PROCURING INNOVATIVE CLIMATE CHANGE SERVICES

Market Consultation Document

(including Annexes)

Open Market Consultation for the future Pre-Commercial Procurement of R&D services of innovative Climate Services based on Earth Observation in four challenges:

FLOODS, FIRE, WATER &

SUSTAINABLE INFRASTRUCTURE

September 2023

This project has received funding from the Horizon Europe Framework Programme (HORIZON) under grant agreement No 101060592

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Abbreviations and Acronyms

AKIS	Agricultural Knowledge and Innovation Systems
COTS	Commercial Off-The-Shelf
CS	Climate Services
DPO	Data Protection Officer
EAFIP	European Assistance for Innovation Procurement
EO	Earth Observation
EU	European Union
FAIR	Findable, Accessible, Interoperable and Reusable
FRAND	Fair, Reasonable and Non-Discriminatory
GEOSS	Global Earth Observation System of Systems
GDPR	General Data Protection Regulation
HAA	Haarlem
HE	Horizon Europe
IPRs	Intellectual Property Rights
NDA	Non-Disclosure Agreement
OMC	Open Market Consultation
PBG	Public Buyers Group
PC	Project Coordinator
PCP	Pre-Commercial Procurement
PIN	Prior Information Notice
R&D	Research and Development
SMEs	Small and Medium Enterprises
SOTA	State of the Art
TED	Tenders Electronic Daily
TRL	Technology Readiness Level

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1. Introduction

Disclaimer and Copyright

It should be noted that this document and its annexes are based upon the information publicly available to the PROTECT project (including but not limited to information on the upcoming pre-commercial procurement call of the European Commission on the "Customisation/pre-operationalisation of prototypes end-user services in the area Climate Change Adaptation and Mitigation"). As such, the PROTECT project and any of its partners cannot guarantee the accuracy and/or completeness of this information and the actions and measures based upon this information. It is recommended to access the relevant EU platforms to receive the actual relevant information and updates thereof.

This document (including the accompanying annexes) has been drafted with the utmost care, but no guarantees are given regarding its soundness and/or completeness. Any errors or inaccuracies can be reported via email to (info-PROTECT@group-gac.com)

The PROTECT-PCP Consortium is not responsible for the correct operation of any URL mentioned in this document, nor for the proper functioning of any used electronic platform (for example the EU survey system). Any problems encountered when using a URL and / or an electronic platform must be reported to the organisation that makes the URL or the electronic platform available. Problems with downloading and uploading (of documents) must also be reported via email to (info-PROTECT@group-gac.com)

Economic operators and other stakeholders are being informed that any information regarding the setup and execution of both the procurement process and the execution of any contract/framework agreement as a result of the procurement process as well as public summaries of the results of the PCP project, including information about key R&D results attained and lessons learnt by the procurers during the PCP, can be shared after consultation with the respective R&D provider by the PROTECT-PCP Group with(in) the context of the contract and consequently can be analysed, (re-)used and published by the PROTECT. Details should not be disclosed that would hinder application of the law, would be contrary to the public interest, would harm the legitimate business interests of the R&D

[1] The Horizon Europe PCP call HORIZON-CL6-2021-GOVERNANCE-01-15 will on 17 October 2023. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-9-food-bioeconomy-natural-resources-agriculture-and-environment_horizon-2023-2024_en.pdf The implementation of the PCP depends on the obtention of this funding by the potential public buyers. https://www.protect-pcp.eu/pcp-call/

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providers involved in the PCP or could distort fair competition between the participating R&D providers or others on the market.

PROTECT project receives funding under the European Union's Horizon Europe framework program for research and innovation under the grant agreement grant agreement No 101060592. The EU is however not participating as a contracting authority in the procurement.

A Prior Information Notice (PIN) has been published in Tenders Electronic Daily (TED) to announce the Open Market Consultation on potential future procurement activity: https://ted.europa.eu/udl?uri=TED:NOTICE:574857-2023:TEXT:EN:HTML&src=0

2. Purpose of the Open Market Consultation

2.1. Scope and main objectives

This document describes the objectives and rules applicable to the Open Market Consultation (OMC) of the PROTECT project regarding 4 challenges, namely: Floods, Fire, Water resilience, and Sustainable Infrastructure, as described in this OMC document and annexes.

The OMC begins on the date of its publication in the EU's Supplement to the Official Journal (TED), and ends on the date indicated as such in this document, unless the market consultation terminates prematurely. Through this OMC, the Public Buyers Group (PBG) organized under the PROTECT project aims to inform market operators regarding the upcoming Pre-Commercial Procurement (PCP) of Research and Development (R&D) services for the "Customisation/pre-operationalisation of prototypes end-user services in the area Climate Change Adaptation and Mitigation"[2]. This PCP responds to commonly identified challenges in the area of climate adaptation and mitigation that can be better addressed jointly or that a single procurer could not otherwise have addressed alone. The PROTECT project and challenges are explained in the following sections.

In this context, the purpose of the OMC is to inform also relevant stakeholders, users and market players to gather their input about the PROTECT challenges on:

- Mapping and predicting **FLOODS** (marine, riverine and other sources)
- Prediction and prevention of **FIRES** and tracing and tracking responsible sources (waste, forest/nature, other)
- Climate resilient **WATER** solutions (prediction, connecting data, planning, supply-demand)
- Sustainable & resilient **INFRASTRUCTURE** (sustainable re-development, buildings restoring & adaptation).

Another objective of the OMC is to understand the market operators' capabilities to satisfy the PBG's needs and to obtain their input on the viability of the procurement plans and conditions as described in this document and annexes.

In sum, the objectives of this OMC are to:

1) Validate the findings of the State-Of-The-Art (SOTA) analysis and the viability of the set of technical and financial provisions.
2) Raise awareness of the industry and relevant stakeholders (including other users) regarding the upcoming PCP.
3) Collect insights from the industry and relevant stakeholders (including users) to finetune the tender specifications.

This OMC is performed under the law of the lead procurer (HAA), which is Dutch law.

[22] The upcoming €19 million pre-commercial procurement call is fully funded by the EU. The goal of the "Customisation/pre-operationalisation of prototypes end-user services in the area Climate Change Adaptation and Mitigation" call is for a consortium of public procurers (the "buyers group") to prepare, launch and implement a pre-commercial procurement procedure that responds to a commonly identified challenge in the area of climate adaptation and mitigation. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-9-food-bioeconomy-natural-resources-agriculture-and-environment_horizon-2023-2024_en.pdf#page=555

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The Public Buyers involved in the PROTECT project are not legally bound in any way by the outcome of the OMC.

Starting an OMC does not mean that the PBG in the PROTECT project is obliges to start a tendering or purchasing procedure. If this OMC is followed by a tendering procedure and/or purchasing procedure, the PBG reserves the right to adjust and/or supplement the solution described in this document on every element. No rights can be derived from statements and/or communications during this OMC in any future tendering procedure and/or purchasing procedure.

The OMC is not part of any pre-qualification or selection process. No advantage or disadvantage will be given to any supplier / group of suppliers to the detriment of others during the OMC and the sub-sequent competitive procedure for the award of contracts.

All information provided during the OMC and other background information will be published online in English.

Where appropriate, parts of the information received from market parties can be shared with the European Commission.

2.2. Who can participate?

The target groups of this OMC are users and technology vendors. All interested parties are invited to take part in the OMC. However, participation in the PCP will be restricted to companies from EU and Associated Countries.

Participation in the OMC is voluntary and non-binding, and is at the own expense and risk of market operators. A market operator cannot charge any costs to the PBG for participation in the OMC or for (re-)use of its information in the context of a future procurement procedure.

Participation in this OMC is not a condition for submitting a tender in the subsequent procurement, does not lead to any rights or privileges for the participants, and is not part of any pre-qualification or selection process. The provided input in this OMC will not be used to evaluate future proposals.

The webinars celebrated within the framework of the OMC will be recorded. By using your video and microphone during the webinars you will be consenting to be recorded. If you do not want your voice and image to be recorded during the webinars, you may ask your questions using the chat. The PROTECT Consortium shall use those records for the purpose of the project only.

In addition, please be aware that photos may be taken during the meetings/webinars. The PROTECT Consortium shall use those photos for the purpose of the project only.

2.3. Activities

The market consultation will take place in the form of:

- **Four webinars** which will take place in November 2023. The webinars will be carried out in English and broadcasted online.
- **A request for information** in the form of an EU Survey questionnaire.
- **Other activities and questionnaires** as deemed necessary within the scope of the project.

The PROTECT Consortium is entitled to adjust the planned activities or to include new activities at any time according to the needs and responses of the market.

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2.4. Registration

Parties interested in participating in the OMC activities are requested to register here: Open Market Consultations – PROTECT (protect-pcp.eu)

2.5. Timetable

The timetable of activities and required actions of the OMC is as follows:

Date	Event
20 September 2023	Publication of the Prior Information Notice (PIN) on TED
25 September 2023	Publication of the OMC documents in the project's website and EU Survey: https://ec.europa.eu/eusurvey/runner/PROTECT-PCP-2023 Open registration for the events and submission of questions
1 October 2023	Deadline to submit questions (17:00 CET)
5 October 2023	Publication of the Q&A document in the project's website
14 November 2023	Deadline to register for the webinars (17:00 CET)
15-16 November 2023	4 OMC webinars
17 November 2023	Deadline to fill in the EU Survey (17:00 CET)
25 November 2023	Publication of the OMC report
30 November 2023	Closure of the OMC

The PROTECT Consortium is entitled to adjust the timetable above and to terminate the OMC for its own reasons at any time. In such a case, the PROTECT PCP Consortium will publish such modifications or termination on TED and the project's website (https://www.protect-pcp.eu/).

2.6. Procedure

The OMC starts on the date of its publication in the EU's Supplement to the Official Journal (TED) and ends on the date set in the timetable, unless terminated earlier.

Interested parties are requested to register through the EU Survey link provided above, in order to participate in the events and receive additional information of the project. The questionnaire should be filled out before the deadline indicated in the timetable above.

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The PROTECT Consortium will be engaged in supporting interested parties throughout the whole OMC during the webinars, and by answering questions through a Q&A document which will be published in the project's website.

Additional written contributions in the form of a Request For Information (RFI) questionnaire or other questionnaires (via the EU survey platform) aiming to collect market information on innovative and commercial solutions may be requested.

The responses to the questionnaires should not contain any confidential information. As the questionnaire is intended to explore the market 'as is', there are no wrong or right answers. The answers provided will be used as input for the procurement strategy and contract conditions.

In case the information provided in this document and annexes needs further clarification, market operators may ask questions during the webinars, events, or via the contact email address provided above.

Market operators that wish to provide additional confidential information during this OMC can send this to the contact person (info-PROTECT@group-gac.com). The information must be clearly marked as confidential. Confidential information will not be included in the OMC report.

The original language of this market consultation is English.

2.7. Open Market Consultation report

After processing and analysing the answers, the PROTECT Consortium will disseminate the results to the widest possible audience. Nevertheless, all answers provided by market parties will be anonymized and treated as confidential. The PROTECT Consortium will therefore not provide information about specific answers from market operators. Only the general findings and a summary of the answers will be provided. The results of this OMC will in any case be published on the project's website.

2.8. Annexes

The following annexes are part of this document:

- Annex 1 – EU Survey questionnaire
- Annex 2 – PROTECT Challenges and Use Cases
- Annex 3 – Summary of e-Pitching results
- Annex 4 – Summary of COTS products/services
- Annex 5 - Methodology

The annexes form an integral and inseparable part of this OMC document. In the event of any conflict between the provisions of this document and the annexes, the provisions of the OMC document shall prevail.

Please note that the questionnaire in EU Survey is expressly qualified as an annex to this OMC document and is not a stand-alone document, but is part of a set of documents.

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3. The PROTECT project

3.1. Context and objectives

PROTECT supports urgent action for climate adaptation, mitigation and resilience. It brings together Public Buyers from different EU countries that use the PCP approach in order to foster and speed up the development of innovative solutions for Climate Services (CS) based on Earth Observation that best fit the specific and systemic needs of the public demand. The focus is on four challenges identified across five application domains, namely: Energy & Utilities, Sustainable Urban Communities, Agriculture, Forestry and other Land use, Marine and Coastal Environments and Civil Security and Protection.

PROTECT will source and assess existing and high-potential CS solutions and technologies that use Earth Observation data. PROTECT engages with an extensive and varied community of procurers, for the definition and aggregation of their needs and functional requirements for climate services, explaining, fostering and supporting a 'buying with impact' approach.

PROTECT is preparing the operational ground for a pre-commercial procurement (PCP) proposal in response to the Horizon Europe pre-commercial procurement call "Customisation/pre-operationalisation of prototypes end-user services in the area Climate Change Adaptation and Mitigation" fully funded by the EU with to €19 million. The goal of the call is for a consortium of public procurers (Public Buyers Group) to prepare, launch and implement a PCP procedure that responds to commonly identified challenges in the area of climate adaptation and mitigation.[3]

3.2. PCP challenge and main requirements

The envisaged future PCP – i.e. a joint procurement of R&D services – is intended to be launched to reinforce public demand driven innovation in end-user services in the area of climate adaptation and mitigation. PCP has the potential to be an effective demand-side innovation action and a useful tool to close the gap between supply and demand for innovative solutions. **Solutions are expected to achieve TRL 7-8.**

The future PCP should deliver successful innovative and fully tested product(s) and/or service(s) that meet the common needs of the PBG to procure research, develop innovative marketable solutions, speed up the time-to-market and provide best value for money.

The common needs of the Public Buyers relate to specific functionalities related to 4 challenges across application domains (further described in Annex 2):

1. **FLOODS CHALLENGE:** rapid-mapping, predicting, preventing different types of floods and improving coordination efforts, relevant to marine and coastal environments, sustainable cities and civil protection and security agencies.
2. **FIRES CHALLENGE:** predicting, preventing fires, tracking and tracing causality (causers) in different scenarios (waste, forest/nature, other), relevant to environmental agencies, sustainable cities, agriculture, forestry and land use, as well as for civil protection and security agencies.
3. **WATER CHALLENGE:** climate resilient solutions for predicting, connecting data, planning, supply-demand, relevant to the application domains marine and coastal environments, energy

[3] HORIZON-CL6-2024-GOVERNANCE-01-5: Customisation/pre-operationalisation of prototypes end-user services in the area Climate Change Adaptation and Mitigation. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-9-food-bioeconomy-natural-resources-agriculture-and-environment_horizon-2023-2024_en.pdf#page=555

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and utilities, sustainable cities, agriculture, forestry and land use, as well as for civil protection and security agencies.

4. **INFRASTRUCTURE CHALLENGE:** sustainable and resilient re-development, buildings restoring & adaptation), relevant to sustainable cities, energy and utilities and civil protection and security agencies.

The future PCP on the customization/pre-operationalisation of prototypes of end-user services in the area of Climate Change Adaptation and Mitigation will be contributing to the European Green Deal related domains benefiting from further deployment, uptake and exploitation of Environmental Observation data and products. Furthermore, it will be contributing to fit-for-purpose Environmental Observation Systems and a strengthened Global Earth Observation System of Systems (GEOSS).[4]

GEOSS is a set of coordinated, independent Earth observation, information and processing systems that interact and provide access to diverse information for a broad range of users in both public and private sectors. GEOSS links these systems to strengthen the monitoring of the state of the Earth. It facilitates the sharing of environmental data and information collected from the large array of observing systems contributed by countries and organizations within GEO. Furthermore, GEOSS ensures that these data are accessible, of identified quality and provenance, and interoperable to support the development of tools and the delivery of information services. Thus, GEOSS increases the understanding of Earth processes and enhances predictive capabilities that underpin sound decision-making: *it provides access to data, information and knowledge to a wide variety of users*.

If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, they must make use of Copernicus and/or Galileo/EGNOS (although other data and services may additionally be used).

The envisaged future PCP is expected to contribute to all of the following outcomes:

- **Customisation/pre-operationalisation of prototypes end-user services** in the area Climate Change Adaptation and Mitigation, **building on the Copernicus[5] Services** that respond to the common needs and beyond state-of-the-art performance targets of the PBG.
- **Reduction of fragmentation of demand for innovative solutions** by enabling public procurers to collectively implement a PCP in the area of climate adaptation and mitigation, which, due to their nature, are better addressed jointly, or which they would not have been able to tackle independently.
- **New opportunities for wide market uptake and economies of scale for the supply side** through the use of joint specifications, wide publication of results and – where relevant – contribution to standardization, regulation or certification to remove barriers for introduction of innovations into the market and creation of new products, processes and/or services ready for market uptake, leading to viable new businesses, jobs and sustainable economic growth.

The follow-up of the joint PCP procurement will include activities for awareness raising, networking, training, evaluation, validation and dissemination of results.

The future PCP proposal will build on the outcomes coming from the PROTECT project funded under HORIZON-CL6-2021-GOVERNANCE-01-15: Preparing for pre-commercial procurement (PCP) for end-user services based on environmental observation in the area of climate change adaptation and mitigation (the PROTECT project), the work done previously under Horizon 2020 and Horizon Europe (e.g., from e-shape, climate service projects and downstream services projects), and GEOSS initiatives.

[4] The mission of the Group on Earth Observations is to build the Global Earth Observation System of Systems (GEOSS) GEOSS (earthobservations.org) https://www.earthobservations.org/geoss.php.

[5] https://www.copernicus.eu/en

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The jointly identified challenges fit into the mid-to-long-term innovation plans of the PBG. The OMC, thus, aims to confirm that solutions currently available on the market or under development are not meeting their needs, and put forward concrete targets for the desired functionality/performance improvement in the quality and efficiency of their public services.

The future solutions should take advantage of the use, uptake, and deployment of environmental observations as well as digital and data-based green solutions, assessed through the European Green Deal's 'do no harm' principle, **to contribute to innovative governance models and for designing, implementing and monitoring science-based policy.**

The project to be carried out under the HE-funded PCP should contribute to Innovative governance supporting the European Green Deal objectives recognizing, coping with and promoting resilience and inclusiveness in the face of on-going shocks and disruptions across Europe and the world, whether these be climatic, ecological, economic, social, geopolitical or related to agricultural inputs and resources, food, health, bio-based sectors or the wider bioeconomy. The creation of networks with the public (citizen engagement) and researchers, including also through digital technologies, can step up transformation and enhance resilience in different areas, such as food.[6]

Critical risk assessment and reduction strategies need to be incorporated, including the diversification of infrastructures, resources and knowledge through more self-sufficiency and autonomy.

Innovative governance will: i) support social innovation in the bioeconomy and bio-based systems (e.g. revitalization of local communities with innovative bio-based business models and social innovation, or with co-creation and trust-building measures for biotechnology and bio-based innovation systems); ii) assess existing and emerging trade-offs of land and biomass; and iii) strengthen the national bioeconomy networks in countries taking part in the Central-Eastern European Initiative for Knowledge-Based Agriculture, Aquaculture and Forestry in the Bioeconomy (BIOEAST Initiative).[7]

Deploying and adding value to environmental observations

Data and information obtained through environmental observation is of great value when assessing the state of the planet and is crucial to supporting the European Green Deal and the climate and ecological transitions.

It is foreseen the integration of information from different sources (space-based, airborne including drones, in-situ and citizens observations) with other relevant data and knowledge while ensuring (better) accessible, interoperable or deployable information for shaping the direction of policy development with a link to Copernicus, the European Earth observation and monitoring part of the EU Space programme and the European Space Agency's (ESA) Earth observation programme, as well as support to the Group on Earth Observation (GEO), its European regional initiative (EuroGEO), the Global Earth Observation System of Systems (GEOSS) and the European Commission initiative Destination Earth.[8]

R&I activities relevant to the ocean, seas and coastal waters will complement and support the UN Decade of Ocean Science for Sustainable Development and the UN Decade on Ecosystem Restoration,

[6] The new partnership 'Agriculture of Data' will help improve the sustainability performance of agricultural production and strengthen policy monitoring and evaluation capacities through using the full potential of Earth and environmental observation and data technologies. It will address public and private sector interests in a synergetic way. This will be done through responsible R&I delivering data-based green solutions and through establishing governance structures which allow for systemic approaches to capitalising and using data. The partnership for a 'Climate-neutral, sustainable and productive Blue Economy' will enable a just and inclusive transition to a climate-neutral, sustainable and productive blue economy providing for a healthy ocean, people's wellbeing, and a blue economy that is in harmony with nature and whose benefits are distributed fairly.

[7] https://bioeast.eu/

[8] https://digital-strategy.ec.europa.eu/en/policies/destination-earth

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the G7 Future of the Seas and Oceans Initiative, the European Global Ocean Observing System (EOOS) and the GOOS 2030 strategy.

Digital and data technologies as key enablers

Digital and data-based innovation, in complementarity with the Digital Europe Programme, should bring benefits for citizens, businesses, researchers, the environment, society at large and policymakers. The potential of the ongoing digital transformation, and its wider impacts – both positive and negative – need to be better understood and monitored in view of future policy design and implementation, governance, and solution development.

The potential for digital and data technologies, including AI-, IoT-, and augmented reality-based solutions, should be applied to increase the sustainability and resilience of production and consumption systems, as well as industry and services.

Solutions should contribute to the development, support and take up of innovative digital and data-based solutions to support communities, economic sectors and society at large to achieve sustainability objectives. The focus is on overall sustainable solutions tailored to the needs of end-users and/or the systems. More specifically, R&I activities will contribute to economic circularity by promoting reuse of materials and waste reduction, adding value to existing knowledge and increasing cost-effectiveness, safety and trustworthiness of innovative environmentally-friendly technologies in and across primary production sectors, food systems, bio-based sectors, bioeconomy, and sectors related to the oceans and biodiversity.

Particular attention should be given to precision and collaborative technologies and contribute to the human-centric twin green and digital transitions. This is a key policy objective that is also supported by the cross-cutting objective of the EU digital strategy, the European industrial strategy, the circular economy action plan, the SME strategy and the European data strategy.

Strengthening Agricultural Knowledge and Innovation Systems (AKIS)[9] is also relevant.

Knowledge and advice to all relevant actors are key to improving sustainability. For instance, primary producers have a particular need for impartial and tailored advice on sustainable management choices. AKIS go beyond agriculture, farming and rural activities and cover environment, climate, biodiversity, landscape, bioeconomy, consumers and citizens, i.e. all food and bio-based systems including value chains up to the consumer. Effective AKIS is a key driver to bridge the gap between science and practice and to enhance co-creation. This will speed up innovation and the take-up of results needed to achieve the European Green Deal objectives and targets.

This includes promoting interactive innovation and co-ownership of results by users as well as strengthening synergies with other EU funds, especially boosting the multi-actor approach and setting up structural networking within national/regional/local AKIS. In addition, social innovation also has the potential to achieve the objectives set in this destination, as it strengthens the resilience of communities, increases the relevance, acceptance and uptake of innovation, and helps bring about lasting changes in social practices, therefore acting as a system changer.

Where appropriate, proposals are encouraged to cooperate with the European Commission Knowledge Centre on Earth Observation (KCEO).[10]

[9] AKIS refers to the organisation and knowledge flows between persons, organisations and institutions who use and produce knowledge for agriculture and interrelated fields.
[10] https://knowledge4policy.ec.europa.eu/earthobservation_en

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Expected impact

PCP proposals should set out a credible pathway contributing to innovative governance and sound decision-making on policies for the green transition and more specifically to one or more of the following impacts:

- innovative governance models enabling sustainability and resilience notably to achieve better informed decision-making processes, societal engagement and innovation;
- areas related to the European Green Deal benefit from further deployment and exploitation of environmental observation data, products and "green" solutions;
- a strengthened Global Earth Observation System of Systems (GEOSS)[11]
- sustainability performance and competitiveness improved through further deployment of digital and data technologies as key enablers;
- stakeholders and end users including primary producers and consumers are better informed and engaged thanks to effective platforms such as AKIS;
- strengthened EU and international science-policy interfaces to achieve the Sustainable Development Goals.

When considering their impact, proposals also need to assess their compliance with the "Do No Significant Harm" principle according to which the project's R&I activities should not support or carry out activities that cause a significant harm to any of the six environmental objectives of the EU Taxonomy Regulation.[12]

Solutions should have impacts in the following areas:

- "Climate change mitigation and adaptation";
- "Clean and healthy air, water and soil";
- "Enhancing ecosystems and biodiversity on land and in water";
- "High quality digital services for all";
- "A Competitive and secure data-economy".

Social innovation is also relevant when the solution is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake. It is envisaged the coordination with European Space Agency (ESA) actions so that ESA space data and science can be proactively integrated into the relevant research actions.

[11] The European Commission is a member and co-chair of the Group on Earth Observations (GEO), as such the European Commission adopted the GEO Canberra Declaration and Commission Decision C(2019)7337/F1, and committed to contribute to the GEO objectives, including to the Global Earth Observation System of Systems (GEOSS).

[12] As per Article 17 of Regulation (EU) No 2020/852 on the establishment of a framework to facilitate sustainable investment (EU Taxonomy Regulation).

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4. The Pre-Commercial Procurement (PCP) approach

This OMC concerns a future PCP of R&D services to be performed 100% in in the EU Member States or Associated Countries. The PCP process will require selected providers to locate the majority of the R&D activities, including the principal researcher(s) working for the PCP contract in particular, in the Member States or Associated Countries.

PCP is an approach that allows public procurers to buy R&D from several competing suppliers in parallel, to compare alternative solution approaches, and to identify the best value-for-money solutions that the market can deliver to address their needs. In PCP, there is a risk-benefit sharing under market conditions between the public procurer and the suppliers, and a clear separation between the PCP and the deployment of commercial volumes of end-products.

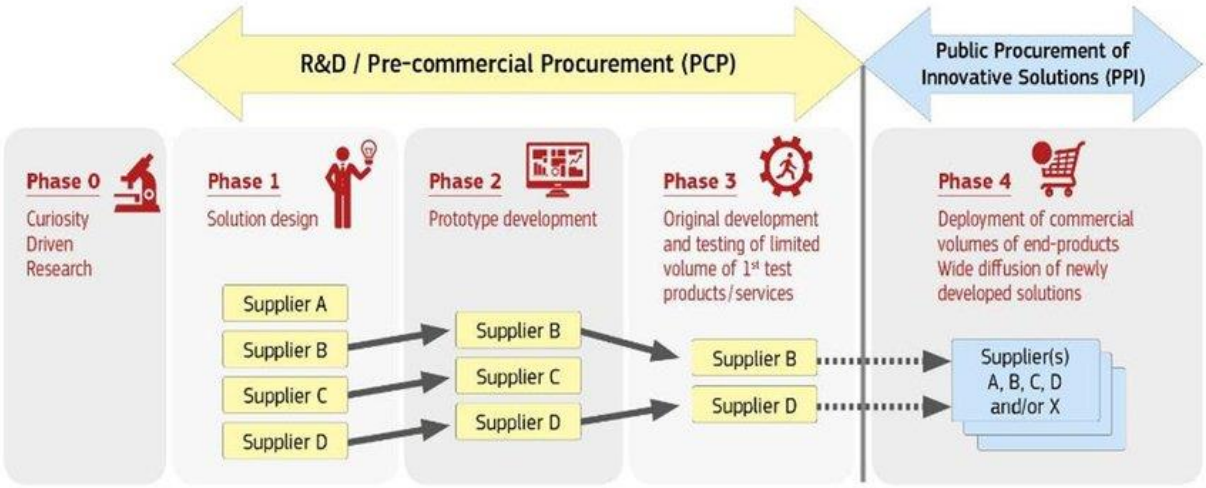

Figure 1: PCP and PPI, according to the European Commission (2016).
Based on "Pre-commercial procurement: driving innovation to ensure sustainable high quality public services in Europe", COM(2007) 799 final.

The value of the total amount of products covered by the contract must be **less than 50 % of the total value of the PCP framework contract.**

The PCP tender will start with the publication of the contract notice along with the request for tenders, the framework agreement, and the phase contracts. After evaluating the offers submitted by the market operators according to the rules established in the tender documents, the contracts will be awarded and a contract award notice will be published. The process will be monitored to ensure sound deployment, integration and validation of the PCP.

The PCP procedure is composed of three phases of solution design, prototype implementation, and validation and demonstration of the solutions.

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- **Phase 1. Solution design:** During this Phase, the awarded R&D providers will be asked to describe the solution providing the complete architecture and design of the solution and verifying the technical, economic and organizational feasibility of their solution based on requirements for the interoperable platform from all procurers. The expected duration of this Phase will be 4 months.

- **Phase 2. Prototype implementation:** This Phase concerns the development of the first prototypes of the solutions, which will be tested. Qualified contractors will develop a first prototype based on the design documents delivered in the previous phase and test their solutions at the procurers' premises under (lab) controlled conditions. The expected duration of this Phase will be 8 months.

- **Phase 3. Validation and demonstration of the solutions (Piloting):** This Phase will deal with testing and validation of the selected solutions (up to three per selected challenge) in operational environments. The quality and maturity of the solutions will be tested with end users from the participating organizations within the framework of the project. During Phase 3, a feedback mechanism will be established between the Public Buyers Group and the selected contractors in order for the latter to receive requests for improvements directly from the end users. The Public Buyers will request from the contractors an Integration Report. Finally, a Field Acceptance Report related to the accomplishment that the final solutions which have been deployed and that the validation tests have been successfully performed in a real operational environment will be requested. The expected duration of this Phase will be 6 months.

After each phase, intermediate evaluations will be carried out to progressively select the best solutions. Contractors that are evaluated as successful after Phase 1 will be invited to bid for Phase 2 contracts. Likewise, contractors that are evaluated positively after Phase 2 will be invited to bid for Phase 3 contracts. During Phases 2 and 3, contractors will be invited to communicate with the PROTECT PCP Consortium about the requirements for electronic control and a user interface for operation of the prototypes to ensure that the developments made within the project.

In principle, two out of the four challenges, depending on the OMC results, will be tackled in two different PCP lots. In phase 3, up to three selected solutions may be tested per lot.

The law applicable to the potential future PCP will be the law of the lead procurer, which may be Dutch law.

Budget per phase

The tables below present an overview of the details of each PCP Phases including the expected number of suppliers, the budget per supplier and the duration of each phase. In case of less suppliers admitted to each phase based on the evaluation (award) criteria, the remaining budget may be shifted to increase the budget for the successful suppliers in the next phase.

Four alternative options are explored in the tables below. These details are purely indicative and may be reassessed based on the feedback resulting from the OMC.

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OPTION 1

Expected number of suppliers (Lot 1 and Lot 2)		Max. budget per supplier (VAT included)	Total budget per phase (VAT included)	Phase duration
Phase 1 solution design	**40 suppliers** Challenge 1: 20 Challenge 2: 20	**Challenge 1**: 20x50.000 € **Challenge 2:** 20x50.000 €	**Challenge 1:** 1'000.000 € **Challenge 2:** 1'000.000 € **Total: 2'000.000 €**	4 months
Phase 2 prototype development	**20 suppliers** Challenge 1: 10 Challenge 2: 10	**Challenge 1:** 10x400.000€ Challenge 2: 10x400.000€	**Challenge 1**: 4'000.000 € **Challenge 2**: 4'000.000 € **Total: 8'000.000 €**	8 months
Phase 3 testing and validation	**6 suppliers** Challenge 1: 3 Challenge 2: 3	**Challenge 1:** 3x1'000.000 € Challenge 2: 3x1'000.000 €	**Challenge 1**: 3'000.000 € **Challenge 2:** 3'000.000 € **Total: 6'000.000 €**	6 months
Total maximum			**16'000.000**	**18 months**

Table 1: PCP phases including number of suppliers, budget and duration (Option 1)

OPTION 2

Expected number of suppliers (Lot 1 and Lot 2)		Max. budget per supplier (VAT included)	Total budget per phase (VAT included)	Phase duration
Phase 1 solution design	**30 suppliers** Challenge 1: 15 Challenge 2: 15	**Challenge 1**: 15x70.000 € **Challenge 2**: 15x70.000 €	**Challenge 1:** 1'050.000 € **Challenge 2**: 1'050.000 € **Total: 2'100.000 €**	4 months
Phase 2 prototype development	**10 suppliers** Challenge 1: 5 Challenge 2: 5	**Challenge 1:** 5x800.000€ **Challenge 2:** 5x800.000€	**Challenge 1**: 4'000.000 € **Challenge 2**: 4'000.000 € **Total: 8'000.000 €**	8 months
Phase 3 testing and validation	**4 suppliers** Challenge 1: 2 Challenge 2: 2	**Challenge 1:** 2x1'500.000 € **Challenge 2:** 2x1'500.000 €	**Challenge 1**: 3'000.000 € **Challenge 2**: 3'000.000 € **Total: 6'000.000 €**	6 months
Total maximum			**16'100.000**	**18 months**

Table 2: PCP phases including number of suppliers, budget and duration (Option 2)

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OPTION 3

Expected number of suppliers One challenge		Max. budget per supplier (VAT included)	Total budget per phase (VAT included)	Phase duration
Phase 1 solution design	**20 suppliers**	20x100.000	2'000.000 €	4 months
Phase 2 prototype development	**6 suppliers**	6x1'300.000€	7'800.000 €	8 months
Phase 3 testing and validation	**2 suppliers**	2x2'000.000 €	4'000.000 €	6 months
Total maximum			**13'800.000**	**18 months**

Table 3: PCP phases including number of suppliers, budget and duration (Option 3)

OPTION 4

Expected number of suppliers One challenge		Max. budget per supplier (VAT included)	Total budget per phase (VAT included)	Phase duration
Phase 1 solution design	**15 suppliers**	15x130.000	1'950.000 €	4 months
Phase 2 prototype development	**5 suppliers**	5x1'600.000€	8'000.000 €	8 months
Phase 3 testing and validation	**2 suppliers**	2x2'000.000 €	4'000.000 €	6 months
Total maximum			**13'950.000**	**18 months**

Table 4: PCP phases including number of suppliers, budget and duration (Option 4)

For payment purposes, the technical committees will decide whether the results delivered by the contractors are non-satisfactory, satisfactory, or whether R&D providers achieved successful completion, after each phase. Only the successful contractors will be eligible to pass to the next PCP phase.

If there is leftover budget from the previous phases, it may be transferred to the next phase. Therefore, the total budget available for phases 2 and 3 may eventually be higher than stated. The right – but not the obligation – to swift budgets could be reserved in the PCP. The total value of the contracts awarded could also be lower than initially expected.

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The participation in Phase 3 will be limited to 3 contractors per lot (per challenge). The exact maximum budget will be defined based on the OMC results.

4.1. The Potential Public Buyers

The PROTECT project has received interest from 19 public organisations who could be potential Public Buyers (for a future possible PCP) from 13 EU Member States: The Netherlands, Finland, France, Belgium, Italy, Portugal, Hungary, Slovakia, Latvia, Spain, Romania, Greece and Cyprus.

These organisations have expressed their initial interest but have no further obligation with regard to the commitment of a future PCP, but are interested in participating in the OMC to define any further actions. The 19 potential Public Buyers are:

1. Municipality of Haarlem, The Netherlands – https://haarlem.nl/
2. City of Nice, France – https://www.nice.fr/fr/
3. DCMR, The Netherlands – https://www.dcmr.nl/locaties/zuid-holland/rotterdam
4. Het Waterschapshuis - https://www.hetwaterschapshuis.nl/
5. Las Rozas Municipality, Spain – https://www.lasrozas.es/
6. Ministry of Interior of the Slovak Republic – https://www.minv.sk/?ministry-of-interior
7. City of Helsinki, Finland – https://www.hel.fi/en
8. City of Cannes, France – https://www.cannes.com/fr/mairie/conseil-municipal.html
9. City of Riga, Latvia – https://www.riga.lv/lv
10. Hungarian Civil Protection Association Town – http://www.mpvsz.hu/EN
11. Arpae Emilia Romagna Climate Observatory, Italy - https://www.arpae.it/it/attivita-e-servizi/osservatori-clima-e-energia
12. Agenzia Regionale per la Protezione dell'Ambiente della Lombardia, Italy – https://www.arpalombardia.it/
13. City of Geel, Belgium – https://www.geel.be/
14. City of Lisbon, Portugal – https://www.lisboa.pt/en/municipio/home
15. Region of Central Macedonia – One Stop Liaison Office – https://www.ris3rcm.eu/en/about/strategy-ris3/
16. Forum Virium Helsinki – https://forumvirium.fi/en/
17. ROVEST Cluster Romania – https://rovest.eu/index.php
18. CERTH Greece – https://www.certh.gr/root.en.aspx
19. Cyprus Energy Agency – www.cea.org.cy

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4.2. Intellectual Property Rights

Intellectual Property Rights (IPRs) are the rights that adhere to creations and grant the holder(s) thereof a monopoly on the use of that creation for a specified period and subject to certain exceptions. The underlying aim of granting such (temporary) monopoly is to incentivise creators to share their creation with the public, and to achieve the social benefits of increased creative activity.

Traditional IPRs – such as patent, copyright and trademark – are generally fully disclosed to the public domain, meaning that the essential qualities of the protected subject matter are made available for public inspection. Public and third party use of IPRs is however curtailed by the requirement of needing a 'license' to use the IPR productively.

We can distinguish between "background IPR", "sideground IPR" and "foreground IPR" depending on when they are generated.

"Background IPR" refers to the pre-existing intellectual property and trade secrets produced before the project and which the parties (public buyers and contractors) bring to the PCP, and which may be built-upon, modified or improved during the procurement. As a general rule, the background IPR remains the property of the party who generated it. Given this, access rights may need to be granted to the public buyers to ensure that they are able to conduct the activities they are involved in during the PCP (e.g., analysing and testing of solutions) and to use the PCP results that incorporate background IPR.

"Sideground IPR" refers to intellectual property produced during the period of the PCP but not in the activities covered by the PCP contract itself. In the vast majority of cases, the sideground IPR remains the property of the party who generated it. Given this, access rights may need to be granted to public procurers to ensure they are able to conduct the activities they are involved in during the PCP project (e.g., analysing and testing of solutions) and to use the PCP results, which incorporate the sideground IPR.

"Foreground IPR" refers to the intellectual property and trade secrets produced in and during the PCP.

In potential future PCP, the contractors will retain ownership of the IPRs that they will generate during the PCP and will be able to use them to exploit the full market potential of the developed solutions. Contractors will be in a position to commercialise the innovations derived from a public procurement, to secure the appropriate protection of the intellectual property and to defend – if necessary – the intellectual property rights in court. In exchange, the public buyers will receive an irrevocable, indefinite, worldwide, royalty-free, non-exclusive license to use all project's results at no additional cost. Moreover, it might have the right to require the companies that participate in the PCP to license the results to other third parties, under FRAND conditions.

In case of non-exploitation of the results or abuse of the results against public interests or failure to commercialize the results, the PBG will have the right to require the transfer of the IPRs generated by the company during the PCP (call back clause).

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5. State-of-the-art analysis: Preliminary results

The main aim of the state-of-the-art (SOTA) analysis is to identify the room for innovation to set the grounds for a future PCP. The SOTA analysis consists of three activities: (i) analysis of the Intellectual Property Rights (IPR) - listing the existing patents, standards; (ii) Commercial-Off-The-Shelf (COTS) products mapping; and (iii) analysis of the material collected, translating this into a list of technologies and assessment of the TRL level of these technologies

The preliminary results of the SOTA analysis are based on the IPR and standards search using keywords on the IPlytics intelligent platform (https://www.iplytics.com/), the e-Pitching sessions conducted on 18th and 19th September (see Annex 3) and the COTS mapping (see Annex 4).

During the mapping of the EO-based climate services at EU level performed in the frame of PROTECT, suppliers were able to provide more details regarding the technology used to be able to provide their services. This information in combination with a desk research, concluded that the most used Commercial-Off-The-Shelf (COTS) products by the providers are in fact open data platforms such as Copernicus.

The initial results show that there is research going in related fields to the 4 challenges and solutions tackling some but not all of the functionalities defined under each of the challenges.

The patent results obtained by challenge is summarised as follows.

FLOODS CHALLENGE

The analysis revealed research on the :

- Methods for identifying the probability of occurrence of a flood event (risk indicators)
- Flood measuring and trigger system (usually by making grids of the regions)
- After event evaluation of the affected area
- Flood map production
- Systems and methods are provided for processing observation data.

Technologies & tools: satellite imagery, computer vision, artificial intelligence, multi sensor input (drones etc), image analysis, statistical analysis, and mathematical analysis, kernel algorithm, visible-infrared band images of a region, water based network devices.

FIRE CHALLENGE

The analysis revealed research on the :

- Methods for identifying fire risk level
- Early warning- prediction
- Fire management system (status, monitoring & forecast –estimated progression)
- Maps & graphical representation of fire information

➔ None of the results was related to waste fire specifically but the inventions identified can provide a technological basis for the challenge

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Technologies & tools: satellite imagery, multi sensor input (drones etc), vegetation information, and weather data, statistical analysis, and mathematical analysis, cloud-to-ground lightning distribution characteristics, water based network devices.

WATER CHALLENGE

The analysis revealed research on the :

- Methods for identifying the probability of occurrence of a drought
- Systems and methods are provided for processing observation data
- Methods for identifying risk level
- Early warning- prediction
- Water and drought management system (status, monitoring & forecast –estimated progression)
- Maps & graphical representation of water information

Technologies & tools: satellite imagery, multi sensor input (drones etc), computer vision, vegetation information, and weather data, statistical analysis and mathematical analysis, water based network devices, ground measuring data, GUI, use of database management systems in handling future data.

SUSTAINABLE AND RESILIENT INFRASTRUCTURE CHALLENGE

The analysis revealed research on the :

- After event evaluation of the affected area
- Creation of a thermal map of a region
- Urban heat island detection method
- Systems and methods are provided for processing observation data.
- Analysis of urban morphology
- Methods for monitoring and managing urban water resources and hydrology through a network of stations
- Early warning-prediction
- Methods for identifying risk level

Technologies & tools: digital aerial and satellite imagery, photography, computer vision, artificial intelligence, multi sensor input (drones etc), image analysis, statistical analysis and mathematical analysis, airborne and spaceborne sensors, deep learning, ground-based data gathering, remote sensing data, data modelling, open source geographical data, image processing, remote sensing image and high-resolution remote sensing image.

The analysis of the standards and COTS is still ongoing, and no concrete results can be shared in the current document. The first indications have not revealed any relevant standards on the four challenges. When it comes to the COTS, the initial search indicated that a number of products is available in the market but they can only partially address the gaps and needs of the procurers.
Therefore, the preliminary conclusion is that there are grounds for a PCP in any of the 4 challenges (Floods, Fire, Water and Infrastructure).

The analysis of the standards and COTS is still ongoing, and no concrete results can be shared in the current document. The first indications have revealed a limited number of relevant standards on the three first challenges and non on the fourth challenge (SUSTAINABLE and RESILIENT INFRASTRUCTURE). When it comes to the COTS, the initial search indicated that a number of products is available in the market but they can only partially address the gaps and needs of the procurers. Therefore, the preliminary conclusion is that there are grounds for a PCP in any of the 4 challenges (Floods, Fire, Water and Infrastructure).

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6. Questionnaire (Request for Information)

The request for information consists of a survey which is part of the OMC of PROTECT. It should provide PROTECT Consortium with feedback from the market about the main challenges of the project. The OMC document related to this questionnaire can be found on the project's website https://www.protect-pcp.eu/).

Respondents are invited to answer all the questions in the EU Survey (one survey per company). The results will be considered when drafting the PCP call for tenders, particularly concerning the design, the prototype testing and the evaluation of the solutions.

This survey can also be viewed online via the following link: https://ec.europa.eu/eusurvey/runner/PROTECT-PCP-2023

Please note that taking part in this survey is not a prerequisite for the participation in the future PCP call for tenders and does not give any advantage to any supplier. The meeting will be held in English and must ensure compliance with the principles of transparency and equal treatment. Therefore, no additional information will be disclosed in these meetings. The sole purpose of those meetings is to allow respondents to ask questions while protecting business confidentiality.

All information provided during the OMC and other background information will be anonymized, summarized and published online in English on the project's website.

Your personal data will be collected, processed, stored and used by the PROTECT Consortium with the only purpose of implementing the PROTECT project. Personal data will be treated as strictly confidential according to the General Data Protection Regulation (Regulation 2016/679 of the European Parliament and of the Council - GDPR). You may exercise your right to access your personal data and the right to rectify such data by contacting: (info-PROTECT@group-gac.com)

QUESTIONS FOR SUPPLIERS	
PCP challenge requirements and planning	
1.	Do you have questions about the PCP requirements? If yes, please explain.
2.	Which challenges can you tackle? 1. Floods 2. Fires 3. Water resilience 4. Sustainable infrastructure Please explain.
3.	Can you contribute on the outcomes related to EO? Yes/no Please explain.
4.	Are you able to enhance the development of new environmental information? Yes/no, please explain.

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5.	Are you ready to explore pre-operational European services through the exploitation of new Earth Observation (EO), digital infrastructures and modelling capabilities? Yes/no, please explain.
6.	Do you see problems or contradictions between the PCP requirements and planning? Yes/no Please explain.
7.	Do you have questions/suggestions about the use cases? Yes/no Please explain
State-of-the Art (SOTA) Analysis and TRL	
8.	Do you think there is room for development beyond the state of the art? Yes/no In which specific area?
9.	What developments would you propose?
10.	Do you know the TRL of those solutions/developments?
11.	Do you know any certifications and/or standards that are relevant to the PCP project? If yes, please explain.
Testing strategy	
12.	In your opinion, are the timelines and testing for phases 2 and 3 feasible? Yes/no Please explain
13.	Do you have any comments on the budget assigned per supplier and per phase? Do you prefer option 1, 2, 3 or 4? Yes/no Please explain.
Miscellaneous	
14.	What information do you still need in order to make a good plan of action?
15.	Do you have any suggestions on the open-source data/information requirement of open access? Yes/No
16.	What are the risks associated to the proposed cooperation between stakeholders and EU programmes?
17.	Are there any omissions in these questions? Please explain Yes/No

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18.	Do you have any suggestions?
19.	You may provide suggestions applicable to any of the use cases: FLOODS, FIRE, WATER RESILIENCE & SUSTAINABLE INFRASTRUCTURE

QUESTIONS FOR USERS	
20.	Do you have specific remarks on the functionalities of a specific challenge that should be take into account? Yes/no Please explain
21.	Can you indicate any use cases that you will be interested in, which are not indicated by PROTECT? Yes/no Please explain
22.	Do you know any developments that PROTECT needs to take into account? Yes/no Please explain.
23.	How could you contribute to PROTECT? a) Share in-house developments b) Suggestions for further developments c) Knowledge d) Other
24.	Do you have any suggestions?

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Annexes

ANNEX 1 - EU SURVEY

Available online via the following link:

https://ec.europa.eu/eusurvey/runner/PROTECT-PCP-2023

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ANNEX 2 - PROTECT CHALLENGES & USE CASES

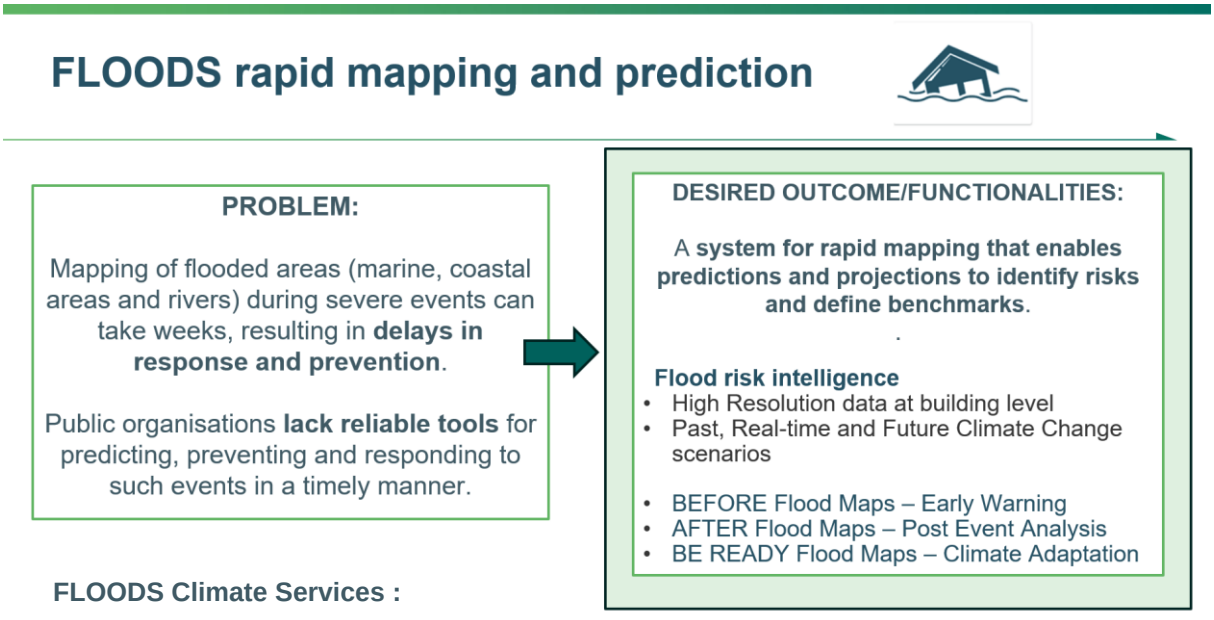
1. Floods challenge

Currently, the mapping of flooded areas (marine, coastal areas and rivers) during severe events can take weeks, resulting in delays in response and prevention. Public organisations lack reliable tools for predicting, preventing and responding to such events in a timely manner.

Some foreseen steps are:

1. Implementing a unified repository for historical data along with a single Application Programming Interface (API)
2. Connecting rapid mapping and climate services to the repository
3. Transforming mapping processes into algorithms for more efficient and automated analysis.
4. Utilising efficient tools and systems to support the mapping and analysis tasks.
5. Ensuring proper utilisation of the tools by a skilled team with the necessary expertise.

The desired outcome is to establish a system for rapid mapping that enables predictions and projections to identify risks and define benchmarks. This will involve the development and utilisation of software capable of higher resolution and timely acquisition of satellite information.



- Digital Twin and EO, climate and geospatial data integration
- Cloud and API based solution
- Fast algorithms for real time mapping
- Specific routine for what if scenarios
- Changing Climate
- Resilient Cities
- User friendly and tailored for non-expert in hydrodynamic model

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BEFORE Flood Maps – Early Warning

- Support Emergency Operations
- Support Early Warning
- Displacement of people at high risk
- Put in place rapid mitigation measures for reducing the damages
- Rapid Mapping tools
- What if scenarios
- River Breaching or overtopping
- Extreme Sea Level
- High Resolution Data
- LIDAR Data'

AFTER Flood Maps – Post Event Analysis

- Flood Mapping from Satellite images
- Copernicus Sentinel
- Cosmo Sky Med
- From Flood Mask to Flood Depth
- Damage Assessment building by building

BE READY Flood Maps – Climate Adaptation

- Support Land Use Planning and Adaptation Strategies in Cities
- Identification of hot spot Risk
- Support in localizing and designing mitigation measures
- Physical Barriers
- Nature based Solution

Currents Gaps and Innovation Needs

High resolution data gaps

- Lack of flood data and risk maps
- Uneven coverage at global level
- Parametric Insurance Not Possible

Complex tools for selected experts

- Cost, Time and CPU-intensive Solutions
- Targeted highly skilled professionals

Static View of Flood Risk

- Not Possible to simulate a changing Resilient City with Adaptation and Mitigation infrastructures
- Multiple hazards/damages and climate scenarios

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Floods in regional adaptation

- **Flood risks figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Marine & coastal: Flooding risks in almost all coastal regions: sea level rise [Med FR,ES,northern IT,northern DE,PL], marine submersion [North and Baltic seas,ES-n,IT-n,FR-se], extreme rainfall, thunderstorms and gales [PL,ES-n], combinations of those factors [DE-n,ES-n,NL,LT,FR-w]
  b) Sustainable urban communities: Risk of flooding in urban areas (heavy rainfall, river overflow, marine submersion, sea level rise), aggravated by soil degradation, itself amplified by droughts [BE,NL, IT,PL,FR]
  c) Energy & utilities: multiplication of flooding (extreme rainfall, sea level rise) to disrupt energy production [DE,LT,PL]; risk of landfill flooding [LT]
  d) Agriculture, forestry and other land use: Negative impact on land use from floodings combined with droughts, heavy rains, storms [IT-n,ES-n,LT,PL]; increasing flooding risk in agricultural areas [FI,DE-e,IT-w/n,FR]

Legal texts relevant to the Floods challenge (EU level)

The EU Floods Directive

- Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (publ. 6 November, 2007)
- Each EU country is required to assess all areas under risk of significant floods, to create Flood Hazard Maps and Flood Risk Maps for such areas in terms of possible flood extent and assets & humans at risk, and to take adequate and coordinated measures to reduce flood risk
- The general public must have access to this information and a say in the planning process
- The Floods Directive is closely coordinated with the Water Framework Directive

Legal texts relevant to the Floods challenge (nat'l level)

Transposing the EU Floods Directive

- The Directive was transposed into national laws mostly between 2008 and 2010
- In most cases, this appeared either within new Water Laws, Water Acts, or updates / amendments of the current ones
- In complement: national flood risk management plans; plans at the level of regions / river basins / sub-regions
- Working Group set up within CIRCABC to support implementation of both the Floods Directive and the Water Framework Directive
- 6-year cycles to reduce the risk of flood damage: 1st cycle 2010-2015, 2nd cycle 2016-2021, 3rd cycle 2022-2027; results from 2nd cycle reported for 19 countries, public consultation concluded in 5 more, 3 ongoing or delayed

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2. Fire challenge

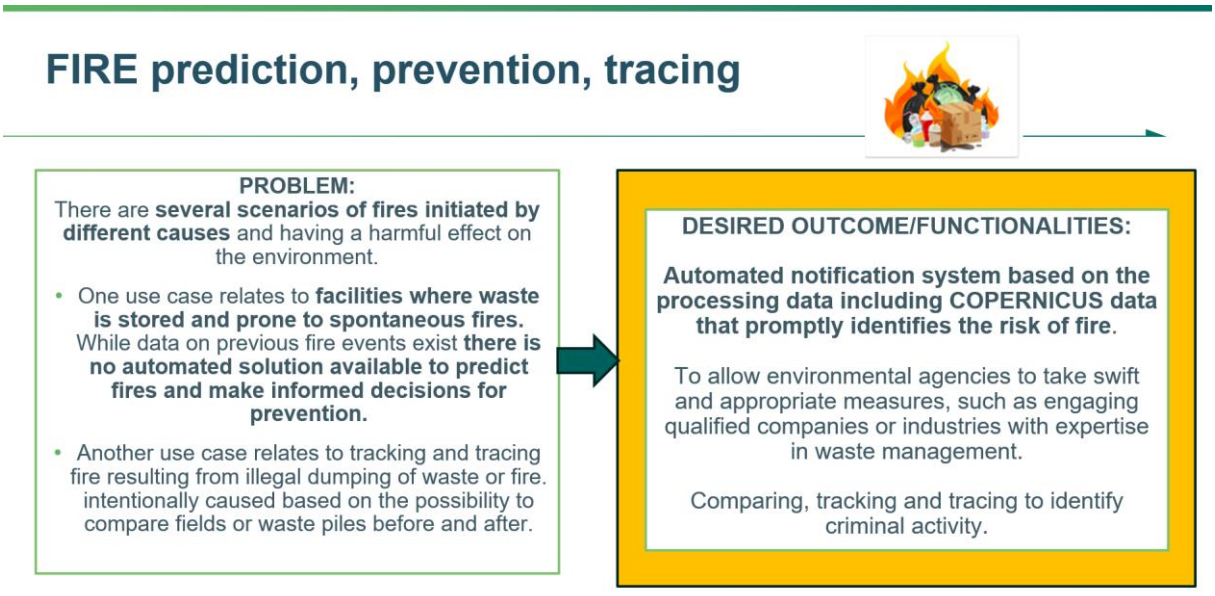
Currently, there are several scenarios of fires initiated by different causes and having a harmful effect on the environment.

One scenario or use case relates to facilities where waste is stored and prone to spontaneous fires, occurring three or more times a year (in one city). These incidents are particularly prevalent during the summer months when temperatures are higher. While data on previous fire events exist (temperature conditions, height of piles, heat waves, composition of garbage, location of storages or disposals) there is no automated solution available to predict fires and make informed decisions for prevention. As a result, environmental agency inspectors bear the responsibility of monitoring these facilities, placing a significant burden on staff resources.

In this waste fire use case, the foreseen steps are:

1. Exploring the technical boundaries to understand the possibilities of providing frequent data updates and establishing the required preparedness frequency.
2. Developing a comprehensive model using both existing and new data to predict waste fires.
3. Aggregating all data from past waste fire incidents can be instrumental in this process.
4. Training the model based on defined conditions and relevant factors, such as the evolving composition of waste over time and temperature variations.
5. Utilizing the gathered data to anticipate fire occurrences, enabling timely preventive actions.
6. Implementing automated notifications to alert environmental; agencies about the risk of fire, empowering them to take necessary measures such as engaging contracted companies or industries experienced in managing waste storage facilities. This proactive approach aims to prevent air pollution and minimize potential damage.

The desired outcome is an automated notification system that promptly identifies the risk of fire in waste storage facilities. This allows environmental agencies to take swift and appropriate measures, such as engaging qualified companies or industries with expertise in waste management. By preventing fires, this solution aims to mitigate air pollution and reduce potential damage associated with such incidents. It is expected to obtain an automated notification system based on the processing data including COPERNICUS data.



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WASTE FIRES

Definition:
An uncontrolled fire in a waste storage site

+/- 77 waste fires/year in the Netherlands

+/- 60 waste fires/year in Sweden

+/- 25 waste fires/year in Austria

CONTRIBUTING FACTORS

Type of waste / contamination

Amount of waste

Ambient temperature (variation and level)

Ambient moisture content / rainfall

Wind

On-site remediating factors

USE CASE

Prediction of waste fires with AI by combining remote sensing, historical and weather data.

FORESEEN STEPS

EXPLORING BOUNDARIES

AGGREGATING DATA

MODEL DEVELOPMENT

TRAINING THE MODEL / ON-SITE VALIDATION

UTILIZATION OF PREDICTIONS

IMPLEMENTING NOTIFICATIONS

TYPE OF WASTE SITES

- Recycle centres
- Landfills

MAIN CAUSES

- Spontaneous ignition
- Sweden: 55% of the cases
- North-Rhine-Westfalen: 33% of the cases
- Unknown
- Lithium/ion batteries

FINANCIAL COSTS

- Soil remediation
- Water treatment
- Damage of buildings and equipment
- Loss of recyclables

SOCIAL COSTS

- Impact on Health
- Sense of security
- Odor complaints
- Redirection of taxes

ENVIRONMENTAL COSTS

- Discharge of pollutants like PM2.5 and Dioxins

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Another use case or fire scenario (also for wild/forest fire) relates to identifying, tracing, and tracking the cause (and the culprit) of the fire. It is challenging for law enforcement agencies to trace the individuals responsible for criminal behavior (e.g., setting fire or dumping substances that cause fire to official waste dumping sites/facilities). In the event that a fire consumes part of a waste dumping site, it is vital to be able to compare the site's condition before and after the fire. This comparison would enable us to determine the amount of waste that was burnt and, consequently, evaluate the environmental damage caused. Additionally, the same technology could be used to establish whether the amount of waste entities dump into the site matches the amount they report officially. Furthermore, there is a lack of effective measures to inform and prevent the cross-border effects. Additionally, the absence of usable data hinders the ability to gather evidence for criminal proceedings.

In this identification, trace and track use case, some foreseen steps are:

1. Conducting a comprehensive assessment of existing monitoring capabilities to identify gaps and potential improvements.
2. Defining the types of substances that are commonly illegally dumped, drawing from previous experiences and specific case studies.
3. Develop a model that uses both existing and new data to compare the amount of waste before and after an incident occurs.
4. Aggregate all data from past waste fire incidents or incidents involving the dumping of more waste than officially reported.
5. Developing appropriate measures to address these incidents.
6. Establishing timely communication channels between environmental agencies, firefighters, and other relevant law enforcement entities to promptly notify them of potential risks and share investigation outcomes.
7. Defining and implementing possible interventions to tackle wild fires and/or at dumping sites to prevent further illegal activities and mitigate damage.
8. Standardizing the reporting and data collection processes, ensuring the admissibility of the gathered information in both civil and criminal courts. This will enable the establishment of responsibilities in accordance with the applicable laws within specific judiciary systems.

The desired outcome is the implementation of an alert system that sends notifications to competent authorities, aiming to prevent the illegal dumping of waste/ illegal activities that could lead to fires in dumping sites and mitigate the risks of cross-border damage. The system would enable us to compare the state of the waste dumping site before and after the fire, determine the amount of burnt waste, and define the extent of environmental damage. Additionally, the system would be able to verify if the amount of waste entities dump into the dumping site is consistent with their official reports.Furthermore, standardized reports and information should be readily available and admissible in civil and criminal proceedings. This will facilitate the establishment of responsibilities in accordance with the applicable laws and regulations within the specific judiciary system.

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Fires in regional adaptation

- **Fire risks figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Sustainable urban communities: sharply increasing fire and wildfire risks in virtually every country, strongly amplified by heatwaves and urban heat islands
  b) Energy & utilities: increased risk of landfill fires [e.g. LT]
  c) Agriculture, forestry and other land use: fast-increasing risk of fires [BE,FI-s,IT-n/c,FR,DE,ES,,,]

Legal texts relevant to the Fire challenge (EU level)

The EU Waste Framework Directive

- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- Basic principles include waste management to avoid endangering human health, harming the environment, creating risks for water, air, soil, plants, animals, causing a nuisance through noise or odours
- It is built on a 5-step waste hierarchy: prevention > preparing for re-use > recycling > recovery > disposal
- It sets targets to every EU country
- There is a strong emphasis on circular economy objectives, which is prominently reflected in several national laws
- However, very limited reference is made to fire risks and illegal dumping, and generally to climate dimensions

Legal texts relevant to the Fire challenge (nat'l level)

Waste related texts

- Almost all EU countries have a Law on Waste or on Waste Management
- In a few cases, waste regulations are part of a broader environmental conservation law (France, Greece, the Netherlands)
- In Belgium and in Italy for instance, the waste sector is regulated by a set of more specific texts; in some cases, most of the regulations are at regional level (e.g. Austria)
- General waste regulations tend to be explicit on the categories of waste, specific risks, technical requirements, prevention of pollution; in contrast, they say little or nothing explicit about fire risks, only a few mention illegal dumping, and the link with climate change issues is not mentioned

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3. Water resilience challenge

Currently, there is unpredictability in the demand for fresh water, and there is a lack of connection between the supply and demand of fresh water. Regulations exist in each EU Member State that determine the use of water from various sources, such as channels, treated sewage water, and drinking water, and different purposes such as for agriculture. However, there is a lack of a common language among different stakeholders (users involved such water companies, industry, farmers, etc.) involved in the water cycle chain. Additionally, while data is available in certain regions, there is a lack of connectivity between data hubs and repositories.

In this use case, some foreseen steps are:

1. Gaining a comprehensive understanding of the current situation, including existing mechanisms and policies in place.
2. Exploring how drought-related issues regarding water supply and demand are addressed and determining the type of new services needed to support coping with stress situations based on common language.
3. Identifying the relevant responsible public authorities and their intended uses, while also identifying any existing data gaps.
4. Identifying the different users and purposes for the supply of water like in agriculture.
5. Developing a system that combines EO data and utilizes Artificial Intelligence (AI) for modelling purposes. This system should effectively integrate and analyze relevant data to provide actionable insights.
6. Utilizing database-driven solutions to enhance the distribution of water. This involves identifying factors such as saline concentration, pollution levels, substances, algae presence etc., using EO data, to ensure efficient and informed water distribution.
7. Providing accurate information to water authorities regarding who needs to collect water, when and how to distribute it in a treated manner, to meet specific demands and avoid unnecessary discharge of sweet water.
8. Establishing a resilient system where different stakeholders, including water companies, farmers, and industries, collaborate during drought periods. This collaboration should be based on a comprehensive understanding of the water conditions and quality requirements for different purposes. Guidance and decisions from a policy perspective should be achieved to comprehend the consequences and combine relevant data throughout the entire water cycle chain under a unified taxonomy.

The desired outcome is a predictable demand for fresh water. The regulatory landscape and policies should be clearly defined, providing a cohesive framework for water management. The system should be capable of effectively handling stress situations through data-driven decision making and interventions. The supply and demand for sweet water should be interconnected based on diverse needs of users such as farmers, companies, and industries, while also considering the specific conditions and water quality requirements for different purposes. A comprehensive understanding of the consequences and a combined approach to relevant data within the entire water cycle chain should be achieved and facilitated by effective policy guidance.

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Climate resilient water solutions

PROBLEM:
Unpredictability in the demand for fresh water, and there is a lack of connection between the supply and demand of fresh water.

There is a **lack of a common language among different stakeholders** (users involved such water companies, industry, farmers, etc.) involved in the water cycle chain.

While data is available in certain regions, there is a lack of connectivity between data hubs and repositories.

DESIRED OUTCOME/FUNCTIONALITIES:

A predictable demand for fresh water.

The **regulatory landscape and policies** should be clearly defined, providing a cohesive framework for water management.

System for **effectively handling stress situations** through data-driven decision making and interventions.

Supply and demand for fresh water interconnected based on diverse needs of users such as farmers, companies, and industries, while also considering the specific conditions and water quality requirements for different purposes.

Understanding of the consequences and a combined approach to relevant data within the entire water cycle chain should be achieved and facilitated by effective policy guidance.

Examples of use for Climate Adaptation

- Greenhouse gas emission indicators (water management):
- In case of droughts: CO2 emission by peat oxidation (subsidence)
- In case of water excess: CH4 en N2O emission in anaerobic soil conditions
- Salinization risks (due to increase of drought and seepage pressure by sea level rise)
- Insight in the available sweet water storage in large Lakes like Ijsselmeer (relevant for the Dutch National LCW commission decision support)
- Insight in the amount of local water storage (saturation level) in soils in times extreme climate conditions in management areas (to anticipate timely for local flooding (e.g. Limburg 2021)
- Insight in drought conditions (agriculture & nature), irrigation limitations/ban, etc
- Transition/monitoring of the rural area functions in future (distribution of blue, green grey infrastructure).

The Dutch Waterschapshuis and STOWA national water management information production hub (through its SAT-WATER programme)

European/national water monitoring resources

- Monitoring Water Quantity and Quality (regular): https://www.rijkswaterstaat.nl/en/water/water-management
- Monitoring extreme high water & Early warning (crisis): https://www.rijkswaterstaat.nl/en/water/water-management/monitoring/efas
- Main waterway network & maintenance, construction & traffic management (European level): for economic drivers like Transport, Storage, recreation cooperation Netherlands, Germany (Rhine), Belgium (Scheldt): https://www.eurisportal.eu/

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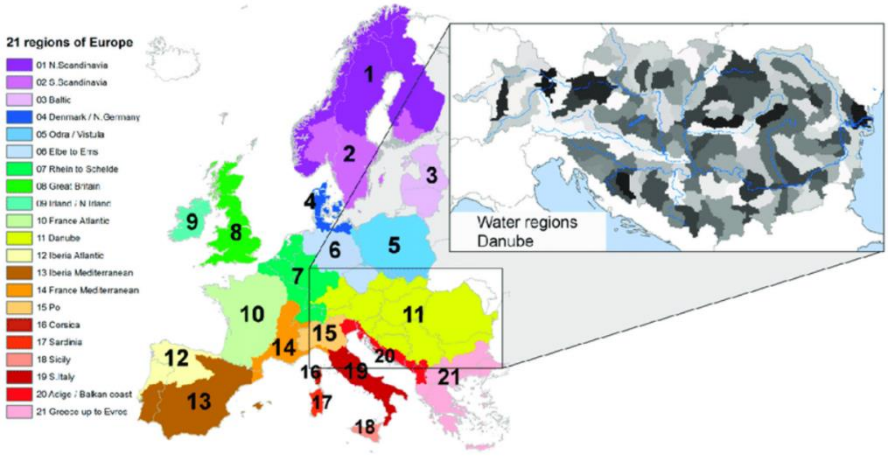
European/national/regional watermanagement resources
(https://www.efas.eu/en/monitoring)

- EFAS collects near real-time water level and river discharge observations to display national/regional threshold exceedances
- European wide, observation-based flood monitoring:
- EU-EO & insitu/model based instrument https://emergency.copernicus.eu/mapping/ems/rapid-mapping-portfolio
- National data on hydrology & meteo & satellite based information: https://www.efas.eu/en/share-your-data-efas
- Dutch examples on national operational EO based information products: e.g. OWASIS (hydrology), WIWB (meteo)
- Gridded meteorological maps (CEMS
- National data on hydrology & meteo & satellite based information: https://www.efas.eu/en/share-your-data-efas
- Dutch examples on national operational information products: e.g. KNMI, WIWB (meteo)
- EFAS provides a number of hydrological monitoring products based on LISFLOOD simulations driven by observed meteorological input
- Soil moisture and snow water equivalent (mostly model based, maps on national initial conditions),
- Dutch examples on national operational EO based information products: e.g. LIBV, soil moisture & OWASIS)

The water challenge needs to be tackle from a regional, national and European perspective, due to the cross-border impact on climate and socio-economics.

Watermanagement regional/national/European infrastructure



The 21 regions of Europe, as defined by river basins, climate and socio-economics. Right insert: the smaller "water regions" for the Danube river basin. The 21 regions of Europe, as defined by river basins, climate and socio-economics. Right insert: the smaller "water regions" for the Danube river basin.

Figure credit: Hans van Leeuwen, Het Waterschapshuis/Stowa, presentation on 13th September 2023

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Water issues in regional adaptation

- **Water quality and availability risks figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Marine & coastal: Quality degradation of coastal waters [FR], increased saltwater intrusions, salinization, freshwater shortages [FR-w,IT-c,ES,NL], decreased water quality [LT,IT-c], eutrophication of water bodies, damaged ecosystem services (ES-n,IT-c,DE-n]
  b) Sustainable urban communities: Water quality and quantity affecting a.o. energy and utilities [southern Europe, now also concerning BE,NL,DE-s]
  c) Energy & utilities: Increased frequency of droughts and of heatwaves [LT,PL,BE,DE,ES,FR,IT] with consequences on water quality and quantity;
  d) Agriculture, forestry and other land use: More frequent and longer droughts [DE,IT-n,NL,ES], often coupled with water quality and quantity concerns [BE,IT,ES-n,FR,LT], competition for water between urban and agricultural use; threats of lower water recharge and decrease in aquifer levels [FR-se,IT-s,ES,NL], risks on pastures and fodder [PL]; reduced river flows, higher transpiration and water stress [ES,FR]; impacts aggravated as more frequent or abundant irrigation required in agriculture [DE-w,IT-n,ES]

Legal texts relevant to the Water challenge (EU level)

The EU Water Framework Directive

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
- Latest version published in 2014; adaptation to climate change not included in the Directive itself but agreement from Member States in 2009 to integrate it in the 6-year River Basin Management Plans (RBMPs) elaborated under the WFD – *cf.* "River basin management in a changing climate - a Guidance document"
- Each EU Member State is required to use their RBMPs and Programmes of Measures to protect and, where necessary, restore water bodies in order to reach good status (chemical and ecological), and to prevent deterioration
- The Floods Directive is closely coordinated with the Water Framework Directive
- Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change refers to water (and particularly freshwater) availability and sustainability notably in its section 2.3.4

Legal texts relevant to the Water challenge (nat'l level)

Transposing the EU Water Framework Directive

- The Directive is implemented primarily through the RBMPs
- Some of the RBMPs are transnational (e.g. Danube, Elbe, Oder, Rhine, Sava) and are closely articulated with water policies in the different countries involved
- Each EU Member State is covered by between 1 and 14 RBMPs, managed at national or regional levels; some of the RBMPs ae not literally centred on one river and cover a hydrographic unit or region
- RBMP process includes identification of "significant water management issues" and broad public consultations
- Working Group set up within CIRCABC to support implementation of both the Floods Directive and the Water Framework Directive
- 6-year cycles: 1st cycle 2010-2015, 2nd cycle 2016-2021, 3rd cycle 2021/22-2027

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4. Sustainable Infrastructure challenge

Currently, there is a need for integrated sustainable re-development, restoring & climate adaptation of existing neighborhoods both in urban and rural areas.

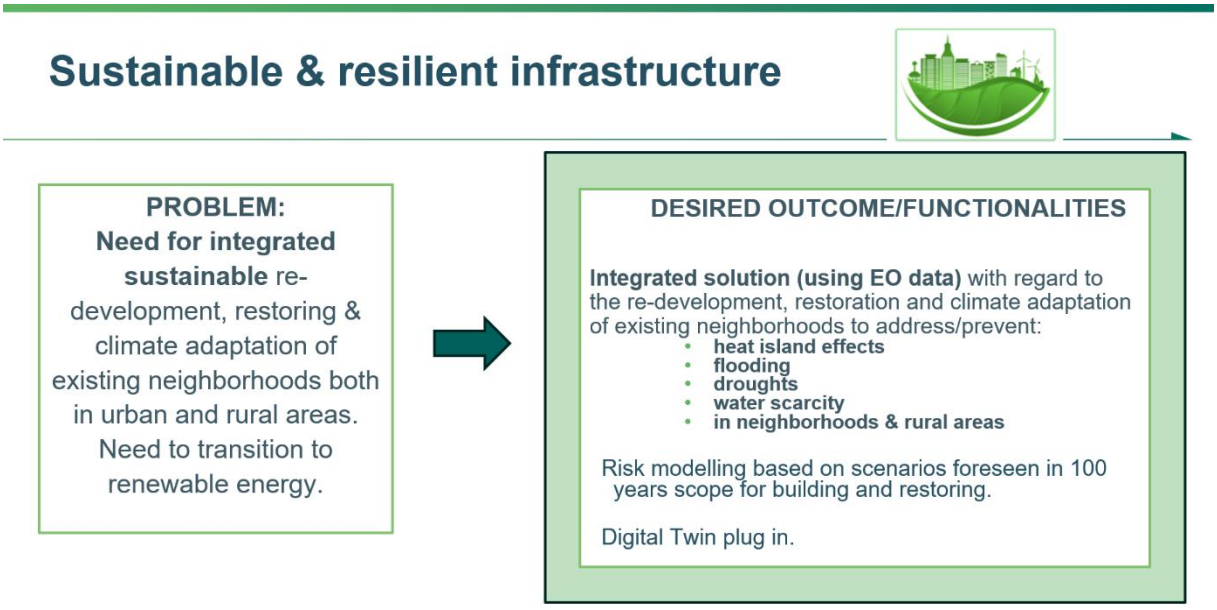
In this use case, some foreseen actions are:

- Developing an integrated solution (using EO data) with regard to the re-development, restoration and climate adaptation of existing neighborhoods to address/prevent:

    - heat island effects
    - flooding
    - droughts
    - water scarcity
    - in neighborhoods & rural areas

- Measuring the effectiveness of climate adaptation measures and applied adaptations.
- Developing an integrated climate service that combines possible adaptation measures such as heat island and water scarcity prevention, measures that address flooding and droughts in neighborhoods & rural areas for modelling purposes and possible scenarios with existing limitations (e.g., narrow streets, protected historical monumental buildings, bridges, water scarcity faced by farmers, etc.) and given other priorities such as green, energy transition, parking.
- Exploring most common limitations, barriers and impossibilities that stand in the way of implementing climate adaptation of the existing infrastructure. Using the outcomes to find an innovative solution given these limitations.

The challenge is to find a solution to climate adaptation for this complex situation (vulnerable urban &/ rural areas with a combination of heat, flooding, water scarcity and droughts) using integrated climate services.



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Some use cases are:

- Nature-based solutions (NBS) to tackle flood risks in case of heavy rains, especially surrounding critical infrastructure (e.g. railways, hospitals, energy network etc.).
- Specifically: Finnish buildings largely wooden, massive insulation etc. cannot survive flooding.
- Snow (amount, moisture level) growing challenge
- Heat mitigation with NBS
- Local energy production/energy renovations
- EO for identifying the most critical sites (e.g. urban heat island, areas losing greenery/impervious surfaces) and potential sites for solar etc.
- Urban hydrology after storms/heavy rain
- Early warning/alert systems for authorities/public
- Existing NBS and implementation strategies
- Tools for evaluating impact of NBS/climate change/future urban development/construction to urban heat (effectiveness of adaptation measures)
- Impact/cost evaluation tools for energy renovations (https://helsinginilmastoteot.fi/en/energy/energy-renovation-what-why-and-how/)z
- Advise on how to do a climate adaptation of existing neighborhoods to address water scarcity, heat islands, floods as an integral solution.
- Monitoring of water scarcity, heat islands, floods for existing neighborhoods.
- Information on renovations to different building stocks (e.g. heritage buildings, old industrial sites etc.).
- How can heat, heavy rainfall and other extreme weather expressions could be used to produce energy.
- Cities need solutions for climate adaptation of existing neighborhoods and energy transition to renewable sources at the same time.

Sustainable infrastructure in regional adaptation

- **Risks to sustainable infrastructure figure prominently in major risk assessments and adaptation strategies in regions across Europe:**
  a) Marine & coastal: Flooding risks in almost all coastal regions: sea level rise [Med FR,ES,northern IT,northern DE,PL], marine submersion [North and Baltic seas,ES-n,IT-n,FR-se], extreme rainfall, thunderstorms and gales [PL,ES-n], combinations of those factors [DE-n,ES-n,NL,LT,FR-w]
  b) Sustainable urban communities: Swelling and shrinking soils resulting from hydrogeological instability [IT,FR-s], creating vulnerability for building foundations in urban areas, landslide risks
  c) Energy & utilities: Increased frequency of droughts and of heatwaves [LT,PL,BE,DE,ES,FR,IT] with indirect impacts of water scarcity or hotter waters on e.g. energy production; consequences of ocean acidification on infrastructures [FR-w]; extreme events and longer term processes threatening railways and roads [FR]; coupled issues on water availability / quality and energy production [large cities]

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Elements from EU's Climate Adaptation Strategy relevant to the Sustainable Infrastructure challenge

- Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change (publ. 24 February, 2021)
- Systemic approach to support the further development and implementation of adaptation strategies and plans at all levels of governance; cross-cutting priorities: integrating adaptation into macro-fiscal policy, nature-based solutions for adaptation, and local adaptation action
- Support implementing nature-based solutions (NBS) on a larger scale, notably blue-green infrastructures, and the development of financial approaches and products that also cover nature-based adaptation
- Support the development of rapid response decision support tools to enrich the toolbox for adaptation practitioners
- Support the integration of climate resilience considerations into the criteria applicable to construction and renovation of buildings and critical infrastructure

Sustainable infrastructure – a space for multiple systemic interactions

Credits: Blue Green Solutions / *Imperial College London, EIT Climate-KIC*

Legal texts of reference at EU and national levels

- **EU foundational documents:**
  a) EU Floods directive (2007)
  b) EU Waste Framework Directive (2008)
  c) EU Water Framework Directive (2000)
  d) EU Strategy on Adaptation to Climate Change (2021)
- **At national levels:**
  a) Water laws/acts or amendments thereof; flood risk management plans
  b) Laws/acts on waste, waste management
  c) River basin management plans (RBMPs)
  d) National and regional climate adaptation strategies and action plans

This is also a dynamic process with cycles and multiple iterations

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ANNEX 3 – SUMMARY OF E-PITCHING

As part of the market analysis, PROTECT carried out e-Pitching sessions on 18 and 19 September 2023. Participants (26 in total) from 8 different countries (France, Lithuania, Germany, Italy, Luxembourg, Finland, Morocco, The Netherlands) presented their solutions and R&D roadmaps. While some of the presented solutions (at TRL 7-9) tackle aspects related to the PROTECT challenges, none of them seem to cover all the functionalities related to a specific challenge. However, the potential of further developments and combination of technologies seem promising for the future PCP challenge, considering the maturity of solutions (at TRL 4-6) and the expected R&D plans.

A summary of the Climate Services presented are as follows:

Climate Services based on Earth Observation:

- Measure the environmental benefits provided by nature-based projects
- Added-value products based on Sentinel-1 SAR data
- IoT systems in the state of suspension for sustainable near real-time EO
- Autonomous flying UAV solution for flood prevention
- Measure emissions
- Satellite measurement of greenhouse gases
- Urban Data Analytics for urban climate risk and mitigation action - simulation of impact
- Cloud-based precision solar radiation service for clean energy in European cities
- Wild Fire Risk Monitor
- Satellite and Drone Technology for Rapid Observation and Notification of Environmental Threats
- Thermal comfort modelling for more liveable and sustainable cities of tomorrow
- Making Agritech sustainable
- Local early warning system for flooding
- Urban Resiliency Monitor
- Geo Big Data Technology For Diverse Climate Service Product Development
- Safer Places: Global Platform
  AI-based Digital Twin Solution for Flood Risk Intelligence
- Assuring food security by mitigating risk for aquaculture farms using Earth Observation technologies
- Democratization of Local Climate Awareness
- Measuring temperature to manage water, ecosphere and climate resilience
- Air Pollution & Urban Heat Island mitigation by Urban vegetation
- High-resolution weather data operator and certifier
- Services for flood and coastal risk management
- Ensuring food production through irrigation monitoring
- Soil Organic Carbon Monitor

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Type of entity (multiple answers are possible)

		Answers	Ratio
Natural person, individual expert, professional		0	0 %
Micro/SME, startup enterprise		26	100 %
R&D institution (public or private)		3	11.54 %
Technology transfer centre (public or private)		0	0 %
Government body or agency		0	0 %
Civil society organisation		0	0 %
University or training centre		0	0 %
Large enterprise		0	0 %
Standardisation body		0	0 %
Other (please specify)		0	0 %
No Answer		0	0 %

Current status of solutions proposed

		Answers	Ratio
Idea (TRL 1-3)		2	7.69 %
Prototype (TRL 4-6)		11	42.31 %
Tested product/service (TRL 7-9)		14	53.85 %
No Answer		0	0 %

Ownership

		Answers	Ratio
100% of the proposer/presenter		21	80.77 %
Shared with third parties		3	11.54 %
IPR held by third parties		2	7.69 %
No Answer		0	0 %

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ANNEX 4 – SUMMARY OF COTS

Product Name	Company	Description	Relevance with the use case	TRL (estimated)
Copernicus Data	Copernicus	At the core of our service is providing access to data and tools related to atmospheric monitoring. We also support our users by providing quality assurance information, and advice on how to use and interpret data.	Is being used by many companies to provide services	9
SENTINEL-1 Data	CREODIAS	Sentinel-1 is a key component of the European Space Agency's (ESA) Copernicus programme, designed to provide valuable and reliable radar imagery for Earth observation. This radar satellite constellation consists of two identical satellites, Sentinel-1A and Sentinel-1B, working together to enable continuous and all-weather imaging of the Earth's surface. Sentinel-1's primary mission is to acquire synthetic aperture radar (SAR) data, offering a unique perspective for monitoring various aspects of the Earth. SAR technology enables imaging of the Earth's surface regardless of weather conditions, daylight, or cloud cover, ensuring the acquisition of critical data under any circumstances.	Is being used by many companies to provide services	9

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Pleiades-1A Satellite Sensor (0.5m)	Pleiades-1A	AIRBUS Defence & Space Pleiades-1A satellite sensor was successfully launched on December 16, 2011, and provides 0.5m high resolution satellite image data. Watch video of Pleiades-1A satellite launch. The Pleiades-1A satellite is capable of providing orthorectified color data at 0.5-meter resolution (roughly comparable to GeoEye-1) and revisiting any point on Earth as it covers a total of 1 million square kilometers (approximately 386,102 square miles) daily. Perhaps most importantly, Pleiades-1A is capable of acquiring high-resolution stereo imagery in just one pass and can accommodate large areas (up to 1,000 km x 1,000 km).	Is being used by many companies to provide services	9
Sentinel Hub	Sentinel Hub	We make satellite data (Sentinels, Landsat and other providers) easily accessible for you to be browsed or analyzed, within our cloud GIS or within your own environment. Get satellite imagery on your table without worrying about synchronization issues, storage, processing, de-compression algorithms, meta-data or sensor bands. Take a look at our Sentinel Hub brochure for more information.	Is being used by many companies to provide services	9
OpenEO Platform	European Space Agency	openEO platform provides intuitive programming libraries to process a wide variety of earth observation datasets. This large-scale data access and processing is performed on multiple infrastructures, which all support the openEO API. This allows use cases from explorative research to large-scale production of EO-derived maps and information.	Is being used by many companies to provide services	9

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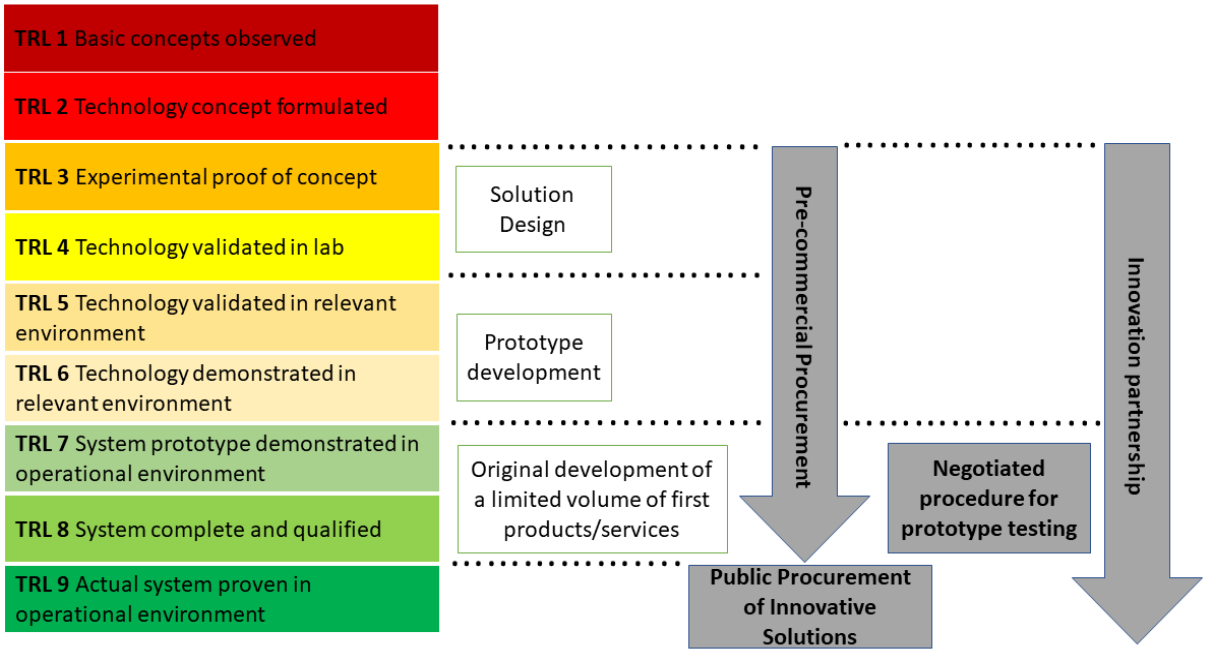
ANNEX 5 - METHODOLOGY

The OMC results are expected to provide additional input on potential solutions, their maturity based on the Technology Readiness Levels and the technology gaps to overcome in order achieve the functionalities described. Therefore the importance of assessing the TRL.



The identification and selection of procurement challenges with a higher climate and procurement impact will be selected for the potential future PCP based on the results of OMC.

The following table provides the definition for the TRLs (between 1 and 9) used to analyse and classify the mapped climate services. The TRL table below refers to software development.

TRL	Definition
1	Preliminary algorithmic stage. Publication of research results.
2	Individual algorithms or functions are prototyped.
3	Prototype of the main functionalities of the integrated system.
4	Alpha version. Preliminary release of non-mature software version; distributed to a community at an early stage of the software development life-cycle; that implements the main functionality of the software and by which preliminary verification and validation activities are archived.
5	Beta version. Preliminary release of non-mature software version; distributed to a community at an early stage of the software life-cycle, that implements the complete functionality of the software and by which preliminary verification and validation activities are archived.
6	Ready for use in an operational or production context, including user support, as a building block or a tool.
7	Demonstrator. Building block and tailored generic software product qualified for a particular purpose.
8	System qualified and ready to be applied in an operational environment.
9	Has been applied in the execution of an operational environment

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