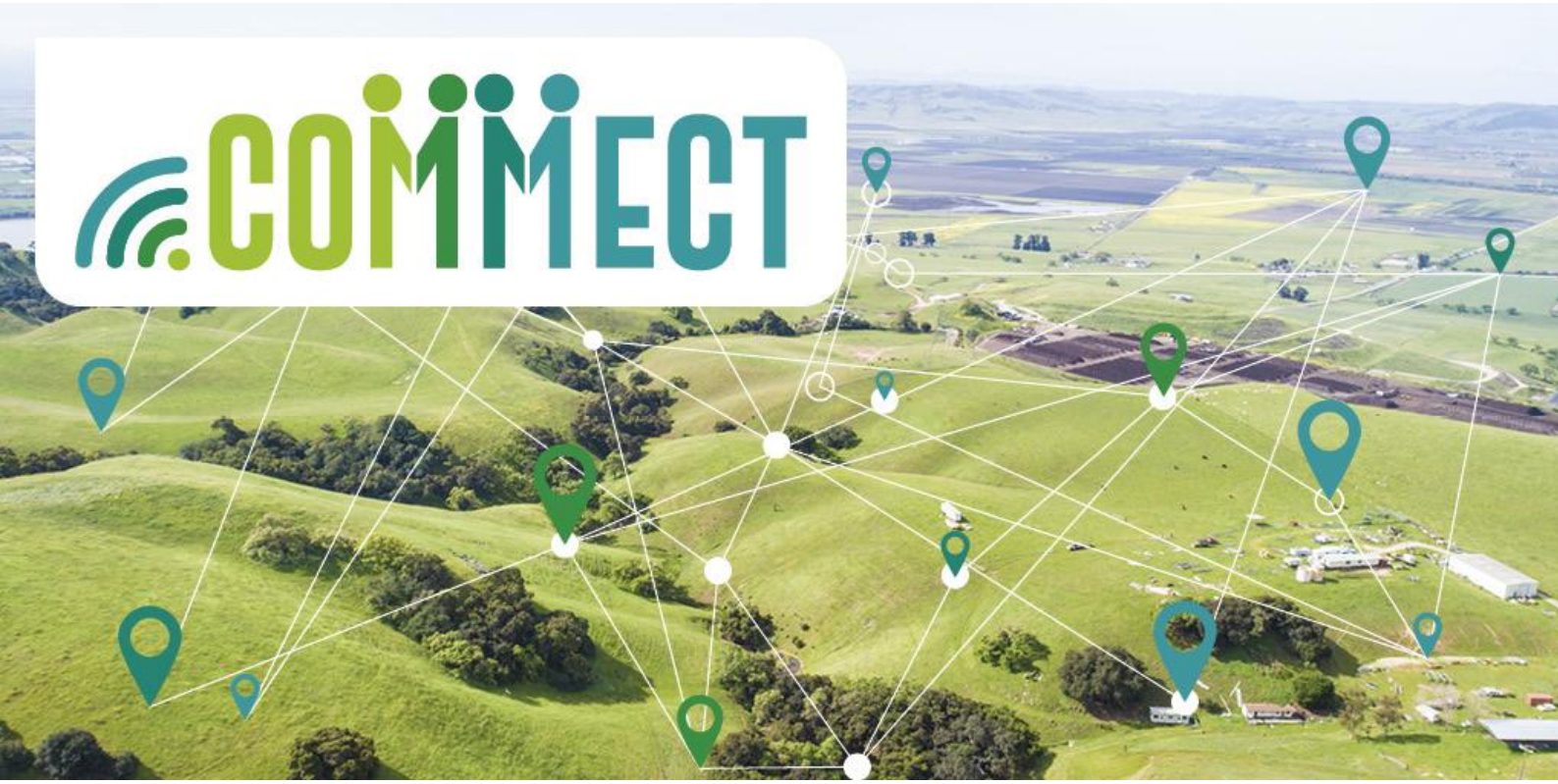
Bridging the digital divide and addressing the need of Rural Communities with Cost-effective and Environmental-Friendly Connectivity Solutions



Deliverable D6.2
Dissemination, Communication and Exploitation Plan

February 2023

PUBLIC

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement no. 101060881.

COMMECT

Bridging the digital divide and addressing the need of Rural Communities with Cost-effective and Environmental-Friendly Connectivity Solutions

Grant agreement No. 101060881

Dissemination, Communication and Exploitation Plan

WP6 Dissemination, Exploitation and Standardisation

Deliverable ID	**D6.2**
Deliverable Name	**Dissemination, Communication and Exploitation Plan**
Lead Partner	INN
Contributors	LIST, SES, TNOR, TCELL, DNET, HWIE, IBLA, KI, HWDU

PUBLIC

COMMECT Project Abstract

Over the last years, the importance and need for broadband and high-speed connectivity has constantly increased. The Covid-19 pandemic has even accelerated this process towards a more connected society. But this holds mainly true for urban communities. In Europe a 13% lack access persists, and mainly concerns the most rural and remote areas. Those are the most challenging to address since they are the least commercially attractive. COMMECT aims at **bridging the digital divide**, by providing quality, reliable, and secure access for all in rural and remote areas. The **goal of extending broadband connectivity in rural and remote areas** will be achieved by *integrating Non-Terrestrial Networks (NTN) with terrestrial cellular XG networks, and low-cost Internet of Things (IoT). Artificial Intelligence (AI), Edge and Network Automation will reduce energy consumption both at connectivity and computing level.*

Participatory approach with end-users and ICT experts working together on development challenges will be the key **for the digitalization of the sector**. To ensure the rich exchange of best-practice and technical knowledge among the actors of the agro-forest value chain, COMMECT will set up **five Living Labs across and outside Europe**, *where end-users "pain" and (connectivity) "gains" will be largely discussed, from different perspectives.*

COMMECT aims at contributing to a balanced territorial development of the EU's rural areas and their communities by making smart agriculture and forest services accessible to all. COMMECT will facilitate that, by developing a **decision-making support tool** able to advise on the best connectivity solution, according to technical, socio-economic, and environmental considerations. This tool, incorporating collaborative business models, will be a *key enabler for jobs, business, and investment in rural areas, as well as for improving the quality of life in areas such as healthcare, education, e-government, among others.*

Document Information

Document Name	Dissemination, Communication and Exploitation Plan
Version No.	R05
Due Date Annex I	28.02.2023
Report Date	28.02.2023
Number of pages	47
Lead Authors	Giuseppe Calignano (INN)
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Dissemination Level	Public

Document History

Version	Date	Description	Authors	Reviewed by
R0.0	15.12.2022	Table of contents	G. Calignano (INN)	M. R. Palattella (LIST)
R0.1	23.01.2023	First draft, with content mainly related to communication and dissemination activities.	G. Calignano (INN)	M. R. Palattella (LIST), P.J. Nesse (TNOR), G. Karagiannis (HWDU), I. Saglam (TCELL), G. Karagiannis (HWDU)
R0.2	03.02.2023	Second draft with enriched content about stakeholder mapping, standardization ad exploitation activities.	G. Calignano (INN), E. Igos (LIST), P.J. Nesse (TNOR), I. Saglam (TCELL), K. McDonnell (HWIE), F. Camacho (HWIE), G. Karagiannis (HWDU)	M. R. Palattella (LIST), E. Igos (LIST), P.J. Nesse (TNOR), I. Saglam (TCELL), K. McDonnell (HWIE), F. Camacho (HWIE), G. Karagiannis (HWDU)
R0.3	10.02.2023	Third draft containing a section on workshops and training events, and a reference list.	G. Calignano (INN), E. Igos (LIST), P.J. Nesse (TNOR), I. Saglam (TCELL), K. McDonnell (HWIE), F. Camacho (HWIE), K. Klemm (IBLA), S. Davidson (KI), G. Karagiannis (HWDU)	M. R. Palattella (LIST), E. Igos (LIST) P.J. Nesse (TNOR), I. Saglam (TCELL), K. McDonnell (HWIE), F. Camacho (HWIE), G. Karagiannis (HWDU)
R0.4	13.02.2023	Complete draft, shared with the internal reviewers	G. Calignano (INN), M. R. Palattella (LIST), E. Igos (LIST), C. Politis (SES), P.J. Nesse (TNOR), I. Saglam (TCELL), S. Krčo (DNET), K. McDonnell (HWIE), F. Camacho (HWIE),	Abdelhakim Cherifi (TNOR) S. Krčo (DNET)

			K. Klemm (IBLA), S. Davidson (KI), G. Karagiannis (HWDU),	
R1.0	28.02.2023	Fifth and final draft addressing the reviewers' comments.	G. Calignano (INN), M. R. Palattella (LIST), E. Igos (LIST)C. Politis (SES), P.J. Nesse (TNOR), I. Saglam (TCELL), S. Krčo (DNET), K. McDonnell (HWIE), F. Camacho (HWIE), K. Klemm (IBLA), S. Davidson (KI), G. Karagiannis (HWDU)	G. Calignano (INN), M.R. Palattella (LIST)

Document Approval

Version	Name	Role in the Project	Beneficiary	Date
1.4	M.R. Palattella	Project Coordinator	LIST	28.02.2023

Executive Summary

This deliverable describes the dissemination, communication, exploitation, and standardization activities planned in the context of the COMMECT project funded under the Horizon Europe (HE) programme.

The deliverable is organized in six sections focusing on the different elements and procedures allowing the COMMECT Consortium to achieve the objective of an integrated and effective communication and dissemination strategy.

The deliverable outlines how communication activities take place within the Consortium, which actions are carried out and what tools are used to disseminate the main results of the project quickly and effectively to targeted audiences (from academics and policymakers to the general public).

The deliverable provides an overview of the main actors and stakeholders involved in the project and describes how they are engaged through specific events and training sessions.

Exploiting the project results and pushing them towards standardization are critical elements in determining the success of the COMMECT project. As such the deliverable describes the strategies and related practical steps carried out to achieve the consortium exploitation and standardization plans.

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Glossary of Terms

DST	Decision-Making Support Tool
EC	European Commission
HE	Horizon Europe
LL	Living Lab
WP	Work Package
IoT	Internet of Things
AI	Artificial Intelligence
NB-IoT	Narrowband Internet of Things
eMTC	Enhanced Machine-Type Communication
SDOs	Standards Development Organizations
OSS	Open Source Software
LoRa	Long Range
LoRaWAN	Long Range Wide Area Network
IETF	Internet Engineering Task Force
LPWAN WG	Low Power Wide Area Working Group
NTN	Non-terrestrial Networks
3GPP	3rd Generation Partnership Project
SA	Standalone
NSA	Non-Standalone
NoW	Network on Wheels
ZSM	Zero Touch N etwork & Service Management
ETSI	European Telecommunications Standards Institute
NGMN	Next Generation Mobile Networks Alliance
6G-IA	6G Smart Networks and Services Industry Association
AIOTI	Alliance for the Internet of Things Innovation
UMTS	Universal Mobile Telecommunications System

LTE-MTC	Long-Term Evolution Machine Type Communication
Rel	Release
API	Application Programming Interface
LCA	Life Cycle Assessment
ISO	International Organization for Standardization
PEF	Product Environmental Footprint
OEF	Organization Environmental Footprint
GHG	Greenhouse Gas

1 Dissemination, Communication and Exploitation Plan

Communication, dissemination, and exploitation activities are organized and executed in a single work package (WP6) for effective coordination and cohesion. However, all communication, dissemination, and exploitation activities, are conducted in collaboration with the other WPs - both internally, inside the Consortium (to optimize the information flow), and externally of the Consortium (to maximize the impact). At the time of the plan preparation, different stakeholder groups and the corresponding types of activities have been identified to effectively convey desired messages. This includes managing several communication channels; fostering exchanges with related associations, organisations, and projects; preparing dissemination material, but also organizing workshops and meetings to engage with end-users and key stakeholders.

A detailed '*Dissemination, Communication and Exploitation Plan*' has been prepared during the first 6 months of the project, in parallel with the preparation of the main communication assets like the project web page, an overview project presentation, social media accounts, etc. In this initial phase, the key stakeholders and audiences have been better identified, a dynamic schedule of activities agreed, to effectively disseminate the main applicable and scientific results.

A unique and recognizable visual identity connected to the COMMECT project has been designed. Constant exchanges with target audiences will be ensured through intense dissemination activities such as scientific reports and publications, newspaper and magazine articles, workshops and conferences, social media campaigns. This strategy enables up-to-date and fruitful communications within and outside the Consortium.

As the results of the project activities within the 5 Living Labs (LLs) become available, dissemination and communication efforts will be conducted in parallel with ongoing exploitation activities.

A series of workshops will be organized to ensure continuous exchange between the project partners, technical experts, target end-users, and stakeholders. Workshops in each targeted LL have been organized during the first four months of the project to identify the needs of the end-users and introduce project's objectives to the targeted communities.

As the project progresses, additional workshops will be used to demonstrate the achieved outcomes, obtain feedback from the stakeholders as well as to raise awareness of the proposed solutions, eventually leading to more widespread acceptance of digitalization in rural communities. These workshops will specifically be used to train the local communities on innovation concepts through digitalization. A final Stakeholder Symposium will be organized at the end of the project. The aim of this event will not only be to showcase the main outcomes achieved by the COMMECT Consortium, but also to attract interest from new stakeholders and explore further possible synergies and collaborations with related projects and initiatives.

Each COMMECT partner has its own business planning processes for exploiting the COMMECT results. When possible, and relevant, for instance in case of co-creation (valid for partners contributing within the same LL), COMMECT partners may explore and engage in joint exploitation activities. COMMECT is expected to generate several exploitable project results in different XG access networks, such as Long Range (LoRa), Narrowband Internet of Things (NB-IoT), Enhanced Machine-Type Communication (eMTC), 5G Advanced relevant standardization contribution. Moreover, COMMECT aims to identify possible gaps that should be filled within or outside Standard Development Organizations (SDOs).

2 External Communication and Dissemination Activities

With the present document, the COMMECT Consortium aims at identifying the most appropriate channels for disseminating the outcomes of the project. In particular, the present 'Dissemination, Communication and Exploitation Plan' has different objectives in three distinct phases, as described below.

Phase 1: Create Awareness - To create awareness, a wide range of communication, dissemination and marketing tools are needed. This includes a COMMECT visual identity with an appropriate project logo, project website, social media channels (Twitter, LinkedIn, YouTube), project flyers and consistent presentation templates. The unique visual identity is a key aspect as it will improve the project´s brand recognition among end-users, stakeholders, and the lay public, and will stimulate exchange and follow-up actions. The project website was made publicly available in December 2022, and the social media channels were also launched in the first months of the project and represent the main dissemination platforms through which the project partners communicate to their targeted audiences.

These activities will include writing papers and articles for highly respected scientific conferences and journals, as well as participating in third-party events to reach a wider audience.

The project's multi-actor approach recognizes that it is essential to involve not just industrial partners, but also local communities in the LLs. To accomplish this, the Consortium plans to organize specific dissemination activities, such as publishing articles in local newspapers and hosting demonstration workshops. It is important to note that the Consortium will take local languages into consideration when publishing newspaper articles or practice abstracts and when interacting with the local community. This will ensure that the communication approach is tailored to the needs of the places where the LLs are located.

To maintain a continuous flow of information and dissemination, the Consortium plans to have a regular presence on social media (Twitter, LinkedIn, YouTube).

Phase 3: Result orientation - During this third phase, the dissemination and communication efforts will be very closely interlinked with exploitation activities. The main results of the project will be mature enough to be shared with target communities using both online and offline channels. In the final year of the COMMECT project, a final Stakeholder Symposium will be organized to present the project outputs, share knowledge with related projects and initiatives (clustering events), and attract interest from stakeholders for further exploitation beyond the project. Besides the engagement with the local actors and communities, COMMECT will also connect with international organizations, associations, and networks, relevant to promote the digitalization of rural communities. The consortium is currently identifying them, some are listed in the following sections, and more information will be available for the updated version of the Dissemination Plan.

In the next sub-sections, the various channels used for dissemination of the main activities carried out in the first six months of the COMMECT project, together with future plans in this respect, are illustrated.

2.1 Visual Identity

The initial step was creating a project logo, which could convey a unique and distinctive representation of the project. During the kick-off meeting, LIST presented to the COMMECT

partners a set of possible alternative logos, prepared by a graphic designer. Following a discussion on the topic and based on the partners' preferences and feedbacks (option 4 and 6 in Annex A), the final version of the logo (illustrated in Figure 1) was prepared.

Our logo focuses on a chromatic scale based on four main shaded colours, which goes from light green to light blue (see Figure 1). The choice of colours, together with the graphic elements emphasize **the two main concepts associated to the project: connectivity** (i.e., the *WiFi logo on the bottom left*) and **community** (*the two Ms with the two circles representing two individuals holding hands*).

Figure 1 The COMMECT logo

Project document templates with self-contained instructions have been created to provide a common identity to the project. They are used rather than partners' own internal templates when the COMMECT activities and findings are presented both in internal meetings and public events.

The latest versions of the COMMECT project templates are included in a dedicated section on the collaborative workspace named 'Template folder'. This folder includes templates for meeting agendas, Power Point presentations (Figure 2) and minutes, as well as deliverables (Figure 3). The templates are updated, when necessary, by the coordination team.

Figure 2 Example of COMMECT template for Project PowerPoint Presentation

Figure 3 Example of COMMECT template for Project Deliverable

2.2 Website

The COMMECT website, available at ***https://www.horizoneurope-commect.eu***, represents the core of the communication activities of the entire project. It was developed through TYPO3 (a free and open-source web content management system written in PHP) and recalls all the visual elements that consistently characterize the COMMECT project from the choice of colours to the captivating images that represent rural landscapes and recall connectivity solutions (e.g., three images appear one after another in carousel style in the main webpage; see Figure 4). Characterized by high quality images, photos, and graphics, the website consists of six sections and several sub-sections.

Specifically, the section named 'The Project' is used to introduce COMMECT to the public and comprises three sub-sections: 'About COMMECT ', 'Objectives and Methodologies' and 'Partners'. The latter sub-section contains the logos of all the partners and the links to their respective official websites.

The 'Living Labs' section is divided into five sub-sections. Each webpage describes in detail the objectives, partners and end-users who are engaged in each targeted territorial context (i.e., Luxembourg, Norway, Denmark, Serbia, and Turkiye).

The 'News and Events' section contains information about all the news and major events. Among other things, this section includes links to articles about COMMECT in the national and international press, video content (e.g., broadcast interviews), information about

partnerships and collaborations with other European or national projects, updates about meetings of various kinds, and so on.

Figure 4 COMMECT Website images

The section called 'Dissemination Materials' is the largest and certainly one of the most important of the entire website. In this section, all the relevant information, documents and results related to the COMMECT project are collected and disseminated. More specifically, the section consists of seven sub-sections referring to: I) Deliverables; II) Scientific Publications; III) Conferences; IV) Workshops with end-users; V) Reports and White Papers; VI) Other Printed and Online Materials; VII) Audios and Videos.

Finally, the 'Other Projects' section, links to the main EU and international projects with which COMMECT has established connections - possibly leading to future fruitful interactions and collaborations - are shared, while in the 'Contacts' section it is possible to get in touch with the main coordinator of the project via a form and find further useful links and information (coordinator's email and address, links to social media channels).

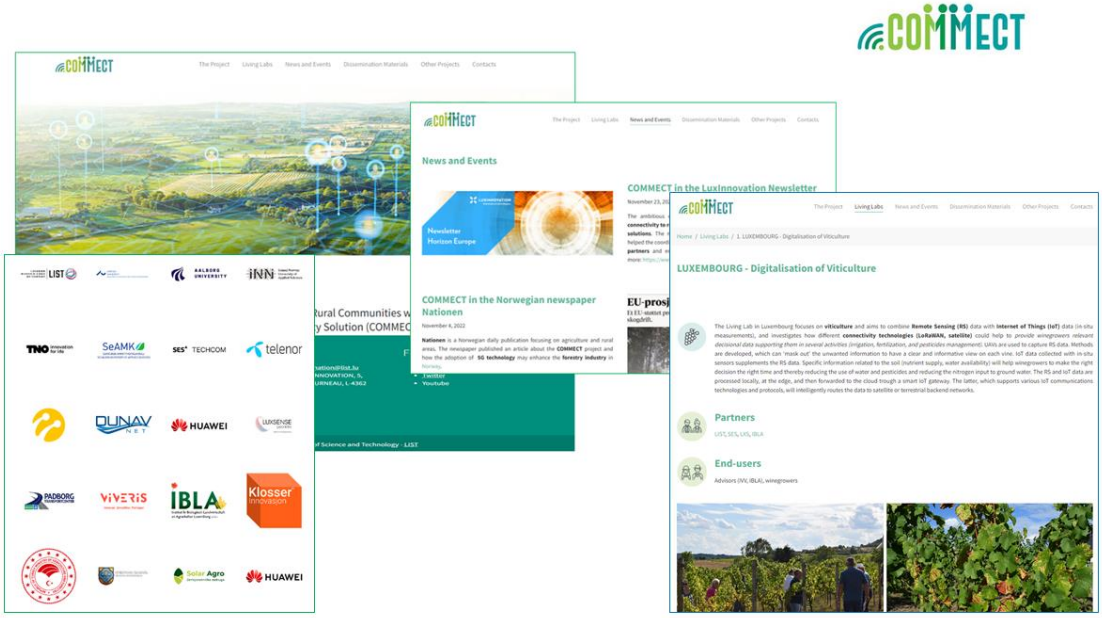

Figure 5 COMMECT website – Main webpage and other selected sub-sections

2.3 Social Media

To maximize the visibility of the COMMECT project, a **social media campaign** was launched in December 2022, coinciding with the launch of the project's website. The campaign targets different audiences with different communication needs, so three platforms were chosen.

Twitter was selected as the primary platform due to its large user base and high potential for interaction with followers. It will be used to communicate the project's participation in events such as conferences, workshops, and congresses, as well as publications, news, and other relevant audio-visual materials.

LinkedIn will be used to disseminate the scientific and applicable results of the project to a specialized audience, including academics, policymakers, and practitioners.

YouTube will be used to produce and distribute high-quality audio-visual materials related to the project, including broadcast interviews, TV appearances, partner clips, conference and congress presentations, and specific videos and infographics to illustrate the project's objectives, progress, and results.

The Twitter and LinkedIn profiles are currently active and updated periodically, with content planned also for the YouTube channel in the coming months. The Consortium considers YouTube an important channel for disseminating high-quality multimedia content to a wide audience interested in the critical issues addressed by the project.

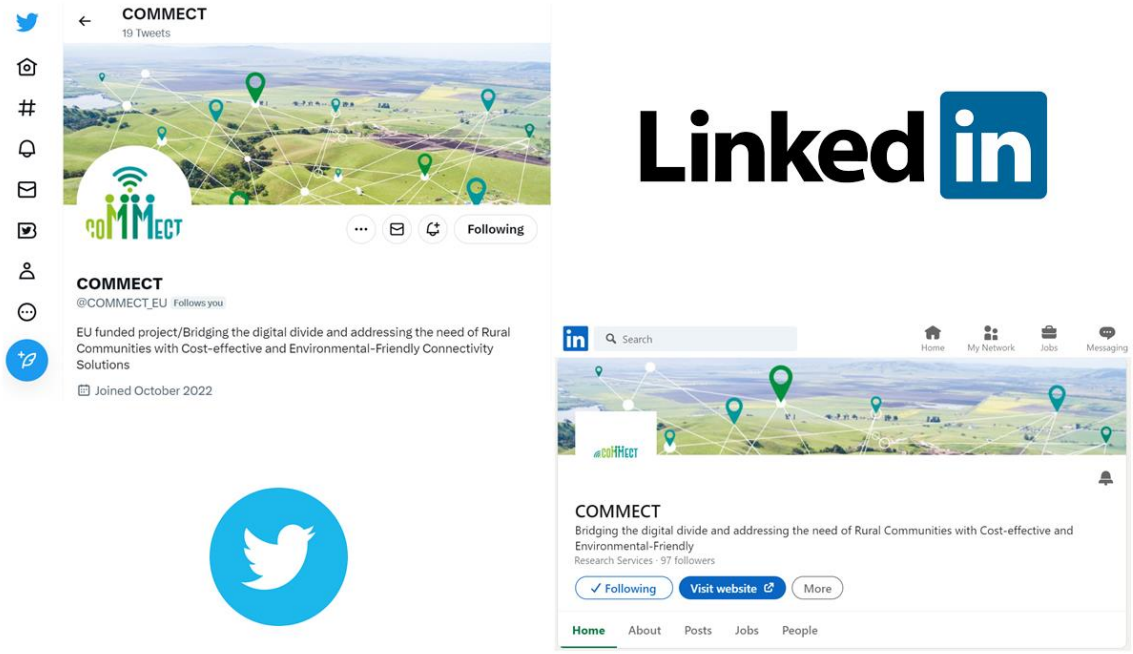

Figure 6 COMMECT Twitter and LinkedIn pages

2.4 Media and Multimedia Production

Media and multimedia production includes various types of activities and their related artifacts. First, as mentioned above, high quality videos will be produced with the aim to illustrate the results achieved by the project (including a final video which will offer a detailed overview of the impact in the territories targeted by the project). In addition to this, the Consortium will produce short videos through which partners and their role in the project will be presented. The same will be done for showing the main activities carried out in the five LLs in Luxembourg, Norway, Denmark, Türkiye and Serbia.

These videos will be subsequently uploaded on the project website and on YouTube, relaunched on the other social platforms (i.e., Twitter and LinkedIn) and showed in the main events in which the project partners are involved (e.g., congresses, conferences, workshops).

In addition to this, a series of infographics will be produced with the aim to illustrate the development of the COMMECT project, the solutions adopted in the LLs and the impact on the territories affected by the project in a simple, effective, and interesting way.

Media coverage is ensured by the constant presence of the COMMECT project in the national and local press and broadcasters. COMMECT participants will publish many articles in newspapers, magazines, and newsletters of other EU projects (thanks to the connections that will be established throughout the duration of the project) with the aim of keeping the attention high towards the evolution of the project.

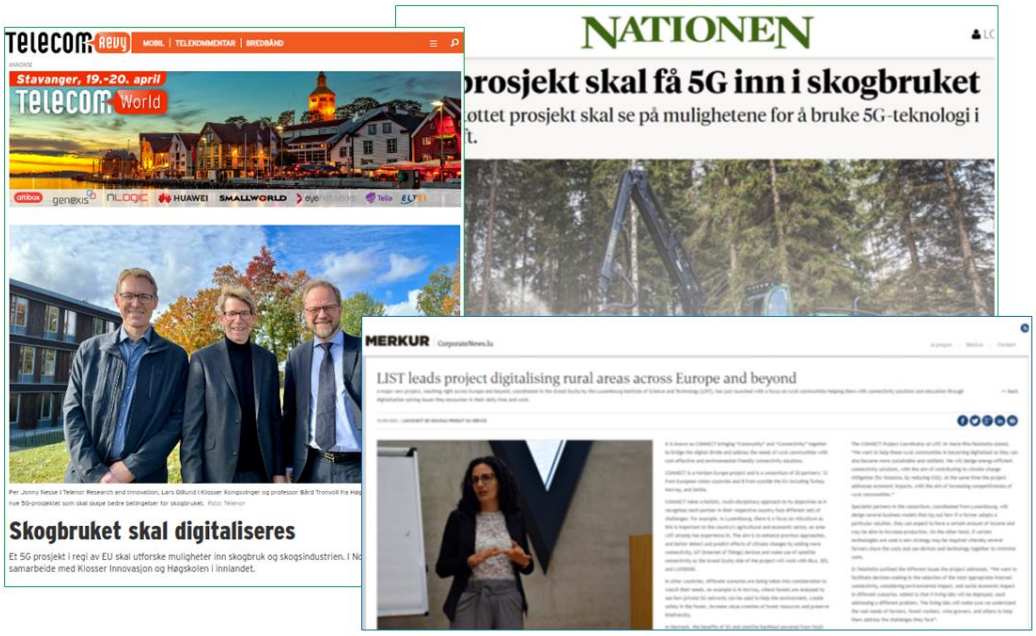

Figure 7 The COMMECT project in the national and international press.

2.5 Scientific publications, conferences, and publicity materials

The COMMECT Consortium will publish research articles in high-impact peer reviewed journals during and just after the execution of the project. By virtue of the multidisciplinary nature of the research activities conducted within COMMECT, the articles will be published in top journals in various scientific fields such as telecommunications; environmental, agricultural and biological sciences; geography, planning and regional science; business and economics. This will enable widespread dissemination of the results achieved and will increase the visibility of the project in different scientific communities. A selection of the targeted academic journals is listed in Table 1.

Table 1 List of targeted academic journals in different scientific fields

Academic Journals
Telecommunications: Elsevier Computer Communications; IEEE Communications Magazine, IEEE Future Networks; Wiley Emerging Telecommunications Technologies, MDPI Sensors, MDPI Telecom. **Environmental, Agricultural and Biological Sciences:** Journal of Industrial Ecology, International Journal of Life Cycle Assessment; Agricultural Systems, ScienceDirect Computers and Electronics in Agriculture, Elsevier Smart Agriculture Technology. **Geography, Planning, and Regional Science:** Journal of Economic Geography; Regional Studies; Geoforum; Journal of Rural Studies. **Business and Economics:** European Review of Agricultural Economics; American Journal of Agricultural Economics; Journal of Business Research; Journal of Service Management; Journal of Business Models; Industrial Marketing.

The partners making up the COMMECT consortium are also aware of the importance to show their progresses in selected events around Europe and beyond. This builds awareness and promote community-building around the five LLs. Where possible, the project will benefit from

the presence of its partners at international, national, or regional events. Table 2 provides a list of conferences, congresses, meetings, study days, etc., which the COMMECT partners have planned to attend throughout the length of the three-year project. This list will be constantly updated based on the opportunities that may arise, invitations to scientific events, joint activities with other research projects, etc.

Table 2 List of targeted scientific conferences

Scientific Conferences
G World; European Conference on Networks and Communications (EuCNC); European Wireless; European 5G Conference; International Workshop on 5G Architecture; Regional Studies Association Conference; Association of American Geographers Annual Meeting; Geography of Innovation Conference; SETAC Annual Meetings, Life Cycle Management Conference; The European Association of Agricultural Economists Congress; QUIS – Service Excellence in Management; Frontiers in Service; ServSig – Service Special Interest Group, GIOTS (Global IoT Summit)

During the early phases of the project, the COMMECT partners were already involved in several national events where they had the possibility to present the objectives and expected outcomes of the project to a wide and qualified audience of scholars, policymakers, experts, practitioners and interested citizens (see Table 3).

Table 3 List of attended events in the first 6 months of the COMMECT project.

Date	**Event**	**Place**	**Type and audience**	**Participants**
21.12.22	Circular Round Table 2022	Belgrade (RS)	National conference	DNET
20.01.23	Turkiye Research Program Evaluation Meeting	Ankara (TR)	National research meeting	TOB
22.01.23	TOB project - Team Meeting	Ankara (TR)	National research meeting	TOB
01.02.23	Weinbautag (IVV)	Grevenmacher (LU)	National conference	LIST, IBLA
15.02.23	IT conference	Zabljak (ME)	International conference	DNET

Moreover, in 2023 – i.e., the first year in which the results of the project materialize – there will be a strong participation of the COMMECT Consortium to renowned national and international meetings. More in detail, the COMMECT partners have planned to participate or already confirmed their participation at the national and international events listed in Table 4.

Table 4 List of planned events in 2023

INTERNATIONAL EVENTS				
Date	Event	Place	Type and audience	Participant
26-29.03.23	IEEE Wireless Communications and Networking Conference	Glasgow (UK)	International conference	TNOR
06-09.06.23	European Conference on Networks and Communications (EuCNC)	Gothenburg (SE)	International conference	AAU, TNO
7-8.06.23	Business Model Conference	Forlì (IT)	International conference	TNO
11-16.06.23	European Conference on Information Systems (ECIS)	Kristiansand (NO)	International conference	TNO
12-15.06.23	AgGateway	Altoona (US)	International conference	TNO
13-15.06.23	GreenTech	Amsterdam (NL)	International conference	TNO
19-22.06.23	IoT Week 2023	Berlin (DE)	International conference	LIST, DNET, HWDU
20-22.06.23	European Sustainable Energy Week	Brussels (BE)	International conference	AU
20-23.06.23	IEEE Vehicular Technology Conference (VTC) Spring 2023	Florence (IT)	International conference	AAU
29-30.06.23	ICT Spring 2023	Luxembourg (LU)	International conference	LIST
2-6.07.23	The 14th European Conference on Precision Agriculture	Bologna (ITA)	International conference	AU
3-7.07.23	ETSI IoT Week	Sofia Antipolis (FR)	International conference	HWDU
19-20.07.23	International Conference on Electrical, Computer, Communications and Mechatronics Engineering – ICECCME 2023	Tenerife (ES)	International conference	TNOR
5-8.09.23	IEEE International Symposium on Personal, Indoor and	Toronto (CA)	International conference	TNOR

	Mobile Radio Communications			
4-6.10.23	IEEE 14th International Conference on Network of Feature	Izmir (TR)	International conference	TOB, TCELL,
20-21.10.23	Digital Around the World	Online conference	International conference	LIST, DNET
10-13.12.2023	International Conference on Information Systems (ICIS)	Hyderabad (IN)	International conference	TNO
TBD - 23	IEEE Conference on Standards for Communitcations and Networking	TBD	International conference	TCELL
NATIONAL EVENTS				
Date	Event	Place	Type and audience	Participant
10-13.03.23	Wein-Kolloquium (IVV)	Remich an der Mosel (LU)	National conference	LIST, IBLA, LXS
20.04.23	Agri & Food Logistiek Congres	Terneuzen (NL)	National congress	TNO
30.06–02.07.23	Foire Agricole	Ettelbruck (LU)	National conference	LIST
TBD - 2023	Nationaal Tunibouwcongres	TBD (NL)	National congress	TNO
TBD - 2023	5Groningen	Groningen (NL)	National research meeting	TNO

Finally, marketing and publicity materials such as press releases, brochures, flyers, etc. will be prepared and distributed at the selected scientific events listed in Tables 2 and 4, as well as at fairs and exhibitions, with the aim to attract the attention of the audience and strengthen the visual identity of the COMMECT project. In this regard, a one-page factsheet, which is currently available on the COMMECT website and the project roll-up have been already prepared and used by the COMMECT Consortium (see Figure 8).

2.6 Events

In addition to the academic and scientific events listed above, the 'Dissemination, Communication and Exploitation Plan' comprises the organization of a workshop series throughout the length of the COMMECT project. These dedicated events will be adapted to the necessity and objective of the various LLs.

In any case, the general plan contemplates the organization of the first workshops in the very early phase of the project with the aim to identify the needs of the end-users. Corresponding

demonstration events are also organized to raise awareness about the proposed connectivity solutions and lead to more widespread acceptance of digitalization in the end-users and related local communities. This specific type of workshops is used to train the local communities on innovation concepts through digitalization. As already mentioned in Section 4, the final outcomes and possible developments of the project will be presented and discussed during a conclusive Stakeholder Symposium, which will be organized at the end of the COMMECT project.

More detailed information about the events organized in the context of the project are provided in the Section 7 of the present document.

Figure 8 COMMECT Project Factsheet and Roll-up

2.7 Synergies with other EU projects and beyond

The COMMECT project will be included in the 'European Innovation Partnership for Agricultural productivity and Sustainability' (EIP-Agri), i.e., a database launched by the European Commission (EC) in 2012 that brings together thousands of EU-funded projects on topics related to smart, sustainable, and inclusive growth.

One of the aims of the platform is to publicise the various projects and, above all, to activate a fruitful exchange of knowledge between all the possible stakeholders operating in the field of agriculture and forestry. End-user materials will be produced in the form of summaries for practitioners in the EIP common format (‘Practice Abstracts’). The project details will also be submitted to the platform with the first deliverable submission. A total target number of 15 Practice Abstracts is foreseen for the COMMECT project.

In this respect, a few months after the start of the project, the COMMECT partners have already established important contacts with other projects funded by both the EU and national research councils.

Just to mention a few, positive connections and shared experiences have been already established with the **H2020 DEMETER** project, whose main goal is the long-term viability and sustainability of Europe’s agri-food sector through its digital transformation (e.g., adoption of advanced IoT technologies, data science, smart farming). Such collaboration was made

possible thanks to the direct involvement of DNET, responsible of the DEMETER Pilots, and of LIST, which beside coordinating COMMECT, is also one of the DEMETER OpenCall2 winners, with the Herbicide Efficacy Analytic System for Sustainable Weed Control (HEMS) Pilot.

A possible future target is represented by ATLAS, i.e., a project which is developing an open interoperability network for agricultural applications and building up a sustainable ecosystem for innovative data-driven agriculture.

Besides projects focused on agriculture, COMMECT is also establishing connection with other H2020 projects, focused on technical connectivity solutions which the COMMECT consortium could explore in rural and remote areas. For instance, this is the case of INGENIOUS, a H2020 project which is designing and evaluating various Next-Generation IoT (NG-IoT) and providing smart networking and data management solutions with AI and Machine Learning (ML). SES, as partner contributing to both projects, will support establishing the exchange and collaboration among the projects.

At the national level, possible collaborations could be developed with the members of the SMART FOREST project, whose primary objective is to improve the efficiency of the Norwegian forest sector through the adoption of digital technologies. Furthermore, collaboration could be carried out in the future with the Luxembourgish-funded MICRO5G project, which focuses on the research of Ultra-Reliable Low Latency Communications (URLLC) and Mobile Edge Compute (MEC) for the support of drone services in 5G through storage/processing offloading of the tasks to mobile edge.

Finally, a special mention goes to the HE **XGain**. This can be considered as a sister project for COMMECT since both projects were accepted in the same EU call[1] for proposals and whose respective teams have already started to work closely (e.g., frequent interactions via Teams meetings, beneficial exchanges of key information and experiences, knowledge sharing). The XGain project aims at I) increasing systemic resilience and energy efficiency, II) contributing to climate mitigation; and III) reducing the digital divides between different types of citizens, farms, sectors, and regions through a series of concerted actions (e.g., facilitating business model development, supporting decision-making, providing connectivity options and edge processing solutions). COMMECT and XGain also plan to co-organize some dissemination events together, co-participate in the workshops organized by the LLs, and visit the different respective Pilots.

The synergy created with the XGain project might lead to fruitful interactions with SMART AGRI HUBS, i.e., a relevant project with which discussions are ongoing, whose aim is to digitalize the European agriculture by fostering agricultural innovation ecosystems through a network of Digital Innovation Hubs (DIH).

3 Stakeholder mapping

The Consortium considers active and sustainable engagement with key stakeholders as essential for the COMMECT project to create and achieve impact. For this purpose, a series of activities have already started and carried out since the very early phases of the project.

In particular, the COMMECT Consortium have adopted a **multi-actor approach** in which the local stakeholders are entirely integrated in the project as consortium partners. On the

[1] Call: Resilient, inclusive, healthy and green rural, coastal and urban communities (HORIZON-CL6-2021-COMMUNITIES-01). TOPIC Smart XG, last-mile and edge solutions for remote farming, forestry and rural areas. TOPIC ID: HORIZON-CL6-2021-COMMUNITIES-01-03.

international level, the widest possible access to the project's results will be given to various types of actors such as governmental authorities, research communities, academic and industrial organizations, and entrepreneurs. This will allow them to use the project outputs or update new adaptation plans, as well as to include the overshoot proofing into existing and upcoming adaptation plans or risk assessments.

Moreover, the stakeholders will be selected to represent a diverse group of world citizens to ensure that COMMECT outputs help overcome inequalities. This includes taking a gender sensitive approach, which ensures that gender-specific impacts are incorporated. In this regard, providing gender-sensitive inputs to adaptation and mitigation strategies provides a first overview of key stakeholder groups addressed, their expected contributions, interests and/or expectations, and a preliminary engagement strategy.

A detailed stakeholder mapping is provided in the present plan. The overall goal is to contribute to the emergence of a community of practice in overshoot risk mitigation and adaptation, as well as contribute to existing stakeholder processes such as adaptation planning processes across the EU and in the Iconic Regions.

With constant communication and dissemination of results through COMMECT's social media channels and project webpage, a first contact with the main Stakeholders has already taken place. Similarly, local stakeholders are currently engaged in ongoing discussion in the LLs, for the definition of the end users' needs, and will also take part in the future in demonstration events and in a final Stakeholder Symposium. The local COMMECT partners, especially the ones who lead the various LLs, are strongly tied to the respective regional areas and are already working to disseminate and communicate the COMMECT's results and the related socioeconomic and environmental benefits to the local stakeholders.

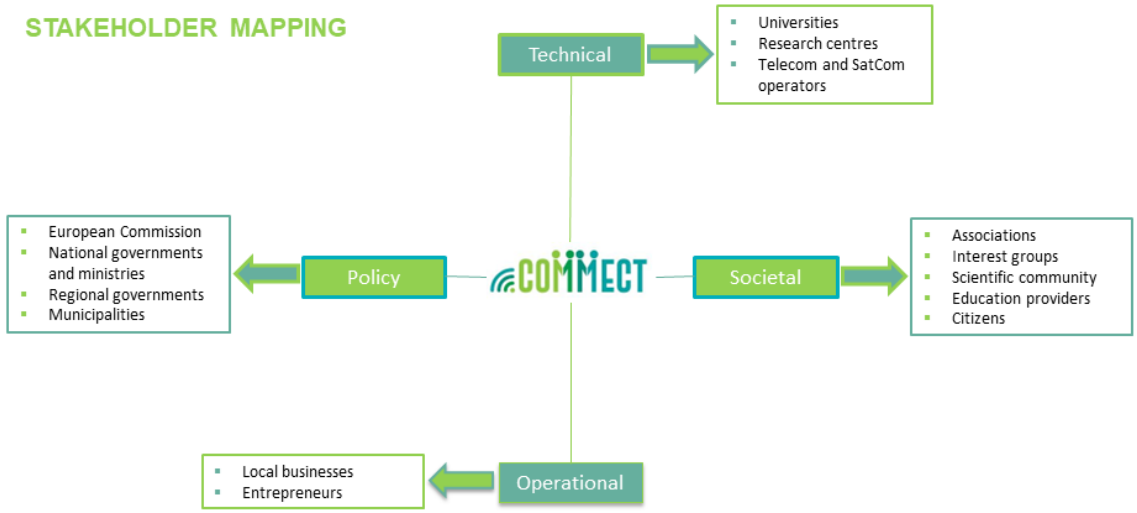

Figure 9 General Stakeholder map

Figure 9 illustrates from the graphical viewpoint the main stakeholders engaged in the COMMECT project. These actors are divided in four main categories: operational, technical, policy and societal.

The operational partners are represented by local businesses and entrepreneurs, who are directly or indirectly targeted by the project and simultaneously contribute to that. Universities, research centres, telecom and satcom operators have been identified as the main technical stakeholders. Policy stakeholders are public authorities from the supranational to the local

level. More in detail, this specific category includes public bodies such as the EC, various national governments, and ministries (e.g., agriculture, forestry, environment), as well as the regional governments and municipalities where the LLs have been implemented. Finally, societal stakeholders comprise various types of organizations such as associations, interest groups, scientists, education providers, and citizens.

After having illustrated all the possible actors with whom the Consortium will establish an open and evolving dialogue throughout the COMMECT project, a specific stakeholder map referring to the LL implemented in Norway is presented below.

As showed in Figure 10, the main policy stakeholders have been identified in the EC, the Government of Norway and two Ministries (i.e., Agriculture and Food, and Climate and Environment), together with the Norwegian Communication Authority (i.e., an executive supervisory and administrative agency for postal and electronic communication in Norway), sub-national (the County Assembly of Innlandet, i.e., the administrative region where the LL has been implemented) and local public bodies (i.e., the municipalities targeted by the COMMECT project). The societal stakeholders are represented by two research centres. The synergy with the first national research centre has been built on shared interests (in particular, a research project about digital forestry), while a constant relationship and fruitful collaboration with a regional research centre focusing on digitalisation and sustainability has been similarly developed. Two organizations such as a large forest owner association and the Norwegian lumber measurement association make up the operational stakeholders. Finally, the main technical stakeholders in the Norwegian LL are a large national research company focusing on technology and digitalization, a small national company developing software for the forestry industry, and an international agriculture machinery corporation.

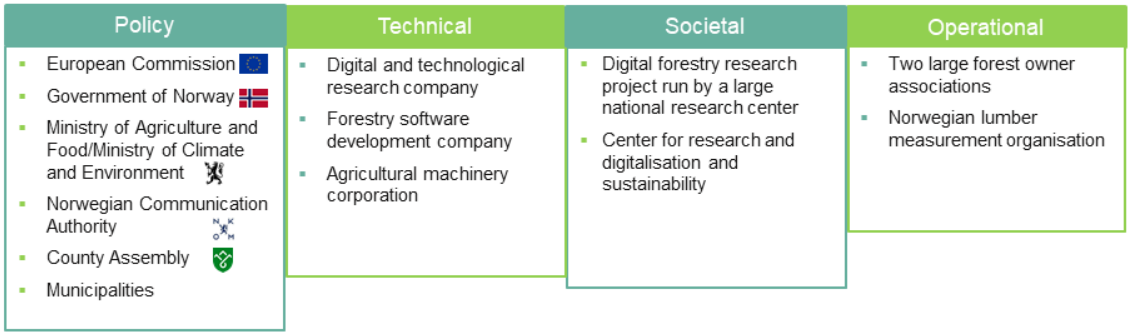

Figure 10 Specific Stakeholder map for the LL Norway Connected Forests.

4 Internal Communication

The COMMECT Consortium will deploy a broad range of communication and dissemination activities to maximize the impact of the achieved results. These activities will be maintained and adjusted during the entire duration of the project.

Coordination within the WP6 – i.e., the one in which the communication and dissemination activities are conducted – takes place through regular internal meetings between the main WP Leader and other two task leaders, to ensure that all of the project results are captured on time and effectively forwarded to the appropriate targeted audience. Moreover, specific tools (e.g., Excel files to be filled in) and services (shared folders) will be used for this purpose.

4.1 Communication and Dissemination Team

The Communication and Dissemination Team is composed of the WP6 Leader (INN), who is also the person in charge for the task named 'T6.1. Dissemination and communication activities', and two task leaders (i.e., one responsible for the task named 'T6.2. Workshops and Training Organisation' (IBLA) and another responsible for the task 'T6.3. Exploitation and Standardisation' (TCELL)).

However, all the COMMECT partners are called to contribute to the attentive and effective internal communication by forwarding relevant information about their main activities and achievements. In this regard, all the partners are asked to interact regularly with the WP Leader, the task leaders, and the coordinator of the entire project to keep the internal information exchange fast, effective and aimed at a fruitful dialogue with the external environment and the various types of audience to whom the project is addressed.

The internal procedures through which the COMMECT partners exchange information with the aim to disseminate it via the multiple channels illustrated in Section 4 is described in detail in following subsections.

4.2 Internal Communication Procedures and Tools

As explained earlier, the main Leader of the WP6 and two task leaders coordinate the process related to the internal communication. The smooth and constant flow of information from the participants to the WP Leader, who is also the person who keeps the website and social media channels updated, is as simple as it is efficient.

An Excel file for each participant called 'Continuous Reporting Dissemination Activity', divided into twelve sheets (one for each month of a given year), has been made available in a shared folder of the COMMECT project. Each partner has the task to update this Excel sheet periodically, reporting both future events (announcement of an attendance at a conference, for example) and a brief report of what happened at those events after they have passed. Likewise, all the other dissemination activities must be indicated in a specific section of the above-mentioned Excel file (e.g., publications, reports, newspaper articles, TV and radio, videos, etc.) (see Figure 11).

In addition to keeping track of all the events and dissemination materials produced during the three-year project period, the Excel file compiled periodically by each partner enables the WP6 Leader to keep the website and social media channels constantly updated on both future and past events, as well as on all the other dissemination activities.

Finally, the WP6 Leader and the two task leaders meet once a month with the aim of taking stock of the situation and updating each other on the respective tasks and future objectives to be achieved. The entire procedure related to internal communication is illustrated from a graphical viewpoint in Figure 12.

DISSEMINATION ACTIVITIES – Monthly report					
Past Event(s) - Conferences, congresses and meetings					
	Date	Place	Title	Type	Brief Description
1					
2					
3					
4					
5					
6					
Forthcoming Event(s) - Conferences, congresses and meetings					
	Date	Place	Title	Type	Brief Description
1					
2					
3					
4					
5					
6					
Other relevant dissemination activities (Publications, reports, newspaper articles, TV and radio, videos, etc.)					
	Brief Description				
1					
2					
3					
4					
5					
6					

Figure 11 Excel file used for collecting relevant information about dissemination activities.

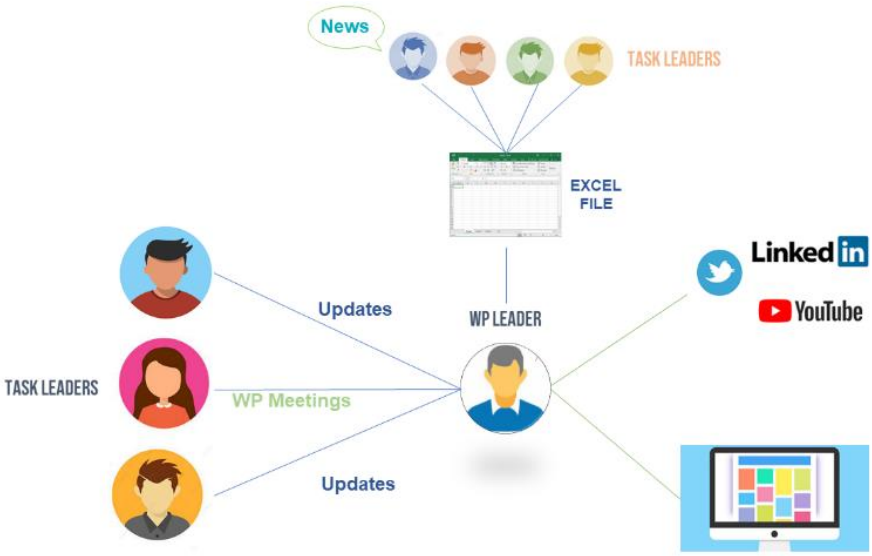

Figure 12 Internal communication - Information flows.

4.3 Monitoring and Evaluation

Monitoring and evaluation are essential to establish the effectiveness of the dissemination activities carried out within the COMMECT project.

Specifically, the term 'monitoring' refers to a careful observation of the processes and progresses in terms of internal communication and to the constant verification that everything is taking place correctly and on schedule. The term 'evaluation', on the other hand, primarily refers to quantitative tools used to measure the performances related to dissemination. With regard to the last point, several tools will be used to evaluate such a performance. In particular, we will mainly focus on the metrics related to the website and social media channels for assessing their impact.

More specifically, thanks to a tool such as Google Analytics, we will analyse the trend of the website, by considering, e.g., the overall traffic generated over time, the number of unique visitors, the most visited pages, the number of downloads of each document uploaded to the site (e.g., publications, reports, other dissemination material).

Similarly, the evaluation of the impact of the social media channels will be considered, e.g., the number of posts or tweets and their related shares or retweets, the evolution of the number of followers over time, and the number of interactions and 'likes'.

More generally, all the (online and offline) dissemination and communication activities carried out within the COMMECT project will be constantly monitored with the aim of achieving the objectives listed in Table 5.

Table 5 Monitoring and evaluation of online and offline dissemination activities.

Channel	Types of audience	Time/Period	Goal	Objective
Press Releases	General Public	Every 4 months (Starting from the 9th month of the project)	Keeping the public informed about the project	3/year
News in online and offline journals and magazines	General public, academics, industry, policymakers, media, investors, customers, end-users, stakeholders	Ongoing	Increasing the interest towards the project and informing the interested actors (end-users, stakeholders, local communities)	At least 5/year
Website	General public, academics, industry, civil society, policymakers, media, investors, customers, end-users, stakeholders	Ongoing	Disseminating relevant information about the project and its achievements to a broad audience	3000 visitors/year
Twitter	General public, academics, industry, policymakers, media, investors,	Ongoing	Disseminating relevant information about the project and its achievements to a broad audience	1000 followers (total)

	customers, end-users, stakeholders			
LinkedIn	Academics, industry, policymakers, media, investors, customers, end-users, stakeholders	Ongoing	Disseminating relevant information about the project and its achievements to a broad audience	1000 followers (total)
YouTube	General public, academics, industry, civil society, policymakers, media, investors, customers, end-users, stakeholders	Ongoing	Disseminating relevant information about the project and its achievements to a broad audience	300 followers (total)/3000 views
Flyer	General public, scientific community, industry, policymakers, media, investors, customers	Ongoing	Promoting the project in selected national and international events (e.g., workshops, conferences, fairs, exhibitions)	1000 flyers (total)
Videos	General public, scientific community, industry, policymakers, media,	Ongoing	Raising awareness about the project through a popular tool	8-12 videos (total)
Publications in scientific journals	Academics, industry	Ongoing	Disseminating the project research to specialized audiences	At least 12 (total)
Participation to third party events (workshops/conferences/exhibitions)	General public, academics, industry, civil society, policy makers, medias, investors, customers	Ongoing	Informing about the project, disseminating results, engaging with stakeholders	20 (total)
Collaboration with related projects	Members of other EU and national projects	Ongoing	Promoting technological achievements sharing approaches, knowledge, resources and ideas with other highly qualified consortia	12-15 (total)
Final video	General public	Month 36	Disseminating the final outcomes of the project through a popular means	1 (total)

5 Workshops and Organization of Training Events

To prepare rural societies toward the adoption of new digital communication technologies in the future, it is important to identify the needs of the end-users and any other important actor of the agri-forest value chain. To this end, workshops are used to identify such concerns in an interactive way. This can mean enabling access and use of existing systems as well as establishing new ones. The COMMECT project takes a two-pronged approach by providing digital solutions and access to fast and reliable broadband internet, on the one hand, and training rural societies in new technologies, on the other hand.

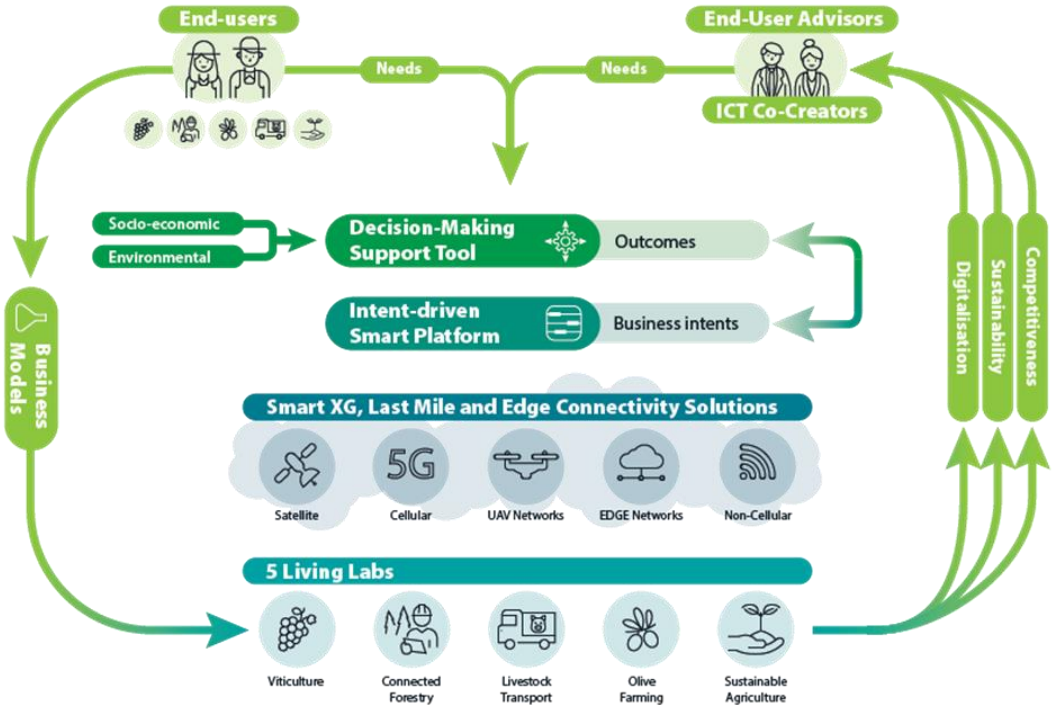

Figure 13 COMMECT Methodology

In the form of a **multi-actor approach with end-users and their advisors**, COMMECT will define a set of criteria for selecting the most appropriate connectivity based on the needs of end-users, not only in terms of technical requirements, but also socio-economic and environmental conditions. End-users will be provided with a tool, the decision-making support tool (DST), to help them on the path to digitization and competitiveness.

The Consortium had planned 16 events that should be organized throughout the execution of the project (5 workshops in each of the 5 LL and 1 final event). However, based on the flexibility that inspires our project and thanks to the adaptability of our work plan, the overall number and dates of workshops will vary in every LL based on different conditions, situations, and necessities.

In any case, the organization of workshops and other training events will follow some clearly defined stages to which specific objectives are associated (see also Section 4.6, in this respect). The workshops and meetings already organized in the initial phase of the project have allowed the COMMECT partners to identify the main needs of the end-users (WP1) in each targeted LL (WP4). Subsequently, various demonstration events will be organized to raise awareness about the proposed connectivity solutions and lead to more widespread acceptance of digitalization in the end-users and targeted local communities. This type of

events will be also used to specifically help the local communities to familiarize with digitalization and innovation concepts.

The main, although not exclusive, aim of these workshops, meetings and training sessions is to create and foster a connection with the end users. This happens through a constant and rapid transfer of the research results achieved and the related ability to put such a knowledge into practice through, e.g.:

- technical advice on agriculture to farmers (i.e., agricultural extension services);
- seminars;
- field trial visits (technical lecture or a guided tour of field testing);
- expertise in viticulture, agriculture and forestry;
- various modern documentation tools (i.e., applied technology in subjects such as digital documentation or registration files for a determined corridor, field, area, etc.).

COMMECT approach will allow us to achieve the expected research outcomes by I) empowering winegrowers and farmers to implement sustainable practices in the LL in Luxembourg, II) enhancing connectivity in the forestry industry in Norway, III) offering digital solutions to farmers, foresters, and refugees in Türkiye IV) developing and testing solutions suitable for different operations in the livestock transport in Denmark, and V) promoting digital farming and environment protection in Serbia.

With specific regard to the LL implemented in Türkiye, the COMMECT Consortium is organizing training sessions to ensure the socioeconomic integration of refugees. Safety, transportation and nutrition needs will be fully met in the planned events, workshops, and survey studies. The priority of the COMMECT partners is to respect the refugees' language, religion and gender during all of the activities that they will carry out in the context of the planned training sessions.

The approach adopted by the COMMECT Consortium – which sees the active participation of both project partners and end users – allows to identify what the users need in terms of digitalization. Workshops, surveys, and knowledge transfer will be used in each LL to meet the end users' expectations and achieve relevant socioeconomic and environmental impacts. Environmental-related data will be gathered and jointly discussed by the partners to optimize practical management. Demonstration events will be organized to raise awareness about the connectivity solutions proposed by farmers, olive growers, vineyard growers, local communities, and refugees in the various LLs. The final aim of these meetings is to increase the acceptance of digitalization processes and inform the targeted actors and the local communities about digitalization itself and other key innovation concepts.

Two original surveys designed by the COMMECT partners will be administered to the targeted actors for collecting key information about their needs and characteristics. The administered surveys will allow the Consortium to conduct an in-depth socioeconomic analysis about the real impact of the project. These surveys will be conducted before (*ex-ante*) and after (*ex-post*) the implementation of the technological solutions in the various LLs with the aim to determine a clear association or causal inference between the measures adopted and the effects in each targeted geographical context. Qualitative Comparative Analysis (QCA) and other statistical techniques will be adopted for this purpose.

Finally, economic, and environmental methods will be applied to address the end users' needs satisfactorily, while digital solutions that are deemed to be critical to achieve the expected results will be tested and made accessible to the end users and the local communities.

5.1 Workshop Organisation

In this sub-section, we illustrate how workshops are organized in each LL through a series of concerted actions. It is worth mentioning, in this regard, that practical guidelines for organizing and conducting participatory workshops or meetings within COMMECT have been developed by the members of the project.

These guidelines aim at gathering information based on end-users' elicitations about actors and functionalities, problems, challenges, and possible solutions. Through this document, it has been possible to establish a knowledge base on current challenges/needs of the targeted rural communities. Although the way workshops are organized and conducted may vary based on the experience of the organizers, the existing relationships with end-users and stakeholders or the available equipment (e.g., use of supplementary devices such as Mentimeter), the guidelines outlined by the COMMECT Consortium represent a helpful supporting tool to identify and define key topics, and determine the current and future challenges or needs in each LL. These guidelines are organized in various sections and contain useful information about the workshop/meeting phases (organization, processes, post event considerations) as well as key indications about the various session objectives, formats, questions and expected outcomes (see Figure 14Figure 14).

In this respect, the organization of the first workshop which took place in the Norwegian LL on 31 October 2022 is used as an example to illustrate the various steps through which events like this are organized. All the stages, from the preparatory phase to the post event activities (including the organization of the subsequent workshop), are thoroughly described, and illustrated in Figure 14).

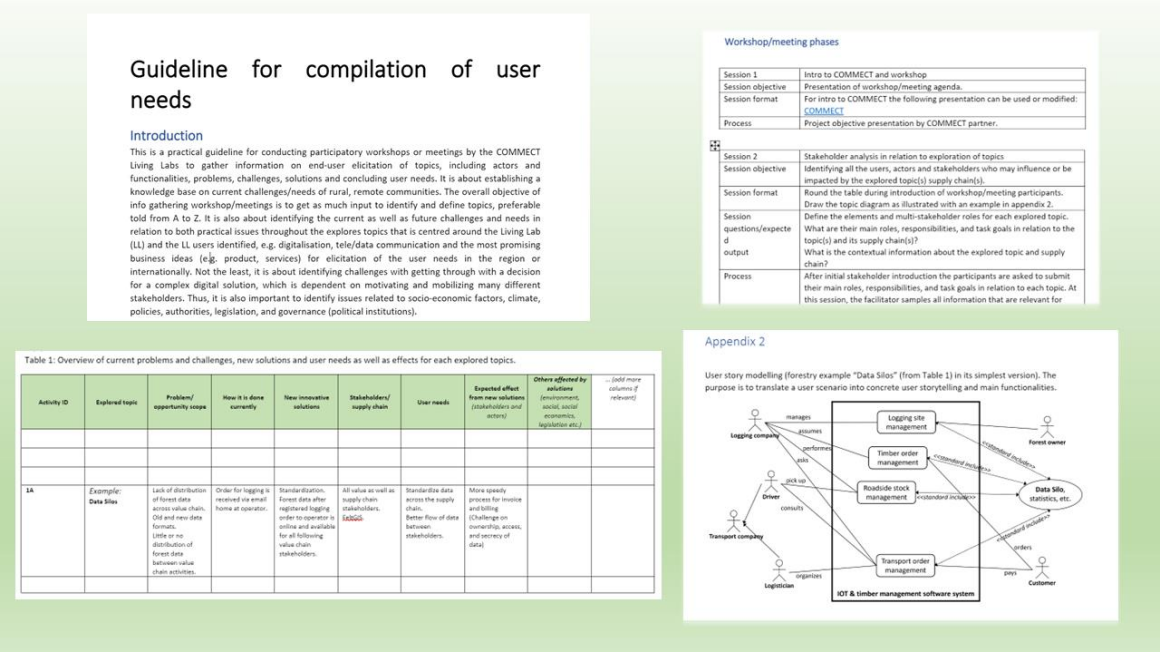

Figure 14 Guidelines for organizing and conducting workshops and meetings within the COMMECT project.

I) How the relevant actors were targeted:

Having worked with several businesses in the forestry industry for a long period of time, the LL leader and other members of the LL had an already established network and were able to utilize this to reach across the supply chain.

II) Meetings before the workshop:

Initial meetings with some industry actors were held preliminary before the workshop. These meetings were held to give the LL members some more insights into the industry and its supply chain.

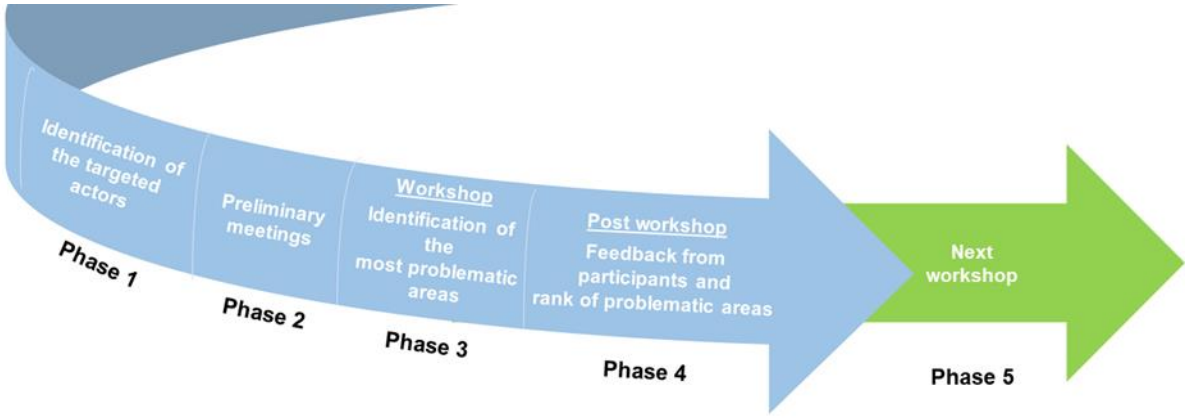

Figure 15 Phases in Workshop Organization.

III) Workshop 1:
Internal meetings were held in the LL to discuss what the partners wanted to achieve during the first workshop. It was decided that it is necessary to get a good overview of what the actors in the industry considered to be the most problematic areas based on their current situation, without the LL members influencing the areas of discussion too much.

A matrix was made that would assist the LL in addressing what the current challenges/problems are, how they are being handled today and how it could be improved in the future.

The workshop participants were formally invited via e-mail and phone calls to ensure a formal confirmation. In the end, the workshop had representatives from almost all areas of the supply chain.

A few presentations were held at the beginning of the workshop and then the participants were split into groups of 5-6 with 1-2 LL members in each group. Each group worked through the matrix, but with the intention of letting the industry actors lead the discussion and the LL members try to get a clear understanding.

IV) Post workshop:

Following the workshop, all the inputs from the matrices were collected and organized into a table with 21 areas of interest. After requesting feedback from the participants on this table and whether they found that it coincided with what had been discussed, the LL members reduced the 21 areas to 14, which were ranked based on level of importance.

Based on the overall feedback and the areas that were considered as the most important, the LL has created a set of “problem questions” that are tied to a set of categories that are all linked to the topic of “environment and efficiency”.

V) Next workshop:

The next workshop will take place after some more in-depth interviews have been held with a few key participants that will help provide more insight into the “problem questions” that have been formulated after the first workshop as well as input provided from the research project *Smart Forest*. The second workshop will aim to provide more defined and targeted areas for the LL. Alongside this, the LL will continue with state-of-the-art studies of newer technologies, users and pilots that have been performed within the industries.

6 Exploitation and Standardisation

This section lists successful implementation of the project such as exploitation and standardization and illustrates the planned activities in this respect. In particular, we present the approach and the methodology that will be used during the project for standardization.

The exploitation and standardization activities over the first 6 months were focused on collecting applicable standards in the domains covered by COMMECT that shall be considered in the architectural framework and design choices of the project. This facilitates finding a common solution and a smooth and homogeneous way to assure a very high level of interoperability (or at least interworking) among the different connectivity systems that will be developed and adopted within each LL.

6.1 Standardisation

This section introduces a collection of applicable standards in the domains covered by the COMMECT LLs that shall be considered in the architectural framework and design choices for the COMMECT project. The key objective is to find a common solution to assure a smooth and homogeneous way to satisfy a very high level of interoperability (or at least interworking) among the different systems. Moreover, this section provides a list of possible standardization activities and/or Standards Development Organizations (SDOs), Alliances and Open Source Software (OSS), where the future results achieved by the COMMECT project could be disseminated.

6.2 Standardisation from LLs

The selection of relevant standards for the project is conducted through the application of a systematic approach. The analysis was based on the partners' expertise and experience in various technology areas, as well as their participation in relevant SDOs pertaining to the areas of interest within the project's scope. Some examples of technology areas that have been used in this analysis are listed below:

- Communication and Connectivity
- Integration and interoperability
- Applications
- Infrastructure
- Architecture
- Devices and sensor technology
- Security and Privacy

6.2.1 LL Luxembourg – Digitalization of Viticulture

The LL Luxembourg “Digitalisation of Viticulture” aims at providing winegrowers with *ground-aerial-space* connectivity solutions that allow collecting high-temporal (near-real time) and high-spatial-resolution information of their vineyards. The goal is to support winegrowers in their decision making and in adopting a more resilient and sustainable management of their farms.

Satellite data (Sentinel-2), and drone data will be used to build a map at field-scale and have a global view of the status of the crops. In-situ data related to soil and weather condition will be collected using Long Range Wide Area Network (*LoRaWAN) networks* deployed in the field by LIST. Besides the energy-efficient nature of the standard, COMMECT will explore different methods to reduce and optimize the energy consumption, leveraging also on renewable energy sources. While LoRa is a proprietary radio communication technique,

LoRaWAN is a MAC open standard, and it gives lot of freedom to develop customized optimisations. The COMMECT project will closely follow the activity of the Internet Engineering Task Force (IETF) Low Power Wide Area Working Group (LPWAN WG), to make sure that the proposed solutions are fully aligned with the LoRaWAN protocol Specification, defined by the LoRa Alliance.

This LL will also investigate multi-access technologies, and integration with NTN (i.e., satellite backhauling provided by SES). The collected data will be gathered and processed by a Smart IoT Gateway and will be sent to the IoT Cloud/Data center through satellite backhaul. The Smart IoT Gateway is able to support LoRaWAN based IoT devices.

Furthermore, the partners engaged in the Luxembourg LL will target 3rd Generation Partnership Project (3GPP) standardisation and European Telecommunications Standards Institute (ETSI), where relevant study/work items, projects or groups are focusing on improved and seamless data transmission (e.g., low energy, pervasive coverage, reliable communications, broadband), NTN backhauling and direct access (e.g., 3GPP) Release (Rel) 18/19), multi-access connectivity (5G, beyond 5G, IoT, UAV, and satellite), etc.

6.2.2 LL Norway - Connected Forestry

The Norway LL (Forest LL) has a primary objective of providing the forest industry in Norway with efficient and eco-friendly connectivity solutions for their operations. Following consultations with key stakeholders, it was established that there are three key areas in their current operations that can be improved through the implementation of XG connectivity solutions. These areas include:

- Decision support for machine operation and maintenance
- Drones for real-time situation awareness during logging operations and disaster handling
- Remote machinery steering/autonomous forest machinery

In terms of communication technologies and protocols, the focus will mainly be on 5G-based communication (Non-Standalone, NSA, and Standalone, SA) and "Network on Wheels" (NoW) with satellite backhauls expected to be included. As for NB-IoT network and IoT platforms and protocols, there are currently no specific details.

The COMMECT project will identify any possible gaps in the SDOs such as 3GPP with regards to NB-IoT and eMTC specifications for both terrestrial and non-terrestrial networks. Additionally, Forest LL intends to investigate energy-efficient and renewable approaches to reduce the cost and power consumption of network devices and machines for smart forestry. Furthermore, Forest LL will contribute to the definition of 5G Advanced and 3GPP Rel-18 passive IoT candidate study items. TNOR, as a partner in Forest LL, will also provide real-world XG network experiences for edge solutions and rural communities to 3GPP activities.

TNOR, among the partners in Forest LL, is a member of ETSI Zero Touch Network & Service Management (ZSM) and will contribute project results and learnings to it through their platform.

6.2.3 LL Denmark - Livestock Transport

The aim of the Denmark LL is to enable the relevant stakeholders to closely monitor the welfare of the transported livestock. In this way, if and where necessary the responsible haulier can take appropriate measures while the transportation is on the way from the source to the destination point. The welfare of animals in transport is regulated by the Council Regulation (EC) No 1/2005 on the protection of animals during transport and related operations which is directly applicable across the European Union (EU) [1].

COMMECT's Denmark LL will focus on two main research areas from the connectivity point of view. First Connectivity to/from the transportation vehicle while the onboarding/offboarding of the livestock is taking place. This is in combination with broadband video surveillance of the on- or off-boarding process. Second, seamless data transmission to/from the transportation vehicle with onboarded livestock while the vehicle is on the road within EU countries and non-EU countries. This in combination with IoT sensor data collection and communication of possible actions if and where necessary, and hybrid 5G/satellite backhauling.

The partners engaged in the Danish LL will target 3GPP standardisation, ETSI, Next Generation Mobile Networks Alliance (NGMN), 6G Smart Networks and Services Industry Association (6G-IA), where relevant study/work items, projects or groups are focusing on improved and seamless data transmission (e.g. low energy, pervasive coverage, reliable communications, broadband), NTN backhauling and direct access (e.g. 3GPP Release 18/19), multi-access connectivity (5G and satellite) at network level, use of unlicensed spectrum, energy efficient/sustainable private networks, etc.

6.2.4. LL Turkiye - Smart Olive Tree Farming

The LL Turkiye Smart Olive Tree Farming aims to enable the digitalization of olive farms agriculture in İzmir, Antalya, and Hatay regions. The LL Turkiye offers digital solutions to farmers, foresters, and refugees. Social and economic integration will be ensured, especially by training women refugees on olive farming.

TCELL works on the 3GPP Radio Access Network (RAN) Working Group (WG) 2 with other COMMECT 3GPP members and LL partners. 3GPP RAN WG2 is responsible for the Radio Interface architecture and protocols like medium access control, the specification of the radio resource control protocol, and the radio resource management procedures. COMMECT focuses on possible contributions and gaps related to NTN and terrestrial networks in 3GPP 5G Advanced Releases like Release 18 (Rel-18) and Rel-19. The current Work Items when this deliverable is prepared are 941006 NR_NTN_enh [2] and 941004 IoT_NTN_enh [3]. The NR_NTN_enh work item is proposed to define enhancements for NG-RAN-based NTN in NTN NR. The ioT_NTN_enh work item is proposed to define further enhancements for NB-IoT NTN and eMTC NTN.

6.2.5. LL Serbia – Sustainable Agriculture and Preservation of Natural Environment

The activities of the LL Serbia will focus on the use of the existing communication networks (4G, 5G, LoRaWAN, Bluetooth) and their combination with the support of renewable energy sources to cater for the lack of the power grid infrastructure in the agriculture fields. When it comes to standardization, the focus will be on contributing to the field of data spaces, particularly those focused on agriculture.

For that purpose, COMMECT will collaborate with recently initiated HE projects in the space. In addition, contribution to the definition of data models through the Smart Data Models initiative [4] will be considered.

6.3 Expected Contributions to Standardisation

This section provides a list with possible standardisation activities and/or SDOs, Alliances and Open Source Software (OSSs), where the future obtained COMMECT results could be contributed to, which are:

- Standardisation activities on facilitating decision-making in the selection of the most appropriate Internet connectivity in rural communities, in the context of SDOs and

alliances such as 3GPP, oneM2M, 5GACIA;
- Standardisation activities on autonomous networks across hybrid networks (mainly TM Forum and ETSI ZSM);
- Data interoperability standardisation challenges on facilitating decision-making in the selection of the most appropriate Internet connectivity in rural communities, in the context of Alliance for the Internet of Things Innovation (AIOTI), oneM2M and ETSI TC SMARTM2M.
- Additional activities related to the COMMECT objective on contributing to climate change mitigation and increase resilience and sustainability of rural communities. In this context, one of the possible approaches for the support of this objective is the calculation of net avoided emissions in the agriculture sector when ICT is used as an enabling technology.
    - Contributions can be provided to AIOTI and the European Green Digital Coalition (EGDC) – that will be done via AIOTI, being an EGDC supporting partner [5]

6.3.1 Contributions related to rural area connectivity

COMMECT aims to facilitate decision-making in the selection of the most appropriate Internet connectivity. One of the most important points is to ensure that the approach adopted by COMMECT is allowed and applicable to a service or a product to be placed on the market. For this purpose, it is expected that the COMMECT's DST will impose requirements on the underlying internet connectivity. Therefore, from the Internet connectivity in rural areas perspective, it is expected that COMMECT will provide contributions to SDOs and alliances like 3GPP. This section identifies the standards development organizations' environment of interest, then the current state of the standardisation relevant to COMMECT.

3GPP is the SDO that defined the widely popular ‘3G’ Universal Mobile Telecommunications System (UMTS), ‘4G’ Long Term Evolution and ‘5G’ New Radio protocols and to support data exchange over a mobile network. The 3GPP organizational partners are regional and national standards bodies shown in Figure 16.

COMMECT utilizes a variety of existing and evolving access technologies including 2G, 3G, 4G, 5G, and NTN (both airborne and space-borne) to ensure connectivity (reachability) everywhere. The solution created by COMMECT meets the standards set by the 3GPP, a leading standards development organization. These solutions cater to both low and high bandwidth IoT applications. 3GPP is working on various types of IoT communication, including:

- **Massive IoT** - this provides cellular connectivity for simple IoT devices using NB-IoT and CAT-M technologies.
- **Broadband IoT** – it offers high-speed mobile broadband connectivity with much higher data rates and lower latency compared to Massive IoT.
- **Critical IoT** – It addresses extremely low latencies and ultra-high reliability connectivity requirements, powered by 5G NR.
- **Industrial Automation IoT** – It is tailored for advanced industrial automation applications of global manufacturers.

ARIB	The Association of Radio Industries and Businesses (ARIB) www.arib.or.jp	Japan
atis	The Alliance for Telecommunications Industry Solutions (ATIS) www.atis.org	USA
CCSA	China Communications Standards Association (CCSA) www.ccsa.org.cn	China
ETSI	The European Telecommunications Standards Institute (ETSI) www.etsi.org	Europe
tsdsi	Telecommunications Standards Development Society, India (TSDSI) http://tsdsi.org	India
TTA	Telecommunications Technology Association (TTA) www.tta.or.kr	Korea
TTC	Telecommunication Technology Committee (TTC) www.ttc.or.jp/e	Japan

Figure 16 3GPP Standards bodies.

3GPP initiated the first study related Internet of Things in Rel-12 with Long-Term Evolution Machine Type Communication (LTE-MTC) and continue with NB-IoT in Rel-13. 3GPP paved the way for the specification of Internet of Things covering 5G NTN come in Rel-17. The baseline 5G supports are completed in Rel-15 and Rel-16. 3GPP Rel-17 is the first release of TN and NTN co-existence.

- **Rel-12** introduced LTE-MTC, a set of integrated features targeting enhanced support for massive MTC.
- **Rel-13** introduced Narrowband IoT (NB-IoT). NB-IoT can be seen as a separate radio-access technology.
- **Rel-15** and **Rel-16** standards enable 5G IoT in the near and medium terms.
- **Rel-17** RedCap (3GPP terminology for Reduced Capability) or NR Light enable future massive IoT technologies in later 3GPP releases.

COMMECT expects to contribute on 3GPP RAN WG2 (RAN2) Rel-18 and Rel-19 agenda items such as:

- NTN mobility enhancements
- NTN-TN and NTN-NTN service continuity enhancements
- Network energy savings

6.3.2 Contributions on Data Interoperability (oneM2M, ETSI and AIOTI)

COMMECT is designing and implementing a DST that will support the selection and implementation of connectivity solutions incorporating: (i) information about the rural area, user needs and the intended application; (ii) available solutions to extend coverage; (iii) socio-economic and environmental impact and reference business models.

An important standardisation challenge related to the commercial success of this COMMECT DST is the support of data interoperability. Data interoperability covers aspects such as data exchange Application Programming Interfaces (APIs), data representation formats, as well as data provenance and traceability. In the context of the data representation formats, it is expected that semantic interoperability will be an important aspect that is expected to be applied in COMMECT and where possible COMMECT contributions to SDO and/or Alliance and/or OSS bodies will be generated.

Semantic Interoperability is associated with the meaning of the content that is exchanged. This requires agreement on common concepts and their relationships. For more details on the semantic interoperability topic, please see the AIOTI reports, [6], [7], [8], [9].

Moreover, the interoperability specification of a protocol between e.g., two IoT devices connected through a network may include: (1) semantic description to describe the device capabilities such as measuring temperature (other semantic description), (2) semantic description to describe the protocols such as WIFI (or interactions), (3) semantic description to describe protocol data units such as Celsius data unit (or information exchanged). As described in [8], the ontology-driven interoperability aims to produce the above-mentioned semantic descriptions and the semantic interoperability. An ontology describes concepts and relationships between concepts in a specific domain and as well between and cross-domains. For instance, in the case of a description of information exchanged, ontologies describe the concepts contained in the information exchanged as well as the relationship links between those concepts.

The SAREF (Smart Applications REFerence) [10] ontology and AIM (Agriculture Information Model) [11] are expected to be considered in COMMECT as semantic interoperability concepts and ontologies, see e.g., [6] and [12]. In particular, it is expected that COMMECT will provide such semantic interoperability concepts and ontologies contributions to SDOs and Alliances, such as https://aioti.eu/ **AIOTI,** oneM2M and ETSI TC Smart M2M.Specifically, COMMECT could work with partners to provide access to the latest technology, such as digital solutions and IoT devices, to rural areas that lack access to high-speed internet and modern communications infrastructure. This would allow people in these areas to connect to the internet and benefit from the opportunities it provides. COMMECT could help to support the development of the necessary infrastructure, such as broadband networks and Wi-Fi hotspots, to bring high-speed internet access to rural areas. This would help connect people in these areas to the rest of the world and provide access to online services and information.

6.3.3. Contributions to environmental impact evaluation of ICT

One of the COMMECT objectives is to contribute to climate change mitigation and increase resilience and sustainability of rural communities.

In this context it is expected that COMMECT will provide contributions on defining the applicable environmental sustainability indicators and their calculation model and apply them to the existing connectivity solutions. This will cover the environmental impacts generated by the deployment of the connectivity solutions (network, server, terminals), as well as the differences of impacts obtained due to the use of the ICT solutions in the specific sector (e.g., agricultural activity). Thanks to the improvement of agricultural practices or transportation processes, it is expected that the latter will correspond to avoided impacts.

This assessment will follow the comprehensive life cycle assessment (LCA) methodology, which provides a quantification of environmental impacts (e.g., on climate change, resource depletion, toxicity) of a product or process over its life cycle. This methodology is standardized by International Organization for Standardization (ISO) 14040/44, of which several standards were derived (e.g., ISO 14067 for the carbon footprint of products, ISO 14046 for the water footprint, ISO 14064 for the carbon footprint of organizations). To further harmonize the LCA

evaluation, guidelines were developed at European level (Product Environmental Footprint – PEF – and Organization Environmental Footprint – OEF[2]) or global level (e.g., Protocol for greenhouse gas (GHG) inventories of companies[3]).

For the ICT sector, specific guidance documents were also generated focusing mainly on energy use and carbon footprint. An overview of the current generic Carbon Footprint Measurement Methodologies, where the ICT carbon measurement methodologies are excluded, is provided in [10] and are depicted in Table 6.

Table 6 Overview of current Carbon Footprint Measurement Methodologies, based on [12]

PEF Methods	ISO 14044: Environmental Management: Life Cycle Assessment:
	ISO 14067: Carbon Footprint of Product
	International Life Cycle Data (ILCD)
	GHG protocol:
	Publicly Available Specification (PAS) 2050
	Publicly Available Specification (PAS) 2060
	Ecological footprint:
	BPX 30-323
	Product Environmental Footprint (PEF) method
Corporate Environmental Footprint Methods	ISO 14064:
	Global Reporting Initiative (GRI)
	CDP Water Disclosure Project
	GHG protocol: Corporate Standard
	International Life Cycle Data (ILCD)
	Defra 'Guidance on how to measure and report your greenhouse gas emissions':
	Defra Guidance on Environmental Key performance Indicators – Reporting Guidelines for UK Business
	Organisation Environmental Footprint (OEF) method
	Science-Based Targets

[2] https://eplca.jrc.ec.europa.eu/EnvironmentalFootprint.html

[3] https://ghgprotocol.org/

Targeted Carbon Footprint Methods	Green House Gas Protocol, used in the context of SBTs

An overview of the current ICT Methods of measuring Carbon Footprint, is provided in [13] and is depicted in Table 7.

Table 7 Overview of ICT Methods of measuring Carbon Footprint, based on [13]

Document	Target group	Scope
©GeSI, ITU-T, GSMA, SBTi: "*Guidance for ICT companies setting science-based targets*"	mobile/fi7d networks operators and data centres operators	GHG emissions of companies (direct and indirect)
Recommendation ITU-T L.1470: "*Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement*"	ICT sector: mobile/fi7d networks, data centres, enterprise networks, end-user goods	GHG emissions of companies (direct and indirect) and long-term ambition for 2050
ETSI GS OEU 020: "Operational energy Efficiency for Users (OEU); Carbon equivalent Intensity measurement; Operational infrastructures; Global KPIs; Global KPIs for ICT Sites", for data centers, for fi7d networks and for mobile networks	(not limited to) data centres and operator sites	GHG emissions due to operational energy in ICT sites, for data centers, for fi7d networks and for mobile networks
ETSI ES 203 228: "*Assessment of mobile network data energy efficiency*"	mobile/fi7d network operators	Energy efficiency in operational networks
ITU T L.1333 (ex L.NCIe): "*Carbon Data Intensity for network energy performance monitoring*"	mobile/fi7d network operators	GHG emissions for telecommunication networks, focusing on Network Carbon Intensity (NCI)
NGMN: "*Green Future Networks: Sustainability Challenges and Initiatives in Mobile Networks*"	mobile/fi7d network operators	GHG emissions intensity per transmitted data volumes
"*On Global Electricity Usage of Communication Technology: Trends to 2030*"	use and production of consumer devices, communication networks and data centers	Electricity usage of communication
"*Green IoT and Edge AI as Key Technological Enablers for a Sustainable Digital Transition towards a Smart Circular Economy: An Industry 5.0 Use Case*"	research on sustainable ICT	GHG emissions of Green IoT and Edge AI

Despite these existing standards and guidelines, the evaluation of the enabling emission-reducing potential of digital solutions in the sector of application remains uncertain. Indeed, this evaluation should compare the environmental impacts without the ICT deployment (reference scenario) and the ones with the ICT deployment, which should quantify the changes in the sector of application that are specifically due to the ICT solution. The modelling of this cause-effect chain can be uncertain and the allocation of the impacts of the ICT solutions to a specific use can also be challenging. The necessary data load and type of service can be considered for this impact allocation.

COMMECT project thus, intends to contribute to the harmonization and standardization of the environmental impact assessment of ICT solutions.

In particular, contributions on the calculation of the avoided carbon emissions in vertical sectors, when ICT is used as an enabling technology, can be contributed by COMMECT to AIOTI and the European Green Digital Coalition (EGDC) [5] – that will be done via AIOTI, being an EGDC supporting partner.

The European Green Digital Coalition (EGDC) is an initiative of companies, supported by the EC and the European Parliament, based on the request of the EU Council, which aims to harness the enabling emission-reducing potential of digital solutions to all other sectors.

EGDC aims to maximize the sustainability benefits of digitalization within the ICT sector, while supporting sustainability goals of other key sectors such as energy, transport, agriculture, and construction. The EGDC Working Group Overview can be seen in Figure 17 below.

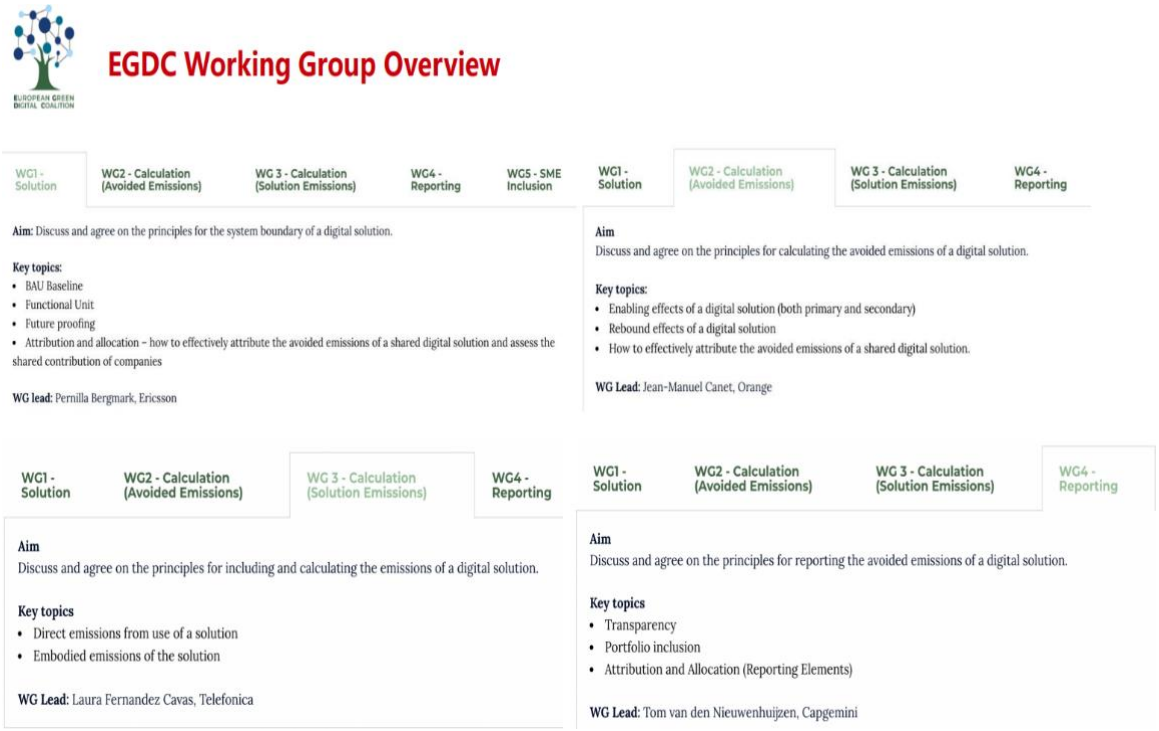

Figure 17 EGDC Working Group Overview

6.3.4 Contributions on Autonomous Networks (TM Forum, ETSI ZSM)

The main goal of standardization efforts in the COMMECT project is to facilitate the adoption, utilization, and overall impact of standards bridging the digital divide. This includes participation in relevant standardization organizations and collaboration on joint standardization initiatives with other European projects and associations. In particular, it is

expected that COMMECT will submit standardization contributions on autonomous networks across hybrid networks to SDOs.

Self-governing (autonomous) and adaptive systems complement the COMMECT approach by placing the right emphasis on respecting the end-user requirements (the “what”) and at the same time hiding the details (the “how”). A DST on top of intent-driven autonomous networks can greatly aid rural areas in determining the best connectivity choices for their specific requirements. The DSS system or DST, using data from the autonomous networks, can analyze various factors such as network capacity, coverage area, costs, and service quality to determine the most optimal connectivity options for the rural area. This system can then make recommendations based on the unique requirements of the rural community, such as providing high-speed connectivity to support remote learning and telemedicine services, or offering cost-effective solutions for connecting underserved populations. By incorporating the capabilities of autonomous networks, the DST and intent platform can continually monitor and optimize the connectivity options in real-time, ensuring that the rural community always has access to the best possible solutions. With the ability to automatically detect and diagnose network issues and reconfigure the network to restore connectivity, the autonomous network can help to improve the reliability and resilience of the rural connectivity infrastructure. The combination of intelligent decision making by both the end-users and the intent-driven autonomous networks has the potential to revolutionize connectivity in rural areas, making it more reliable, efficient, and cost-effective while providing better coverage and support for the specific needs of rural communities.

Two key SDOs that can support the COMMECT standardization and dissemination activities in the area of autonomous networks across hybrid networks are TM Forum and ETSI:

1. The **TM Forum** is a global industry association that focuses on improving the efficiency and effectiveness of service providers in the telecommunications, media, and technology industries.
2. European Telecommunications Standards Institute (ETSI) - ETSI is a European SDO that develops and publishes standards for information and communication technologies, including broadband and wireless communications. https://euc-word-edit.officeapps.live.com/we/ETSI ISG Zero-touch Service Management (ZSM)

COMMECT can have an influence on TM Forum work in a number of ways. First, the results of COMMECT are planned to be published in the TM Forum annual white paper on Autonomous Networks. This paper provides an in-depth look at the latest trends, advancements, and best practices in the industry, and explores different levels of automation criteria, implementation methodologies, reference business cases, and solutions.

Second, COMMECT will make contributions to the TM Forum **Autonomous Networks Project**, which is focused on defining fully automated, innovative network and ICT services for various vertical industries and consumers. The goal of this project is to create autonomous networks that offer a simplified network architecture and intelligent, automated business and network operations. This will result in closed-loop control of digital business and offer users the best possible experience, full lifecycle operations automation, and maximum resource utilization.

It is expected that COMMECT will contribute to ETSI ISG ZSM in the context of automatic configuration of network services.The ETSI ISG Zero-touch Service Management (ZSM) defines a framework that enables the automatic configuration and management of network services, without the need for human intervention. The goal of ZSM is to simplify the provisioning and management of network services, making them more efficient and cost-effective. With ZSM, service providers can automate the deployment and management of broadband services in rural areas, by using zero-touch provisioning and management. This means that new services can be deployed and configured automatically, without the need for

human intervention. This can help to reduce the time and cost associated with deploying and maintaining broadband services in rural areas and make these services more accessible and affordable for rural communities. Additionally, ZSM can help to improve the reliability and quality of broadband services in rural areas, by automating network management and configuration tasks. This can help to reduce the number of service disruptions and outages and improve the overall customer experience.

7 Exploitation

A key element in determining the success of the project is represented by the fulfilment of successful exploitation activities. In this respect, the COMMECT partners have planned a series of steps and actions enabling them to achieve this important result, potentially leading to further development scenarios.

In the first phase, continuous testing and validation of the COMMECT connectivity solutions applied in the different LLs will be carried out across different rural areas in Europe in a variety of sectors. These procedures will be implemented during and after the execution of the project (up to 6 months following the end of the project) with the aim to I) disseminate knowledge among new stakeholders and user communities across Europe, and II) look for additional investments for new possible implementations and LL set ups.

In the second phase, the COMMECT connectivity solutions will be made ready for market and large-scale adoption (12 to 24 months after the end of the project).

The COMMECT project aims at fostering competitiveness and growth, possibly leading to widespread socioeconomic benefits for the rural communities, farmers, and foresters involved. In addition to this, the participation in the project will be similarly beneficial for all the partners making up the COMMECT Consortium, who represent different types of highly qualified actors within the digitalized agriculture and forestry value chain. Among other things, the various partners will exploit the project to:

- gain experience and insights into the renewable energy sector;
- facilitate the creation of a new product lines addressing the use of renewable energy in the agriculture and environmental protection sectors;
- gain insights into the technical and interoperability challenges associated with integrating terrestrial and satellite network technologies;
- strengthen their expertise in digital farming applications;
- test new infrastructures in a broader range of sectors;
- meet the customers' demand in the respective sector of interest;
- foster internal research activities, potentially leading to new job creation;
- enhance knowledge and technology transfer.

Individual exploitation plans will be developed during the project, building on the general topics described above. The individual plans might involve partnerships between two or more partners, depending on the interests of the parties.

8 Conclusions

The aim of the present plan is to describe the main activities already initiated and conducted in the first six months of the COMMECT project concerning internal and external communication, dissemination, standardisation, and exploitation.

The COMMECT dissemination and exploitation plan will evolve as the project evolves. It will adapt to the needs of LLs and to the different types of activities carried out by the various partners by virtue of the multi- and intra-disciplinary nature of the project.

To constantly monitor the quantity, quality and impact of the activities and actions described in this plan (workshops, publications, conferences, etc.), all the COMMECT partners will periodically update the designated shared file. In addition to this, statistics and metrics related to the traffic, popularity and impact of the online and offline dissemination channels will be periodically evaluated and discussed.

A first update of the present plan will be presented at month 18 of the project, when two reports titled 'Dissemination and Communication Activities' (Deliverable - D6.3) and 'Technical Exploitation and Standardisation' (D.6.4) will be published, while a final report for each topic tackled in D6.3 and D6.4 will be published at month 36, i.e., in concomitance with the end of the project.

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Annex I: Logo design proposition

During the kick-off meeting, which was held in Luxembourg in September 2022, the COMMECT partners discussed about the logo which would have represented the project throughout its length. In that occasion, a set of possible logos created by a professional graphical designer at LIST was proposed (see Figure 18). The coordinator had expressed a preference for the alternative number 6 in Figure 18, which was confirmed by the other members of the consortium. Some alternatives were presented, using different colours (see Figure 19), and little variants (in the position of the wi-fi logo, or dots used to represent the heads of humans).

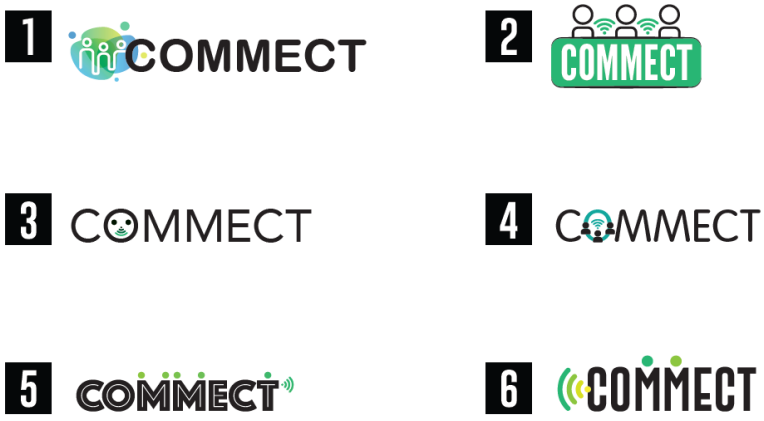

Figure 18 COMMECT logo - First round of design.

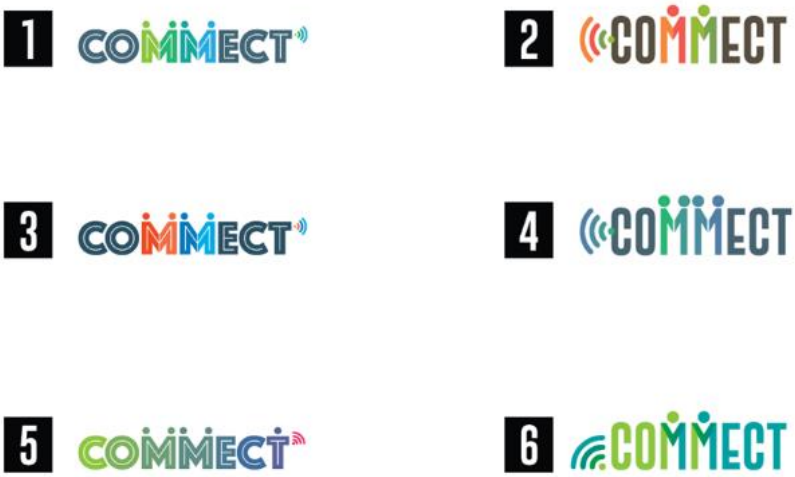

Figure 19 COMMECT Logo - Second round of design.

The preference of the Consortium went to the alternatives 4 and 6 displayed in Figure 19.

By combining the two, the COMMECT partners selected the final version of the logo (depicted in Figure 1).