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Advancing the digital transformation of agriculture and rural areas through national strategies, e-Government systems, and Digital Villages - update for Europe and Central Asia

I. Introduction

1. Modern information and communications technologies (ICTs) are yielding new growth in the food and agriculture sector and in rural areas. They are enabling farmers to work more precisely, efficiently and sustainably; connecting producers and consumers in new ways; and offering consumers greater choice and transparency. However, the digital technology dividends are not automatic. Rural areas in Europe and Central Asia are still falling behind when it comes to the adoption of new technologies due to weak infrastructure, affordability and availability of solutions and services, lack of awareness, digital skills, and regulatory issues.

2. The importance of technology, data and innovation in realizing the objectives of the 2030 Agenda for Sustainable Development is outlined in the FAO Strategic Framework 2022–31¹ and reiterated in the FAO Science and Innovation Strategy.² These strategic frameworks identify digital agriculture as one of the 20 Programme Priority Areas while recognizing technology as a key accelerator to be seamlessly integrated into all programmatic interventions, together with innovation, data and other complements.

3. The FAO Regional Office for Europe and Central Asia recognizes the pivotal role of e-agriculture³ in accelerating the transformation of agrifood systems, overcoming challenges arising from global crises and achieving the Sustainable Development Goals. In response to the growing demand for seizing the opportunities brought by digital technologies, the FAO Regional Office for Europe and Central Asia has formulated a comprehensive regional action plan to integrate science and innovation and has introduced the Digital REU 2022–2030 approach. Driven by the objective to serve as a catalyst for the digital

¹ The FAO Strategic Framework 2022–31 is available online at <https://www.fao.org/3/cb7099en/cb7099en.pdf>.

² The FAO Science and Innovation Strategy is available online at <https://www.fao.org/3/cc2273en/cc2273en.pdf>.

³ The term “e-agriculture” refers to the use of modern information and communications technologies (ICT) in the agricultural sector. It is often referred to as “digital agriculture,” which serves as a comprehensive term that broadly encompasses ICT, digital and emerging technologies applied in the agrifood sector.

transformation of agriculture throughout the region, the FAO Regional Office for Europe and Central Asia provides critical capabilities to country offices, technical units and Members. This entails the spearheading of vital corporate endeavours, such as the FAO Digital Villages and Hand-in-Hand initiatives.

II. The digital approach

4. The Digital REU 2022–2030 approach prioritizes inclusive rural transformation, digitalization, and innovation to empower smallholders, family farms, and youth. With a people-centric and field-first approach, it emphasizes affordable and equitable access for rural communities and smallholder farmers, viewing technology as a catalyst for accelerating the sustainable transformation of agrifood systems. The approach aims to embed digitalization in all programmatic interventions and focuses on two main priorities: (1) creating an enabling environment for thriving e-agriculture across the region through assessments, collection of good practices, strategy support and digital literacy initiatives; and (2) expediting the development and adoption of digital agriculture solutions, services and data as scalable digital public goods across the region.

5. This approach is reflected in the following three related but independent workstreams: (1) addressing the challenges of agrifood systems at the community level with the Digital Villages Initiative; (2) developing e-government solutions that aim to enhance transparency, efficiency and accessibility in the governance and administrative processes of agrifood systems; and (3) supporting countries in the development of national digital agriculture strategies that aim to transform agrifood systems at the national level.

III. Advancing rural development through the Digital Villages Initiative

6. Rural communities in Europe and Central Asia suffer from a triple divide (urban–rural, gender and digital) that locks them into a circle of decline and leads to limited economic opportunities and inadequate access to essential services. Nevertheless, digitalization and innovation can serve as drivers of rural development, unlocking transformative processes to improve access to services, markets and knowledge and leading to increased agricultural productivity and opportunities. With digital technologies becoming more accessible, useful and affordable, they have the potential to significantly improve the livelihoods of rural communities in the region.

7. FAO has launched the corporate Digital Village Initiative (DVI) with the goal of converting at least 1 000 villages around the world into digital village hubs. Since its launch, the programme has been implemented in several countries across the globe.

8. With DVI, FAO in Europe and Central Asia seeks to address the challenges of agrifood systems at the local community level, capitalizing on the rich European experience with smart villages and FAO's longstanding experiences and practical knowledge in rural development. With a vision of making every village and rural community in Europe and Central Asia smart, green, digitally connected and interconnected, the initiative stimulates community-led action and fosters linkages between villages to exchange knowledge, good practices and technology ("village twinning").

9. DVI acts in three dimensions: a) agricultural production; b) farmers' access to digital services; and c) support for a holistic digital rural transformation.

10. Agricultural production emphasizes improved productivity via technological solutions, including smart farming, precision agriculture technologies and automation tools such as agro-robots and farm

management solutions. DVI focuses on democratizing these technologies for small-scale and family farmers, mitigating barriers such as availability and affordability. Examples of this can be seen in Uzbekistan, where the internet of things and open source are utilized to lower technology costs for farmers.

11. Farmers' access to digital services extends beyond traditional ICTs such as television and radio, as emerging digital technologies provide opportunities to share knowledge and advice, surmounting the spatial barriers of distance or isolation. Vehicles for these services include instant messaging, mobile apps, websites and platforms, providing a range of offerings such as extension services, early warnings and insurance or financial services. Furthermore, the opportunities offered by e-commerce platforms allow connections with local consumers and input suppliers. Market price access and digital public services can bring benefits to the broader community.

12. DVI adopts a village-wide perspective to stimulate a holistic digital rural transformation, addressing the needs of the entire rural community, including those not directly involved in agriculture. It aims to enhance service delivery in sectors such as health, education, tourism, transport and energy while building local capacities, nurturing digital skills and championing local leaders. The focus is on stimulating local innovation and co-creation by fostering connections with various actors that can support this comprehensive digital rural transformation.

13. To guide the selection of villages and rural communities that hold the potential to be transformed into digital villages, a DVI Readiness Assessment tool was developed. Since 2022, the tool has been tested in over 30 villages throughout Albania, Kosovo,⁴ Bosnia and Herzegovina, Türkiye, Uzbekistan and Kyrgyzstan. It is based on 17 criteria across three dimensions: digital ecosystem, leadership and governance and strategic context, facilitating the analysis of the preparedness of potential villages to undergo a digital rural transformation process. The analysis of each criterion determines the level of maturity of the village to be transformed into digital.

14. As of July 2023, eight countries of Europe and Central Asia are actively developing digital villages: Albania, Azerbaijan, Bosnia and Herzegovina, Georgia, Kyrgyzstan, Tajikistan, Türkiye and Uzbekistan. Significant progress has been made in several other countries, as they have already identified their target villages and are now taking steps towards implementation.

15. An example of DVI implementation can be seen in Uzbekistan, where FAO has successfully developed a comprehensive DVI road map for Novkent and Yuksalish villages. This road map serves as a strategic guide, outlining the specific DVI interventions required to propel digital transformation in the agricultural sector and beyond. Such interventions include the introduction of high-quality – yet low-cost – internet of things devices based on open source for greenhouse monitoring, the dissemination of innovative agricultural practices via a “digital hub,” and a comprehensive capacity-development plan encompassing digital skills, entrepreneurship and agronomic training.

16. In DVI, rural communities, and especially their more vulnerable people, are at the centre of the innovation process. Through “living labs,” the rural community can gather and discuss the challenges they face among themselves or supported by other actors, such as local administration, the private sector or research institutes to aid in identifying solutions.

17. Similar progress is unfolding in other countries as well. In Albania and Tajikistan, DVI is leveraged to support agritourism development in Tropoja and Hissar Valley. In Bosnia and Herzegovina, community workshops are about to commence in rural communities in Pale and Kakanj, signalling the initiation of the digital transformation process.

⁴ All references to Kosovo should be understood to be in the context of United Nations Security Council resolution 1244 (1999).

18. A dedicated regional website was developed that serves as a valuable platform for sharing information, resources and updates related to DVI in the region.⁵ The platform will also feature AgriD, an open digital database of ICT-based solutions and good practices stemming from the region, with a special focus given to solutions for smallholder farmers.

19. Furthermore, FAO aims to foster linkages and cooperation across villages and institutions through “DVI twinning.” This approach stimulates the exchange of knowledge, good practices and technology transfer between nearby or geographically dispersed villages or institutions at the national or international level. For example, twinning exchanges were piloted between Permet, a village in Albania, and Lormes, a smart village of France. In addition, Tajikistan engaged in knowledge exchanges with experts from the Republic of Korea who shared their experiences and best practices in digital agriculture policy and innovation.

20. DVI has received significant attention and support from national governments, marked by a high-level launch event “Digital Villages in Action in Europe and Central Asia”⁶ on 18 May 2023 and with sustained commitment to the initiative beyond pilot projects.

21. In conclusion, the Digital Village Initiative in Europe and Central Asia represents an important step towards addressing the challenges faced by rural communities in the region, as DVI aims to unlock transformative processes that improve access to services, markets and knowledge, ultimately leading to increased agricultural productivity and enhanced livelihoods.

IV. Accelerating the digital transformation of governments

22. The second workstream focuses on accelerating the digital transformation of governments by supporting the development of e-government systems solutions and public digital services for agriculture in countries across the region.

23. While governments already play a significant role in stimulating the digitalization of agriculture through strategies and policies, they also need to develop and deploy their own digital agriculture solutions. FAO supports these efforts by providing technical assistance and solution services to governments for the design, development and deployment of core e-government solutions in agriculture. This must be achieved through the development of solutions that are built for sustainability and easy replicability across the region and beyond and that embed the Principles for Digital Development.⁷

24. For example, the National Animal Identification Registration and Traceability System (NAITS) in Georgia enables the National Food Agency to track animal diseases and ensure efficient disease control and eradication in shorter time frames. NAITS, which incorporates about 900 users (veterinarians and inspectors) and more than 250 000 animal holdings, documents the full path of the animals (including more than 1 million bovines) from farm to plate, making the system an important part of the food safety chain puzzle. The tool was developed as a fully European Union-compliant solution as a requirement and recognition of the European Union approximation efforts of Georgia but also as an indicator for European Union potential candidate country. NAITS is currently being replicated and adapted in North Macedonia and in other countries beyond the region, such as in Central America and Mauritius.

25. Digitalization has opened new possibilities for efficient data collection, management and analysis, often leveraging geospatial technologies. It is critical to encourage stakeholders to make meaningful agricultural data openly available as public-good data and democratizing them to become relevant to

⁵ For more information on the Digital Villages Initiative in Europe and Central Asia, please visit <https://fao.org/digital-villages-initiative/Europe>.

⁶ The Digital Villages Initiative launch event is available online at <https://www.fao.org/europe/events/detail/digital-villages-in-action-in-europe-and-central-asia/en>.

⁷ For more information on the Principles for Digital Development, please visit <https://digitalprinciples.org/principles/>.

farmers while addressing data protection risks. This is achieved by working with governments and stakeholders across the region to ensure the adoption of good data governance frameworks and by leveraging tools such as the FAO Hand-in-Hand Geospatial Platform to make agricultural data openly available as a digital public good.

26. FAO's Hand-in-Hand Initiative has made remarkable progress in the Europe and Central Asia region. Geospatial datasets related to country food systems – encompassing crucial information about population, infrastructure, natural resources, production and data processing – have been made openly available in the platform and in Atlas,⁸ an open-source geospatial data platform.

27. FAO also developed and made openly available the Land Degradation Neutrality Decision Support System,⁹ a geospatial platform that assists countries in the region in their efforts to achieve land degradation neutrality by facilitating the identification of target areas for different types of interventions, to eventually balance the gains and losses of natural capital and achieve land degradation neutrality.

28. Assisted by FAO, the Government of Montenegro launched its own Farm Accountancy and Data Network (FADN), an information technology system that enables the monitoring of economic development at the farm level and facilitates a better understanding of the impacts of measures taken by the government to support different types of agricultural holdings. The FADN is an important milestone in European pre-accessions, and countries such as Albania are receiving similar support for the development of an FADN.

29. To facilitate governments in assessing damages and losses in crops, livestock, fisheries, forestry and aquaculture, FAO developed a damage and loss tool. Other examples of assistance in the field of e-government include the digitalization of the grape value chain via the implementation of a vineyard registry system in Armenia. The solution will serve as the single official source of information about vineyards, enabling a better level of control over the quality of winemaking products and preventing falsification.

30. Looking forward, FAO remains committed to supporting governments in the Europe and Central Asia region in further accelerating their digital transformation in agriculture. By embracing technologies and fostering good data governance, FAO and its Members can unlock the full potential of digitalization for sustainable agriculture. Collaboration among governments, stakeholders and development partners will continue to be pivotal in driving this transformative change. As the digital landscape evolves, FAO will adapt its approach to ensure that e-government systems and public digital services for agriculture remain inclusive and tailored to the diverse needs of countries in the region.

V. Fostering the development of national e-agriculture strategies

31. Another area of FAO's work in the region is supporting countries in articulating inclusive e-agriculture strategies, programmes and road maps, both at national and local levels, that establish sustainable and inclusive pathways for the digitalization of agriculture and for rural development.

32. Noteworthy examples of FAO's efforts in this direction include supporting Armenia, Bosnia and Herzegovina, Kyrgyzstan, Kosovo, Republic of Moldova and Türkiye in their quests to build comprehensive national e-agriculture strategies. Moreover, FAO has worked hand in hand with the Ministry of Agriculture of Kazakhstan in crafting a strategic document that elevates digitalization as a crucial pillar of the country's agrifood sector development for 2021–2025.

⁸ The Atlas geospatial data platform is online at <https://zemskov.users.earthengine.app/view/tjnip>.

⁹ The Land Degradation Neutrality Decision Support System is online at <https://projectgeffao.users.earthengine.app/view/reu-ldn-assessment>.

33. Looking to the present and future, FAO's endeavours extend to Tajikistan and Uzbekistan, where the Organization is actively engaged in shaping digital agriculture road maps and programmes of action, respectively.

34. In Tajikistan, the focus lies on overcoming infrastructural challenges and ensuring widespread access to affordable internet connectivity, particularly in remote regions. The proposed digital agriculture road map envisions concrete actions to drive digitalization forward, uniting stakeholders in a common vision and fostering collaboration among government agencies, farmers, technology providers and other relevant stakeholders.

35. Likewise, in Uzbekistan, FAO's technical assistance aims to construct a robust programme of action that sets national objectives for agricultural digitalization. The strategy envisions an enabling environment to support digital transformation and the acceleration of e-government initiatives related to agriculture, digital literacy and the promotion of entrepreneurship and innovation in the agricultural sector.

36. We stand at the threshold of an era in which digitalization – if opportunely harnessed – holds the promise of a thriving agricultural sector and prosperous rural communities. FAO remains committed to empowering its Members through inclusive and sustainable policies, strategies and plans for e-agriculture development throughout the Europe and Central Asia region.

VI. Work ahead

37. As we look to the upcoming biennium, FAO in Europe and Central Asia will continue to collaborate with Members to address their needs and leverage e-agriculture as a catalyst for accelerating the transformation of agrifood systems and rural areas. This collective effort aims to overcome challenges arising from global crises and advance progress towards the Sustainable Development Goals. The focus of the work will particularly revolve around:

- Scaling up the Digital Villages Initiative in the region, thereby promoting inclusive rural development and innovation. As part of this initiative, a comprehensive methodology for creating DVI interventions that effectively address the unique contexts, challenges and strengths of rural communities will be developed. Additionally, FAO aims to become a relationship broker and to establish an e-community of connected villages, facilitating the exchange of knowledge, technology and practices among them. The ultimate goal is to advance and transform food and agriculture systems within these communities.
- Analysing good practices involving the use of ICT and making such knowledge openly available through publications and AgriD, an open database of digital initiatives advancing the agrifood sector in the region. Initially focusing on Europe and Central Asia, AgriD has the potential to scale up and become a global initiative.
- Increasing support to countries in the European Union pre-accession phase on the necessary processes and e-government systems required for digital agriculture. This guidance document, which is being developed in collaboration with the International Telecommunication Union Office for Europe, will provide valuable insights into the steps needed to advance the digitalization of agriculture in pre-accession countries.

38. Considering the growing challenges of digital transformation in the Europe and Central Asia region and the pressing need for action within the context of modern technological trends, a robust foundation is

provided for FAO's work on e-agriculture. FAO will maintain the development of strong alliances and engage with diverse stakeholders to address e-agriculture as a priority area for ongoing assistance to countries in Europe and Central Asia.

39. By empowering rural communities through the Digital Villages Initiative, advancing governments' digital transformations, and crafting national digital agriculture strategies, FAO aims to create a future in which agriculture is smart, resilient and inclusive. Through these efforts, we will overcome the challenges of the digital divide and seize the opportunities of the digital age.

40. With technology as an accelerator, FAO will work to achieve the four betters and build a future in which farmers work more efficiently and sustainably, consumers have greater choice and transparency, and rural areas thrive with limitless possibilities across Europe and Central Asia.