![DESIRA logo]

# Digitalisation of ordinary land management in rural areas with mountain landscape

This policy brief presents the discussion of the Living Lab Toscana Nord on the use of digitalisation to prevent hydrogeological risk. The main idea is that digitalisation can facilitate the information flow from the field to the decision makers, involving different actors and tools in order to identify the need for maintenance works.

Within this frame, the LL identified two main alternative scenario narratives based on a different level of interaction between people and technologies. During the workshop the participants identified the scenario with higher participation of local communities as the preferred one for the Consorzio Toscana Nord.

As a result of the two main scenarios developed with stakeholders, four central policy options were elaborated: (1) to promote the involvement of local communities in public service delivery in rural areas with mountain landscape; (2) support farmers' income; (3) promote the involvement of local communities in the technology design process; (4) increase broadband coverage as well as connectivity and digital skills of local communities and public administrations.

## CONTEXT

The hydrogeological risk is increasing due to climatic change and land abandonment. Erosion phenomena due to extreme weather events can generate floods and landslides. The ordinary land management, focusing on constant maintenance works on the drainage network represents an efficient solution to reduce the risk.

> *Ordinary land management is the activity of constantly monitoring of land and water streams, identification of sites where maintenance works are needed and the organisation of such maintenance works.*

The maintenance of the main hydrographic system is under the responsibility of public institutions. However, the division of tasks and roles among different institutions is not always clear, especially in rural areas with mountain landscape where there are several issues of accessibility and communication among overlapping institutions. In the area identified for the present Living Lab (LL) in the North of Toscana the competences for managing the maintenance works on the drainage network are of the Reclamation Consortium (Consorzio Toscana Nord), as defined with the Regional Law 79/2012. The area managed by the Consorzio Toscana Nord cover more than 360.000 ha including rural areas with both plain and mountain landscape. A constant monitoring of the drainage network in rural areas with mountain landscape is difficult, due to isolation and complexity of the environment.



**Figure 1.** Example of maintenance work

The Consorzio Toscana Nord recognise the experience of local farmers and their role for ordinary land management. They consider important the active role of farmers in the alert system and in the small-scale maintenance work as they 'live on the land' and have a continuous observation perspective, not related to single periodical on-site inspections.

The main required activities that emerged in this context are:

- To deploy better solutions **to facilitate the coordination of monitoring and prevention** of the hydrogeological risk;
- To identify the needs of stakeholders to **develop suitable and effective digital tools for environmental monitoring**.

## RESEARCH APPROACH

The research work started in the first year of the DESIRA project focusing on the way digital technologies are currently used and which are the needs of local stakeholders. This work, represented a starting point to explore the future of digitalization in the process of ordinary land management in 2 workshops involving the participants to the Living Lab.

The Living Lab Toscana Nord defined the following scenario question: "**How will the ordinary land management in rural areas with mountain landscape of the Reclamation Consortium "Toscana Nord" be managed in 2031? What role will digital technologies play in this process?**"

A first online workshop was conducted in September 2021 with key informants from the LL to develop the first draft of possible future scenarios based on the identified drivers of change. End of October 2021, a face-to-face workshop was then organised by involving local actors of the LL (e.g. Local farmers, municipalities, technical staff of Consorzio Toscana Nord etc.) to discuss the two main scenarios drafted and define specific details and narratives.

*THE LIVING LAB DEVELOPED POSSIBLE FUTURE SCENARIOS BY CONSIDERING DIFFERENT LEVELS OF INTERACTIONS BETWEEN HUMANS AND TECHNOLOGIES.*

Four possible scenarios developed by the key informants in the first online workshop were presented to stakeholders at the beginning of the second workshop. The LL participants identified the preferred scenario as the one with higher interaction between technology and people as opposed to the one that assumes an absence of investments on digitalisation in ordinary land management (Called business as usual). However, the two options discussed in the workshop were the technology intensive scenario and the human intensive one (figure 2).

## SCENARIOS DEVELOPED

The LL participants were asked to elaborate scenario narratives based on two intermediate scenarios, which can be considered as alternative scenarios for answering the scenario question, depending on the specific context. The LL Toscana Nord identified the "Human Intensive" scenario, as

the better but not best one and the "Technology intensive scenario" as the worse but not worst one.

The Human Intensive scenario assumes that there is a **stable rural population in mountain areas** with basic **digital skills that allows them using apps on smartphones**. The local population and farmers and forest managers in particular have a high environmental awareness and **want to work in and preserve their territory**.
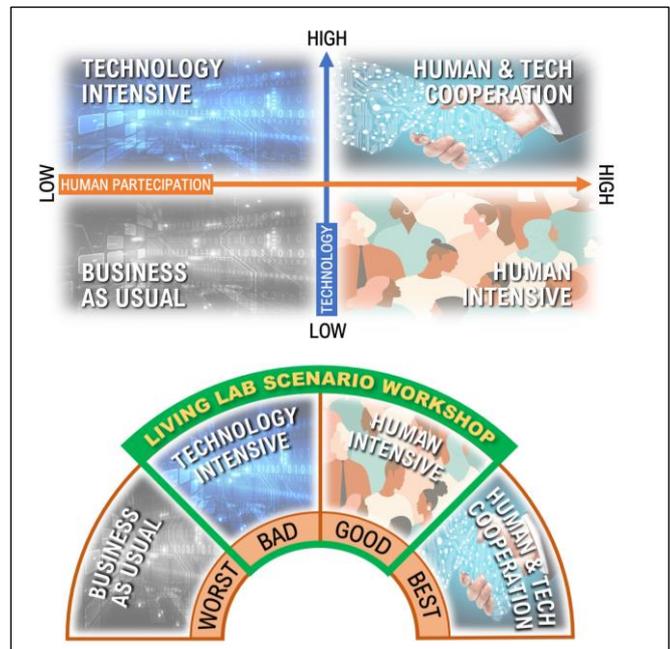


**Figure 2.** The four scenarios presented in the workshop and the judgement of the participants and selection of the two narratives to be developed.

In the Human Intensive scenario, on which the Reclamation Consortium (Consorzio Toscana Nord) is already working, the digitalisation process is aimed to increase the efficiency of an **alert system for the need of maintenance works on the drainage network in order to involve the local population in ordinary land management.** In particular the local farmers and forest managers can send an alert on the need for intervention in a specific site. If the intervention is a simple one, it will be assigned to the individual farmers, which will be paid for the delivery of the public service (maintenance work). Such payments represent **a significant part of small farmers' income** and are an important **incentive for small local enterprises to stay in rural areas with mountain landscape.** This scenario is focusing on the possibility to expand the number of farmers participating in e-governance and delivering public services in isolated areas **through digitalisation.** The main digital

technology used will be a **digital platform to facilitate communication between public and private actors at different levels**.

In the Human Intensive scenario, the main winner is the local community that will be involved in the ordinary land management and have an efficient system contributing to the prevention of floods and landslides.

The Technology Intensive scenario assumes that the **rural population is decreasing in rural areas with mountain landscape** and the few people remaining do **not have specific digital skills** and are not willing to participate in e-government initiatives nor to collaborate with local administrations. However, a **high connectivity and broadband coverage**, together with **a lower cost of technologies** will allow IT companies to provide sensor and other digital tools to local administration. Public administration can then set up an automated system of land monitoring that will allow them to identify the need for maintenance works in the drainage network.

The occurrence of increasing extreme weather events ask for constant and increasingly precise land monitoring which can be reached with the use of a larger number of sensors and more data analysis using forecast models, with a high interoperability between instruments.
The combination of in-situ and remote sensing technologies will allow to provide information only to the technical staff of the Reclamation Consortium (Consorzio Toscana Nord) responsible for ordinary land management. There is no direct involvement of the local population.

The main winners in this scenario are the IT companies selling the sensors and all instruments needed to build the automated system.

## POLICY RELATED DISCUSSION

The two main scenarios could be the result of different approaches in the development of innovation policies. While in the Human Intensive scenario, digitalisation is the result of a **mutual learning process among local actors, researchers and technology providers** in order to develop digital solutions tailored to the needs of the local community; in the technology intensive scenario, the IT companies that developed digital tools for environmental monitoring (as a result of a linear R&I process) will **offer their**

**technologies to the local public administration.** In addition, this scenario may bring to a centralisation of the monitoring tasks, with the consequence that local communities might lose control of the territory.
Some assumptions were clear in the policy related discussion: (1) the development of technologies for public services should be funded by public resources and cannot be the result of the free market, as it would not be profitable for IT companies. (2) In order to develop a digitalisation process, by 2031, there is a need to have a **higher connectivity and broadband coverage in rural areas with mountain landscape**.

The Human Intensive scenario is integrating digitalisation policies within local development policies, using digital tools to create an efficient ordinary land management system based on the involvement of local farmers and small enterprises with an e-government approach. The farmers in the workshop stated that they are willing to contribute in the delivery of public services in rural areas with mountain landscape and that the payment for such services represent a significant part of their income. This scenario implies a strong partnership between a large range of local actors, and effective local governance mechanisms. The outcome of this scenario would be a higher level of resilience of the local community.

💡 *CO-DESIGN ACTIONS TO INVOLVE CITIZENS IN PUBLIC SERVICE DELIVERY IN RURAL AREAS WITH MOUNTAIN LANDSCAPE IS A KEY POLICY ACTION.*

The Technology Intensive scenario is based on digitalisation policies funding the development of the infrastructure to enhance connectivity and broadband coverage in marginal areas, the purchase of technologies available on the market by public administrations, and a public administration able to manage the complexity of the technologies. This scenario can be suitable in absence of an active local community and in case of a high level of land abandonment. However, the participants to the workshops were sceptical about the feasibility of this scenario. They stated that an automated process can detect big events in large water streams, but it cannot work for small and secondary water streams of the drainage network in rural areas with mountain landscape. This would increase the vulnerability of the community.

## POLICY OPTIONS

**Promoting and funding initiatives for local communities' involvement in the process of developing digital solutions tailored to the local needs and skills.**

- Supporting the development of networks involving local administrations and local actors in order to contribute in the identification of specific needs and skills and facilitate the involvement of citizens in the delivery of public services through digitalisation.

**Supporting farmers' income to ensure their unique role in risk prevention**

- Involving farmers in ordinary land management not only to alert on intervention needs, but also in small scale maintenance work in order to get an additional income relevant to maintain their economic activity on the territory
- Once a digital platform to manage the farmers' network will be set up, farmers will be able to provide more public services and be paid for it (incentive to stay in the area with their economic activity).
- Developing an e-governance approach with the direct involvement of farmers and local companies in public services delivery, thanks to digital tools facilitating the process.

**Promoting the integration of the use of digital technologies for land monitoring with citizens in-situ observation.**

- Providing resources to local administrations to purchase technologies needed to develop an e-governance approach and an environmental monitoring based on Earth observation data to be combined with in-situ observation data.

**Increasing connectivity and broadband coverage in rural areas with mountain landscape.**

- Increasing infrastructure functioning in order to facilitate the use of digital tools.

**Increasing digital skills of public administrations and local communities.**

- Improving digital skills and competences of public administration staff with specific technical trainings in order to avoid overlapping of competences of institutions at different levels.
- Improving digital skills of local communities in order to make citizens able to contribute in environmental monitoring of land and water streams in rural areas with mountain landscape.

**Amigo**

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Università di Pisa

DESIRA POLICY BRIEF