction of an **individual learning account (ILA)**;
 - **additional incentives** for rural workers and those in disadvantaged regions;
 - **state recognition of industrial qualifications**;
 - adding a **digital module** to **vocational education and training**;
- Application of **new economic, IT and data analysis methods** to forecast labour market needs; development of an **up-to-date occupational structure model**.

2. The importance of the area

The primary constraint on the development of Hungary's digital economy remains the **shortage of IT and digital professionals**. This deficit not only explains the low level of digital adoption among Hungarian small businesses but also increasingly poses challenges for large Hungarian enterprises and multinational companies operating in Hungary. The gap is exacerbated by **low levels of participation in adult learning**, which not only hinders the development of digital skills but also the acquisition of curricular professional knowledge, including digital solutions.

However, both the **willingness to engage in adult learning and the participation rates, along with the level of digital skills among domestic workers, are significantly lower than the EU average**. This indicates that without effective labour market interventions, **the proportion of jobs requiring advanced digital skills will continue to rise** on the demand side in the coming years, while the supply side will see a growing number of workers with skills falling short of market expectations, **thereby widening the skills gap**.

To address the persistent digital labour shortage, **it is essential to elevate the overall digital skill level of the population and small to medium-sized enterprises (SMEs)**. This is crucial not only for strengthening the ICT user base but also for providing the career guidance necessary to develop a digitally competent workforce. Equally vital is the need to **boost the willingness to participate in adult education** and to enhance the social acceptance of the concept of lifelong learning (LLL).

The low engagement in adult training **perpetuates the skills gap in the labour market**, compelling investors to choose between automation (which requires fewer but more digitally skilled workers) and relocating their operations, particularly in traditionally labour-intensive sectors.

Before the COVID-19 pandemic, employers—particularly capital rich large international firms — attempted to address the IT skills gap by **significantly raising wages**. However, this approach offers only a temporary fix, as it does not substitute for proper worker training and often leads to a loss of skilled labour from less competitive domestic micro, small, and medium-sized enterprises. Their digital development, and consequently both their own and the nation's long-term economic competitiveness, **are constrained by the insufficient supply and quality of digitally skilled workers**.

Thus, one of the most effective strategies to enhance the flexibility of the domestic labour market, to cultivate the professional knowledge and **skills demanded by the market**, and to **speed up the recovery from the economic downturn** brought about by COVID-19, is to make **training courses for acquiring and developing digital skills widely accessible**, to **raise awareness of the advantages of participating in adult learning**, and to promote engagement in such training.

A more skilled workforce and more competitive businesses can drive **competitiveness at the national level**. This was highlighted by a **macroeconomic analysis**² conducted by IVSZ, which estimates that the **swift adoption of new technologies** could lead to an annual GDP increase of nearly HUF 4 trillion within 3-5 years, representing almost 10% of Hungary's current GDP.

The **significance of this area was acknowledged by the EU and national governments years ago** when the **National Infocommunications Strategy (NIS)**, the **Digital Education Strategy (DOS)**, and the **Digital**

Workforce Programme (DWP) were established, though these initiatives have yet to be fully realised. In the overall strategies, digital competency was identified as a distinct pillar; however, this approach was not consistently reflected in the development policy programmes due to the separation between different Operational Programmes and resource types.

The experience gained from various schemes aimed at enhancing digital competency has demonstrated the necessity of providing **comprehensive social inclusion interventions** for disadvantaged individuals or those with other basic skills deficits. Without such support, improving digital literacy alone does not guarantee successful integration into the labour market.

Key EU and national strategic documents, development policy instruments

EU strategy papers	Hungarian strategy papers
<ul style="list-style-type: none"> • Europe 2020 Strategy • European Digital Agenda • DigComp 2.1: EU Digital Competence Reference Framework • New Skills Agenda for Europe • Upskilling Pathways • 2030 Digital Compass: the European way for the Digital Decade • The Digital Europe Programme 	<ul style="list-style-type: none"> • National Infocommunications Strategy (NIS) • Green Paper (2014-2020) • Digital National Development Programme (DNFP) • Digital Well-being Programme (DWP) • Digital Education Strategy (DOS) • Digital Workforce Programme (DWP) • DWP 2.0. • National Digitisation Strategy (NDS)
Development policy instruments (2014-20)	
<ul style="list-style-type: none"> • GINOP-3.3.1 Development of community internet access points and expansion of their service portfolio • GINOP-3.3.2 Encouraging the adoption of online government, public administration, and e-health services, along with the expansion of the Digital Wellbeing Programme • GINOP-3.3.3 Supporting the expansion of online government, public administration and e-health services and the Digital Wellbeing Programme by supporting national and local NGOs and professional organisations • GINOP-6.1.2 Developing digital skills for disadvantaged adults • GINOP-6.1.6 Support for on-the-job training for employees of micro, small and medium-sized enterprises • GINOP-3.1.1-VEKOP-15 Encouraging and supporting cooperation between educational institutions and ICT enterprises ("Program your future") 	

3. Identifying areas of intervention

Designing the human resource development needed for the balanced development of the digital ecosystem is a complex task, each of its elements requiring different approaches: it is necessary to find simultaneous solutions for the following:

- enhancing digital literacy for students at various levels within the **formal education system**.
- **engaging and motivating individuals who have been excluded from the digital world (bridging the digital divide)**.
- providing those with only basic digital skills with **relevant digital knowledge** for the labour market (up-skilling).

- **up-skilling** individuals who **already possess above-average digital skills** or work in engineering fields other than IT, and where necessary, **retraining** them as IT or digital professionals (re-skilling).
- increasing both the number and the skill set of **IT with programming skills and digital workers**, with a particular emphasis on raising the proportion of women with IT qualifications.

Accordingly, **we propose the following areas for intervention:**

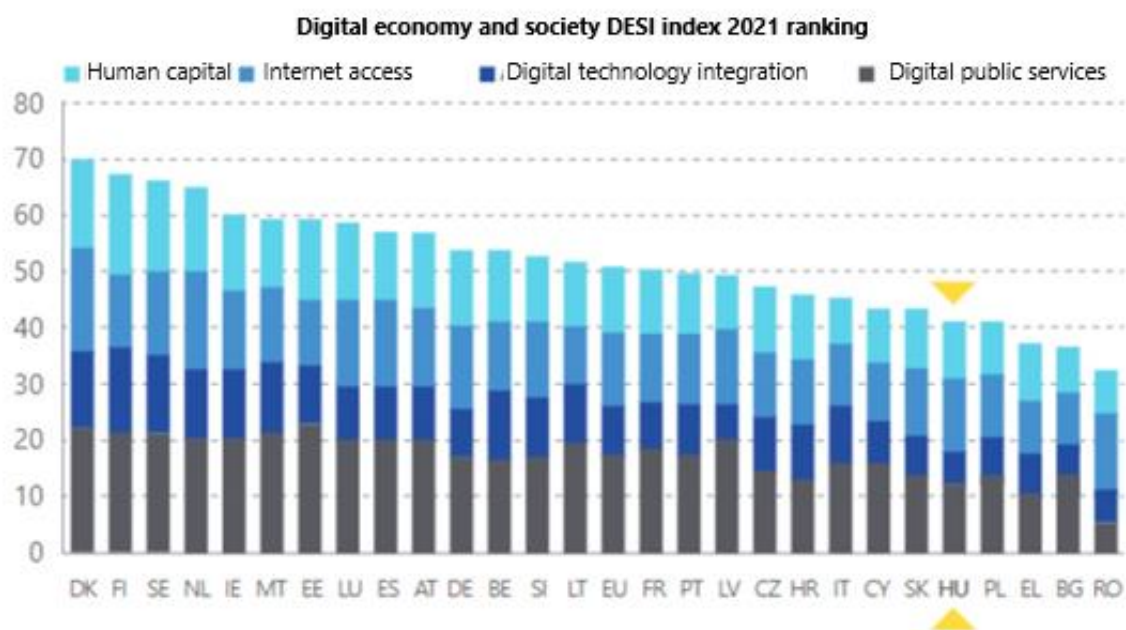


4. Methodology

The present discussion paper **summarises and, on certain points, further reflects** the analyses and proposals made by the staff and experts of the IVSZ in recent years on the subject of human resources. The aim of the document is to invite the members of the IVSZ, its professional partners, as well as the individuals, businesses, professional and social organisations that have joined the Manifesto, **to think together** about the human resource conditions for the development of the digital ecosystem in Hungary.

So, for now, the document only contains the IVSZ's assessment of the situation and its proposals, but we plan to produce **a final version as a result of a much broader professional and social consultation**. With the incorporation of the comments, additions and clarifications, we plan to have a package of policy proposals - covering all four pillars - ready by spring 2022, which will formulate a **clear conceptual position and operational proposals on all issues of importance to the membership of the IVSZ**. We want to present this in a single document to the next government responsible for digitalisation that will take office after the elections.

According to the DESI 2021 report published on 12 November 2021, Hungary has dropped two places overall (from 21st to 23rd) compared to the 2020 results.



Source: Digital Economy and Society Index (DESI) 2021 Hungary





Hungary's position in the "Human Capital" dimension, which measures the digital and IT readiness of the population and workers, has deteriorated even more, by 3 places.

	2014	2015	2016	2017	2018	2019	2020	2021
Overall DESI ranking	22.	21.	20.	23.	22.	22.	21.	23.
1. Internet access	20.	17.	16.	15.	14.	16.	7.	12.
2. Human capital	18.	15.	18.	18.	19.	20.	19.	22.
3. Digital technology integration	26.	25.	27.	24.	24.	24.	26.	26.
4. Digital public services	22.	24.	24.	27.	26.	26.	24.	25.

Source: DESI

In the realm of human capital, data indicates that the proportion of individuals with at least basic digital skills has remained stagnant for years and is still over 10% below the EU27 average. According to DESI data, based on Eurostat (and thereby indirectly on CSO), less than half (49%) of Hungary's population aged 16-74 possess basic digital skills, compared to an EU average of 56%.

Components of the DESI Human Capital Dimension

Human capital (25%)	DESI 2019 value 	DESI 2020 value 	DESI 2021 value 	DESI 2021 value 
DESI human capital dimension (22nd place)	42.1	41.8	40.5	47.1
1a1. At least basic digital skills (Percentage of individuals)	50%	49%	49%	56%
1a2. Digital skills above basic (Percentage of individuals)	26%	25%	25%	31%
1a3. At least basic software skills (Percentage of individuals)	52%	51%	51%	58%
1b1. ICT professionals (as a percentage of total employment)	3.6%	3.7%	3.8%	4.3%
1b2. Women ICT professionals (as a share of women in employment)	9%	11%	12%	19%
<i>1b3. Enterprises providing ICT training (as a percentage of Enterprises)</i>	<i>17%</i>	<i>16%</i>	<i>16%</i>	<i>20%</i>
1b4. ICT graduates (as a percentage of graduates)	4.3%	4.3%	4.9%	3.9%

Source: DESI (In the tables, the new indicators included in 2021 are shown in italics, with green background for those significantly better than the EU average and pale red background for those significantly worse).

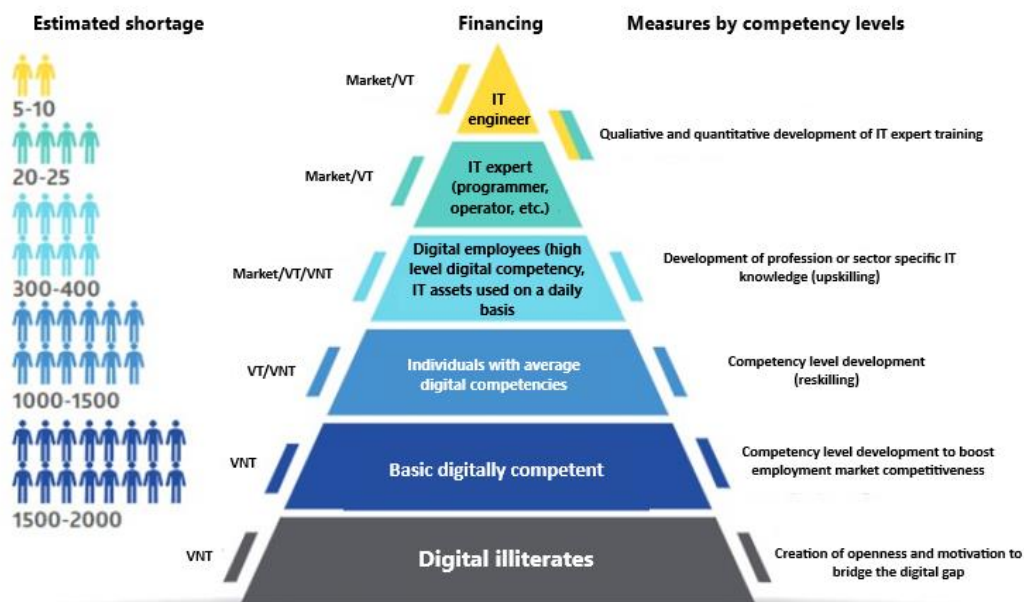
The gap is even greater, at almost 20%, **for the share of people with advanced digital skills**: the 25% share in Hungary has been stagnating for years (EU27 average: 31%). Combining the two indicators reveals that while 74% of Hungary's population aged 16-74 possess basic or higher digital skills, the EU average stands at 87%. In other words, Hungary's digital illiteracy rate of 26% is twice the EU average of 13%.

Hungary shows a significant gap in the proportion of employees with at least basic software skills, with a 7 percentage point difference (51% versus 58%). Additionally, the percentage of Hungarian enterprises offering ICT training to their employees is below average, at 16% compared to 20%.

Although the proportion of ICT graduates in Hungary has been better than the EU average for years, the percentage of ICT professionals (those with vocational or adult education and training beyond graduation) in total employment is lower than the EU average, as is the proportion of female ICT professionals. This suggests that while a significant number of Hungarian ICT professionals have tertiary education, many may be employed in roles that could be filled by less-skilled workers, though such positions are not available. Additionally, a high percentage of IT graduates are working abroad or for foreign companies from home, which further exacerbates the domestic labour shortage.

The picture presented by the DESI index is corroborated by IVSZ's own research and analyses conducted in recent years, with the findings summarised in the preceding figure. The figure shows the **digital skills levels that are relevant for the labour market** and the estimated shortages (training needs) associated with them. The figures displayed in the chart for each target group segment are **estimates derived from DESI data and various surveys**. At the top of the pyramid, **the shortage of IT engineers and IT professionals** could reach **44,000** in two years, according to the latest surveys (e.g. the labour market survey³ conducted under the umbrella of GINOP 3.1.1 "Program your future" project).

Dimensions of the digital skills gap



The number of **digital illiterates** (i.e., those who do not use digital tools and solutions) is estimated to be between 1.5 and 2 million. However, providing a more accurate figure is challenging due to variations in definitions and methodologies across different studies. Efforts should be made to transition as many of these individuals as possible into the "basic digitally competent" category. Additionally, at least 1 to 1.5 million people in this group should receive training to improve their digital literacy, as many currently use digital tools solely for watching videos or engaging with social media.

4.1 Renewing the education system - digital competence minimum

There is a growing demand on the labour market for workers with IT and high digital skills. However, an increasing proportion of workers with no (or insufficient) digital skills are **working in repetitive, monotonous jobs or are being used to service robots and automated production technologies and feed production lines, which are becoming more common in such jobs**. Workers in low value-added jobs face significant vulnerability, with those lacking digital skills facing increasingly bleak prospects if they lose their employment. This situation necessitates urgent and substantial educational reform, **as traditional 20th-century teaching methods are inadequate for preparing students for the 21st-century job market**.

A crucial driver of economic growth is the ongoing expansion of capacity, which, with the advent of advanced manufacturing processes, is increasingly achieved cost-effectively through automation and robotisation. This shift demands workers with advanced digital skills and competencies. Innovation also plays a vital role in economic growth, and the introduction of new services and products necessitates entirely new skill sets, including creativity, teamwork, emotional intelligence, critical thinking, a scientific approach, complex problem-solving, entrepreneurial spirit, and digital proficiency. Addressing the evolving demands of the labour market requires a comprehensive reform of the education system, encompassing both its content and methodologies.

The **subject of "digital culture," introduced under the National Core Curriculum (NAT), much like the "informatics" subject introduced over the past 20 years, is inadequate**—both in terms of lesson frequency and content—to equip young people with the digital skills necessary for the labour market or to adapt to the rapidly evolving forms of employment (such as self-employment, digital nomadism, remote working, and portfolio careers).

Although there **have been some notable improvements in certain areas since the adoption of the Digital Education Strategy (DOS) in 2016** — particularly in digital infrastructure, thanks to the **StudentNet programme** aimed at enhancing bandwidth and WiFi connectivity in educational institutions — **the systematic and consistent implementation of the DOS has fallen behind.**

- There is no expectation for digital competency to be an output requirement at various stages of education.
- Due to the lack of proper methodological training and ongoing support (e.g., digital teaching assistants), developments in digital tools have either gone unused or have merely led to the digitisation of traditional teaching methods without any significant impact on the development of digital competences.
- Without a standardised assessment of the digital competence development capacity of educational institutions or a clear definition of their digital maturity, neither the institutions nor their owners are aware of what needs to be improved and where.
- **Digital pedagogical methodologies** have not been effectively communicated or disseminated. This may be partly because distance education, introduced during the COVID-19 lockdowns, was mistakenly equated with digital education by both policymakers and educational authorities.
- **The restriction of educational content to digital and paper-based formats**, coupled with efforts to "protect" learners from sources other than centrally provided materials, severely undermines their ability to evaluate various sources, think critically, and make informed choices—skills that are increasingly crucial in the job market.
- There is a complete **lack of support for the digital functioning of educational institutions, including predictable resources and administrative and operational assistance.**
- There is also a notable **absence of open learning spaces and methods that complement traditional classroom teaching**, which are essential for developing students' communication and teamwork skills and for supporting independent learning.
- **Digital platforms for learning, educational management, and communication with parents are not user-friendly.**
- Furthermore, the absence of an open standard for interoperability between digital education systems prevents integration and connectivity among different systems, limiting choices and significantly diminishing the quality of services provided.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Digital Education Strategy (DOS) adopted since 2016, • Full Internet coverage, high WiFi institutional coverage in education and training institutions • Thanks to the Sulinet and StudentNet programmes, the digital infrastructure and the equipment of domestic schools have improved • NAT includes content regulation for the acquisition of high level digital skills • Distance learning solutions introduced by COVID-19 have introduced many teachers to the use of digital tools, teaching materials and pedagogical methods • Clean Software Programme 	<ul style="list-style-type: none"> • Implementation of the DOS is partial and stuttering, with improvements often deviating significantly from the original objectives; • Schools do not have sufficient modern digital equipment, replacement of obsolete equipment is ad hoc, and not systematically ensured • In public education, digital competences are not sufficiently developed across subjects outside of digital culture, as these skills are either not included at all or only to a limited extent in the output requirements. • Teachers are not digitally literate enough, and the distance learning solutions introduced during COVID-19 have given many the misconception that this is what digital education is - and they don't want it • Low percentage of independent IT activities, programming appears almost satisfactory • The IT teaching profession is not popular and competitive enough, with a shortage of teachers who can teach professionally
Options	Dangers
<ul style="list-style-type: none"> • Expand existing digital education and skills development programmes and best practices • Consistent implementation of DOS (or a revised DOS 2.0) will greatly enhance the state of digital education within the country • Promoting digital literacy throughout all levels of education can significantly boost labour market capacity 	<ul style="list-style-type: none"> • The limited adoption of digital solutions in public education is primarily due to resistance from teachers and students • Insufficient support, such as a lack of equipment, impedes the shift towards effective digital education • A significant amount of aid is misdirected from its intended purpose by organisations and/or companies seeking to exploit it for financial gain • The lack of ICT development in public education, vocational training, and higher education leads to disadvantages in the labour market and competitive challenges for individuals, businesses, and the state

4.2 Digital competence development at primary and higher levels

Currently, a **major barrier to the development of the digital ecosystem in Hungary is the deficiency of digital skills within the workforce**. This issue arises not only from the high number of citizens—often elderly, rural, inactive, or of lower socio-economic status—who still do not use digital tools and services, but also from the fact that a substantial portion of those who do use digital services at a basic level are primarily engaged with social media, video chatting, and gaming. Consequently, they do not utilise higher value-added digital services and lack the competences required to actively participate in the digital economy.

As can be seen from the DESI data in chapter 3.1, Hungary lags significantly behind the EU average in both basic and high-level digital skills, as well as in basic software skills. Previous research on the reasons for the gap among the groups concerned has shown that it is not just motivational: **often lack the necessary basic skills** (e.g. reading, reading comprehension, numeracy).

The deficiency in basic skills **also affects participation rates in adult learning programmes, particularly among low-skilled groups, which fall below** both the continental average and that of most regional countries. A significant concern is that **most employers do not regard continuous skill development as essential**, nor do they see it as a fundamental requirement for enhancing competitiveness.

HR managers are also at fault, as they often fail to promptly report skills gaps to management or advocate for the introduction of training programmes to enhance the digital and other skills of their employees.

The government recognised years ago that the shortage of a digital workforce poses a threat to competitiveness. In response, the **Digital Workforce Programme (DMP⁴)** was published on kormany.hu in 2018. **The DWP** has precisely defined the improvements that **would prepare the whole labour market system to meet the changing labour market needs of the digital economy**, from the training system to the development of digital competences, including the incentive and anticipation system to the certification of skills acquired.

Some aspects of the Digital Workforce Programme (DWP) have been included over the past three years in official government strategy documents (such as VET 4.0, Sector Skills Councils, and VET Innovation Council papers), as well as in Ministry of Innovation and Technology (MoIT) documents and measures (including VET 4.0, the National Digitalisation Strategy, and the new Adult Education Act). However, the comprehensive framework and full implementation of the interventions originally proposed by the DWP and developed over the past two to three years to support its main objectives are still incomplete.

Since the DWP was created, several technological advancements have occurred, which could expedite the evolution of labour market needs. This has led to an increase in the number of workers entering the job market who, despite their numbers, face growing difficulties in securing employment due to insufficient digital and other skills.

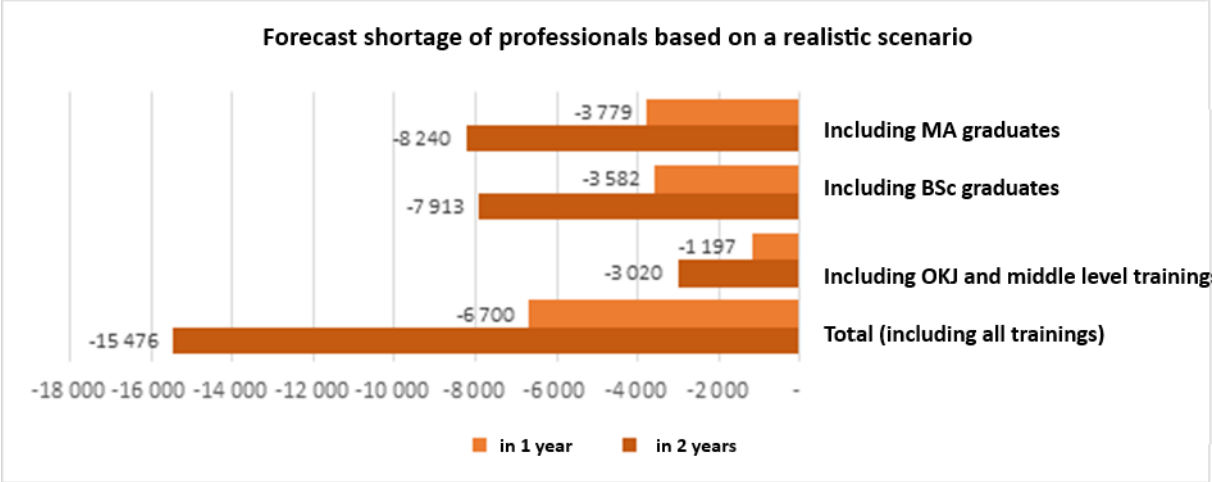
Strengths	Weaknesses
<ul style="list-style-type: none"> • High internet usage among individuals aged 16-50 • Legal framework for the Digital Competence Framework (DigKomp) has been adopted and development has commenced • The DWP Network, managed by the Digital Wellbeing Coordination Centre (DWCC), now has nationwide coverage • - There is a growing number of e-learning and further training courses across various sectors, including public administration, education, and corporate training 	<ul style="list-style-type: none"> • Digital illiteracy rates are significantly higher than the EU average • The proportion of individuals who have never used the internet and those who are digitally illiterate is notably high among disadvantaged groups • Basic internet users mainly engage with social media and video calls • There is no comprehensive, systemic approach to digital literacy, and current practices fail to reach disadvantaged individuals • Awareness of and willingness to participate in adult learning programmes is low • The uptake and visibility of digital literacy programmes remain limited • Priority projects have minimal impact on the target audience, high administrative costs, and excessive bureaucracy
Options	Dangers
<ul style="list-style-type: none"> • The pandemic has prompted many who previously avoided digitalisation to recognise the need for digital skills development • Expanding and enhancing IKER programmes and introducing DigKomp (self-assessment and examination system) is expected to boost interest in training • Widespread (free) digital literacy programmes could help lower the rate of digital illiteracy and increase the number of people with advanced digital skills • Further growth of the DWP Network and increased visibility of DWP Points will engage and motivate non-internet users • Market participants are increasingly involved in advancing digital literacy through public-private partnerships 	<ul style="list-style-type: none"> • The high number of digital illiterates imposes a significant economic burden on society • Individuals over 50 often remain digitally illiterate, which severely impacts their employment prospects • Insufficient digital skills development exacerbates the exclusion of disadvantaged groups and hinders their integration into the labour market • The pace of workplace digitalisation is outstripping the training available for the digital workforce • A significant amount of aid is misdirected from its intended purpose by organisations and/or companies seeking to exploit it for financial gain

4.3 IT and digital skills training

As part of the GINOP 3.1.1 flagship project⁵ ("**Program your future**"), several recent studies have been conducted to investigate the alignment or discrepancies between the IT skills possessed by employees and those demanded by employers. The research indicates a **substantial potential increase in skill**

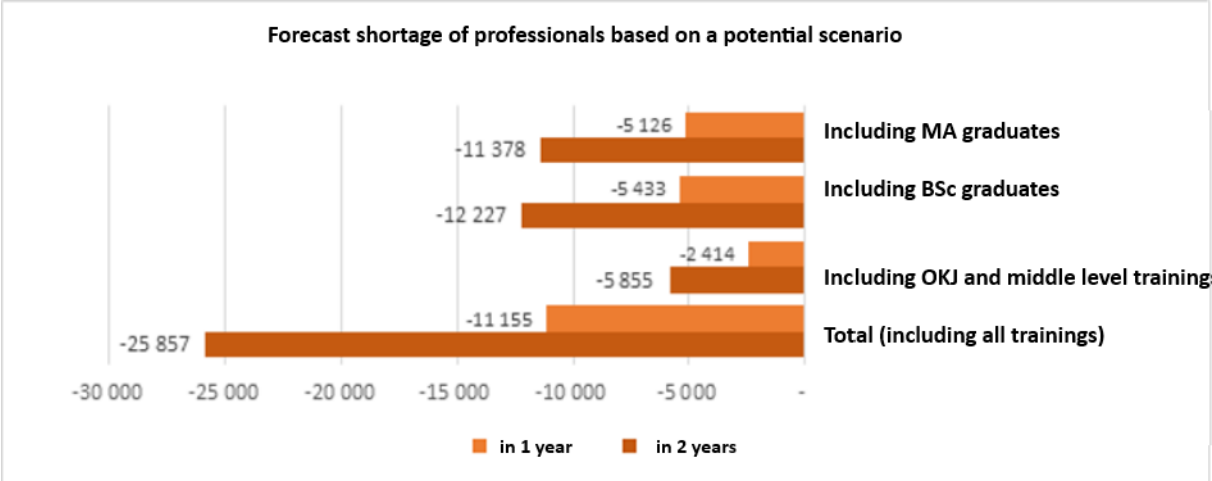
shortages within both vocational education and training and higher education (bachelor's and master's degrees). This conclusion is drawn from both a realistic scenario based on current trends and a potential scenario that assumes a technology-driven economic turnaround.

IT skills shortage (realistic scenario)



Source: eNET labour market research

IT skills shortage (potential scenario)



Source: eNET labour market research

Main findings of the research:

- **Labour shortage:** In a potential scenario where the industry develops dynamically, failing to implement significant improvements in the training system could lead to an increase in the gap between supply and demand for IT workers. This shortfall could exceed 11,000 within a year and more than 25,000 within two years.
- **Varied educational requirements:** The current labour shortages in the IT sector have spurred a demand for bootcamp-style training. This approach can address specific labour market needs for certain roles more quickly and affordably than expanding higher education provisions, which would be both slow and costly. However, it's crucial to recognise that bootcamp training and higher education offer fundamentally different theoretical knowledge and skill sets. Short, targeted training courses can also serve as a pathway to higher education, highlighting that some knowledge and skills from bachelor's and master's courses may become outdated or irrelevant.
- **Attrition:** The skills shortage is exacerbated by the high drop-out rates in higher education. This issue stems from inadequacies in the preparatory capabilities of public education, unmet training expectations, and the early absorption of students into a labour market already struggling with a shortage of workers.
- **Skilled workers' choices:** the research identifies risks not only on the training side, but also on the retention of skilled IT professionals (26% of respondents were considering leaving their careers and a third were thinking of working abroad).
- **Macro-effects:** significant mismatches between the supply and demand sides have a major impact on competitiveness at both the national economy and the firm level. It is important to underline that this should not be interpreted as a reduction in the efficiency of the IT sector, but as a restraining force for the whole economy due to the lack of digital competences/basic skills.
- The strong demand for **BProf graduates**⁶ with a three-year bachelor's degree and the swift adoption of **graduates from bootcamp programming schools**⁷ both suggest that the market is facing an increasing need for IT professionals with diverse qualifications.

Strengths	Weaknesses
<ul style="list-style-type: none"> • The existence of higher education institutions of international quality • Increasing enrolments in IT fields; • The share of IT graduates is high; • the ICT sector and the digital economy make a high contribution to gross value added (GVA) at the national economy level, which promises a secure long-term livelihood for IT professionals • a growing and expanding number of bootcamp schools/training courses 	<ul style="list-style-type: none"> • a significant and growing shortage of IT and digital skills (both quantitative and qualitative) • high (but decreasing) drop-out rates in IT courses • low proportion of female IT professionals • high out-migration of IT professionals (both physical and digital nomadic) • little interdisciplinary training in other fields of study, including IT
Options	Dangers

<ul style="list-style-type: none"> • reducing early school leaving • the significant increase in interest in IT and digital training among young people will allow an increase in the number of participants in IT education/training • reducing emigration, attracting IT professionals working abroad/abroad; • attracting foreign digital nomad workers to Hungary (physical or virtual) • free, online, high-quality IT training for mothers with young children, which will help reduce the shortage of IT professionals; 	<ul style="list-style-type: none"> • a lack of IT specialists, engineers, technicians and skilled workers with network skills to implement digitalisation developments and operate communications networks, which leads to a backlog of developments • further increase in early school leavers and/or migration of IT professionals abroad (in particular as a result of the growth of digital nomadic employment opportunities)
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4.4 HR digitalisation

The pandemic and global crisis caused by COVID-19, as well as changing employment trends, have further accelerated the digitalisation of HR and made it a necessity. The most digitised areas are payroll, employee data management, labour administration, time and absence records, and HR administration in general. HR BI (business intelligence) is the least used HR digital area, and the use of data-driven HR analytics is not yet widespread.

Deloitte's Digital HR 2021¹⁸ research has highlighted that a wave of HR IT development can be expected in 2022, regardless of size, industry and digital HR maturity among domestic companies.

Deloitte's research reveals a clear correlation between an organisation's size and its use of HR IT systems: 57% of small companies, 86% of medium-sized companies, and 98% of large companies utilise these systems. The study indicates a notable increase in HR IT investment across all types of companies. The primary challenges identified in implementing and developing these systems include organisational culture, resistance from employees, shortages of skills and resources, and integration with corporate governance systems.

4.5 Jobs of the future

Main trends in expected labour market changes, regardless of sector⁹

In 2019, the greatest threat to labour market stability was posed by automation. The onset of the pandemic over the past two years has further disrupted employment and accelerated changes within the labour market. Many companies have transitioned to **remote work**, which has considerably reduced physical presence and face-to-face interactions. Post-pandemic, it is unlikely that there will be a return to pre-pandemic norms; instead, a shift to a "new normal" is anticipated, characterised by **hybrid working, teleworking, and part-time arrangements as standard practices**.

Hungary is significantly behind the EU average in terms of part-time and remote work employment. There is a pressing need for substantial intervention to bring the domestic rate of 4.8% closer to the EU average of 18%. However, many managers remain uncertain about the productivity of their hybrid or remote employees. Companies with prior experience in remote work had established practices to maintain community and ensure effective communication. In contrast, organisations new to teleworking face substantial challenges in these areas.

4.6 Attract and retain IT talent

The growing mismatch between supply and demand in the IT labour market is compelling employers to explore new labour market groups that were previously not considered.

4.6.1 Employment of foreign workers

With the free movement of labour within the EU, it is crucial to understand the measures each Member State is implementing to attract professionals both from within and outside the EU. In this context, it is also positive that the Government has introduced two measures in 2021 aimed at addressing the digital skills shortage affecting all sectors and increasingly impacting the competitiveness of domestic businesses.

Government Decision 1516/2021 (dated 29 July 2021), which is set to come into effect in September 2021, **aims to enhance the employability of non-EEA workers**. Additionally, Government Decision 1516/2021 (dated 29 July 2021) **addresses the regulation of digital nomads residing in Hungary**. Both decisions reflect that the Government and **businesses have acknowledged that the shortage of digitally proficient workers skilled in advanced technologies has become a major constraint on the digital economy—and consequently on the competitiveness of the national economy**.

4.6.2 Labour market reserves

With approximately 8 million ICT professionals in the EU labour market, and only about 17% of them experiencing average growth, boosting their numbers in the ICT sector could significantly alleviate the talent shortage across Europe. The ICT sector requires highly skilled professionals, and since the proportion of women in higher education is typically very high, retraining them is not an obstacle. Attracting women, who are notably underrepresented in the IT field, is increasingly becoming a focus in companies' strategies. Rather than individual workplaces simply making efforts to accommodate women by offering specific work schedules, there is a growing emphasis on broader initiatives to attract female IT professionals. Tailoring working hours to meet the needs of female employees, providing flexible access to development programmes and training, can enhance job satisfaction and loyalty among female workers.

5. Vision and goals

5.1 Comprehensive vision

Aligned with the objectives of the EU's Digital Compass initiative¹⁰, the primary goal of the **Human Resources pillar is to enhance the digital literacy of both the general population and workers**, and to ensure the **availability of a highly skilled IT and digital workforce**. This is crucial to prevent the advancement of Hungary's digital economy and society from being obstructed by insufficient digital skills or a lack of professionals.

This goal is reinforced by several factors:

- The businesses and economies poised to thrive in the coming decades will be those that remain at the **cutting edge of technological advancements**, leveraging the **innovative potential of digital technologies**.
- The COVID-19 pandemic has highlighted that the widespread adoption of digital technologies is vital for enhancing the **resilience of individual economies**.
- In various sectors, repetitive and monotonous tasks are **increasingly being replaced by automated and robotised processes**, as well as Industry 4.0 solutions. This shift **requires workers to adeptly use digital tools and collaborate effectively**.
- Jobs lost to digitalisation are being replaced by new or emerging roles. Transitioning individuals displaced by automation into these new roles is possible only if they are adequately prepared.

- There is a **growing shortage of workers with IT and advanced digital skills**, as well as the **ability to work collaboratively in teams**.
- Effective use of digital solutions can **help mitigate the disadvantages faced by social groups at risk of exclusion**, though digital exclusion can also exacerbate social exclusion and make it more permanent.

5.2 Renewing the education system – digital competence minimum

Digitalisation is fundamentally **altering the structure of the economy**, the **nature of professions**, and the **range of skills needed in the labour market**. These changes necessitate an **education system that updates the content, methods, and technologies of education and training to align with labour market demands**.

The **distance learning solutions implemented during the pandemic cannot substitute for comprehensive digital reforms across all aspects of the education system**. Moreover, merely providing students and teachers with digital tools does not replace the need for new educational approaches based on digital pedagogies, collaboration, and critical thinking.

The **enduring shortfall** in digital competences compared to international standards, and the need to secure a **workforce that is digitally prepared**—vital for the competitiveness of the Hungarian economy—can only be addressed through a **consistent and effective digital transformation** that encompasses every segment of the education system.

International (OECD PISA, WEF, PWC, etc.) and domestic research and surveys show that the public education system should strengthen the development of the following competences in particular, in addition to the transfer of knowledge:

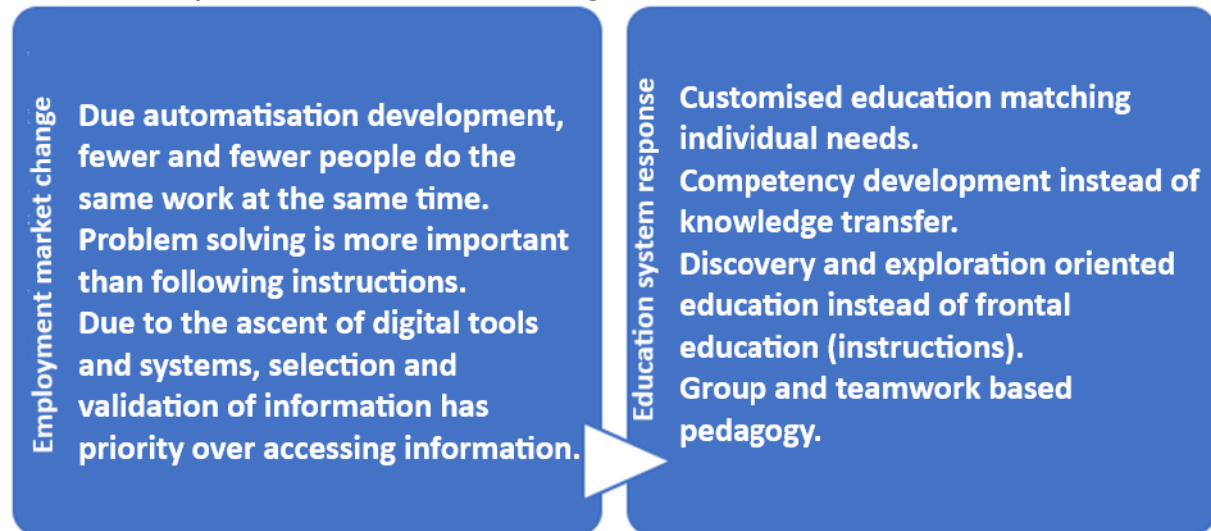
- complex problem solving,
- creativity and innovation,
- communication, teamwork and empathy,
- digital competency,
- critical approach.

There is also a need to enhance the development of fundamental skills, specifically reading, reading comprehension, and mathematics, where underachievement is consistently rising even when compared to national basic and minimum standards. To address this, these skills must be measurable and incorporated into the outcome requirements, and pedagogical approaches should be provided to ensure these competencies can be effectively developed, such as:

- project pedagogy and group work,
- learning through discovery and experience,
- the use of epochal activities with an interdisciplinary approach,
- open learning spaces to support education outside the classroom,
- integrating digital technology into all stages of learning.

Advances in digital technology are having a major impact on information management, **fundamentally changing the perception of single-channel, pre-controlled knowledge transfer** as an unrealistic situation that no longer exists in real life. Students should be prepared to be able to process and understand new, unfamiliar problems and to generate new methods and knowledge to solve them.

Educational responses to labour market challenges



In line with the envisioned goals, **the education system is progressively evolving towards a pedagogical environment where:**

- **Technology-intensive tools** are employed
- in the learning and competence development process, with **teachers acting as mentors**
- while **students tackle problems independently and collaboratively**
- supported by **empirical and practical reinforcement**.

This necessitates revising the objectives outlined in the Digital Education Strategy (DOS) and promptly preparing a DOS 2.0 document. This should align with the EU Digital Education Action Plan (EUDEAP)¹¹ objectives and consider updates to the Higher Education Curriculum Committee (HECC)¹² recommendations, focusing at least on the following areas:

- The further enhancement of educational institutions' **digital infrastructure** should ensure that issues related to insufficient bandwidth or inadequate in-building WiFi capacity do not hinder the widespread adoption of digital pedagogical methodologies (e.g., institutional bandwidth of at least 1 Gbps for more than 100 students; at least 5 Mbps per student on WiFi).
- The focus of **digital facilities** in schools should transition from traditional PC and laptop computer labs to digital community workshops and hands-on experiences with modern technologies (e.g., 5G, AI, 3D printing, robot programming, drones). Every student should be provided with their own device (tablet or laptop) to access and connect to digital learning materials and resources from Grade 5 onwards. Each institution should also have a creative education workshop equipped with at least four 3D printers, a laser cutter, and 32 microcontrollers for every 400 students.
- The widespread adoption of BYOD (**bring your own device**) in education, coupled with the need to establish a Device as a Service (DaaS) scheme for loan or rental of devices to families in need.

- **teachers** should be encouraged as much as possible to develop **their digital competences** (free training as hours worked, DigKomp levels as incentives or progression conditions in the career model, etc.)
- organise in-service training for teachers with the appropriate digital competences, including study visits abroad and six-month study breaks, in order to **acquire digital pedagogical methodologies**;
- Review the expectations of the National Core Curriculum (NAT) across all subject areas from a digital education perspective to ensure the effective use of digital learning materials and methodologies.
- **Assess and update existing digital curricula** to meet the requirements of the digital age (e.g., usability, interactivity, support for group work) and align them with international best practices. Develop new curricula as needed, avoiding the need for printed versions.
- Initiate **widespread training for digital teaching assistants** to support educators both in and outside the classroom. In the absence of digital teaching assistants, the digital pedagogical efforts of teachers can be augmented by the **voluntary contributions of senior students**.
- **Enhance the competitiveness of the digital education solutions (EdTech) market**, which is one of the fastest-growing sectors globally for digital tool and technology development.
- **Replace current digital platforms for education administration and parental contact with solutions that adhere to open standards**, allowing for integration with external systems and applications (e.g., payment systems, collaboration platforms).
- Ensure that **education administration systems can comprehensively track educational careers and link them to labour market and taxation systems**, strictly for statistical and planning purposes.

5.3 Digital competence development at primary and higher levels

In this area, the proposed interventions aim to involve different population groups (elderly, disadvantaged, etc.) and to continuously develop the digital competences and user awareness of employees

- **engaging and motivating individuals who have been excluded from the digital world (bridging the digital divide)**;
- providing those with only basic digital skills with **relevant digital knowledge** for the labour market (up-skilling);
- Encourage businesses to develop the **digital skills of their employees** and deepen their IT knowledge.

It is clear from international and national research and experience, as well as from the DESI index, that **the development of digital competences is a complex task, each of its elements requiring different approaches**. To this end, it is essential to make digital competence measurable, accountable and certifiable, and the **DigKomp framework** is an accepted tool for this.

In line with the above, we propose the following main objectives for competence development:

- **achieving measurable improvement in the DESI human capital dimension**: by 2025, the Hungarian value should not be in the bottom third of the list (move up from 22nd in the 2021 report to at least 17th);
- **accelerate the development of the DigKomp framework**, adopting and using **reference frameworks** for general and specific professional groups (e.g. teachers, civil servants, etc.) by the end of 2022;
- **reduce the proportion of digital illiterates**: the proportion of 16-74 year olds not using the internet should fall below 10% by 2025, from over 20% today);

- **increase the share of people with at least basic digital skills** (from 49% of individuals aged 16-74 today to 58% by 2025);
- **increasing the share of people with digital skills above basic** (from 25% of individuals aged 16-74 to 32% by 2025);
- **increase the proportion of people with at least basic software skills** (from 51% of individuals aged 16-74 today to 60% by 2025);
- **increase the share of enterprises providing ICT training to their employees** (from 16% to 25% of SMEs with more than 10 employees by 2025);

5.4 IT and digital skills training

The primary goal in this area is to address the substantial and continuing shortage of IT and digital skills by increasing the number of **workers with programming and IT expertise and enhancing their professional abilities**, with a particular emphasis on boosting the proportion of women with IT qualifications.

For this purpose, we propose the following targets to be achieved by 2025:

- increase the proportion of applicants in IT and related interdisciplinary fields of study (from 17.7% to 20% at BsC level and from 7.1% to 10% at MsC level)
- increase the proportion of graduates in IT and related interdisciplinary fields from an average annual growth rate of 5.5 percentage points between 2010 and 2020 to 10 percentage points per year
- reduce the drop-out rate in IT and related interdisciplinary fields from 41.86% in 2020 to below 30%
- boost enrolments in IT vocational secondary schools and technical schools
- enhance enrolments in IT and digitalisation training for adults, such as bootcamp schools
- mandate the inclusion of digital competence development and digital skills training for non-IT professions
- expand upskilling or reskilling opportunities for individuals with high digital competencies or those with engineering backgrounds in other disciplines
- increase the proportion of ICT professionals to 4.5% of total employment by 2025, up from 3.8% currently
- raise the percentage of female ICT professionals to 18% by 2025, from the current 12%
- increase the proportion of ICT graduates to 5.5% by 2025, up from 4.9% today

5.5 HR digitalisation

The proliferation of hybrid and teleworking has led to an increasing need for digitisation of HR processes and remote access to HR systems. Priority processes for improvement:

- effectively integrating new employees into the organisation,
- internal communication,
- performance management,
- assessment and development of
- employee engagement, satisfaction and opinion
- internal training,
- and the improvement of recruitment processes, one of the first areas to go digital in the wake of the pandemic.

At the same time, areas that have been falling behind can be incorporated into future developments, such as HR business intelligence, talent management, and change management.

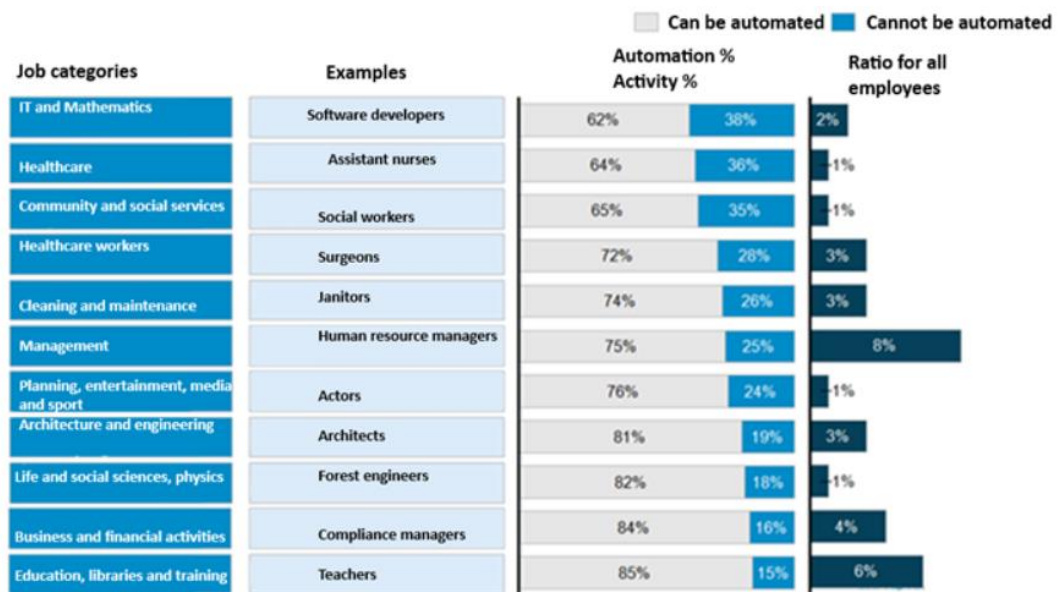
The importance of these areas is underscored by the ongoing transformation of the labour market. According to **Deloitte's Digital HR 2021**¹³ research, while only 58 percent of small businesses are

preparing to adopt more flexible working arrangements as the pandemic subsides, the figure exceeds 92 percent for medium-sized companies. This shift also promotes digital transformation within organisations. The research indicates that organisations with some form of HR IT system are more inclined to embrace flexible working compared to those lacking such support.

5.6 Jobs of the future

Cloud computing, big data, and e-commerce continue to be the primary focus for companies, consistent with trends from previous years. Additionally, there is a significant rise in interest towards encryption, non-humanoid robots, and AI-driven solutions. These emerging technologies are driving demand for new job types and skills. The necessity and advantage of human labour will increasingly be seen in tasks where humans retain their unique strengths: advisory roles, decision-making, management, reasoning, communication, and interaction.

While many entirely new jobs are being created, existing job roles and the skills needed for them are also evolving. The future job market will favour individuals who are adaptable and willing to shift from their original professions to meet emerging demands. Over the next few years, rapid digital transformation is expected to bring even more profound changes to the workplace. Industry experts project that by 2030, over 20% of workers—approximately 800 million people globally—could lose their jobs due to automation and robotisation. For this reason, it is also **vital** to carry out the urgent intervention proposals outlined in the human capital section of the Education and Training Strategy.



Technical automation potential of jobs

Source: GINOP 5.3.5 project

Based on research conducted by IVSZ as part of GINOP 5.3.5, it can be inferred that 5% of enterprises have been the primary drivers of productivity growth since 2000. In contrast, the remaining 95% of enterprises have experienced only modest productivity improvements, with efficiency gains of less than 1% since 2000. The current wave of digitalisation could serve as a new catalyst for development: the widespread adoption of digital technologies and automation is transforming the nature of work and necessitating new knowledge and skills from employees. This shift is supported by the explosion of data, increased automation, and the ongoing reduction in the cost of technology¹⁵. However, the impact of digitalisation varies across industries, and while not all sectors are affected equally, the ICT sector is also undergoing this transformation. A significant aspect of this change is the rise of low-code and no-code software development platforms. Software development is no longer solely within the IT sector but has become a crucial part of the business sector as well. With a shortage of IT developers, companies are exploring alternative technology solutions. The low-code approach is increasingly attracting attention from companies aiming to accelerate their digitalisation and modernisation efforts.

According to a recent TechRepublic survey¹⁶, the main advantage of low-code and no-code (LCNC) platforms is enhanced productivity (15%), followed by reduced application development time (14%), automation of manual processes (12%), increased business process automation (11%), and simplified workflows (10%).

Most survey respondents (67%) do not believe that the rise of low-code or no-code platforms will result in fewer developer jobs. However, 16% of respondents think otherwise. The primary reasons given were that developers are unable to respond swiftly enough to rapidly changing market conditions and opportunities, and that developers might feel undervalued and leave their positions rather than work on these platforms.

5.7 Attract and retain IT talent

In recent years, IVSZ has frequently highlighted the critical labour shortage and has been involved in various initiatives designed to address this issue. The organisation has participated in programmes like the GINOP 3.1.1 "Program your future" initiative and supported ICT companies through the GINOP 5.3.5 projects for organisational development.

5.7.3 Employment of foreign workers

By easing the entry of foreign workers and digital nomads into Hungary, we can address the severe labour shortage and make Hungarian and international start-ups—particularly those integrating advanced technology with high digital skills—more appealing for establishment or expansion in the country. The introduction of the "white card" for digital nomads by the government from 1 January 2022 is a positive step, but domestic companies also need the option to hire foreign IT professionals to fill workforce gaps.

5.7.4 Women in IT

Increasing the proportion of women in the IT sector could enhance their access to higher-paying roles compared to those in traditionally female-dominated professions, potentially reducing the gender pay gap over time. Currently, we are conducting an IVSZ survey titled "FemInTech," the results of which will inform the development of targeted programmes aimed at attracting and retaining female talent. Our survey indicates that female IT professionals in Hungary are most likely to find careers in international companies, where efforts to support and advance women are already in place. Additionally, our research highlights the importance of facilitating the return of women with young children to the workforce, such as by promoting flexible and non-traditional employment arrangements.

5.7.5 Generation management

By 2050, one in two workers is expected to be over 50, a group of active workers whose needs are rarely addressed by employers and are not served at the infrastructure or process level. The IT sector is mainly young people, but Generation X (45-55) professionals are present in the market in significant numbers and will increase significantly as the age pyramid evolves. Retaining them not only reduces the sector's labour shortage, but is also in the social and economic interest.

6. Proposals

6.1 Comprehensive, systemic proposals

Based on the findings of the situation analysis, **our starting point is the need for interventions across all levels of the system to enhance digital competences.** Whether within the education system, among the currently inactive, or those in employment, there is no social group where continuous learning is not warranted, nor where a significant gap does not exist—both in comparison to the EU average and to labour market expectations.

However, fully financing such a large volume of aid programmes through **both domestic and EU sources would be challenging.** Therefore, we propose to **allocate significant, non-refundable grant aid only to areas where market-based (co-)financing is not a viable option.** These areas include digitising education, integrating the **digitally illiterate** into the digital realm, and enhancing the knowledge of those with only **basic digital competencies.**

For specific target groups (e.g., disadvantaged individuals, NEET youth, and those needing training to address skills gaps), it is worth considering the inclusion of a non-repayable support element alongside financial instruments (e.g., loan forgiveness, interest rate subsidies) **for higher levels of digital competence development or even IT vocational training.**

When **employers and market actors recognise the need to enhance the digital skills** and IT literacy of their current or prospective employees, we **propose that the financial responsibility and training risks be distributed among the stakeholders (trainees, trainers, employers, and government)**. This is because all these parties stand to gain from the training. This approach is particularly applicable to **high-level digital and IT training for adults, such as bootcamps**, which are especially pertinent to the labour market.

We believe that digital competency development requires **a new type of programme that reaches more stakeholders than ever before**. In terms of funding, this could involve the introduction of a "digital training voucher" (or a "digital training account" serving a similar purpose) for non-reimbursable schemes, which would enable **demand-driven funding for various types of programmes and training**. For **repayable subsidies** (such as loans), the voucher could facilitate access to commercial bank loans with a state guarantee.

These vouchers could be distributed to individuals in several ways:

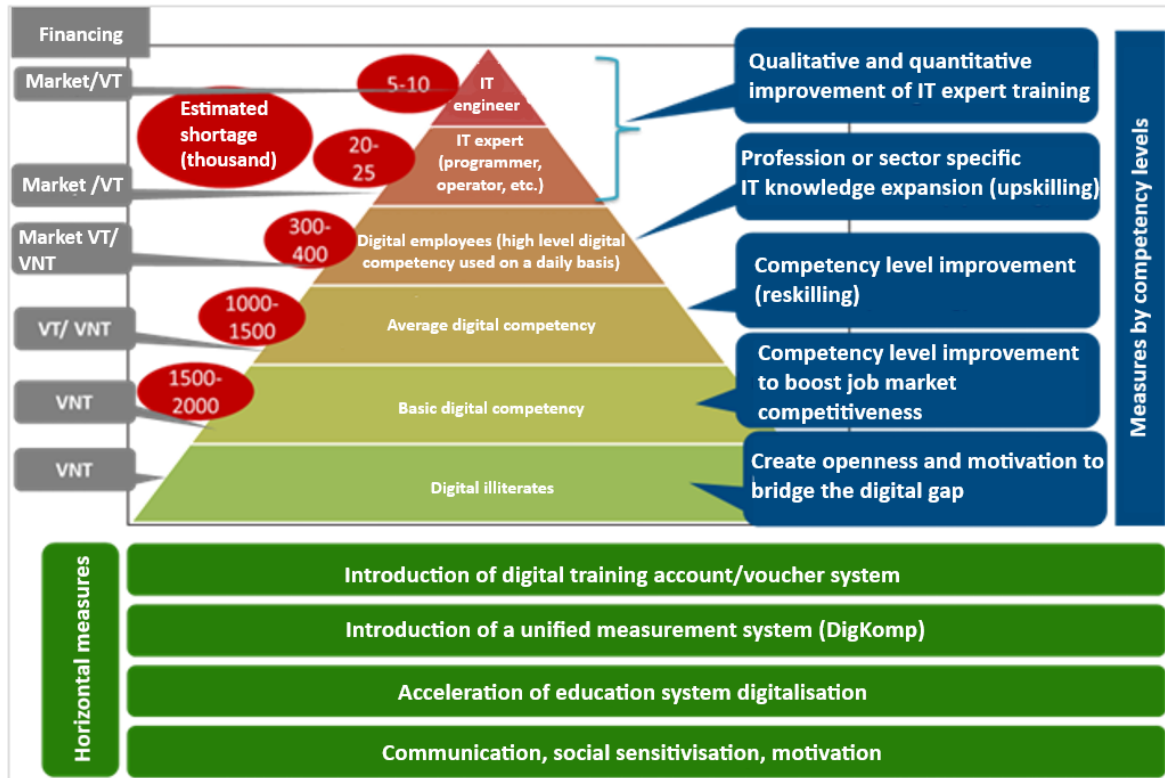
- To the **most disadvantaged individuals in need**.
- To other citizens **by covering their own and/or their employer's contributions**. (For individuals, it is advisable to make voucher purchases tax-deductible from personal income tax through an individual digital training account, and for businesses, from TAO or other taxes/income.)

Vouchers could be used in one of the following ways:

- **Exclusively for the development of digital competence**.
- Redeemed for **additional discounts** (e.g., on teaching materials and equipment).
- Applied to **other DOS and DWP programmes** (e.g., support for BYOD - bring your own device).

In line with this approach, it is recommended that the intervention system be **designed with maximum flexibility to address the varying digital competency levels within target groups**, while minimising "blind spillover" and the deadweight effects of interventions, **ensuring that the burden on state funding is kept to only what is strictly necessary**. The system should also be able to **support independent learning and informal and formal training**. The proposed system of interventions is shown in the figure below.

The proposed system of interventions



HUMAN RESOURCES		
EDUCATION AND TRAINING STRATEGY		
Renewing the education system - digital competence minimum	Digital competence development at primary and higher levels	IT and digital skills training
LABOUR MARKET/EMPLOYMENT		
HR digitalisation	Jobs of the future	Attract and retain IT talent

6.2 Renewing the education system - digital competence minimum

Renewing the education system - digital competence minimum	Measure	Making DOS 2.0
The aim of the measure	Building on the experience gained from the DOS adopted five years ago, the goal is to create an educational system and pedagogical environment where students tackle problems both independently and collaboratively , using technology-driven tools . This approach involves a learning and skills development process supported by the teacher in a mentoring role , with a focus on empirical and practical reinforcement .	
Content of the measure	Updating the DOS situation assessment, vision, objectives, tools and action plan, covering the public education, vocational training, adult education and higher education systems, with a detailed assessment of the situation, the desired target status, the identification of development needs and the resources required for development in at least the following areas: <ul style="list-style-type: none"> • digital infrastructure of educational institutions; • digital devices in educational institutions; • learners use their own tools; • digital competences for teachers; • digital pedagogical methodologies; • Review of NAT from a digitisation perspective; • digital learning materials and other content used in digital education; • training digital teaching assistants; • introducing digital education (EdTech) solutions; • digital platforms for education administration and parental contact; • the traceability of educational careers. 	
Proposed responsible person(s)	Ministry or ministries responsible for education, vocational training, adult education, higher education, labour market, digitalisation	
Proposed timetable	Making DOS 2.0: 31/12/2022 DOS 2.0 Government Decision: 31/03/2023 Action Plan: 30/06/2023 Implementation: From 1 September, 2023	
Estimated resource requirements	Preparation of DOS 2.0 and Action Plan: HUF 50 million. Implementation: TBD	
Resource map	Making DOS 2.0: domestic budget Implementation: EU (MFF, RRF, central) and national budget resources	
Proposed indicator(s)	<ul style="list-style-type: none"> • the proportion of institutions with at least 1 Gbps institutional connections and more than 100 pupils. Objective: 100% • the percentage of pupils with access to WiFi networks with an individual user bandwidth of at least 5 Mbps. Objective: 100% • Percentage of upper secondary or secondary school students with their own or community-owned equipment. Objective: 100% • Proportion of institutions equipped with a digital workshop. Objective: 100% • The proportion of institutions equipped to teach robotics and programming that meet curricular requirements. Objective: 100% • The percentage of the total number of pupils in the institution's open learning spaces (extra-curricular, school learning 	

	spaces, e.g. library, lounge, etc.) that are open to the public. Objective: 10% <ul style="list-style-type: none"> All institutions with more than 100 pupils should have at least 1 digital teaching assistant.
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6.3 Digital competence development at primary and higher levels

Digital competence development at primary and higher levels (1)	Measure	Introduction of a uniform DigKomp measurement and certification system
The aim of the measure	Development and implementation of the DigKomp framework for measuring digital competency.	
Content of the measure	<p>The introduction of the DigKomp system for defining, developing, measuring, and assessing digital competence, as well as its certification and state recognition. The complete implementation of DigKomp will facilitate a shared understanding and mapping of digital competences acquired through education and training, adult education, and self-learning to pre-defined competence levels.</p> <ul style="list-style-type: none"> Development, implementation and operation of the DigKomp citizen reference framework; Creation of the DigKomp learning support platform, development and operation of a task bank; Creation and operation of a training register to record and validate the quality of DigKomp training; Running the DigKomp dissemination and marketing campaign; Provision of professional and methodological support, along with the further development, quality assurance, monitoring, and evaluation of digital competence development. 	

Digital competence development at primary and higher levels (2)	Measure	Communication, social sensitisation, motivation
The aim of the measure	Strengthening social openness to digitalisation, attracting and motivating those who have been excluded from the digital world, thus bridging the digital divide	
Content of the measure	<p>A widespread recognition that digitalisation is not a fleeting trend but a major force reshaping many aspects of the economy and society is essential. It is crucial for workers and businesses to be prepared for this transformation rather than shielded from it. This initiative also seeks to enhance awareness about the significance of lifelong learning, particularly in developing digital skills.</p> <p>It includes non-formal and informal motivational activities, as well as group and individual sessions involving family, friends, the community, and the DWP Network, designed to encourage those not yet engaged with the digital world to become more open and take their initial steps into it.</p> <ul style="list-style-type: none"> Offline and online motivation campaigns, programmes A programme to engage the digitally illiterate working age population (especially those aged 55-65) Programme for the inclusion of elderly people, people living in extreme poverty, the chronically ill and people with disabilities Supporting local digital heritage protection Strengthening the digital presence of local communities Roma Digitisation Programme 	

Digital competence development at primary and higher levels (3)	Measure	Basic digital competence development in a voucher system
The aim of the measure	Providing those with only basic digital skills with relevant digital knowledge for the labour market (up-skilling);	
Content of the measure	<p>Enhancing the skill levels of target group members (DigKomp 1-2) to prevent their long-term exclusion from the labour market. Improving the digital literacy of individuals who already have a basic understanding through informal (DigKomp 1) and formal (DigKomp 2) training provided via a voucher system.</p> <p>Basic digital competencies should not be taught solely through the adult education system, as they benefit more from mentoring and informal training methods to maintain participant motivation. Therefore, for DigKomp1 level training, we propose a solution that is not based on the adult education institutional system, but on a possible instead, it allows citizens to acquire the digital skills required for DigKomp1 level in an informal training setting, in or near their place of residence, with mentoring support.</p> <p>For DigKomp2 level training, accredited adult education institutions would serve as the venues for digital training. However, it should be noted that for groups of at least 10 individuals from the same municipality, it would be preferable for the trainer to visit the local area rather than requiring participants to travel to the training site.</p> <p>With the proposed voucher, any citizen would have the opportunity to attend one of the authorised institutions offering courses/training, where they could acquire basic digital skills at a pace and in a format tailored to their needs. The ongoing enhancement of the DigKomp system will address the issues of identifying suitable examination centres, determining the output requirements for obtaining the DigKomp1 level certificate, and establishing how frequently this certification needs to be renewed or updated.</p>	

Digital competence development at primary and higher levels (4)	Measure	Advanced digital competence development with mixed (market/VT/VNT) funding
The aim of the measure	Increasing the proportion of people with digital skills above basic	
Content of the measure	<p>Enhancing the level of competencies (DigKomp 3+) is crucial to help individuals retain their jobs in a digital environment. This involves supporting participation in formal digital competence training courses, initiated by both individuals and employers, primarily through financial mechanisms such as training loans, interest rate subsidies, guarantees, and public counter-guarantees for trainers.</p> <p>Financial support for training could include reimbursable grants, VNTs for exceptional needs and performance, or vouchers, partial loan guarantees, and interest rate subsidies.</p> <p>Additionally, it may be beneficial to consider interventions outside the typical development policy scope, such as:</p> <ul style="list-style-type: none"> • Allowing training fees and, for companies, costs associated with replacing workers who are away for training to be deductible from corporate tax. • Making training expenses for employees deductible from corporate tax or other relevant taxes/fees. • Evaluating and enhancing aspects of the vocational education and training system related to digitalisation, scaling up IT-related training, and improving necessary infrastructure, tools, and trainers. 	

	<ul style="list-style-type: none"> For non-IT professions, expanding the digital components of vocational training curricula, developing digital workshops, and creating interdisciplinary programmes.
Proposed indicator(s)	increase the share of individuals aged 16-74 to 32% by 2025 from the current 25%

Digital competence development at primary and higher levels (5)	Measure	Encouraging SMEs to develop the digital skills of their employees
The aim of the measure	Encourage businesses to develop the digital skills of their employees and deepen their IT knowledge;	
Content of the measure	<p>Digital training for employees of micro, small, and medium-sized enterprises could be considered as a standalone initiative (e.g., VNT for basic skills or financial instruments for advanced digital training), such as expanding the training voucher scheme to include SMEs undertaking digital enhancements.</p> <p>More crucially, training should be incorporated as an eligible activity, an eligible expense, or even a compulsory component in any business development programme that encompasses digitisation improvements. Without this, a beneficiary business might struggle to fully utilise the tools or applications developed due to a shortage of adequately trained and skilled staff.</p>	
Proposed indicator(s)	increase the share of enterprises providing ICT training to their employees (from 16% to 25% of SMEs with more than 10 employees by 2025)	

Digital competence development at primary and higher levels (6)	Measure	Development and operation of a labour market forecasting system
The aim of the measure	Develop and operate a digital labour market forecasting system for data-driven labour market decision-making.	
Content of the measure	Create and maintain a forecasting system capable of predicting shifts in labour market demands by analysing trends. This will enable more precise and efficient planning of labour market interventions, training, and support, thereby shortening response times to emerging needs and enhancing the flexibility of the domestic labour market supply.	

6.4 IT and digital skills training

IT and digital skills training (1)	Measure	"Program your future 2030" programme
The aim of the measure	Increasing enrolment in IT and digital vocational training, adult education, and higher education, while reducing drop-out rates and enhancing the quality of training through expanded collaboration between educators and businesses.	
Content of the measure	<p>To boost demand for IT training, enhance its relevance to the labour market, and reduce drop-out rates, it is essential to foster collaboration between training institutions and ICT companies.</p> <ul style="list-style-type: none"> • this could include initiatives such as apprenticeship programmes, dual training schemes, the development of interdisciplinary training, training packages, and mentoring programmes. • to boost interest in mathematics, science, technology, and information technology among students, parents, teachers, and trainers, with a specific emphasis on raising the proportion of female IT specialists in both secondary and higher education; • implement an awareness-raising and career guidance programme that involves parents, peer groups, teachers, students in education and training, and the broader community. This programme should utilise communication and motivational strategies to encourage more students to view science, engineering, and IT as viable career options; • enhance the appeal of IT careers, increase the number of applicants, and reduce drop-out rates; • improving the content and methodology of IT training in vocational education and adult education • support for digital workshops, programming courses (tool vouchers, travel support, preparation for competitions) • motivational and communication activities to support the project's objectives • support for the development of experience centres / digital community spaces 	
Proposed indicator(s)	<p>By 2025</p> <ul style="list-style-type: none"> • increase the proportion of applicants in IT and related interdisciplinary fields of study (from 17.7% to 20% at BsC level and from 7.1% to 10% at MsC level) • increase the proportion of graduates in IT and related interdisciplinary fields from an average annual growth rate of 5.5 percentage points between 2010 and 2020 to 10 percentage points per year • reduce the drop-out rate in IT and related interdisciplinary fields from 41.86% in 2020 to below 30% • boost enrolments in IT vocational secondary schools and technical schools • enhance enrolments in IT and digitalisation training for adults, such as bootcamp schools • mandate the inclusion of digital competence development and digital skills training for non-IT professions • expand upskilling or reskilling opportunities for individuals with high digital competencies or those with engineering backgrounds in other disciplines 	

	<ul style="list-style-type: none"> • increase the proportion of ICT professionals to 4.5% of total employment by 2025, up from 3.8% currently • raise the percentage of female ICT professionals to 18% by 2025, from the current 12% • increase the proportion of ICT graduates to 5.5% by 2025, up from 4.9% today •
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IT and digital skills training (2)	Measure	Training loan scheme for professionals with high level IT and digitalisation skills
The aim of the measure	Supporting the training and retraining of (non-IT) professionals with above-average digital competence and interest in IT to address the shortage of IT and digitalisation professionals.	
Content of the measure	<p>Increasing the number of digitally literate workers through flexible training funding solutions.</p> <p>The target group of the measure includes workers who have acquired (or are acquiring) a high level of digital competence and have the desire and ability to learn (or are perceived by their employer as having the desire and ability to learn) entry-level IT skills (e.g. junior programmer, tester, scrum master, etc.). The scheme would essentially support upskilling and reskilling training for companies and individuals, typically through financial instruments (loan products), with the participation of bootcamp schools and adult education institutions.</p> <p>Given that these training courses could be partially market-driven if stakeholders were not dissuaded by the risks related to financing, it is suggested to employ financial instruments such as training loans, interest rate subsidies, guarantees, and public counter-guarantees for trainers and trainees. Additionally, the use of the VNT component should be considered primarily for the groups in greatest need.</p>	
Proposed indicator(s)	<ul style="list-style-type: none"> • expand training for people with high levels of digital competence or in engineering in other disciplines 	

IT and digital skills training (3)	Measure	Increasing the number of IT and digital professionals available to domestic businesses
The aim of the measure	The initiative will concentrate on attracting and retaining IT and digital professionals in Hungary, as well as enhancing the ability of domestic businesses to keep their skilled workforce.	
Content of the measure	<ul style="list-style-type: none"> • Encouraging Hungarian and foreign digital professionals working abroad to work in Hungary (physically or nomadically); • A targeted programme or support to help retain domestic talent for domestic ICT businesses; • Facilitating the employment of foreign nationals (e.g. visa and/or tax facilitation) • Hybrid working, mosaic employment, self-employment, new generation organisational culture, atypical employer solutions, support for attracting and retaining professionals; • Strengthening the labour retention capacity of domestic employers to reduce the leverage of global telework intermediaries; 	

Our other proposals in the field of education:

- Large-scale **STEM/ICT scholarship programme** in higher education.
- To **significantly increase participation rates in adult learning**
 - **Central budget-supported training to remediate basic competences** in adult education, mainly in literacy, reading, reading comprehension, mathematics and digital literacy;
 - **Income tax allowance for employees** participating in training;
 - introduction of an **individual learning account (ILA)**;
 - **additional incentives** for rural workers and those in disadvantaged regions;
 - **state recognition of industrial qualifications**;
 - adding a **digital module to vocational education and training**;
- Application of **new economic, IT and data analysis methods** to forecast labour market needs; development of an **up-to-date occupational structure model**.

6.5 HR digitalisation

HR digitalisation (1)	Measure	Policy lobbying
The aim of the measure	Making grant funding available to SMEs and large companies.	
Content of the measure	<i>Under development</i>	

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HR digitalisation (2)	Measure	Communication, sensitisation, motivation
The aim of the measure	Increase openness to HR IT solutions, to demonstrate organisational integration and their positive impact on organisational processes and business.	
Content of the measure	<i>Under development</i>	

6.6 Jobs of the future

Jobs of the future (1)	Measure	Communication, sensitisation, motivation
The aim of the measure	Reducing mistrust and increasing openness to part-time and teleworking in domestic companies.	
Content of the measure	<i>Under development</i>	

Jobs of the future (2)	Measure	Establishment of a methodology centre
The aim of the measure	Engage in outreach efforts to understand future technologies. A dedicated methodological centre could survey local businesses regarding the effects of technological advancements and offer effective tools to counter the belief that technology is diminishing the need for IT professionals, which can result in job losses. Technology has the potential to bridge, rather than exacerbate, the growing gap between the supply of and demand for IT professionals.	
Content of the measure	<i>Under development</i>	

6.7 Attract and retain IT talent

Attract and retain IT talent (1)	Measure	Measures to facilitate access to employment
The aim of the measure	Several areas can be identified where employment could be enhanced by reassessing regulations and adjusting the legal framework to align with current opportunities and needs. Proposing and implementing changes in these areas can contribute to improving the labour market conditions.	
Content of the measure	<ul style="list-style-type: none"> • To address the domestic labour shortage, the status of qualified employer should be expanded to include both domestically owned and foreign-owned ICT companies with a registered office or a permanent establishment in Hungary, as outlined in Government Decree 407/2021 (8 July 2021), which will take effect in September 2021. • Qualified employers can hire workers from non-EEA countries with reduced administrative burdens, such as allowing up to 90 days of employment without a work permit in shortage occupations. • A qualified employer may determine a worker's qualification based on their certified skills and competencies. • Further measures to ease administrative requirements include (e.g. removing notification obligations). • Eliminating the requirement for employers to have a certified establishment in the worker's country. • Simplifying tax and contribution regulations, including those related to remote work. 	

Attract and retain IT talent (2)	Measure	Support for the recruitment of foreign workers
The aim of the measure	Not only the employment of foreign workers in Hungary, but also their access to and facilitated recruitment should be facilitated.	
Content of the measure	<ul style="list-style-type: none"> • Government support for the recruitment of non-EEA workers • Simplified immigration procedures, work and residence permits also for the worker's immediate family members. • Developing housing support (e.g. with municipal or public housing) 	

Pillar 2: Sectoral digitalisation, SME development

1. Summary

The purpose of our professional discussion paper on sectoral digitalisation and SME development is to highlight the potential benefits of sectoral digitalisation through targeted interventions. We aim to encourage IVSZ members, professional partners, and individuals and businesses supporting the Manifesto to engage in a collaborative reflection on this topic.

The discussion paper outlines the key direct and indirect advantages of digital transformation, emphasising that for manufacturing and service businesses, digitalisation is crucial for survival and success.

On an international scale, we are lagging behind both globally and within Europe. There is significant scope for enhancement in terms of the economic environment, human capital, and technological transformation.

Among the key areas for development, cultural change appears to be the most critical for effectively preparing the workforce and implementing technological investments.

IVSZ will summarise its findings and offer recommendations for each development pillar, which will form the foundation for a detailed action plan, taking into account the available development resources.

2. Introduction

In Hungary, as in many countries worldwide, sectoral digitalisation is a pressing issue. In the fourth quarter of 2021, 20% of Hungarian workers were employed in industry, and 25% in service enterprises closely linked to industry. This means nearly half of the Hungarian workforce is directly reliant on the competitiveness of the domestic industry.

Figure 1-17: Work productivity indicators of Hungarian sectors

Sector	National economy weight (added value %)	Work productivity 2019 HUF million/ps	Real work productivity avg ann chg 2013-19	Real work productivity avg ann chg 2017-2019
Processing industry	21%	9,4	1,7	0,6
Commerce	19%	6,7	3,6	6,4
Community services	17%	6,8	-0,3	1,9
Professional, scientific, technical	10%	7,8	-0,8	5,7
Real estate	9%	48,4	-0,9	-3,0
Construction	6%	6,3	2,9	7,4
ICT	5%	12,6	0,5	4,8
Agricultura	4%	8,5	5,7	-0,6
Finance and insurance	4%	16,2	3,9	5,6
Other services	3%	5,5	-0,1	2,7
Market services total	50%	9,1	1,4	4,7

Note: market services encompass the following national economy sectors: commerce, information, communication, finance and insurance, real estate, professional, scientific and technical activities, other services.

Source: HNB calculation based on Eurostat data

The competitiveness of our sector is primarily influenced by labour productivity, which digitalisation significantly impacts. It is in the interest of all stakeholders to advance this area transparently and to identify opportunities for substantial development in Hungary.

2.1 The concept of sectoral digitisation

Digitalisation has been present for decades in production and services, albeit with varying levels of intensity and intermittently. In the context of industrial digitisation, data generated from physical processes are gathered—often through sensors and IT tools—then loaded into models such as MES systems or GIS systems for analysis. This involves examining the interconnections between data from

multiple facets of the production or service process to provide decision recommendations (e.g., diagnostic applications) or to directly influence physical processes (e.g., through robots).

The main changes that businesses expect from digitalisation are:

- Improving customer engagement
- Increasing staff energy
- Optimising the operation
- Developing attractive new products and services

It is not only in Hungary that the priorities of business leaders have changed following COVID outbreak:



In addition to the direct effects, there are also a number of indirect, positive consequences:

- Profitability and organisational norms that encourage creativity can contribute greatly to a more fulfilling life, and ultimately to a better quality of life.
- Participation in optimised processes can improve work-life balance.
- A healthier working environment and less harmful physical stress will make it easier to maintain quality of life in the long term.

3. Technological approach

3.1 Developing a data-driven application environment

The technological implementation of digital transformation can be achieved through various approaches and methodologies, which may partially or entirely overhaul operational processes. Technologies such as 5G data transmission, the Internet of Things, Big Data, Blockchain, Cloud Computing, Artificial Intelligence, and Cyber Security are all gaining prominence, each building on the others to fundamentally change how we operate.

Key steps in this process include:

- Establishing a data transport infrastructure capable of reliably delivering data to appropriate storage facilities.
- Converting measurable physical changes in the workplace into data as comprehensively as possible. Ensuring that this data is recorded in a standardised format.
- Employing data processing application systems to handle data cleansing and analysis, which may involve custom developments but are more likely customisable industry solutions.
- Evaluating whether artificial intelligence (AI) can provide added value in the specific field.
- Prioritising decision-making and implementation through automation and robotisation, with the goal of harnessing the potential of autonomy.
- Developing efficient data sharing and communication processes.
- Investigating the potential for electronic data communication between companies.
- Implementing comprehensive value-added data security throughout the entire process.

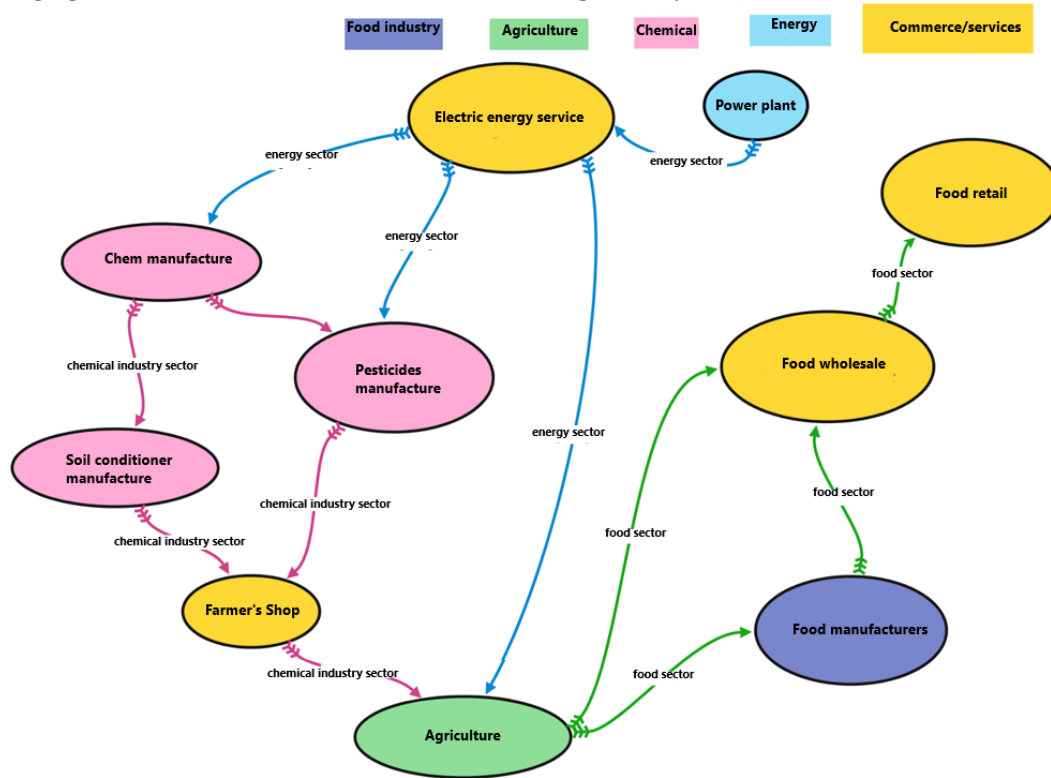
3.2 Defining technological trends

The proliferation of data-driven production processes and services has also paved the way for the advancement of other technologies. Production processes are now enhanced by 3D printing technologies and robotisation. Drone technology is playing a crucial role, particularly in service delivery and agriculture. The gathering, integration, and analysis of consumption data has evolved into a distinct technology, commonly referred to as digital marketing. Virtual reality technology is proving valuable in supporting both training and remote working activities.

4. Sectoral approach

The digitisation of sectors is a complex undertaking that, following its original production-based model, involves the transformation of materials into finished products. This interdependent process is also evident in the services sector. As a result, defining sectors in the context of digitalisation requires a distinct approach compared to traditional methods. Historically, businesses in these sectors were categorised according to the EU's statistical classification system. However, digitalisation and Industry 4.0 are disrupting these classifications. The transformation stages of a material into a finished product can occur within a single enterprise, but are typically part of a network of businesses, where one enterprise might act as a buyer at one point and as a seller at another. In the services sector, this is often seen as part of a material flow (e.g., transport services). During digitisation, these enterprises can map their internal processes and also integrate with other collaborators in the material flow at the data flow level. This creates chains that may span beyond traditional statistical categories (e.g., a

hosting service provider and a power plant supplying the necessary electricity). Additionally, there are numerous examples of firms operating across multiple industries within a sector (e.g., an apple-growing agricultural business that also runs a drinking water plant).



Publications and services of the IVSZ (e.g. www.digitalismegoldasok.hu) try to apply this sectoral approach to make digitisation more inclusive.



See www.digitalismegoldasok.hu for a more detailed explanation of the IVSZ sectoral solution.

5. Strategic background

5.1 International outlook following the pandemic crisis:

Globally, there is a concerted effort to revitalise businesses, with many viewing the digitalisation of sectors as the key solution. Special emphasis is placed on SMEs due to their prevalence and vulnerability.

Countries are aiming to expedite reforms by enhancing broadband connectivity, developing online business models to support firms, and improving digital skills. Well-planned infrastructure investment projects, including the expansion and modernisation of electricity grids and investment in renewable energy sources, will guide businesses towards sustainable development and intelligent operations. Both OECD countries and EU Member States are grappling with the challenge of maintaining a technological equilibrium between small and large enterprises to ensure they remain effective collaborative partners.

5.1.1 The EU's role in digitalisation

EU institutions are also consistently advancing the digital transformation of industries across Member States through research, methodologies, and strategic initiatives. Recently, several notable measures have been implemented:

In its Communication on the Digital Compass 2021, dated 9 March 2021, the European Commission outlined several key objectives, including strategic directions for digitisation in the sector:

- Ensuring the presence of 20 million highly skilled digital professionals in Europe.
- Establishing secure and modern, sustainable digital infrastructures, including 5G coverage in all populated areas, large-scale semiconductor manufacturing, secure edge nodes distributed in the cloud, and quantum-accelerated computing for businesses.
- Supporting businesses in their digital transformation efforts.

Additionally, the Commission presented a strategic document to the Council for 2030, titled "The Road to the Digital Decade".

Regarding the digitalisation of businesses, the following targets have been established:

- **Technological innovation:** 75% of EU companies use Cloud/ML/Big Data technologies,
- **Innovation:** Doubling the size of EU unicornis businesses,
- **Slow to adapt:** More than 90% of SMEs have reached a basic level of digitalisation.

To achieve these goals, €1.98 billion has been earmarked under the Digital Europe Programme (in which the IVSZ plays an active role).

5.2 Domestic situation

5.2.1 Economic trends

Recent economic shifts have not favoured the short-term implementation of businesses' digitalisation plans.

- The exchange rate and purchasing power of the Forint are unstable and generally trending downwards. Consequently, companies that sell domestically but import parts and raw materials from abroad are required to maintain higher levels of working capital in their production processes. A decline in the exchange rate can also impact sales adversely.
- Inflationary pressures further complicate matters for businesses that are not dependent on imports, making it harder to meet purchasing and wage requirements.

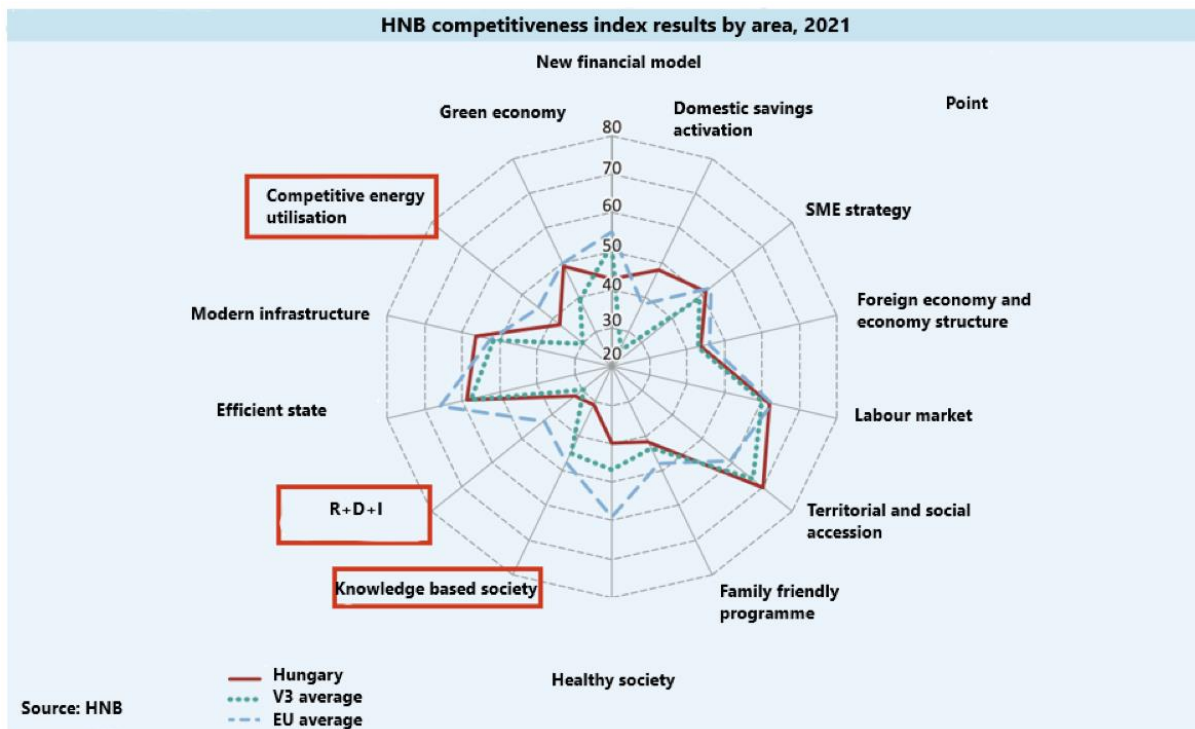
- The global pandemic has led to shortages of certain raw materials, significantly increasing their purchase prices. Alongside these higher costs, ensuring production continuity involves managing disruptions in material flow and handling extraordinary organisational challenges.
- Transport costs have surged due to the sharp rise in energy and fuel prices, which in turn has escalated production and sales expenses.
- The increase in the minimum wage will necessitate general wage rises by many employers.

Consequently, to maintain business operations, additional resources will need to be allocated to production, potentially impeding firms' efforts towards modernisation.

5.2.2 Human trends

The discussion paper on Pillar 1 of the Manifesto thoroughly examines the human elements of digitalisation.

Our competitiveness relies on a skilled and adaptable workforce, which shows significant room for improvement, both compared to the EU and the V3 countries.



Despite the pandemic's impact on the European labour market, the OECD forecasts that economic activity in Hungary will remain robust, potentially pushing output above its potential in 2022. However, there remains a shortage of skilled workers, which poses a major obstacle to the digital transformation of SMEs. Additionally, management is often inadequately prepared, highlighting the importance of providing education and training for them as well.

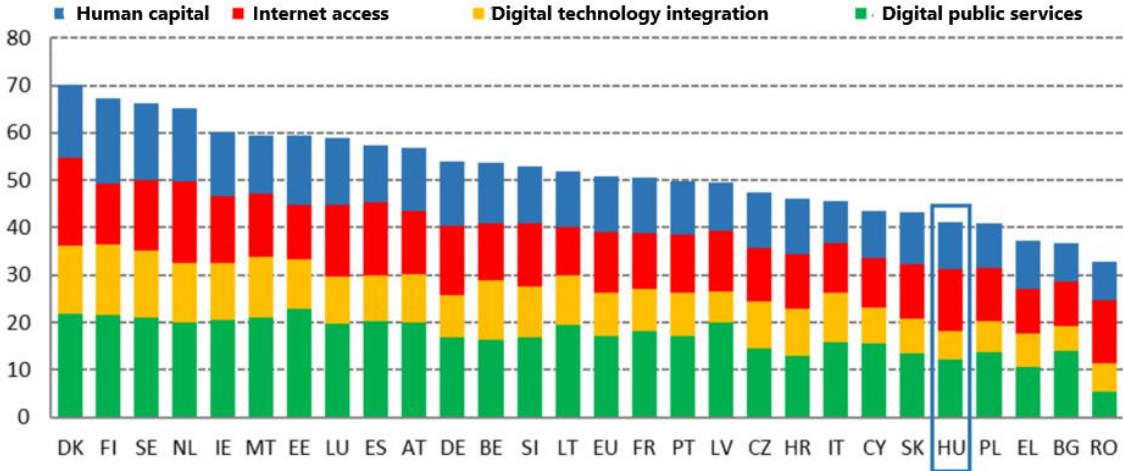
5.2.3 Digitalisation trends

Since 2015, the policy has provided hundreds of billions of forints in support to domestic industrial enterprises. Several initiatives have been started, such as GINOP 1.1.3 ("Model Factory/Model Plant"), GINOP 3.2.1 ("Modern Enterprises"), GINOP 5.3.5 ("Mechanical Contractors"), GINOP-8.2.5 ("Digital

Capital Funds"), and the Digital Wellbeing Loan Programme. These projects have aimed either directly or indirectly at advancing digitisation, addressing a wide range of businesses or focusing on specific sectors. Background institutions responsible for business development and innovation have collaborated with various government and professional organisations to achieve a significant breakthrough. Regrettably, only a small fraction of the subsidies appears to have been utilised by companies to enhance their level of digitisation. While the tools for digitisation are accessible, what is most lacking, based on our experience, is effective integration. We observe that outstanding solutions often operate in isolation and eventually falter because their impact on the overall system performance diminishes due to a lack of collaboration. The measurement of aid uptake is still inconsistent.

Despite these efforts, Hungary has regrettably fallen two positions in the EU's annual Digital Economy and Society Index (DESI), as reported in November 2021, compared to the 2020 results.

Digital Economy and Society Index (DESI) ranking in 2021



Source: Digital Economy and Society Index (DESI) 2021 Hungary

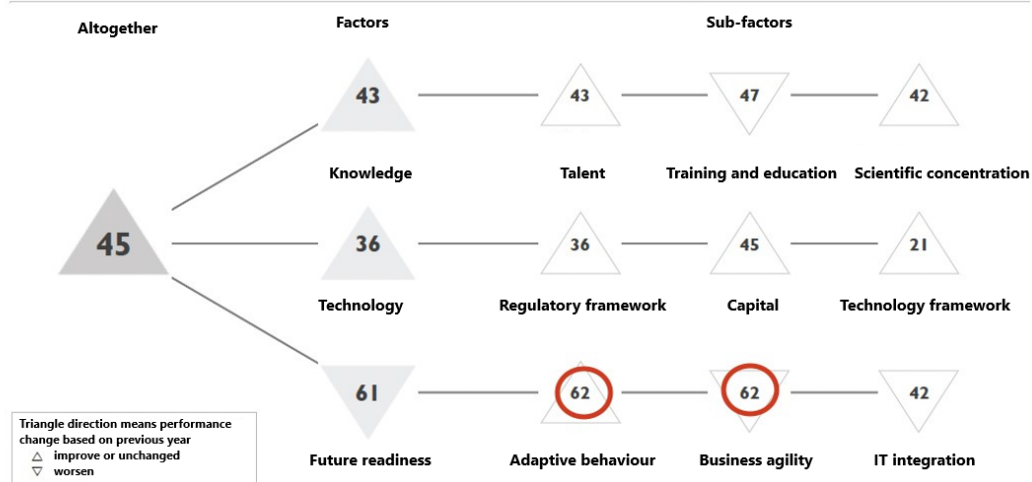
In Hungary, the primary sources of competitiveness in the field of digitalisation are the widespread adoption of digital technologies within businesses, e-government initiatives, and the enhancement of digital skills among citizens. In many instances, the formalisation of the documentation regime not only impacts e-government but can also hinder the digitisation of business services.

Digitalisation is a new dimension in R&D and innovation, laying the groundwork for the implementation of advanced technologies and thus boosting business productivity.

The EU's Digital Economy and Society Index (DESI) and the IMD Digital Competitiveness Ranking are utilised to gauge digitalisation progress. According to DESI, Hungary ranks below the EU average but slightly above the V3 average. While Hungary performs better than the EU average in several relevant indicators, it still has considerable room for improvement in adopting digital solutions within businesses, utilising e-government services, and enhancing the digital skills of its workforce. Similar findings are echoed in the IMD Digital Competitiveness Ranking, where Hungary's position improved by two places (from 47th to 45th) in 2021.

HUNGARY

Overall performance (64 countries)



According to IMD analysis, significant progress has been made in Technology Frameworks (thanks to the NDS and sector strategies). However, there has been a decline in education and training and business agility.

In the DESI parameter most related to sectoral digitalisation, Hungary is a leader only in the integration of digital technologies. The latest analysis from the MNB Competitiveness Index also identifies critical areas needing improvement:

Although many SMEs now utilise advanced digital solutions like cloud services and sensor technologies, concepts such as Big Data, artificial intelligence, robotics, and blockchain remain unfamiliar to many SME managers.

Only 10% of domestic firms are committed to digital transformation. A widening gap is emerging between businesses that are advancing rapidly and those that are falling behind.

Digitalisation not only enhances overall productivity but has also given rise to digital businesses that capitalise on the disruptive transformation of industry value chains. For existing decision-makers, these competing companies highlight the urgency and visibility of digital transformation and comprehensive technology integration.

Transformation is fundamentally altering traditional business operations. Companies struggle to adapt due to deficiencies in their IT technology stack (TECH DEPTH), a lack of digital/agile management mindset and expertise, fear of change, and the shortage of domestic experts to support transformation.

By 2022, leading firms across all major sectors are expected to confront the inevitable rise of digitalisation and a shortage of skilled professionals. Without sector-specific digital strategies and a comprehensive digital blueprint covering databases, interfaces, templates, and regulations, digital transformation will progress slowly and inefficiently. This will create opportunities for other countries, including V4 nations, to penetrate the Hungarian market and establish new positions.

Examples are already visible: KILFI.HU (Czech) - food trade, EMAG (Romanian), ALZA (Czech) - retail, WOLT (Finnish), Foodpanda (Czech) - parcel delivery

The lack of adoption of digital solutions is one of the biggest contributors to the productivity gap between companies. Hungary is positioned 26th among EU countries regarding the integration of digital technologies into business operations. Hungarian SMEs are at the bottom of the EU rankings for the use of enterprise resource planning (ERP) and customer relationship management (CRM) software. This performance means that Hungarian firms achieve only a third of the EU average, which is particularly concerning given Hungary's relatively high presence of multinational companies that are more advanced in digitalisation compared to their EU counterparts.

Moreover, industrial digitalisation has become a prominent topic in political discourse. In the upcoming 22nd parliamentary elections, one political party has made digitalisation the central focus of its agenda. The policy plans to continue offering significant support to the sector, but this support must be more precisely directed towards genuine digitalisation efforts. Currently, only 1% of Hungarian SMEs have a digitalisation plan or strategy, which threatens the success of catch-up programmes and leaves Hungary in the last position within the EU (Eurobarometer, 2020).

6. The pillars of development, proposals for measures and interventions

6.1 Technological innovation

IVSZ is dedicated to advancing technology, as digitalisation only becomes meaningful when technology is effectively utilised. While we recognise the importance of technological innovation, we believe that marketable technologies often succeed on their own and that their adoption in the domestic market is largely dependent on human receptiveness.

A small number of business leaders are pushing their capabilities to continually modernise their operations, even under challenging conditions. They are consistently seeking out technological and management opportunities to leverage. Changes in technology are driven not only by sectoral developments but also by actors within the value chain. Suppliers and consultants are expected to provide complex industry and sector-specific expertise when formulating technology change plans. Identifying the development potential and breakthrough points within enterprises is crucial before embarking on digitalisation and technological investments. It is essential to map out the fundamental processes of the enterprise, including not just production and manufacturing but also market processes. Only optimised processes should be implemented with new technology. Most EU or nationally funded support programmes have focused on improving production facilities or technological infrastructure. There is significant potential for increasing production efficiency and system/process integration, as well as balancing the capacity of upgraded assets. It is common to find processes operating 15-25% below industry benchmarks due to a lack of Business Process Reengineering (BPR).

- To ensure successful project implementation, support schemes should cover a larger portion of the design and project implementation costs
- Additionally, a certification scheme for digitisation experts should be established, and an up-to-date directory of such experts should be maintained.
- The range of products and services that facilitate digitisation must be kept current for businesses, and reliable quality information should be provided.
- A review of existing processes and working methods, including BPR, is necessary before making any technological investment.
- Communication of outcomes should include accessible information on developing technological solutions.

In many cases, ICT infrastructure does not extend to production and service sites, remaining confined to administrative functions. Investments in Operation Technology that support business functions require investment in ICT infrastructure as well, often leading to the combination of several projects to reduce unit costs.

6.2 Ensuring the human conditions for digital work

IVSZ ideas are set out in the discussion paper on the Human Resources pillar. Here we have highlighted only those points that are also important for digitisation in the sector.

6.2.1 Establishing data-driven decision-making processes

- Businesses must acknowledge the necessity of actively driving change and developing a business and digitalisation strategy that extends beyond a two-year horizon.
- It is important to evaluate the level of digitalisation within businesses using a validated maturity model and to set targets accordingly.
- By analysing the processes requiring modification along the material flow, specific interventions can be identified and executed on a project-by-project basis.
- Ensuring the conditions for the systematic implementation of these plans is essential.
- Additionally, promoting generational change in business management is crucial.

6.2.2 Production/service culture change

According to most experts (*Harvard Business Review Analytic Services, February 2021*), cultural change is crucial for enabling digital transformation. The technology skills of business leaders in Hungary are on par with those of decision-makers in the region.

However, adopting a shift in mindset in the following areas would be essential for achieving successful digital advancement:

Customer value centred improvements:

- Value chain and value stream focus,
- Managing uncertainty with agile methods.

Cooperation:

- Establishing group operation,
- Organise work on the basis of competences (matrix organisations),
- Establishing effective links with other projects,
- Running multifunctional agile teams.

Adaptability:

- Information should flow freely,
- Individuals should have the right and ability to make decisions and react to changes at their level,
- Workers should be encouraged to experiment and learn.

Transparency:

- Data-driven enterprise - make or change decisions based only on verifiable data,
- Individuals and teams regularly disclose their plans, products or processes to other stakeholders,
- Decision-makers share data and resources.

Inclusivity:

- Have channels for providing feedback or feedback on project activities,
- Leaders and project teams actively seek different perspectives,
- There should be processes for collective or collaborative decision-making.

Community:

- Shared values guide decision-making, so instead of relying solely on top-down approaches, organisations mobilise the expertise of the people closest to the challenges,
- Provide opportunities for agility, faster decisions and better ideas.

6.3 Lifelong learning

The lack of a properly skilled workforce is a major barrier to business growth. The key factor driving productivity is the willingness to self-improve, which is most evident in the ICT and scientific research sectors.

Ongoing participation in lifelong learning and continuous training will become increasingly crucial to keep pace with technological advancements. In Hungary, only 5% of the adult population engaged in lifelong learning in 2020, which is half the EU average of 10%. Compared to 2019, this figure represents a decrease of 1 percentage point, although it is still higher than the 3% recorded in 2011. There are

notable disparities across European countries: while Nordic nations have over 25% of their populations in regular training, Romania and Bulgaria have only 1% and 2%, respectively.

The primary drivers for lifelong learning include:

- The evolution of technologies,
- The disappearance of traditional professions and the emergence of new ones,
- The impact of technological progress, which leads to the obsolescence of some professions while creating new ones.

6.3.1 Education

Language teaching

A lack of foreign language proficiency significantly diminishes the opportunities available to individual workers, as it restricts their access to various channels for knowledge sharing, such as literature and online resources. This limitation impedes knowledge acquisition, learning, and innovation, which in turn hampers economic development. In 2016, only 42% of the Hungarian population was proficient in at least one foreign language, and less than 14% spoke at least two foreign languages—figures that fall notably short of the EU and Visegrád Group (V4) averages.

- **To address this, adult education should focus on motivating and providing preferential opportunities for learning English at the primary level.**
- **Additionally, there should be increased promotion of international business meetings for SMEs.**

Vocational training - technician training

To effectively implement the digitalisation agenda, it is essential to cultivate a generation of industrialists with both practical and digital skills.

The technological and organisational revitalisation of the sector, along with its associated career models, should be grounded in research and promoted through effective communication.

Modern tools and a contemporary work culture have the potential to enhance the reputation of vocational training and attract young people to careers in skilled trades.

While the separation of designers and contractors is most prevalent in the construction industry, it is also seen in other sectors. Increased collaboration with higher education institutions should help bridge this gap.

- **Assigning production/service digitisation experts to the Sector Skills Councils (SSC Expert Pool),**
- **Conducting a digitisation review of Training and Output Requirements (TORs) and Programme Curricula (PTT),**
- **Ensuring continuous training and engagement of vocational teachers in the work of higher education competence centres,**
- **Regularly monitoring sectoral digital competencies among individuals entering the labour market from vocational training.**

Higher education

The most successful higher education institutions have been those that establish strong connections between their curricula and practical production through market partnerships, fostering a dynamic, day-to-day relationship between industry and students.

Institutions should equip themselves with technologies and laboratory facilities that businesses can access, providing discounted RDI services in addition to their educational functions.

We need multidisciplinary experts capable of reliably handling complex tasks in management, manufacturing, information technology, and project management.

- **It is important to continue developing content and infrastructures that facilitate collaboration between entrepreneurs and higher education institutions.**
- **Additionally, a digital coach training programme should be launched as soon as possible to prepare experts, interim managers, and Chief Digital Officers for large-scale company modernisation, as well as to train educators for updating vocational training.**

Adult education

It is beneficial to expand the training offerings available to adult workers, as they are the quickest to utilise digitalisation resources. Their training should address both management skills and shifts in production culture, as well as updates to technological skills.

Instead of general knowledge, it is important to engage their interest with topics closely related to their profession, such as:

- Management skills, including project management and entrepreneurial culture
- Technological skills and knowledge
- Digital skills and knowledge

To make retraining or further education attractive and accessible for adults, national-level legal, financial, and infrastructural conditions must be established:

- Conduct a national survey of sectoral digital competencies (in relation to the VET JRC)
- Revise or expand Programme Requirements (PKK) to include sectoral digitalisation content
- Provide the Innovative Training Support Centre (ITC) with current sectoral digitalisation expertise from designated competence centres
- Offer ongoing sectoral digitalisation training for vocational trainers and involve them in the activities of Higher Education Competence Centres
- Support and promote sectoral digitalisation training through business development portals
- Implement a training credit scheme and regulations for working time allowances

6.4 Generational aspects of digitalisation

6.4.1 Bringing generations together

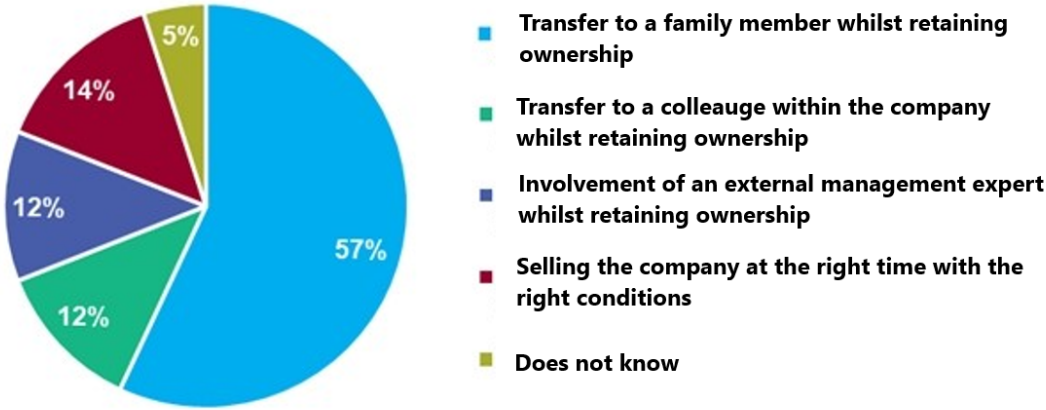
Most SMEs in Hungary were founded in the 1990s, and many of their original founders are still in charge of their companies today. The majority of Baby Boomers and early Generation X individuals lack foreign language skills, have not received training in finance, management, or project handling, have not been exposed to modern production management techniques, and struggle with digital tools. Successful digital transformation demands strong commitment from leadership. The competitive market is seeking renewal from this generation. Thus, addressing this generational gap benefits everyone, including policy makers and solution providers.

- **There is a need to evaluate and develop more catch-up programmes and ensure they are accessible nationwide to the relevant generations.**

Family business generation change

Sixty per cent of Hungarian SMEs are family-owned, with half of these businesses currently experiencing a generational transition. Most owners (57%) would like to see succession occur within the family.

AT YOUR COMPANY, WHAT TYPE OF MANAGEMENT GENERATION CHANGE DO YOU CONSIDER FITTING?



According to IVSZ, SMEs that genuinely contemplate family-based succession are more inclined to make decisions that can set their business on the path to digitalisation.

- **After conducting a national survey, the motivational potential of generational change should be harnessed through expert awareness, consultation, and coaching.**

7. Developing a sectoral digital ecosystem

Digitalisation extends beyond the boundaries of individual companies. Enterprise systems achieve their full potential only when they integrate both buyers and suppliers into the digital information flow. Value streams, ecosystem participants, and digitalisation opportunities vary greatly across different sectors, as indicated by terms like: Precision Agriculture, Fintech, Industry 4.0, Smart Building, Electromobility, and so on.

While the technologies, systems, and interfaces used may be similar, significant differences also exist.

- It is beneficial to create Sector Digitalisation Strategies in collaboration with industry associations, leading companies, government bodies, and related sectors, leveraging international experience. This approach allows companies, regulators, and digital ecosystem developers within the sector to align their efforts, thereby minimising development inefficiencies. Emphasising this as a crucial national economic interest is vital, as it is the key to ensuring both efficiency and rapid development.

8. Further information and list of resources

- <https://ivsz.hu/hirek/osszefogas-a-digitalis-magyarorszagert/>
- <https://www.penzcentrum.hu/gazdasag/20211201/megerkeztek-a-friss-gdp-adatok-ennyitnott-a-magyar-gazdasag-teljesitmenye-1119849>
- <https://www.ksh.hu/docs/hun/xftp/idoszaki/mone/20213/index.html>
- <https://www.mnb.hu/letoltes/versenyke-pesse-gi-jelente-s-hun-2021-1018.pdf>
- https://eur-lex.europa.eu/resource.html?uri=cellar:12e835e2-81af-11eb-9ac9-01aa75ed71a1.0012.01/DOC_1&format=DOC
- <https://digitrendi.hu/a-magyar-cegek-unios-szinten-meg-igen-aluldigitalizaltak/>
- [https://digital-strategy.ec.europa.eu/en/policies/countries-digitisation-performance#:~:text=DESI%20country%20profile%20\(HU\)](https://digital-strategy.ec.europa.eu/en/policies/countries-digitisation-performance#:~:text=DESI%20country%20profile%20(HU))
- <https://ojs3.mtak.hu/index.php/mksv/article/view/2430/1755>
- https://eacea.ec.europa.eu/national-policies/eurydice/hungary/lifelong-learning-strategy_hu
- <https://www.portfolio.hu/gazdasag/20210830/generaciováltás-csupán-az-érintett-cégek-14-százaléka-adná-el-a-vállalkozását-498352>
- <https://ivsz.hu/hirek/generaciok-szakadékok-nelkül/>
- <https://ivsz.hu/hirek/kkv-digitalizáció-északi-rokonainknál/>
- <https://www.eib.org/en/essays/european-digitalisation-study>
- <https://www.consilium.europa.eu/hu/policies/a-digital-future-for-europe/>
- <https://data.consilium.europa.eu/doc/document/ST-13809-2021-REV-1/hu/pdf>

Pillar 3: Data Economy, Innovation, Startup ecosystem

The role of data and cloud in the innovative digital economy

1. Why is it crucial to develop an economy centred around advanced data and cloud technologies?

In recent years, the management and significance of data in the digital economy have become prominent topics in both public discussions and policy considerations. There is increasing awareness among individual users, business leaders in traditional sectors are prioritising data-driven approaches, and government and EU regulations are becoming more active in this domain. All stakeholders seem to agree that establishing a comprehensive data infrastructure—comprising cloud services, skilled personnel, and a supportive digital and regulatory environment—will be essential for enhancing our country's competitiveness in the coming years. However, the emphasis on data sometimes leads to misconceptions. Therefore, the fourth pillar of this proposal package addresses the role of data in an innovative economy and outlines relevant recommendations.

We believe that **data-driven innovation** has huge potential both to boost Hungarian economic growth and to create value for society. The economic, decision-making, and research benefits of data largely hinge on the ability to share and access data widely. These advantages, however, can only be realised if privacy and cybersecurity risks associated with the data source (often individual or business users) are effectively mitigated.

Cloud technologies signify the latest, third paradigm shift in computing, akin to the transformative impacts of the internet in the 1990s and smartphones in the 2000s.¹ The aftermath of the COVID-19 pandemic and the crisis in Ukraine represents another pivotal moment in digital transformation. Countries, including both government and market players, must be prepared for unpredictable situations, with the ability to rapidly adapt their working methods and operational approaches. During the global adaptation in 2020, cloud computing proved to be more crucial than ever, aiding in the adjustment and mitigation of the economic impact of the pandemic. Such flexibility was only achievable through cloud computing, which enables us to treat computing as a service. Cloud computing is not only facilitating and accelerating digital transformation across all industries but is also vital for enhancing the competitiveness of the Hungarian economy.

This fourth pillar first reviews the main features of the data-driven economy, its emerging regulatory framework and proposed development directions, and then presents the importance of building a cloud-friendly ecosystem. In the final section, it makes management-level recommendations to decision-makers in both areas.

2. Status and main issues of the data-driven economy

2.1 The regulatory framework for the data-driven economy

¹ [McKinsey&Co: Capturing Poland's potential for accelerated digital growth. Report, October 26, 2021](#)

The regulatory framework for this fast-growing area of the economy is currently being intensively developed both in the European Union and in Hungary. The EU published the [European Data Strategy](#) in 2020, which led to two complementary pieces of legislation: the [EU Data Governance Act](#), which is close to adoption, and the [EU Data Act](#), a general data regulation published in February this year and under early negotiation. The former mainly regulates the processing of non-personal data generated in the public sector, while the latter regulates the processing of non-personal data generated in the private sector (mainly industry). Together, they aim to build the foundations of an advanced European data economy. However, the EU legal map of data processing is complete with at least two other pieces of legislation already in force: the General Data Protection Regulation ([GDPR](#)), adopted in 2013, which regulates the processing of personal data, and the 2019 [Regulation](#) on the free movement of non-personal data in the EU. At the same time, in Hungary, in line with [Hungary's Artificial Intelligence Strategy](#), the parliament passed the [National Data Assets Act](#) in 2021, which established the regulatory environment for public data held by Hungarian state and public institutions. Also under the MI Strategy, two public organisations, the National Data Asset Management Agency ([NDAMA](#)) and the even younger National Data Economy Knowledge Centre (NDEKC), have been set up to further work on the development of the data economy.

The above data-driven economy legislation is complemented by four pieces of **horizontal** legislation that are close to adoption, many of whose provisions also regulate the handling, sharing or transparency of digital data. These are (i) the [AI Regulation](#), (ii) the Digital Services Act ([DSA](#)), and (iii) the Digital Markets Act ([DMA](#)), and (iv) the already adopted Regulation on the promotion of fair terms and conditions for B2B users of online intermediary services ([P2B Regulation](#)).²

One of the central issues of the data-driven economy is the development of different **data spaces**, including European and regional data spaces. This need arises from the understanding that the effective processing and sharing of data is crucial for driving economic growth, enhancing competitiveness, fostering innovation, and advancing societal development as a whole. Data spaces establish the technical foundations for collecting and securely sharing data, which can provide a competitive edge, particularly for cross-border services. Existing frameworks, such as the [draft regulation](#) on the European Data Space for Health issued by the European Commission, can serve as models for developing data frameworks. When creating data spaces, it is important to consider potential obstacles to data sharing, such as the need to develop distinct sharing and access frameworks for public data and data sets produced and managed by the public sector at the Member State level, as opposed to those generated by other economic entities. Thus, the ability to share data within regional or local (Member State) datasets can also depend on the quality of the data.

2.2 The economics of data and its role in the economy

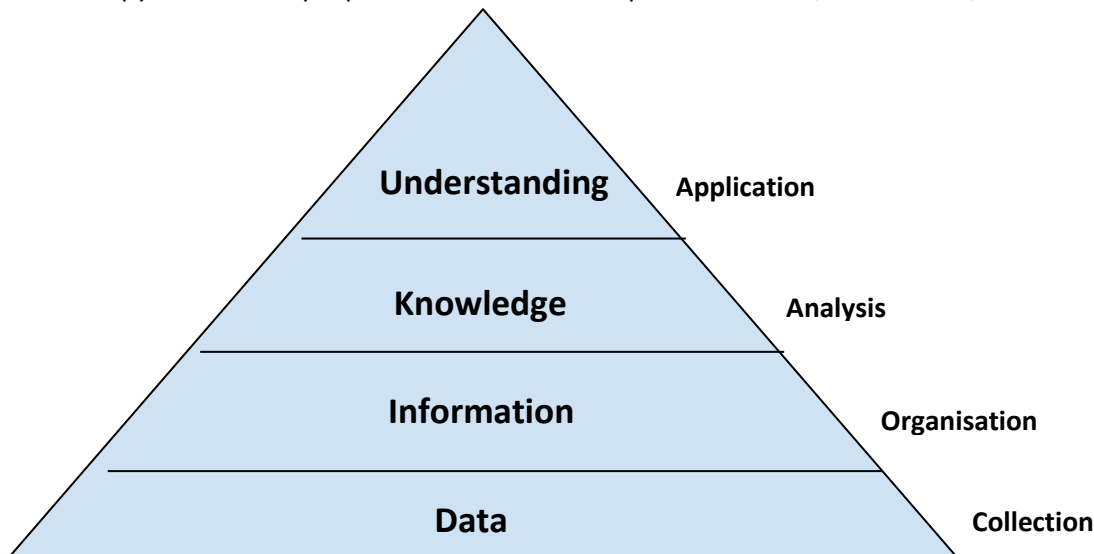
Transforming data into information with economic value is a lengthy process influenced by various factors and the specific business context. Simply accumulating raw or big data does not inherently

² The full picture also includes taking into account certain sectoral legislation (such as the Digital Operational Resilience Act, which sets out IT and cybersecurity requirements for ICT services in the banking sector, including cloud services [DORA Regulation](#)). However, a detailed description of these is beyond the scope of this summary.

create significant economic value. Data needs to undergo multiple levels of processing and specialised analysis, with the extent of this depending on the particular business environment. These processing stages ultimately produce information with high potential business value, such as insights and strategic directions, which can provide a competitive edge to those—such as companies, researchers, and decision-makers—who use the data effectively. Thus, it is crucial to determine where, in what format, and under what access conditions the data are made available to those who wish to process them.

Devices, sensors, and interfaces (such as IoT sensors) capture signals and convert them into data. This raw data is then processed, stored, and often immediately fed back into the data capture function in the form of a re-paste. Data analysis is essential for deriving **useful conclusions** from raw or aggregated data. Different companies may not extract the same insights from identical data sets due to various factors, including sector, business model, and human expertise (typically data scientists). Generally, data is characterised by heterogeneity, arising from differences in context, purpose, source, instrument, and processing.

The data pyramid visually represents the relationship between data, information, and knowledge.



Source: Hal Varian's data pyramid, see. [Artificial Intelligence, Economics, and Industrial Organization](#), National Bureau of Economic Research Working Paper, July 2018.

In plain English: raw data is contained in bits, information in documents and knowledge in people.

Thanks to digitisation, which has made it possible to access potentially very large datasets, the amount of data is less of an issue today than it was in the early 2000s. In today's practice, data **quality** seems to be a more pressing issue than the sheer **quantity of** data. According to a 2016 estimate, most data scientists spend 75-90% of their time cleaning, manipulating, transforming and preparing data for analysis³, yet poor data quality still has a significant detrimental impact on the economy. [IBM estimates](#), for example, that the economic damage caused by poor-quality data can be as high as \$3,100 billion a year in the United States.

From the user's viewpoint, enhancing competition among service providers in digital markets is best achieved by facilitating **data mobility**. This approach creates new opportunities for often smaller service providers. Reducing obstacles to switching enables more innovative providers to lure consumers from established providers by offering distinct or personalised services. In this context, the capability to manage user data effectively ensures a swift and seamless transition to a new service without compromising the user experience.

When discussing the role of data in the economy, it is also important to see that digitisation is already affecting the **economy as a whole**: the data-driven economy is not a sector that is well distinguishable from traditional sectors. Although public attention frequently centres on companies that are inherently digital, digitisation and digital data are impacting every sector of the economy. All sectors, both now and in the future, are or will be intensifying their efforts to leverage digital data. For instance,

³ WIK Consult Report, European Data Economy, January 2020 ([PDF link](#))

since the latter half of the 2000s, there has been a notable rise in the proportion of value creation associated with services within traditional industrial sectors.

Traditional industry examples: Automotive companies have already integrated data connectivity into their cars, built their own data centres and developed data analytics tools, and are increasingly generating a share of their revenues from these services. Similar trends can be observed in agriculture, machinery and chemicals, where manufacturing processes are becoming increasingly data-driven. In the Netherlands, for example, a public-private partnership has set up a [smart industry value centre](#), offering a secure way for companies in different industries to exchange or combine their data.

The key **economic aspect** of data is that, unlike physical goods, it cannot be consumed or owned. To be truly valuable, data must be processed and analysed. The "consumption" or processing of data is **non-competitive**: one user's consumption does not diminish the availability of the data for others. Multiple users can access and use the same data simultaneously without depleting it. For instance, a user might upload identical information (such as photos, contacts, or location data) to various services, and companies can analyse the same datasets. Given this, focusing on **data access** rather than ownership seems more practical to harness the innovation and development potential of data.

Besides the non-competitive consumption of data, another important economic feature is that its processing, like any other factor of production, offers **diminishing economies of scale**. Although it was once believed that more data is always advantageous, research ([here](#) and [here](#)) indicate that the benefits of enlarging datasets diminish⁴. Another crucial factor affecting the competitive edge of data-rich companies is the **timeliness of the data**. The value extracted from data often hinges on its accuracy, making the efficient collection and processing of relevant, up-to-date data potentially more significant than amassing a larger but outdated dataset.

⁴ [Rethinking big data: A review on the data quality and usage issues](#), ISPRS Journal of Photogrammetry and Remote Sensing (2016) and Lerner, Andres V., [The Role of 'Big Data' in Online Platform Competition](#) (2014).

2.3 The balance between data sharing and data protection

As illustrated above, we believe that responsible data sharing and access are advantageous for society overall. Research, development, and product innovation often rely on open access to data. However, a crucial limitation to the **principle of data sharing** is the **principle of data security**, encompassing both general cybersecurity and the protection of personal data. For companies providing B2C services, implementing robust data protection principles and practices is essential to balance privacy protection with access to valuable data.

We advocate that standardisation, both within and across industries, is the most effective means of supporting data sharing and portability.

EU and national policymakers should therefore promote the **development of industry-led standards** to ensure that data sharing practices within the EU single market evolve in a responsible and coordinated manner. These common standards will be complemented by **information security and transparency requirements**, which will also be mandated by the forthcoming AI Regulation (currently under negotiation), the EU Data Act, and the GDPR, which stipulates technical and organisational measures. It is crucial for legislators to maintain a balance, as excessive transparency requirements could compromise data security by making systems more susceptible to malicious attacks. Protecting data during the release process is especially important, as it is at its most vulnerable while being transferred between services (refer to section III/2 for industry best practices).

Additionally, data usage must be secure and efficient. It is essential that data, along with the insights derived from it, remains accessible to the public, including for public interest and research purposes. Another aspect of openness that policymakers should address is **the effective availability of open source data**. Often, data that are meant to be publicly accessible and in an open format are challenging to use because they are hard to locate.

Data protection is a crucial component of data sharing and cannot be separated from it. Alongside promoting industry standards, supporting the development of **Privacy-Preserving Technologies (PPTs)** is another promising avenue. For example, in online advertising markets, PPTs can play a significant role (as discussed below). While these technologies cannot replace robust data protection laws and regulatory oversight, they are essential for safeguarding personal data and maintaining consumer and business **trust** in digital services and the digital economy at large. Encouraging the development and use of PPTs can also have a positive impact on innovation by supporting data-driven analysis while minimising the privacy risks for individuals. The advancement of data-sharing solutions towards privacy-preserving protocols is expected to enhance the privacy standards of today's online and digital ecosystem.

Privacy concerns have gained substantial attention in recent years, particularly with the widespread use of **third-party cookies**, also known as "tracking cookies".⁵ The industry recognises the conflict between the advertising-driven ecosystem that provides free access to online content—supporting the

⁵Third-party cookies, which are set by entities other than the website operator, are used to gather information about user behaviour to deliver relevant advertisements.

livelihoods of numerous websites, news outlets, and content creators—and the increasing demand from users for enhanced online privacy. As a result of this conflict, and partly due to the GDPR, most browsers have begun or are planning to phase out support for third-party cookies.⁶ Given that a significant portion of the online advertising market still relies on third-party cookie technology, the transition away from these cookies needs to be a carefully considered and widely agreed process. The advancement of digital marketing strategies must therefore balance the requirement for a targeted advertising ecosystem with the imperative to safeguard and respect online privacy. Privacy-Preserving Technologies (PPTs) represent a substantial investment by market players aimed at achieving this balance.

3. Proposed actions related to the data economy

3.1 A well-defined and consistent definition of data

The definition of data is a fundamental issue in the data economy, and a consistent set of definitions is the first step towards consistent regulation of data sharing and portability. First, the GDPR introduced a definition of **personal data** in European law in 2016 (which defines personal data as "any information relating to an identified or identifiable natural person ("data subject)"). The concept of **non-personal data** is defined in the 2018 Regulation on the free movement of non-personal data as "Article 4. 1 of GDPR", i.e. as an inverse of personal data.⁷

With the intention of creating a **single** definition of data, the draft EU Data Act, which has been under negotiation since February 2022, includes a **data definition** covering both personal and non-personal data: "*any digital representation of acts, facts or information, or any compilation of such acts, facts or information, including in the form of a sound, visual or audiovisual recording*" (Article 2(1)). This proposed definition looks at data as a source of information. Although it only applies to data in digital form, it may be too broad in practical terms and lead to **legal uncertainty**, especially in relation to the GDPR.

⁶Mozilla's Firefox has blocked third-party cookies by default since 2019, and Safari (Apple) has done the same since 2020. The market leader, Chrome (Google), has also announced plans to implement this measure by 2023.

⁷ See Article 4(1) of the GDPR (General Data Protection Regulation) and Article 3(1) of Regulation 2018/1807(EU) on the framework for the free movement of non-personal data in the European Union.

This uncertainty is likely to increase with the implementation of the ePrivacy Regulation, which has been under negotiation since 2016. Additionally, it is essential to consider how the Digital Markets Act (DMA) and the Data Act align with each other.

Therefore, we believe it is essential that any definition introduced by the Data Act (or any other legislation) is **clearly and precisely defined** in both its content and scope, particularly when it pertains to non-personal data. Such legal uncertainty could **pose a significant threat to European competitiveness**.

In our view, the existing definitions, which partially overlap yet differ in content, **should be harmonised**, rather than introducing new data definitions, to foster a robust digital data economy. It is crucial that this definition is **consistent and standardised across Europe** to ensure it does not compromise the freedom to provide services within the EU internal market, including enabling European start-ups and companies to develop new services. In other words, the quality of digital services available to European users should not fall behind those offered to users in the United States or Asia. Establishing a digital single market for services, which are common in the digital economy and often operate across borders, is a crucial priority for enhancing competitiveness and necessitates EU-level regulation. If Member States regulate certain aspects individually, it could lead to a fragmented regulatory landscape, creating compliance challenges that could negatively impact the delivery of these services.

3.2 Ensuring easy portability of personal data

We believe that in the current era of pervasive digital services, the process of transferring personal data from one service provider to another should be straightforward, simple, and secure for users. Data portability is a crucial factor in enhancing competition in digital markets, as it provides new opportunities for both service providers and consumers, especially when it helps diminish the issue of *walled gardens*.

In collaboration with various stakeholders in the digital industry, several tools have been developed to facilitate the export of personal data from one service to another, and optionally, to transfer it to additional services. These data portability tools must be easily accessible, user-friendly, and, importantly, interoperable.

Industry example: The [Data Transfer Project](#) is an open source project developed jointly by Microsoft, Apple, Google, Facebook, Twitter and others. Its aim is to increase user access to storage devices by enabling any company to create a secure and scalable proprietary storage solution. The Data Transfer Project supports the **direct** transfer of data between service providers. Without this, users will first have to download their data to a personal device and then upload it again to the new service. In addition to the inconvenience, limited storage space and or expensive mobile bandwidth further reduce the attractiveness of such non-direct solutions.

However, strong data protection and security safeguards should not be compromised during data transfer. Service providers involved in data portability transactions must therefore enforce **stringent**

privacy and security protocols to guard against unauthorised access, data theft, and various types of threats or fraud. This need for robust security is addressed by the following industry best practices:

- Authentication: To complete a download, users must re-authenticate their account, even if they are already logged in. This may involve two-factor authentication and additional security measures, particularly if the account is deemed vulnerable or the download originates from an unfamiliar device.
- Encryption: Data is encrypted during transfer to the user's device or a third-party service provider (such as Dropbox).
- User notification: Users will receive notifications through multiple contact points before the export begins, to prevent account breaches.
- Delayed delivery: The delivery of exported data may be delayed to counteract scenarios where an unauthorised individual gains access to a user's account and attempts to access or duplicate their data.
- Archive expiry: The archive data is only available for a limited time, after which the account must be re-authenticated and the data re-exported.

Recognising these benefits, data portability also has a **legal basis** in the EU. The 2016 General Data Protection Regulation introduced a very strong portability right for European users (Article 20 GDPR). This right could be fully exploited if EU and national policy makers encouraged greater use of direct forms of portability (i.e. service-to-service).

3.3 The importance of portability of non-personal data

The portability of non-personal data represents a great potential for innovation through the acquisition, sharing and structured evaluation of **industrial data, which is still largely untapped**. Industrial data refers to information generated by specific industries, such as small and wholesale trade, ICT, energy or agriculture: data generated by machines, data describing the functioning of manufacturing and supply chains, productivity data, etc. The EU Data Act, which is currently under negotiation, contains rules on the sharing of this data. The declared aim of the EU Data Act is to promote data sharing in three areas for a competitive and fair data economy: i) the sharing of data generated by the use of consumer services with the user of the service (B2C data sharing), ii) the transfer of data by data owners to data recipients (B2B data sharing), iii) and the provision of data by data owners to government organisations on an exceptional need basis in order to fulfil their public interest mission (B2G data sharing).

The proposal is particularly relevant in the B2G context, given that in the area of data sharing between companies and governments (here: public sector bodies in the broader sense), many data providers with relevant data are multinational companies. This is the basis for a single set of EU rules. While possible future detailed rules could be set at national level, fragmentation resulting from the adoption of national rules, which could lead to increased transaction costs and lack of transparency, should be avoided.

As we saw in the introduction, the data-driven economy is far from being an unregulated area at EU level. Therefore, while the declared aim of the Data Act is welcome, it will be extremely challenging **to achieve consistency in the detailed rules** between the DSA, the DMA, the AI Regulation, the Data Governance Act (DGA), the GDPR, the e-evidence Regulation 2018, the e-Privacy Bill and the legislation on cloud service providers - not to mention the transatlantic renegotiation of the Privacy Shield agreement. The European Data Protection Board (EDPB), which brings together national data protection authorities, [has recently warned](#) that legislation such as the DGA or the Data Act could undermine the application of existing data protection rules.⁸

In a domestic context, we consider the Act on [National Data Assets](#) of 2021 to be a step forward, which sets out the basic framework for sharing public data, i.e. certain conditions for access to and information about data. It may be worth exploring along these lines to which other areas the data sharing rules could be extended.

4. Building a cloud-friendly ecosystem

4.1 The economic benefits and current prevalence of cloud technologies

As noted in the introduction, cloud technology enables us to **view computing as a service**: scalable to precisely meet user needs, accessible from any location, and consistently updated with the latest technologies. Transitioning from on-premises to the cloud allows businesses to leverage on-demand services and achieve significant economies of scale without the necessity of constructing costly server farms. Previously, large companies were often perceived as efficient yet slow-moving, while smaller firms were seen as nimble but required to rebuild systems frequently. The cloud mitigates many of these distinctions, enabling large corporations to maintain the agility of a start-up, and allowing start-ups to access the same level of computing power and security as the leading global technology firms. Additionally, the cloud lowers the barriers to experimentation and innovation, as it eliminates the need for substantial investments in new IT infrastructure and computing solutions. Instead, businesses can utilise cloud capacity and services as needed for specific projects.

A snapshot of Europe: In 2021, 42% of EU businesses will be using cloud computing, a 6% increase compared to 2020 (36%) and more than double the share in 2016 (19%).⁹ Although the proportion of firms with internet access was similar across EU countries, cloud use varied significantly, with the highest levels in Sweden and Finland (75%), the Netherlands and Denmark (65%) and the lowest in Bulgaria (13%) and Romania (14%). **Hungary ranks 24th** (26%) - while the EU average is 42%. The vast majority of businesses across Europe utilise cloud-based email systems (79%), with two-thirds also employing them for file storage (68%) and office software (61%), and more than half using them for

⁸ European Data Protection Board Statement on the Digital Services Package and Data Strategy, 18 November 2021.

⁹ Cloud computing used by 42% of enterprises. Source: [Eurostat, 2021](#)

security software (59%). These businesses also rely on the cloud for more advanced end-user applications, including finance/accounting (48%), CRM (27%), and resource planning (24%). Among the more advanced cloud services, over half (59%) of enterprises use cloud-based security software, 47% store their company databases in the cloud, and one-fifth (21%) engage in application development and testing.

Cloud computing is facilitating and **accelerating a digital transformation** that no industry can afford to ignore. Cloud usage not only reduces IT system energy consumption, thereby enhancing sustainability, but also proves cost-effective. The financial advantages of cloud technologies, both at the level of national economies and individual enterprises, are well-documented. For instance:

- A Deloitte survey commissioned by the European Commission found that cloud adoption has led to a 20-50% reduction in overall IT costs ([Deloitte, 2016](#)).
- McKinsey forecasts that cloud benefits could generate more than \$1 trillion for the global economy by 2030 ([McKinsey Global, 2021](#)).
- According to Public First's [2020 UK survey](#), the cost of cloud services is recouped many times over, with an average payback of double and up to ten times for the top 10% of customers. A similar Deloitte survey of the [North American market](#) revealed a 2.5-fold return on investment, indicating that every dollar spent on cloud technology generates \$2.50 in net revenue.

4.2 The importance and potential tools of a cloud-first strategy

However, cloud adoption among companies in **Hungary is considerably below** the EU average and varies greatly across the country. Meanwhile, domestic government agencies are implementing cloud technology through the on-prem [Government Cloud](#) (KOF). We believe that the value and potential offered by widespread cloud technologies are too significant to ignore. Failure to capitalise on these opportunities will exacerbate the competitiveness gap.

To expedite the adoption of cloud technology in Hungary, we recommend that **decision-makers commit to its integration**, as it is crucial for a nationwide transformation. Policymakers have several tools to encourage cloud adoption, including establishing a supportive regulatory environment, facilitating funding, and leading by example with public sector institutions. To fully realise the benefits of cloud transformation, it is essential for public sector entities to experience the advantages of the cloud, such as enhanced innovation and cost efficiency. Therefore, it is advisable to develop and consistently implement a **comprehensive cloud strategy**, which should also include plans for acquiring necessary skills and competences.

Many countries globally (such as the United States, Philippines, Bahrain, Chile, Argentina, Canada, New Zealand, Australia, and Singapore) and in Europe (including the United Kingdom, Estonia, Belgium, Greece, Czech Republic, and Italy) have adopted "**cloud-first**" policies to enhance agility, reliability, security, and innovation in government services.

*The UK's cloud strategy is a notable success: since the introduction of its [Cloud First Policy](#) in 2013, which mandates that government departments **prioritise public cloud solutions**, The strategy was binding for the central government and strongly recommended for the wider public sector. The UK has set up a digital marketplace ([G-Cloud](#)), based on framework agreements with market service providers, where public authorities can procure the cloud services they need. G-Cloud allowed new providers to join the list of approved suppliers every six months. This dynamic solution enabled more than half of the procurements to be allocated to smaller businesses (worth over £1 billion annually), resulting in substantial growth for more than a thousand smaller innovative companies, as they could compete on an equal footing with larger firms. It has led to job creation, increased tax revenues, and, according to the UK National Audit Office, every £1 spent on G-Cloud has saved at least an equivalent amount.*

Subsequent **public procurement mechanisms**, such as the [Digital Outcomes and Specialists Framework](#), have further lowered barriers for innovative businesses, fostering a more diverse and sustainable supply chain for large and small enterprises alike. This approach has been instrumental in the growth of the UK's digital economy, which represents approximately 15% of the overall economy. Similar approaches have emerged in the Visegrad countries: Poland, for instance, has also implemented cloud-friendly public procurement systems.

A crucial component of a cloud-first policy is the development of modern **data classification systems**, which are essential for effective **cybersecurity risk management**. This risk management is crucial in the present day, as any system directly or indirectly linked to the Internet serves as a potential attack surface, irrespective of its physical location. As technology continues to advance and alter the threat landscape for users, public policy makers should consistently re-evaluate and shape their data management and privacy strategies, alongside their risk tolerance.

The traditional model of "full stack control" in data management has been undermined over the past decade by two factors. Firstly, the majority of attacks now originate from remote locations, with the physical location of the data having minimal or no influence on attacks transmitted via the internet. Secondly, the risk of insider threats has grown: the overwhelming majority of significant data breaches are caused either by unintentional human error or by malicious actions from individuals with access to the data.

The physical location of the data has no effect on the factors listed above. Breaches do not necessitate physical access to the server but instead take advantage of the absence of robust logical security controls. Nowadays, the most effective mechanisms for protection, detection, response, and recovery are provided by security and encryption solutions offered by hyperscale market providers through automated processes.

Data security requirements may differ according to the level of data classification. It is advisable that, when developing the CFP, government agencies consult with cloud providers to understand how cloud technology can support various levels of data classification (e.g. familiarity with the most advanced end-to-end encryption solutions can be beneficial in realising the advantages of the cloud). A modern, cloud-compatible data classification system will ensure stronger protection of government information and assist in making more informed decisions regarding the access, storage, and transmission of

government data. Data classification specifies the safeguards necessary to protect different levels of data, standardises access, and reduces costs. It will also enable both business and public sector entities to better utilise and manage appropriately classified data.

To cite the British example, a three-tier [data classification](#) system was introduced in 2014: i) official, ii) secret, and iii) top secret. The UK government has classified approximately 90% of the data it handles as official and has determined that it is suitable to use trusted cloud providers for running workloads with this data. This cloud-centric UK approach, based on the UK National Cyber Security Centre's (NCSC) [Cloud Security Principles](#), has been successful in ensuring that the latest technologies are employed in a straightforward and cost-effective manner, thereby alleviating unnecessary burdens from individual government departments.

4.3 Costs of data localisation obligations

As discussed earlier, when cybersecurity risk management is grounded in a suitable data classification scheme and consistently implemented, the physical location of the data does not influence security. However, a significant issue within the cloud services ecosystem across Europe is the tension between national regulations that either promote the free flow of data or enforce **data localisation requirements** for security or sovereignty reasons, representing two opposite ends of the spectrum. In this context, Hungary adopts a more stringent approach. Nevertheless, this method of ensuring data security and control brings with it substantial economic and social costs, as well as challenges in feasibility. Enforcing data localisation imposes significant burdens on compliance officers, stemming from factors such as the expense of local employment and infrastructure investment, the deviation from standard IT solutions within the organisation—thereby diminishing the system's resilience and robustness—and the legal uncertainty associated with the unpredictability of data localisation requirements. These additional costs are often passed on to consumers.¹⁰ Furthermore, there are costs related to deterring economic operators from conducting business in a particular jurisdiction, leading to a reduction in tax revenue and the social costs of depriving the public of a valuable service. Beyond economic concerns, data localisation also presents feasibility challenges, as it assumes that the data controller can determine the geographical location of the data under its control. However, this is not always feasible, particularly in cases of "shared storage" designed specifically for data security purposes.¹¹

We therefore suggest considering a relaxation of data localisation requirements based on a multi-factor, proportional data classification scheme. This approach could take into account factors such as the sensitivity of the data (e.g., health data), the nature of the data controller (e.g., a public sector data controller), the purpose of the data processing, as well as the direct and indirect, domestic and international impacts of these measures.

¹⁰ European Centre for International Political Economy (ECIPE), [The cost of data localisation](#), No. 3/2014.

¹¹ In shared storage, rows of a database table are stored individually on servers across the globe—each partition being a 'segment' that holds sufficient data to be functional, but not enough to re-identify an individual.

4.5 Cloud-related expertise and human skills

The development of digital skills is emphasised in the first pillar of the Digital Agenda for Action, but it should also be noted that human expertise is crucial in the realm of cloud services. Using a device or system without adequate preparation can hinder efforts to achieve data security or data portability, even if the technology itself is capable of supporting these goals. For instance, one of the benefits of open-source platforms is that the skills acquired on one platform are easily transferable to another similar platform—meaning that as more products are developed on open-source, more people will possess the skills to use them. A good industry example is [Kubernetes](#), an open-source container-based application management software, which has now been adopted by all major cloud providers and significantly enhances portability.

Developing digital skills, including cloud expertise, **is also vital within the public sector**, where attention should be focused on addressing outdated technology, modernising and enhancing security solutions, and introducing public procurement reforms to foster growth and innovation. This could begin with training operational government managers on the operational, business, and other changes brought about by digital transformation.

4.6 Arranging government access to data in the cloud

The advent of digital data in the cloud for law enforcement has highlighted an **ongoing conflict** between law enforcement agencies, which seek cross-border data access, and data protection authorities, which aim to safeguard personal or business data within national boundaries. This legal and sometimes political conflict of interest creates significant uncertainty for both business users and providers of cloud technologies. Large cloud service customers are concerned that data transfer requests based on the laws of foreign countries could potentially compromise their confidential information. Meanwhile, service providers face a decline in business trust in cloud solutions. Despite the business and economic advantages that cloud technologies offer, **these benefits are somewhat constrained**. Many cloud service providers are now integrating advanced technology into their offerings to safeguard both non-personal and personal data.

The ongoing dispute between the European Union and the United States over the conflict between the GDPR and the US CLOUD Act is well-known, though it is not without its complexities. This disagreement was a major factor in the dissolution of the **Privacy Shield** agreement, which was the legal framework for data transfers between the EU and the US, and was invalidated by the Court of Justice of the European Union in 2020.

Given the significant legal uncertainty, we **warmly welcome** the [announcement](#) by US President Biden and European Commission President Ursula von der Leyen of an agreement in principle to renew the Privacy Shield data flow agreement on 25 March 2022. It is also in the interest of the domestic digital industry to end the period of uncertainty over data flows between the US and the EU, and we recommend that the Hungarian decision-maker support the negotiations. The high-level political agreement is a very promising development. However, since the legal drafting of the actual agreement will only commence afterward, it will still be some time before a formal agreement facilitating secure data transfers is reached.¹²

5. Decision-makers' proposals

In the future, we propose a detailed examination of the above issues, supported by consultations with market actors and impact studies, and the development of concrete action plans. When designing them, we recommend considering the following:

5.1 To develop the data economy

- Establishing a precise definition of data and clarifying related concepts.

¹²Until this is accomplished, the primary mechanism for data transfers will remain the standard contractual clauses (SCCs) under Article 46(1)(c) of the GDPR.

- Setting clear rules for non-personal data generated in the private sector, ensuring alignment with the expanding EU regulations.
- Continuing to balance data protection with data security, particularly by promoting industry-driven standards.
- Facilitating the easy portability of personal data.
- Enhancing secure government access to data in the cloud.
- Increasing transparency, including informing individual right holders and ensuring open and consistent access conditions for data in B2B and B2G interactions.
- Raising public awareness by promoting digital literacy and the mindful use of digital tools among the population.

5.3 To establish a cloud-friendly ecosystem

- Develop a cloud-first policy for government and a modern data classification system to underpin cybersecurity risk management.
- Introduce a cloud-compliant procurement mechanism and, based on this, create a hybrid cloud solution (combining public and government on-premise options) to deliver innovative and cost-effective services for government needs, utilising the most advanced technological solutions available.
- Encourage the adoption of cloud services in the public sector through public-private partnership (PPP) arrangements (e.g. in healthcare), aligning public and private sector goals, resources, and risks.
- Provide national or regional (e.g. V4) cloud-based technical support for start-ups and SMEs, to create the essential conditions for innovative business solutions that might otherwise face obstacles.
- Maintain copyright royalty exemptions for cloud services, with the exception of those related to private copying.

Innovation

1. Introduction

1.1 What do we mean by innovation?

Innovation refers to the process that stems from a creative idea and brings it to fruition. The theoretical foundations of innovation were first introduced in Schumpeter's study in 1934. Today, the following types of innovation are distinguished: the introduction of a new product, the adoption of a new manufacturing method, the opening of a new market, the acquisition of a new source of raw materials or semi-finished products, the reorganisation of an industry. Innovation differs from creativity in that it describes a process where creativity, which is the initial stage involving the generation of new ideas, concepts, or visions, is a foundational element. Creativity (such as an inventive idea) becomes innovation when it is realised — meaning that the invention or tool begins to be produced and the idea is ultimately applied in practice. In other words, creativity transforms into an innovative product when it is implemented and used in daily practice.

According to the Hungarian Association for Innovation (https://www.innovacio.hu/1g_hu.php), "The generation, utilisation, and dissemination of knowledge are crucial for economic growth, development, and a robust national presence, making the accurate measurement of innovation a key issue. Recently, the nature and emergence of innovation have evolved, necessitating new indicators that better capture these changes and provide suitable tools for policymakers to analyse innovation processes."

Several related studies were conducted in the 1980s and early 1990s, leading to the publication of the first edition of the Oslo Manual in 1992, which introduced a set of relevant concepts and tools. Since then, the manual has undergone multiple revisions, with the content being updated in collaboration with the OECD from the third edition onwards. The 4th edition is currently in circulation and [can be downloaded from the NRDIO website](#), which defines innovation as "*a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practice, workplace organisation or external relations.*"

The initial definition in the first edition was quite restrictive, focusing solely on manufacturing technology products and processes. The second edition expanded the scope to include the services sector, while the third edition introduced a more comprehensive definition, akin to the current one. This revised definition, unlike its predecessors, omitted the term "technology" and incorporated marketing and organisational innovation.

According to the Hungarian Association for Innovation, this broader definition makes innovation more accessible to less R&D-intensive companies and the service sector.

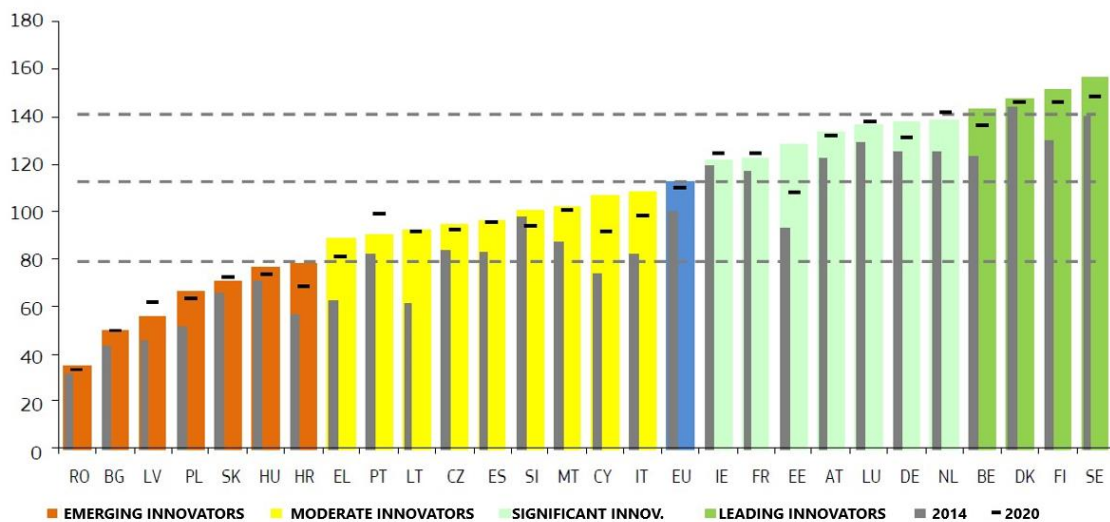
1.2 Working method

The discussion paper was informed by interviews with key stakeholders in the field of innovation in Hungary, including those from academia, large corporations, government, and start-ups. These discussions yielded several intriguing ideas, which were used to examine various facts and subsequently shape the professional stance presented in this paper.

2. Situational analysis

2.1 General summary, Hungary's place in the international innovation ranking

Hungary is currently among the worst performers in innovation among EU Member States. According to the European Innovation Scoreboard, Hungary was placed 22nd out of the 27 EU countries in 2021, categorising it as an emerging innovator alongside Romania, Bulgaria, Lithuania, Poland, Slovakia, and Croatia. Hungary's position in these rankings has remained relatively stable for several years, with no notable changes in measurable metrics and only modest improvement since the 2014 baseline. As depicted in the figure below, Hungary continues to lag significantly behind the EU average.



(Source: European Innovation Scoreboard 2021)

Among the numerous indicators assessed by the EU, Hungary excelled in only three areas: the proportion of foreign doctoral students in higher education, the export of medium and high-tech goods, and the level of government R&D funding. While government R&D funding appears to be a crucial indicator and a significant driver of progress, some argue that increased government support alone is insufficient and that meaningful structural changes are required rather than merely more financial investment in an ineffective system. Despite Hungary's R&D expenditure being 1.4% of GDP, well below the EU's target of 3%, most experts surveyed—each with different perspectives on the domestic innovation landscape—remain optimistic and note positive trends.

Despite Hungary's relatively poor standing within the EU, most experts interviewed, each offering varied insights into the domestic innovation ecosystem, remain optimistic and recognise positive trends. They agree that while there are adequate R&D resources available, the main barriers to innovation are not financial but rather stem from a lack of willingness to innovate, human resource issues, and problems with knowledge sharing and collaboration. This is especially evident in the SME sector, which is largely excluded from the innovation ecosystem.

Hungary's innovation landscape is also affected by what is known as the European paradox. This phenomenon suggests that, while Europe, including Hungary, excels in research and scientific discoveries, it struggles to translate these discoveries into commercially viable products. In other words, despite having strong foundational research, there is a lack of culture and infrastructure to convert these into successful businesses, and the startup ecosystem remains insufficiently developed. Additionally, in certain areas such as software patenting, the legal framework is inadequate, placing Europe at a competitive disadvantage compared to the US and Asia.

2.2 Key players in the domestic innovation scene and their situation

2.2.1. State, government

As of this writing, the new government of Hungary has not yet been established. Therefore, this section will describe the governmental structure from the 2018-2022 term.

The Ministry of Innovation and Technology (ITM), led by Dr László Palkovics, the Minister of Innovation and Technology, is tasked with advancing innovation in Hungary. Under the direction and supervision of the ITM are, among others, two agencies that are important in the innovation ecosystem, the National Research, Development and Innovation Office (NRDIO) and the National Intellectual Property Office.

The NRDIO is the budget body responsible for the public funding of R&D and innovation in Hungary, i.e. it is the budget body responsible for the management of national and EU RDI proposals. The Express Innovation Agency (XIA) is a separate company under the NRDIO, which operates the Hungarian Startup University Program (HSUP). HSUP is the nation's inaugural unified higher education startup programme, integrating all elements of the innovation ecosystem, including investors, universities, entrepreneurs, and professional organisations. While it does not offer financial support, it provides mentoring and various opportunities for those involved in the programme.

As the Hungarian Intellectual Property Office (SZTNH), it is responsible for safeguarding intellectual property, including industrial property rights. Beyond legal protection, SZTNH is also engaged in research, legislative preparation, and awareness-raising activities.

In the Triple Helix Model, the government collaborates with other innovation stakeholders to promote innovation by creating platforms that enhance the innovation culture. These arenas can be virtual, such as [Territorial Innovation Platforms](#), or physical, such as the [National Laboratories](#) or the Science Parks that are being set up.

Elements of the Hungarian innovation ecosystem institutions



17

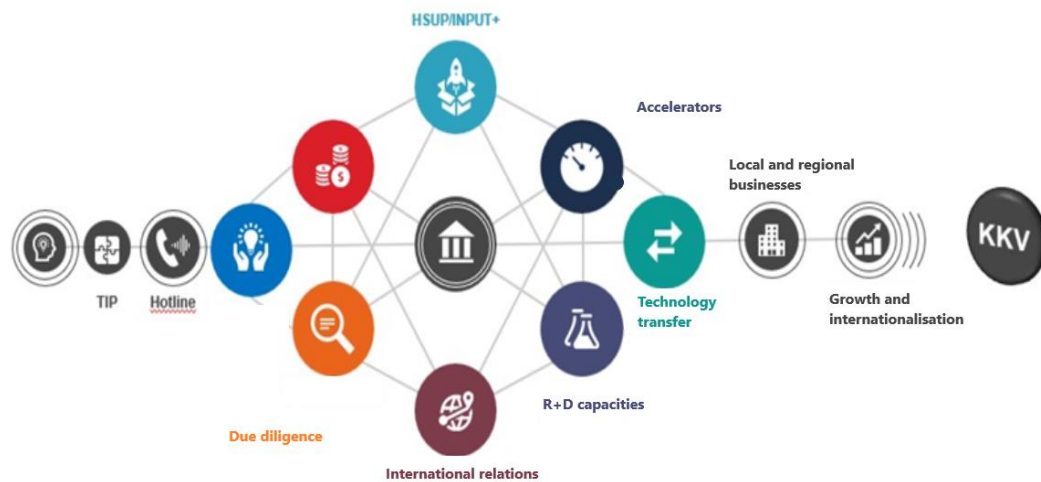
Source: ITM

2.2.2. Universities, research institutes

In Hungary, approximately half a dozen higher education institutions offer high-quality technical education and are regarded as pivotal to university-led innovation, though innovation also plays a significant role in fields such as agriculture and medicine. Today, universities focus more on delivering market-oriented, high-quality research services, typically to the R&D departments of major companies, in addition to conducting fundamental research that supports future innovations. There are four tiers of business-university collaborations, which operate concurrently and build upon each other. The first tier involves internship opportunities provided by companies. The second tier includes practical experience where companies assign research topics, offer external consultants, and students work on these topics over multiple semesters. The third tier encompasses joint research and measurements, while the fourth tier consists of ongoing joint research activities that establish university laboratories supported by companies.

Beyond partnerships with large corporations, there are also European-level networks of universities with similar profiles. These networks primarily aim to participate in EU tenders together but also facilitate extensive experience sharing and optimal utilisation of resources.

University centred innovation ecosystem



Source: ITM

2.2.3. Large companies

In Hungary, corporate innovation is primarily driven by large companies. However, for multinational corporations, it is common for the R&D departments of Hungarian subsidiaries to lack independent decision-making authority regarding research direction and resource allocation, although there are exceptions. As discussed in the previous chapter, research is usually conducted in collaboration with universities. This collaboration is largely driven by financial considerations: university research can often be fully funded by grants, whereas large companies typically receive only 45-50% of their funding from such sources. Additionally, these partnerships provide an opportunity for companies to enhance their human resources through their work with universities.

2.2.4. Small and medium-sized enterprises

The sector that requires the most attention in terms of innovation is SMEs. Despite SMEs representing 99% of all domestic businesses and employing two-thirds of the workforce, innovation within this sector remains minimal. According to the NRDIO survey, 70% of SMEs do not innovate at all, and 86% of them do not innovate because they do not see the benefits or direct economic advantage. There is also a significant issue with the effective management of intellectual property rights, including the patenting and protection of such rights. Despite the availability of numerous funding opportunities, the application process often presents cumbersome and frequently insurmountable administrative barriers for smaller companies, diverting focus from genuine innovation and depleting valuable human resources. While individual success stories do exist, it is common for businesses that appear successful only in securing tenders to struggle with producing tangible market results and remaining operational without continued funding.

Various players in the innovation ecosystem are striving to support the SME sector's advancement in innovation. For example, the NRDIO's SME Start programme aims to assist SMEs in incorporating international innovative solutions into their operations, and the SZTNH provides protection benefits and awareness-raising activities for SMEs. Although there are university support programmes for SMEs, participation has been limited, and even fewer have completed the programme as originally intended.

2.2.5. Startups

Although start-ups generally begin as micro or small enterprises, their unique characteristics warrant a separate discussion regarding their operations.

Despite Hungary's goal in the mid-2010s to establish Budapest as the startup capital of Europe by 2020, this objective has unfortunately not been realised. Although the region has seen significant development since then, Hungary has yet to produce a new unicorn. (Unicorn is the collective name for startups with a valuation of at least \$1 billion.) Similar to the broader innovation landscape, the startup sector in Hungary lags regionally, not only behind the rapidly emerging Baltic States but also in comparison to neighbouring countries, despite showing positive trends.

Paradoxically, one contributing factor to this gap may be the excessive presence of EU and state support in the startup scene. This over-reliance on funding schemes often results in startups becoming dependent on tenders, as previously discussed for SMEs. This pressure to conform to tender requirements can detract from genuine results and innovation. Additionally, the rigid milestone-based system associated with tenders fails to adequately assess the functioning of a start-up. In early-stage funding, incubator support combined with investor logic and mentoring can assist teams that struggle to secure capital due to high risk. However, the distorting impact of this funding framework is significant. Research by Startup Hungary indicates that the pressure to adhere to tenders can distort startups to the extent that attracting genuine market investors becomes increasingly difficult once a company has pursued this route.

The reliance on grants is evident from Startup Hungary's 2021 survey, which found that 76% of the 212 companies surveyed raised external capital, with 70% of these relying solely on grants, and only 15% securing funds directly from the market.

Another major issue is that the domestic legal environment is not particularly conducive to startups. Finding an appropriate company structure can be problematic; many Hungarian startups begin as limited liability companies, which lack shares, leading to complex legal procedures and share allocations that may deter market investors. Successful start-ups often undergo a 'flip', registering a foreign company—typically in the US or the UK—where their revenue is generated, while the original Hungarian entity operates as a subsidiary of the foreign firm. Furthermore, Hungarian regulations are not well-suited to employee stock ownership plans (ESOPs), a common form of compensation for start-ups.

Looking at international examples, a major breakthrough for the startup scene in Hungary could occur if some start-ups achieve significant success, enabling their founders and employees to enter the market in substantial numbers as angel investors, thereby initiating a self-expansion cycle. The success of Skype, which triggered a startup revolution in Estonia, serves as a prime example of this process. While there have been notable successes in Hungary, large exits and subsequent investments have yet to reach a transformative level.

3. Funding, difficulties and constraints of the tendering system in Hungary

The first level of domestic funding is provided by the National Research, Development and Innovation Fund. Revenue is generated from the innovation contributions of domestic businesses and is then redistributed to innovators through the NRDIO. This funding supports both basic research, which may not immediately produce market benefits, and market-oriented developments. It offers the advantage of being consistently available and more flexible compared to EU Structural Fund resources, allowing for better customisation.

The next tier of funding is the European Union Structural Funds, accessible in Hungary through the GINOP Plus programme. This funding significantly exceeds the amount available from domestic sources.

The third tier is direct EU funding, primarily through the Horizon Europe programme. However, Horizon Europe funds are allocated such that countries in the EU's eastern region (EU-13) receive only 5% of the total, with Hungary's share in 2020 at just 0.65%. While this allocation is relatively beneficial for the EU-13, it is minimal on a broader European scale. A key regional goal is to enhance the absorption of these funds.

However, as demonstrated by SMEs and start-ups, merely increasing grant funding is not the solution. Tenders present numerous challenges and obstacles. One common issue is that the application system imposes a heavy bureaucratic burden on applicants, and often the criteria are not favourable to innovative businesses and ideas. Technical content is given less importance than ideal, while irrelevant criteria, such as the duration of the applicant company's operation, are also considered. Additionally, the application process frequently requires winners to demonstrate achievements or milestones that may be superficial, with no substantial results behind them. Ideally, an innovation project might reveal that development should be postponed or reconsidered, but the current system does not support this or encourage businesses to confront and learn from failures. Overall, this structure tends to marginalise numerous companies that appear successful but are essentially reliant on tender funding. Without these resources, many would struggle to survive in the market.

4. Goals, vision

Innovation will be the foundation of the future Hungary. Innovative technological solutions have the potential to mitigate our vulnerability to economic and social crises, enhance the country's adaptability and resilience, and foster a sustainable and long-term successful economic environment.

To advance these processes, we must strengthen connections between government systems, academic research labs, research centres, and the entrepreneurial sector. This involves creating a demand for the development and application of innovative solutions while cultivating a mindset that can engage existing angel investors. Currently, there is an excessive focus on safety and insufficient acceptance of the risks and potential failures inherent in innovation processes. Often, the approach should shift from asking "how not to?" to considering "how can we?" before arriving at a positive answer.

Additionally, the Hungarian State should leverage the tax and contribution system to create more incentives. Beyond providing various grant funds, this could alleviate the financial burden on emerging start-ups and SMEs. Tax incentives for angel investors could also encourage more firms to invest in this manner. Both EU and domestic funds should be made accessible to participants in the innovation ecosystem, with the goal of achieving high levels of business adoption and internationalisation.

Moreover, innovation should also influence societal attitudes. It is crucial to foster openness to new innovations and future-oriented technologies among the Hungarian populace, with particular emphasis on shaping the perceptions and attitudes of young people.

4.1 A legal/economic environment that supports innovation more effectively

There are currently many different sources of innovation funding available, but the legal environment makes it very difficult to ensure that the money coming into the field is put to good use. It would be worth revisiting the earlier plans to "make Hungary a startup capital" or even rethinking the European Union's [Startup Nations](#) initiative of the European Union, because if we can lay the foundations that are favourable to startups, it could boost both entrepreneurship and investment in general.

4.2 Strengthening the role of SMEs in innovation

The aforementioned NRDI survey of SMEs shows that 70% of SMEs do not innovate, and 86% of them do not believe that doing so would bring them any economic benefits. This situation may stem from the often complex and discouraging list of requirements for such applications. There is a clear need for a fundamental shift in attitude to develop an SME sector in Hungary that recognises the value of innovation, is willing to engage with it, and is open to exchanging experiences and sharing best practices. Additionally, it is crucial to introduce incentives that encourage innovation within SMEs. These should help lower operating costs, reduce tax burdens, and potentially assess or at least consider the business value of innovations.

4.3 Moving up in the EU innovation rankings

Hungary currently finds itself in a less favourable position, ranking at the bottom among *emerging innovators*, just ahead of Romania, Bulgaria, Lithuania, Poland, and Slovakia, and slightly behind Croatia. Since the ranking is based on well-measured data that takes multiple factors into account, a key objective is to break free from the ranks of the laggards and **advance at least one level up**, into the category of *moderate innovators*.

5. Proposals

There was a consensus on the importance of greater engagement from SMEs, large corporations, and multinationals, but views varied on how to accomplish this. Some believed that establishing Science Parks would enhance SME participation in the innovation process, while others argued that simply creating these parks would not suffice to achieve the desired outcome. Based on the discussions for the discussion paper, we believe the following measures are necessary to meet the stated objectives:

5.1 Wide-ranging, ongoing consultation with stakeholders in the field

The innovation ecosystem cannot thrive significantly without providing participants with opportunities for regular and more extensive consultations than are currently available. However, these consultations should remain informal, and their outcomes should be accessible to those who could not attend. Additionally, there should be an option for new participants, who were not previously involved, to join at a later stage.

5.2 Legislation to develop the innovation ecosystem

Even if Hungary does not officially join the EU Startup Nations initiative, integrating some aspects of this initiative into the national regulatory framework could foster a more conducive environment for

innovation. For instance, simplifying the processes for starting or closing a business and regulating employee share ownership schemes could be beneficial.

5.3 Reforming the tendering system

This issue can be viewed from multiple perspectives. Although there are generally sufficient resources available, we are still a long way from reaching the EU's target for RDI expenditure as a percentage of GDP. The real concern lies in how these resources are utilised. From the perspective of measurable outcomes, the Innovation Ranking List—which has been referenced several times in this document—does not present a favourable picture. The presence of isolated success stories is inadequate if they fail to become a systemic force that drives a significant qualitative advance in the domestic innovation landscape.

5.3.1 Restructuring the project management system

At present, the management of most innovation projects is akin to handling grants for more tangible assets. This creates a substantial administrative burden for businesses of all sizes, forcing them to focus on paperwork rather than on genuine innovation. A more effective approach would be to evaluate project success through ongoing mentoring and continuous dialogue with project experts, rather than relying on a fixed checklist. Such a system would better support the participation of potential start-ups in these tenders, regardless of their size. This brings us to the second point on the list.

5.3.2 Reducing success orientation

Though it may initially seem surprising, the underlying message of this statement is essentially about shifting attitudes. It's clear that organisations managing funds aim to maximise the impact of their resources, which is not in question. However, the current system fails to offer innovators the chance to learn from their setbacks, as the market does not support acknowledging these failures. When innovators are penalised for their missteps, it becomes extremely challenging for them to recover their opportunities, and their motivation can be severely affected by the loss of support. In addition to assigning experts to projects and providing technical support, it should be possible for ongoing innovation projects to pivot when necessary. During the implementation phase, it may become apparent that the project's goals are being achieved elsewhere or that the original concept is no longer viable. Recognising these failures and adjusting direction accordingly is crucial, and this connects closely to the next point.

5.3.3 Giving businesses more freedom to use resources

Certainly, innovation grants should focus on this aspect; however, tendering processes can also lead to unexpected innovations that were not initially intended. If we allow businesses the freedom to utilise the funds they have secured according to their actual needs, rather than adhering strictly to a pre-approved expenditure list, this can foster innovation. While it is crucial to **verify that the allocated resources are used effectively**, we **must also acknowledge that the definition of effective use can evolve**, as market dynamics may disrupt even the most meticulously planned projects. In line with this, it is essential that successful applicants are permitted to adjust their approach if necessary. Recognising and implementing such changes should not be viewed as a failure but as a natural component of the innovation process.

6. Summary

From the above, it is clear that Hungary has considerable work ahead to advance its innovation ecosystem. Although recent efforts have not been without impact, they have not led to significant improvements in measurable outcomes. Achieving substantial progress may require a fundamental shift in approach—a change in mindset that engages all stakeholders in the field and redirects domestic innovation onto new trajectories.

7. Sources

European Innovation Scoreboards 2021 summary:

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European Innovation Scoreboards 2021

European Innovation Scoreboard 2021 Hungary: <https://ec.europa.eu/docsroom/documents/45917>

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<https://startupnationsstandard.eu/>

Startup ecosystem

1. Introduction

For many years, IVSZ has concentrated its efforts and research on startups and the broader Hungarian startup ecosystem, aiming to foster and advance the digital economy. As a result, we deemed it crucial to highlight the startup sector as a key focus and foundational element in the third pillar of the Association for a Digital Hungary manifesto.

As a digital association, we have worked diligently to establish the Millenárís Startup Campus as both a physical and intellectual hub for Hungarian startups. As one of the founding members of Startup Hungary, our goal is to cultivate a legal and economic environment in Hungary that supports rather than hinders startups. This year, for the second time, we are producing the Startup Riport, which offers a comprehensive and current overview of the evolving startup landscape and provides insights into the needs of these teams.

Among our recent organisational developments is the creation of the Startup and Scale-up Professional Chapter. This initiative fosters collaboration among various stakeholders in the startup ecosystem—such as startups, scale-ups, venture capital funds, fund managers, incubators, and consultants—offering professional support and representation to IVSZ members. IVSZ also actively contributes to the Hungarian Startup University Programme by providing mentors for member companies and organising meetups and ideathons. These events give emerging startups, whether in their initial stages or those with established businesses, the chance to connect with Hungarian investors and experienced serial entrepreneurs. IVSZ are committed to making startup life appealing and engaging for young people across all platforms and through various means, providing necessary encouragement and knowledge in educational institutions. Our aim is to direct innovative ideas to where they can thrive and succeed, and to support the development of a domestic regulatory, legal, and economic environment that fosters the growth of startups and their entry into international markets.

The success and recognition of the Hungarian startup ecosystem on both regional and international stages are vital for the overall Hungarian digital economy and are essential for the country's competitiveness.

Startups and scale-ups are crucial drivers of economic competition, innovation, and digitalisation, playing a significant role in shaping the future of the European economy and society. Numerous examples demonstrate that high-impact global companies can emerge rapidly not only from Silicon Valley, Tel Aviv, and Western European innovation hubs but also from other regions, contributing substantial value to national economies and generating new startups that enhance a country's innovation ecosystem.

In the following sections, we will detail the importance of startups and scale-ups for the national economy, present the current state of the industry in Europe, the region, and Hungary, and propose a set of actions and a vision for the development of the startup ecosystem for the consideration of decision-makers and government officials.

Before discussing the potential of startups for the national economy, it is crucial to define what constitutes startups and scale-ups. These companies are challenging to define legally, with their specific characteristics and needs often being shaped by subjective factors. Clarifying these definitions is essential, as misconceptions and media portrayals can sometimes misrepresent the true nature of early-stage startups in Hungary, often depicting them with superficial markers of success. This is often reinforced by the media, which, without any professional criticism, portrays virtually any IT start-up with a foosball table and some external funding as a start-up on the verge of global success.

1.1 What is a startup?

Startups are companies with **high international growth potential, scalable business models and innovative products and services.**

Innovative products and services

Innovative, novel products aim to offer improved solutions to existing problems or needs compared to what was previously available. Often, the innovation within startups is not necessarily tied to technological advances but is reflected in the business model, user experience, and distribution methods.

Scalable business model

Scalability refers to the ability of a business to grow without a proportional increase in costs. A scalable business model allows a company to expand its operations significantly while keeping the cost of growth relatively low. For example, an IT consulting firm that sells the limited time of its staff does not possess a scalable model. In contrast, a company providing an Internet service, such as 'Software as a Service', can achieve rapid international growth and increase its revenue substantially without a corresponding rise in stock or resources.

International growth potential

A key feature of startups is their potential for rapid international expansion. The most successful startups often develop competitive products for large global markets from the outset, frequently bypassing the local market. Companies focusing mainly on domestic and regional markets, and replicating business models from more developed markets, should be classified as digital SMEs rather than true startups.

True startups and scale-ups exhibit clear signs of the three defining characteristics from the beginning, with their plans and achievements reflecting a global ambition.

A startup transitions into a **scale-up** when it successfully finds its market fit and begins to experience a growth phase, often marked by securing Series A funding. From a financing perspective, this can be seen as the so-called "Series A" phase. These investments now amount to €4-15 million in the region. At this stage, a Software as a Service company, for instance, would be anticipated to achieve around €1 million in Annual Recurring Revenue (ARR) and to have the capacity to double or even triple its revenue each year.

Another trait common to startups is their high level of risk and elevated failure rates. However, companies that manage to succeed on an international scale can significantly influence and benefit a country's national economy.

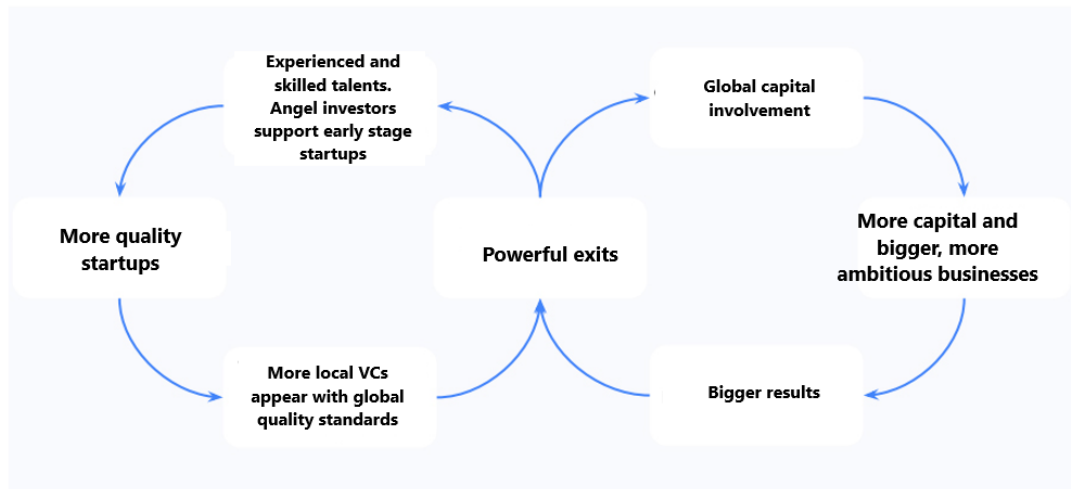
1.2 Why are startups important?

Start-ups play a crucial role in the economy not only by generating tax and contribution revenues through their rapid growth in revenue, enterprise value, and size but also by addressing and even partially reversing the brain drain. They create jobs that help retain our most internationally competitive professionals, attract Hungarian talent who have gained valuable international experience back to the country, and often draw in foreign experts.

Furthermore, successful start-ups enhance a country's image and bolster the confidence and interest of international investors in the region.

Importantly, they also have a ripple effect; one major start-up success story tends to inspire others. A single major success story in the start-up world often leads to the creation of additional successes. When a start-up achieves exceptional success, not only do the founders but also hundreds of employees can accumulate significant wealth. This wealth, along with their valuable experience, is frequently reinvested into the ecosystem as these individuals become investors, founders, and mentors for new start-ups.

The positive flywheel is at full swing, startup success motivates continuous ecosystem development



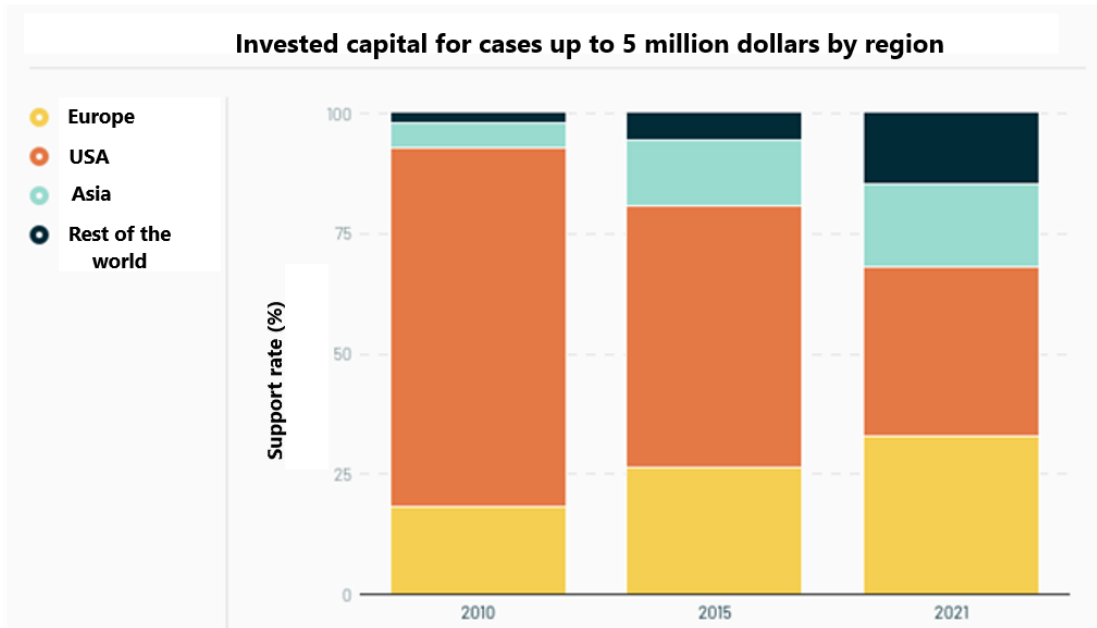
This cycle is responsible for the explosive growth of many successful ecosystems. A notable example in Europe is the "Skype effect" observed in Estonia. The company's exit, valued at over \$8 billion, has led to the emergence of more than 100 new angel investors. These investors are supporting numerous new-generation Estonian scale-ups that have achieved global success. ¹

3. European, regional and national situation

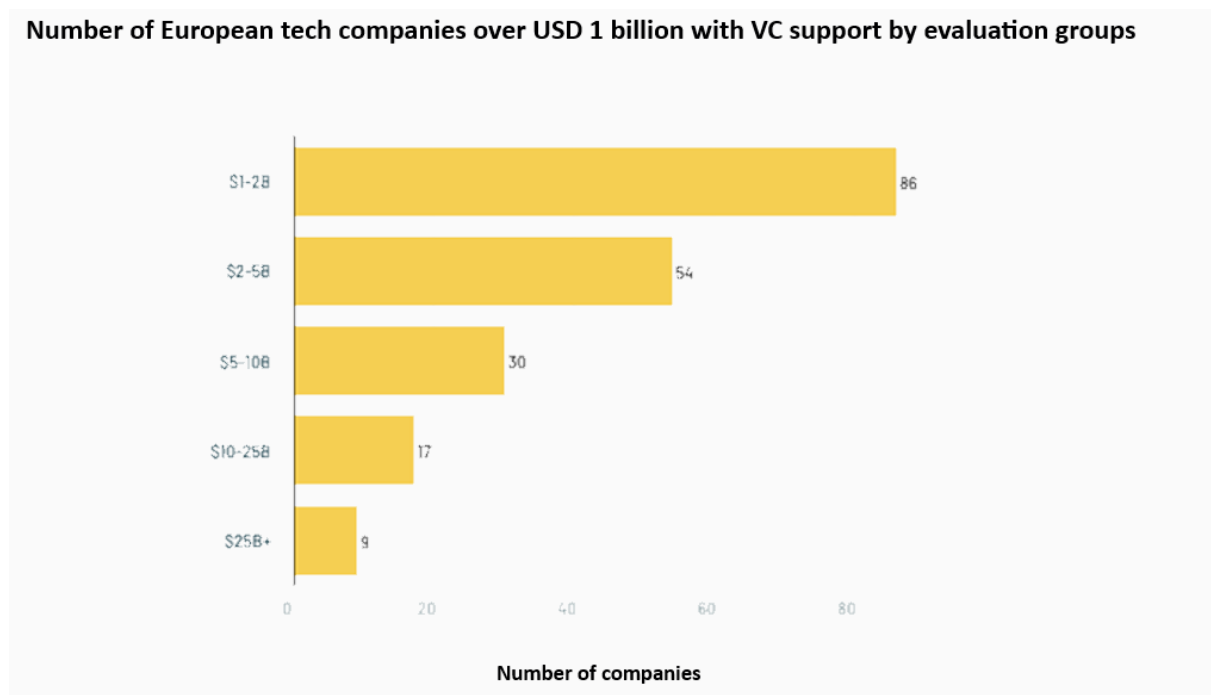
In recent years, the start-up ecosystem in Europe, as well as in the region, has experienced significant evolution. The pandemic has notably accelerated the trend towards decentralisation, making it increasingly evident that high-impact global tech companies can emerge from anywhere, not just from Silicon Valley and other prominent and established innovation hubs.

2.1 Europe

In 2021, Europe experienced **over €100 billion** in venture capital investments², marking a dramatic three-fold increase from the previous year and a tenfold rise from the 2015 figure. This extraordinary growth has been primarily driven by the increasing involvement of large US investors and their so-called "mega-rounds"—investments exceeding €250 million—which surged from 11 to 54 between 2020 and 2021. While there has been no rise in the number of early-stage seed investments (those below USD 5 million) compared to the previous year, the larger investment amounts (ticket sizes) and higher company valuations at this stage have led seed investments in European companies to account for 33% of the global capital invested at this stage, a significant increase from previous years.



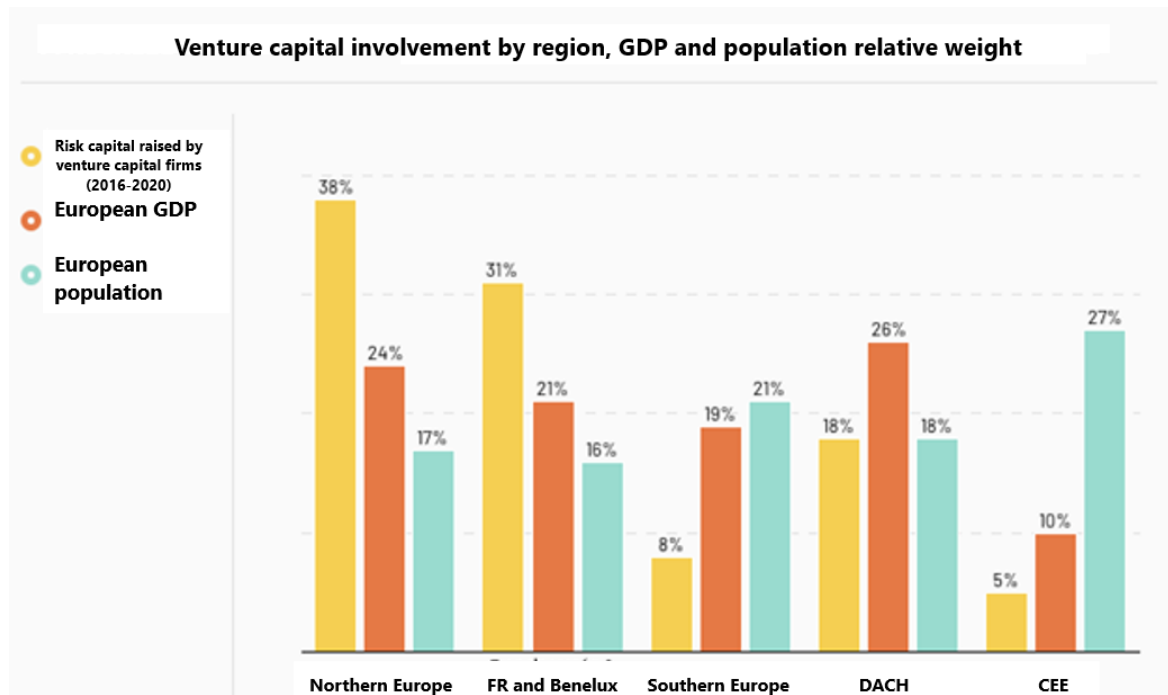
Last year, European start-ups achieved notable success in mergers and acquisitions (M&A) and initial public offerings (IPOs), with exits valued at \$275 billion. Additionally, **more than 98 European start-ups have reached unicorn status**, with valuations exceeding \$1 billion, bringing the total number of such companies on the continent to over 225. Europe has experienced a record year for the number of unicorns. For comparison, the most productive year prior to this was 2014, when the number of unicorns rose from 34 to 59. The number of European "deconsolidators"—scale-ups with a company valuation exceeding USD 10 billion—also doubled last year, with 26 such companies now operating across the continent. In the coming years, we can anticipate a further rise in the number of these high-value companies, with over 30 European startups currently valued between USD 5 billion and USD 10 billion.



The most successful European startup hubs include London, Berlin, Paris, Stockholm, and Munich. Startups from these cities account for 54% of all venture capital in Europe.

2.2 CEE

The level of venture capital investment in Central and Eastern European and Baltic countries (hereafter the CEE region) is below the European average. Although the CEE region represents 27% of Europe's population and 10% of its GDP, only 5% of European VC investment flows into the region.



Despite this lag, the startup ecosystem in the CEE region has seen substantial growth in recent years. Investment in the region reached €5.4 billion in 2019, more than double the previous record year and ten times the 2016 figure.

The growth was primarily driven by an increase in mega rounds (investment rounds exceeding €100 million), but the amount of early-stage pre-Series B investments also doubled compared to the previous year. **The presence of international investors has increased significantly.** Nearly half of the investments in the Seed (EUR 1-4M) and Series A (EUR 4-15M) stages also come from international investors outside the region. However, capital for later-stage growth rounds is typically provided by international investors with larger funds from beyond the region.

An increasing number of CEE start-ups are receiving investment from so-called "top-tier VCs," primarily Western European and American venture capital firms that rank among the world's leading and most prestigious. Some of the most active international top-tier VC funds in the region include Accel Partners, Partech, Creandum, PointNine Capital, Tiger Global, Sequoia Capital, Bessemer Ventures, Index Ventures, Kleiner Perkins, SoftBank, and Balderton Capital. These top-tier investors completed over 20 deals in the region in 2021 and have established a strong portfolio across several regional countries in recent years. Such investors not only **bring more money to the startup, but also knowledge and valuable contacts that are hard to come by in the region, and through them, flow on to the local startup ecosystem,** to other startups and local investors.



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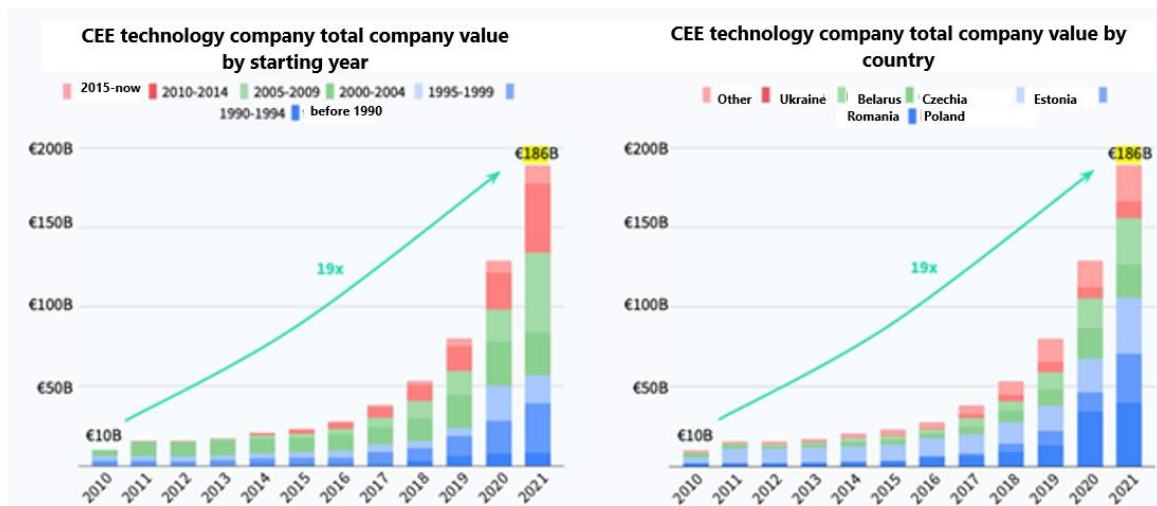
A good indicator of the maturity of the VC market in the region is the proportion of capital available to local investment funds that comes from **public and EU sources**. Between 2016 and 2020, €2.1 billion, or 27% of all capital invested in the region, came from public and EU sources, but this **has risen to 40%** in 2020, which is very high compared to the European average of 6%. Moreover, the capital from public sources was unevenly distributed between countries. **63% of these funds were allocated in two countries, Hungary and Poland**⁵.

Venture capitalists in more advanced European markets find it easier to attract both institutional and private investors. In these markets, 30% of their resources come directly from pension funds, whereas in the CEE region, pension fund investments make up only 5% of the equity funds' resources. This disparity explains why investment funds in the region are considerably smaller than their European counterparts, relying more on public resources and playing a significant role in financing regional scale-ups that have entered the more capital-intensive growth phase (post-Series A).

Despite having less capital available, the region has achieved some remarkable success stories in recent years. The number of unicorns rose from 6 to 37⁶ between 2015 and 2021. Moreover, 31% of the unicorns from the region were "bootstrapped," meaning they did not use external funding, compared to only 7% in the rest of Europe. In recent years, almost every country in the region has produced one or two unicorn start-ups, and there are over a hundred companies that could potentially become unicorns in the near future. These companies have current valuations ranging from \$100-250 million ("Rising Star") to between \$250 million and \$1 billion ("Soon-icorn").

The latest generation of unicorns in the region (2011-2020) achieved a \$1 billion valuation in an average of just seven years, compared to two to three times longer for earlier unicorns from the region. The first CEE deconsolidators, or scale-ups with valuations exceeding €10 billion, have emerged. Notable examples include the Estonian fintech giant Wise (formerly TransferWise) and Romania-based UIPath, which last year listed at \$36 billion on the New York Stock Exchange, becoming the fastest-growing enterprise software company to enter the public markets.

The total valuation of start-ups from the CEE region has reached €186 billion, a 19-fold increase since 2010.



In terms of overall company valuation, Estonia (€32 billion), Romania (€27 billion), and Poland (€25 billion) are the leading start-up-producing countries. Furthermore, the majority of the reported value of Romanian listed companies is attributable to a single company, UIPath.

Estonia stands out as the clear leader in the region, boasting the highest number of VC investments, start-ups, and unicorns relative to its population size. They have just had their seventh unicorn, when Veriff received a \$100 million investment⁷ led by Tiger Global in early 2022.

The start-up ecosystem in the other Baltic countries is also outstanding. In Latvia and Lithuania, several successful start-ups have been launched and have become unicorns. The state has built such a startup-friendly legal environment through various company law and fintech regulations that it currently tops the list of Index Ventures⁸, a renowned global venture firm that monitors how favourable regulations are, especially those related to employee stock options (ESOPs). On this list, the Baltic states are ahead of both the United Kingdom and the United States.

2.3 Hungary

In Hungary, the notable successes of first-generation start-ups established before 2010, such as LogMeIn's 2009 IPO in the US, Accel Partners' investment in Prezi, and Ustream's early strong presence in the US, were extremely rare and almost unique among regional start-ups. Hungary began with a significant advantage compared to its regional counterparts.

Since then, Hungary has seen more than a dozen successful exits, though most have been small to medium-sized. The largest start-up exits are estimated to be in the range of €100-150 million, including the acquisitions of Ustream, Balabit, and IND Group. including the acquisitions of Ustream, Balabit, and IND Group.

These companies have played a key role in initiating a crucial cycle in the development of start-up ecosystems. Founders and professionals from earlier start-ups have reemerged as angel investors, co-founders, or leaders in the new generation of scale-ups.

The Startup Hungary Foundation was established to build on this cycle. Its founders, twelve successful entrepreneurs, mostly from exit-listed start-ups, created the organisation with the support of major ecosystem players like Google, Design Terminal, IVSZ, and various VCs and large corporations. Their goal is to support the growth of successful start-ups in Hungary by sharing their experience within the start-up community.

However, Hungary has yet to see a high-profile success story or large-scale exit comparable to Skype in Estonia or UIPath in Romania, which have drawn numerous angel investors and spurred the growth of successful new start-ups.

Currently, around 10-15 domestic start-ups have achieved global reach and attracted capital from prominent international investors. Some of these have already reached valuations of over \$250 million (soonicorn), with potential for one or more Hungarian unicorns emerging in the coming years.

In early 2021, Creandum, an early investor in top-tier companies like Spotify, Bolt, and Kahoot, led the Series A investments for two Hungarian start-ups: SEON, with €10 million, and Craft Docs, with €8 million. By the end of the year, Bitrise, the only Hungarian start-up to have graduated from the renowned Y Combinator incubator, secured a record €60 million Series C investment led by US-based Insight Partners.

In addition, other firms such as Shapr3D (Point9, Creandum), Turbine (Accel Partners), Commsignia (Partech), and AiMotive (Draper, Inventure) have attracted significant investments from prominent international investors in previous years. Recent exits have also been notable, including the acquisitions of Tresorit, Starschema, Banzai Cloud, and Drops.

Despite the recent encouraging signs, success stories and somewhat accelerating events, **Hungary has been lagging behind the region in terms of the number and size of exits, company valuations and international investments in recent years.** The Hungarian start-up ecosystem has the potential to generate many more successful scale-ups, provided the right approach is widely adopted and barriers and inefficiencies are accurately identified and effectively addressed.

Currently, there is an unusually high reliance on public and EU funding within Hungarian start-ups. As previously discussed, these public and EU funds play a crucial role in supporting the start-up-focused venture capital market, especially given the limited funding opportunities available from local VCs. However, if these funds significantly deviate from market best practices and fail to boost the proportion of market-based funding, they can inadvertently distort the market and hinder the development of a robust start-up ecosystem.

It is important to differentiate between various types of funding. For instance, "public VCs" are entirely funded by public or EU sources, such as Hiventures and SZTA. On the other hand, "semi-public VCs" typically consist of around 80% EU and public funds and 20% private capital. This category includes the former JEREMIE funds, which dominated domestic start-up financing for a decade, and their successor GINOP funds, such as Solus Capital and Bonitas. This group also encompasses the Startup Factory and pre-seed funds from previous public incubator programmes.

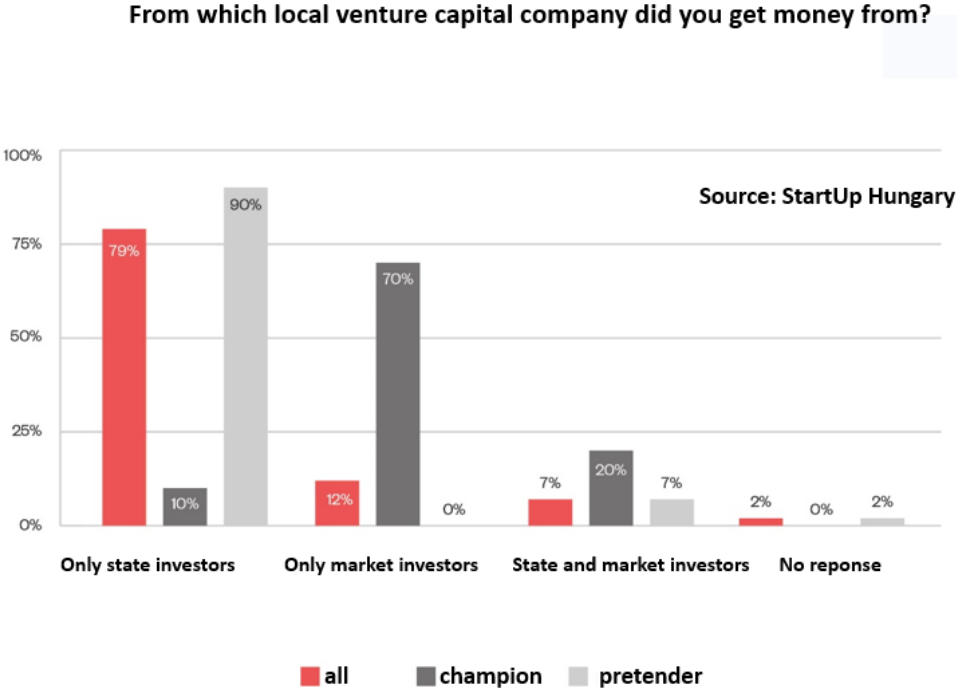
The nature of these financial resources imposes different constraints and operational practices compared to market counterparts. Start-ups often face challenges such as being required to establish their headquarters outside Budapest, dealing with limited eligible costs, managing cumbersome administrative requirements, and adhering to practices that differ from international norms. These include market-distorting valuations and milestone-linked investments, which can be problematic during the early stages of a company's development.

These less favourable conditions, coupled with the constraints associated with outsourcing such funds, create a difficult environment for start-ups, making it harder for them to thrive compared to those financed through market-based mechanisms. They are still required to invest the allocated funds even if suitable start-ups cannot be identified. Consequently, this results in numerous companies receiving financing that may not be warranted. In many cases, these businesses are kept afloat for extended periods, contrary to the "fail fast, iterate" philosophy typical of start-ups.

This situation fosters the development of rent-seeking behaviour, survival-oriented entrepreneurs, and detrimental incentives within the start-up ecosystem. Entrepreneurs frequently become more concerned with satisfying tender-like requirements rather than addressing genuine market needs. In this sense, a kind of **dual economy is emerging in the startup market in Hungary, where some startups are trying to make a living from the market and avoid public funding, while others are trying to make ends meet with the help of the state.**

There is scarcely any connection between these two realms. Only a handful of start-ups have managed to secure follow-on funding from market sources or international investors after receiving public and

semi-public support. According to the Hungarian Startup Report 2020, there is a significant gap between public and semi-public investors and market or international investors. In 2020, over 86% of start-ups backed by venture capital had received investment from public or semi-public VCs, yet only 7% succeeded in attracting funding from market sources concurrently. Conversely, 70% of "champion" start-ups, which have demonstrated growth potential, raised capital solely from "market investors."



By "market investors," we refer to venture capital funds predominantly funded by market sources. Although some market funds may also receive Community resources (e.g., EIF), these are relatively minor and do not carry the same constraints. This enables such funds to invest on more advantageous terms, forge international partnerships, and adhere to global standards.

Regrettably, there are only a few investment funds in Hungary that operate as market funds. As indicated in the chart above, it is generally these funds' portfolio companies that achieve success. The limited number of domestic, mainly market-funded VCs have managed to establish a growing international network by co-investing with regional and leading European investors. However, in recent years, these few domestic market capital firms have invested significantly more in other regional countries rather than in Hungary. This trend may explain why many domestic start-ups are optimising their operations to align with the broader public investment framework available to a wider range of investors.

4. Vision and proposals for action

Hungary is anticipated to experience its most significant startup successes in the near future, which will likely expedite the emergence of more internationally successful startups following the lead of the dozen or so Hungarian ventures already making strides.

With appropriate regulatory measures, a global outlook and startup mentality, the promotion of exceptional examples and best practices, and integration into the international mainstream, this process can be markedly accelerated.

3.1 Startup community, knowledge sharing and mindset building

One of the most effective strategies is to highlight successful startup founders, investors, and professionals with international experience both within the country and the region, ensuring their expertise is shared with the ecosystem through various platforms. This necessitates close collaboration and dialogue among the different players in the startup ecosystem.

Hungary boasts a vibrant startup support environment with numerous business incubators, competitions, hackathons, and meetups available. A particularly noteworthy initiative is the Hungarian Startup University programme, which instils an entrepreneurial and startup mindset in thousands of university students. Increasing the number of such programmes and steering their content towards a more international perspective is essential. It is also important to involve professionals who have practical experience with successful startups and international mentors in these community initiatives to provide participants with the most current and relevant knowledge.

International programmes supporting early-stage startups are becoming more accessible to regional ventures. For instance, Y Combinator, the world's leading incubator and early-stage investor responsible for tech giants like Dropbox, Airbnb, and Stripe, is annually doubling its intake of European companies¹⁰. Despite numerous regional startups being accepted, only one Hungarian company, Bitrise, has participated so far. Bitrise has since secured over \$70 million in its largest funding round and has become one of Hungary's most successful scale-ups. Encouraging startups to pursue international opportunities early and aim for the top global programmes is crucial.

Building an international network of contacts is vital for ecosystem players. Some domestic VCs have successfully networked and co-invested with their European and regional counterparts, gaining valuable experience. As more startups and investors forge relationships with international partners, the Hungarian startup community will become more integrated and recognised on the global stage. Supporting and encouraging local startups to engage in international conferences and programmes is highly beneficial.

3.2 Startup-friendly regulation

The state is an important player in the ecosystem, and in Hungary it plays a particularly important role in financing start-ups. Optimising public and semi-public funding mechanisms to align more closely with the practices and success criteria of market investors is crucial. **Equally important is for the state to focus on fostering an environment conducive to the creation and growth of start-ups and scale-ups, using regulations that reflect international best practices.** Last year, the European Commission introduced the Startup Nation Standards package of regulatory proposals. The Manifesto, endorsed by 22 EU countries, outlines measures designed to bolster the startup ecosystem, some of which are detailed in the proposals below. In Hungary, there are several specific regulatory challenges and obstacles that need to be addressed urgently.

The current business legal structures are not ideal for start-ups. The LLC is the most frequently used legal form for start-ups in Hungary due to its cost-effectiveness. However, LLCs lack traditional shares, and limited liability companies with registered shares present administrative difficulties when bringing in new shareholders, be they investors or employees motivated by equity. As a result, founders and lawyers seek complicated workarounds and additional agreements that are incomprehensible to foreign investors, creating "share quotas" and "phantom shares" to overcome the limitations of the LLC and Zrt form. Consequently, common financing instruments like the "Convertible Note" and "SAFE" have not become widely adopted in the Hungarian ecosystem.

It is not surprising that over a third of Hungarian start-ups have already "flip-flopped" (and a further 30% plan to do so soon)¹¹, meaning they have relocated their headquarters to another country (typically the US or the UK) and now operate in Hungary through a local subsidiary. For start-ups that

have progressed to the international stage and are now in the growth phase, or scale-ups, this rate is nearly 100%.

This issue is not unique to Hungary but is widespread across Europe, particularly with the influx of larger, predominantly US investors. These investors often expect the parent company to be registered in Delaware, a well-established and industry-standard location. While this trend is unstoppable and should not be forcibly resisted, it is beneficial to delay relocating as long as possible and to minimise the legal complexities of operating a start-up and attracting initial investors.

For instance, reforms in Estonian company law have introduced fully electronic registration through e-government, making the Estonian EEZ (private limited company) highly compatible with the Anglo-Saxon legal system and international investor practices. As a result, many business angels in London are now willing to invest directly in Estonian companies. Bolt, which has become a decacorn and one of Europe's most valuable tech companies, has successfully remained an Estonian entity. This may explain why Drops, a Hungarian-developed company registered in Estonia and later acquired by Kahoot!, was celebrated as an Estonian start-up success in the global media¹².

The state's close cooperation and active fora with the most successful start-ups, the most internationally savvy professionals, and the joint efforts to effectively break down legal barriers and take measures to support the development of the industry have clearly played a key role in the success of the Baltic countries and the development of supportive regulation.

3.3 More efficient use of public and EU funds

It is crucial for the government to enhance the efficiency of Community funds allocated to start-ups. The objective should be to reduce the reliance on public funding by increasing the involvement of private resources. This can be achieved through measures such as tax incentives and benefits that lower the risks for angel investors and private investors backing venture capitalists.

The performance of current public and semi-public investors should also be evaluated based on the proportion of their portfolio companies that attract follow-on investments from market or international investors.

Ideally, public and EU funds for start-up financing should not be channelled directly to start-ups through bureaucratic public agencies. Instead, they should be routed through experienced investment funds managed by individuals with strong backgrounds in start-up entrepreneurship and investment, along with valuable international connections and industry expertise. It is preferable if these fund managers also contribute their own capital ("GP Commitment") and secure as much private funding as possible.

Furthermore, it is essential that these funds are used with flexibility, without excessive restrictions, to ensure they can adapt to international best practices and effectively support start-ups. A notable example of a successful model is the European Investment Fund (EIF), a fund-of-funds with a strong track record, which has invested in several successful European venture capital funds.

5. Proposals for action

4.1 Amendments, modifications, exceptions to company law

- Relaxations, modifications and exceptions for startups
- Possibly a new company form available for start-ups
- Development of regulatory sandboxes

Start-ups could gain substantial advantages if they were afforded certain concessions in company law and administrative procedures, regulatory adjustments, or even a new form of legal entity. Such

changes would enable them to manage their investments, ownership structures, and daily operations more efficiently and in accordance with international standards.

4.2 Creating a startup-friendly ESOP regulatory framework

- Streamlined management of non-voting employee share
- Tax regulations that benefit both employees and start-ups—where tax liabilities arise only after a liquidity event—are crucial

Employee Stock Option Plans are widely used by start-ups globally as a means of competing with established companies that offer stability and higher salaries. It is essential to foster this culture and establish a supportive and effective regulatory environment, drawing on successful international models such as those from the Baltic countries.

4.3 Introduction of SAFE and Convertible Note

- Identify and remove legal barriers to internationally recognised financing practices.

SAFE (Simple Agreement for Future Equity) and Convertible Notes are well-established and popular tools for early-stage start-up funding. These investment methods serve as alternatives to traditional capital-raising approaches, offering the significant advantage of avoiding the need for a complex company valuation at an early stage, thereby facilitating simpler and quicker financing. A Convertible Note functions as a specialised loan that converts into equity after a certain period or upon meeting specific conditions. In contrast, a SAFE involves an investor providing funds to the company with the equity granted only if a subsequent funding round—at a specific valuation—successfully occurs. Such agreements typically feature a discount on the next round's share price and a maximum valuation cap, which are intended to reward the investor for assuming additional risk and to protect them from excessive dilution. However, legal obstacles hinder the use of these instruments. According to the MNB (Hungarian National Bank), investments made by angel investors through Convertible Notes may be classified as financial institution activities (i.e., lending), which requires a licence that an angel investor is unlikely to acquire. Similarly, the domestic application of SAFEs involves a complex option structure and can lead to tax and accounting issues, such as problems arising from a negative share capital balance.

4.4 Discounts for early-stage startups

- Discounts for start-ups during their first three years of operation

One of the biggest challenges for start-ups in their early years is covering salaries and associated contributions. During this period, they typically aren't yet generating revenue, as their focus is on product and prototype development. Due to limited resources, start-ups often hire their employees as KATA contractors, but this approach is far from ideal. Not only does it often come close to the line of hidden employment, but it also doesn't inspire confidence during international investment rounds. If the balance sheet suggests that the product was developed by subcontractors rather than an internal team, it can be a significant drawback.

4.5 Startup Visa - Fast-track visa processing (max 1 month)

- Third-country professionals to be employed by domestic startups
- Startup founders from third countries, validated by a professional representative or committee, who wish to relocate their headquarters to the country.

In recent years, several countries in the region have introduced start-up visa programmes. One aspect of these programmes is to simplify the process for local start-ups to employ workers from third countries through expedited work visa applications and other facilitations. Another common initiative is to streamline and accelerate the visa process for founders of early-stage start-ups from abroad, enabling them to relocate their headquarters more easily. Estonia, Latvia, Bulgaria, and Poland have successfully implemented similar programmes.

4.6 Encouraging market sources of finance, tax incentives

- Tax incentives for angel investors
- Tax incentives for private and institutional investors supporting venture capital

Many countries are working to enhance the balance between public and private resources by offering tax incentives to stimulate private investment. Among the most effective examples are the UK's "SEIS" and "EIS" schemes, which allow angel investors in early-stage start-ups to receive tax deductions on their profits or offset part of their unsuccessful investments against their tax liabilities. A similar regulatory proposal was previously suggested in the Digital Startup Strategy. However, the final legislation allowed only corporate tax bases to utilise this benefit, excluding individual investors from these advantages. This approach does not align with the practices of angel investors, who typically invest as individuals and do not generate substantial income from their investments for many years. Additionally, it is crucial to facilitate the efforts of venture capital firms that seek to attract Limited Partners (LPs) – investors who contribute to the creation of an investment fund – primarily from the private sector.

4.7 Fine-tuning of state and parastatal VCs

- Bringing investment fund practices closer to market functioning
- Elimination of obligations and administrative burdens
- Prioritisation of the "Fund of funds" model
- Change the success criteria / KPIs

It is crucial to align the practices of public and semi-public investors more closely with those of their market counterparts and to enhance collaboration between these institutions. The goal should be to minimise the restrictions and administrative burdens associated with these funds and shift towards supporting funds that not only provide financial backing but also have experience in funding tech start-ups and operate according to market and international standards. Finally, it is important to evaluate

the success of these funds by considering the proportion of their portfolio companies that can scale internationally and how effectively they can attract further market and international funding.

4.8 Startup database and reports

- Continuously measuring the development of the startup ecosystem and increasing the visibility of the industry
- Startup registration and database (e.g: <https://startupestonia.ee/startup-database>)

Startup Hungary has conducted an annual survey of startups and ecosystem players since 2020. The ITM, NRDI, and Xi Agency have collaborated with prominent organisations like Dealroom and Startup Genome to enhance the visibility of the Hungarian start-up sector by monitoring global start-up ecosystems. These efforts should be bolstered and broadened with the introduction of a local start-up database. This database should also provide registered companies with access to various services and regulatory discounts.

4.9 International startup conference in Budapest

- Organising a major annual international start-up conference

The promotion of conferences that unite prominent start-ups, investors, experts, innovative firms, industry journalists, and other key players from Europe and the surrounding region has been crucial to the growth of various ecosystems. Events such as the once-popular Pioneers Festival in Vienna, Estonian Latitude59, and Finnish Slush are iconic gatherings in the global start-up landscape, significantly boosting their local ecosystems. Undoubtedly, hosting a similar event could enhance Budapest's international profile and facilitate the development of essential connections.

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Pillar 4: International cooperation

1. Introduction

1.1 The importance of the area

Since its inception, **international relations have been central** to the IVSZ's activities. This is not only because the **IVSZ's membership includes numerous Hungarian subsidiaries of global IT and telecommunications firms**—who continue to play a pivotal role—but also **because international engagement is a fundamental aspect of the IT and telecommunications sectors**. This importance has been amplified by the rise and proliferation of digitalisation, which has a profound and transformative impact on every facet of the economy and daily life.

Without ongoing monitoring, study, analysis, and understanding of international trends and development trajectories, it is impossible to formulate effective digital strategies, define development paths, or ensure the modernisation of the economy and society.

A national economy and market, despite their unique characteristics, are deeply interconnected with the global economic landscape. They are woven into the international market system by numerous ties. **This is particularly relevant for international technological trends and digitalisation, which fundamentally influence a country's development, competitiveness, and modernisation, as well as the efficient functioning of government and state institutions.**

Digitalisation also triggers a comprehensive transformation of society, affecting social existence, individual lives, and the functioning of communities. It redefines social structures, highlights the importance of digital skills and capabilities, and underscores the need for their broader adoption, not only domestically but on an international scale.

Throughout its three decades of operation, the IVSZ has consistently engaged with international relations. However, in the past 5-7 years, there has been a noticeable increase in the focus on strengthening, enhancing, and actively pursuing international relations, reflecting the growing significance of the ICT sector, the deeper penetration of digitalisation, and the IVSZ's strategic shift in direction.

1.2 Digitalisation knows no borders

In the digital realm, the distinctions between the "real world" and the "online" environment are becoming increasingly blurred and are undergoing significant transformation. Alongside the disappearance and dissolution of geographical and physical borders and distances, the impact of **digital transformation leads**

- to the **dismantling of previous social and communication barriers**.
- In the economy, **traditional industries, value chains, and ecosystems** are either entirely transformed or replaced
- **by new, disruptive solutions, activities, and operations**. Many of these innovations cannot be classified according to previous nomenclatures.
- They radically alter businesses' product and service offerings, markets, internal structures, operational processes, manufacturing, marketing, sales, and business models,
- and fundamentally reshape the professional and skill requirements expected of management and employees.

1.3 The importance of exporting digital services and products

A key area of international cooperation is the export of digital services and products by companies operating in Hungary, which traditionally represents a significant proportion of total exports. The ICT manufacturing sector ranks as the second largest exporter in the economy, following the automotive sector. In 2018, it represented 7.9% of total exports, comparable to the combined figures for

agriculture and food. Meanwhile, the ICT services sector contributed 9% to total services exports during the same period. Typical forms of export activity include:

- **service and research and development centres for international companies,**
- **the export of software and digital services by domestic companies, and**
- **start-ups that innovate in digital technology.**

It is also important to note that companies operating and exporting in the digital economy **possess much higher value-added capabilities, both in terms of their products and services and the jobs they create.**

1.4 The horizontal nature of international relations

Based on the above, **international cooperation and its various elements can be viewed as a horizontal and often diagonal connection spanning across different verticals, linking various aspects and components of digitalisation.** In this regard, the IVSZ's declaration titled "United for Digital Hungary" and its **first three pillars**, which fundamentally define the strategic directions and themes of **both narrower and broader international cooperation, must not be overlooked.**

1.5 COVID-19 effect

The **impacts of the coronavirus pandemic** should also be mentioned. **The pandemic, which emerged at the end of 2019, created an international public health emergency and had unforeseeable and far-reaching negative effects on the global economy. It highlighted the vulnerability and weaknesses of the interconnected global economy more acutely than before. Health-related lockdowns and restrictions disrupted international trade, production, and supply chains, leading to severe shortages of raw materials and components. The free movement of people, and consequently the workforce, was halted, leading to an unprecedented global economic downturn.**

Naturally, **the digital sector was not exempt from these negative effects; however, digital technologies have played a leading role in the fight against the virus, including efforts to discover, understand, track, and manage it. They have also contributed to mitigating the broader negative impacts on the economy.** The pandemic has significantly **boosted and hastened the adoption, spread, and potential of digital technologies, aiding in a quicker economic recovery and speeding up digital transformation.**

1.6 Key EU and national strategy documents and resources

For effective international cooperation, it is crucial to (i) outline the key EU and national strategic documents that set the framework for digital collaboration, and (ii) detail the resources available for financing international partnerships, projects, and cooperation:

EU strategy papers	Hungarian strategy papers
<ul style="list-style-type: none"> European Digital Single Market Strategy* Europe 2020 Strategy* European Digital Agenda* NextGeneration EU Plan 2030 Digital Compass: the European way for the Digital Decade The Digital Europe Programme 	<ul style="list-style-type: none"> Hungarian Foreign Policy Strategy National Export Strategy (2019-2030) Digital Well-being Programme (DWP) Digital Export Strategy (DES) Digital Start-up Strategy (DSS) National Digitisation Strategy (NDS)
Resources to support international cooperation	
<ul style="list-style-type: none"> INTERREG EUROPE HORIZON EUROPE: 2021-2027 Multiannual Financial Framework 2021-2027 Next Generation EU - Recovery and Resilience Funds (RRF) Ministry of Foreign Affairs and Trade – HIPA, HEPA, EXIM Visegrad Fund 3Seas Investment Fund International and regional multinational companies 	

*previous programmes for the period 2010-2020

Figure 1: Own editing

The graphs below provide a more detailed overview of the funding allocated by the **EU budget for 2021-2027**, through various programmes, to support industrial collaboration, projects, and research and innovation activities across Member States and their industries.

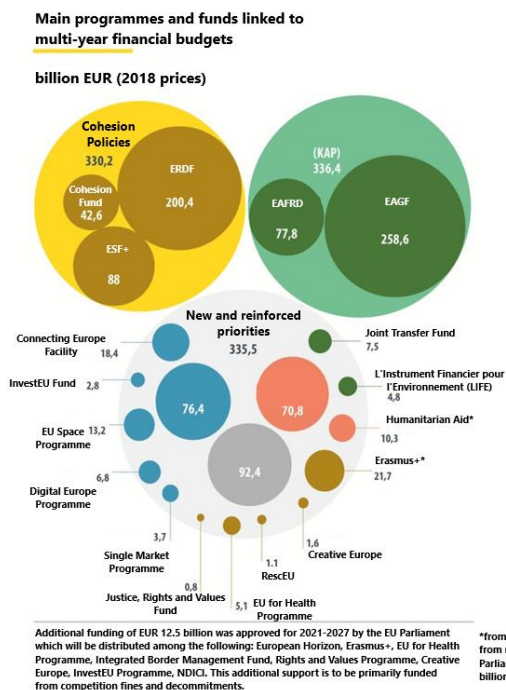


Figure 2: MFF -2021-2027, Source: EU

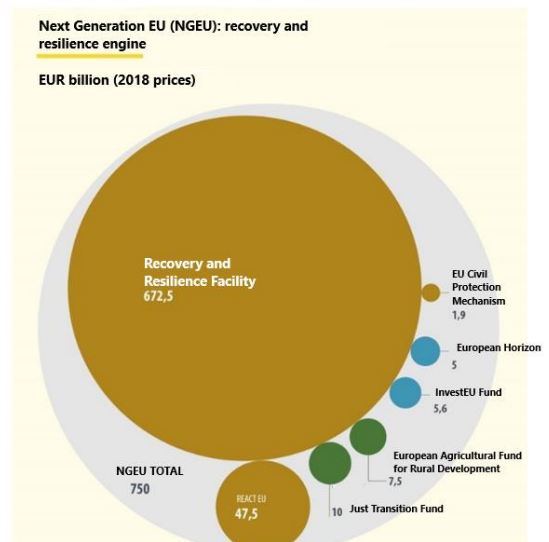


Figure 3: NextGenerationEU, RRF, Source:EU

2. Identifying areas of intervention

In the context of international relations, it is crucial to pinpoint the **areas and directions of intervention** that require particular focus and resources to ensure that cooperation is developed most effectively, grounded in mutual interests. To achieve this, **it is essential to establish the fundamental principles and strategic directions that will underpin international cooperation, providing a stable, long-term framework for such collaboration.** Key focus areas for international cooperation include:

- The **significance of the connections, strategic directions, and the pivotal role of NATO and EU membership, which stem from transatlantic and European integration.**
- The **inherent interconnectedness, interdependence, and partnership among the countries of the Carpathian Basin and the Visegrad (V4) region, driven by their geographical proximity, as well as their shared economic and social history.**
- The **broader Central and Eastern European (3 Seas) cooperation, which is rooted in their shared historical background (Eastern bloc), similar trajectories of economic and social development, and previous trade, cultural, and economic ties.**

As such, the **following priority areas for international cooperation have been identified and proposed:**

INTERNATIONAL RELATIONS		
European and EU relations	Partnership between the Visegrad countries	Wider CEE region, "3 Seas" cooperation

Figure 4: IVSZ International Relations, Own editing

2.1 Methodology

This discussion paper summarises IVSZ strategic ideas, cooperation frameworks, and development directions of international relations over recent years, focusing particularly on the goals, aspirations, proposals, and projects detailed within the three pillars of the Manifesto. The aim of the document is to invite the members of the IVSZ, its professional partners, as well as the individuals, businesses, professional and social organisations that have joined the Manifesto, **to think together** about the human resource conditions for the development of the digital ecosystem in Hungary.

So for now, the document only contains the IVSZ's assessment of the situation and its proposals, but we plan to produce **a final version as a result of a much broader professional and social consultation.** With the incorporation of the comments, additions and clarifications, we plan to have a package of policy proposals - covering all four pillars - ready by spring 2022, which will formulate a **clear conceptual position and operational proposals on all issues of importance to the membership of the IVSZ.** We want to present this in a single document to the next government responsible for digitalisation that will take office after the elections. *Page break*

3. Situational analysis

3.1 Introduction

As highlighted in the previous chapter, **and perhaps as a fundamental principle, the operation of any modern organisation is inconceivable without strategic partnerships and cooperation.** This is particularly relevant in the era of **digitalisation and digital transformation, which has gained momentum over the past decade and now permeates every aspect of the economy and society.** One of the most significant features of digital transformation is its capacity to transcend and reshape **physical and virtual boundaries,** both in narrow and broad contexts. **Borders in space and time are becoming increasingly blurred, transforming, and often disappearing, giving rise to a global, international landscape.** **Internationality—encompassing global information, data, social and economic connections, and collaborations—is becoming an essential and influential part of daily life and routine activities.** Consider, for instance, the trends and growth in the volume of digital data and

information flows related to individuals, businesses, governments, entertainment, work, and official transactions.

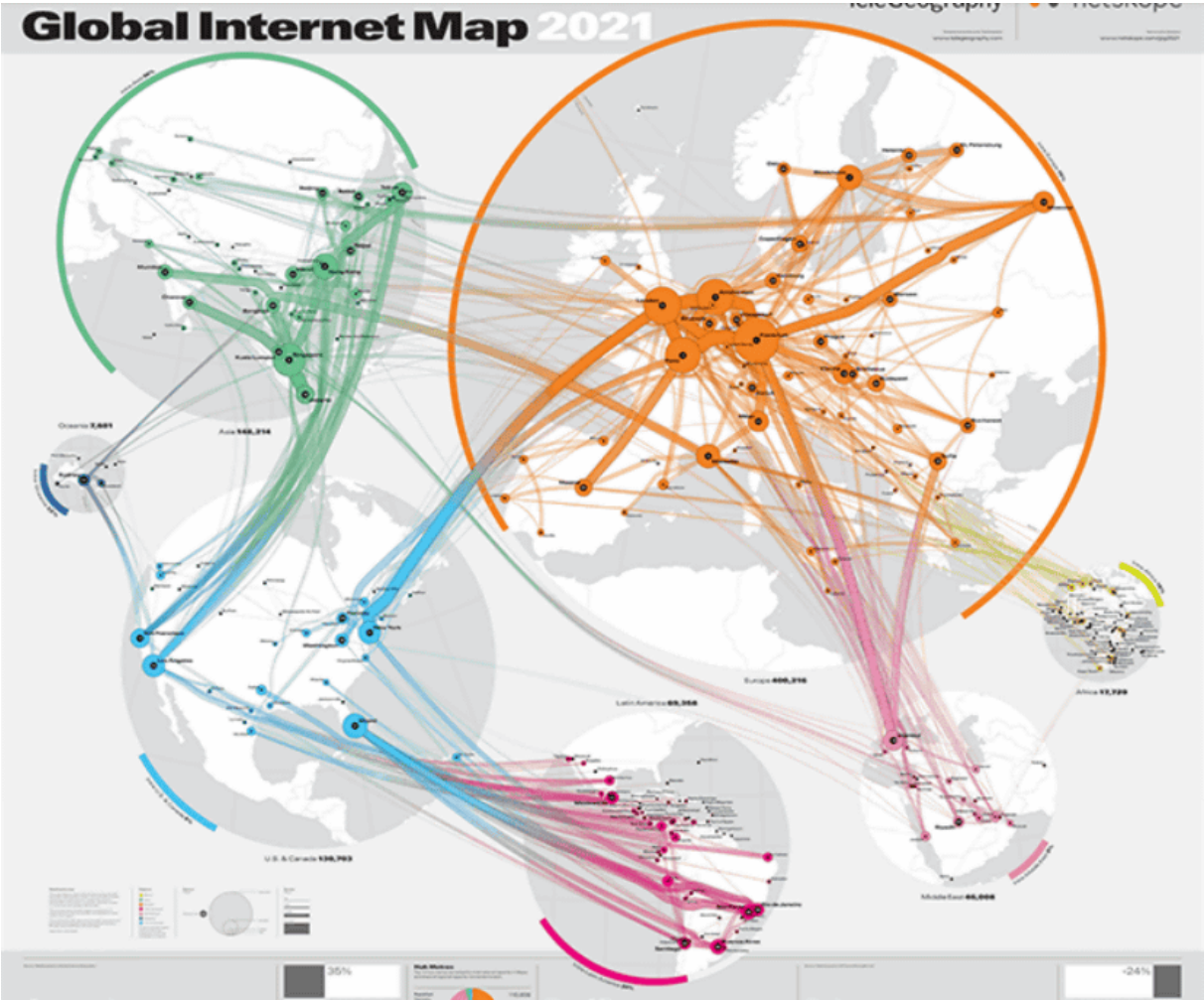
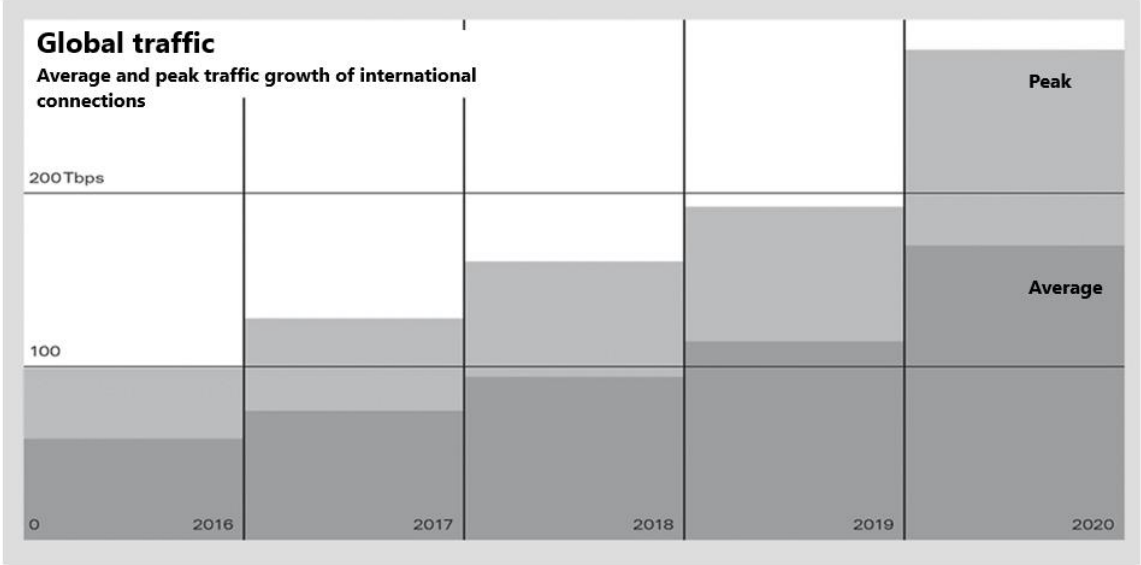


Figure 5: Global Internet Map
Source: <https://blog.telegeography.com/2021-global-internet-map-tracks-global-capacity-traffic-and-cloud-infrastructure>

Figure 6: Global Internet Traffic

3.2 The EU framework

This chapter provides a detailed overview of the **programmes and strategic documents** that define the direction, primary objectives, **key development areas, projects, and cooperation priorities for the EU's digital transformation** over the coming decade. These documents influence inter-country cooperation and specifically address bilateral and multilateral collaboration issues. It is important to note that, in response to the crisis caused by the COVID-19 pandemic, **at the end of 2020, European Union leaders agreed on the largest financial stimulus package ever financed in Europe's history. This package consists of two main components: (i) the EU's long-term budget (MFF 2021-2027), and (ii) the temporary NextGeneration EU programme for recovery, which allocates €2.018 trillion³ to support Europe's reconstruction according to the jointly adopted strategic priorities outlined below⁴.**

- **research and innovation** (through the European Horizon programme),
- **green transition and digital switchover** (through the Just Transition Fund and the Digital Europe programme,
- **enhancing preparedness, recovery and resilience (through the Recovery and Resilience Facility (RRF), rescEU⁵ and the new EU health action programme, EU4Health⁶),**
- **modernising traditional policies**, such as cohesion policy and the common agricultural policy,
- **combating climate change** - with 30% of EU funds earmarked for this purpose,
- **protecting biodiversity and gender equality.**

The new **long-term budget** strengthens flexibility mechanisms in anticipation of unforeseen needs, with a **particular focus on digitisation**, digital solutions and digital transformation.

3.3 "NextGeneration EU Programme" - European Recovery Plan⁷

The "NextGeneration EU" programme is a temporary recovery instrument exceeding **€800 billion, aimed at addressing the immediate economic and social damage caused by the COVID-19 pandemic.** It also seeks to **lay the foundation for a greener, more digital, resilient, and stronger Europe** that is better equipped to face future economic and social challenges.

The **core component of this programme is the Recovery and Resilience Facility (RRF), which provides loans and grants to member states up to a total of €723.8 billion to support their reforms and investments.** According to EU regulations, **when drafting national plans, each country must allocate at least 20% of the total requested funds to digitalisation and digital transformation.** Additionally, **EU policymakers have prioritised the support of cross-border programmes and projects involving multiple countries.** While most member states have already developed and received approval for their national recovery and resilience plans, allowing them to access significant funding, **Hungary and Poland's plans have yet to be approved, meaning these funds are not yet available to them.**

The "NextGeneration EU" programme **also allocates nearly €50 billion for cohesion and recovery support to European regions through the REACT-EU initiative.** The aim of "REACT-EU" is to **support and extend crisis response and recovery measures by backing investment initiatives related to the pandemic.** These measures also aim to **foster the economy's green, digital, and resilient transformation.** In addition to this, "Next Generation EU" **has also increased the budgets of other European programmes and funds, such as Horizon 2020, InvestEU, rural development, and the Just Transition Fund.**

3.4 EU "Digital Compass" 2030⁸

On 9 March 2021, the EU Commission presented **its vision and proposals for the digital transformation of the European Union up to 2030.** The four main directions of the "digital compass" that will define the EU's Digital Decade:

- **Digital skills development** (see IVSZ "Association for a Digital Hungary" - Pillar 1)⁹
 - ICT professionals - 20 million and gender balance
 - basic digital skills - at least 80% of the population
- **Secure and sustainable digital infrastructures**
 - connectivity - gigabit for all, 5G everywhere
 - high-tech semiconductor manufacturing - doubling the EU's share of world production
 - data - edge and cloud technologies
 - computer science - quantum computer network
- **Digital transformation of businesses, industries** (see IVSZ "Association for a Digital Hungary Manifesto" - Pillars 2-3)¹⁰
 - technology development - 75% of EU businesses use cloud services, artificial intelligence and big databases
 - innovation, innovators, - strengthening growing innovative businesses and supporting and funding EU start-ups and scale-ups (unicorns),
 - digital upgrading of lagging businesses - more than 90% of SMEs use digital tools intensively, at least at a basic level
- **Digitisation of public services**
 - key public services - 100% online
 - E-health - access for all Europeans to their health data
 - digital identity - 80% of citizens to use a digital ID

The Commission is implementing the EU's 2030 Digital Agenda through concrete actions and has developed a governance framework to ensure that the Digital Agenda can be achieved by 2030. The **governance framework is based on an annual cooperation mechanism** involving the Commission and the Member States. The Commission, in partnership with the Member States, first plans what the EU needs to achieve for each objective, and then **Member States propose strategic roadmaps** for achieving these objectives, which include:

- a **structured, transparent and coherent monitoring system based on the Digital Economy and Society Development Indicator (DESI)**¹¹ to measure progress towards the 2030 goals
- **an annual report on the state of the digital decade**, in which the Commission assesses progress and makes recommendations for action
- **preparation of multi-annual strategic roadmaps for the Digital Decade**, in which Member States outline the policies and measures adopted or planned to achieve the 2030 goals
- a structured framework for **identifying and addressing gaps**, including a joint commitment by the Commission and Member States
- **establishing a mechanism to support the preparation and implementation of multi-country projects**

It is also worth paying special attention to **transnational projects**, as the **European Commission has accelerated and facilitated large-scale transnational projects that cannot be implemented by Member States individually**, in order to achieve the digital objectives. These projects

- use **EU, national and private sector funding at the same time**
- **fill gaps in the EU's indispensable capacities**
- **support** an interconnected, interoperable and secure **digital single market**

The Commission has also drawn up a first list of multi-country projects, with **priority investments in** the following priority areas:

- creating and developing **data infrastructures**
- expanding manufacturing capacity for low-power **processors**
- development of **5G communication** networks and technologies

- **high performance computing**, the development of secure **quantum communications**,
- **digitisation of public administration**
- development and extension of **blockchain** technology
- development of **Digital Innovation Hubs (EDIH)** and, for each of the projects indicated
- developing **digital skills**.

3.5 Digital Europe Programme¹²

The **Digital Europe Programme**, adopted in May 2021 and applicable retroactively from 1 January 2021, is the first **EU financial framework programme** to focus on bringing the benefits of digital technology to businesses and citizens.

With a budget of €7.5 billion (in current prices) over seven years, the programme aims to accelerate economic recovery and promote the digital transformation of European society and the economy, with a particular focus on small and medium-sized enterprises. The programme **complements investments made under other EU programmes** such as Horizon Europe, EU Health, InvestEU, the European Network Facility and the Recovery and Resilience Instrument.

The main objectives of the Digital Europe programme are (i) **to strengthen Europe's technological sovereignty** and (ii) **to bring digital solutions for citizens, public administrations and businesses to the market as widely and as quickly as possible**, through **three main work programmes**:

- **support investment in artificial intelligence (AI), cloud and data science, quantum communications infrastructure, advanced digital skills** and the widespread use of digital technologies in the economy and society,
- **strengthening cybersecurity** and, in this context, increasing and improving the efficiency of funding in this area,
- **establishing a network of European Digital Innovation Hubs (EDIH)** and ensuring their continued and sustainable operation¹³.

The main work programmes of the Digital Europe programme include the following investments¹⁴:

- **creating common data spaces (e.g. manufacturing, mobility and financial data spaces) to facilitate cross-border data sharing** for businesses, including SMEs and start-ups, and the public sector, and building a backbone of unified cloud and edge network infrastructure and services, i.e. digital solutions that ensure secure data flows;
- **building an institutional framework for testing and experimenting with AI-based solutions** to harness trusted AI (including by SMEs and start-ups) to respond to key societal challenges, including climate change and sustainable healthcare (e.g. deployment of AI testing facilities for healthcare and smart cities, communities);
- **building a secure quantum communications infrastructure (EuroQCI)** for the EU that is highly resilient to cyber-attacks;
- Developing and conducting masterclasses on advanced digital technologies to **enhance digital skills across Europe**, including **intensive digital training programmes for SMEs**, as outlined in the 2020 Skills Agenda and SME Strategy;
- **Establishing, operating, and maintaining digital services that facilitate cross-border interoperability for public administration solutions (e.g., European digital identity)**;
- Investing in advanced **cybersecurity tools**, equipment, and data infrastructure, while also fostering and supporting **cybersecurity** expertise and capabilities;
- Providing opportunities for technology testing within European Digital Innovation Hubs (EDIHs) and supporting the digital transformation of both private and public organisations across Europe, **including initiatives related to the "Twin Transition" of green and digital advancements**.

3.6 Hungarian Foreign Policy Strategy, National Export Strategy, DES

In the context of the IVSZ's international relations, **it is important to understand the key directions shaping Hungarian foreign policy**. Given Hungary's position, the current foreign policy considers the following priorities¹⁵ to be particularly important, several of which overlap with the intervention areas identified by the IVSZ:

- **Regional Policy:** Advocating for our interests related to our region (in cooperation with other Central and Southeast European states), including the protection of the rights of Hungarian communities abroad.
- **Euro-Atlantic Orientation:** Representing our national interests within the EU and NATO, including the goal of a strong and unified Europe (effective crisis management, the dominance of the community method in decision-making) and further strengthening transatlantic cooperation.
- **Global Opening:** Revitalising relations in areas previously neglected in foreign policy, enhancing our presence in the international community, and increasing our activity in addressing global challenges

These three priorities are closely interconnected and can be most effectively realised by exploiting the synergies between them. (For example, regional policy and the implementation of global openness rely, among other things, on the instruments of Europe policy.)

In addition, **it was a very important strategic decision that foreign policy should also focus on the promotion of economic interests**, so that the elements of the foreign economic policy developed earlier were integrated and linked with foreign policy priorities. Based on this, **for example, the representation of Hungarian interests in shaping EU trade policy, as well as our participation in multilateral economic cooperation, falls within the jurisdiction of the Ministry of Foreign Affairs and Trade**. The **primary goal of foreign policy in terms of economic advocacy is to support Hungarian exports and to promote investment into the country**. In line with this, **in the spring of 2019, the government adopted the National Export Strategy¹⁶**, a strategic framework supporting the export ambitions of domestic enterprises. **The main objective of this strategy is to outline the directions for further development of the government's export support system** and, considering the changed global economic environment, to ensure Hungary's competitiveness with new tools, **establishing the policy foundations of the export development institutional framework**.

Key findings of the document:

- as a small and open economy, **export development needs to be a pillar of economic policy,**
- **we have excellent political relations with the Visegrad Cooperation (V4) countries, which should be exploited in the field of economic cooperation,** in particular through joint international projects, infrastructure development
- to further diversification, it is desirable to **set geographical priorities, for example, the Western Balkans offer export opportunities for domestic companies** (due to emerging solvent demand, logistical proximity, investment potential)
- **promoting the involvement of domestic SMEs in the global value chains of international companies,** as most of our foreign trade is in so-called global value chains managed by large international companies, which account for the majority of our exports (leading products are traditionally automotive and electronics exports)
- **identifying focus sectors and dynamic growth sectors**
 - health economy
 - food economy (including agricultural technologies),
 - construction economy,
 - water management,

- creative industries,
- as well as **digitalisation and its technological solutions, including industries, companies and enterprises developing digital technology solutions with a particularly high export potential.**

It is essential to mention here the **Digital Export Development Strategy for Hungary**¹⁸, prepared by the IVSZ within the framework of the Digital Welfare Programme (DWP)¹⁷ in 2016. This strategy was informed by research (IVSZ-Századvég)¹⁹ that established the methodology for measuring the contribution of the digital economy to the gross value added (GVA) of the entire national economy. The **strategy outlined the strategic directions and tools for digital export development**, based on the following key findings:

- The **further improvement of digital economy export performance significantly contributes to the growth of the Hungarian economy.**
- It is crucial to **intensively increase the export of high value-added digital products and services.**
- Boosting digital exports creates attractive, **high value-added jobs in large numbers.**
- **It stimulates domestic digital innovation** and,
- by utilising Hungarian knowledge and innovation, **enhances Hungary's international competitiveness.**
- It also aids in the **international integration** of Hungarian economic players (including SMEs and start-ups), **facilitating their entry into global value chains.**

Exporting firms and businesses that specialise in digital products and services are crucial participants in international cooperation and relations. They have consistently been integral to the operations of the IVSZ.

3.7 International advocacy - DIGITALEUROPE

The **membership of DIGITALEUROPE**²⁰ (or its predecessor organisation) has always been important in the international activities of the IVSZ. DIGITALEUROPE is the leading advocacy organisation in Europe for industries undergoing digital transformation. It aims to establish a regulatory environment that enhances the competitiveness of European businesses and empowers citizens through digital technologies, thereby fostering economic growth and social well-being in Europe. With the active engagement and expertise of its members, **DIGITALEUROPE influences European industrial policy and contributes to the creation and implementation of relevant EU policies.** Its membership encompasses over **36,000 companies operating or investing in Europe.** The organisation includes 94 direct members, comprising global leaders in digitalisation within their respective sectors, and 38 national European interest groups, such as IVSZ.

DIGITALEUROPE has **become one of the most influential European professional organisations in the field of digitalisation and digital transformation**, with a consistent and high professional level of activity over the past years, **having a significant impact on the shaping of the digital strategy and policies of the European Union, as well as on the European strategy for the increased allocation of financial resources to digitalisation** and the promotion of transatlantic cooperation.

The activities of DIGITALEUROPE are organised in "**Policy Groups**" or "**Working Groups**", based on the strategic orientations defined, **in which member companies, national stakeholders and experts from DIGITALEUROPE's office are represented** and participate in the formulation of EU policies, the consolidation of positions, the development of positions on specific issues and the drafting of strategy documents, according to their annual work plan.

The Policy Groups (PGs) and the Working Groups (WGs) within them are:

- **Digital Commerce PG**
 - Copyright WG
 - Consumer Policy WG

- Intermediary Liability WG
- **Infrastructure, Privacy & Security PG**
 - Infrastructure & Services WG
 - Privacy & Security WG
 - SpectrumWG
- **Digital Sustainability PG**
 - Chemicals WG
 - Ecodesign WG
 - Waste WG
 - Responsible Business Conduct WG
- **Digital Technology & Innovation PG**
 - Audiovisual WG
 - e-Inclusion WG
 - Product Compliance & Market Access WG
 - Research & Innovation WG
 - Standards & Interoperability WG
 - Intellectual Property Rights WG
- **Digital Trade PG**
 - Digital Taxation WG
 - Export Control & Customs WG
 - WTO & Trade Agreements WG
 - Market Access to Third Countries WG
- **Digital Transformation PG**
 - AI & Data WG
 - Autonomous Driving WG
 - Digital Finance WG
 - Digital Health WG
 - Digital Manufacturing WG
 - Digital Skills WG
 - Green Deal WG

In the organisational structure of DIGITALEUROPE described here, **there are several similarities with the working group structure of the IVSZ**, which may provide a good basis for more active involvement in international work.

DIGITALEUROPE **also continuously publishes studies, analyses and decision support material to inform its strategy-making and its work on the main directions, challenges and responses to Europe's digital transformation.** Among these documents, special focus must be given to **professional materials drafted in recent years (2019-2022), formulating comprehensive proposals** - which have contributed significantly to the EU decisions and legislation **concerning digitalisation, technological development, innovation**, the rebuilding of the European economy and society, increasing its competitiveness and resilience, and development.

While not exhaustive, some of these key documents are outlined below:

- *"Manifesto: A Stronger Digital Europe - Our Call to Action towards 2025"*²¹ - February 2019
- *"Digitalisation as key for a sustainable Europe - our Call to Action for the EU's Strategic Agenda 2019-2024"* – June 2019²²
- *"Pan-European survey on the impact of COVID-19 on the digital industry"*²³ - April 2020
- *"How to spend it: a digital Investment Plan for Europe"*²⁴ - October 2020
- *"Schrems II Impact Survey Report"*²⁵ - November 2020
- *"Scaling in Europe"*²⁶ - February 2021

- *"Data Flows & The Digital Decade" (The Value of Cross-border Data Flows to Europe: Risk and Opportunities, Frontiers Economics) "*²⁷ - June 2021
- *"Digital action = Climate action: 8 ideas to accelerate the twin transition "*²⁸ - October 2021
- *"A digital health decade: from ambition to action "*²⁹ - November 2021
- *"Becoming tech allies: 24 targets for the EU-US Trade & Technology Council by 2024"*³⁰ - February 2022

DIGITALEUROPE plays a crucial role in **pan-European thematic projects**³¹ initiated by the EU and related to digitalisation. These include participation in initiatives such as the "AI High Level Expert Group," "GAIA-X," "EU-US Trade & Technology Council," "EU Industry Forum," "Digital Skills and Jobs Platform," "Women4IT," "European Software Skills Alliance," "Blockchain Skills for Europe," "Digital SkillUp," and "AccessibiliTech," as well as the "Digital Europe Funding Program: Manufacturing, Health, Green, Skills" (currently under application).

It is also important to highlight the **"Masters of Digital" event**³², **created and organised by DIGITALEUROPE, which has been held for the past five years. This is the largest conference in Brussels focused on digital policy**, where representatives of EU institutions, governments, businesses, and national digital advocacy organisations gather to discuss the most pressing issues and challenges in digitalisation and digital transformation. **The main topics of the 2022 conference included:** (i) the role of **artificial intelligence in transforming business operations**, (ii) how **data can be utilised to improve our quality of life**, (iii) **how to ensure security in the digital world and combat cyber threats and attacks**, (iv) what steps are necessary to **achieve the green technology revolution**, and (v) the key factors that can facilitate and catalyse the **broader adoption of cross-border solutions and collaborations**.

Each year, the **event recognises the most promising European start-up or scale-up with the "Future Unicorn Award."** This award was established to address the fact that currently only around 12% of the world's unicorns are based in Europe. Although this represents a substantial increase from just 6% in 2014, it still does not reflect Europe's economic significance. **DIGITALEUROPE aims for Europe to host at least 25% of the world's unicorns by 2025 as a benchmark for digital leadership success.** The award offers a valuable opportunity to highlight emerging innovative European companies with the potential to become future unicorns—businesses with a projected enterprise value exceeding \$1 billion. **Hungarian candidates selected by IVSZ have consistently performed well in this competition, with the 2021 award going to the Hungarian firm Oncompass. Start-up Hungary could play a significant role in furthering cooperation in this area.**

In recent years, **IVSZ has increasingly engaged with DIGITALEUROPE at both strategic and operational levels.** IVSZ representatives **have served on the DIGITALEUROPE board for several terms representing Hungary and** contributing significantly to its effective functioning, strategic document preparation, and strategy implementation. **IVSZ is also actively involved in various flagship projects**, including the EU Industry Forum, the Digital Skills and Jobs Platform, Women4IT, and the European Software Skills Alliance.

Hungarian representatives, recognised for their previous work and professional expertise, **have been appointed to several high-level advisory bodies.** As a result, **IVSZ members have been delegated to the "Executive Advisory Group on COVID-19"**³³ and the **"Executive Council for Health,"**³⁴ **both established by DIGITALEUROPE.**

It is also important to highlight once again that DIGITALEUROPE represents not only EU-based companies and national digital associations within the EU but also organisations from European countries outside the EU, among which our British counterpart, **TechUK,**³⁵ deserves special mention. The activities of the British advocacy group are exemplary in the areas of **digital strategy development, fostering innovation, business and market development, and advancing the digital transformation and technological progress of the British economy. It would be beneficial to deepen and broaden**

the collaboration between IVSZ, regional actors, and TechUK, particularly since the British market offers significant business opportunities for companies from Hungary and our region.

While **no Israeli organisation is currently a member of DIGITALEUROPE, collaboration with Israel—potentially outside the framework of DIGITALEUROPE—could also present substantial opportunities**. This is especially relevant in areas such as **digital skills development, education, innovation, and cooperation among startups, with entities like IATI (Israel Advanced Technology Industries)³⁶ and IAESI (Israeli Association of Electronics & Software Industries)** serving as key digital industry representatives. This direction is already visible in V4 activities, along the lines of the V4+ strategy.

3.8 Visegrad Cooperation - DigitalV4 Platform

The **partnership of the Visegrád countries (V4: Czech Republic, Hungary, Poland, and Slovakia)** currently represents the most organic form of Central European cooperation, shaped by shared historical experiences, geographical proximity, and similarities in economic and social development paths. **In 2021, both the V4 and IVSZ celebrated their 30th anniversaries**, with the V4 partnership having evolved into one of the most important platforms for representing Central European interests and fostering regional cooperation.

Together, the V4 countries represent nearly 64 million people (14.2% of the EU-27), more than €990 billion in GDP (7.1% of the EU-27), and over 30 million employed individuals (14% of the EU-27)³⁷.

The foundation of V4 cooperation is built on mutual relations at all levels—from high-level political summits to expert and diplomatic meetings, the activities of civil society organisations in the region, the establishment of think tanks and research bodies, the operation of cultural institutions, and initiatives driven by private individuals.

The key areas of strategic cooperation and joint projects include culture, environmental protection, internal security, defence, science and education, transport, tourism, and energy security. **Over the past two years, however, there has been a notable strengthening and intensification of joint thinking, strategic planning, cooperation, and participation in common projects in the fields of information technology, digitalisation, and the digital transformation of the region.**

In mid-February 2021, **the V4 prime ministers officially incorporated digitalisation into the framework of their countries' political and economic cooperation by signing a joint declaration on collaboration in Kraków³⁸.**

The declaration emphasised that accelerating the digital transformation of the region is essential for sustainable economic and social development. To this end, the **V4 countries committed to enhancing cooperation in digital affairs as follows:**

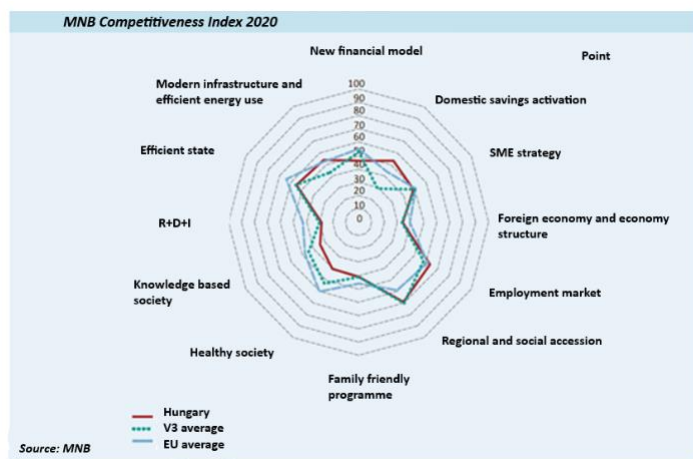
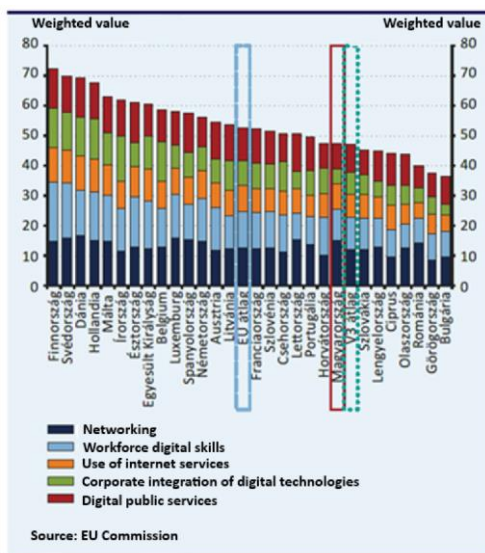
- **Effective use of the multi-annual financial resources for 2021–2027 and the EU funds available under the NextGenerationEU (RRF) to support digitalisation³⁹.**
- **Establishing a common framework** for cooperation on digital matters
- **Collaboration on the region's digital transformation**, particularly in securing EU funding for joint V4 digital projects
- Developing sustainable **R&D&I** cooperation among **scientific and university research centres** in the field of digitalisation
- **Priority areas include** computational infrastructure and data infrastructure—Big Data, Industry 4.0, cloud and edge networks, high-performance computing (HPC), quantum computing capacities, artificial intelligence (AI), robotics, machine learning, blockchain, IoT, cybersecurity, digital skills and competencies, and telecommunications.
- Raising awareness among **innovative SMEs and startups** to encourage cross-border cooperation.

- Establishing **knowledge bases and centres**, supporting joint **international events**, **exchanging best practices**, and promoting mutual achievements in the field of digitalisation.
- Collaborating in the **preparation of relevant EU-level legislation** that contributes to the creation and successful operation of **cross-border digital projects**.
- **Identifying urgent global challenges** (e.g., severe pandemics, natural disasters) where the immediate and **joint action** of regional ICT experts and digital enterprises can contribute to rapid and effective solutions.

These efforts are largely thanks to the consistent professional work of the **DigitalV4 Platform**⁴⁰, established in **December 2019 by the digital advocacy organisations of the V4 countries**, and of course, to the economic and social challenges posed by the COVID-19 pandemic. The **DigitalV4 Platform** will play a crucial role in the successful realisation of the above goals, **having been founded on two key recognitions**:

- The **economic, social, and digital development levels** of the region's countries are **nearly identical**, and the **markets are fundamentally homogeneous**, yet there is a **noticeable lag in the areas of digitalisation and digital transformation**.
- as the founding organisations (KIGEIT, PIIT, ZIPSEE - Poland, ITAS - Slovakia, IVSZ) are all members of DIGITALEUROPE, who have encountered and are encountering many positive European initiatives, projects and regulatory issues, but at the same time, **within DIGITALEUROPE, it is not always possible and cannot be expected to fully and effectively promote regional interests and the differences in the level of development of the various regions of Europe**.

The following graphs show the similarities and differences in economic, social development and competitiveness of the V4 countries compared to other countries and the EU average, based on the **DESI 2020** and the **MNB Competitiveness Index 2020**.



The **main objective of the V4Digital Platform** is to raise awareness of the digital specificities of the region and bring it closer to V4 governments and policy makers, to create a framework for digital partnerships in the wider Central and Eastern European region and to establish a system of **multilateral cooperation**. Three priority areas have been identified as the focus for regional digital cooperation:

- **digital education** - from primary to adult education
- developing SMEs' technological and digital skills, **digital transformation of SMEs**

- **strengthening and developing** the regional innovation, **startup and scaleup ecosystem**

It is worth noting the International **Visegrad Fund (IVF)**⁴¹, based in Bratislava and established in June 2000 by the V4 countries, which has been recognised by various evaluations as one of the most successful collaborative initiatives of the V4. The Fund provides financial support and fosters cooperation among member countries in areas such as culture, science and research, and education. **In 2021, following the initiative of the DigitalV4 platform, the Fund expanded its support to include digitalisation and digital transformation.** With an annual budget of €8 million, the Fund allocates resources through calls for proposals.

The **DigitalV4 platform has begun to form a strategic partnership with the Fund**, starting with an agreement that each V4 Digital Interest Group **will present a regional digitalisation proposal**. The **first successful proposal** is the **IT Fitness Test 2022, the largest and most comprehensive digital skills assessment** among the V4 countries, initiated by Slovakia⁴². The **second project, currently under evaluation**, is the **"Digital Solution Matchmaking Platform for SMEs,"** organised by IVSZ. This initiative is a regional extension of the "digitalismegoldasok.hu"⁴³ search engine and virtual marketplace, also developed by IVSZ. It primarily supports businesses seeking tools, experts, services, and solutions for their modernisation and digital transformation. Our **next planned project in Poland will focus on cybersecurity**.

During the **2021-2022 period, Hungary will assume the Presidency of the V4 Cooperation**⁴⁴ and its programme titled **"V4 - Recharging Europe,"** will concentrate on areas where the Visegrad Group can achieve concrete outcomes and added value. This includes a range of issues from various EU policies to global matters, with a focus on the following key objectives:

- European Visegrad
- Regional Visegrad
- **Digital Visegrad**
- Global Visegrad

The motto of the V4 presidency programme, "V4 connects," highlights the substantial benefits of Visegrad cooperation, which integrates the four countries politically, economically, and culturally. It also underscores the priority of enhancing energy and transport connections within the region and fostering an **innovative V4 area that embraces the digital era**.

An important consideration is that **during the second half of 2022, the Czech Republic will hold the rotating presidency of the Council of the European Union, followed by Hungary from July 2024, and then Poland until the end of June 2025.** This sequence presents a **favourable opportunity to prioritise digital affairs** and, where necessary, **more assertively represent the region's interests**.

These prospects are supported by key elements of the **18-month strategic agenda (1 January 2022 – 30 June 2023)**⁴⁶ prepared by representatives of the current French presidency and the upcoming Czech and Swedish presidencies, along with the High Representative chairing the Foreign Affairs Council. The agenda includes significant priorities such as **"advancing the digital transformation and fully leveraging its benefits"** and **"supporting regional development."**

3.9 "Three Seas Initiative" (3Seas) cooperation - CEE Digital Coalition

The **3Seas Initiative, launched in 2015 through the efforts of Poland and Croatia**⁴⁷, brings together **12 EU member states from the Baltic, Black, and Adriatic Sea regions: Austria, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.**

A shared historical experience among the 12 countries is the **"Iron Curtain,"** which isolated the region for decades and impeded their natural social development, economic progress, and international integration, with the notable exception of Austria. While the western part of Europe benefitted from

well-developed roads, railways, power lines, oil and gas pipelines, and advanced telecommunications networks, **Central and Eastern Europe remained considerably disconnected from the West and from each other in terms of modern infrastructure, especially along the north-south axis of the region.** Although the European Union’s single economic and customs space and **access to EU cohesion and structural funds** have facilitated stable development across the continent, **Central and Eastern European countries still lag behind their Western European counterparts in terms of economic advancement and infrastructure development.** Despite the EU's collective policies, the economic and social divide that emerged in the latter half of the 20th century has not yet been sufficiently addressed. The backlog of infrastructure, energy and digital investments is estimated to have grown over the years to €1.15 trillion⁴⁸. Addressing this gap by implementing and developing the **most innovative solutions** and advancing **digitalisation** in energy and transportation systems could provide a **significant boost to the region’s development.** This would enable the region to integrate more effectively into European and global supply chains, thereby strengthening EU cohesion and the region's transatlantic integration.

In 2019, the "3Seas" countries will together have more than 111 million inhabitants (cc. 25% of the EU-27), a GDP of more than €1.880 billion (cc. 14% of the EU-27) and more than 52 million employees (cc. 25% of the EU-27),⁴⁹ while their average economic growth rate between 2015 and 2019 was 3.5%, compared to 2.1⁵⁰ in the EU50, despite their significant productivity gap, and their average GDP per capita is below 80% of the EU average.

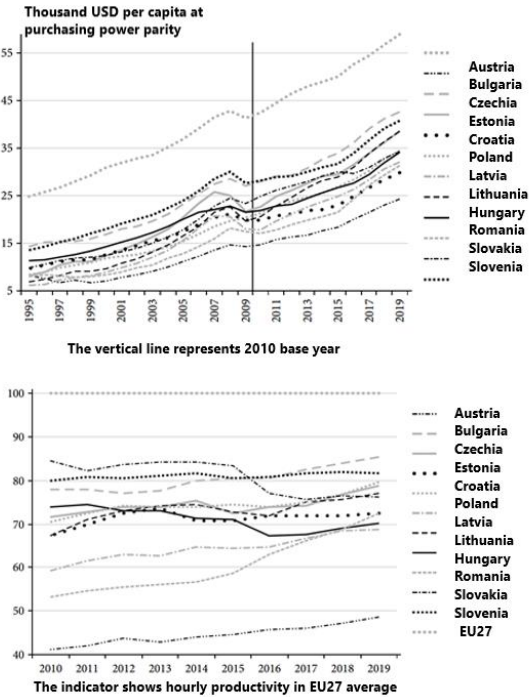


Figure 9: 3Seas - GDP per capita, 1995-2019 and Figure 10: 3Seas - Labour productivity 2010-2019
 Source: Dóra Györfly: *Catching up in Central and Eastern Europe between two crises*, Economic Review LXVIII, January 2021

In light of this, the countries participating in the 3Seas partnership have set the following primary objectives:

- **Strengthening economic growth** and thereby enhancing social well-being
- Addressing **energy and cybersecurity issues**
- Creating a **stronger and more cohesive Europe**

To achieve these goals, they have committed to joint **strategic actions** and the initiation and support of **regional projects, particularly in the areas of infrastructure development, energy, transport, and**

the digital sectors. Supporting these objectives requires the promotion of **trade and service development** within the region and with neighbouring countries, fostering **research, innovation, and startup/scaleup collaborations**, and **accelerating digital transformation**. This approach is further underscored by the **fact that the countries in the region typically rank among the "laggards" according to the DESI 2021 indicators, which measure the digital economy and society development across EU countries.**

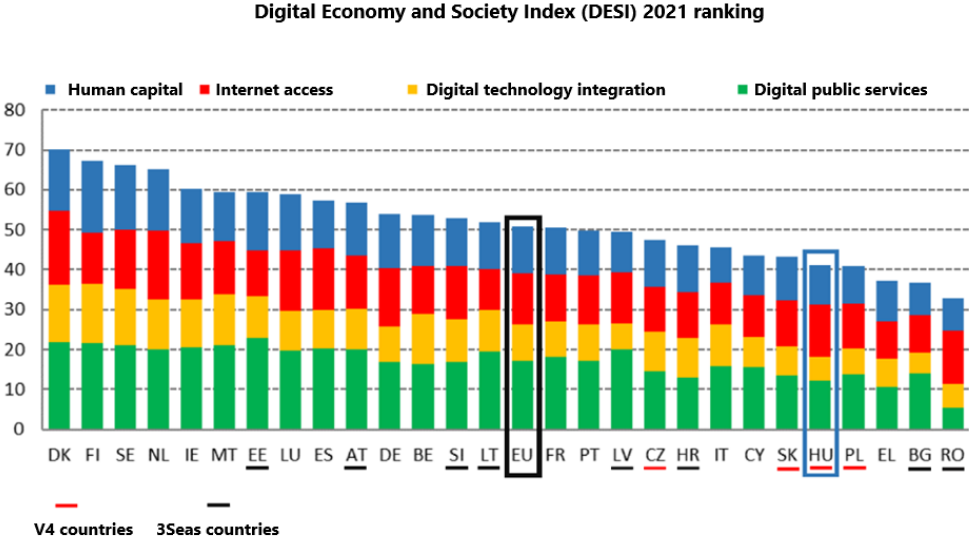


Figure 11: Digital Economy and Society Index (DESI) 2021, Source: EU

The **importance of the targets set is demonstrated by the impact of the COVID-19 epidemic.** As previously noted, the digital sector was crucial during the global health crisis in maintaining operations across epidemics, public administration, business, education, and social networks. Maintaining this momentum is vital for the region, as the post-pandemic landscape has highlighted that **digitalisation, the ICT sector, and emerging industries are pivotal for economic recovery, competitiveness, and progress in Central and Eastern Europe.** In this context, international partnerships and support for cross-border digital projects are essential.

In response, in **September 2020, national stakeholder organisations from the "3Seas" region, building on the insights and achievements of DigitalIV4,** established the **"CEE Digital Coalition"**⁵¹ with the Warsaw Declaration. The founding members, including the IVSZ, have identified the following key areas for collaboration:

- **Developing digital competences**
 - responses to the digital challenges of the labour market
 - "digital transformation" of education systems
- **Increasing investment in advanced technologies** and expanding their use
 - AI, IoT, Cloud, increasing computer capacity
 - R+D+I
 - high bandwidth access
- **developing 5G networks and technologies**
 - accelerating the deployment of networks
 - standardisation of technologies
 - developing uniform innovative products and service
- **Developing the data economy**
 - ensuring access to public data assets
- **Strengthening cybersecurity**

- raising awareness
- joint development of technologies, services
- developing the cybersecurity industry
- **Support and development of startups, scaleups**
 - creating a supportive regulatory environment
 - preference for regional cooperation
- **Creating a coherent and clear regulatory environment**
 - making digital innovations accessible
 - developing a harmonised regional position
 - developing the ability to attract capital at regional level

The digital advocacy organisations from the **"3Seas" nations will offer significant technical support to key area developments**, leveraging their vast experience, expertise, and professional networks while maximising their international and regional influence.

To **fund crucial infrastructure projects in the region**, the **"3Seas" countries established the "Three Seas Initiative Investment Fund" in Luxembourg in 2019⁵²**. This international investment fund, while similar in purpose to the Visegrad Fund, follows a distinctly different strategy. Its aim is to **complement EU financial instruments by investing on a commercial basis in projects that advance North-South transport, energy, and digital infrastructure within the region**. Initially, the Fund's assets were contributed by the national development banks of the "3Seas" countries, and by 2022, their total financial commitment had **grown to €913 million. In December 2020, the Hungarian EXIM Bank joined the Fund with a capital commitment of EUR 20 million**. The investment fund is managed by the London-based Amber Infrastructure Group ⁵³, which also plans to raise additional capital from private institutional investors and international multilateral financial institutions.

3.10 Other international connections

The **Enterprise Europe Network (EEN)⁵⁴**, established in 2008 and currently co-financed by the EU's COSME⁵⁵ and Horizon 2020⁵⁶ programmes, aims to provide advice and support to **small and medium-sized enterprises (SMEs) with international ambitions. Its objectives are to (i) assist these businesses in entering and expanding in international markets, (ii) integrate them into the global innovation ecosystem (including technology transfer and R&D), and (iii) offer a platform for establishing international business and professional partnerships**. The EEN is active in more than 60 countries worldwide and brings together 3000 experts from more than 600 member organisations, among whom it maintains privileged links:

- chambers of commerce and industry
- technology development centres
- organisations supporting innovation
- university and academic research institutes, and
- regional development organisations.

The **EEN Hungarian Member Network (EEN-HU)⁵⁷** is managed and coordinated by a consortium led by the **HEPA Hungarian Export Development Agency Nonprofit Zrt⁵⁸**, which also provides direct services as a partner in two Hungarian regions—Central Hungary and Northern Hungary. Other participants in the consortium include regional chambers of commerce and industry as well as business development foundations. EEN-HU's activities encompass matchmaking, informational events, training sessions, exhibitions, business opportunities, and personalised business consultancy.

In addition, EEN-HU provides, through its strategic partners, **individual, tailor-made business advice to companies in a number of areas. The strategic partners involved are Bay Zoltán Applied Research Non-profit Ltd., IFKA Industrial Development Non-profit Ltd., and IVSZ.**

In the context of international relations, it is important to consider the role and activities of international chambers of commerce and industry, with two key aspects to highlight:

- In many countries, including those in the region, the largest representative bodies for the ICT sector and digital industries are the national chambers of commerce and industry or their specific divisions. This is because smaller, specialised organisations have limited size and influence (as seen in the Czech Republic, Croatia, and Slovenia, for instance).
- The interests of international companies operating in Hungary and their subsidiaries are often represented by foreign or mixed chambers. Many of these chambers, such as the American-Hungarian Chamber of Commerce, the British-Hungarian Chamber of Commerce, and the German-Hungarian Chamber of Industry and Commerce, play significant roles beyond lobbying. They are involved in various activities including advocacy, business development, analysis, and preparing studies.

Fostering and sustaining strong relations with chambers and forming strategic partnerships, both regionally and bilaterally, should be a key priority in international relations.

3.11 SWOT analysis of the international cooperation activities of the IVSZ

The table below summarises **all the factors** that can **(i) continue and strengthen, (ii) improve, correct, or eliminate, (iii) leverage, and (iv) prevent or manage, which can enhance the focus, efficiency, and success of international cooperation**. This, in turn, can accelerate the digital transformation of the country and region, drive economic growth, boost competitiveness, promote social development, and modernise the functioning of the state.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Existing long-term international relations, participation in the activities of international organisations and projects • Active, consistent and proactive work and competence recognised by partners • Personal and institutional commitment to the importance of international relations • Long-standing membership and active activities of international companies in IVSZ • The openness and commitment of partner organisations (DITALEUROPE and in particular the regional stakeholders) to cooperation and the good relations established with them • Strong knowledge and experience in areas that are also a priority for international cooperation (digital education, innovation education, industry 4.0, start-ups) 	<ul style="list-style-type: none"> • There is no coherent, overarching strategy, or its elements cannot always be implemented, in the absence of operational support • The value proposition is not always right • Shortage of human and financial resources • Our integration in international partnerships is not always deep enough • Lower efficiency of international representation of SMEs • No stable and continuous cooperation and strong links with governmental and state actors and agencies responsible for international relations • International laws, regulations and policies do not have a professional background or an established procedure for commenting on them • Insufficiently effective external and internal communication of international relations

Options	Dangers
<ul style="list-style-type: none"> • The crisis caused by the COVID-19 epidemic has also increased the role of international cooperation and partnerships • International, especially regional, cooperation allows for greater market opportunities, more effective joint action in the day-to-day activities of businesses and participation in joint projects • Better advocacy with our international partners can influence lawmakers, policy makers and politicians, both nationally and internationally • The new EU programmes and financial resources explicitly support cross-border cooperation and projects (especially in the field of digital transformation) • International cooperation, sharing of work, tasks, knowledge and good practice allows for more efficient mobilisation and use of resources, with extensive use of synergies • International cooperation will provide an opportunity to broaden partnerships with international companies and to involve SMEs and start-ups more actively 	<ul style="list-style-type: none"> • Geopolitical, federal and regional policy changes • Lack of support for politics, foreign policy, policy • International isolation of the region and/or Hungary; weakening of European and transatlantic cooperation • Focus on individual interests instead of partnership and cooperation • New actors, new alliances, emergence of federal priorities • Insufficient availability of resources

4. Vision and goals

4.1 The Big Picture

Based on the situation analysis and the facts presented, **it is evident that successful digitalisation and digital transformation cannot be achieved without international connectivity, cooperation, and partnerships**, nor without the **consistent, effective, and continuous development, representation, and strengthening of these relationships**. The free flow of goods and services, capital, people, news, information, data, and technology is now almost unhindered. **The absence of international integration, cooperation, and interconnectedness can entirely hinder the development of the economy and society**, significantly **diminishing adaptability and competitiveness**. This is particularly relevant today, as a **revolutionary transformation is underway, driven by borderless digitalisation that impacts every corner of the globe and every facet of life**. In this global system of digital transformation, **only those regions, countries, states, economies, businesses, societies can be and remain successful that**

- **are at the forefront of technological development**, harnessing and leveraging the **innovation potential of digital technologies**;
- **continuously develop and strengthen digital skills and competences** at all levels, and
- **Are also closely linked to these two points above, are effectively integrated, connected and functioning in a system of international cooperation.**

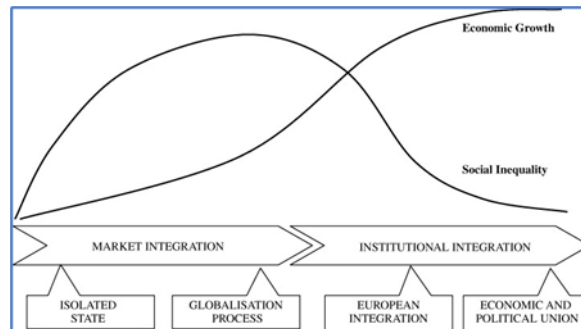


Figure 12: Forms of international integration and the trade-off between growth and inequality, source: *International Social Science Journal*, Ricardo Cappellin: "International knowledge and innovation networks for European integration, cohesion, and enlargement"

In the context of global cooperation, **it is essential to establish priorities and outline a strategic framework that considers various factors.** These include natural, geographical, historical, economic, political, and social development elements, all of which are interlinked and influence each other.

4.2 Priority areas for international cooperation

Considering the situation analysis, along with the experience gained, work carried out, and contacts established thus far, **three key areas** for international cooperation have been identified.

These areas hold particular significance, **both independently and in conjunction with one another**, as the primary priorities of partners and collaborations frequently align, overlap, and complement each other.

The international cooperation framework should therefore be founded on and driven **by the following three pillars** in these priority areas:

- **EU and transatlantic relations,**
- **the broader CEE regional cooperation,**
- **and the partnership with the V4 countries.**

The institutional and general political, economic and social framework of the system of cooperation is well established and operates on a permanent basis, based on a well-defined strategy:

- **European Union, NATO**
- **Three Seas Initiative**
- **Visegrad Group.**

However, effective advocacy for the digital transformation of **information technology, digital industries,** and the broader impact of digitalisation on the environment, economy, society, and the functioning of the state—alongside activities such as reflection, awareness-raising, strategy development, and advisory roles—**can only be successfully undertaken by professional organisations and platforms.** These entities must possess the necessary expertise, knowledge, experience, commitment, and resources, and be dedicated to the "internationalisation" and international cooperation that is intrinsic to digitalisation. On this basis, and in close connection with the broader institutional framework outlined above, **IVSZ should continue its proactive and dynamic international engagement and its development efforts within the following professional organisations and platforms:**

- **DIGITALEUROPE**
- **CEE Digital Coalition**
- **DigitalV4.**



Figure 13: IVSZ international cooperation scheme
Source: Own editing

Financial resources are closely tied to the functioning of the institutional systems that have been established. These funds support organisational operations and **finance projects** aligned with their strategic objectives.

- **EU resources**, funds (e.g. NextGenerationEU, MFF, Horizon, Interreg)
- **3Seas Investment Fund**
- **Visegrad Fund**.

Investment priorities increasingly focus on innovation, technological advancement, digitalisation, and digital transformation. This emphasis should be maintained and even expanded to promote a greater number of cross-border initiatives. This should be continued and even extended, with a view to increasing the number of cross-border projects.

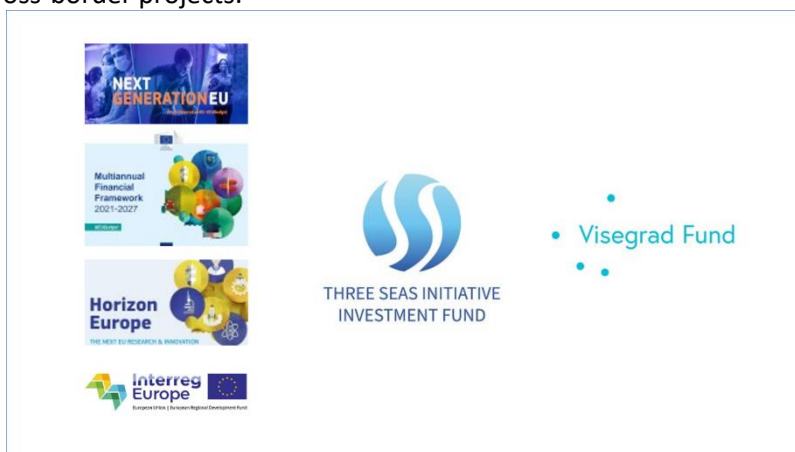


Figure 14: Sources of international cooperation
Source: Own editing

In addition to the points mentioned, **it is crucial to pinpoint the specific areas where international and regional cooperation should be concentrated.** This is essential for (i) **establishing priorities**, (ii) enhancing the effectiveness and synergy of **collective knowledge and actions**, and (iii) **ensuring the optimal allocation of resources.** International cooperation efforts should be directed towards the following priority areas in digitisation:

- **digital competences**, skills development - digital education, digital training
- **digital infrastructure** development - optical networks, 5G
- development and expansion of **digital public services**

- **innovation** - digital transformation of SMEs, startup, scaleup ecosystem development
- **technology development** - data economy, quantum computing, artificial intelligence, blockchain
- developing and strengthening **cybersecurity**
- **green & digital** - twin transition

The table below summarises the institutional, organisational, strategic and substantive framework for cooperation.

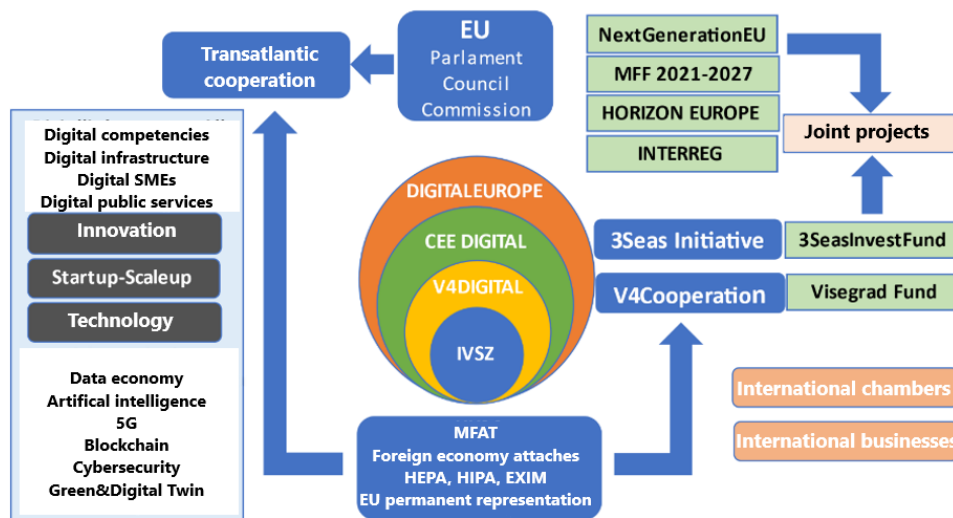


Figure 15: The institutional, organisational, strategic and substantive framework for international cooperation of IVSZ
Source: Own editing

5. Proposals

5.1 Comprehensive, general proposals

The specific proposals outlined in this chapter **are not yet fully developed or detailed**. While some aspects are already well-established, others remain as preliminary ideas or concepts and may not yet be agreed upon by all stakeholders. Nevertheless, it is clear that cooperation in the realm of digitalisation is unavoidable, essential, and should be approached with both activity and proactivity. This is especially pertinent for countries with similar or identical historical, economic, and social contexts, such as those in Central and Eastern Europe, which are at the forefront of digitalisation. The proposals for the digital transformation of the region aim to consider the unique characteristics of the area, incorporating successful examples and lessons learned that may be relevant or adaptable for effective regional cooperation.

It is essential that **digital interventions occur across all sectors**, achievable only through close collaboration and joint efforts, which is crucial for the optimal allocation and utilisation of resources, both financial and human. The various areas of international cooperation **are interlinked and mutually reinforcing**, and this interconnection has been taken into account in the design of each proposal, with the **goal of leveraging synergies** and avoiding unnecessary duplication.

On this basis, the proposals have been defined along the following principles:

- international cooperation **is essential and necessary**
- broad consideration of **similarities**
- **adopting good practices and examples**
- Setting **priorities**
- **division of tasks and work**

- **optimisation of** asset and **resource** allocation and use
- extensive use of **synergies**
- **flexible** approach, rapid change, possibility to intervene

5.2 Strengthening transatlantic digital connections - technology, skills, organisational frameworks, projects, funding

<p>Further strengthening transatlantic digital cooperation</p>	<p>Measure</p> <p>1. DIGITALEUROPE connection extension 2. Strategic cooperation with international chambers and international companies 3. Developing closer professional links with the Ministry of Foreign Affairs and Trade</p>
<p>The aim of the measure</p>	<ul style="list-style-type: none"> To enhance the transatlantic integration of IVSZ and advance towards cutting-edge technologies, it is essential to connect with the companies utilising these technologies, international organisations, projects, and funding bodies that promote, disseminate, and advocate for digitalisation. This also involves engaging with decision-makers who influence the regulatory environment, as well as participating in workshops, analyses, and studies that evaluate the economic and social impacts of digital transformation. Efforts should be made to establish and strengthen frameworks and platforms that facilitate business cooperation among enterprises, including SMEs, start-ups, and scale-ups. This includes creating conditions that support the development of joint projects and establishing a more efficient, streamlined, and accessible financing system.
<p>Content of the measure</p>	<p>Deepening the relationship with DIGITALEUROPE</p> <ul style="list-style-type: none"> continued agile participation in strategy development Participation in the preparation of studies, analyses, research, and surveys, with a particular focus on areas where IVSZ holds significant knowledge, experience, and expertise, is essential Strengthening the representation of European NTAs, especially in the CEE region, for example through the establishment of an NTA Advisory Board, is a priority. Active involvement in the work of DIGITALEUROPE's Policy and Working Groups by integrating the activities of IVSZ's working groups is important. Continued and expanded participation in joint projects, as well as involvement in project generation, is encouraged. <p>Strategic cooperation with international chambers of commerce and global companies should be pursued.</p> <ul style="list-style-type: none"> A digital strategic partnership agreement with representative international chambers (e.g., AMCHAM, British-Hungarian Chamber, German-Hungarian Chamber), as well as chambers in the CEE region, should be established, setting the framework for continuous cooperation, identifying key areas of collaboration, and defining joint projects and studies. The creation of "matchmaking" platforms for SMEs, startups, and scaleups, organizing events with active participation from our international member companies, is also recommended. A special collaboration package and value proposition for international and Hungarian large enterprises should be developed, including multi-year cooperation programmes and a sponsorship system extending to the CEE region. <p>Closer professional ties with the Ministry of Foreign Affairs and Trade</p>

	<ul style="list-style-type: none"> • should be established, ensuring that the topic of digitalisation features prominently in Ministry of Foreign Affairs and Trade's foreign and economic strategies, particularly concerning SMEs and startups. • The inclusion and strengthening of the digital region theme (3Seas, V4), ensuring a solid professional foundation, is crucial. • Strategic agreements with the Ministry of Foreign Affairs and Trade's key background institutions, such as HIPA, HEPA, and EXIM, should be formed to provide professional support for digitalisation, joint projects, events, studies, and surveys. • A joint review of the DES, evaluation of activities to date, formulation of corrections, and development of proposals for possible revisions and further enhancements, leading to the creation of a new, unified DES 2.0, should be undertaken. • Establishing a structured system of regular collaboration and interaction with economic attachés is necessary.
Proposed responsible persons	DIGITALEUROPE Board IVSZ Board, IVSZ Multi-, Telco-, and Large Business Membership International chambers Ministry of Foreign Affairs and Trade
Proposed timetable	DIGITALEUROPE - ongoing International chambers, international companies - ongoing, to develop a full system of cooperation: 31/12/2022 Ministry of Foreign Affairs and Trade - the development of a full cooperation system: 30/09/2022
Estimated resource requirements	Annual operating costs of HUF 15 million Implementation: TBD
Resource map	IVSZ own resources Ministry of Foreign Affairs and Trade – HIPA, HEPA, EXIM Corporate grants, sponsorships EU funds (RRF, Interreg, 3Seas Investment Fund -Technical Assistance Visegrad Fund

5.3 Strengthening digital cooperation in the wider CEE-3Seas region

Accelerating and strengthening digital transformation in the CEE region	Measure	Developing and expanding the activities of the CEE Digital Coalition
The aim of the measure	<ul style="list-style-type: none"> • Enhancing digital collaboration and speeding up digital transformation across the broader CEE (3Seas) region to boost the region's competitiveness and, in turn, accelerate its economic and social development, as well as the creation of a digital region • Establishing and developing an institutional framework for effective digital cooperation within the region, defining its key strategic directions, operational procedures, and funding mechanisms • Creating a platform for digital businesses in the region to collaborate, develop joint ventures, cooperate on regional projects, and potentially secure funding for these initiatives • Collaboratively shaping the digital regulatory environment of the region and presenting a unified digital stance to regional decision-makers, particularly in terms of securing and allocating financial resources. 	
Content of the measure	<ul style="list-style-type: none"> • Detailed development of the organisational and operational framework of the CEE Digital Coalition should be pursued, along with securing resources for its operations and forming a strategic partnership with the governing body of the "3Seas Initiative" (the next Summit is scheduled for June 2022 in Riga, Latvia). • Developing detailed regional strategies for selected areas of cooperation: <ul style="list-style-type: none"> ○ developing digital competences ○ support for investment in advanced technologies ○ access to the internet and digital services ○ developing the data economy ○ strengthening cybersecurity ○ startup, scale up ecosystem development ○ creating a coherent and clear regulatory environment ○ developing 5G networks and technologies • Establish a CEE cybersecurity forum to strengthen cybersecurity in the CEE region • Setting up a network of digital coordinators in the CEE region • Involving international and regional companies in cooperation • Setting up working groups along the detailed strategy • Defining priority cross-border, regional projects • Creating a web site, setting up social media channels • Setting up a knowledge repository, knowledge centre, project repository • Startup cooperation (Startup CEE Network) • strategic partnership with 3Seas Investment Fund 	
Proposed responsible person(s)	3Seas Initiative representatives 3Seas countries' digital advocacy groups	

	3Seas Investment Fund DigitalV4 representatives
Proposed timetable	Ongoing Milestones: In principle, an agreement during the June 2022 3Seas Summit is envisaged. 31/12/2022 - practical implementation
Estimated resource requirements	under construction
Resource map	EU funds 3Seas Investment Fund - Technical Assistance and Project Financing

5.4 Digital partnership of the Visegrad countries

Digital V4 cooperation - SMART V4 Region	Measure	Deepening, broadening and extending the digital partnership among V4 countries
<p>The aim of the measure</p>	<ul style="list-style-type: none"> • Further development and expansion of the digital cooperation platform established in 2019 by digital stakeholders of the V4 countries to accelerate their digital transformation • Providing professional support as a strategic partner to achieve the strategic goals outlined in the Kraków Joint Declaration on Digital Cooperation, signed by the V4 Prime Ministers in 2021 • Stronger representation of the region's interests in transatlantic relations, including engagements with DIGITALEUROPE, international chambers, and global companies • Taking a leading role in enhancing digital cooperation across the wider CEE (3Seas) region • Creating a platform for digital businesses in V4 countries to collaborate, develop joint ventures, cooperate on regional projects, and secure funding for these initiatives 	
<p>Content of the measure</p>	<ul style="list-style-type: none"> • Organise an annual high-level conference on digitalisation, showcasing the key directions, achievements, and challenges of V4 digital cooperation, as part of the V4 Presidencies' programme • Promote the region's digital transformation, facilitate access to EU funds, and ensure their more efficient utilisation through collaborative digital projects, providing professional guidance and validation (e.g., MFF, RRF - 20% digital spending, Interreg) • Establish and further develop systems and platforms for digital cooperation between SMEs and start-ups (e.g., "digital solutions CEE", "Start-up V4, CEE network") • Support R&D&I collaboration within the V4 countries, continuing the project aimed at establishing a regional digital knowledge centre ("NewV4lley"), with a particular focus on cooperation among EDIHs in the region • Conduct studies and surveys on digital readiness and competences (at least two annually), create a unified measurement system for digital development (e.g., IT Fitness Test, "CEE Digital Footprint", sectoral digitalisation, competitiveness indicators), and propose necessary interventions and measures based on these findings • Collaborate on the deployment of advanced digital infrastructures to achieve rapid development parity, particularly focusing on 5G technologies, and establish a V4 expert team to outline a cooperation framework • Harmonise the development of digital skills and competencies, share experiences, best practices, and applications in digital education and training; establish a V4 digital education forum and platform, with a focus on fostering regional partnerships among training and educational institutions • Given the increasing importance of cybersecurity, establish the V4 Cybersecurity Forum in close collaboration with the CEE Digital Coalition 	

	<ul style="list-style-type: none"> • Actively participate in and consult on the creation and daily operations of the "Virtual Office of V4 Digital Projects", established by the V4 governments • Support the work of the V4 Digital Coordinators; position the DigitalV4 platform and its members as key strategic partners for governments and formalise this through a partnership agreement • Proactively shape the regulatory environment by establishing an institutionalised system for consultation on legislation and draft laws, involving experts • Strengthen the V4 system of long-term strategic cooperation with international and regional corporations by jointly defining areas of collaboration, dividing responsibilities, and developing a "sponsorship" structure for each area • Conclude a strategic agreement with the Visegrad Fund to create strategic resources for digitisation and support digital projects (with a plan to submit one project per funding cycle)
Proposed responsible person(s)	Ministry of Foreign Affairs and Trade - State Secretariat for V4 Cooperation State Secretariat for Digitalisation of the Ministry of IT (also V4 Digital Coordinator) Visegrad Fund DigitalV4 representatives
Proposed timetable	Continuous
Estimated resource requirements	HUF 15 million per year - operating costs (excluding projects and events)
Resource map	IVSZ own resources International companies V4 Group Visegrad Fund

A "last argument - ultima ratio"

At the time this document was being drafted, it was neither possible to predict nor anticipate that a significant political conflict and actual war would erupt on the EU's eastern edge on 24 February 2022. This conflict might, according to some analyses, signal the onset of a new geopolitical and economic world order. It could also be contended that digitalisation and digital transformation, along with their profound impacts on all sectors of the economy and society, are currently establishing the groundwork for a new socio-economic structure.

The countries bordering the EU to the east, which play a crucial role in the aforementioned international and regional cooperation strategy, are located just a few hundred kilometres from the conflict zone. This conflict, like all modern wars, is a multifaceted, hybrid war that features a significant cyber warfare component, involving digital tools and technologies.

The current circumstances underscore the necessity of a transatlantic partnership, regional collaboration, and digital cooperation among small and medium-sized countries in the CEE region. This is crucial not only for cybersecurity but for broader regional stability and development. It is evident that the acceleration of economic, social, and digital advancement in the CEE region, as well as the swift enhancement of digital skills at all levels, can no longer be delayed and has become a pressing priority, a last chance.