Thematic paper

IDATE

DIGITAL TRANSITION:

A lever for the development of rural areas in Europe

July 2022

Digital transition, a lever for the development of rural areas in Europe

"Our rural areas are the fabric of our society and the heartbeat of our economy. The diversity of landscape, culture and heritage is one of Europe's most defining and remarkable features. 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."

President von der Leyen – *July 2019*

Policy recommendations to ensure a successful digital transition in rural areas

Our recommendations meet **two key-objectives for rural areas**:

- Actively fighting the digital divides – connectivity and skills
- Make rural areas a place to be for the digital economy and for living.

Actively fighting the digital divides

As broadband is widely deployed, the connection of residual outlets is becoming increasingly important to achieve the objectives set at European level. These residual outlets are largely located in rural areas and require a convergence of efforts combining all possible technologies with the mobilisation of public and private funding. Public investment on technology-neutral very high broadband should be promoted for rural areas. In this context, fixed wireless access could provide a suitable solution to reduce the digital gap in rural areas. Innovative technologies for fibre deployment, like AirPON, should likewise be considered: in this regard, AirPON contributes to significantly reducing operators' Total Cost of Ownership (TCO) while shortening the time to market deployment. Regardless of the physical infrastructure, special attention must be paid to the software solutions that enable this connectivity. Indeed, the operating systems that enable the operation of terminals and connected objects (IoT) occupy a strategic position today, and even more so tomorrow with the development of Edge Computing. Therefore Open-Source solutions must be favoured over totally proprietary solutions like those pushed by Gafam.

Digital transition, a lever for the development of rural areas in Europe

Policy recommendations to ensure a successful digital transition in rural areas

The gap in digital skills is still a reality in rural areas. Nowadays, digital empowerment, the reduction of digital exclusion, the improvement of digital skills among the population are recognised by all public authorities around the world as key to ensure prosperity. Economic and social inclusion depend more and more on the capacity of people to be digitally skilled. Specific attention should be paid to supporting initiatives leading to improving digital skills among the populations in rural areas. The European skills agenda has set a framework covering four target groups: education & training, citizens, labour force and ICT professionals.

Make rural areas a place to be for the digital economy and for living

There is evidence of a close relationship between innovation and the performance of agriculture. The 'farmers of the future' will benefit from digitalisation (precision agriculture, automation and robots, connectivity, virtual services and servitization) and biotechnology (new breeding technologies/synthetic biology, alternative protein sources, food design, bioeconomy). From the farmer's perspective, attention should be paid to making digital transition affordable to them. Business models should clearly show the direct benefits on farm economy and the environment. Public support should facilitate implementation of digital technologies in agriculture by aligning their granting conditions not only with economic indicators but also with broader externalities, such as the positive impact on reducing environmental impacts. Also, attention should be paid to considering skill building programmes for farmers.

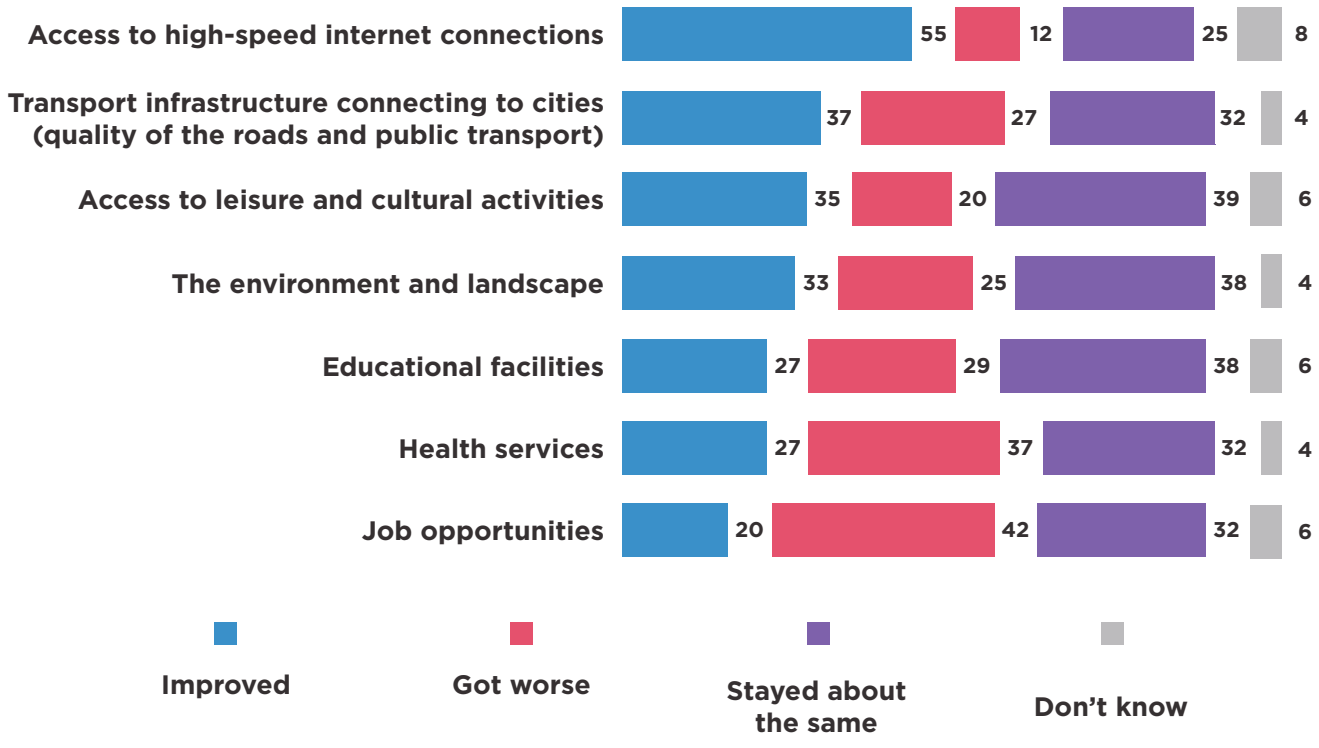
From the innovation ecosystem perspective, agriculture represents an attractive market. The public support should focus on creating an attractive environment for digital companies and services providers to set up their activities in rural areas, to reduce rural areas' digital dependency; the objective being that value from innovation could be created in rural areas as well as in urban centres.
Public policy attention should be paid to ensuring good living standards in rural areas, that relies on access to public and essential services (administration, healthcare, mobility, education, energy...). Lessons from existing smart villages highlight the importance of setting up a rural innovation ecosystem with a cross-cutting digital component. Supporting digital transition should be carefully accompanied in a way that digital benefits in improving services accessibility are clearly understood and shared by populations, avoiding the feeling that digital transition leads to a reduction in the presence of services on the territory. This argues for the establishment of an ecosystem participating in the fabric of everyday rural life, in which digital services can generate appropriate solutions to rural community needs. On this subject, incentives for the structuring of third places should be envisaged as soon as these new places have shown their capacity to respond to local problems by relying on an ecosystem of actors and to support local social and digital innovation.

Digital transition, a lever for the development of rural areas in Europe

Reaching the new EU ambition for the next decade involves a proactive territorial cohesion policy that values rural areas as a major asset for Europe

At a time when the emergency climate is becoming more and more important on the public policy agenda, it is becoming urgent to rethink the rules of the new green growth to achieve a fair balance between territories. Rural areas, which account for almost 30% of Europe's population, have so far suffered from a strong polarisation towards metropolitan areas. Despite corrective policies of recent years and decades, 59% of rural areas (NUTS 3 level) are characterised as shrinking. For many reasons, the future of Europe cannot be envisaged without linking rural areas to the dynamics of change and transformation: control of food-related issues, enhancement of the environment and richness of biodiversity, control of energy issues, plurality of local and regional cultures are all assets of rural areas. However, rural areas face commonly acknowledged constraints: depopulation and ageing, climate change, lack or poor quality of infrastructure and basic services. According to Eurobarometer survey, in ten years' time, apart from accessing the Internet, access to most of the other essential services stayed about the same or got worse. In the impetus needed to accompany the transformation of the economy and society, particularly for rural areas, digital technologies offer many opportunities, which have been highlighted during the last two years marked by the health crisis.

Compared with ten years ago, would you say things have improved, got worse or stayed about the same in rural areas?



Base: all respondents (n=27,237)

Source: EUROBAROMETER, 2020

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Weak signals linked to COVID-19 crisis that underline the population's aspiration to live and work outside big cities

Popularised by media coverage, many testimonies have been published describing the personal journeys of individuals/families who have taken advantage of the COVID-19 crisis to leave the city either to carry out their professional activity via teleworking or to consider a more radical change of personal and/or professional life. For instance, as reaction to the first lockdown in 2020, 200,000 Parisians left Paris and 1.6 million French people moved to another department, the out-migration mainly affecting Paris Region. Will we enter a period of urban exodus and, if so, to what extent and what impact will it have on rural areas? To date, there is not enough evidence to confirm this trend. However, some initial analyses support the idea that the big city is no longer the aspiration of life for a part of the population. A research work[1] based on school enrolments data (2016-2019 and 2020-2021) from the French Ministry of National Education has tested the hypothesis that if a significant number of people are leaving metropolises in favour of medium-sized cities or rural areas, so we must observe a relative drop in school enrolment since the start of the 2019 school year in the largest cities, compared to smaller cities. The analysis of school enrolments shows that significant changes are taking place, particularly in primary education. It is reasonable to see this as a sign of increased mobility from certain large towns to smaller towns, particularly for couples with young children.

The analysis of the dynamics of the housing market highlighted a stronger attraction for housing searches in small towns and the countryside at the expense of large cities, as well as first impacts on property markets. Behind these trends, it is still too early, due to a lack of data, to measure whether the COVID-19 crisis will mark a territorial rebalancing in favour of small and medium-sized towns and rural areas. Moreover, without strong public policy involvement, there is a risk that the revitalisation of rural areas will lead to land grabbing which would have a negative effect on the resident and the poorest populations.

It will of course be necessary to see whether these trends are confirmed in future years and whether other data leads to the same results[2].

COVID-19 crisis, an accelerator of digital technologies adoption

The Covid-19 crisis has put rocket boosters under the transition to a digital society. In just a few months' time, companies, citizens and public authorities have implemented digital solutions much more quickly than they had thought possible before the crisis.

Traffic on the networks has increased considerably as a result, especially on fixed networks and at weekends, starting with online video services – whose traffic has surged by as much as 50%, according, for instance, to Nokia. Three types of service have seen the most spectacular rise in usage, all of which are best suited to fixed devices, and which had previously been adopted by only a small fraction of the general public. Teleworking, which is often used on a small scale, has been adopted en masse (sometimes by force), increasing the use of audio and video conferencing tools fourfold *(source: Nokia)* in a single week. The prime beneficiaries here have been Zoom followed by Microsoft and Google.

As mentioned in the figure on working from home during COVID-19 (*source: Eurofound – Living, working and COVID-19, research report 2020),* a

[1]Géographie du monde d'après : assiste-t-on à un « exode urbain » ? Olivier Bouba-Olga & Etienne Fouqueray (DITP, Pôle DATAR, Région Nouvelle-Aquitaine), January 2022

[2]The district data brief from Federal Reserve Bank of Cleveland, Feb. 2021, addressed the issue, did the COVID-19 Pandemic cause an urban exodus? and concluded that, based on Credit File Panel data, migration flows were unfavourable for urban neighbourhoods during 2020 however the declines of in-migration were almost always greater than the increases in out-migration. Rather than an urban exodus, the analysis outlined a loss of attractiveness of urban areas.

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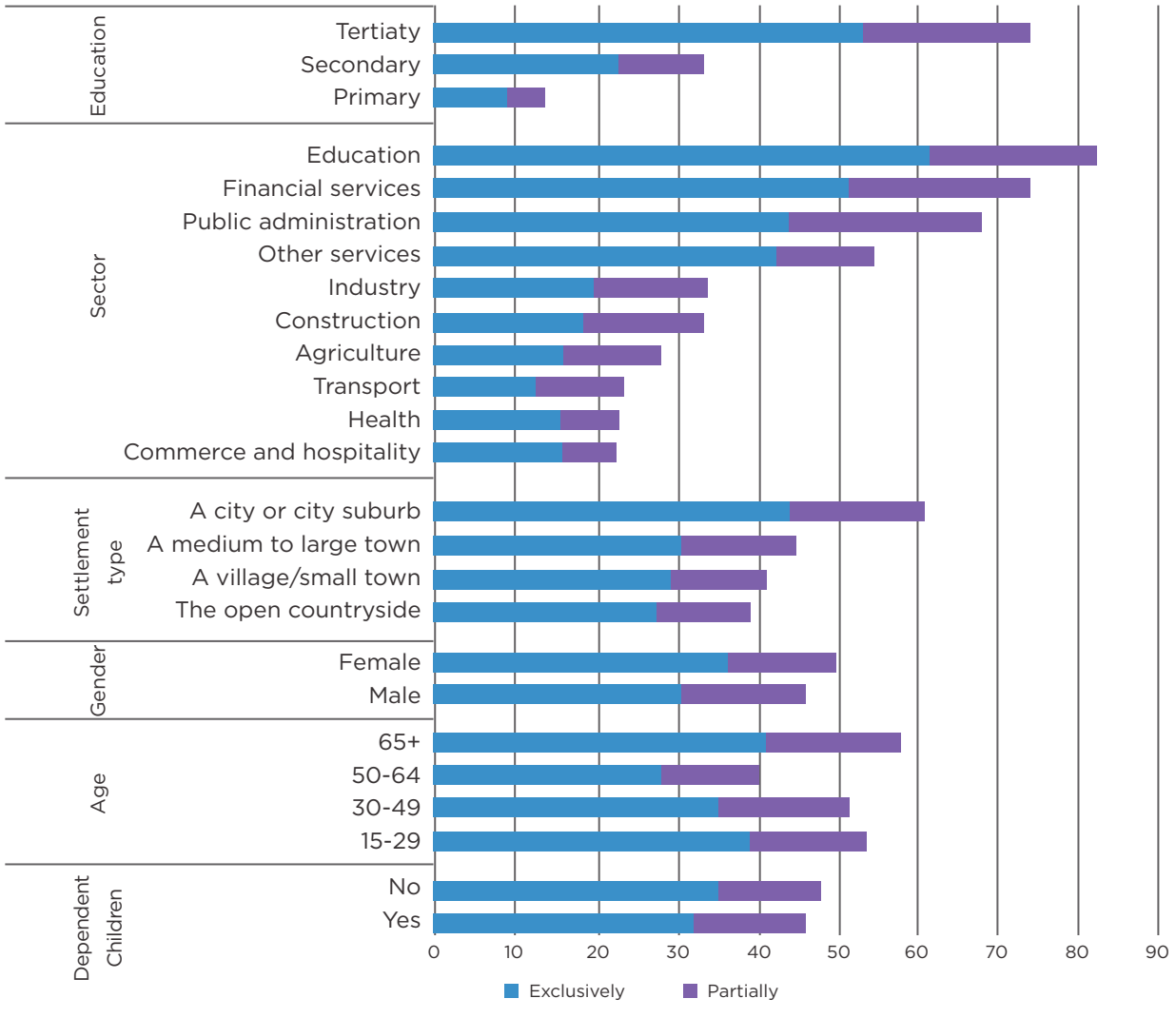
COVID-19 crisis, an accelerator of digital technologies adoption

significant proportion of European workers have been in a situation where they have had to work from home, whether they live in a large city, a small or medium-sized town or a village.

Growth is still massive for online gaming. Last are educational applications, especially those designed for young children, which are also seeing a tremendous surge in use, supplementing the solutions put into place at the last minute by schools. All of these applications are putting an added strain on the networks (individual video streams, latency, in addition to the usual demand for bandwidth), which is hard for traditional networks to sustain on a large scale but being handled better by 5G and fibre systems. We are also seeing a rise in the use of fitness apps, albeit to a lesser degree. On the flipside, it is not surprising to be seeing a sharp drop in the use of ride sharing services, travel booking sites and sport news sites, while traffic on financial services sites is down overall. Dating apps are still humming along, especially those that have introduced an element of gamification.

Working from home during COVID-19, EU27 (%)



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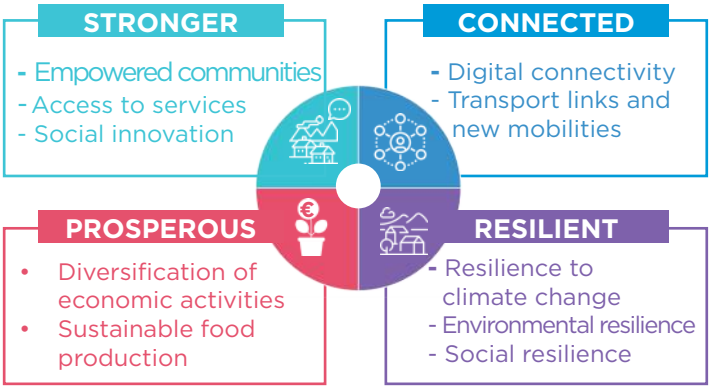
Time to capitalize on the emergency response to the COVID-19 crisis

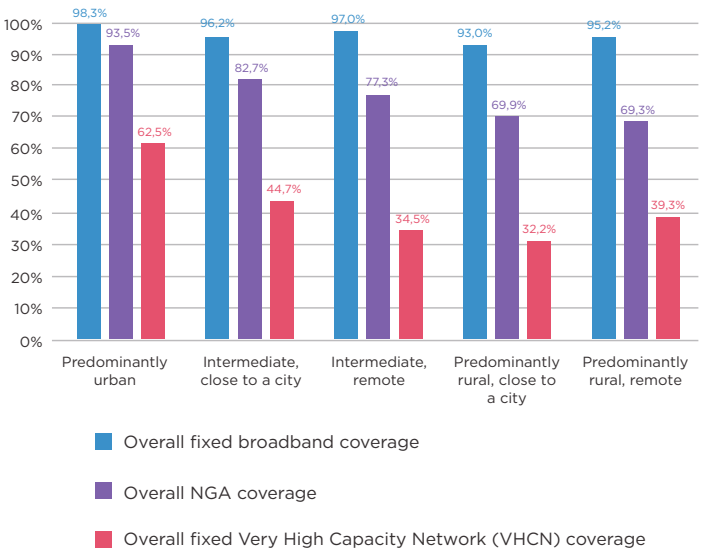
With the Digital Decade, EU has fixed ambitious goals to ensure that its citizens and businesses have access the right digital solutions, both for connectivity and services, to make their life better, safer, and even greener – while providing them the necessary digital skills. Policy instruments directly linked to digital transition (for instance, EUR 672.5 billion from Recovery and Resilience Facility will be allocated to fibre and 5G rollout) but also other ones such as cohesion funds (with a total budget of EUR 392 billion for 2024-2027), the European Agricultural Fund for Rural Development (EAFRD), part of the Common Agricultural Policy (CAP), to help rural areas make the structural changes necessary to achieve the goals of the European Green Deal and the digital transition (EUR 8 billion from Next Generation EU) … bring new opportunities to sustain the momentum of the pandemic crisis that has seen so many digital initiatives emerge.

Furthermore, the Long-term Vision for the EU's rural areas up to 2040 identifies areas of action towards stronger, connected, resilient and prosperous rural areas and communities. The connected component recalls that the further development of rural areas is dependent on the provision of good and performing connected means. Digital infrastructure is an essential enabler for rural areas to contribute to and make the most of the digital transition. Digital technologies will be applied to all sectors in rural areas leading to the improvement of their connecting capacities through, for instance, multi-modal intelligent transport systems, smart waste management solutions, smart energy and lighting solutions, better access to smart health and education services…



COVID-19 reveals the risk of rural areas' digital divide

As the crisis has highlighted, our daily life and work is more and more digitally dependent. Over the last two years internet access became the gateway to accessing services and social rights. Access to performing and affordable connectivity is key. But the pandemic crisis has revealed that the digital divide remains a reality in rural areas on many aspects.



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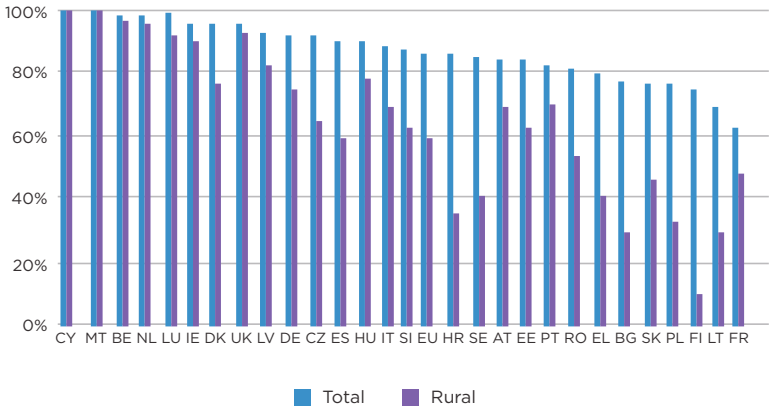
COVID-19 reveals the risk of rural areas' digital divide

Broadband coverage of rural areas remains challenging as 10% of households are not covered by any fixed network and 41% are not covered by any NGA technology. Rural fixed coverage increased marginally from 88% to 90%. Rural coverage improved in VDSL (from 36% to 42%), DOCSIS 3.0 (from 10% to 11%) FTTP (from 14% to 18%) and VHCN (from 14% to 20%). Mobile broadband availability went up by 2 percentage points last year, although mobile is still mainly used as a complementary technology rather than a substitute for fixed technologies[3].

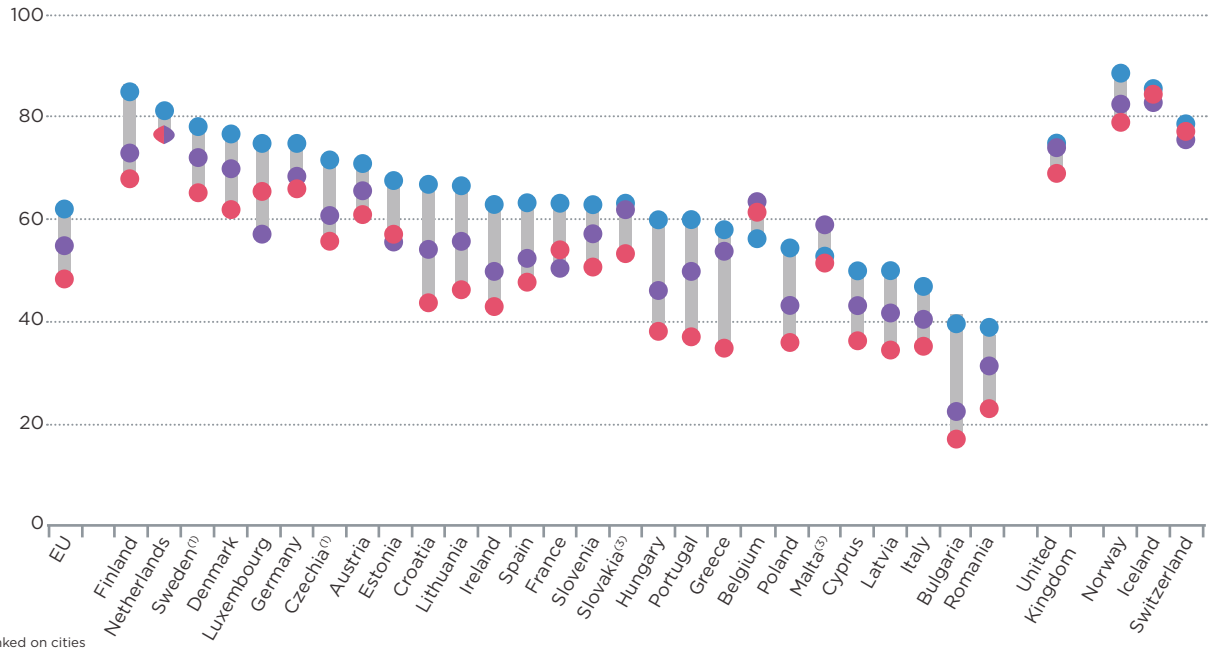


The current COVID-19 pandemic has also shown how important digital assets have become to our economies and how basic and advanced digital skills sustain our economies and societies. Although already 85% of citizens used the Internet in 2019, prior to the COVID-19 crisis, only 58% possess at least basic digital skills. Therefore, having an internet connection is not sufficient; it must be paired with the appropriate skills to take advantage of the digital society. Digital skills range from basic usage skills that enable individuals to take part in the digital society and consume digital goods and services, to advanced skills that empower the workforce to develop new digital goods and services.

Thus, without a strong commitment, there is a risk that territorial inequalities will increase in Europe, even though rural areas have the potential to meet the ambitions of the EU green and sustainable growth.

People with basic or above basic digital skills, 2019

(%, share of people aged 16-74; during the 12 months preceding the survey, by degree of urbanisation)



Note: ranked on cities
(1) Low reliability
(2) Rural areas: low reability
(3) 2017 data instead of 2019

Source: ec.europa.eu/eurostat

[3]The Digital Economy and Society Index (DESI) - 2020

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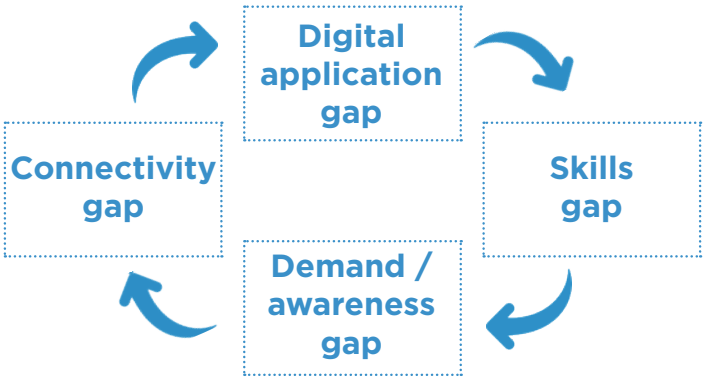
Smart Villages, a bulk of pioneer projects clearing the way to digital transition in rural areas

Since 2017, the support of early smart villages projects in Europe has shown concretely how digital technologies and innovations may support the quality of a higher standard of living, public services for citizens, better use of resources, less impact on the environment and new opportunities for rural value chains in terms of products and improved processes. These initiatives have laid the foundations for a complementary approach to closing the gaps: connectivity, digital application, skills, demand awareness.

Despite the difficulties they are facing, rural areas are home to numerous innovative initiatives and projects on digital transition, some of them being already included under a smart village scheme, others being more individual but outlining the willingness of rural areas to become active players of digital transition. Recent preparatory works across Europe (Long-term vision 2040 for rural areas, Next CAP...) outline the expectations on digital transition. The rise of digitalisation and smart rural areas are perceived as one of the most valuable opportunities. Digitalisation is seen as an important instrument to develop rural territories in various ways: the digital transition can help with service provision, job creation, and the development of new digital products. Digitalisation can support the creation of new ways of working and robotization in agriculture is an opportunity for rural territories that flows from the increase in digitalisation.



Rural smart specialisation

The rise of digitalisation and smart ruralities are perceived as one of the most valuable opportunities, specially to tackle rural areas challenges. Rural smart specialisation is a way of looking at the expected impacts of digital transition. Particular attention can be paid to 5 key-pillars.

Smart agriculture

Agriculture and food sectors are essential to Europe and face a need to adapt to meet current and future challenges. Smart Agriculture – smart farming and precision farming, brings innovation to cope with such challenges and generates benefits across the value chain.

The smart and precision farming market has cropped up through the introduction of innovative technologies. Digital technologies bring numerous merits in agriculture, mainly in the plant and livestock markets. Equipment and machinery also benefit from broadband technologies to meet their requirements in data transmission and mobility.

The key driver in this sector lies in improved productivity for farmers: they can optimise their plant and livestock yields, and thereby significantly save costs. In addition, they could potentially generate new forms of revenue such as in improved dairy

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production for cattle applications. However, the main hurdle is the huge amount of investment and the high-cost levels of comparable solutions, resulting in a return on investment, which is hard to make attractive. Another aspect which should be mentioned is the relative lack of education on the part of farmers: few of them are very 'tech-savvy' yet and have little IT knowledge in their toolbox although this is noticeably changing over time. As an emerging market, a broad range and number of proprietary solutions are being proposed. The level of adoption is still negatively impacted by the lack of interoperability and the capacity of farms to integrate these innovations into their routine, apart from large farms. Moreover, farming is a low margin business, and a large part of farmers face economic difficulties and low revenues.

In addition to the techno-economic approach to digital innovation, it seems important to us to support its contributions in terms of positive externalities and the objectives of the Green Deal. The numerous developments of systems and services driven by digital technology highlight tangible gains on various levels: reduction in the consumption of resources such as water or pesticides, better management of soil and livestock, etc. While many barriers remain to ensure the widespread deployment of these digital systems (cost, sustainability of solutions, farmers' skills, etc.), adding value of externalities in conjunction with public policies supporting the agricultural sector could facilitate the implementation of the entire ecosystem supporting smart agriculture. The challenge of reducing water consumption can be taken as an example. Agriculture is a major consumer of water resources, and the major cause of water consumption in agriculture is irrigation. Farming activities account for almost 70 % of global water withdrawals. Significant water savings could be achieved with improvements in irrigation infrastructure and technologies. Estimates indicate a saving of more than 40 % in the volume of water withdrawn, through improved efficiency in the delivery and application of irrigation systems, changes in practices, planting of drought-resistant crops and reuse of treated water. Farming technologies, such as optimised irrigation equipment and digitally assisted irrigation, provide opportunities for better water management. Examples of these technologies are a) drip-irrigation – which, compared with sprinklers, allows water savings of 10 to 35 % for arable crops, 28 to 46 % for arboriculture, and 17 to 43 % for fruits and vegetables, and b) field sensors that map irrigation needs – which allow water savings of 20 to 25 % for arable crops and arboriculture and 45 to 50 % for fruits and vegetables. Hydroponics (i.e., methods and techniques for growing plants without the use of soil) is one emerging example of higher water-use efficiency than soil-based cultivation.

However, the monitoring of water alone is insufficient, even given its essential role during such critical stages as the bloom and fruit set stages of a plant which can significantly affect crop yield. Other vital parameters are interrelated with water and thus need to be kept track of. There are multiple factors at play, not only about the plant itself but also the soil and the weather. Typically, water and nitrogen are interdependent. Water shortages can block the photosynthesis process, reducing a plant's demand for nitrogen. When irrigation is used to compensate a lack of water, the nitrogen level also needs to be adjusted as the (renewed) supply of water alone will not relaunch the process. With a good set of collected and processed data, farmers can improve the information needed on the volume of inputs (notably

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fertilisers) or on whether – and to what extent – to apply such plant protection (phytosanitary) measures such as fungicides and pesticides. This rational approach can reduce the inputs required by up to 15-30%, according to IRSTEA, the French National Institute for Environmental and Agricultural Science and Research formerly known as CEMAGREF.

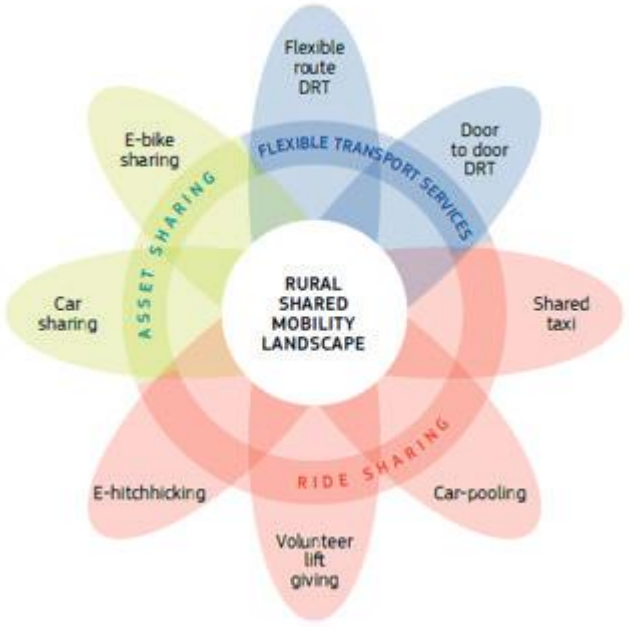
It still needs substantial initial investment capacity. Investment support could be linked to effective positive impact on water and inputs consumption.

Smart mobility

Rural areas are very sensitive to mobility due to low population density and a dispersed population. Rural mobility has received far less attention from policy makers than urban mobility while the needs are great as a good mobility means better access to work, access and services. Developing smart mobility – shared mobility, e-mobility, connected and automated vehicles... is key to fitting within the decarbonised mobility and society in rural areas.

Globally, the rollout of connected and automated vehicles requires to ensure quality broadband connection, define regulation for such vehicles and the low modal share of public transport, promote usership rather than ownership, improve online-mapping and quality of rural roads. Tourist spots could be places to deploy connected and automated vehicles pilot services.

Numerous initiatives of shared mobility have been launched in rural areas and in existing smart villages. Shared services can benefit from digital technologies to secure the value proposition for users. Promoting these shared services doesn't require a specific heavy digital infrastructure as observed in rural areas that have developed such projects.



'Shared mobility' generally refers to modes and services that are additional to the conventional route-based public transport operated by buses.

It spans demand-responsive transports (DRT), shared taxis, car-pooling, car-sharing, community/volubteer schemes, etc.

The 'shared mobility services' include both the mobility services themselves and the supporting services including traveller information, reservations, payment and operations management.

Soutce: SMARTA Project

On decarbonised mobility, the real issue for rural areas is to support massification of e-vehicles. The car market has been strongly impacted by the COVID-19 crisis and by the commitment of EU member states to ban fossil-fuel cars in the medium term. There are the first signs of a shift in the market towards electric and hybrid cars Rural regions offer great potential to electrify the motorised car fleet. Financial incentives to support electric vehicle purchase and use, and local incentives for the extension of the public and private

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charging infrastructure network can help to expand adoption. Local activities such as community-based electric carsharing initiatives, information, and awareness campaigns can also help to spur the electrification of the rural vehicle fleets beyond major cities. The map provides an illustration that predominantly rural regions can be proactive in supporting deployment of E-vehicles.

Lastly, smart mobility for rural areas has to consider the potential of connected and automated vehicles. Once again, urban areas and main corridors, because of their coverage in digital infrastructures, will be first concerned by connected and automated vehicles and will benefit from the new services provided. However, as quoted by OECD in its report Rural 3.0 people-centred rural policy, autonomous/driverless/self-driving cars should bring opportunities for rural areas such as: shared self-driving cars, to improve public transport, to increase attractiveness to live and to ease access to services. The synergy effects of different mobility technologies like electric driving, connected services and automated functionality will improve the efficiency of driving. Longer distances are not pure driving time, it can be considered e.g. as working time. Furthermore, the overall traffic situation will increase in efficiency and sustainability through smarter and more balanced route planning possibilities.

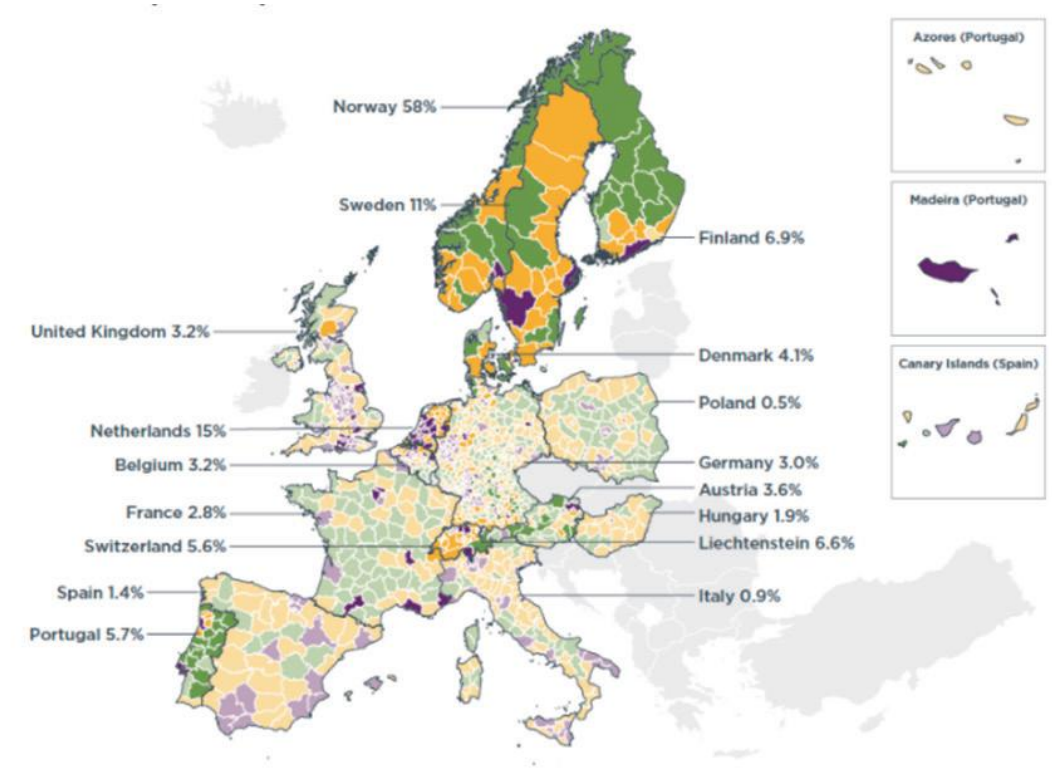

Figure 5. New electric passenger car registration shares in European countries in 2019, by NUTS 3 regions.

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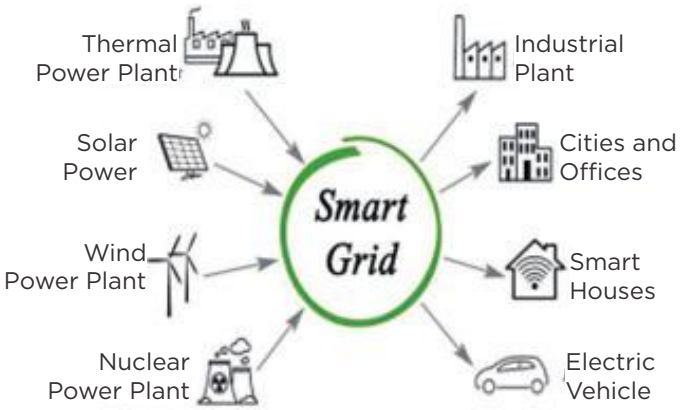
Smart grids

Making the energy transition a success depends heavily on the capacity to manage data and digital technologies. Implementing smart grids in rural areas responds to both production and consumption sides. On the production side, rural areas host a significant proposition of the production, with real perspectives on renewable energy. On the consumption side, smart villages support interesting community energy initiatives.

Smart grids combine digital and electricity technologies. They are integrated into production sites, network infrastructures and consumers to optimise all the links in the electricity network. Almost all the functionalities, which enable to reduce the environmental impact of energy production and consumption today are linked to the implementation of smart grids.



As everyone knows, the production of electrical energy is subject to peaks in demand, especially in the early morning and late afternoon. These peaks are generally compensated by the production of electricity using more expensive (compared to nuclear production for example) and more polluting means of production, such as coal-fired power plants for example.

To inject electricity from renewable energies, such as wind and solar power, or energy stored temporarily in batteries or surplus self-generated electricity from private individuals into the grid, the smart grid is essential.

Another possibility offered by smart grids is the ability of the network to adapt itself in case of failure. Indeed, in the case of a major power failure, due to the fall of a high voltage line for example, the network can switch to 'islanding' mode and operate autonomously. It is also able to switch back to its initial configuration as soon as the problem is identified as resolved. In a context of global warming and repeated brutal meteorological phenomena, this functionality makes sense for rural areas.

Some technologies also make it possible to adapt the capacity of the electrical transmission network according to climatic parameters, particularly air temperature. With these smart grids functionalities, we can, for example, inject a production surplus of electricity on the network even if it is already loaded.

Rural areas have advantages, to produce solar energy for example, particularly because of more accessible land prices, and the possibility of self-consumption for individual housing.
Photovoltaic self-consumption remains marginal but is growing strongly. In France, for example, 45,000 consumers (representing 0.13 GW of the 5 GW of photovoltaic panels installed on roofs), have opted for self-consumption, compared with 10,000 two years ago.

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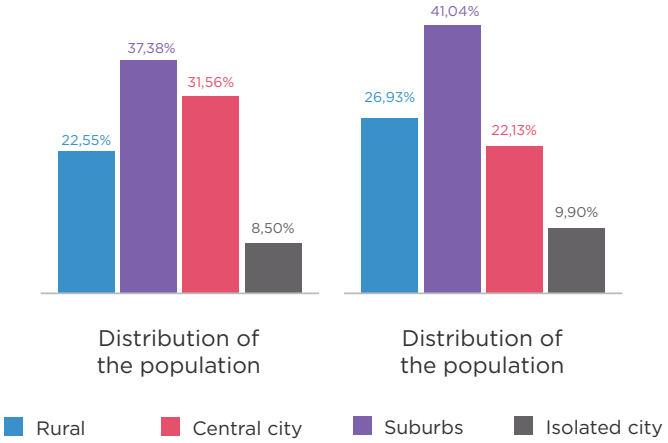
Opportunities can be seen under the Renewable Energy Directive that offers citizens and communities across Europe the possibility to invest in renewable energy. Smart Villages approach, LEADER and other forms of cooperation, support can bring together local and national stakeholders to develop a community vision and a business case for community energy. There are now over 3 500 Renewable Energy Cooperatives, mainly concentrated in the Northwest of Europe. A high proportion of these involve rural communities (www.rescoop.eu).

Smart grids also cover the deployment of smart metering. The last published figures on smart metering by EC outlined that close to 225 million smart meters for electricity will be rolled out in the EU by 2024. And by 2024, it is expected that almost 77% of European consumers will have a smart meter for electricity, with an average of €270 savings for electricity per smart meters.

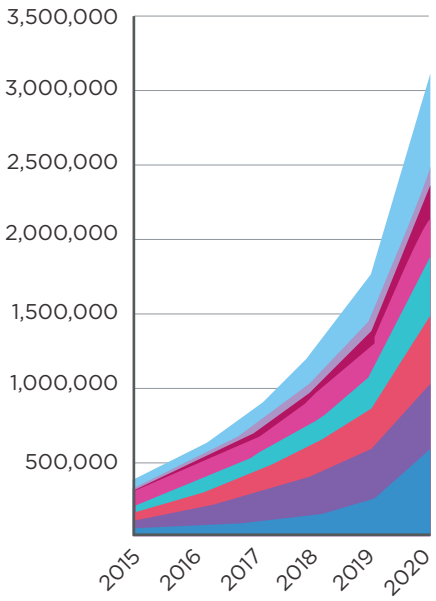
The smart grid also has a role to play in relation to smart mobility. The development of electric vehicles in rural areas requires the presence of a sufficiently dense network of charging stations. However, to date, these charging stations have been deployed mainly in metropolitan areas or on highways for ROI reasons.



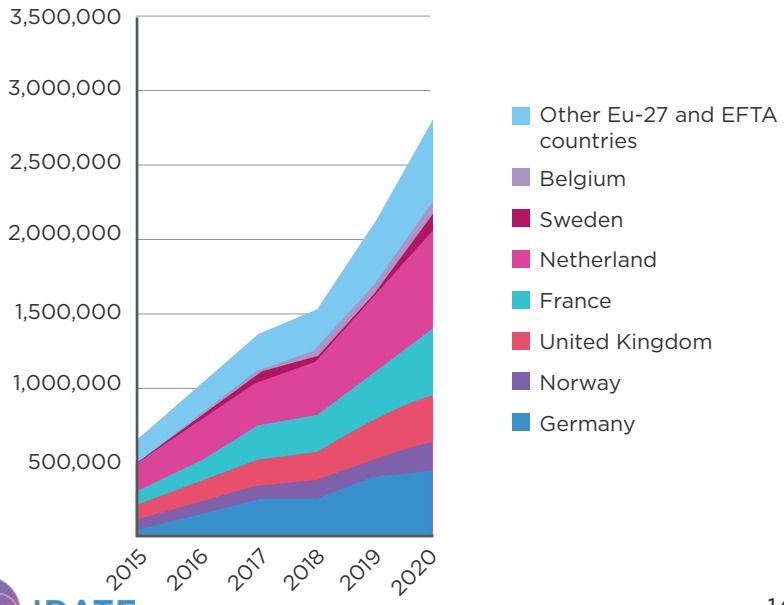
The development of Smart Grids in rural areas must therefore take this need into account. Indeed, contrary to what one might think, and as we have shown in the paragraph on mobility, electric vehicles are not only of interest to city dwellers or suburbanites. The distribution of electric vehicles in the territory is globally correlated with the distribution of the population, as shown in the graph opposite.

Moreover, the number of electric vehicles in Europe has been growing very strongly since 2020, whereas the number of charging points is growing less quickly, as shown in the graph below from the European Alternative Fuels Observatory. The lack of infrastructure, particularly in rural areas, must not slow down this momentum.

Electric passenger car fleet 2020



Public recharging points 2020



Digital transition, a lever for the development of rural areas in Europe

Rural smart specialisation

The shift towards electric vehicles seems to be underway for good in Europe, but the size of the network of public charging stations is not commensurate with its ambitions of electrification of the fleet. In a letter sent in February 2021, the Association of European Automobile Manufacturers (ACEA, and the European Bureau of Consumers' Unions) called on the European commissioners responsible for climate, transport, industry, and energy to take advantage of the revision of the law on infrastructure for alternative fuels scheduled for 2021 to require the establishment of one million public charging stations across the Union in 2024 and 3 million in 2029. Thus, the challenge is to include rural areas in the rollout of charging stations to avoid a gap with urban areas and road corridors being well equipped and covered by different systems and operators.

That is why, local authorities should consider co-financing the deployment of this network of charging stations, with, for example, one charging point per municipality allowing the charging of 2 or 3 vehicles simultaneously.

Smart healthcare

Digital technology has proven its effectiveness in making medical appointments, carrying out administrative procedures, consulting remotely and being monitored continuously outside of consultations. In that sense, smart healthcare has a strong interest in responding to the rural areas' challenges, including that of medical desertification.

Especially at the heart of the Covid-19 crisis, digital technology applied to health has played a major role in curbing the epidemic, speeding up decision-making, enabling continuity of care and giving patients more autonomy in screening and monitoring their symptoms. The increase in emergency room admissions and the use of telemedicine has also shown the usefulness for health and medical-social professionals to have access to patient data, particularly in the context of file consultation. However, the digital transformation of actors and organisations in the health, social and medico-social sectors in Europe is lagging behind, and we need to go further in terms of digital health.

In rural areas, there is a latent problem related to medical desertification. This has been a fact for many years now, that there are less and less doctors in rural areas. Moreover, it is necessary to travel long distances to have access to a specialist when in town all specialists, or almost, are present.

Digital health is a fragmented, yet dynamic, sector driven by data collection, with a high number of players of all sizes addressing a wide variety of use cases in both the medical and non-medical sector, but at the same time dominated by legacy players.

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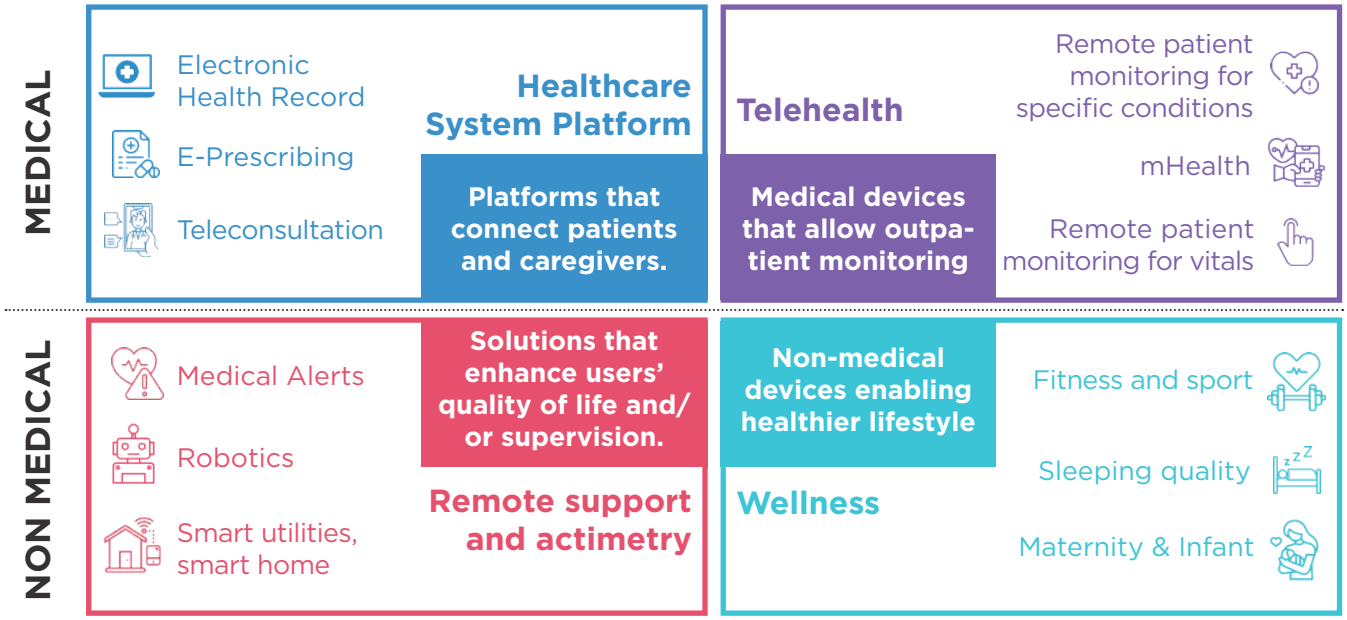
Typology of use cases



Source: IDATE, *e-Health*, November 2220

There is a twofold challenge for rural areas: to be part of the deployment of digital health services, avoiding a digital health divide and to be part of the ecosystem, by far dominated by large players and start-ups usually not located in rural areas. For this, state bodies, large players and start-ups should collaborate more with local structures and take the specificities of territories more into account.

Digital health has clear potential for improving access to care for people living in rural areas. We can give two major examples.

Teleconsultation, which allows for remote diagnosis without direct physical examination of the patient. For example, since October 2019, the community of Le Favril in France launched the teleconsultation service for citizens of its community of municipalities, to facilitate access to a general practitioner. 4,000 citizens already had access to the service, by the end of 2021.

Digital technology can also improve citizens' health by moving from curative to preventive medicine. For example, remote monitoring is a guarantee of serenity, particularly for diabetics, people suffering from kidney or heart failure, high blood pressure, and even for people being monitored for cancer. At the same time, people suffering from these pathologies and living in rural areas are more exposed to risks because of their isolation and their distance from health professionals. Moreover, remote monitoring can reduce hospitalisations or, conversely, make it possible for patients to return home from hospital more quickly and in complete safety. Preventive medicine also aims at informing, in the most precise way possible, a community or an individual about general risk factors based on known guidelines and studies,in particular, behavioural risks such as diet, sedentary lifestyle, alcohol, but also environmental risks, such as the impact of fine particles. In a retrospective, observational analysis in an American Diabetes Association study, researchers found that use of this type of solution was associated with a significant 30% reduction in acute diabetes or complications that may result from diabetes, and 13% reduction in all-cause hospitalisations in people with type 2 diabetes not receiving intensive insulin therapy.

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Smart education

Education and training are key for personal fulfilment, social cohesion, economic growth and innovation. Raising the quality and inclusiveness of education and training systems and the provision of digital skills for all during the digital and green transitions is of strategic importance for the EU.

Very high-capacity internet connectivity is critical for education. Demand for connectivity is increasing due to bandwidth-heavy applications such as video streaming, video conferencing, cloud computing, and other emerging applications (such as virtual and augmented reality). Bringing fast and reliable internet to educational institutions and learners plays an important role in ensuring effective and engaging learning experiences.

For rural areas, Smart education is an answer to ensure equal access to learning and training, while these areas face a continuing loss of education services and the difficulty of recruiting and retaining staff. Smart education is also a means to improve digital literacy among the population in rural areas.

Smart education can contribute to reducing the educational divide between cities and rural areas, which is large and has grown over time. Although the share of population aged 25-64 with a tertiary education has increased in rural areas, it increased more in cities where the share is almost double (41% in cities vs 22% rural areas). The educational divide depends not only on access to tertiary education, but also on jobs that demand these types of qualifications.

Smart education is a means to improve digital literacy among the population in rural areas. The share of the population with at least basic digital skills is lower in rural areas than in cities and this gap has not changed since 2015, which may hinder the use of online services and the capacity for teleworking.

However, the digital gap is still persistent in rural areas when thinking of school connectivity, which is part of the basis to provide smart education. Only 8% of students across all ISCED (International Standard Classification of Education) levels attend schools located in a village or a small city, which have access to high-speed Internet above 100 Mbps. For all ISCED levels, schools located in larger towns and cities are, on average, more likely to connect to the Internet via fibre optic.

Internet speed according to location of schools
(all ISCED levels, in % of students, EU level, 2017-2018)