

SHERPA
Rural Science-Society-Policy
Interfaces

SHERPA Discussion Paper

DIGITALISATION IN RURAL AREAS



SHERPA receives funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 862448

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Citation: Brunori, G., Rolandi, S., Arcuri, S. (2022). Digitalisation of Rural Areas. SHERPA Discussion Paper. DOI: 10.5281/zenodo.6421292

Paper finalised in April 2022

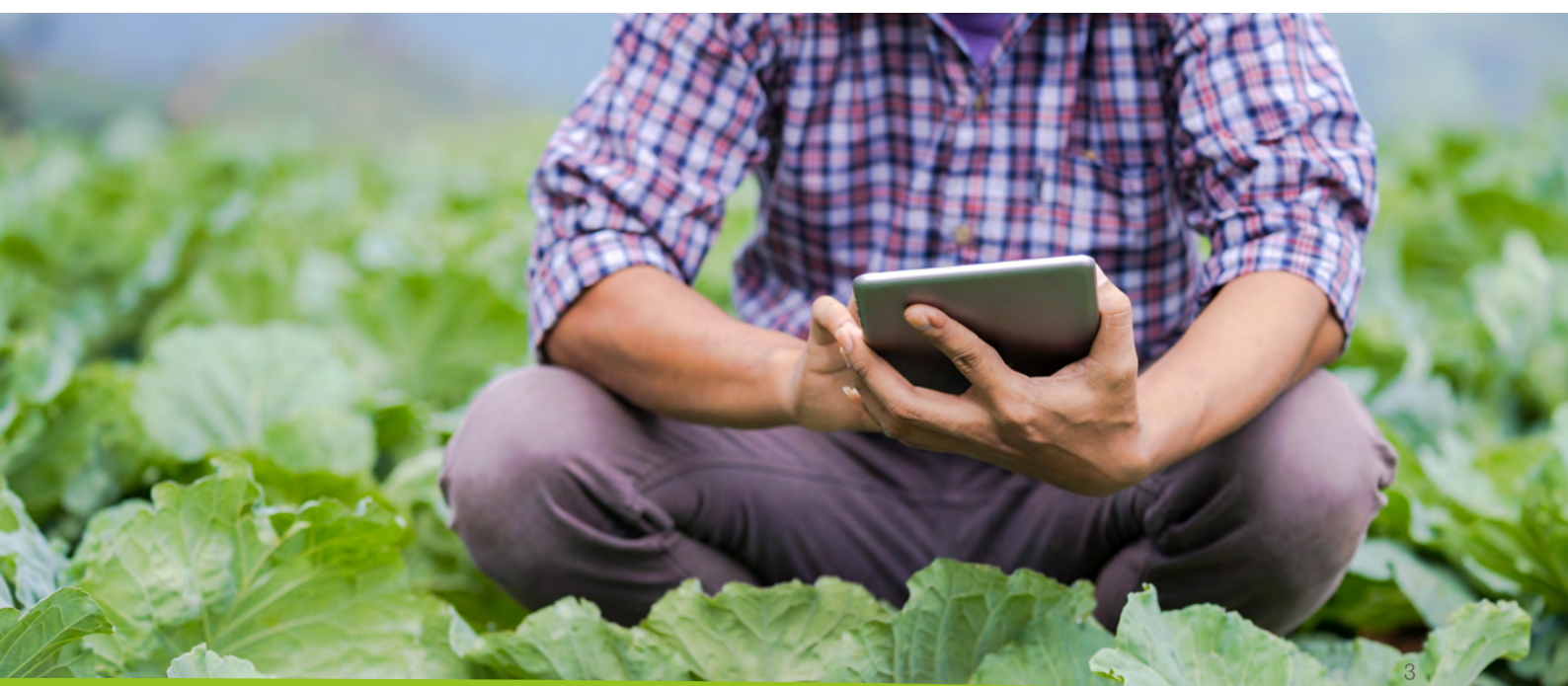
Sustainable Hub to Engage into Rural Policies with Actors (SHERPA) is a four-year project (2019-2023) with 17 partners funded by the Horizon 2020 programme. It aims to gather knowledge that contributes to the formulation of recommendations for future policies relevant to EU rural areas, by creating a science-society-policy interface which provides a hub for knowledge and policy. Find out more on our website:

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Summary

The SHERPA process will support the gathering of evidence from across Europe, at multiple levels, regarding **digitalisation**, showing the directions in which it is most appropriate and feasible to address local needs. SHERPA Multi-Actor Platforms (MAPs) are invited to discuss the following key questions:

What are the needs of the area covered by the MAP in relation to **digitalisation**?

What are the policy interventions already in place, and what are examples of actions taken by local actors addressing these needs implemented in the area covered by the MAP?

Which policy interventions (i.e. instruments, measures) 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 exercise will follow the standard SHERPA process: (i) preparation of discussion material based on the SHERPA Discussion Paper as well as regional- and national-specific research; (ii) consultation with MAP members, (iii) summary of the discussions in a MAP Position Paper; and (iv) synthesis of the regional and national MAP Position Papers for discussion at European Union level.

This SHERPA Discussion Paper provides a synthesis of international and EU policy aims and findings from research as identified in recent research projects. It sets out the main research findings and approaches of EU policy in relation to digitalisation. It does not aim to cover all aspects related to digitalisation, but will focus on a set of sub-themes identified as relevant for rural areas, namely: the determinants of rural digital divide, the attractiveness of rural areas and opportunities for strengthening local governance. For each of these topics, the role of digital tools is addressed and supported by case study examples. The conclusion section illustrates a set of guiding principles for sustainable digitalisation in rural areas and draws recommendations for actions.



1. Introduction

Rural and remote rural areas represent 83% of the total EU territory, but are home to a declining share of the population (30.6%), which is older, on average, compared to population in urban areas (European Commission, 2021). As the public consultation conducted by the European Commission (EC) confirmed, limited access to essential services and infrastructures and the lack of fast broadband are included among the main features of rural and remote areas and risk exacerbating issues related to depopulation, out-migration, ageing, education, general and digital lack of skills, and the gender employment gap (European Commission, 2021). Consequently, the risk of social exclusion and poverty is higher in rural areas than in towns and cities (European Commission, 2021a).

In the given context, digitalisation is recognised as to have the potentialities to mitigate these problems, and furthermore, as also indicated in the European Green Deal, to support the ecological transition and a sustainable growth (Brunori, 2021; Kamolov and Stepnov, 2020). Even if digitalisation has recently entered everyday life, its presence, for citizens and both private and public sectors, has consistently grown since the Covid-19 outbreak, changing habits but also allowing to work and communicate while being constrained at home or physically distant (EU Rural Review No. 32). In the past months, rural and remote rural areas have shown to bear all the potentialities to make digital transformation fully express becoming less remote thanks to digital tools, such as the internet, capable of shortening distances. Digitalisation has proven to foster the achievement of the UN Sustainable Development Goals in these areas, as well as of the current EU agricultural policies, such as the Green New Deal, the Long-Term Vision for Rural Areas (LTVRA), the Common Agricultural Plan (CAP), and the Farm to Fork Strategy (see Section 2).

Possible benefits do not come without possible burdens or new and peculiar issues such as privacy, data security, data management, lack of connectivity, from several different perspectives including legal and ethical issues in relation to new forms of social divide, the so-called digital divide (Ferrari et al., 2022). On the run of understanding how to deal and manage the digital transformation at local level, it is important, especially in rural areas, to handle and shape arising issues in relation to the peculiarities and needs emerging from the characteristics of specific rural and remote areas (e.g. the rural area of Garfagnana in Italy carries diverse needs compared to that of Ardèche in France) (Borodina et al., 2021).

In the agricultural sector, digitalisation has entered the scenes driving what has been called 'the fourth revolution', where the traditional role of agricultural machines was overcome by the introduction of tools capable of letting those machines interact and helping farmers make tailor-made choices (e.g. in field sensors, connected to an application providing options about the best moment to spread the fields with treatments, to make the best out of the intervention). These new instruments, among other positive outcomes, provide the possibility to reduce the physical burden typically associated to farm labour and contribute at reducing the abandonment of agricultural activities and consequent depopulation of rural areas (Popescu et al., 2020). In the meantime, high concerns have been raised in relation to possible negative consequences of digitalisation such as, among others, the loss of heritage culture and loss of jobs.

The H2020-funded project **DESIRA** investigates the socio-economic impact of digitalisation in rural areas. Through a network of 20 Living Labs in rural areas of Europe, the project assesses the past, current and future socio-economic impacts of ICT-related innovation, aiming at improving the capacity of society to respond to the challenges and opportunities of digitalisation. DESIRA facilitates a **Rural Digitisation Forum (RDF)**, an open EU-wide community discussing the opportunities and challenges of digitalisation. Four experts' working groups are established at the RDF (respectively on Agriculture, Forestry, Rural areas and Policy), whose contribution to the debate on the LTVRA is encompassed in three reports focused on the **role of key digital game-changers in shaping the future of agriculture, forestry and rural areas**. An overview of technologies that are considered as potentially game changing for agriculture, forestry and rural areas, resulting from the **Synthesis Report on the Inventory and Taxonomy of Digital Game Changers**, is illustrated in Table 1.

Table 1. Potentiality of game-changing digital technologies for DESIRA RDF domains.

TECHNOLOGY	AGRICULTURE	FORESTRY	RURAL AREAS/LIFE
Social Media and social networks Websites and online platforms	Access to online services and connection with the market		Access to information, knowledge exchange
Cloud	Provision of remotely deployed services; better support to real-time sensitive scenarios	Provision of remotely deployed services	Provision of remotely deployed services to be accessed through web or mobile apps
Local and remote sensing (sensors), drones and/or satellite imagery	Advanced monitoring capabilities applied to crops and livestock to increase production, assess health status, and other	Advanced monitoring capabilities applied to trees to monitor physiological parameters, growth, and other	Wearables have a large potential in e-health scenarios; sensing can prevent and reduce the impact of natural hazards
Blockchain or other certification / traceability services	Traceability and smart contracts; insurances		Trust dependant services and applications (digital identity, education, health, insurance, energy)
Data and analytics (Big data)	Information from sensed data to support decision making		Supporting decision making at different levels in communities
Augmented reality/virtual reality	Educational purposes; easily accessible visual information		
3D printing	Design and printing of custom parts and small equipment		Empowered local production

Source: Brunori et al. (2021)

2. EU policy context

Rural areas in the European Union are particularly important as they are:

“the fabric of our society and the heartbeat of our economy. They are a core part of our identity and our economic potential. We will cherish and preserve our rural areas and invest in their future”

(Ursula von der Leyen, President of the European Commission, July 2019).

In order to strengthen rural areas, the Communication on **A long-term vision for EU's Rural Areas - Towards stronger, connected, resilient and prosperous rural areas by 2040** (European Commission, 2021), as part of the Commission political priority “a new push for European democracy”, has identified four main areas of intervention, with digitalisation as a crosscutting element in relation to various functions.

The first area of action is indicated as *Stronger rural areas*, where digital tools should be used to provide innovative solutions for the provision of services, enabling the possibility to create rural communities attractive for a living choice. The second area is *Connected rural areas*, where digitalisation is inherent to digital infrastructure and their relevance when dealing with the possibilities to use services, i.e., home office from remote areas, home banking, digital administration-related services, and more services to enable the inclusion of women and vulnerable groups in rural areas. One of the flagship initiatives in this area is ‘Rural Digital Futures’, with a set of actions including:

1. **Digital connectivity:** closing the gap between rural and urban areas and enabling universal and affordable access to high-speed connectivity. This will be achieved by mobilising private-sector investments.
2. **Digital technology:** digital innovation and new technologies such as artificial intelligence, robotics, Internet of Things solutions and Digital Innovation Hubs contributing to the development of rural areas.
3. **People:** boosting competencies needed for the digital transformation of rural areas, including access to and being part of a high-performing digital education ecosystem as per the strategic objectives of the Digital Education Action Plan 2021-2027, and promoting digital skills and entrepreneurship, so that everyone can benefit from the digital transition.
4. **Measuring progress** towards closing the digital gap between urban and rural areas by re-arranging existing indicators, notably from the Digital Economy and Society Index, in a Rural Digital Index (A long-term vision for EU's Rural Areas, p. 19).

More resilient rural areas that foster well-being, is the third area of intervention identified in the LTVRA, where the main objective is the preservation of natural resources, and the creation of areas resilient to climate change and potential economic crisis. Digital tools are considered as valuable instruments in this area, as for instance the use of sensors in the fields can indicate the soil characteristics and provide information on possible interventions, contributing to natural resources preservation. A fundamental role is assigned to digital literacy in the fourth area of intervention, *Prosperous rural areas*, where the capability to use digital tools is considered decisive for the diversification of economic activities, for example using platforms.

The **Rural Pact** and **Rural Action Plan** will summarise the actions identified under the four areas, for the success of which the acknowledgement of specific problems and possible solutions will be fundamental.

The importance of rural areas emerges fully when other EU policies are also considered, as well as the key role assigned to rural areas for their implementation, namely the **European**

Union's Green Deal and the current European digital strategy that is part of the digital agenda. Within the context of the EU Green Deal (European Commission, 2019), rural areas are pivotal for achieving the goal of declaring Europe a neutral continent by 2050. The development of circular and bio-economy, the preservation of biodiversity and production of renewable energy present multiple opportunities for rural areas, all sectors where digitalisation will have a major role in the implementation of EU policies.

Europe's current digital agenda focuses on Europe's digital decade (2020-2030) and envisions a digital transformation. As part of this vision, the European Commission set out the 2030 Digital Compass: the European way for the Digital Decade (European Commission, 2021b). This Communication confirms that rural areas are active players for attaining the EU Green Deal, the Farm to Fork strategy and the protection of biodiversity. To reach a level of efficiency capable of improving significantly the quality of life in rural and remote areas, actions are needed. What needs to be primarily eradicated is the digital divide, which causes a phenomenon that has been indicated as 'digital poverty' (European Commission, 2021b).

As another part of the current digital agenda, the EU Commission recently put forward a Declaration on digital rights and principles, through which it aims at promoting a digital transition that is shaped by European values. The rights and principles proposed are organised around six main values, considered fundamental in promoting a sustainable and human-centred digital transformation:

1. Putting people and their rights at the centre of the digital transformation
2. Supporting solidarity and inclusion
3. Ensuring freedom of choice online
4. Fostering participation in the digital public space
5. Increasing safety, security and empowerment of individuals
6. Promoting the sustainability of the digital future

(European Declaration of Digital Right and Principles for the Digital Decade, p. 2-7)

The digitalisation process, accelerated by COVID-19, has reached a level of presence unavoidable in everyday life, to work, learn, shop, communicate, showing also its potentialities in rural areas, where people might choose to live while doing distance working and where isolation is perceived less when there is a high connectivity. By shortening distances, digitalisation changes the way of living in rural and remote areas, unveiling not exclusively the possibility to work and learn but also deal with public administrations, manage payments and finances, participate to debates and facilitating access to healthcare digital systems. It is worth mentioning, in this regard, the possibility of developing the so-called 'Smart Villages', indicated as "communities in rural areas that use innovative solutions to improve their resilience, building on local strength and opportunities" (Zavratnik and Stojmenova Duh, 2018).

In the context of EU Cohesion Policy, digitalisation is intended as a viable alternative for delivering cost-effective, remotely coordinated, public services in the most remote rural areas (Dubois and Sielker, 2022).

Furthermore, the new Common Agricultural Policy (CAP) will be among the instruments to implement the Farm to Fork and Biodiversity strategies in rural areas, with the aim to achieve the goals of the European Green Deal. Pillar II of the new CAP sees digitalisation in rural areas as the instrument to help foster knowledge and innovation. CAP Strategic Plans are demanded to each Member States to reach indicated targets (available on the EC website by country).



3. Overcoming the rural digital divide

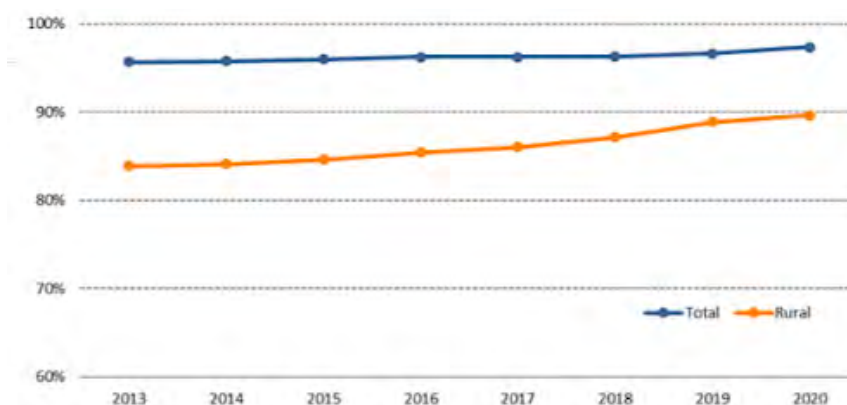
This section sets out main elements for addressing the following questions: **what is the state of the rural digital divide in Europe? What are its determinants?**

Digitalisation strategies need to pay specific attention to rural areas, as they are territories where infrastructures and human capital are, on average, weaker than in urban areas. According to Dubois and Sielker (2022), “the digital divide, often monitored as the difference in access between urban and rural areas, has been outlined as a new layer of spatial inequalities” (p. 2). This is therefore a field where policy integration is most needed because digitalisation affects several domains covered by different policies and administration bodies. The digital divide depends on the interaction between at least three determinants: connectivity, digital capital and motivation.

3.1 Connectivity

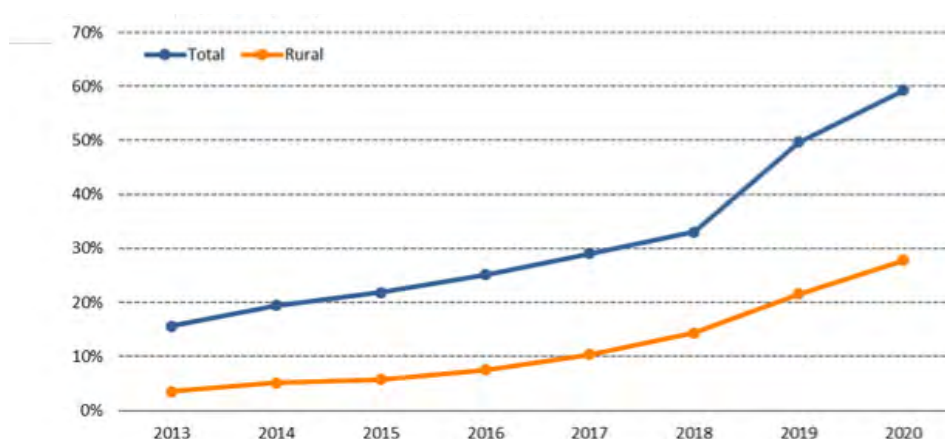
The **Digital Economy and Society Index report** (European Commission, 2021c), that analyses the state of digitalisation in Europe, does not provide much information useful to measure the rural digital divide. The only data available relate to connectivity, which shows that while the internet gap on broadband has been reduced in the last years (Figure 1), the gap related to the fixed very high-capacity network (VHCN) has increased in the last years (Figure 2). In other words, this demonstrates that the digital divide is a dynamic process, and proactive approaches are needed.

Figure 1. Fixed broadband coverage in the EU (% of households) 2013-2020.



Source: European Commission (2021c).

Figure 2. Fixed very high capacity network (VHCN) coverage (% of households) in the EU, 2013-2020.



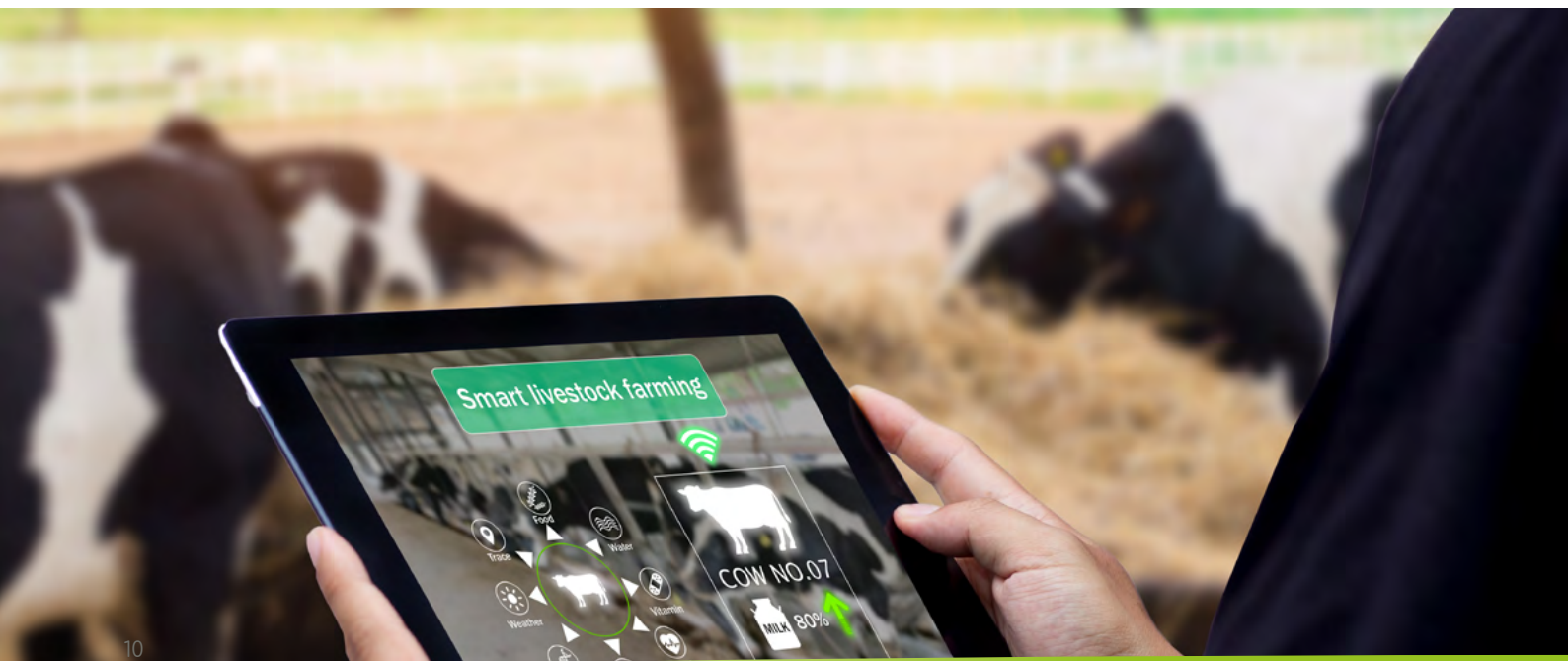
Source: European Commission (2021c).

The connectivity gap is a case of market failure: in sparsely populated areas, the demand is insufficient to recoup the cost of the infrastructure investment. Digital divide might emerge from a chicken-egg problem: lack of infrastructure implies no demand for internet-based services, and lack of demand does not encourage internet providers to invest in infrastructure. Moreover, the problem is dynamic, as connectivity is subject to technological innovation, and to catch up an upgrade of infrastructure is needed.

Public support is needed to address market failures. This can be top-down or bottom-up. In the latter case, municipalities and public-private partnerships can be important drivers of digitalisation (Randall et al., 2020).

3.2 Digital capital

The use of digital technologies by individuals or households requires relevant resources, that can be grouped into the concept of digital capital, defined by Ragnedda (2018) as “**the accumulation of digital competences (information, communication, safety, content-creation, and problem solving), and technology**”. Higher age and lower education levels make human capital in rural areas poorer than in urban areas, and rural areas have on average lower incomes than urban areas, so tariffs for internet services and digital equipment could be a barrier to access.





3.3 Motivation

Another important factor of the digital divide is the **motivation for the use of digital technologies**. In general, in the rural areas there is a lower level of acceptance of digital technologies compared to urban areas. However, when a need is clear, and the solutions are available, uptake can be high, and motivation to learn and to use digital technologies can increase sensibly. The use of internet-based instant messages, for example, responds to the needs for communication and coordination of people who are far away from each other and do not stand in fixed places, such as farmers or foresters. DESIRA H2020 provides an example of COVID-19 as a driver of motivation, taken from the **Living Lab in Western Scotland**:

The crofting community on the West Coast of Scotland is situated in a remote rural region of Scotland. Crofting is a form of small-scale agriculture typical in Scottish Highland and Island communities. Crofters are pluri-active – they have multiple economic roles, because crofting itself is not a viable means of making a living for a household. Digitalisation impacts relate mostly to using 'low-tech' tools including digital platforms that allow social connectivity. The community are at an early stage of 'digital readiness'. The installation of reliable broadband arrived just before Covid-19 struck. This motivated the community to embrace digital tools for connecting at a relatively fast pace. The ability to access digital tools and services has been transformational for some, enabling community networking and action, empowering local businesses, and giving residents access to e-health services. The benefits of this rapid digital transition have not reached all members – the older members of the community are most likely to be marginalised from these services and opportunities (DESIRA H2020).

Market-driven digitalisation tends to broaden the digital divide. Public intervention is needed to address in an integrated way connectivity, digital capital and motivation. In the OECD countries, there are several policies in place to address the rural digital divide: regulation-imposing providers to cover rural areas, financial support to investments, planning and monitoring activities. Here the difference between top-down and bottom-up approaches might matter. For example, bottom-up models to finance and deploy high-speed networks, such as those of municipal or community networks, have been effective in some rural areas. In Sweden, nearly 50% of local fibre networks are owned by municipalities or community-run enterprises (EU Rural Review, No.26, 2018).

Promoting the development of local government policies and community-led initiatives can potentially facilitate and reduce costs of last-mile broadband provision in the absence of sufficient private supply. According to the recent **OECD Report Bridging the Rural Digital Divide (2018)**, policies addressing the digital divide should consider the following challenges:

- i. **Measurement:** Collecting and making available standardised and comparable data on actual broadband gaps. Measurement can help the analysis of the gap, and information available to users can back the pressure on authorities to improve the infrastructures. Figure 3 shows a grid for the assessment of digital maturity of a village. Digital maturity is an important indicator to design digitalisation strategies.

Figure 3. Grid for assessing the digital maturity of a village or rural area.

A. The extent and quality of digital resources and skills	Digital infrastructure (incl. WIFI) and public access points	Score (1-5)	Score (1-5)
	The existence of creative, work, innovation and maker spaces/hubs	Score (1-5)	Score (1-5)
	Coordination by a multi-skilled individual/ team (within a wider network)	Score (1-5)	Score (1-5)
	Local & networked experts, skills, technical support & equipment pool	Score (1-5)	Score (1-5)
B. The types of digital functions that the village can carry out	Facilitation of social and economic digital inclusion of local stakeholders	Score (1-5)	Score (1-5)
	Support to digital and social innovation and co-creation in coordination with external policy-makers/service deliverers	Score (1-5)	Score (1-5)
	Mediation/brokerage services to enable the village to access external Research, Technological Development and Innovation (RTDI)	Score (1-5)	Score (1-5)
	Relay for national and regional Digital Innovation Hubs (DIH) and Incubator/Accelerator networks	Score (1-5)	Score (1-5)

Source: ENRD Thematic briefing on Smart Villages and rural digital transformation, no date).

- ii. **Coherence:** Lack of coordination is often the cause of delays and higher costs. Improved coordination of different levels of government can eliminate administrative redundancies. In some cases, the establishment of an entity to coordinate the administrative bodies would be necessary. They could carry out functions such as strategy development, networking, monitoring. An example from DESIRA H2020:

National Policy Analysis (France) – The programme “*Incubateur des Territoires*” piloted by the National Agency for Territory Cohesion, provides financial and consultant support to local communities in the development of digital public services to resolve local problems, including the selection of problems, search of funding, creation of networks, and support of digital skills, etc. The objective is to help local communities to develop digital solutions to local problems, and thus to promote digital transition in the territory. The programme can also contribute to the sharing of experiences among different local territories (Huang et al., forthcoming).

- iii. **Efficiency:** Plurality of actors leads to duplications. These could be prevented by stimulating the sharing of infrastructure and investment. Developing and implementing common regulations for laying cables may further reduce costs.
- iv. **Context sensitiveness:** Different rural areas have different needs. Digitalisation pathways should depend on the vision that communities have on the development of their territory. Areas with high incidence of retired people could have different priorities than areas with high productive specialisation. Different requirements according to the different type of users should be considered. For example, business, schools, hospitals have specific needs. Evolving demand needs to consider including upload speed targets to roads and connected objects. Issues related to use of broadband-services, such as awareness, affordability, digital literacy, relevant content, and trust, should receive attention. The example of the German policy framework report from DESIRA H2020 is significant in this regard:

The programme “Digitaler Engel” (English: “Digital angel”) supports older people in using digital services. It is a project of “Deutschland sicher im Netz e.V.” (Germany on the web safely association), funded by the German Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) (Berg et al., forthcoming).

4. Improving the attractiveness of rural areas

By 2040, rural areas are vibrant, attract newcomers and offer qualified jobs with decent salaries. Rural areas are fully connected to urban areas, and population flows occur two-ways. The challenge for rural areas is to become places that can be chosen to live, to work, to visit, or all of the three activities. We can identify four factors of attractiveness for a place: quality of the rural environment, quality of social relations, quality of work, and quality of services. Digitalisation can support all these goals.

4.1 Quality of the rural environment

Rural environment includes both natural and cultural components of rural places. The quality of the natural and cultural environment provides benefits to individuals such as quality of air, water, attractive landscapes, open green spaces, good food, knowledge and spirituality. These characteristics can be turned into economic value as they become part of tourist experience and as parts of the place are embodied into local products. Digital technologies can help to raise awareness about local natural resources, to promote the place and its products: social media can be a powerful instrument in promoting the place; geographical information systems available to all through smartphones can make the places visible and increase the tourists' experience. Virtual reality can be used to create new activities in the area and to support promotion strategies. Citizen science can contribute to the accumulation of knowledge about the place by sharing information into common repositories, and at the same time citizen science tools can encourage people's participation to the building of a territorial identity. [RURITAGE H2020](#) and [DESIRA H2020](#) provide two examples in this respect, the first from the [Digital Sanctuary in Brazil](#) and the second from the [Living Lab in the Spanish region of Aragon](#):

The Digital Sanctuary (Brazil) – It is a digital multiplatform (digital library, portal and applications) for storage, localisation, identification, dissemination and promotion of natural and cultural assets, which integrates official data with the perceptions of local communities, focused on environmental education and heritage, committed to the democratization of information on heritage, community communication and training for a culture of citizenship. The key factors that negatively affect the existence of this platform are the constant lack of resources of the protection organizations for the maintenance, conservation and restoration of the built heritage (RURITAGE H2020)

The Virtual Museum of the Maestrazgo (Spain) was created in 2008 and has been progressively endowed with content from the activity of the Area of Cultural Heritage and Culture of the Maestrazgo Region in collaboration with the municipalities, cultural associations and individuals. It aims to be an interactive and participatory museum that can be promoted as a place of re-evaluation of the culture of the Region, through the exhibition of the most diverse testimonies of the present and the past in its peoples. This will make it possible to gather at a point of convergence, various manifestations of culture, in the form of text, image, sound or video, such as objects, fashions, places, popular sayings, characters, events or even private collections that are difficult to access (DESIRA H2020)

At the same time, rural areas are vulnerable to natural disasters such as extreme weather events, wildfires, floods, landslides. Digital technologies can contribute to the improvement of the quality of environmental information and to the management of natural resources. Data from different sources, including that provided by citizens themselves, can be integrated into

monitoring systems that provide regular update the current state of the environment. Public administrations can use this information to improve their management of resources, private business to link the quality of the environment to their products, and civil society can have a stake into environmental management. In Andalucía, for instance, the [Living Lab established in DESIRA H2020](#) will investigate how digitalisation can help prevent forest fires:

The impact of digitalisation in forest fires has been of special relevance in relation to data and communications. New technologies have significantly increased the capacity for data acquisition and processing. Nowadays, it is easier, cheaper, and faster to gather data with remote sensing technologies, cameras, sensors, GPS devices, etc., providing a detailed picture of all the forest fires stages. The capacity to process, integrate, and analyse data has undergone rapid improvements, enabling faster and more informed decision-making processes. Geolocation systems and portable GPS devices allow to track assets and to improve people safety. Progress in communications systems have also contributed to enhance the response capacity during a forest fire episode. Advanced technologies (satellite broadband, digital radio communications networks, etc.) facilitate onsite and offsite communications through a variety of devices, even in challenging conditions and complex topography (DESIRA H2020).

4.2 Quality of social relations

Life in rural areas can benefit from a stronger sense of community, strengthened by frequent face-to-face relationships and a limited number of members of the community. However, the size of the community and the distances can be perceived as a limitation by some. On one side, digital technologies can strengthen the building of social capital within a community by intensifying the interaction and avoiding unnecessary travels, and on the other side, it can multiply the contacts with distant people. The case of Cloughjordan Ecovillage is the focus of DESIRA Living Lab in Ireland:

Cloughjordan Ecovillage was developed 10 years ago, bringing an influx of residents with high levels of skills, capability and education, and a subsequent increase of enterprises and remote working to an area with low population density and few employment opportunities. The most significant impacts of digitalisation on the system relate to innovative projects that are at the core of the centre's activities. A number of past and present projects would have been inconceivable without digitalisation. Digitalisation has also created global peer-to-peer networks that share information and skills, which has led to an increase in citizen-led innovation and allowed regional start-ups to benefit from global experience. This has created a change to the nature of many local livelihoods. Other impacts relate to a reduction in travel to work, which was enabled by the advent of collaborative platforms, and amplified by the pandemic response. This contributes to a reduction in carbon emissions, rural repopulation, and strengthening of local economies, as well as improved quality of life.



4.3 Quality of work

COVID-19 has accelerated a process of rethinking the role of rural areas as attractors of working professionals who can work at a distance. According to a [study of McKinsey Global Institute \(2020\)](#), more than 20% of the workforce could work remotely three to five days a week as effectively as they would do working from an office. That would mean three to four times as many people working from home than before the pandemic, and would have a profound impact on urban economies, transportation, and consumer spending. [Italy had 20 million commuters before COVID-19](#), nearly half of which were travelling from different municipalities. Commuting has a relevant impact on rural economies, as it keeps incomes in the area and activates demand for goods and services (Andersson et al., 2018). The challenge is to replace at least a part of commuting – e.g. the one employed in information intensive work areas – with smart working that would generate substantial savings in terms of time, energy and improvement of quality of life of workers (Adobati and Debernardi (2022).



The most diffused digital platforms, providing workspace for real-time collaboration and communication, meetings, file, and app sharing, have strongly improved during the COVID-19 pandemic. Learning processes have contributed to reduce the productivity gap between working at a distance and working in presence.

Improving the attractiveness of rural areas for smart working is related both on technology and non-technology factors. Good or excellent connectivity is a prerequisite, as well as the further development of digital workspaces. However, smart workers would choose rural places when other factors, first of all quality and cost of life will be competitive with other locations. Services as co-working spaces could increase the attractiveness, as they combine the advantages of smart working with the possibility of enjoying social life and avoiding pressure on home spaces. The value of good co-working spaces is acknowledged at [Coconat, in the Brandenburg Region \(Germany\)](#), a case included in [RUBIZMO H2020](#):

The company offers an inspiring physical co-working space for digital workers to facilitate a balance between work and free time. The shared internet connection has both a high reliability and speed and there is a proximity to a main road for easy access. Coconat is situated close to a bigger city, but still located in the countryside where you can renew inspiration and increase efficiency. A wide variety of spaces to work from is offered, from cosy indoor rooms to the garden. Clients can take part in several activities including yoga sessions, massages, spa and sauna, but also hiking and biking to discover the beautiful landscapes of the region (RUBIZMO H2020).

Digitalisation can also contribute to improve quality of work in traditionally rural activities, such as agriculture. In this regard, automatisisation of heavier operations and simplification of administrative burden can relieve a workforce that has a high average age and can make agricultural work more attractive for young people. Availability of adequate technological infrastructures can also be an attractiveness factor for new rural entrepreneurs, as the RUBIZMO H2020 project has put into evidence in their [Guidelines for creating supportive business environment \(2021\)](#).

4.4 Quality of services

Rural areas suffer from inadequate provision of services. In most rural areas, mobility relies mostly on private cars, commercial services are at risk for lack of critical mass, and there is a limited supply of entertainment. In addition, to access administrative, education and healthcare services rural people have often to travel. Digitalisation is rapidly changing some of the gaps in commercial services: e-commerce makes all types of commodities available in a few days. Home banking has already revolutionised the relation between citizens and their bank. Home entertainment (streaming TV, games) provides at least a partial replacement of traditional entertainment services. In the near future, initiatives based on sharing models would be able to address the lack of mobility services. The RAMSES project shows the case of one platform combining public transportation services and alternative mobility:

Community-driven transportation and other alternative mobility options like bottom-up car sharing rely mostly on face-to-face contact, personal acquaintance and trust; it is largely paper-based, as restricted budgets do not allow implementing IT infrastructure. Building on this first generation of the sharing economy, the RAMSES project offers an easy-to-use IT application that allows providers to make the most of the local commitment ([Rural Mobility 2.0](#)).

Digital services provided by public administrations will avoid trips and long queues to obtain a certificate or information. Some of these services do not need personnel in place, as they can be provided by centralised platforms. Although it cannot replace many of the functions that school plays in the development of children, distant learning is a modality that, integrated with school in presence, can support rural households to provide supplementary skills to children. E-health, if not considered just as a component of a cost-reduction strategy, can get rural populations closer to the health system, providing collaborative tools to support the relationship and behavioural changes through monitoring and offering feedback to patients.

Another example from [DESIRA Living Lab in the Rhineland-Palatinate region \(Germany\)](#):

The pilot project 'Digital Villages', which focuses on the development of digital services in rural regions, has been running since 2015. The results of the project include the creation of the web platform 'DorfNews' and the smartphone app 'DorfFunk'. These tools provide regional news, information about events, and interactive messaging. In 2019, the platforms were expanded to include the 'LösBar' app, a digital tool that enables interactions between local government and citizens.



5. Strengthening local governance

One of the four areas of the Long-Term Vision for Rural Areas is related to the capacity of local actors to align their objectives around strategic areas. Old governance patterns, based on sectoral specialisation and hierarchical relations, are unfit to challenges that are by their nature cross-sectoral and need integrated approaches. Top-down and bottom-up processes can establish 'weak' ties between rural actors by improving communication between administrations at different levels and between local levels, and by sharing resources and initiatives. Trusting, and co-operative relationship with the private sector, civil society, and other communities can facilitate the alignment of objectives and incentives.

Information and communication are key to an improved governance. In fact, they open up new ways for policy-making in all phases of the policy cycle, from problem definition to policy evaluation. In the problem setting, information can change the way governments engage with citizens. Providing detailed information can help civil society to raise issues in the public debate and encourage administrators to take action. Information can also help citizens take informed choices, and to make it just as feasible as direct feedback mechanisms. Here is an example from [Croatia, where mapping pockets of poverty allowed a better targeting of antipoverty funds](#):

Because the allocation of funds depends on an area's gross domestic product (GDP) per capita, poor municipalities situated in non-poor regions may not receive funding. Based on a poverty map created through the combination of census and administrative data, Croatia proposed new geographical subdivisions that concentrate EU funds in the poorest areas (World Bank, 2021).

Citizens, in turn, can have the opportunity to provide feedback on plans and policies in development, as shown in this case on [spatial planning in Lodz \(Poland\)](#) from DESIRA's Living Lab:

The digitalisation of spatial planning affects the way spatial information is displayed (digital image) and accessed by individuals but also enables their participation in planning procedures as they can easily respond to the current or planned development of local communities' neighbourhoods. GeoDesign opens up new possibilities for spatial planning on the local scale. However, success in its implementation depends on a high level of digital skills by the stakeholders and awareness of local authorities, who should seek to cross the barriers beyond which a community can become a partner in the planning process (DESIRA H2020).

Better information is also key to effective policy monitoring and evaluation, which in turn is key to improved governance. Moreover, access of researchers to data can improve evidence production and better science-policy interaction.

To harness the potential of data (environmental, administrative), a strong effort to create a common data space for public intent, wherein business, administrative, environmental, statistical, and citizens-generated databases are made interoperable. This would providing the opportunity for local actors to increase the value of single databases. This goal requires strong coordination and ad-hoc governance structures.

The [World Bank report 'Data for better lives'](#) envisages integrated data system that produce high-quality data and then make data open "in a way that it is both protected and accessible to be shared and reused by all stakeholders" (p. 41). This goal can be achieved through the following

steps: 1) establishing fundamentals (a high-level strategic document, data protection regulations, improving technical capacity in the administrations); 2) initiating data flows (establish a culture of data use in ministries and among policy makers and legislators, prioritise open data for development and use of common standards throughout the data life cycle, establish a secure, integrated digital platform); and 3) optimising the system (charge an existing or new government unit with responsibility for overseeing and reporting on implementation of a national data strategy, define clear institutional mandates for the various government institutions).

One of the flagship initiatives of the Long-Term Vision for Rural Areas is “a rural revitalisation platform ... as a one-stop shop for rural communities, rural project holders and local authorities alike to collaborate” (European Commission, 2021).

6. Conclusions

At the (online) gathering of the experts' working groups of the Rural Digitisation Forum of DESIRA H2020, the discussion on the LTVRA started with the following question:

Will digital technologies contribute to build desirable futures in rural areas, or will they get us further away from the desired ambitions?

Taking into account the notion that **digitalisation should be intended as a means to an end** rather than the end itself, one of the key messages from Brunori et al., 2021 (p.1) is that

the potential of digital technologies to lead rural areas as well as the agriculture and forestry sectors to a desirable situation cannot be taken for granted, nor can the futures of these sectors be solely reliant on the processes of digitalisation.

With the purpose of informing the debate, research and practice on digitalisation in agriculture, forestry and rural areas, DESIRA developed a set of principles to guide digitalisation processes toward desired futures, briefly mentioned hereunder:

1. **Creating the basic conditions for digitalisation**, these being technological infrastructure, human capital, and economic gains.
2. **Anchoring digitalisation to sustainable development**, that is: digitalisation can drive sustainable development but only if processes and strategies are aligned with Sustainable Development Goals (SDGs).
3. **Adapting digitalisation to different contexts**, by means of participatory and place-based approaches to ensure that digital solutions are adapted to, and address the diverse needs of, local people and territories.
4. **Favouring digital inclusion**, implementing active policies to prevent uneven development of, and ensure equal access to, opportunities from digitalisation.
5. **Developing digital ecosystems**, whereby 'connectors' can operate to ensure the coordination of local actors, infrastructures, digital application systems, data and services.
6. **Developing adaptive governance models**, namely proactive multi-actor governance models able to integrate and engage science and innovation with policy-makers, civil society and citizens, in the co-creation process for digitalisation, while balancing power.
7. **Designing policy tools for sustainable digitalisation**, starting from a revision of the whole set of policies that affect rural areas, agriculture and forestry in the light of the threats and opportunities of digitalisation, and assigning new competences to dedicated bodies from regional to the EU level (Brunori et al., 2021, p. 5-7).



Such guiding principles can be enacted by implementing action in four key development domains: i) Human capital; ii) Innovation; iii) Investments; and iv) Governance. Table 2 provides an overview of ideas of actions for inspiring actors working in or with digitalisation of agriculture, forestry and rural areas.

Figure 4. Ideas of actions to operationalise the guiding principles for digitalisation in agriculture, forestry and rural life.

Guiding principles for digitalisation	Key rural development domains			
	Human capital	Innovation	Investments	Governance
Creating the basic conditions for digitalisation	Education & training for basic digital skills	Encouraging peer-to-peer networking	Public support to infrastructures	Monitoring Digital Economy and Society Index (DESI) indicators progress
Anchoring digitalisation to sustainable development	Raising awareness; Education & training for above basic-level skills; Training of ARKIS agents.	Digitalise ARKIS and aligning it with Responsible Research Innovation (RRI)	Linking investments & projects to sustainability goals	Monitoring the sustainability performance of digitalisation projects
Adapting digitalisation to different contexts	Profiling digitalisation users according to skills and needs	Encourage interactive innovation	Align support to investments with local strategies	Community based approaches to digitalisation strategies
Favouring digital inclusion	Mapping vulnerable groups	Encouraging peer-to-peer networking	Support to vulnerable groups	Monitoring DESI indicators progress
Developing digital ecosystems	Training and digitalisation brokers	Encourage Living Lab approaches. Peer learning among digitalisation brokers (within ARKIS) and align them to RRI	Prioritise support based on cooperation and multi-actor projects	Encourage the development of Smart Villages and Local Digital Innovation Hubs
Developing adaptive governance models	Planning, coordination and networking among rural digitalisation agencies, Smart Villages, Digital Innovation Hubs, Fab labs, etc.			
Designing policy tools for sustainable digitalisation	Develop fast and flexible supporting mechanism or policy instruments to support local/regional multi-actor cooperation processes for digitalisation. Support should be provided for all preparatory work around digitalisation such as animating stakeholders, facilitating engagement processes, feasibility assessments, prototype and project development, etc.			

Source: Brunori et al. (2021)

Acknowledgements

SHERPA acknowledges the organisations, authors and projects, which provide sources of data and information, cited below.

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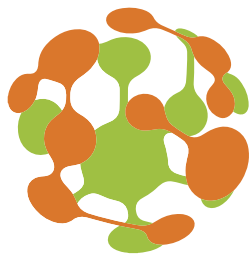
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SHERPA receives funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 862448