



Grant Agreement Number: 821911

Project acronym: **CoRDiNet**

Project full title: **Copernicus Relays for Digitalisation spanning a Network**

## D7.1 Short Roadmap for digitalisation via EO/ Copernicus data



The CoRDiNet project is financed by the European Union under the Horizon 2020 program, grant no. 821911

GRANT AGREEMENT N.	821911
PROJECT ACRONYM	CoRdiNet
PROJECT FULL NAME	Copernicus Relays for digitalisation spanning a Network
STARTING DATE (DUR.)	1 Oct. 2018
ENDING DATE	30 Sep. 2020
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Workpackage n.   title	WP7 - Strategic coordination of regional/ cluster expertise to better promote Copernicus & support related business developments.
Workpackage leader	GMV
Deliverable n.   title	D7.1 Short Roadmap for digitalisation via EO/ Copernicus data
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Version   status	V1.2
Nature	Report
Due date	30/11/2019
Delivery date	30/11/2019
Dissemination level	PU
Authors (partner)	CoRdiNet's Copernicus European Regional Strategy Panel (CERSP) and its six Task Groups TG1 to TG 6

VERSION	MODIFICATION(S)	DATE	AUTHOR(S)
V1.0	Start, structure, repsonsibilites	11/07/2019	TG 1-TG 5
V1.1	First draft	5/11/2019	TG 1-TG 6
V1.2	Second draft	30/11/2019	Some TGs

## Summary

This is the second draft of the CoRdiNet's Short Road Map to Digitalisation via Earth Observation/Copernicus data based on work of the 18 Copernicus European Regional Strategy Panel, fifteen of which are regional, sub-national representatives of soix working groups formed out of this panel in order to set-up a road map adapted to the regional needs and offers in digitalisation via Earth Observation/Copernicus data. The panel thinks that a regional/sub-national view is closer to the needs and offers and allows to support business and pilot creation on a more effective and successful way compared to a national approach. In addition the regional/sub-national view allows for synergies with regional/sub-national funds and policy priorities. This draft has to be further improved and streamlined in order to start a consultation process with its primary stakeholders in the regions in Europe.

## List of Acronyms

Acronym	Meaning
CAP	EU Common Agriculture Policy
CDTI	Centro para el Desarrollo Tecnológico Industrial
CSC	Copernicus Space Component
CUF	Copernicus User forum
DIAS	Copernicus Data and Information Access Services.
EARSC	European Association of Remote Sensing Companies
ECMWF	European Centre for Medium-Range Weather Forecasts
EEA	European Environmental Agency
EEEs	Copernicus Entrusted Entities
EGNOS	European Geostationary Navigation Overlay Service
EMSA	European Maritime Safety Agency
EO	Earth Observation
ESA	European Space Agency
EU	European Union
FRONTEX	The European Border and Coast Guard Agency
FWC	Framework Contract
JRC	EU Joint Research Centre
LRA	Local Regional Authority
PWC	Pricewaterhouse Copper
RUS	Copernicus Research and User Support
SME	Small and medium sized Enterprise
TBD	To be determined

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## 0 Introduction

The present document corresponds to Deliverable **D7.1 Short Roadmap for digitalisation via EO/Copernicus data of the Horizon 2020 project CoRdiNet running from October 2018 to September 2010**

The objective of this deliverable is framed within the general goal of the work of the Copernicus European Regional Strategy Panel (CERSP) :

- Increase use of Earth observation data and EO markets on regional level
- Support strategic exchange of gathered regional/sub-national expertise
- Promote the use of Earth observation / Copernicus data
- Support business development and generation based on EO data
- Formulate guidelines for other Copernicus Relays and establish a basis for collaboration with the Copernicus Academy on regional/sub-national level

## 1 Context

Mankind has always set the eyes on space. Nowadays, space is at hand; **space achievements are part of our daily life**: telecommunications, positioning systems, routing, on-line finances, real time emergency response or rescue systems notably **enhance our living standards**.

The **European Space Strategy, Policy and Programmes**, however challenging these may be, are an excellent roadmap to achieve true **digitalisation** in regional markets. Moreover, satellite data applications cross-cut and **propel other economy sectors**: automotion industries, sustainable forest management and wood markets, precision agriculture, biomass energy supply, coordinated social services for depopulated areas or air quality monitoring, to mention only a few.

European Space achievements attained at institutional, technical and industrial levels are a landmark and an **open door** to new market of applications, through the flagship programmes EGNOS, Galileo-GNSS, **Copernicus** and Horizon 2020. The Earth Observation (EO) Copernicus programme, *Europe's eyes on Earth*, is a reality, and there is more to come.

The first seven Copernicus Sentinel satellites record **petabytes of high quality data daily** while 13 other spacecraft await to be launched. Data and **information products** reach thousands of users in the public sector, research and scientific communities, SMEs and start-ups **to create satellite-enabled products and services**: more than 185.000 Sentinel **data users** are registered on the ESA/EU Copernicus data portal

Over the decade 2020-2030, services will evolve to meet **emerging monitoring needs**. i.e.: climate change, CO<sub>2</sub> and greenhouse gas emissions, changes in the Arctic, precision agriculture, land use changes and forestry, borders control and maritime surveillance.

Imminently, new Copernicus **High Priority Missions** will be launched by 2021, to measure key natural elements, poorly covered so far, which will enlarge further and beyond the possibilities for the sector industries: **anthropogenic CO<sub>2</sub>**, relevant for urban air pollution monitoring; **High-resolution Land Surface Temperature**, which will add substantial information to conventional LULC; **Hyperspectral Imaging**, essential for cataloguing mineral resources or soil types; **Polar Ice and Snow Topography**, a “must-

have” for high latitudes safe navigation; **Passive Microwave Radiometer**, to measure atmospheric profiles, water and ozone content in the atmosphere; and **L-Band SAR Imaging**, needed for forest biomass and carbon sequestration counts, which are imperious to meet United Nations Framework Convention on Climate Change (UNFCCC).

European **regions are key** to the deployment of Copernicus; Space digitalisation should root down from the regions or it will not happen evenly across the Member States.

The EARSC 2019 survey into the state and health of the European EO services industry reports that **96% of sector companies are SME’s**, notably with a strong **local identity**. Nothing is said, however, relative to the capacity of space SME’s **to vertebrate** the specialised workforce and the territory they are in. CoRdiNet seeks **to increase the EO/Copernicus exploitation at regional level**, from the regional hubs to higher national and EU levels.

It is necessary to ponder over the main **regional steering actors** (Regional Gvernment Offices, consolidated industrial sectors), the target groups, markets and costs of implementation for those regional spin-offs. Moreover, it is necessary to evaluate the links between the Copernicus offer and the type of actors. The outcomes of the [Council of the European Union](#) “Space as an enabler”, held on May 17<sup>th</sup> 2019, need to have a regional dimension: the **penetration** of the use of the applications of space systems **needs a balanced distribution between geographic areas**, user categories and **economic sectors**.

The success of Copernicus downstream applications across European regions has been pointed out by [NEREUS](#) through a selection of success stories achieved by local and regional authorities. Yet, as noted by the European Council “the **penetration** of the use of the applications of space systems **needs a balanced distribution between geographic areas**, EU and ESA Member States, user categories and **economic sectors**, and emphasises that there are significant opportunities for **fostering economic growth and innovation from the more widespread use of space-based applications**”.

CoRdiNet D7.1 explores a roadmap to consolidate more evenly the use of Copernicus data across Europe’s Regions. The **roadmap vision follows a double logic flow**. **First**, a bottom-up relation between the Regional and Space policies, approaching regions needs and capacities to the EU actors, including the CSO, in such way, that regions may increase Copernicus exploitation capacity for further expansion. **Second** and foremost, a top-down approach to enable, promote and support EO related business, with consolidated industrial linkages to support public authorities in the use of data and services.



## 2 Issue and vision

### 2.1 Importance of a Copernicus European Regional Strategy

The Space Strategy for Europe recognized the importance of networks operating at local/regional level (e.g. Copernicus Relays and Academy) to encourage and enhance the uptake of Copernicus services, data and solutions. The networks are now in place and are working to promote Copernicus Programme at local level. This is a notable outcome of a “top-down” approach (i.e. spreading the EU information locally) which is still useful and necessary.

Similarly, a “bottom-up” approach (i.e. bringing the regional issues/requirements at EU level) is also important but, presently, it is not equally supported and promoted. In fact, there is a lack of the “regional voice” at national and EU level. The regional expertise is a wonderful heritage that is not fully integrated and gathered so far at higher levels. Similarly, local/regional user feedback have not been fully investigated and taken into account in designing the new EU space strategy and the new generation Earth Observation programme.

This is presently a missed opportunity, as the regional level is very relevant because it is close to local issues, it knows very well the peculiarities and needs of the different territories and it allows resources to be pooled. Moreover, Local Regional Authorities (LRAs) are the main potential drivers of the demand for space-based services and products.

A wider awareness of Copernicus at local level, in fact, will drive to a more diffuse uptake of EO/Copernicus data, services and solutions in regional offices that, in turn, would allow for a wider and faster digitalization process and for developing and implementing improved and innovative services citizens may increasingly use in their everyday life.

### 2.2 Bringing the regional views towards national/ European levels

Therefore, there is an urgent need to increasingly bring the regional view both at national and European levels. In order to facilitate this process, new ways and approaches can be explored and tested. Here in the following a couple of possible suggestions are reported:

- Allow for the NEREUS stable participation to the Copernicus User Forum and facilitate a better coordination with COR;

NEREUS is the network of European Regions Using Space Technologies, presently counting 25 full members (i.e. European regions) and 38 associate members. Thus, NEREUS can actually advocate the key role of regions in developing the space market and relay the regional dimension (i.e. the **regional view**) of European space policies and programs towards the European Copernicus User Forum where, presently, only the Member States (i.e. **the national view**) are sitting and Committee of Regions has been invited as observer.

- Create better links between regional and national networks (i.e. Theia in France ...);

Networks and working groups at national levels have been established in recent years. They are of different forms and natures, but all aim to enable the LRA to use Copernicus data. In France, for example, the Theia cluster is organized by drawing on regional strengths to promote Earth observation images and products and share experiences. Where they exist, these national or regional networks should be identified and associated as relevant intermediaries to link end-users to European levels.

### **2.3 Improving CSO-CR-EC collaboration and exchange**

Speeding and facilitating the digitalization process via EO/Copernicus data at local level will also require to improve and strengthen the collaboration and the exchanges among all the relevant actors working at different levels: the European Commission, the Copernicus Support Office and the CR/CA networks.

For example, CR/CA nodes expertise's should be better explored and possibly integrated, trying to maximize their complementarities and synergies. This would allow for a better quality and effectiveness of training materials, communication methods, information modules, etc. For this, a major role of the CSO has to be expected and should be aimed at; in fact, CSO should promote and facilitate a much more continuous and systematic dialogue among the CR (and CA) network members, pushing for more frequent and structured collaborations and partnerships within specific Copernicus-related initiatives (e.g. pilot projects, jointly tailored EO solutions).

Putting in place these actions will probably require an additional effort from the EC, who should improve and reinforce its support to CSO and CR/CA members, e.g. planning additional and dedicated funding instruments and mechanisms/opportunities for their ecosystems (for example by means of systematic annual calls dedicated to CR/CA members), definitively removing language barriers (i.e. all the Copernicus material should be available in all the EC Member States languages, with no exception).

### **2.4 Increasing EO/Copernicus exploitation at regional level**

Although the Commission has put in place several actions so far to encourage the uptake of Copernicus data and services, their actual usage at local/regional level is still far to be fully satisfying. Examples of systematic use and “full integration” of Copernicus data in the regional offices' procedures and protocols are still too rare and occasional.

Copernicus full exploitation at regional level needs to be strengthened and several actions can be promoted and implemented in this direction with the active involvement of all relevant regional and local stakeholders/users (Ex: Establish a “Copernicus interface” in relevant regional/local offices, systematic collection and analysis of regional/local user needs and feedbacks, focus on local expertise/demand, rely on existing INSPIRE SDI, encourage collaboration between research laboratories/privates companies/ LRAs, bring Copernicus/EO data in “non-space” regional sectors, etc). In the following chapters of this documents you will find a list of concrete actions suggested to promote the full integration and exploitation of Copernicus data and services at regional and local level.

### 3 Actors, benefits for target group, efforts

Application	Stakeholder	Role	Comment
ALL	Lawyer Insurance companies consultancy company	support support support	This entities can help region to have a better understanding of the issues faced by all the stakeholder within a specific domain (agriculture, energy, water, etc.)
AGRICULTURE, FOOD	Farmer	be involved	Farmer can use Earth observation to oversee thier soil health status through different parameters that can not be measurement from a crop monitor device located on the ground.
	farm inputs manufacturer	be involved	Earth observation can lead to a precise spray of agricultural intrant in order to improve the field yield.
	Farm equipement manufacturer	be involved	
	food industrialist	be involved	Food industrialist can access informations about soil and crop health status. This data can be used for a better transparency for consumers.
FORESTRY	Private forest owner	be involved	As well as in the agricultural application, Earth observation can be used to insure a better forest management and avoid overexploitation some piece of forest.
	Public forest manager	be informed	
	Public local manager/owner	?	
	Equipment manufacturer for forestry	be involved	
FISHERIES	Local entity for forest ownership registration	in involved	
	Fishermen (wild and aquaculture)	be involved	Improve fish stock management by avoiding overfishing or It can be used to monitor costal life.
	Fishmonger	be informed	Earth observation can offers a better overview of the fishstock. Thanks to Earth observation can ajust their demand to avoid overexploiting the fishstock.
	Trader	be informed	
	Boat and equipment manufacturer	be involved	
BIODIVERSITY AND ENVIRONMENTAL PROTECTION	Fish-farming input manufacturer	be informed	
	Biodiversity agency	be involved	Collecting data offers a better understanding of biodiversity management. For example, it can help to delimitate precisly a natural park.
	NGO	be informed	
	Testing laboratory	be involved	Earth observation can provide data that can not measured from a device located at the Earth surface.
	Research laboratory	be involved	

CLIMATE AND ENERGY	Power plant operator	be involved	Earth observation can give informations such as the river water temperature which has a great influence on the gas, coal or nuclear power plant efficiency.
	Electricity grid operator	be involved	
	Equipement manufacturer	be involved	
	Meteorological center	be involved	
WATER	Water mangement wastewater treatment plant operator	be involved	Thanks to Earth observation water quality can be monitored and ajustement within the wastewater treatment plant can be done properly.
		be involved	
TERRITORIAL MANAGEMENT AND URBAN PLANNING	construction firm	be informed	Earth observation can give informations such Earth movement or it can help to determine a flood-risk area and therefore having a better territorial management.
	Public transport operator	be involved	
	Road traffic operator	be involved	
CIVIL PROTECTION	Police	be informed	In case of umergency, such as flooding due to heavy rainfall or wildfire, local authorithies can be informed rapidly and precisly. So, taking action can be done more quickly.
	Firefighter & forest fire prevention	be informed	
PUBLIC HEALTH	Air quality measurement center	be involved	

## 4 Main policy objectives

### 4.1 *Enable, promote and support Copernicus-related digitalisation in local, EO related businesses i.e. service providers in the regions*

- Focus on Earth observation data /Copernicus being part of a larger portfolio providing relevant information for specific customer solutions: Higher resolution data, free data like Copernicus or from other EO satellites, drone data, other spectral data, but optical data, in situ data/ground truth, but also enablers like IT providers, big data crunching service providers, storage, hence this means strengthening abilities of intermediate users to incorporate external sourcing of Copernicus data into their data intelligence workflows
- Support regional structures like clusters, Copernicus Relays, start-up supporters to have them provide better feedback to EO service providers and provide training to local users and their needs
- EO/Copernicus data have to be increasingly promoted and brought in the context of regional challenges and policies. Efforts to improve the digital environment and capabilities of the regional level should in the centre, also interdisciplinary co-operations: Analyse strengths and specialisations of the regional ecosystem: Close linkages to regional Smart Specialisation Strategies (S3): which sectors dominate/distinguish regional economy/natural disaster scenarios/environmental preservation aspects – how does EO/Copernicus feed into these local sectors?
- From this set-up a strategy for local digital platforms given knowledge of their needs
- Foster regional laboratories to experiment with new data sources and different approaches to integrate them
- Promote interdisciplinary exchange and cooperation
- Strategically align relevant EU-programs and funds that could contribute to advance digitalisation via EO/Copernicus;
- Strengthen interregional cooperation, cross-border and cross-regional approaches.

### 4.2 *Top down: Better Copernicus – community linkage of Europe’s regions to EU and esa levels*

Copernicus is a European Programme, members of esa and EU are the national states

- European level is to better target regions and give them better opportunities to access up-to-date information, improve information on and digitised flows of data related to Copernicus (EC -> national -> regional level). This is also to target funding and tender opportunities at local levels related to Copernicus uptake
- Better marketing of Copernicus products to local users
- Better use opportunities given by reporting obligations towards European institutions like e.g. on environment and climate data

- Member States (national level) and regions should enhance and broaden exchange/cooperation with the objective to collect more information on best practices, experiences with the use of EO/Copernicus, making the situation of users more transparent, collecting statistics, mapping activities, capabilities and relevant player etc.; greater knowledge sharing; aligning initiatives and innovation driver such as incubation and accelerator programs and get a better overview on their impact on industry
- More involvement of the regional level in design of policies that promote the digitalisation in different domains
- Ensure Copernicus data and knowledge are readily accessible to local regional users, this meaning knowledge-generation and transmission services with high connectivity across the EU, so non-expert users can access data and knowledge, and generate their own knowledge. For this a better capacity is to be created locally to access e.g. Copernicus data via e.g. DIAS
- Make Copernicus data and knowledge available via low-cost technologies such as mobile phones, local tablets and notebooks, prepare for mass market scale-up

### **4.3 Support public authorities in the use EO/Copernicus data and services**

- Find out about their potential needs via interviews, studies and personal talks
- Support information events and create opportunities to make offers and needs meet
- Support trainings of public authorities in the use of EO/Copernicus data in close cooperation with service providers and Copernicus Academy members

### **4.4 Bottom up: Better direct engagement of regions in Copernicus: Lobbying of regions, interest of regions to be brought forward directly to European level, better connectivity to local governments**

- Via lobbying by European-centred regional space application support or more general innovation support networks like EARSC, NEREUS, ERRIN, EBN,...
- Via your regional Members of European Parliament, some are specific committee members in EP dealing with space related issues.
- Enable and install more user feedback and satisfaction services and channels: e.g. via a more digitalised engagement with local users enabling statistical analysis to understand user needs and feedback.
- Encourage digitalisation of Copernicus in local government systems.
- Encourage better connectivity between central platforms and local platforms.

#### **4.5 Leveraging and facilitating opportunities, operating and framework conditions set by European and national space policies to better go hand-in-hand with regional strategies, initiatives and programmes**

- Spread information on Copernicus capabilities within official, often regional online maps and enable additional map layers over official public local maps: put satellite-based information on top, e.g. regularly updated (by Satellite data) map on forest fire risks (Example for implementation could be “Bayern-Atlas” in Bavaria)
- Strengthening of leading industry software and visualisation companies to include Copernicus software plug-ins, particularly for non-expert companies.
- Inclusion of Copernicus knowledge feeds in apps.
- Provision of Copernicus knowledge in easy-to-use layers
- Support of regional training and local expertise in Copernicus. This would give greater accessibility of Copernicus to local users.

## 5 Consultation of draft road map with regional/sub-national committees

### 5.1 Identify clear perimeter for the consultation

- Roadmap feedback and needs are be clarified, expectations from this consultation regarding its content (benefits, policy objectives, guidelines)
- Define what the various committees are to comment on, i.e. all roadmap sections, main objectives, etc.
- Review what has been done on the topic up to now in order to have a better contribution of this work..

### 5.2 Define the methodology and tools to implement this consultation

- Three interviews (f2f) per Task Group (primary stakeholder)
- Two interviews (telcos) per Task Group (TG) member with common questions (next primary stakeholder)
- Online survey/questionnaire (Other stakeholders)

### 5.3 Define relevant stakeholders (and also existing studies, reports)

- Selection of regions (e.g. via NEREUS or regions active in EO/Copernicus initiative) / define number
- Each TG member brings its knowledge and identifies contacts, including CSO
- Prioritise stakeholders for consultation (designation of primary, secondary, other stakeholders)

### 5.4 Analyse the data

- Deskwork gathering the consultation content

### 5.5 Synthetise

- Draft the 'consultation's outcome and report to CERSP

### 5.6 Timing

- Consulting from the ready draft, define timeline for the following steps

First step:

- define consultation questions and implement tools (online survey)
- stakeholder identification, prioritisation
- Roadmap draft release

Second step:

- Interviews carried out



Third step:

- Deskwork / consultation outcome
- Draft consultation outcome

Fourth step::

- Contribution to the deliverable (consultation outcome final version).

## 6 Guidelines for Copernicus Relays

A perspective is needed for Copernicus Relays to operate in the future, this is to come from the initiator of the network of Copernicus Relays and the Copernicus Academy:

### Funding opportunities

- Framework Partnership Agreement
- Horizon 2020/Horizon Europe
- INTERREG
- Other

### Types of actions

- Awareness raising
- Training
- Uptake promotion

### Copernicus Relays and LRAs

- Political engagement
- Technical engagement

### Copernicus Relays and SMEs

- Business incubation
- Business acceleration
- Business development

### Copernicus Relays and Copernicus Academy

- Science development
- Training development

### Copernicus and Galileo

- Synergies to exploit

### Copernicus Interface / Copernicus Champions

- To be established in relevant regional/local offices/public agencies/authorities to promote the uptake of Copernicus data and services, to identify regional/local users' needs and to collect their feedbacks, in order to develop pilot projects, to jointly design tailor made products and services, etc.
- Perform a systematic collection and analysis of regional/local user needs and feedbacks (e.g. training need, services' costs and funding, barriers, improvement legislation and innovation and pre-commercial procurement, etc.)
- Focus on local expertise/demand (e.g. LRAs already using geospatial data and ICT infrastructures, private companies with expertise on ICT, GIS, etc.)

- Rely on existing INSPIRE SDI and describe in geocatalogs EO data and products in “application/user” terms and in the local language
- Encourage with specific calls collaboration between research laboratories/privates companies/ LRAs and “Copernicus interface” entity (allowing a transfer);
- Bring Copernicus/EO data in peculiar, “non-space” regional sectors.

#### Relation to Copernicus Academy

- Potential to concentrate on technical outcome of CopHub.AC, pursuing - amongst others - to regionalize the Copernicus-relevant expertise in Europe in order to allow for regional / local queries, in two ways or combined: thematic expertise (application domains, i.e. core services and below) or methodological competence. In the Copernicus Academy’s “Knowledge Landscape”, these expertises are presented in an extended WebGIS solution, to be queried through the Citizen App, as an important tool for the local / regional authorities and Copernicus Relays.
- Synergies with the CopHub.AC road map: Recommendations on the Copernicus Academy and its relation to the Copernicus Relays. (Concept of a Copernicus Hub, ideally anchored regionally, uniting Copernicus Relays and Copernicus Academy members on regional level).

## 7 Annex

### List of convincing arguments for the use of Earth Observation / Copernicus data by public authorities

- Targeted at politicians, ministries and presidents of local regional agencies reporting to ministries
- Targeted at technicians working in above institutions, implementing the work necessary to use EO/Copernicus data.
- Targeted at heads of Copernicus Relays.