

Brussels, 19 May 2025

COST 079/25

## DECISION

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Subject: Memorandum of Understanding for the implementation of the COST Action “Building resilient rural communities through synergy of traditional knowledge and technological innovation” (SMART-RURAL) CA24170

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The COST Member Countries will find attached the Memorandum of Understanding for the COST Action Building resilient rural communities through synergy of traditional knowledge and technological innovation approved by the Committee of Senior Officials through written procedure on 19 May 2025.

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## MEMORANDUM OF UNDERSTANDING

For the implementation of a COST Action designated as

### **COST Action CA24170**

### **BUILDING RESILIENT RURAL COMMUNITIES THROUGH SYNERGY OF TRADITIONAL KNOWLEDGE AND TECHNOLOGICAL INNOVATION (SMART-RURAL)**

The COST Members through the present Memorandum of Understanding (MoU) wish to undertake joint activities of mutual interest and declare their common intention to participate in the COST Action, referred to above and described in the Technical Annex of this MoU.

The Action will be carried out in accordance with the set of COST Implementation Rules approved by the Committee of Senior Officials (CSO), or any document amending or replacing them.

The main aim and objective of the Action is to develop and implement a holistic framework that enhances rural resilience by integrating traditional knowledge with modern technologies, addressing interconnected socio-economic, environmental, and digital challenges faced by rural communities across Europe. This will be achieved through the specific objectives detailed in the Technical Annex.

The present MoU enters into force on the date of the approval of the COST Action by the CSO.

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**OVERVIEW**

**Summary**

Rural communities across Europe face unprecedented challenges in the 21st century, including depopulation, economic stagnation, climate change impacts, and digital divides. These challenges undermine the resilience and sustainability of rural areas, which are essential for Europe’s cultural heritage, food security, and ecological health. The SMART-RURAL Action addresses these critical issues by proposing an innovative, integrated approach that combines traditional knowledge systems with modern technological solutions to enhance rural resilience and promote sustainable development.

This Action seeks to establish a pan-European network of researchers, practitioners, policymakers, and rural community representatives to co-develop and implement strategies that build rural resilience through the synergy of traditional wisdom and digital innovation. SMART-RURAL will work across four key areas: traditional knowledge systems and rural resilience, technological innovation for rural development, integrated resilience assessment and monitoring, and knowledge dissemination and capacity building. It places special emphasis on inclusiveness, youth engagement, and context-sensitive adaptation.

The Action will identify best practices, assess existing gaps, and develop a holistic framework for evaluating and strengthening resilience in rural communities. Through participatory research and real-world pilot projects, SMART-RURAL will co-create and test solutions tailored to specific rural contexts. It will also foster cross-border learning and interdisciplinary collaboration to translate findings into policy, practice, and education.

By empowering rural communities and bridging historical practices with emerging innovations, SMART-RURAL contributes to the European Green Deal, Smart Villages, and broader COST priorities - enhancing Europe’s capacity to respond to scientific, technological, and societal challenges in a cohesive and inclusive manner.

<p><b>Areas of Expertise Relevant for the Action</b></p> <ul style="list-style-type: none"> <li>● Other engineering and technologies: Sustainability in food science and technology</li> <li>● Agricultural biotechnology: Sustainable production</li> <li>● Social and economic geography: Socio-economic aspects of agriculture, agriculture and environment, urban agriculture, gardens, agricultural economy</li> <li>● Other social sciences: Qualitative methods for the social sciences</li> <li>● Other agricultural sciences: Databases, data mining, data curation, computational modelling for other agricultural sciences</li> </ul>	<p><b>Keywords</b></p> <ul style="list-style-type: none"> <li>● Rural resilience</li> <li>● Traditional knowledge</li> <li>● Sustainable development</li> <li>● Digital innovation</li> <li>● Community empowerment</li> </ul>
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**Specific Objectives**

To achieve the main objective described in this MoU, the following specific objectives shall be accomplished:

Research Coordination

- Develop a rural resilience framework by reviewing current practices and conducting stakeholder analysis across Europe. This includes mapping challenges, opportunities, and creating a typology of rural communities based on their potential to integrate traditional knowledge with modern approaches.
- Establish an online platform to collect, share, and analyse data on traditional knowledge and new technologies. This includes creating an inventory of practices, assessing technologies and developing methodologies to evaluate their impact on rural resilience.

- Elaborate compilations of best practices and policy recommendations by building an integrated resilience assessment framework. This will combine traditional and modern metrics and offer actionable guidance for tailoring integrated approaches to diverse rural European contexts
- Design and test pilot projects that integrate traditional practices with modern technologies. Develop a European platform of case studies to showcase successful examples of enhancing rural resilience through innovative, context-sensitive strategies
- Engage diverse rural stakeholders through participatory research and analyse existing governance frameworks - to identify barriers and enablers, and support the co-creation and evaluation of inclusive resilience strategies with farmers, women, youth, and other rural actors

#### Capacity Building

- Bridge separate fields of science and technology to create a strong talent pool, providing knowledge across the rural development value chain, and entrepreneurial approaches towards novel solutions in sustainable rural communities.
- Foster and coordinate collaborations between academia and rural practitioners, especially in underserved areas with low connectivity and high climate vulnerability, to harmonise practices towards the research coordination objectives of the action
- Create goal-oriented events in Inclusiveness Target Countries and Near Neighbour Countries, to enhance capacity and stimulate participation and decision-making of young researchers and innovators, promoting a culture of inclusiveness and cultural diversity
- Empower Young Researchers and ITC participants through mentoring, leadership roles, and professional development - creating equal opportunities to grow professionally, helping establish a new generation of research leaders with an innovative mindset looking at rural challenges with a holistic approach
- Develop a communication platform to empower rural communities, media, and public policymakers. Provide a source of reliable information and a trusted reference point for rural development strategies integrating traditional knowledge and modern technologies.

# TECHNICAL ANNEX

## 1. S&T EXCELLENCE

### 1.1. SOUNDNESS OF THE CHALLENGE

#### 1.1.1. DESCRIPTION OF THE STATE OF THE ART

Recent military conflict in Ukraine has exposed critical vulnerabilities in European rural food systems and highlighted the urgent need for building rural resilience. A recent assessment by Ferreira and Critelli (2023) of Moldova - one of Europe's poorest nations - illustrates common challenges faced by rural areas: while agriculture generates 18% of GDP and over 50% of exports, the country struggles with limited infrastructure, low agricultural productivity, and food insecurity among vulnerable populations. The European Commission's Long-Term Vision for Rural Areas (2021) emphasises the need to support such regions in building stronger, connected and resilient rural communities through improved access to services, infrastructure and economic opportunities.

Rural areas in Europe are facing multiple interconnected challenges that threaten their sustainability and resilience. These include:

**Demographic changes:** Many rural regions are experiencing depopulation, particularly of young people, leading to an ageing population and reduced workforce. Eurostat data shows that 28% of the rural population in the EU is over 65, compared to 21% in urban areas. In 2022, the NEET (Not in Employment, Education, or Training) rate for young women in rural areas was 14.9%, compared to 10.5% for young men, highlighting significant gender disparities in youth employment opportunities.

**Economic stagnation:** Rural economies often lack diversification and rely heavily on traditional sectors like agriculture. According to the European Commission, GDP per capita in rural regions is only 70% of the EU average.

**Digital divide:** Despite progress, rural areas still lag in digital infrastructure and skills. The European Court of Auditors reports that only 59% of rural households had access to fast broadband in 2019, compared to 85% EU-wide.

**Climate change impacts:** Rural areas are particularly vulnerable to climate-related risks. The European Environment Agency estimates that climate change could reduce agricultural income by up to 16% in some regions by 2050.

**Loss of traditional knowledge:** Urbanisation and modernization have led to a decline in traditional practices and knowledge that have historically contributed to rural resilience.

Current approaches to rural development often focus on singular aspects of these challenges, such as improving digital connectivity or promoting sustainable agriculture. However, there is growing recognition of the need for integrated approaches that combine traditional knowledge with modern innovations.

Recent initiatives like the EU's Long-term Vision for Rural Areas (2021) emphasise the importance of smart villages, which leverage digital technologies to improve services and quality of life. Projects such as the Horizon 2020-funded DESIRA (Digitisation: Economic and Social Impacts in Rural Areas) are exploring the potential of digitalization in rural contexts. Additionally, the European Commission's Common Agricultural Policy (CAP) includes initiatives aimed at promoting smart villages and enhancing digital connectivity in rural areas, with a budget of €95.5 billion allocated for rural development from 2021 to 2027.

In terms of preserving and leveraging traditional knowledge, UNESCO's LINKS (Local and Indigenous Knowledge Systems) programme has been working to bridge traditional and scientific knowledge for sustainable development. However, the integration of such knowledge with modern technologies in rural development strategies remains limited.

The Green Transition has become an even more urgent challenge for rural areas, particularly in the wake of recent geopolitical and environmental crises. The war in Ukraine has underscored the energy dependency of many European countries on Russian fossil fuels, exposing vulnerabilities in energy security across the continent. This situation has triggered a critical need for accelerated investments in

renewable energy and energy efficiency in rural areas.

At the same time, climate change continues to exacerbate existing vulnerabilities, with rising temperatures and extreme weather events affecting agricultural productivity, water availability, and ecosystems across rural regions. Countries with significant rural populations dependent on agriculture are particularly susceptible to climate-induced shocks.

This convergence of environmental and geopolitical pressures highlights the need for a holistic approach to rural development that not only addresses immediate challenges but also builds long-term resilience. Such an approach must integrate traditional knowledge systems with modern technologies, promote sustainable resource management, and foster economic diversification in rural areas.

The SMART-RURAL Action aims to address these challenges by developing and implementing an integrated framework for enhancing rural community resilience. By synergizing traditional knowledge with modern technologies, the project seeks to create sustainable development pathways for rural areas across Europe.

### 1.1.2. DESCRIPTION OF THE CHALLENGE (MAIN AIM)

The main aim of SMART-RURAL is to develop and implement an integrated framework for enhancing rural community resilience by synergizing traditional knowledge with modern technologies across Europe. This Action addresses a critical gap in current approaches to rural development, which often focus on singular aspects of challenges rather than adopting a holistic perspective.

The SMART-RURAL Action will address the following key challenges and implement corresponding solutions:

**1. How can traditional knowledge be effectively documented, validated, and integrated with modern scientific approaches to enhance rural resilience?** To address this, SMART-RURAL will develop a comprehensive methodology for documenting and assessing rural community resilience. This methodology will incorporate both traditional knowledge indicators and modern scientific metrics, creating a robust framework for validating and integrating diverse forms of knowledge. By bridging the gap between traditional wisdom and contemporary science, we will enhance our understanding and measurement of resilience in rural contexts.

**2. What are the most appropriate technological innovations for rural areas, and how can they be implemented in ways that respect and enhance local cultural practices?** SMART-RURAL will tackle this challenge by conducting a thorough identification and evaluation of technological innovations specifically suited to rural areas. We will focus on solutions that complement and enhance traditional practices in key sectors such as agriculture, resource management, and community services. Our approach will ensure that technological advancements are not only effective but also culturally appropriate, respecting and enhancing local practices rather than replacing them.

**3. How can digital technologies be leveraged to preserve and disseminate traditional knowledge while also improving rural services and economic opportunities?** To leverage digital technologies effectively, SMART-RURAL will create a comprehensive typology of traditional knowledge relevant to rural resilience across different European contexts. This typology will serve as the foundation for developing digital platforms that not only preserve and disseminate traditional knowledge but also integrate it with modern rural services and economic initiatives. By facilitating cross-cultural learning and adaptation, we will ensure that digital technologies become a bridge between preserving heritage and fostering development.

**4. What governance models and policy frameworks are needed to support the integration of traditional and modern approaches in rural development?** SMART-RURAL will address this challenge by designing and piloting integrated strategies that combine traditional knowledge with modern technologies in selected rural communities across Europe. These real-world pilot projects will serve as living laboratories, informing the development of effective governance models and policy frameworks. By testing various approaches in diverse contexts, we will identify governance structures and policies that successfully support the integration of traditional and modern approaches in rural development.

**5. Challenge: How can we ensure that rural communities, especially marginalised groups, are active participants in the design and implementation of resilience strategies?** To ensure inclusive participation, SMART-RURAL will establish a pan-European network of researchers, practitioners, policymakers, and most importantly, rural community members. This network will facilitate knowledge exchange and best practice sharing, with a specific focus on empowering marginalised groups. By

prioritising the voices of rural communities in this network, we will ensure that they play a central role in shaping resilience strategies, from design through to implementation.

This Action is timely and crucial as it addresses the urgent need for more resilient rural communities in the face of demographic changes, economic stagnation, digital divides, and climate change impacts. By bringing together experts from diverse fields and fostering collaboration between countries with varying levels of rural development, SMART-RURAL aims to create a more cohesive and effective approach to enhancing rural resilience across Europe.

The outcomes of this Action will provide policymakers, practitioners, and rural communities with evidence-based strategies for integrating traditional knowledge and modern technologies in rural development. This will contribute to more sustainable, resilient, and culturally sensitive rural areas, ultimately supporting the broader goals of the European Green Deal and ensuring the long-term vitality of rural Europe.

## 1.2. PROGRESS BEYOND THE STATE OF THE ART

### 1.2.1. APPROACH TO THE CHALLENGE AND PROGRESS BEYOND THE STATE OF THE ART

SMART-RURAL will address the complex challenges facing rural communities through an integrated, multidisciplinary approach that bridges the gap between traditional knowledge and modern technologies. This approach will be implemented through four interconnected Working Groups (WGs):

1. **WG1:** Traditional Knowledge Systems and Rural Resilience
2. **WG2:** Technological Innovation for Rural Development
3. **WG3:** Integrated Resilience Assessment and Monitoring
4. **WG4:** Knowledge Dissemination and Capacity Building

The Action's primary strategy is to build a robust network of researchers, practitioners, policymakers, and rural community representatives who can collectively address the multifaceted challenges of rural resilience. This network will serve as a platform for exchanging knowledge, resources, and best practices, facilitating the development of innovative solutions tailored to specific rural contexts.

A key component of this approach is to empower rural communities by providing them with the necessary tools and knowledge to adopt and implement appropriate technologies while preserving valuable traditional practices. This will involve the development of targeted training programs, workshops, and pilot projects that offer both technical and strategic insights, ensuring that participants have the skills to translate theoretical concepts into practical actions.

The Action will also focus on capacity building through continuous education and training, designed to adapt to the evolving landscape of rural challenges and technological advancement. By bridging the gap between research and practical application, SMART-RURAL will ensure that innovative strategies can be effectively integrated into rural development, thus driving sustainable growth and resilience.

SMART-RURAL aims to move beyond traditional approaches to rural development by addressing key gaps that have hindered the widespread adoption of integrated resilience strategies. The Action will advance the current state-of-the-art in several key areas:

1. **Holistic Resilience Framework:** Develop a comprehensive framework for assessing and enhancing rural resilience that integrates traditional knowledge indicators with modern resilience metrics. This goes beyond existing models by providing a more nuanced and culturally sensitive approach to understanding and building rural resilience.
2. **Co-creation of Innovative Solutions:** Facilitate the co-design of rural development strategies that synergize traditional practices with cutting-edge technologies. This approach advances current practices by ensuring that technological innovations are not only effective but also culturally appropriate and enhance rather than replace valuable traditional knowledge.
3. **Cross-cultural Knowledge Exchange:** Establish a pan-European network for sharing best practices in integrating traditional and modern approaches to rural resilience. This network will enable the identification and transfer of successful strategies across diverse rural contexts, addressing the current

lack of coordinated knowledge sharing in this field.

**4. Transdisciplinary Research Model:** Implement a research approach that brings together experts from social sciences, natural sciences, engineering, and humanities to address rural challenges. This interdisciplinary collaboration will foster innovative, holistic solutions that go beyond the current disciplinary boundaries often seen in rural studies.

**5. Participatory Technology Assessment:** Develop methodologies for evaluating the impact of technological innovations on rural communities that incorporate both scientific metrics and community perspectives. This advances current assessment practices by ensuring that technology adoption enhances rather than undermines local resilience and cultural values.

By integrating these innovative approaches, SMART-RURAL will create a more comprehensive and effective framework for enhancing rural resilience across Europe, addressing the limitations of current sector-specific or technology-driven approaches to rural development.

## 1.2.2. OBJECTIVES

### 1.2.2.1. Research Coordination Objectives

The SMART-RURAL Action will create research opportunities by distributing tasks, sharing knowledge and know-how, and creating synergies among Action Participants to achieve specific outputs with the following Research Coordination Objectives:

**RO1:** Develop a comprehensive framework for rural resilience through a collaborative State-of-the-Art Report, integrating traditional knowledge and modern approaches. This will be achieved by conducting a comprehensive literature review and stakeholder analysis to identify current practices, challenges, and opportunities in rural development across Europe. Additionally, we will develop a typology of rural communities based on their resilience challenges and potential for integrating traditional and modern approaches.

**RO2:** Create a centralised online platform that facilitates the collection, sharing, and analysis of data on traditional knowledge systems and innovative technologies in rural contexts. This objective involves creating an inventory of traditional knowledge systems relevant to rural resilience in different European contexts, assessing the potential of emerging technologies (e.g., IoT, AI, blockchain) to complement and enhance traditional practices in key areas such as agriculture, natural resource management, and rural services, and establishing a methodology for collecting and analysing data on the impact of integrated solutions on rural communities.

**RO3:** Promote integrated approaches to rural resilience by producing a Best Practices Handbook and policy recommendations. To accomplish this, we will create an integrated framework for assessing rural community resilience that incorporates both traditional knowledge indicators and modern resilience metrics. Furthermore, we will develop a set of best practice guidelines and policy recommendations for implementing integrated approaches to rural resilience, tailored to different European rural contexts.

**RO4:** Assess and validate the effectiveness of integrated strategies for rural resilience by designing and implementing pilot projects. This will involve designing and pilot testing of at least five innovative strategies that synergize traditional practices with modern technologies in selected rural communities. We will also establish a pan-European online platform of case studies showcasing successful integration of traditional knowledge and modern technologies in enhancing rural resilience.

**RO5:** Engage stakeholders in strategy development by implementing participatory research approaches and analysing existing governance frameworks. This objective will be met by analysing existing policy and governance frameworks at local, national, and EU levels to identify barriers and enablers for the integration of traditional knowledge and modern technologies in rural development strategies. Additionally, we will develop and implement a participatory action research approach to engage rural stakeholders - including farmers, women, and youth - in the co-creation and evaluation of integrated resilience strategies.

### 1.2.2.2. Capacity-building Objectives

**CO1:** Bridge separate fields of science and technology to create a strong talent pool, providing knowledge across the rural development value chain, and entrepreneurial approaches towards novel solutions in sustainable rural communities. This will be achieved by establishing a multidisciplinary network of researchers, practitioners, and policymakers from at least 10 European countries, of which

at least 5 will be Inclusiveness Target Countries (ITCs). Additionally, we will organise 4 interdisciplinary training schools focusing on integrating traditional knowledge with modern technologies for rural resilience.

**CO2:** Foster and coordinate short-term scientific missions, collaborations between academia and rural practitioners, exchanges and training schools to harmonise practices towards the research coordination objectives of the action. To accomplish this, we will facilitate at least 20 Short-Term Scientific Missions (STSMs) over the duration of the Action. Furthermore, we will develop partnerships with at least 10 rural communities - prioritising small size, low broad band coverage, and high climate vulnerability - to serve as living labs for co-creation and testing of integrated resilience strategies.

**CO3:** Create goal-oriented workshops and conferences in Inclusiveness Target Countries and Near Neighbour Countries, to enhance capacity and stimulate participation and decision-making of young researchers and innovators, promoting a culture of inclusiveness and cultural diversity. This objective will be met by organising annual workshops in different European regions, with at least 50% held in ITCs and NNCs. We will also establish a Young Researchers Forum within the Action to provide leadership opportunities for YRIs.

**CO4:** Give management responsibility to YRIs and Inclusiveness Target Country researchers, creating equal opportunities to grow professionally, helping establish a new generation of research leaders with an innovative mindset looking at rural challenges with a holistic approach. Promote gender balance and inclusiveness. This will involve implementing a mentoring program pairing senior researchers with YRIs, establishing at least 15 mentoring relationships. We will ensure at least 40% of leadership positions within the Action are held by YRIs and researchers from ITCs, and strive for gender balance in all Action activities and leadership roles, aiming for at least 40% representation of each gender.

**CO5:** Develop a communication platform to empower rural communities, media, and public policymakers. Provide a source of reliable information and a trusted reference point for rural development strategies integrating traditional knowledge and modern technologies. To achieve this, we will create an online knowledge hub serving as a repository for research outputs, training materials, and best practice guidelines. We will also produce a series of practice guides tailored to different stakeholder groups and implement a 'Train the Trainer' program to build capacity among local rural development practitioners in applying integrated approaches to resilience.

## 2. NETWORKING EXCELLENCE

### 2.1. ADDED VALUE OF NETWORKING IN S&T EXCELLENCE

#### 2.1.1. ADDED VALUE IN RELATION TO EXISTING EFFORTS AT EUROPEAN AND/OR INTERNATIONAL LEVEL

The SMART-RURAL Action offers significant added value in relation to existing European and international efforts by addressing critical gaps in rural development initiatives. While many programs aim to enhance rural areas, SMART-RURAL distinguishes itself through its emphasis on integrating traditional knowledge with modern technologies to build rural resilience. This unique approach focuses on leveraging local expertise alongside cutting-edge innovations to ensure sustainable development across diverse rural contexts, including those in less represented and more vulnerable regions.

SMART-RURAL is complementary to the European Network for Rural Development (ENRD), which focuses on implementing rural development programs. This COST Action contributes by building a collaborative platform where stakeholders from different European countries can exchange best practices, develop integrated approaches, and test innovative solutions that combine traditional wisdom with technological advancements. By providing a space for continuous dialogue and practical knowledge sharing, it enhances the broader objectives of rural development initiatives, ensuring that insights and methods are adapted to regional specificities, thereby promoting uniform progress across Europe.

Furthermore, SMART-RURAL aligns with the goals of the Smart Villages Initiative, expanding on this concept by explicitly incorporating traditional knowledge alongside digital innovations. While the Smart Villages Initiative addresses the need for digitalization in rural areas, SMART-RURAL's focus on integrating traditional practices offers a more holistic approach that respects and enhances local cultural heritage. This collaboration not only supports the deployment of appropriate technologies but also ensures that knowledge and skills are preserved and adapted, enabling sustainable practices to be deeply embedded within rural communities.

Ultimately, the value of SMART-RURAL lies in its capacity to act as a bridge between top-down European policies and on-the-ground implementation in rural areas. By integrating efforts across borders and fostering innovation through inclusive networks, it ensures that existing European and global measures for rural development are more effectively realised. The Action addresses the need for a coordinated approach to enhancing rural resilience, offering a comprehensive solution that makes sustainable practices and technologies accessible to all participating regions. This ensures that rural development is not only technologically advanced but also socially inclusive and culturally sensitive, thus reinforcing the broader aims of European rural and regional development policies.

## 2.2. ADDED VALUE OF NETWORKING IN IMPACT

### 2.2.1. SECURING THE CRITICAL MASS, EXPERTISE AND GEOGRAPHICAL BALANCE WITHIN THE COST MEMBERS AND BEYOND

The SMART-RURAL Action will bring together a critical mass of researchers, practitioners, policymakers and rural community representatives from across Europe to address the challenge of enhancing rural community resilience through the integration of traditional knowledge and modern technologies. At the proposal stage, the network includes participants from over 10 European countries, with a balanced representation of researchers from different disciplines (e.g. rural sociology, agricultural sciences, information and communication technologies, environmental sciences), practitioners (e.g. rural development agencies, agricultural extension services), policymakers at local, regional and national levels, and representatives of rural communities and organisations.

This diverse network provides the multidisciplinary expertise needed to tackle the complex challenges of rural development. Key areas of expertise include:

- Traditional ecological knowledge and agricultural practices
- Digital technologies for rural areas (e.g. precision agriculture, smart villages)
- Rural sociology and community development
- Environmental management and climate change adaptation
- Agricultural economics and rural entrepreneurship
- Rural policy and governance

The network has a strong representation of researchers and stakeholders from Inclusiveness Target Countries (>75% of participating countries), ensuring that the specific challenges and opportunities of less research-intensive regions are addressed. There is also a good balance between experienced researchers and young researchers and innovators (>25% YRI), fostering knowledge transfer while bringing in new perspectives.

As the Action progresses, the network will continue to expand strategically to fill any gaps in expertise and to increase stakeholder involvement. Particular emphasis will be placed on engaging more rural community representatives, local policymakers, and industry partners to strengthen the practical impact of the Action.

### 2.2.2. INVOLVEMENT OF STAKEHOLDERS

The SMART-RURAL Action recognizes the critical importance of engaging a diverse range of stakeholders to effectively address the complex challenges of rural resilience. Our comprehensive stakeholder engagement strategy aims to ensure meaningful participation and collaboration across multiple sectors and levels of expertise.

Rural communities and local organisations form the cornerstone of our stakeholder network. Rather than being viewed merely as research subjects, these groups will be actively involved as full participants in the Action. Their invaluable local knowledge and perspectives will be integrated into Working Group activities, training schools, and the co-creation of innovative solutions through pilot projects. This approach ensures that the Action's outcomes are grounded in real-world rural contexts and needs.

Rural development practitioners, including extension services, development agencies, and NGOs, will play a crucial role in bridging the gap between research and practical implementation. These stakeholders will be key partners in knowledge exchange activities and will contribute to the

implementation and evaluation of novel approaches developed within the Action. Their involvement ensures that research outputs are translated into actionable strategies for rural development.

Industry partners, particularly those in sectors crucial to rural development such as agri-tech, telecommunications, and rural enterprises, will be engaged through targeted initiatives. These will include dedicated industry workshops, collaborative pilot projects, and opportunities to contribute expertise to training activities. By involving industry stakeholders, the Action aims to foster innovation and ensure that developed solutions are economically viable and technologically feasible.

To broaden the Action's impact and align it with global rural development efforts, partnerships will be sought with relevant international organisations such as the FAO and OECD. These collaborations will provide valuable insights into global best practices and help disseminate the Action's findings to a wider audience.

To facilitate effective stakeholder engagement, SMART-RURAL will implement several key mechanisms:

1. A Stakeholder Advisory Board will be established, comprising representatives from each key stakeholder group. This board will provide strategic guidance to ensure the Action remains aligned with stakeholder needs and priorities.
2. Short Term Scientific Missions (STSMs) will be specifically allocated for stakeholder exchanges, fostering knowledge transfer between academic and non-academic partners.
3. Stakeholder participation will be ensured in all major events and training activities, promoting continuous dialogue and collaborative learning.
4. Tailored communication materials will be developed for different stakeholder groups, ensuring that information is accessible and relevant to each audience.
5. Co-creation opportunities and participatory research approaches will be prioritised, allowing stakeholders to actively shape the direction and outcomes of the Action.

Through this comprehensive approach to stakeholder involvement, SMART-RURAL aims to create a truly collaborative and impactful network that addresses rural resilience challenges from multiple perspectives, ensuring that developed solutions are both innovative and practically applicable in diverse rural contexts across Europe.

### 3. IMPACT

#### 3.1. IMPACT TO SCIENCE, SOCIETY AND COMPETITIVENESS, AND POTENTIAL FOR INNOVATION/BREAKTHROUGHS

##### 3.1.1. SCIENTIFIC, TECHNOLOGICAL, AND/OR SOCIOECONOMIC IMPACTS (INCLUDING POTENTIAL INNOVATIONS AND/OR BREAKTHROUGHS)

The SMART-RURAL Action aims to contribute to scientific, technological, and socioeconomic advances in rural development across Europe and beyond. From a scientific perspective, the Action will explore frameworks for rural resilience assessment that could integrate social-ecological systems theory, traditional knowledge systems, and digital innovation paradigms. This research could provide valuable insights for researchers and policymakers in evaluating rural community adaptability. Through interdisciplinary methodologies, the Action will examine ways to bridge traditional practices with modern approaches in rural studies. A key objective will be to investigate the feasibility of developing a pan-European online platform cataloguing traditional knowledge and practices relevant to rural resilience, which could serve as a foundation for future research and policy development.

Regarding technological considerations, SMART-RURAL will analyse potential digital approaches for documenting and preserving traditional knowledge crucial to rural resilience. The Action will explore how time-honoured agricultural practices might be considered alongside emerging precision farming and smart agriculture technologies, with the goal of understanding how to optimise resource utilisation while preserving local knowledge systems. The network will also examine various ICT solutions that could help bridge the digital divide while respecting local cultural norms, investigating ways rural communities might harness modern technologies while maintaining their cultural identity.

The socioeconomic focus of SMART-RURAL will centre on understanding how integrated strategies combining traditional wisdom with modern approaches might enhance rural communities' resilience to

economic, environmental, and social challenges. The Action will study potential pathways for improving economic viability of rural areas through knowledge-based approaches that could create new employment opportunities and foster economic diversification. Additionally, by examining the relationship between traditional knowledge and modern innovations, the Action will explore methods for strengthening social cohesion and bridging generational gaps in rural regions.

Several potential innovations could emerge from this collaborative network. These might include the conceptual framework for a "Rural Resilience Index" that could help assess rural communities' adaptive capacity, explorations of "Smart Traditional Agriculture" approaches that could suggest new paradigms for sustainable food production, and investigations into how digital platforms might help preserve traditional rural knowledge for future generations.

Through this comprehensive research approach, SMART-RURAL seeks to contribute to our understanding of rural development practices, potentially supporting the development of more resilient, sustainable, and culturally rich rural communities across Europe and beyond.

## 3.2. MEASURES TO MAXIMISE IMPACT

### 3.2.1. KNOWLEDGE CREATION, TRANSFER OF KNOWLEDGE AND CAREER DEVELOPMENT

The SMART-RURAL Action is committed to fostering knowledge creation, facilitating knowledge transfer, and supporting career development, particularly for young researchers and innovators (YRI). These efforts are essential for ensuring that the insights gained through the Action have a lasting impact on rural development practices and policies across Europe.

Knowledge creation will be at the heart of SMART-RURAL's activities, with a focus on initiating cross-country, interdisciplinary research projects that address key challenges identified in the Action's research agenda. These collaborative efforts will bring together expertise from various fields, fostering innovative approaches to integrating traditional knowledge with modern technologies in rural contexts. To support this research, the Action will organise methodological workshops aimed at developing and refining research methodologies specifically tailored to studying the intersection of traditional and modern approaches in rural development. Additionally, SMART-RURAL will create a comprehensive, searchable online platform of case studies showcasing successful examples of integrating traditional knowledge and modern technologies to enhance rural resilience. This platform will serve as a valuable resource for researchers, policymakers, and practitioners alike.

Knowledge transfer is a crucial component of SMART-RURAL's strategy to maximise its impact. The Action will organise annual training schools covering topics such as "Documenting Traditional Knowledge," "Digital Tools for Rural Development," and "Integrating Traditional and Modern Approaches in Rural Policy." These training schools will provide participants with hands-on experience and expert insights into cutting-edge approaches in rural development. To facilitate direct knowledge exchange between researchers, SMART-RURAL will prioritise Short-Term Scientific Missions (STSMs) that bridge disciplines and connect researchers from different regions. These missions will enable participants to gain firsthand experience of diverse rural contexts and innovative practices across Europe. Furthermore, the Action will develop and disseminate best practice guides for practitioners, offering practical guidance on implementing integrated traditional-modern approaches in rural development.

Career development, particularly for young researchers and innovators (YRI), is a key priority for SMART-RURAL. The Action will establish a dedicated YRI network to foster collaboration and provide targeted support to young researchers in the field of rural development. A comprehensive mentoring program will be implemented, pairing YRIs with experienced researchers to support their career growth and professional development. To ensure that YRIs gain valuable leadership experience, they will be given prominent roles within Working Groups and in organising Action activities. SMART-RURAL will also offer a series of skills workshops tailored to rural development researchers, covering essential transferable skills such as grant writing, project management, and science communication. Recognizing the importance of industry connections for career advancement, the Action will facilitate interactions between YRIs and relevant industry partners, broadening career perspectives and creating potential opportunities for future collaboration.

Through these interconnected efforts in knowledge creation, transfer, and career development, SMART-

RURAL aims to build a robust and sustainable network of expertise in rural resilience, ensuring that the insights and innovations generated by the Action continue to influence rural development practices and policies well beyond its formal duration.

### 3.2.2. PLAN FOR DISSEMINATION AND/OR EXPLOITATION AND DIALOGUE WITH THE GENERAL PUBLIC OR POLICY

The SMART-RURAL Action recognizes the critical importance of effective dissemination, exploitation, and public engagement to maximise its impact and ensure that its findings reach a wide audience of stakeholders, policymakers, and the general public. To this end, the Action has developed a comprehensive strategy encompassing diverse channels and approaches.

**Dissemination Strategy:** The Action's dissemination strategy is designed to ensure wide accessibility and visibility of its outputs. At the core of this strategy is a commitment to open access publishing, ensuring that all scientific publications resulting from the Action are freely available to researchers and practitioners worldwide. To serve as a central hub for project information, resources, and outputs, SMART-RURAL will develop and maintain a comprehensive website. This digital platform will be complemented by an active social media presence across platforms such as Twitter, LinkedIn, and ResearchGate, enabling real-time engagement with a diverse audience and facilitating the rapid dissemination of updates and findings.

To keep stakeholders regularly informed, the Action will distribute a quarterly newsletter highlighting key activities, research findings, and upcoming opportunities. The dissemination of SMART-RURAL's work will extend to the academic community through presentations at relevant scientific conferences and the organisation of dedicated SMART-RURAL symposia. Additionally, a regular webinar series will be hosted, showcasing research findings and innovative practices to a global audience, thereby extending the Action's reach beyond geographical boundaries.

**Exploitation Plan:** SMART-RURAL's exploitation plan is focused on translating research outcomes into practical applications and policy recommendations. A crucial first step in this process is the development of a clear Intellectual Property Rights (IPR) strategy, which will provide guidelines for managing IPR arising from Action activities, striking a balance between open science principles and the potential for innovation.

To bridge the gap between research and application, the Action will organise innovation workshops that bring together researchers, rural entrepreneurs, and industry partners. These workshops will serve as incubators for identifying commercialization opportunities and fostering collaborations. For researchers interested in translating their work into entrepreneurial ventures, SMART-RURAL will provide startup support through guidance and networking opportunities.

Recognizing the importance of policy impact, the Action will develop practical implementation toolkits designed to support policymakers and practitioners in translating the Action's recommendations into concrete measures and initiatives.

**Dialogue with the General Public:** Engaging the general public, particularly rural communities, is a key priority for SMART-RURAL. The Action will organise local forums in partner rural communities, creating spaces for direct dialogue where findings can be shared and feedback gathered from rural residents. To reach broader audiences, SMART-RURAL will participate in science festivals and public events, showcasing the importance of rural resilience and the role of research in supporting rural communities.

Media engagement will form another crucial aspect of public outreach. The Action will cultivate relationships with journalists and media outlets specialising in rural affairs, providing regular updates and expert commentary to ensure that SMART-RURAL's work receives wide coverage.

To foster long-term understanding and engagement with rural resilience issues, the Action will create educational materials tailored for schools and adult education programs in rural areas. These resources will help to build awareness and capacity at the grassroots level.

Finally, SMART-RURAL will launch citizen science initiatives that actively engage rural residents in data collection and analysis related to local resilience strategies. This participatory approach will not only generate valuable data but also empower communities to take an active role in understanding and enhancing their own resilience.

Through this multifaceted approach to dissemination, exploitation, and public engagement, SMART-RURAL aims to ensure that its findings and innovations have a lasting impact on rural development

practices, policies, and public understanding across Europe.

## 4. IMPLEMENTATION

### 4.1. COHERENCE AND EFFECTIVENESS OF THE WORK PLAN

#### 4.1.1. DESCRIPTION OF WORKING GROUPS, TASKS AND ACTIVITIES

**WG1: Traditional Knowledge Systems and Rural Resilience**

Objective: Document, analyse, and assess the role of traditional knowledge systems in enhancing rural community resilience.

Tasks:

1. Develop a standardised methodology for documenting traditional knowledge relevant to rural resilience
2. Develop a pan-European online platform of traditional practices contributing to rural resilience
3. Analyse the effectiveness of traditional knowledge systems in addressing contemporary rural challenges
4. Identify factors influencing the preservation and transmission of traditional knowledge in rural communities
5. Establish evaluation criteria for assessing the effectiveness of traditional knowledge integration in contemporary rural contexts
6. Create guidelines for policy implementation regarding traditional knowledge preservation
7. Develop metrics for measuring the impact of traditional practices on rural resilience
8. Design a framework for intergenerational knowledge transfer mechanisms

Activities:

- Organise interactive workshops per year bringing together researchers, traditional knowledge holders, and rural practitioners to develop and refine documentation methodologies
- Coordinate joint publications comparing traditional knowledge systems across different European regions
- Conduct annual training schools on "Traditional Knowledge Documentation and Integration" targeting young researchers and practitioners from ITCs
- Prepare a comprehensive report on the state of traditional knowledge in European rural areas

**WG2: Technological Innovation for Rural Development**

Objective: Assess and advance the application of modern technologies in rural development, with a focus on enhancing resilience.

Tasks:

1. Review state-of-the-art technologies relevant to rural development (e.g., precision agriculture, IoT, renewable energy)
2. Assess the impact of digital technologies on rural economies and social structures
3. Identify barriers to technology adoption in rural areas and strategies to overcome them
4. Develop guidelines for human-centred design of rural technologies
5. Create assessment protocols for measuring technology readiness in rural communities
6. Develop implementation roadmaps for sustainable technology adoption
7. Establish monitoring frameworks for evaluating the socio-economic impact of technological innovations
8. Design pilot projects for testing integrated traditional-technological solutions

Activities:

- Conduct a comprehensive literature review and technology assessment
- Organise expert panels on emerging technologies for rural areas
- Identify case studies of successful technology adoption in rural communities
- Develop a "Rural Technology Readiness Index" to assess community preparedness for technological innovation

**WG3: Integrated Resilience Assessment and Monitoring**

Objective: Develop frameworks for assessing and monitoring rural resilience that integrate traditional

and modern approaches.

Tasks:

1. Review existing resilience assessment frameworks and their applicability to rural contexts
2. Develop an integrated framework for assessing rural community resilience
3. Design indicators that combine traditional and modern measures of resilience
4. Create guidelines for participatory resilience monitoring in rural communities
5. Develop validation protocols for the integrated resilience assessment framework
6. Create standardised reporting templates for resilience monitoring
7. Establish feedback mechanisms for continuous framework improvement
8. Design training materials for implementing the assessment framework

Activities:

- Organise a methodological workshop on resilience assessment in rural contexts
- Conduct pilot studies to test and refine the integrated resilience assessment framework
- Prepare guidelines for implementing participatory resilience assessment in rural communities

#### **WG4: Knowledge Dissemination and Capacity Building**

Objective: Ensure effective dissemination of the Action's findings and build capacity among researchers, practitioners, and rural communities.

Tasks:

1. Develop and implement a comprehensive communication and dissemination strategy
2. Design and deliver training programs for researchers, practitioners, and community leaders
3. Facilitate knowledge exchange between academic, policy, and rural community stakeholders
4. Support the development of educational materials on rural resilience for various audiences
5. Develop impact assessment metrics for training and dissemination activities
6. Create specialised knowledge transfer protocols for different stakeholder groups
7. Establish quality control mechanisms for educational materials and training programs
8. Design sustainability plans for maintaining knowledge sharing platforms beyond the project timeline

Activities:

- Maintain the Action website and social media presence
- Organise annual training schools on key topics related to rural resilience
- Coordinate the production and dissemination of publications, including best practice guides
- Facilitate Short-Term Scientific Missions (STSMs) to promote knowledge exchange

Cross-cutting Activities:

1. Annual Action Conference: Bringing together all WGs to share progress, align activities, and engage with external stakeholders.
2. Integrated Case Studies: Identify 3-5 in-depth case studies involving all WGs to demonstrate the practical application of integrated approaches to rural resilience.
3. Young Research and Innovator (YRI) Forum: Regular meetings and activities specifically designed to support and engage YRIs across all WGs.
4. Stakeholder Advisory Board: Regular consultations with key stakeholders to ensure the relevance and impact of the Action's activities.
5. Inter-WG Task Forces: Establishment of task forces to address cross-cutting themes (e.g., climate change adaptation, digital inclusion) that span multiple WGs.

This structure ensures a comprehensive approach to addressing the challenge of rural resilience, fostering interdisciplinary collaboration, and maximising the impact of the Action's outputs.

#### 4.1.2. DESCRIPTION OF DELIVERABLES AND TIMEFRAME

The SMART-RURAL Action will produce a range of deliverables over its 4-year duration, designed to achieve its objectives and maximise impact. The deliverables are structured according to the Working Groups (WGs) and cross-cutting activities, with a timeline ensuring steady progress and effective dissemination of results.

DESCRIPTION OF DELIVERABLES	WGs involved	Timeframe
D1.1 Standardised methodology for documenting traditional knowledge in rural areas	WG1	M9
D2.1 State-of-the-art report on technological innovations for rural development	WG2	M9
D3.1: Review of existing rural resilience assessment frameworks	WG3	M9
D4.2: Communication and dissemination strategy document	WG4	M12
D1.2 Pan-European online platform of traditional practices contributing to rural resilience (beta version)	WG1	M18
D2.2 Guidelines for human-centred design of rural technologies	WG2	M18
D3.2 Integrated framework for assessing rural community resilience (draft version)	WG3	M21
D4.1: SMART-RURAL website and social media channels launched	WG4	M18
D4.3: First SMART-RURAL training school materials and evaluation report	WG4	M20
D4.4: Interim report on Short-Term Scientific Missions (STSMs)	WG4	M24
D5.1: Report on the 1st Annual Action Conference proceedings	Cross-cutting	M24
D5.2: Selection and initial reports of 3-5 integrated case studies	Cross-cutting	M24
D1.3: Comprehensive report on the state of traditional knowledge in European rural areas	WG1	M30
D2.3: "Rural Technology Readiness Index" methodology and pilot application results	WG2	M33
D4.5: Special issue in a peer-reviewed journal on integrating traditional and modern approaches for rural resilience	WG4	M36
D5.3: Mid-term report on Young Research and Innovator (YRI) activities and outcomes	Cross-cutting	M30
D5.4: Interim synthesis report on cross-WG findings and implications	Cross-cutting	M36
D1.4: Policy recommendations for preserving and leveraging traditional knowledge in rural development	WG1	M42
D2.4: Roadmap for sustainable technology adoption in European rural areas	WG2	M42
D3.3: Final version of the integrated rural resilience assessment framework with user guide	WG3	M45
D4.6: SMART-RURAL handbook on integrating traditional and modern approaches for rural resilience	WG4	M48
D4.7: Final report on communication, dissemination, and training activities	WG4	M48
D5.5: Final reports on integrated case studies	Cross-cutting	M45
D5.6: SMART-RURAL Action final report and future research agenda	Cross-cutting	M48

Additional ongoing deliverables:	
D4.8 - D4.23: Quarterly newsletters	M3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48
D5.7 - D5.10: Annual progress reports	M12, 24, 36, 48

This deliverable structure ensures a steady flow of outputs throughout the Action's duration, with early deliverables focusing on establishing methodologies and baselines, mid-term deliverables presenting initial findings and tools, and final deliverables synthesising results and providing policy recommendations. The mix of academic publications, practical tools, and public-facing outputs ensures that the Action's results reach and impact a wide range of stakeholders.

#### 4.1.3. RISK ANALYSIS AND CONTINGENCY PLANS

The SMART-RURAL Action has identified potential risks that could impact the successful implementation of the work plan. For each risk, we have assessed the probability of occurrence and potential impact, and developed mitigation strategies and contingency plans.

Description	Probability	Risk mitigation and contingency plan
1. Insufficient engagement from rural communities	Medium	To engage rural communities, SMART-RURAL will involve them in planning and execution from the start, prioritising clear benefits of communication and adapting research methods to be minimally disruptive. If engagement continues low, we will increase outreach through local partners, offer small grants, and shift our study focus to higher-engagement areas. This proactive involvement and flexible response will keep community interest and participation high throughout the Action, keeping our research relevant and useful to rural stakeholders. The Action's success depends on strong community relationships, therefore we address any disengagement early and have a solid contingency plan.
2. Limited access to necessary technological infrastructure in rural areas	High	SMART-RURAL will assess technological readiness in target areas early and build low-resource solutions to account for infrastructure constraints. We will work with telecoms and municipal governments to improve infrastructure. In locations with inadequate access, we will develop offline and low-tech digital tools, build capacity for future technology adoption, and allocate resources to areas with sufficient infrastructure while campaigning for changes elsewhere. This multi-faceted approach allows our Action to progress effectively despite technology limits while improving rural digital infrastructure over time. We aim to improve rural technical capabilities by balancing urgent adjustments with connection improvements.
3. Insufficient cross-WG collaboration	Low	SMART-RURAL will establish clear communication standards and hold regular cross-WG meetings and workshops to promote WG collaboration. All WGs will participate in cross-cutting case studies to promote multidisciplinary work. If collaboration challenges occur, we will select integration officers to promote cross-WG activity, realign WG structures to reflect new synergies, and organise a mid-term retreat to improve interdisciplinary collaboration. Our Action's integrated and complete rural resilience approach is maintained by proactive collaboration and responsive measures. By prioritising cross-WG synergies from the start and having means to address collaboration gaps, we maximise innovative, interdisciplinary solutions to challenging rural situations.

4. Delays in deliverable completion	Medium	SMART-RURAL will use a sophisticated project management system with clear milestones and responsibilities, regular progress monitoring, and buffer time for essential deliverables to avoid delays. If delays persist, we will reallocate resources to support WGs in need, change deliverable scope or timelines to meet primary objectives, and hold intensive work sessions or "sprints" to catch up. This combination of preventive and responsive tactics ensures that our Action can retain pace and produce high-quality results despite setbacks. We protect SMART-RURAL's timetable and impact by prioritising adaptability in project management.
5. Insufficient engagement of young researchers and innovators (YRIs)	Low	SMART-RURAL will create YRI roles in each WG, offer mentoring and career development, and fund YRI-led initiatives to boost YRI engagement. We will increase outreach to colleges and research institutions to recruit YRIs, establish more training and support programs, and change the Action structure to give YRIs greater leadership chances if engagement remains low. This combination of organised inclusion and responsive tactics empowers YRIs in the Action. By prioritising YRI engagement and development, we create a new generation of rural development experts and boost SMART-RURAL's innovation and impact.
6. Unexpected external events (e.g., economic crises, pandemics)	Medium	To prepare for unanticipated external occurrences, SMART-RURAL will create flexible work plans, powerful digital collaboration tools and practices, and diversified collaborations. We have contingency budgets, can switch to remote working, and will build alternative research and engagement plans for major disruptions. This comprehensive risk management strategy helps SMART-RURAL retain production and effect despite major external difficulties. In our planning, we prioritise flexibility and resilience to ensure the Action's capacity to provide beneficial results regardless of external factors.

#### 4.1.4. GANTT DIAGRAM

SMART-RURAL Activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Management</b>	[Purple bar]															
MC meetings	[Purple]		[Purple]		[Purple]		[Purple]		[Purple]		[Purple]		[Purple]		[Purple]	
WG meetings	[Purple]		[Purple]		[Purple]		[Purple]		[Purple]		[Purple]		[Purple]		[Purple]	
<b>Dissemination</b>	[Green bar]															
Participation in Conferences/Webinars	min. 1				min. 1				min. 1				min. 1			
Web page and media channels	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]	[Green]
Newsletter			[Green]				[Green]				[Green]				[Green]	
Organisation of Webinars			[Green]				[Green]				[Green]				[Green]	
Mid-term and final conference				[Green]				[Green]				[Green]				[Green]
<b>Research and Education</b>	[Orange bar]															
A1. Workshops			[Yellow]				[Yellow]				[Yellow]				[Yellow]	
A2. Training Schools						[Yellow]								[Yellow]		
A3. STSMs	min. 4				min. 4				min. 4				min. 4			
A4. Scientific publications and research papers	min. 2				min. 2				min. 2				min. 2			
<b>SMART-RURAL Deliverables</b>	[Blue bar]															
D1.1: Documentation methodology (T1.1 in WG1)	[Green]	[Green]	[Green]													
D1.2: Online platform (beta version) (T1.2, T1.8 in WG1)			[Green]	[Green]	[Green]	[Green]										
D1.3: Comprehensive report (T1.3, T1.5, T1.7, T1.8 in WG1)						[Green]	[Green]	[Green]	[Green]	[Green]						

