PROCURING INNOVATIVE CLIMATE CHANGE SERVICES

PROTECT CHALLENGES

& USE CASES

Summary for the e-Pitching sessions

PROTECT Consortium

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

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.

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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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.

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:

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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.

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

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(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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