



SHERPA  
Rural Science-Society-Policy  
Interfaces

## MAP Position Paper

# DIGITALISATION IN RURAL AREAS



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## 1. Summary and key messages

In Hungary, there is a significant divide between the larger cities and remote rural areas, in terms of skills, working conditions, and living standards of their inhabitants. Digital inclusion offers substantial economic and social opportunities in rural areas, but also raises major challenges. These challenges include creating the proper road and other infrastructure, improving living conditions, finding digital/smart solutions, and developing digital knowledge, skills, and competences. Lagging rural areas need external help to overcome these challenges and to avoid depopulation. The relevance of the topic rural digitalisation is justified also by the fact that it is embedded into the Common Agricultural Policy (CAP) strategic planning, thus it requires the cooperation of policy makers, researchers, and farmers or, in broader context, the society.

Among the main conclusions, it is worth mentioning that digitalisation cannot solve all problems, and may raise new issues such as privacy, data security, data management, and the so-called digital divide, whether among inhabitants or companies. Digitalisation is a cross-sectoral task, where data should be the basis for all development and should be integrated into complex programmes in the poorest areas. Knowledge transfer and education are also key elements to making people aware of the opportunities offered by digitalisation. Particular attention should be paid to the role of digitalisation in achieving (environmental) sustainability goals. In practice, the simplest solutions to problems that affect a wider audience and help farmers with decision support systems are the most appropriate.

There is an increasing number of smart village initiatives in Hungary that can serve as good practice examples to others. These examples show how diverse and complex the smart concept is in practice, and that it does not only involve technology-based solutions. However, the definition should be clarified in order to develop an efficient subsidy scheme.

## 2. Introduction

Predominantly rural regions represent 27.6% of the total territory of Hungary and host 18.5% of the population (Eurostat, 2021, 2022). Rural areas in different parts of Hungary are diverse and face quite different socio-economic conditions. Regional inequalities have been conserved for decades (Szalai and Fabula, 2012), there are areas lagging behind, which need outside help to avoid complete depopulation, while rural areas with more favourable conditions will attract urban out-migrants (Vásáry and Vágó, 2021).

Despite the progress in several domains (thanks to public investment in Hungary), rural areas still suffer from several disadvantages, including a lack of basic infrastructures and services, investment, and innovation. A quarter of the population in rural settlements can be considered to be at risk of poverty and social exclusion, which far exceeds the values measured in cities (Bálint et al., 2021). Agriculture still plays an important role in the rural economy, but its impact on economy and employment is slowly declining (European Commission, 2020). However, shaping the future of the Hungarian rurality is of fundamental importance for the Hungarian government from a social, economic, and environmental point of view. The aim is to modernise the agriculture and food supply sectors that are the backbone of the rural economy, while preserving the natural values, allowing for an improved quality of life for people in the countryside, and providing support to small- and medium-sized farms (Ministry of Agriculture, 2021).

According to the SHERPA Foresight exercise (Vásáry and Vágó, 2021) major challenges in the Hungarian rural areas are linked with the aspects of digital gap, better coordination of existing institutions and platforms, adequate roads and other infrastructure, to find digital solutions, and to develop digital knowledge, skills, and competencies. The government has recognised the challenges of digitalisation and has developed detailed and comprehensive strategies in response. The COVID-19 pandemic and the crisis in Ukraine are another turning point in the digital transformation, as the widespread use of digital technologies plays a crucial role in increasing the resilience of national economies (IVSZ, 2022).

The paper provides a synthesis of statistical data, research findings, and policy aims in Hungary in relation to rural digitalisation. It does not aim to cover all aspects related to digitalisation but will focus on rural digital divide, agriculture – which plays an important role in rural areas –, and smart villages. Each of these topics consider the role of digital tools. Examples of good practices are provided.

The MAP Position Paper focuses on the following key questions:

- What are the needs in Hungary in relation to rural digitalisation?
- What are the policy interventions already in place, and what are examples of actions taken by local actors?
- Which policy interventions are recommended by MAP members to be implemented at the local, regional, and/or national level? How can the EU support these interventions?
- What are the knowledge gaps and what research projects are needed?

The SHERPA Discussion Paper cites a set of principles to guide digitalisation processes toward desired futures, developed by the DESIRA project (Brunori et al., 2021). MAP members were also asked to evaluate the Hungarian situation in line with these principles.

### 3. Current situation based on background research and evidence

According to the Digital Economy and Society Index (DESI), Hungary ranks overall 22<sup>nd</sup> out of the 27 EU Member States. Hungary is above the EU average for broadband coverage (European Commission, 2022a), but there are important regional diversities. Connectivity is a problem for homesteads and villages in poorer rural areas, even if these villages are located in well-performing regions. In several counties, rural areas are facing lack of access to basic infrastructure and services (European Commission, 2020).

The epidemic exerted a significant impact on the use of digital devices by society, too. The internet access of Hungarian households has been continuously increasing and was 88% in 2020, while 91% in 2021. However, there is a clear divide in its distribution, as this proportion was 96% in Budapest (capital) region, while 86% in Northern Hungary (KSH, 2022). Household income is a key determinant of Internet penetration. The higher the net income capita is, the higher is the proportion of households with internet access (Table 1).

Table 1 – Proportion of households with internet access by income categories, 2020

Monthly net income per capita*	Proportion of households (%)
<b>Less than EUR 430</b>	60.7
<b>EUR 430–715</b>	86.3
<b>EUR 715–1000</b>	95.2
<b>Above EUR 1000</b>	99.0

\* rounded values, 1 EUR = 351 HUF

Source: KSH (2020)

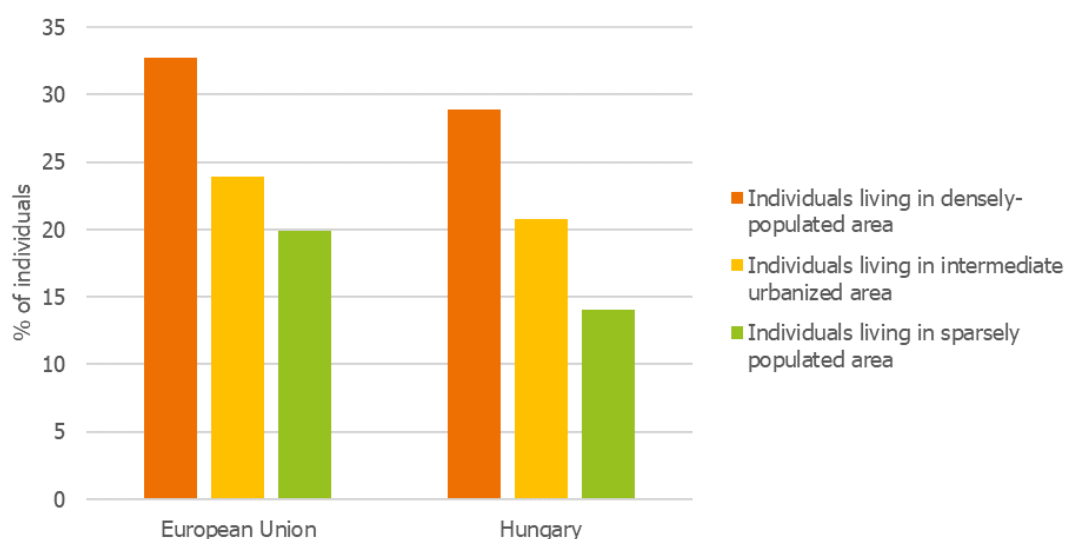
In addition, averaging all the baskets of mobile broadband usage, Hungary belongs to the most expensive countries (European Commission, 2022b). It means that some rural communities are not able to benefit of the social and economic integration that digitalisation brings, however, fast connectivity for a fair price and

digital technologies can improve quality of life in rural areas and have the potential to provide new possibilities for farms, including small ones (European Commission, 2019).

On human capital, the country ranks 23<sup>rd</sup> among EU countries. Only 49% of individuals have at least basic digital skills compared to the EU average of 54% and the Digital Decade target of 80% by 2030. The proportion of individuals above basic digital skills is only 22%. Digital skills of rural population are usually lower than that of people living in urban areas, and this is particularly characteristic for Hungary (Figure 1). Significant proportion of the rural society's digital skills does not meet today's labour market expectations and retraining the population will require outside support. Roma people represent an important vulnerable group in rural areas as their education level is lower than in the rest of the population combined with high poverty rate (Forray and Varga, 2021; Siposné Nádori, 2021).

Although there was progress in the digitalisation of enterprises, most Hungarian enterprises do not exploit the opportunities offered by digital technologies. The situation is similar for advanced technologies: on AI, cloud, and big data, Hungary scores well below the EU average and integration of digital technology ranks 25<sup>th</sup> among EU countries. Regarding digital public services, there was substantial progress on the demand side of e-government, number of users increased significantly (81% of internet users), going above the EU average of 65%. All other component scores are below the EU average, especially open data maturity is weak (European Commission, 2022a).

*Figure 1 – Individuals with above basic digital skills, 2021*



*Source: European Commission, Digital Scoreboard*

The agricultural sector in Hungary is characterised by an ageing farming population. According to the 2020 Agricultural Census data, 35% of all farm managers are older than 65 years, while only 10% of farmers are younger than 40 years. The agricultural education level of farm managers is low, especially when referring to full agricultural training (9%). The new technical solutions and devices are available on the market, but digitalisation is not typical for Hungarian farmers. 38% of the farms used some kind of digital tool in 2020, mainly related to banking and e-government. The use of tools related to precision agriculture is very low (12%), with the highest prevalence (5.6%) of plant health monitoring. The use of digital tools decreases with the age of farm managers but increases with the level of agricultural education. Former research found that the economic benefits of the guidance systems by reducing overlaps, allowing drivers to work longer with less fatigue, and to work in mist or dust, have proven substantial for farmers. However, information-intensive technologies (e.g., variable rate technologies) are more complicated, their adoption is slower but increasing. Due to the limited digital skills, farmers require additional investment in training or purchase advisory or complex services (Gaál et al., 2020). Based on 2020 Census data, the majority of farmers who

have not used precision farming tools (87%) believe that they do not need those in agricultural production. This may be partly a consequence of the lack of adequate information and knowledge, which are among the main barriers to the diffusion of digitalisation and advanced technologies (Gaál et al., 2020; Bálint et al., 2021; Varga, 2021). However, some research points out that digitalisation can deepen the already significant inequalities between farmers, as smallholders are at disadvantage in adopting technology (Hoyk et al., 2022).

Digitalisation and smart solutions are increasingly important to enhance local well-being by improving endogenous resources and thus contributing to sustainable development. It is worth mentioning that Tibor Szanyi, Member of European Parliament for Hungary had a key role in starting the Smart Villages for Europe movement in 2018. Recently, smart villages and their development have become an important research topic. There are several initiatives and programs supporting smart villages, however, the smart rural development policy field is still evolving in Hungary (Szalai et al., 2021). For villages and small towns, access to services is the main development objective, and the local community is a potential resource to be exploited. Szalkai (2021) draws the attention to the problem of lack or insufficient availability of transport in rural areas, that could be addressed by intelligent transport solutions (e.g., car-sharing system, demand-driven village bus). Greater emphasis should be placed on communication to ensure that the local community understands what can be considered smart development and what everyday benefits it can bring, so that development can be made acceptable and known to the community. Unplanned developments and under-utilisation of the introduced services can cause smart village initiatives to fail (Káposzta and Honvári, 2019; Szalai and Fabula, 2021).

## 4. Position of the Multi-Actor Platform

MAP members essentially agree with the findings of the Discussion Paper: However, it is important to not only highlight the benefits of digitalisation.. On the other hand, the importance of the knowledge transfer is not sufficiently emphasised in the paper.

Digitalisation has the potential to mitigate many rural problems, like depopulation, out-migration, and employment gaps. However, it cannot solve all problems, and may raise new issues such as privacy, data security, data management, and the so-called digital divide, whether among inhabitants or companies. COVID-19 has been a driver for digitalisation but has also increased the digital divide in Hungary.

The quality of the rural environment, quality of social relations, quality of work, and quality of services are of great importance. Housing issues, increasing the comfort of rural residents, caring for the elderly people are challenges. Digitalisation can support all these goals, but personal relationships are also important both in private life, in services (e.g., entertainment) and at work.

Regarding local solutions, it must be highlighted that there are several small settlements in Hungary (36% with less than 500 inhabitants), but it is not sustainable to develop for each small one, regional cooperation is needed. Instead of the traditional area definitions, the functional rural area approach should be introduced. Local solutions can be new developments or the adoption of solutions that work well elsewhere. Community-led initiatives are important, but sometimes local people do not understand the problems, and this is a barrier to involve them into the developments.

Hungarian policy has made many efforts to promote digitalisation in recent years, but the current systems need to be revised. Digitalisation is a cross-sectoral task, and data are the basis for development – data generated in one place can be an input in another. The technologies are changing rapidly; therefore, a big challenge is to solve present problems with future technologies. In general, terms simple solutions to problems that affect a wider audience are the best ones.

## 4.1. Identified needs

There was nobody among the participating MAP members who would state that the current situation is satisfactory. The key areas identified can be summarised as follows:

- **Education, knowledge transfer:** Development of education for better future of rural areas is one of the key tools. The digital skills are most often developed in school education, and it is important at all levels. It would be particularly necessary in vocational training – where often the adequate infrastructure and tools are also missing – and teacher training. The professional and adult education would help people to meet today's labour market expectations. The extension of e-learning is a very relevant opportunity. However, for the older generation, who are not yet online or who are limited users of digital solutions it is more difficult to reach digital education and training. Digital training for advisors is also important in agriculture because they can transfer knowledge and help attitudinal change of farmers.
- **Living and working conditions:** Increasing the comfort of rural residents, better healthcare system, and caring for the elderly people are challenges that digitalisation can help address. The digital solutions may transform the working conditions, the organisation of employment, and enable atypical forms of employment (e.g., remote working, co-working).
- **Data access and online services:** Data is the basis for all development. Citizens and enterprises require online services to public administration, public services, waste management, and market information. Local authorities and rural policymakers should have a geographic information system that integrates rural data collected by different institutions.
- **Infrastructure development:** Hungarian rural infrastructure and development culture need to be improved, as their shortcomings often hinder the implementation of smart solutions.

## 4.2. Existing interventions and actions

Digitalisation efforts in Hungary have undergone significant development in the last decades. The Government of Hungary has realised the significance of the digital transformation and intends to prepare citizens and businesses for this. The main actions and programmes are presented below. They are structured according to the following aspects: policy measures, organisations supporting knowledge transfer, digital public services, and initiatives by local actors. The chapter does not aim to cover the entire Hungarian agricultural knowledge transfer system.

### 4.2.1. Policy measures and programs

Several programs were initiated within the [Digital Success Programme](#) (DSP) between 2015 and 2022, for example Digital Education Strategy, Digital Export Development Strategy, Digital Start-up Strategy, Digital Workforce Program, and Digital Healthcare Development Strategy of Hungary. The National Digitalisation Strategy, approved in 2021, like an umbrella for the other strategies, provides an ambitious strategic policy framework for 2021–2030. It is structured around the four main pillars of the Digital Decade Compass measured in DESI: digital infrastructure, digital skills, digital economy, and digital state. The Digital Hungary Agency has been established in 2022 integrating several institutions and is responsible for the operation of e-public administration and IT systems, and the creation of digital citizenship on a single platform. It is an important intention that by 2025 everyone will be able to manage their official affairs using a mobile phone (Hungary Posts, 2022). At the same time, the Digital Success Programme terminated at the end of July 2022 and will be replaced by programmes and developments planned partly by the Digital Hungary Agency and partly by the Neumann Technology Platform.

Agriculture, food industry and rural digitalisation have received special attention in the DSP. The Hungarian Digital Agriculture Strategy (DAS) was adopted in 2019 and is an important component of Hungary's Food Industry Concept 2017-2050. Its aim is to improve farmers' digital skills (through education development program and consultancy development), facilitate the data access and use, and to encourage the agricultural digitalisation. A so-called digital cost reduction drive in agriculture is aimed at granting free access to as many central databases as possible, simplifying reporting to Hungarian authorities and the European Union, and speeding up decision-making (Ministry of Agriculture, 2019). The desired outcome of the strategy is the more profitable and sustainable agricultural production, as well as retaining the farmers in farming and attracting the rural youth in agriculture. The Digital Food Industry Strategy (DÉS) is also before approval. Its two main pillars are the renewal of production technology with ICT and the development of education. A more detailed description of digitalisation and rural policy framework can be found in a DESIRA working paper (Szenderák et al., 2021).

Among the several measures and programmes, MAP members suggested highlighting the followings:

- [Digital Agricultural Strategy](#) aims to contribute to increasing the profitability of agricultural production by collecting and processing information, automating and robotising technological operations, and making efficient use of available environmental resources. The strategy is focusing both on the data and technology needs and on the growing demand for a workforce capable of using digital technology in agricultural production and supporting change.
- Among the first actions, as a flagship project, the [Digital Agricultural Academy](#) (available only in Hungarian) has been established. In the Digital Agricultural Academy, 31 online learning materials are available in 9 modules (farm management, arable crops, livestock, horticulture, viticulture, forestry, precision machinery, remote sensing, and Digital Producer Market). It also includes a knowledge base explaining terms related to precision agriculture. The catalogue of available digital public services and a database of digital demonstration farms are constantly being updated. Demonstration farms play an important role in training farmers, where they can experience digital solutions in practice.
- [Digital Village Programme](#) (DVP, available only in Hungarian) was launched in 2021 in order to facilitate the improvement of the attractiveness and liveability of small settlements with different digital or smart solutions. The programme fits into The European Network for Rural Development (ENRD) and the expectations of the CAP Strategy (Balla, 2021). It is also directly related to Hungarian Village Programme (HVP) introduced in 2019 with the aim to maintain or increase populations in rural areas. Within the framework of the HVP programme, local governments, ecclesiastical legal persons, and NGOs have a wide range of opportunities for implementing development programmes, with a special focus on public services (Government of Hungary, 2020).
- The Digital Village of the Year Award was established in 2021 within the framework of the DVP. The title is awarded to Hungarian villages with less than five thousand inhabitants, in four categories: innovative settlement environment, innovative and social community well-being, sustainable built and natural environment, and innovative economic ecosystem. The awards also make existing national digital good practices widely known, helping to foster cooperation between municipalities, strengthen local communities and promote regional development.
- As a measure of the DAS, the Digital Producer Market ([Közért+](#), only in Hungarian) under the professional mentorship of the Széchenyi István University of Győr has been launched in 2020 and ensures the movement of goods between producers and consumers through its logistics, quality assurance and coordination services. The services of the system also provide opportunities for local and regional actors to make coordinated use of existing resources in a collaborative way, for example by integrating logistics tools (e.g., village buses, long-distance transport).

- The Civitas Sapiens Smart City Knowledge Centre coordinates the smart city projects, develops trainings, and sets up projects to enhance the digital development of Hungarian towns and villages. A free of charge '[Digital area development executive](#)' webinar course has been launched, targeted for practitioners and decision-makers in small towns and villages. The aim of the training is that every settlement has at least one expert, who can contribute to the digitalisation and smartening of his/her own village and of neighbouring settlements. There is a chargeable higher level of the training called '[Digital Area Development Specialist](#)' providing a degree for successful participants (DJP, 2019).
- In the framework of the Operative Programme for Development of Economy and Innovation, the [GINOP-6.1.2-15: Narrowing the digital gap](#) priority project (available only in Hungarian) was implemented between 2015 and 2021. The project trained more than 260 thousand low-skilled (ISCED 1 or 2) adults, residing in less developed – convergence – regions of Hungary. Almost 260 mentors (e-advisors) and 19 coordinators worked during the programme. Mentors supported the trainees with a wide range of tools (e.g., customer service, training consultancy, individual user management). Experience showed that the trained person was more confident when they had a mentor, and the process was even more successful if they had known each other personally for a longer period of time. A pilot project to develop the digital competences of vocational trainers was also implemented. This training ensures that they have the technical skills and competences needed for digital education, and the ability to select and apply the appropriate digital teaching-learning methodology.

#### 4.2.2. Supporting organisations

Under the Digital Success Programme, the competence development of Hungarian citizens was realised with the mentors of the DSP Network. Since 2017, approximately 1,680 mentors have worked to reduce digital illiteracy in 1,205 settlements and 1,515 DSP Points (DJP, 2022). The Points offered free help from the young to the elderly: internet, digital tools and skills development activities were available. In the course of their work, mentors have helped with electronic administration, e.g., Client Gateway, access to document offices, taxation, social security or public utility services, electronic banking, electronic enrolment or even recreational services. In spring 2022, Digital Knowledge Centres have been established in six rural towns. In addition to shaping attitudes and demonstrating digital solutions, these centres aim to help people's competitiveness at the labour market through adult education programmes of digitalisation.

The agricultural advisory has predominant role in knowledge transfer. The tasks of the Hungarian Chamber of Agriculture include the coordination advisory activities, organisation of the training and examination of advisors, maintaining and publishing the list of advisors and advisory organisations. It is important that the advisors have sufficient knowledge about digitalisation. Therefore, the basic compulsory training for the advisors has been completed with the topic of 'digital technologies in agriculture and rural development'. The Hungarian Chamber of Agriculture also employs more than 600 village agronomist who are the local points of information supply and knowledge transfer. They provide information and help chamber members regarding issues related to their activities, e.g., filling the digital single application forms (Gáborné Jakab et al., 2020).

#### 4.2.3. Digital public services

The digitisation of agriculture relies on data, some of which is generated at farm level, but there is a significant amount of public data available. Public agricultural data – such as soil information, meteorological data, land parcel information, market price data – in Hungary are collected by 13 institutions, stored and processed in 48 databases in the public administration. However, farm-level decision support applications do not directly access these databases (Milics et al., 2022).

In addition, several e-government services help to facilitate the tasks and daily life of farmers and rural society. According to the MAP experts, good practices for digital public services include:

- The Simplified Employment Reporting (EFO) mobile application was launched in 2013 with the aim of facilitating the registration of workers in a simplified employment. The application has become increasingly popular among users over the past years, with an average of 150-200,000 notifications per month. The system does not require any special knowledge to use, but it has a number of automatic control features that make it simple and reliable to use.
- The National e-Health Infrastructure (EESZT), launched in 2017, provides a unified IT environment to manage communication within the healthcare sector and towards citizens. The system provides services that can make health services more efficient. This includes digital monitoring of the treatment process, telemedicine, instant access to digitalised health documents. The use of e-prescriptions increased from 70% to 95% in the last 2 years following the outbreak of COVID-19 (European Commission, 2022a).
- The Municipality ASP (Application Service Provider) system was implemented nationwide in 2019. The integrated back-office software and e-government portal provides a uniform, high-quality electronic administration opportunity for the citizens and businesses operating in the given municipality. There are 9 sector-specific systems included in the centrally provided service portfolio: financial management, local tax management, document management, property cadastre, industrial and commercial management, inheritance registration, online form management, local government e-administration single point of contact portal, municipality web-portal service (Dán, 2019). By the end of 2021, all the 3178 local municipalities and 19 county governments in Hungary have introduced the system. The system also allows the Treasury, the Ministry of Finance, and the Ministry of Interior to produce quick reports. The system received a Good Practice Certificate at the European Public Sector Award in 2021.
- MobilGAZDA app, launched in 2021, is the Hungarian State Treasury's mobile application for agricultural and rural development subsidies, which facilitates communication between farmers and the Treasury. The app includes customer service functions, information functions (e.g., news, calendar), displaying the parcel data and measurement functions, geo-referenced photo making and sending, and submission of certain electronic support documents. Using the app will increase information exchange and make applications more accurate, which will facilitate faster decisions on payments of subsidies.

#### **4.2.4. Actions taken by local actors**

As examples of actions taken by local actors, the increasing number of smart village initiatives can be mentioned. Smart village strategies can help to address the digital divide by recognising the different starting points of rural areas and developing digital pathways from the bottom up. From a practical point of view, a smart village makes rural life more convenient, saves time, money and effort for villagers, increases opportunities and makes better use of existing resources. Digital solutions can help care for the elderly (which is very important in an ageing population) and increase residents' safety and security. The Lechner Knowledge Center operates an [Online Database of Smart Projects](#), which collects best practices related to the smart services available in the settlements. The purpose of the online database is to show how diverse and complex the smart concept is in practice, and that it does not only involve technology-based solutions. At present, the database contains more than 1,000 examples worldwide, classified along six sub-systems: government, economy, environment, mobility, living conditions, people. Among these, 32 belong to Hungarian settlements with less than 10,000 inhabitants. Selected examples (Table 2) show the diversity of actions related to smart villages.

MAP experts also suggested mentioning the EU-funded [WiseFarmer](#) project (2019–2021), led by the Hungarian GAK Education, Research and Innovation Nonprofit Ltd. The main goal of the project was to bring the younger (missing competency and experience in the practice) and elder (lacking digital skills) farm generations together in a common program for the exchange of knowledge, access to high quality learning opportunity, facilitating support and sustained collaboration for increased competence. As the farmers' most trusted source of information are other farmers, the skills of using digital tools can be successfully transferred in the local context.

Table 2 – Examples of actions taken by local actors

Name and short description of the projects
<p><b>Digital Future Settlement Network</b></p> <p>The network was set up in 2016, led by the town of Budaörs (more than 28,000 inhabitants) and the village of Alsómocsolád (around 280 inhabitants that time). The aim was to create a community platform for testing and upscaling inclusive smart projects and the exchange of best practices.</p> <p>Link: <a href="https://www.facebook.com/groups/1285091431558411/about">https://www.facebook.com/groups/1285091431558411/about</a> [in Hungarian]</p>
<p><b>North Hegyhát Micro-Regional Union</b></p> <p>The municipalities, economic partners, institutions and NGOs of the settlements of Alsómocsolád, Bikal, Mágocs, Mekényes, Nagyhajmás (southern part of Hungary, Baranya County) decided in 2014 to work out a joint development program, and the Union was born from this initiative. Now the Union intends to create the first 'Smart Area' of Hungary, connecting the participating municipalities and community resources with the information technology tools. This can break down the boundaries between the modern metropolitan world and the rural life and helps to reach demographic balance.</p> <p>Link: <a href="https://eszakhegyhatiunio.files.wordpress.com/2019/07/okos-hegyhc3a1t-stratc3a9gia_rc3a9szletes_fin.pdf">https://eszakhegyhatiunio.files.wordpress.com/2019/07/okos-hegyhc3a1t-stratc3a9gia_rc3a9szletes_fin.pdf</a> [in Hungarian],  <a href="http://okosvaros.lechnerkozpont.hu/en/node/783">http://okosvaros.lechnerkozpont.hu/en/node/783</a> [summary in English]</p>
<p><b>Digital developments of Alsómocsolád</b></p> <p>In addition to the above-mentioned projects, the digital developments of Alsómocsolád are worth highlighting in more detail. Four information points form smart community spaces, with free Wi-Fi coverage within a radius of 80 metres. The village has a regional interactive public transport support system called HazaTér. Tourism services are supported by a planetarium, a Boeing simulator and a QR code walking trail. The village received the Digital Village of the Year award in 2021 in the category of Innovative municipal environment. The settlement has a smart village strategy available also in English.</p> <p>Link: <a href="https://alsomocsolad.hu/?hir=797">https://alsomocsolad.hu/?hir=797</a> [in Hungarian]  <a href="#">Smart village strategy of Alsómocsolád</a> [in English]</p>
<p><b>Developments of Füzérradvány</b></p> <p>Füzérradvány is a small village with about 250 residents in the tourist region of Northern Hungary, in Borsod-Abaúj-Zemplén County. The village received the Digital Village of the Year award in 2021 in the category of Innovative Social and Community Well-being. Despite the small population, three Digital Success Programme points have already been established, and organise digital media literacy events for parents and grandparents. In addition, cameras were installed in the municipality for better and more effective public safety, the local church was equipped with solar panel and inverter, and the amount of solar energy produced can be digitally tracked.</p>

Name and short description of the projects
Link: <a href="https://www.fuzerradvany.hu/2021/10/19/fuzerradvany-lett-a-az-ev-digitalis-faluja/">https://www.fuzerradvany.hu/2021/10/19/fuzerradvany-lett-a-az-ev-digitalis-faluja/</a> [in Hungarian]
<p><b>Elderly care system in Tamási</b></p> <p>Tamási is a small town with less than 8,000 inhabitants in Tolna County. In collaboration with Antenna Hungaria, a state-owned telecommunications operator in Hungary, an elderly care system has been set up in 2018. The IoT network uses LoRaWAN sensors to monitor the environment of the most deprived persons, so that an emergency (in this case, unheatedness of the property) can be detected in time and the social worker responsible for the area can be informed. The municipality has gained valuable experience on the heating habits of care recipients, which will help in planning the provision of social firewood in winter.</p> <p>Link: <a href="https://www.ahrt.hu/hu/hirek/az-antenna-hungaria-fejlesztok-reszere-megnyitotta-oroszagos-iot-halozatat">https://www.ahrt.hu/hu/hirek/az-antenna-hungaria-fejlesztok-reszere-megnyitotta-oroszagos-iot-halozatat</a> [in Hungarian], <a href="http://okosvaros.lechnerkozpont.hu/en/node/674">http://okosvaros.lechnerkozpont.hu/en/node/674</a> [summary in English]</p>
<p><b>Digitalisation survey of local businesses in Balatonmárfiafűrdő</b></p> <p>The digitalisation survey of local businesses started at the end of 2018 in Balatonmárfiafűrdő (settlement with about 870 inhabitants, at lake Balaton), led by T-Alfasystem Economic and Business Consultant Ltd. The main concept of the municipal cooperation is to make an up-to-date list of the services and companies in the settlement, which can be found on the website of the Balatonmárfiafűrdő Municipality. In addition, organisations participating in the digitalisation survey will receive a customised IT project proposal to help them increase their digital competence.</p> <p>Link: <a href="http://www.balatonmariafurdo.hu/okos-falu-program">http://www.balatonmariafurdo.hu/okos-falu-program</a> [in Hungarian], <a href="http://okosvaros.lechnerkozpont.hu/en/node/804">http://okosvaros.lechnerkozpont.hu/en/node/804</a> [summary in English]</p>
<p><b>Ceglédbercel, the smart village</b></p> <p>Ceglédbercel is located in Pest County, its population is around 4,200 inhabitants. In cooperation with Invitech Solutions IT company, the settlement become a smart village in 2018. As a first step, an eight-unit Full HD camera system has been installed, which can send photos of high-frequency public spaces to the local police and civilian guard. In addition, a WiFi hotspot has been set up at two of the most visited locations. As a next step they developed a mobile application, which helps locals and visiting tourists to get the needed information, such as services of local entrepreneurs or program opportunities happening in the village. The next step is to build the IoT network by deploying environmental sensors, which can improve the energy efficiency of public lighting and provide information about the traffic.</p> <p>Link: <a href="https://www.okosfalu.hu/">https://www.okosfalu.hu/</a> [in Hungarian], <a href="http://okosvaros.lechnerkozpont.hu/en/node/776">http://okosvaros.lechnerkozpont.hu/en/node/776</a> [summary in English]</p>
<p><b>Development of Baksa village</b></p> <p>Baksa is a village in Baranya County with about 800 inhabitants. The Municipality actively works on developing the village and its facilities. For safe transport, a traffic slower lane and surveillance cameras were installed. There are two smart benches at the two ends of the village, providing free Wi-Fi hotspot and a charger for laptops and mobile phones. For its retired people, the municipality have set up a monitoring system that can provide help via satellite if necessary.</p> <p>Link: <a href="http://okosvaros.lechnerkozpont.hu/en/node/803">http://okosvaros.lechnerkozpont.hu/en/node/803</a> [summary in English]</p>

Source: own collection based on the Smart City database, news and other sources

### 4.3. Recommendations from the MAP

MAP members made several suggestions during the workshop and rated on a scale of 1 to 5 how Hungary is performing in terms of the principles developed by the DESIRA project (Brunori et al., 2021). The opinions and recommendations received are summarised below.

#### 4.3.1. Recommendations for future rural policies

Despite several measures taken in recent years, none of the proposed interventions has been answered as not requiring improvement (Figure 3).

##### **Creating the basic conditions for digitalisation**

According to the 75% of the respondents, this area needs significant improvement. Reversing the trends of depopulation and ageing in rural Hungary requires investments in access to basic services and infrastructures, boosting the local economy, and increase the comfort of rural residents. Development of education for better future of rural areas is one of the key tools. Investment in digital infrastructure will be wasted if there are no sufficient digital skills to use them. Special attention should be paid to low-educated groups, e.g. Roma, to avoid increasing the digital divide. Digitalisation should be integrated into complex programmes in the poorest areas, like 'Catching-up settlements' project.

##### **Anchoring digitalisation to sustainable development**

Digitalisation should contribute to reducing the vulnerability of rural areas, developing new services, and improving access to market for rural products and services. To meet the ambition of the Green Deal, broadband connectivity should be further expanded in agricultural areas. There are innovative food system-related businesses, operational groups, living labs and accelerators, and better integration of information, knowledge, advice, and digital services, should also contribute to making Hungarian farming sector smarter, more sustainable and more productive. These goals are included in Hungary's CAP Strategic Plan and in the Digital Agricultural Strategy. However, most of the MAP members indicated that further action is needed. For a large-scale change it is essential making the innovation and digital-technological results more widely available to farmers and the rural population.

##### **Adapting digitalisation to different contexts**

This question received the most evenly distributed response, i.e. mixed opinions. Different rural areas have different needs. The different environmental, economic and social conditions should be considered in development. However, in many cases the development of each individual small settlement is not sustainable and regional cooperation is needed. Local problems can often be solved by adopting solutions that work well elsewhere.

##### **Developing digital ecosystems**

There were also different views on this question. Digital transformation requires strengthening the existing connections among research, education, and farming advice, and by providing innovation support across the farming and the rural community.

##### **Favouring digital inclusion**

According to 75% of the respondents, this area needs at least moderate improvement. Research results and statistical data show that the pandemic has been a driver for digitalisation but has also increased the digital divide in Hungary. Digitalisation can also deepen the already significant inequalities between farmers. Active policies should take place to avoid digital exclusion and ensure equal access to the benefits of digitalisation.

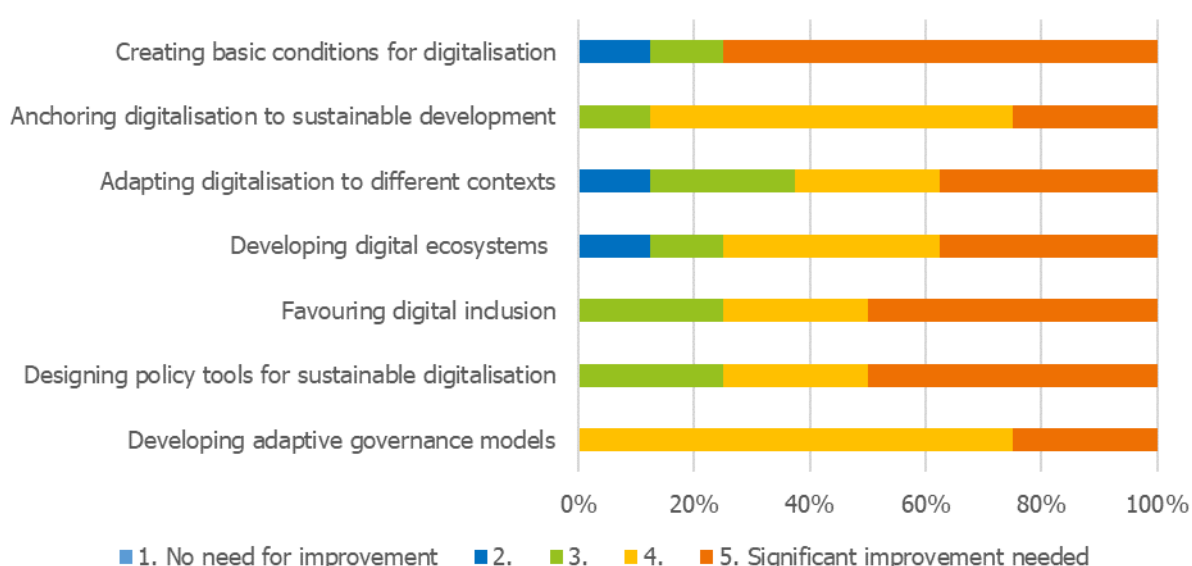
## Designing policy tools for sustainable digitalisation

The CAP strategic plan and the Hungarian Digital Agriculture Strategy have taken into account the opportunities and risks of digitalisation. The CAP Network is under development. Probably for this reason, some MAP members indicated that the improvement of policy tools is neutral, but most of them agree that significant improvement needed. However, the following problems can be highlighted: (1) both on EU level and in Hungary there are several strategies, initiatives and programs related to digitalisation, which are difficult to follow; (2) the Eurostat survey on 'ICT usage in and e-commerce in enterprises' that is the basis of DESI index, does not cover the agriculture sector; (3) the monitoring system of agricultural digitalisation is still missing.

## Developing adaptive governance models

According to the answers, this area needs the most improvement. Digitalisation is a cross-sectoral task, and data are the basis for development. Data generated in one place can be an input in another. Policy cooperation should also be data-driven. In addition to that, the CAP is now at a stage of development when the research results and experiences (e.g., smart villages) could be considered in the resource allocation.

*Figure 3 – Experts' recommendations to the rural digitalisation process in Hungary*



*Source: SHERPA MAP survey*

The EU can support these interventions by several measures, like CAP Strategic Plan, the agricultural European innovation partnership (EIP AGRI), the Smart Village program and H2020 projects. Hungary should find and link existing resources to make full use of them. However, several EU projects focus on rural and agricultural digitalisation, but the results are not transparent.

The knowledge of mobility zones (e.g., commuting to work) is important for defining and developing functional rural areas. For example, Google Maps can delineate mobility areas, and Google provided [Community Mobility Reports](#) during the Covid pandemic about trends over time by geography, across different categories of places such as retail and recreation, groceries and pharmacies, parks, public transport stations, workplaces and residential. Such data would cost a lot of money to obtain. However, there could be an initiative at EU level to support local authorities to have access to aggregated and anonymised data in their region.

An EU-level decision would also be needed to include agricultural enterprises in Eurostat's ICT use survey and thus in the DESI indicators.

#### **4.3.2. Recommendations for future research agendas**

A key research question might be: who can afford to move to the countryside, and what are their motivations? This question is strongly connected to other issues related to working conditions. For example, are these people becoming teleworkers? There are companies that organise special buses to transport their workers. If the people moving out are young families, what about schools and kindergartens?

Another set of questions is related to urban-rural linkages, as well as the sustainability of rural economy. What is there beyond teleworking, tourism and agriculture, and how can they work well? How can a region remain prosperous in the longer term, given current trends?

Last but not least, the research needs related to knowledge transfer. According to the MAP experts, more detailed measurement and assessment of digital competences is needed. Digital competence assessment for students is a good practice now, but there is lack of assessment of teachers' competences, especially in vocational training. The review of the DESI index, and the involvement of agricultural enterprises is recommended.

## **Conclusions**

Both on EU level and in Hungary there are several strategies, initiatives and programs related to digitalisation, which are difficult to follow. The MAP members concluded at the workshop, that the revision of the current systems is needed, which is in line with the statement of the head of the newly formed Digital Hungary Agency. He stated that there are currently more than 30 strategies for public IT, which are planned to be replaced by a single strategy (Infotér, 2022).

Despite several measures taken in recent years, further steps still need to be made to achieve the level of digitalisation that has been set as a target in European and Hungarian strategies. All developments should be data-driven, which requires the collaboration between the sectoral policies and digital services. There is an increasing number of smart village initiatives in Hungary, which can serve as good practice examples to the others. Their experiences should be incorporated into further development programmes, e.g., CAP, LEADER, and complex development programmes in the poorest areas.

Knowledge transfer and education are also key elements in agricultural and rural digitalisation. Adequate initiatives have also been taken in this area, but more emphasis should be given to the training of trainers, both in case of vocational training and advisors. In addition, a more detailed measurement and assessment of digital competencies would be needed, as well as a complete monitoring system of agricultural digitalisation.

Digitalisation raises several new issues such as privacy and data security, which are very important to handle, however, these topics were not covered by the present paper.

## **Acknowledgements**

This Position Paper was created by the facilitator and monitor of the MAP together with a valuable contribution of the MAP members. We have used the data and information collected from scientific literature, as well as experiences during the CAP strategic planning. We have reviewed also relevant projects, programs, and strategies. The SHERPA Discussion Paper 'Digitalisation in rural areas' created by Brunori, G., Rolandi, A., and Arcuri, S. served as a basic document. We acknowledge the organisations, authors and projects, which provided sources of data and information, cited below.

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## Annex 1 Methodology used by the MAP

The topic *Digitalisation in rural areas* is a horizontal issue and it is embedded into the CAP strategic planning process. Therefore, the development of AKIS definitely requires the close and intensive cooperation of policy makers, researchers, and farmers or in broader context the society with various stakeholders.

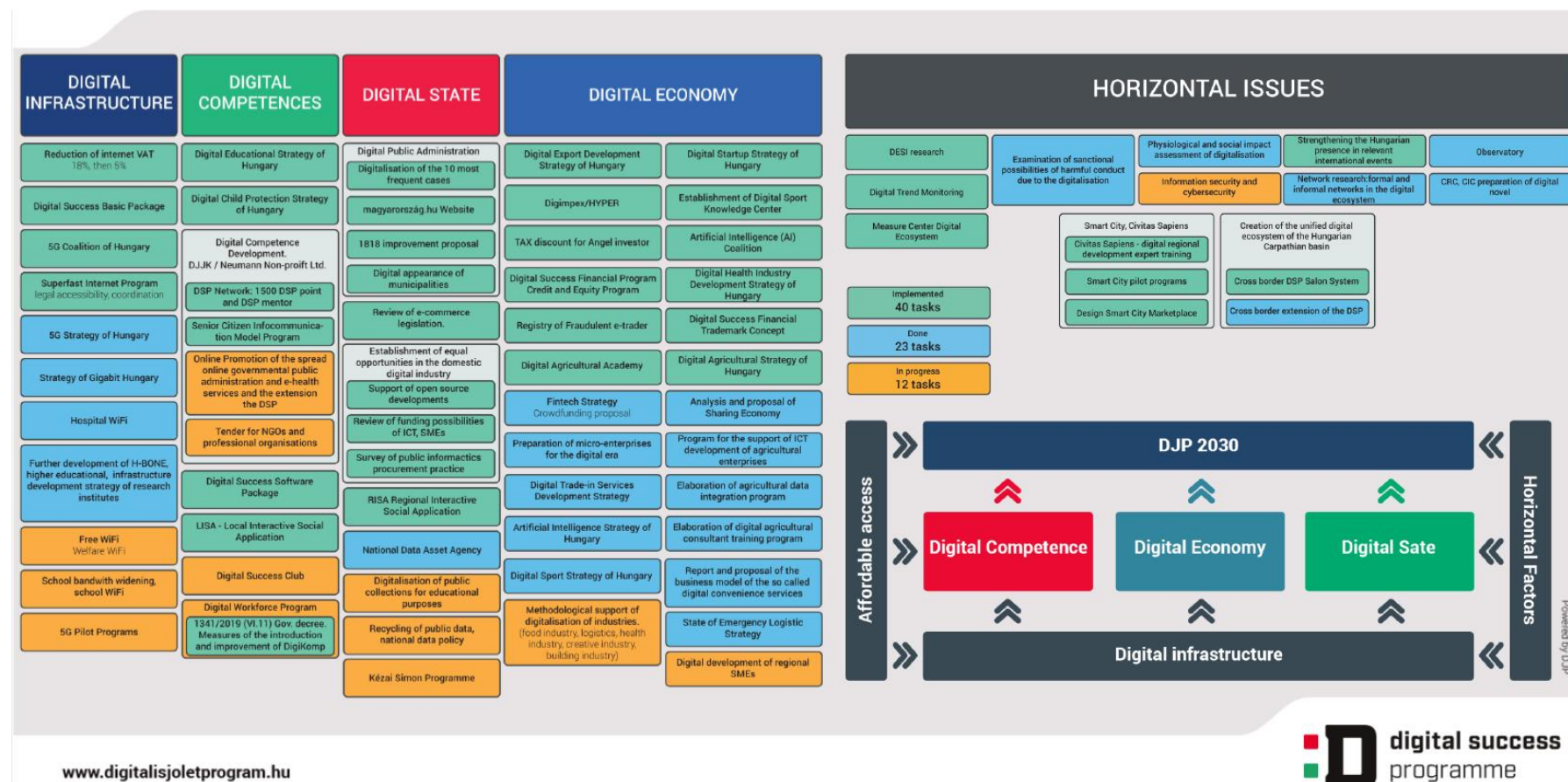
There have been several changes at the Institute of Agricultural Economics over the past years including changes in the management of the project. Both the facilitator (who was earlier a MAP member) and the monitor have become new, which raised many challenges for them. Most of the MAP members have been participated also in the previous MAP cycles, but new members have also been involved. Number of official MAP members is 12, and equal balance of power is demonstrated among the stakeholder groups. The MAP's core group is the AKIS sub-working group established by the Ministry of Agriculture to facilitate the CAP strategic planning process, therefore they have a good insight into the problems and needs discussed. An additional external stakeholder participated in the workshop.

MAP members received the SHERPA Discussion Paper before the meeting and the key questions to be discussed at the workshop. The meeting was a hybrid workshop, most of the members were able to attend in person, but some of them joined online via Teams.

In the framework of the workshop MAP experts were asked to talk about their experiences and opinions. Afterwards they received the outline notes of the meeting and were requested to make any additional comments. They were also asked to fill in a short online survey concerning the principles defined by the DESIRA project.

MAP experts commented the draft of the position paper and approved the final version.

## Annex 2 The task system of the Digital Success Program



Note: DJP 2030 is the so called Digital Government strategic framework

Source: DJP, 2020



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