



# **BLUE MISSION BANOS**

**Supporting the Mission  
Ocean Lighthouse in the  
Baltic and North Sea Basins**

## **Deliverable 6.1 Data ontology in BlueMissionBANOS project**

|                                     |                                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------|
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## BLUE MISSION BANOS PROJECT

BlueMissionBANOS (BMB), as a Coordination and Support Action (CSA) for the Baltic and North Sea (BANOS) Mission Ocean Lighthouse, inspires, engages, and supports stakeholders across the BANOS region in taking positive action to reach the Mission Ocean objectives. In particular, we facilitate the uptake of a sustainable, carbon-neutral, and circular blue economy by connecting national, regional, and transnational actors from politics, industry, and science, thereby creating a governance model that is conducive to innovation.

While fostering the transition towards the blue economy, BlueMissionBANOS supports the prevention and elimination of water pollution and the protection and restoration of biodiversity and marine and freshwater ecosystems. The project focus is on reducing governance fragmentation, facilitating evidence-based decision-making and fostering citizen engagement across the BANOS area. These supporting actions raise awareness, showcase opportunities, and inspire stakeholders to actively contribute to the transition and the preservation of oceans, seas and waters to 2030 and beyond.

To accelerate the transition towards an innovative and circular blue economy, in line with regions' strategic priorities, as defined by their Smart Specialisation Strategies (S3), BlueMissionBANOS organises regional pilot demonstration arenas (Mission Arenas) involving innovators, business support and training organisations, local stakeholders and any interested parties to accelerate the uptake of innovative solutions in support of Mission Ocean. Furthermore, BlueMissionBANOS develops a consistent monitoring framework to assess progress in achieving carbon neutrality and circularity.

Finally, BlueMissionBANOS facilitates synergies and matchmaking between actors working towards achieving the Mission Ocean objectives in the BANOS area, by providing a catalogue of services, technical expertise and projects that can foster progress, collaboration and knowledge sharing. The BlueMissionBANOS project is funded under the HORIZON-MISS-2021-OCEAN-04 call by the European Union under Grant Agreement ID 101093845 and runs from December 2022 until November 2025.



# TABLE OF CONTENTS

|                                                      |           |
|------------------------------------------------------|-----------|
| <b>BLUE MISSION BANOS PROJECT</b> .....              | <b>3</b>  |
| <b>TABLE OF CONTENTS</b> .....                       | <b>4</b>  |
| <b>LIST OF TABLES</b> .....                          | <b>5</b>  |
| <b>EXECUTIVE SUMMARY</b> .....                       | <b>5</b>  |
| <b>1. BACKGROUND</b> .....                           | <b>6</b>  |
| 1.1. THE WAVELINKS PLATFORM .....                    | 6         |
| 1.2. DATA CATEGORIES IN THE WAVELINKS PLATFORM ..... | 6         |
| <b>2. DATA ONTOLOGY</b> .....                        | <b>6</b>  |
| 2.1. PROJECTS .....                                  | 6         |
| 2.2. STAKEHOLDERS .....                              | 8         |
| 2.3. ENGAGEMENT METHODS .....                        | 10        |
| 2.4. CITIZEN SCIENCE INITIATIVES .....               | 10        |
| 2.5. SOLUTIONS .....                                 | 13        |
| <b>3. ANNEXES</b> .....                              | <b>17</b> |
| 3.1. CODE FOR ALL RELEVANT DJANGO MODELS .....       | 17        |

## LIST OF TABLES

|                                                            |    |
|------------------------------------------------------------|----|
| Table 1. Project data description .....                    | 8  |
| Table 2. Organization data description .....               | 9  |
| Table 3. Engagement methods data description .....         | 10 |
| Table 4. Citizen science initiative data description. .... | 13 |

## EXECUTIVE SUMMARY

This dataset describes the ontology of data used in the BlueMissionBANOS project specifically relating to how the data is stored on the WaveLinks platform. For each type of data, parameters that describe individual data points are listed and described, including possible values when applicable. Relationships between different data points are also listed. The annexes include relevant parts of code from the WaveLinks platform that hold the data ontology, as represented in the Django models for the platform database.

## 1. BACKGROUND

### 1.1. THE WAVELINKS PLATFORM

The [WaveLinks.eu](https://wavelinks.eu) website is a platform developed within the BlueMissionBANOS project, in close collaboration with BlueMissionAA and the PREP4BLUE projects. WaveLinks offers a user-friendly and intuitive web interface allowing all stakeholders to access, search, and contribute relevant data and information in the context of the EU's Mission Restore our Ocean and Waters ([Mission Ocean](#)). Users of WaveLinks can easily explore and filter projects, stakeholders, citizen science initiatives, engagement methods, and solutions linked to the Mission Ocean objectives. WaveLinks currently showcases 5900 projects, more than 14000 stakeholders, 50 engagement methods, 950 citizen science initiatives, and 170 solutions, covering the three objectives of the Mission Ocean.

Technologically, the monitoring platform of WaveLinks leverages a robust and scalable technology stack, including Django, PostgreSQL, and Next.js, to manage large volumes of data and traffic efficiently. Data sources for the monitoring platform include contributions from various open-source platforms, such as the Mission Ocean Charter, UN Decade of the Ocean, Cordis, and the EC Portfolio, together with direct contribution of curated data from BlueMissionBANOS and other Mission Ocean CSAs.

### 1.2. DATA CATEGORIES IN THE WAVELINKS PLATFORM

The data in the WaveLinks platform is organised into 5 categories: Projects, Stakeholders, Engagement methods, Citizen Science, and Solutions. Two additional categories may be added before the project completion, Funding and Policy & Legislation. Data in each category is described by multiple variables (fields), in addition to variables describing the relationships between the categories (many-to-and foreign key database relationships). Organisation of these data categories represents the data ontology developed for and used in BlueMissionBANOS project.

## 2. DATA ONTOLOGY

### 2.1. PROJECTS

Each project organisation data point is described by the fields listed in Table 1. For each field, we list field name, definition of the field, type of data in the field, and possible values the field can take, when those values are constrained.

| Field name | Definition      | Type          | Allowed values                |
|------------|-----------------|---------------|-------------------------------|
| acronym    | Project acronym | Char          | Max length 85                 |
| area       | Project area    | Array of char | Max length 255, for each char |

|                         |                                                    |                    |                                                                                                                                                                                                                  |
|-------------------------|----------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| cordis_website          | CORDIS website of the project                      | URL field          |                                                                                                                                                                                                                  |
| data_source             | Project data source                                | Array of char      | Max length 64, for each char                                                                                                                                                                                     |
| extra_links             | Additional project links                           | Array of URL field | Max length 511, for each URL                                                                                                                                                                                     |
| end_date                | Project end date                                   | Date field         |                                                                                                                                                                                                                  |
| funding                 | Project funding                                    | Float              |                                                                                                                                                                                                                  |
| funding_source          | Project funding source                             | Char               | Max length 31                                                                                                                                                                                                    |
| keywords                | Project keywords                                   | Array of char      | Max length 255, for each char                                                                                                                                                                                    |
| date_added              | Date the project was added in the database         | Date field         |                                                                                                                                                                                                                  |
| date_update             | Date the project was updated in the database       | Date field         |                                                                                                                                                                                                                  |
| lighthouse              | Lighthouse the project contributes to              | Array of char      | Max length 511, for each char                                                                                                                                                                                    |
| mission_ocean_objective | Mission Ocean objective the project contributes to | Array of integers  | 1 - Protect and restore marine and freshwater ecosystems and biodiversity; 2 - Prevent and eliminate pollution of our ocean, seas, and waters; 3 - Make the sustainable blue economy carbon-neutral and circular |
| ocean_decade_challenges | Ocean decade challenge that project corresponds to | Array of char      | Max length 2047, for each char                                                                                                                                                                                   |
| programme               | EU program that project is funded under            | Char               | Max length 63                                                                                                                                                                                                    |
| project_id              | Project ID                                         | Char               |                                                                                                                                                                                                                  |

|                |                                                           |                                |                                                                         |
|----------------|-----------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------|
| start_date     | Project start date                                        | Date field                     |                                                                         |
| subarea        | project sub area                                          | Array of char                  | Max length 511                                                          |
| summary        | Project summary                                           | Text field                     |                                                                         |
| title          | Project title                                             | Char                           | Max length 1023                                                         |
| type_of_action | Project type of action                                    | Char                           | Max length 255                                                          |
| organisation   | Connecting a project with a stakeholder organisation      | ManyToManyField (through Role) | For each connection, a role can be Coordinator, Participant, or unknown |
| website        | Project website                                           | URL field                      | Max length 255                                                          |
| year_only      | If start and end date should be considered as a year only | Boolean                        |                                                                         |
| acronym        | Project acronym                                           | Char                           | Max length 64                                                           |
| area           | Project area                                              | Array of char                  | Max length 511                                                          |

Table 1. Project data description

## 2.2. STAKEHOLDERS

Each stakeholder organisation data point is described by the fields listed in Table 2. For each field, we list field name, definition of the field, type of data in the field, and possible values the field can take, when those values are constrained.

| Field name        | Definition           | Type          | Allowed values                                                                                                                                                                                                                                                            |
|-------------------|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| name              | Name                 | Char          | Max length 2000                                                                                                                                                                                                                                                           |
| organisation_type | Type of organization | Array of char | Higher or secondary education establishment; Private for-profit organization; Research organization; Small or medium sized enterprise; Public organization; Civil Society organization non-profit NGOs, cooperatives, networks; International organization; Other; Unknow |

|                   |                                                      |               |                                                                                           |
|-------------------|------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------|
| country           | Country                                              | Country field |                                                                                           |
| city              | City                                                 | Char          | Max length 100                                                                            |
| postal_code       | Postal code                                          | Char          | Max length 20                                                                             |
| description       | Description                                          | Text          |                                                                                           |
| keywords          | Keywords                                             | Array of char | Max length 256, for each char                                                             |
| alternative_names | Names that the organization have been referred to as | Array of char |                                                                                           |
| website           | Website                                              | URL field     | Max length 511                                                                            |
| email             | Contact email of organization                        | Email field   |                                                                                           |
| external_id       | ID                                                   | Integer       |                                                                                           |
| pic_id            | Participant Identification Code                      | Integer       | 9 digits                                                                                  |
| ror_id            | Research Organization Registry Identifier            | Char          | <a href="https://ror.readme.io/docs/identifier">https://ror.readme.io/docs/identifier</a> |
| vat_id            | Value Added Tax Identification number                | Char          | ISO 3166-1 A2 code followed by up to 12 alphanumeric characters                           |
| created_on        | Date of entry creation                               | DateTime      |                                                                                           |
| last_updated      | Date of last modification                            | DateTime      |                                                                                           |
| data_source       | Data source                                          | Array of char | Max length 20, for each char                                                              |

Table 2. Organization data description

## 2.3. ENGAGEMENT METHODS

Each engagement method data point is described by the fields listed in Table 3. For each field, we list field name, definition of the field, type of data in the field, and possible values the field can take, when those values are constrained.

| Field name       | Definition                       | Type            | Allowed values                                 |
|------------------|----------------------------------|-----------------|------------------------------------------------|
| method           | Name                             | Char            | Max length 60                                  |
| engagement_level | Engagement level                 | Char            | Inform; Consult; Involve; Collaborate; Empower |
| description      | Description                      | Text            |                                                |
| results          | Results                          | Text            |                                                |
| strengths        | Strengths                        | Text            |                                                |
| weaknesses       | Weaknesses                       | Text            |                                                |
| purpose          | Purpose of engagement            | Text            |                                                |
| targeted_groups  | Targeted stakeholder groups      | Array of char   | Max length 60, for each char                   |
| countries        | Related stakeholder organisation | ManyToManyField |                                                |
| source           | External source                  | URL field       |                                                |
| needs            | Facilities needed                | Char            | Max length 200                                 |
| location         | Location                         | Array of char   | Max length 20, for each char                   |
| duration         | Duration                         | Char            | Max length 25                                  |
| participants     | Participants                     | Char            | Max length 25                                  |
| projects         | Linked projects                  | ManyToManyField |                                                |

Table 3. Engagement methods data description

## 2.4. CITIZEN SCIENCE INITIATIVES

Each citizen science initiative data point is described by the fields listed in Table 4. For each field, we list field name, definition of the field, type of data in the field, and possible values the field can take, when those values are constrained.

| Field name  | Definition                    | Type              | Allowed values                                                                                                                                                                                                                                                                                                                                |
|-------------|-------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| title_eng   | Title in English              | Char              | Max length 2000                                                                                                                                                                                                                                                                                                                               |
| title       | Title (original)              | Char              | Max length 2000                                                                                                                                                                                                                                                                                                                               |
| citizen_id  | Unique identifier             | Integer           |                                                                                                                                                                                                                                                                                                                                               |
| scope       | Scope                         | Char              | Nationally; Locally; Regionally; European (EU+); Globally                                                                                                                                                                                                                                                                                     |
| inclusive   | Citizen groups to be included | Array of char     | Max length 255                                                                                                                                                                                                                                                                                                                                |
| description | Description                   | Text              |                                                                                                                                                                                                                                                                                                                                               |
| aim         | Aim                           | Text              |                                                                                                                                                                                                                                                                                                                                               |
| website     | Website                       | URL field         | Max length 511                                                                                                                                                                                                                                                                                                                                |
| partners    | Partners                      | MultiSelect filed | Research Institute; University/College; NGO/Non-profit/Charity; Governance/Policy; Industry/Private Sector; Community/Partnership; Person/Individual; Museum/Exposition; Aquarium; Science Centre                                                                                                                                             |
| area        | Area covered                  | MultiSelect filed | Norwegian Sea; Baltic Sea; Greater North Sea, incl. English Channel and Kattegat; Celtic Seas; Biscay & Iberian; Mediterrean; Black Sea; Barents Sea; Oceanic NE Atlantic; RB to Norwegian Sea; RB to Baltic Sea; RB to Greater North Sea; RB to Celtic Seas; RB to Biscay & Iberian; RB to Mediterranean; RB to Black Sea; RB to Barents Sea |
| start_year  | Start here                    | Integer           |                                                                                                                                                                                                                                                                                                                                               |
| end_year    | End year                      | Integer           |                                                                                                                                                                                                                                                                                                                                               |
| frequency   | Frequency                     | Char              | One-time event; Once a year; Multiple times a year; Continuously                                                                                                                                                                                                                                                                              |
| topic       | Topic                         | Array of char     | Max length 255                                                                                                                                                                                                                                                                                                                                |
| category    | Category                      | Char              | Abiotic; Aquaculture; Archeology; Biodiversity; Fisheries; History; Species (group); Technology; Pollution; Habitat (Biodiv+Abiotic)                                                                                                                                                                                                          |

|                     |                                                       |               |                                                                                                                                                                                                               |
|---------------------|-------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| species             | Species studied                                       | MultiSelect   | Birds; Cnidaria; Macro-algae; Crustaceans; Insects; Plants; Micro; Fish; Molluscs; Reptiles; Amphibians; Invertebrates; Mammals; Marine mammals; Coastal biodiversity; phytoplankton; Echinoderms; Tube worms |
| invasive            | Whether the initiative targets invasive species       | Boolean       |                                                                                                                                                                                                               |
| decarbon            | Whether the initiative contributes to decarbonization | Boolean       |                                                                                                                                                                                                               |
| data_availability   | Availability of data collected                        | Boolean       |                                                                                                                                                                                                               |
| data                | Type of data selected                                 | MultiSelect   | Sightings; Imagery; Collection/Samples; Syst. Obs.; Msrn/Spec. Data                                                                                                                                           |
| policy_task         | Relevant policy task                                  | MultiSelect   | PT1; PT2; PT3; PT4; PT5; PT6; PT7; PT8; PT9; PT10; PT11; PT12; PT13; PT14; PT15; PT16; PT17                                                                                                                   |
| technology_support  | Technology support availability                       | Char          | Foreseen by participant; Foreseen by organisers; No                                                                                                                                                           |
| technology_needed   | Technology needed                                     | Array of char | Max length 255                                                                                                                                                                                                |
| level_participation | Level of participation                                | Char          | Crowdsourcing; Distributed intelligence; Participatory science; Extreme citizen science; PE                                                                                                                   |
| co_creation         | Whether project is co-created with citizens           | Boolean       |                                                                                                                                                                                                               |
| location            | Type of location                                      | Char          | Outdoors; Indoors; Online; Indoors and outdoors                                                                                                                                                               |
| specific_location   | Specific location                                     | Char          | Max length 2000                                                                                                                                                                                               |
| general_aim         | General aim                                           | Char          | Descriptive; Performance; Composite; Public engagement                                                                                                                                                        |
| participants        | Number of participants                                | Char          | < 100; 100-1000; > 1000                                                                                                                                                                                       |

|              |                                                  |                   |               |
|--------------|--------------------------------------------------|-------------------|---------------|
| data_source  | Data source                                      | Char              | Max length 64 |
| organisation | Stakeholder organization related to this project | Many-ToMany field |               |
| date_added   | Date the project was added in the database       | Date field        |               |
| date_update  | Date the project was updated in the database     | Date field        |               |

Table 4. Citizen science initiative data description.

## 2.5. SOLUTIONS

Each solution method data point is described by the fields listed in Table 5.

| Field name | Definition                      | Type          | Allowed values                                                                                                                                                         |
|------------|---------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| title      | Title                           | Char          | Max length 2000                                                                                                                                                        |
| ko_code    | Knowledge Output Reference Code | Char          | Max length 50                                                                                                                                                          |
| area       | Basin                           | Array of char | Atlantic & Arctic; Baltic and North Sea; Danube; Mediterranean; Cross Basin; Pacific; Indian; Black Sea; Not Associated; Unknown                                       |
| lighthouse | Lighthouse                      | Array of char | Atlantic & Arctic; Baltic and North Sea; Danube and Black Sea; Mediterranean; Unknown                                                                                  |
| scale      | Scale                           | Array of char | Local; Regional; National; Trans-boundary; EU; International                                                                                                           |
| category   | Category                        | Array of char | Knowledge Sharing; Technology and Tools; Infrastructure; Material and Equipment; Public Mobilization and Engagement; Regulatory and Governance; Financial and Business |
| theme      | Themes                          | Array of char | Ecosystem services; Marine Biodiversity & Conservation; Marine                                                                                                         |

|               |                               |               |                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|-------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                               |               | Protected Areas; Marine and Coastal Restoration & Remediation; Literacy & Awareness & Communication; Community engagement; Blue Carbon Capture and Storage; Ocean Observation & Data Management; Marine Pollution & Cleaning                                                                                                                                                                                                           |
| benefits      | Main benefits                 | Array of char | Environmental; Technical; Political; Social                                                                                                                                                                                                                                                                                                                                                                                            |
| keywords      | Keywords and tags             | Array of char | Max length 100                                                                                                                                                                                                                                                                                                                                                                                                                         |
| last_modified | Last update                   | Date filed    |                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| trl           | Technological Readiness Level | Integer       | TRL 1 - Basic principles observed; TRL 2 - Technology concept formulated; TRL 3 - Experimental proof of concept; TRL 4 - Technology validated in lab; TRL 5 - Technology validated in relevant environment; TRL 6 - Technology demonstrated in relevant environment; TRL 7 - System prototype demonstration in operational environment; TRL 8 - System complete and qualified; TRL 9 - Actual system proven in operational environment |
| brl           | Business Readiness Level      | Integer       | BRL 1 - Basic need research; BRL 2 - Needs formulation; BRL 3 - Needs validation; BRL 4 - Small scale stakeholders offer; BRL 5 - Large scale early adopter offer; BRL 6 - Proof of traction; BRL 7 - Proof of satisfaction; BRL 8 - Proof of scalability; BRL 9 - Proof of stability                                                                                                                                                  |
| srl           | Societal Readiness Level      | Integer       | SRL 1 - Societal problem in stakeholder context; SRL 2 - Proposed solution in stakeholder context; SRL 3 - Stakeholder context proof of concept; SRL 4 - Stakeholder context validated; SRL 5 - Validated in simulated stakeholder context; SRL 6 - Demonstrated in simulated stakeholder context; SRL 7 - Demonstrated in operational                                                                                                 |

|                                    |                                   |               |                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------|-----------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    |                                   |               | stakeholder context; SRL 8 - Final testing in real stakeholder context; SRL 9 - Successful deployment in real stakeholder context                                                                                                                                                                                                                                              |
| irl                                | Impact Readiness Level            | Integer       | IRL 1 - Conception; IRL 2 - Discovery; IRL 3 - Outcome: Engagement; IRL 4 - Outcome: Implementation; IRL 5 - Impact: Uptake; IRL 6 - Impact: Sustained Change                                                                                                                                                                                                                  |
| description                        | General description               | Text          |                                                                                                                                                                                                                                                                                                                                                                                |
| background                         | Background description            | Text          |                                                                                                                                                                                                                                                                                                                                                                                |
| technical_description              | Technical description             | Text          |                                                                                                                                                                                                                                                                                                                                                                                |
| potential_impacts_and_applications | Potential impact and applications | Text          |                                                                                                                                                                                                                                                                                                                                                                                |
| contextual_information             | Contextual information            | Text          |                                                                                                                                                                                                                                                                                                                                                                                |
| other_information                  | Other information                 | Text          |                                                                                                                                                                                                                                                                                                                                                                                |
| website                            | Website                           | URL field     |                                                                                                                                                                                                                                                                                                                                                                                |
| mission_ocean_objectives           | Mission Objective                 | Array of char | Protect and restore marine and freshwater ecosystems and biodiversity; Prevent and eliminate pollution of our ocean, seas, and waters; Make the sustainable blue economy carbon-neutral and circular                                                                                                                                                                           |
| mission_ocean_targets              | Mission Targets                   | Array of char | Protect a minimum of 30% of the EU's sea area and integrate ecological corridors as part of a true Trans-European Nature Network; Strictly protect at least 10% of the EU's sea area; Contribute to relevant upcoming marine nature restoration targets, including degraded seabed habitats and coastal ecosystems; Reduce by at least 50% plastic litter at sea; Reduce by at |

|                        |                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------|-----------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                                   |               | least 30% microplastic release into the environment; Reduce by at least 50% nutrient losses, the use and risk of chemical pesticides; Eliminate greenhouse gas emissions from maritime economic activities in the EU and sequester those emissions that cannot be avoided (net zero maritime emissions); Develop zero-carbon and low-impact aquaculture and promote circular, low-carbon, multi-purpose use of marine and water space                                                                                                                                                                                                                                                                                                                                                 |
| mission_ocean_enablers | Mission Enablers                  | Array of char | Digital Ocean and water knowledge system; Public mobilisation and engagement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| mission_ocean_impact   | Mission Impact                    | Array of char | Improvement and widening of the network of marine protected areas in the EU (30% of EU's seas protected with integrated ecological blue corridors and 10% of EU's seas areas strictly protected); At least 25,000 km of restored free-flowing rivers; Restored marine and coastal ecosystems in line with the upcoming EU Nature Restoration targets; Reduction by 50% of the plastic at the sea and by 30% of micro-plastics released into the environment; Reduction by 50% of nutrient losses and the risk and use of chemical pesticides and reduction of water pollution from pharmaceuticals; Reduction of Blue Economy's greenhouse gas emissions by at least 50% and towards 55% compared to 1990 levels; Circular low carbon use of marine space and sustainable aquaculture |
| reviewed               | Solution has been reviewed        | Boolean       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| financial_level        | Financial level                   | Char          | Max length 255                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| organisation           | Provider related to this solution | ManyToMany    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                |                                  |            |                |
|----------------|----------------------------------|------------|----------------|
| contact_person | Contact Person                   | Char       | Max length 255 |
| project        | Project related to this solution | ForeignKey |                |

## 3. ANNEXES

### 3.1. CODE FOR ALL RELEVANT DJANGO MODELS

```

class GenericModel(models.Model):
    "Generic Abstract models.Model best suited for Grant, Project & Organization"

    created_on = models.DateTimeField(default=timezone.now)
    last_updated = models.DateTimeField(default=timezone.now)
    reviewed = models.BooleanField(
        verbose_name="Has been reviewed", default=False, db_index=True
    )
    data_source = ArrayField(
        models.CharField(max_length=200),
        null=True,
        blank=True,
    )
    search_vector = SearchVectorField(null=True, editable=False)

    objects = GenericManager()

    class Meta:
        abstract = True

    def save(
        self,
        *args,
        force_insert=False,
        force_update=False,
        using=None,
        update_fields=None,
    ):
        """
        Overwriting save method to automatically update last_updated when record is
        saved.
        """
        try:
            self.last_updated = timezone.now()
            return super().save(
                *args,
                force_insert=force_insert,
                force_update=force_update,
                using=using,
                update_fields=update_fields,
            )
        except DataError as e:
            logger.error("%s %s", e, logger_json(dict(sorted(self.__dict__.items()))))
        except Exception as e:
            logger.exception(e)

```

```

class Organisation(GenericModel):
    # Base information
    name = models.CharField(
        verbose_name="Name",
        help_text="The name of the organisation",
        max_length=256,
    )
    organisation_type = ArrayField(
        models.CharField(choices=OrganisationType.choices, max_length=3),
        verbose_name="Organisation Type",
        default=list,
        blank=True,
    )

    # Location information
    country = CountryField(
        verbose_name="Country",
        help_text="Country of corporate residence",
        blank=True,
        default="",
    )
    city = models.CharField(max_length=100, blank=True, default="")
    postal_code = models.CharField(max_length=20, blank=True, default="")

    # Metadata
    description = models.TextField(verbose_name="Description", blank=True, default="")
    keywords = ArrayField(
        models.CharField(
            max_length=256,
        ),
        default=list,
        blank=True,
        help_text="Keywords associated with the organisation",
    )
    alternative_names = ArrayField(
        models.CharField(
            max_length=256,
        ),
        db_index=True,
        default=list,
        blank=True,
        help_text="Aliases that the organisation goes under",
    )

    # Contact
    website = models.URLField(
        verbose_name="Website",
        max_length=511,
        blank=True,
        default="",
        validators=[URLValidator(schemes=["http", "https"])],
    )
    email = models.EmailField(max_length=63, blank=True, default="")

    # External ID's
    external_id = models.IntegerField(
        help_text="External ID linked with the Data Source",
        null=True,
        blank=True,
        db_index=True,
    )

```

```

pic_id = models.PositiveIntegerField(
    help_text="Participant Identification Code (PIC)",
    null=True,
    blank=True,
    unique=True,
    validators=[
        MinValueValidator(100000000),
        MaxValueValidator(999999999),
    ],
    db_index=True,
)

ror_id = models.CharField(
    max_length=9,
    validators=[RORValidator()],
    null=True,
    blank=True,
    default="",
    help_text="Research Organization Registry Identifier",
    db_index=True,
)

vat_id = models.CharField(
    max_length=30,
    validators=[VATIDValidator()],
    null=True,
    blank=True,
    default="",
    help_text="Value Added Tax identification number",
    db_index=True,
)

objects = OrganisationManager()

class Meta(GenericModel.Meta):
    ordering = ["name"]
    verbose_name = "Organisation"
    verbose_name_plural = "Organisations"
    indexes = [models.Index(fields=["name", "country"])]

def __str__(self):
    country = Countries().name(str(self.country))
    return f"{self.name} {f'-' {country}' if country else ''}"

def get_type(self) -> str:
    """Returns the display value of organisation_type"""
    if isinstance(self.organisation_type, list) and len(self.organisation_type) >
0:
        return dict(OrganisationType.choices).get(self.organisation_type[0], "")
    return "Unknown"

```

```

class Project(GenericModel):
    # Identification fields
    project_id = models.CharField(
        verbose_name="Project ID",
        null=True,
        default=None,
        blank=True,
        unique=True,
        db_index=True,

```

```

)
title = models.CharField(verbose_name="Title", max_length=1023, blank=True)
acronym = models.CharField(
    verbose_name="Acronym", max_length=85, blank=True, db_index=True
)
# Date fields
start_date = models.DateField(
    verbose_name="Start date", null=True, default=None, blank=True, db_index=True
)
end_date = models.DateField(
    verbose_name="End date", null=True, default=None, blank=True
)

year_only = models.BooleanField(
    null=True, blank=True, default=False
)
# true if start and end date should only be considered as a year

date_added = models.DateField(
    verbose_name="Date added", auto_now_add=True
)
# transition to created_on

date_update = models.DateField( # transition to last_updated
    verbose_name="Date update",
    auto_now=True,
)
# it does work with Model.save() but not with QuerySet.update()

# Description
summary = models.TextField(verbose_name="Summary", blank=True)
keywords = ArrayField(
    models.CharField(max_length=255, blank=True),
    verbose_name="Keywords",
    default=list,
    editable=False,
    blank=True,
    db_index=True,
)

# Web fields
website = models.URLField(verbose_name="Website", max_length=511, blank=True)
cordis_website = models.URLField(
    verbose_name="CORDIS website", max_length=511, blank=True
)
extra_links = ArrayField(
    models.URLField(max_length=511, blank=True),
    verbose_name="Extra links",
    default=list,
    editable=False,
    blank=True,
    db_index=True,
)

# Funding
funding = models.FloatField(verbose_name="Budget", default=float, blank=True)

funding_source = models.CharField(
    verbose_name="Funding source", max_length=31, blank=True
)
programme = models.CharField(verbose_name="Programme", max_length=63, blank=True)

# Classification Fields
area = ArrayField(
    models.CharField(max_length=255, blank=True),
    verbose_name="Area",

```

```

        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    data_source_proj = ArrayField(
        models.CharField(max_length=64, blank=True),
        verbose_name="Data Source",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    lighthouse = ArrayField(
        models.CharField(
            max_length=511,
            blank=True,
            choices=Lighthouse.choices,
            default=Basins.UNKNOWN,
        ),
        verbose_name="Lighthouse",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    mission_ocean_objectives = ArrayField(
        models.IntegerField(blank=True),
        verbose_name="Mission Ocean Objective",
        choices=MissionOceanObjectives.choices,
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    ocean_decade_challenges = ArrayField(
        models.CharField(max_length=2047, blank=True),
        verbose_name="Ocean decade challenge",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    subarea = ArrayField(
        models.CharField(max_length=511, blank=True),
        verbose_name="Subarea",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    type_of_action = models.CharField(max_length=255, blank=True)

    # Relationships
    organisation = models.ManyToManyField(
        Organisation,
        verbose_name="Organisations",
        through="Role",
        related_name="projects",
    )
    # name organisations

```

```

# people_proj = models.ManyToManyField(People)

def __str__(self) -> str:
    if self.acronym:
        return str(self.acronym)
    else:
        return str(self.title)

@staticmethod
def frontend_table_url():
    return "/explore/projects"

def get_funding(self) -> str:
    if self.funding > 0:
        formatted_budget = "{:, .2f}".format(self.funding)

        # Replace commas and periods with X to avoid locale issues
        formatted_budget = (
            formatted_budget.replace(",", "X").replace(".", ",").replace("X", ".")
        )

        # Append the Euro symbol
        return f"{formatted_budget} €"

    return ""

" Managers "
objects = ProjectManager()

class Meta(GenericModel.Meta):
    db_table = "project"

class Role(models.Model):
    project = models.ForeignKey(
        Project, verbose_name="Project", on_delete=models.CASCADE
    )
    organisation = models.ForeignKey(
        Organisation, verbose_name="Organisation", on_delete=models.CASCADE
    )
    role = models.CharField(
        max_length=4, choices=RoleType.choices, default=RoleType.UNKNOWN
    )

class EngagementMethods(GenericModel):
    method = models.CharField(verbose_name="Name", max_length=60, blank=True)

    engagement_level = models.CharField(
        verbose_name="Level of engagement",
        max_length=3,
        choices=EngagementLevels.choices,
        blank=True,
    )

    description = models.TextField(verbose_name="Description", blank=True)

    results = models.TextField(verbose_name="Results", blank=True)

    strengths = models.TextField(
        verbose_name="Strengths",
        blank=True,
    )

```

```

weaknesses = models.TextField(verbose_name="Weaknesses", blank=True)

purpose = models.TextField(verbose_name="Purpose of engagement", blank=True)

targeted_groups = ArrayField(
    models.CharField(
        verbose_name="Targeted stakeholder groups", max_length=100, blank=True
    ),
    default=list,
    editable=False,
    blank=True,
    db_index=True,
)

countries = models.ManyToManyField(
    Organisation,
    verbose_name="Countries",
    blank=True,
    related_name="engagement_methods",
)

source = models.URLField(
    verbose_name="External source",
    blank=True,
)

needs = models.CharField(
    verbose_name="Facilities needed", max_length=200, blank=True
)

location = ArrayField(
    models.CharField(
        verbose_name="Location",
        max_length=20,
    ),
    default=list,
    editable=False,
    blank=True,
    db_index=True,
)

duration = models.CharField(verbose_name="Duration", max_length=15, blank=True)

participants = models.CharField(
    verbose_name="Participants",
    max_length=25,
)

projects = models.ManyToManyField(
    Project, verbose_name="Linked projects", related_name="methods_used"
)

objects = EngagementMethodsManager()

@staticmethod
def frontend_url():
    return "/explore/engagement-methods/"

def update_countries_from_organisations(self):
    linked_countries = set()

    for organisation in self.organisations.all():
        linked_countries.add(organisation.country)

```

```

        self.countries.set(linked_countries)

class Meta:
    db_table = "engagementmethods"
    verbose_name_plural = "Engagement Methods"
    indexes = [
        models.Index(
            name="shem_reviewed_true_idx",
            fields=["reviewed"],
            condition=Q(reviewed=True),
        )
    ]

class Solution(GenericModel):
    ko_code = models.CharField(
        verbose_name="Knowledge Output Reference Code",
        max_length=50,
        blank=True,
    ) # Should be made unique
    keywords = ArrayField(
        models.CharField(max_length=100),
        verbose_name="Keywords and tags",
        blank=True,
        null=True,
    )
    title = models.CharField(verbose_name="Title", max_length=2000)

    description = models.TextField(verbose_name="General description", blank=True)

    background = models.TextField(verbose_name="Background description", blank=True)

    technical_description = models.TextField(
        verbose_name="Technical description", blank=True
    )

    potential_impacts_and_applications = models.TextField(
        verbose_name="Potential impact and applications", blank=True
    )
    # Categories
    area = ArrayField(
        models.CharField(max_length=6, choices=Basins.choices),
        verbose_name="Basin",
        blank=True,
        null=True,
    )
    lighthouse = ArrayField(
        models.CharField(max_length=6, choices=Basins.choices),
        verbose_name="Lighthouse",
        blank=True,
        null=True,
    )

    scale = ArrayField(
        models.CharField(max_length=3, choices=Scales.choices),
        verbose_name="Scale",
        blank=True,
        null=True,
    )

    category = ArrayField(
        models.CharField(max_length=3, choices=Categories.choices),
        verbose_name="Category",

```

```

        blank=True,
        null=True,
    )

    theme = ArrayField(
        models.CharField(max_length=4, choices=Themes.choices),
        verbose_name="Themes",
        blank=True,
        null=True,
    )

    benefits = ArrayField(
        models.CharField(max_length=3, choices=Benefits.choices),
        verbose_name="Main benefits",
        blank=True,
        null=True,
    )

    trl = models.IntegerField(
        verbose_name="Technological Readiness Level",
        choices=TechnicalReadinessLevel.choices,
        null=True,
        blank=True,
    )
    brl = models.IntegerField(
        verbose_name="Business Readiness Level",
        choices=BusinessReadinessLevel.choices,
        null=True,
        blank=True,
    )

    srl = models.IntegerField(
        verbose_name="Societal Readiness Level",
        choices=SocietalReadinessLevel.choices,
        null=True,
        blank=True,
    )

    irl = models.IntegerField(
        verbose_name="Impact Readiness Level",
        choices=ImpactReadinessLevel.choices,
        null=True,
        blank=True,
    )

    website = models.URLField(
        verbose_name="Website",
        blank=True,
        null=True,
    )

    mission_ocean_objectives = ArrayField(
        models.IntegerField(choices=MissionOceanObjectives.choices),
        verbose_name="Mission Objective",
        default=list,
        blank=True,
    )
    mission_ocean_targets = ArrayField(
        models.CharField(max_length=2, choices=MissionOceanTargets.choices),
        verbose_name="Mission Targets",
        default=list,
        blank=True,
    )

```

```

mission_ocean_enablers = ArrayField(
    models.IntegerField(choices=MissionOceanEnablers.choices),
    verbose_name="Mission Enablers",
    default=list,
    blank=True,
)
mission_ocean_impact = ArrayField(
    models.IntegerField(choices=MissionOceanImpacts.choices),
    verbose_name="Mission Impact",
    default=list,
    blank=True,
)

financial_level = models.CharField(max_length=255, blank=True, null=True)

# Relationships

organisation = models.ManyToManyField(
    Organisation,
    verbose_name="Provider",
    related_name="solution",
    default=None,
    blank=True,
)

project = models.ForeignKey(
    Project,
    verbose_name="Project",
    related_name="solution",
    on_delete=models.SET_NULL,
    null=True,
    default=None,
    blank=True,
)

contact_person = models.CharField(
    max_length=255,
    verbose_name="Contact Person",
    blank=True,
    null=True,
)

email = models.EmailField(
    max_length=400,
    verbose_name="E-mail",
    blank=True,
    null=True,
)

def __str__(self):
    return str(self.title)

def get_ko_code(self):
    return str(self.ko_code)

" Managers "
objects = SolutionsManager()

class Meta(GenericModel.Meta):
    db_table = "solutions"
    indexes = [
        models.Index(
            name="solutions_reviewed_true_idx",

```

```

        fields=["reviewed"],
        condition=Q(reviewed=True),
    )
]

class SolutionImage(models.Model):
    solution = models.ForeignKey(
        Solution, on_delete=models.CASCADE, related_name="images"
    )
    image = models.ImageField(upload_to="solutions/images/")
    image_name = models.CharField(max_length=255, blank=True, null=True)

    class Meta:
        constraints = [
            models.UniqueConstraint(
                fields=["solution", "image_name"],
                name="unique_solution_image_combination",
            )
        ]

class Citizen(GenericModel):
    FREQ_CHOICES = [
        ("0 - One-time event", "One-time event"),
        ("1 - Once a year", "Once a year"),
        ("2 - Multiple times a year", "Multiple times a year"),
        ("3 - Continuously", "Continuously"),
    ]

    TECH_CHOICES = [
        ("Yes, to be foreseen by participant", "Foreseen by participant"),
        ("Yes, foreseen by organisers", "Foreseen by organisers"),
        ("No", "No"),
    ]

    PART_CHOICES = [
        ("< 100", "< 100"),
        ("100-1000", "100-1000"),
        ("> 1000", "> 1000"),
    ]

    AIM_CHOICES = [
        ("Descriptive", "Descriptive"),
        ("Performance", "Performance"),
        ("Composite", "Composite"),
        ("Public engagement", "Public engagement"),
    ]

    TYPE_CHOICES = [
        ("ri_cs", "Research Institute"),
        ("uc_cs", "University/College"),
        ("no_cs", "NGO/Non-profit/Charity"),
        ("gov_cs", "Governance/Policy"),
        ("ind_cs", "Industry/Private Sector"),
        ("col_cs", "Community/Partnership"),
        ("per_cs", "Person/Individual"),
        ("mus_cs", "Museum/Exposition"),
        ("aq_cs", "Aquarium"),
        ("sc_cs", "Science Centre"),
    ]

    SCOPE_CHOICES = [
        ("Nationally", "Nationally"),
        ("Locally", "Locally"),
    ]

```

```

("Regionally", "Regionally"),
("European (EU+)", "European (EU+)"),
("Globally", "Globally"),
]

AREA_CHOICES = [
("nws_cs", "Norwegian Sea"),
("bal_cs", "Baltic Sea"),
("gns_cs", "Greater North Sea, incl. English Channel and Kattegat"),
("cel_cs", "Celtic Seas"),
("bib_cs", "Biscay & Iberian"),
("med_cs", "Mediterranean"),
("bls_cs", "Black Sea"),
("bar_cs", "Barents Sea"),
("nea_cs", "Oceanic NE Atlantic"),
("rb_nws_cs", "RB to Norwegian Sea"),
("rb_bal_cs", "RB to Baltic Sea"),
("rb_gns_cs", "RB to Greater North Sea"),
("rb_cel_cs", "RB to Celtic Seas"),
("rb_bib_cs", "RB to Biscay & Iberian"),
("rb_med_cs", "RB to Mediterranean"),
("rb_bls_cs", "RB to Black Sea"),
("rb_bar_cs", "RB to Barents Sea"),
]

CAT_CHOICES = [
("Abiotic", "Abiotic"),
("Aquaculture", "Aquaculture"),
("Archeology", "Archeology"),
("Biodiversity", "Biodiversity"),
("Fisheries", "Fisheries"),
("History", "History"),
("Species(group)", "Species (group)"),
("Technology", "Technology"),
("Pollution", "Pollution"),
("Habitat (biodiv+abiotic)", "Habitat (Biodiv+Abiotic)"),
]

SPC_CHOICES = [
("Birds", "Birds"),
("Cnidaria", "Cnidaria"),
("Macro-algae", "Macro-algae"),
("Crustaceans", "Crustaceans"),
("Insects", "Insects"),
("Plants", "Plants"),
("Micro", "Micro"),
("Fish", "Fish"),
("Molluscs", "Molluscs"),
("Reptiles", "Reptiles"),
("Amphibians", "Amphibians"),
("Invertebrates", "Invertebrates"),
("Mammals", "Mammals"),
("Marine mammals", "Marine mammals"),
("Coastal biodiversity", "Coastal biodiversity"),
("phytoplankton", "phytoplankton"),
("Echinoderms", "Echinoderms"),
("Tube worms", "Tube worms"),
]

DATA_CHOICES = [
("data_type_sightings_cs", "Sightings"),
("data_type_imagery_cs", "Imagery"),
("data_type_collection_samples_cs", "Collection/Samples"),
]

```

```

        ("data_type_syst_obs_cs", "Syst. Obs."),
        ("data_type_msrmspec_data_cs", "Msrms/Spec. Data"),
    ]

    PT_CHOICES = [
        ("pt1_cs", "PT1"),
        ("pt2_cs", "PT2"),
        ("pt3_cs", "PT3"),
        ("pt4_cs", "PT4"),
        ("pt5_cs", "PT5"),
        ("pt6_cs", "PT6"),
        ("pt7_cs", "PT7"),
        ("pt8_cs", "PT8"),
        ("pt9_cs", "PT9"),
        ("pt10_cs", "PT10"),
        ("pt11_cs", "PT11"),
        ("pt12_cs", "PT12"),
        ("pt13_cs", "PT13"),
        ("pt14_cs", "PT14"),
        ("pt15_cs", "PT15"),
        ("pt16_cs", "PT16"),
        ("pt17_cs", "PT17"),
    ]

    LEVEL_CHOICES = [
        ("Crowdsourcing", "Crowdsourcing"),
        ("Distributed intelligence", "Distributed intelligence"),
        ("Participatory science", "Participatory science"),
        ("Extreme citizen science", "Extreme citizen science"),
        ("PE", "PE"),
    ]

    LOC_CHOICES = [
        ("Outdoors", "Outdoors"),
        ("Indoors", "Indoors"),
        ("Online", "Online"),
        ("In- and outdoors", "Indoors and outdoors"),
    ]

    title_eng_cs = models.CharField(verbose_name="Title", max_length=2000, blank=True)
    title_cs = models.CharField(verbose_name="Title (OV)", max_length=2000, blank=True)
    citizen_id_cs = models.IntegerField(
        null=True, default=None, blank=True, db_index=True
    )
    scope_cs = models.CharField(
        verbose_name="Scope", max_length=255, blank=True, choices=SCOPE_CHOICES
    )
    inclusive_cs = ArrayField(
        models.CharField(max_length=255, blank=True),
        verbose_name="Inclusive",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )
    description_cs = models.TextField(verbose_name="Description", blank=True)
    aim_cs = models.TextField(verbose_name="Aim", blank=True)
    website_cs = models.URLField(verbose_name="Website", max_length=511, blank=True)
    partners_cs = MultiSelectField(
        choices=TYPE_CHOICES,
        verbose_name="Partners",
        blank=True,
        max_choices=10,
    )

```

```

        max_length=200,
    )
    area_cs = MultiSelectField(
        choices=AREA_CHOICES,
        verbose_name="Area",
        blank=True,
        max_choices=10,
        max_length=200,
    )
    start_year_cs = models.IntegerField(
        verbose_name="Start year", null=True, default=None, blank=True, db_index=True
    )
    end_year_cs = models.IntegerField(
        verbose_name="End year", null=True, default=None, blank=True, db_index=True
    )
    frequency_cs = models.CharField(
        max_length=30,
        verbose_name="Frequency",
        choices=FREQ_CHOICES,
        default=None,
        null=True,
    )
    topic_cs = ArrayField(
        models.CharField(max_length=255, blank=True),
        verbose_name="Topic",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )
    category_cs = models.CharField(
        max_length=30,
        choices=CAT_CHOICES,
        verbose_name="Category",
        default=None,
        null=True,
    )
    species_cs = MultiSelectField(
        choices=SPC_CHOICES,
        verbose_name="Species",
        blank=True,
        max_choices=10,
        max_length=200,
    )
    invasive_cs = models.BooleanField(
        verbose_name="Invasive species", null=True, blank=True, default=None
    )
    decarbon_cs = models.BooleanField(
        verbose_name="Decarbon", null=True, blank=True, default=None
    )
    data_availability_cs = models.BooleanField(
        verbose_name="Data availability", null=True, blank=True, default=None
    )
    data_cs = MultiSelectField(
        choices=DATA_CHOICES,
        verbose_name="Data",
        blank=True,
        max_choices=10,
        max_length=200,
    )
    policy_task_cs = MultiSelectField(
        choices=PT_CHOICES,
        verbose_name="Policy task",

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```

        blank=True,
        max_choices=10,
        max_length=200,
    )
    technology_support_cs = models.CharField(
        max_length=40,
        verbose_name="Technology support",
        choices=TECH_CHOICES,
        default=None,
        null=True,
    )
    technology_needed_cs = ArrayField(
        models.CharField(max_length=255, blank=True),
        verbose_name="Technology needed",
        default=list,
        editable=False,
        blank=True,
        db_index=True,
    )

    level_participation_cs = models.CharField(
        max_length=30,
        verbose_name="Level of participation",
        choices=LEVEL_CHOICES,
        default=None,
        null=True,
    )
    co_creation_cs = models.BooleanField(
        verbose_name="Co-creation", null=True, blank=True, default=None
    )
    location_cs = models.CharField(
        verbose_name="Activity location",
        max_length=255,
        blank=True,
        choices=LOC_CHOICES,
    )
    specific_location_cs = models.CharField(
        verbose_name="Specific location", max_length=2000, blank=True, null=True
    )
    general_aim_cs = models.CharField(
        max_length=20,
        verbose_name="General aim",
        choices=AIM_CHOICES,
        default=None,
        null=True,
    )
    participants_cs = models.CharField(
        max_length=130,
        verbose_name="Number of participants",
        choices=PART_CHOICES,
        default=None,
        null=True,
    )
    data_source_cs = models.CharField(
        verbose_name="Data Source", max_length=64, blank=True
    )

    # services_org = models.CharField(max_length=63, blank=True)
    # people_org = models.ManyToManyField(People)
    organisation_cs = models.ManyToManyField(
        Organisation,
        verbose_name="Organizer",
    )

```

```
date_added_cs = models.DateField(verbose_name="Date added", auto_now_add=True)
date_update_cs = models.DateField(
    verbose_name="Date update", auto_now=True
) # it does work with Model.save() but not with QuerySet.update()

def __str__(self):
    return f"{self.title_eng_cs}"

@staticmethod
def frontend_url():
    return "/explore/citizen-science/"

" Managers "
objects = CitizenManager()

class Meta(GenericModel.Meta):
    db_table = "citizen"
```