Open
Geospatial
Consortium

Open Science Persistent Demonstrator

Request For Information (RFI)

Interoperability and Collaboration

2023 – 2024

Version 1.5 – July 2023

1. Introduction

The Open Geospatial Consortium (OGC) is releasing this Request for Information (RFI) to solicit information and intentions for the OGC Open Science Persistent Demonstrator (OSPD) Initiative. This RFI is in preparation for an OGC Call for Participation (CFP), which will be released once the RFI responses are analyzed.

The OSPD project will explore the principles of reusability, portability, and transparency, within an Open Science Persistent Demonstrator. The goal is to enable and demonstrate prototyping technology solutions that create capacity for better and faster Earth Science research, comparison scenarios, as well as higher adoption of EO-based results and impact on society. Ultimately, the Open Science Persistent Demonstrator will be a 24/7 available web application that demonstrates and tests scientific workflows across several existing platforms. The goal is to demonstrate how platforms operated by different organizations can be used for collaborative research and data representation. By providing corresponding learning modules, the OSPD allows easy entry into the world of scientific resources and data analysis. At the same time, it demonstrates the provision of results in different forms to meet the needs of scientists, decision makers and the general public.

The Open Science Persistent Demonstrator (OSPD) will be a dynamic interoperation hub. It enables disciplines, scientists and decision makers to interact at variable skill levels and to evaluate existing components with advancing technologies. OSPD integrates requirements and ideas from the European Space Agency (ESA) and the National Aeronautics and Space Agency (NASA), facilitating leverage of both prototype and existing data, services, and systems and symbiotic objectives for a more dynamic and enterprising outcome. The OSPD is also meant to enable prototype developments to be available and tested for operational usage prior to adoption by organizations.
As the OSPD matures over the two - three year project cycle, it will demonstrate interoperability across an increasing number of in-kind contributed geospatial infrastructures from many organizations; bringing them together in a 24/7 tangible interoperability environment; enhancing interoperability, raising awareness, and building community.

This RFI is released to solicit your interest and advice for the design, implementation, and operation of the OSPD, as illustrated in the figure below. Specific requirements are provided in section 2.

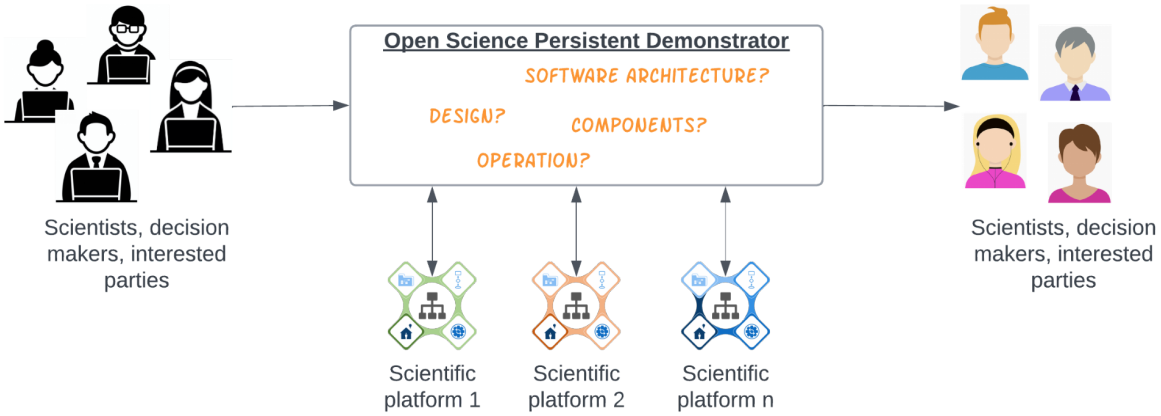

Figure 1: Core elements and RFI questions for the Open Science Persistent Demonstrator

The OSPD Goal

The goals of the OSPD (not the goals of this RFI, the RFI is only used to discover participation level of interest in the OSPD project and what form the OSPD implementation should take) are to promote open science, to collaborate on open science, to experiment with open science, and to demonstrate open science results. In detail it is about:

- Promoting an open science approach to understanding Earth processes.
    - Advance broader access, use, engagement, and cross-discipline scientific research and societal decision making.
    - **Expected Results:** reproducible EO scientific workflows (including AI) built on FAIR elements to both scientific platforms and data, linked to publications; demonstrated reuse (inter or cross-discipline) of entire workflows or of elements that build them; demonstration of result representation to various stakeholders.
- Using combined capacities provided by various platforms.
    - Grow value and impact of participating organizations existing initiatives while creating new benefits with combined capacities.
    - **Expected Results:** reproduced and reused EO scientific workflows across platforms; scientific results visualised across platforms; mapping capabilities for data custodians;
- Collaboratively exploring best tools and representations.
    - Co-design with scientists, technology developers, and decision makers to develop, test, and validate advanced interoperability and integration methods.
    - **Expected Results:** guides and tutorials for OSPD and co-design workshops; co-designed solutions (e.g., for workflow handling, multi-stakeholder result representation, etc.).

The Challenge

Integration of a variety of heterogeneous data and processes across heterogeneous platforms.

- Enable integration, interoperability and collaboration across a selection of platforms intersecting communities and domains.

Co-design with a broad range of stakeholders & collaborative research.

- Attract divergent disciplines to collaborate with the Earth Science community through integrated data provided by different disciplines.

Open access & optimal representation of the reproducible results to the various recipients.

- Facilitate access to research and provenance of data and products.

The Plan

Build a persistent demonstrator.

- A long-term framework for technology advancements and prototypes to be used and tested prior to adoption by organizations.

Invite all existing platforms to join the initiative.

- Co-design with scientists and decision makers, and encourage cross-discipline interactions.

Experiment with advanced result presentations.

- Enable and experiment across a variety of innovative visualization capabilities/

The overall concept being a lightweight OSPD component that is generally a workflow builder and a training/education module, combining both elements neatly. Actual processing, result storage, and related activities are all done on existing platforms. The concept also allows new applications or processing instructions to be delivered to the OSPD. The OSPD then registers these with one of the platforms for execution. The focus is not to develop another platform, but to focus on user experiences, outreach, training, and advanced visualization as depicted in Figure 2.

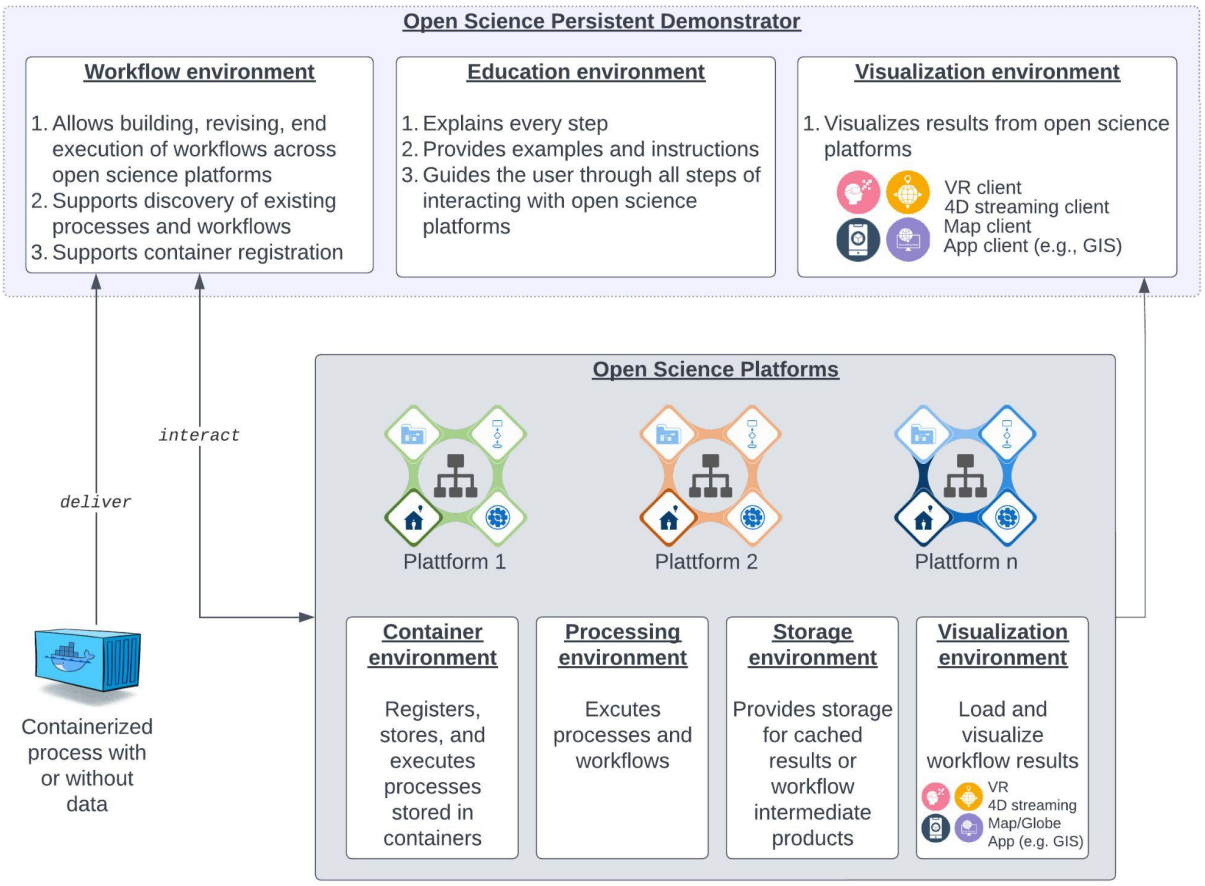

Figure 2: Open Science Persistent Demonstrator Architecture Diagram

The OGC Open Science Persistent Demonstrator initiative (OSPD) will be conducted as a multi-year project, developing, testing, and refining the OSPD for users to explore geospatial technology solutions from various angles. Similar to other OGC initiatives this will take the OGC Baseline into account, and at the same time explore selected aspects with broad teams from industry, government, and academia to advance Findable, Accessible, Interoperable, and Reusable (FAIR) principles and OGC's open standards capabilities. The OSPD portal demonstrator will be either provided by a project participant or developed jointly and procured through the CFP.

Important Features

This project is a strategic initiative between ESA and NASA – open to other interested parties. We welcome and encourage organizations to become sponsors of this initiative to fund and drive requirements as the architecture matures.

OGC's consortium of experts ensures that OGC remains a neutral forum to solve issues leveraging the power of geospatial, and delivering open and consensus-based solutions that move at the rapid pace of innovation.

As the architecture matures and sponsors provide more advanced requirements, providers and users submit requirements and requests the focus and priorities will adapt to reflect the collaboratives necessities and specifications.

Master Schedule

The following table details the major Initiative milestones and events for the first year of the Open Science Persistent Demonstrator initiative. It is anticipated this will be a multi-year project. Dates are subject to change.

Milestones	Project Month	Description
M1	Jul '23	Development and Release of a Request for Information (RFI) and requirements for the Open Science Persistent Demonstrator (OSPD)
	Jul '23 - Sep '23	RFI open for response and design phase
M1.5	Jul '23 - 11 Sep '23	Responders Q&A; online answers as questions are submitted
M2	17 Sep '23	RFI responses due and review; Development of CFP for OSPD Implementation
M3	25 Sep '23	CFP Release for Open Science Persistent Demonstrator Implementation (closes 15 Nov '23)
M4	Nov - Dec '23	Proposals review, participants selection, and contracting
M5	Jan '24	Kick-off meeting for implementation
M6	Jan '24 - Jun '24	OSPD Implementation phase
M7	Jun '24 - Jul '24	Open Science Persistent Demonstrator ER and presentations

Participation - Join, Scale, Please Don't Leave too Early

The goal of this RFI is twofold: First, OGC wants to solicit your interest in joining the OSPD project. Second, OGC asks for your guidance in terms of OSPD design, implementation, and operation.

Industry, Governmental / National, academic, or any organizational platform could participate. Submitting a proposal to the Call For Participation when it comes out would be the most direct avenue; however, contacting OGC to express your interest would be acceptable as well.

Degrees of participation

The OSPD is open for participation, recognizing that engagement levels and available resources may vary. Regardless of your capacity, the initiative welcomes all interested organisations, however every participant is expected to actively take part in the co-design process and promote the initiative, specifically the standards based interaction between components and OGC FAIR principles. Here are some examples of various possible levels of engagement:

- Active/passive - Active is to provide funding, in-kind service, or other related requirements (cloud credits, etc.) Passive participation would include providing components with minimal agreement with OGC. Passive might also include the End User experience and what insights and requirements this domain brings to the architecture.
- Limited/full access - Limited would include just providing an aspect, such as a data source; while Full Access might include a contract to fully integrate your organizational component(s) with the architecture and commit for a period of time acceptable to all parties.
- Share data/processes/science - This architecture should provide all aspects of any combination of Spatial Data Architectures so providing any components your organization has and/or produces is desirable
    - We are as equally interested in the End User experience in sharing requirements and providing vision.

The Call For Participation is an opportunity to implement and explore interaction with such an architecture.

- The CFP will include requirements, timelines for development, and a commitment to participate for a period of time depending on the component being provided.
- The development phase will offer an opportunity to work with other organizations to test and implement integration and interoperability between platforms, products, end users, etc.

The persistent demonstration will result in evolution of spatial data, technologies, and related capabilities into valuable information for decision makers, science researchers, policy makers, data providers, and service providers.

2. Request For Information and Design Phase

This RFI will inform the OSPD project development initiative. Following is the RFI information, evaluation criteria, submission details, response deadline and information about the follow-on CFP for the OSPD.

2.1 RFI Goal

Given the opportunity to participate in an Open Science Persistent Demonstrator what do you imagine that participation to be? How will your organization fit into this demonstrator? How will this persistent demonstrator help support your organization's objectives?

This is the type of information we need to effectively design and implement the Open Science Persistent Demonstrator. We are not requesting information on the development of the OSPD in this RFI, but rather the components and pieces from organizations to be included in the architecture. The request for development concepts will be included in the follow-on Call For Participation (more data on the CFP in Appendix A).

The following information provides the objectives, RFI questions, and an Appendix with information regarding the follow-on Call for Participation.

2.2 RFI Objectives

Who wants to be part?… and in which role? This RFI will aid in understanding how we will develop the OSPD and what organizations and components should be included, as well as what interconnections are missing or might need to be adapted. Additionally, which role will your organization participate in, or multiple roles?

What do you want to get out of this project? This RFI includes the opportunity to let us know what your organization would consider success for yourselves and users / customers as well as what your organization is trying to achieve by participating.

Participation: Join, scale, but don't leave too early.

- We prefer a commitment to the full period of performance (three years) of the project, until 2025.

Response information covered in section 2.4 RFI Response.

2.3 RFI Inquiry

Please address only the questions that are relevant to your type of participation, it is not necessary to answer every question.

Organization

- Organization Name and address
- Organization Point of Contact (POC)
- POC email and phone
- Organization Type: (Government, Industry, Academia, Non-Profit, Other)
- Is your organization willing to be a (add all that apply):
    - Platform Provider
    - Resource Provider
    - Use Case Provider
    - Developer
    - End User
- What in-kind services could your organization provide?
- Organization Achievement: What is your organization trying to achieve with the infrastructure component(s) you anticipate providing?
- Organization Success: What would your organization's success criteria be?
- How long do you anticipate being involved in this initiative?
    - Note: We prefer a commitment to the full period of performance (three years) of the project, until 2025.

Platform Provider

- How would your infrastructure or components fit into the architecture in Figure 2?
- What is missing or should be restated within this architecture?
- What infrastructure pieces should be prioritized?
- How long do you anticipate providing infrastructure?
    - Note: We prefer a commitment to the full period of performance (three years) of the project, until 2025.
- How will your capabilities interoperate and integrate with everyone else's (will you adapt your capabilities to work with others)?
    - What types of APIs, standards, and interoperability do you currently use?
    - How would your organization's components be accessible?
- Additional Comments -

Resource Provider

- What specific products/datasets/resources will your organization offer?
- How long will you provide access to these products/datasets/resources?
- What types of APIs, standards, and interoperability do you currently use?
- Additional Comments -

Use Case Provider

- What specific use cases will your organization offer?
- What kind of data/ resource/infrastructure/component/capability the use cases will need access to?
- What types of APIs, standards, and interoperability do you use to provide use cases to platforms?
- Additional Comments -

Developer

- In which domain are you interested in developing?
- On which software stack; Open source or commercial?
- Are you familiar with the agile software process used during OGC pilots?
- What types of APIs, standards, and interoperability will you use in your development(s)?
- Additional Comments -

End User

- What scientific / research / technical / economic / climatic domain does your organization work in?
- What specific components / products / datasets / modeling / visualization does your organization require access to?
- What use cases does your organization require?
- What types of APIs, standards, and interoperability do you currently use or require?
- Additional Comments -

Sponsor

- Is your organization interested in becoming a sponsor / funder of this initiative?

2.4. RFI Evaluation Criteria

This RFI data will be gathered and assessed by OGC, ESA, and NASA. The inputs will aid in the design concept of the OSPD development and the follow-on CFP. There is no strict evaluation

criteria as this RFI is to advance the design, development, implementation, testing, and validation of the OSPD itself.

No responder will be prevented from responding to the Call for Participation, nor will any responder be considered automatically included.

2.5. RFI Response

Responders Question and Answer will be ongoing; questions will be addressed as they come to OGC email at: mcole@ogc.org

- Subject Matter: OSPD RFI
- RFI Q&A Responses will be emailed to questionnaire and posted at: https://www.ogc.org/initiatives/open-science/
- Responders Q & A ends Monday, 11 September, 2023

Please respond to this RFI through SurveyMonkey at: https://www.surveymonkey.com/r/OSPDSurvey. Not every question under the RFI Inquiry section needs to be addressed. All RFI Responses are due by: Sunday, 17 September 2023, 12:00 PM Eastern Time Zone - 6 AM, Monday, 18 September, CEST

Appendix A

Open Science Persistent Demonstrator Future Call For Participation

Understanding complex science and societal interactions and the implications for localities and people, today and in the future, requires an interdisciplinary approach across existing institutional and administrative boundaries. Understanding Earth's geospatial processes requires the integration of Earth Observation results with data, information, and approaches from many other communities. The collaboration of the Earth Observation community with health professionals, social scientists, statisticians, and economists provides the basis for understanding geospheric processes in the context of a growing world population and a globally organized economy.

Additionally, ESG, Environmental, Social and (corporate) Governance, is an established United Nations (UN) approach working in concert with Sustainable Development Goals (SDGs) towards advancing nation state objectives related to economic, environmental, and social sustainability. A group of the world's largest institutional investors joined a process to develop the Principles for Responsible Investment. The UN is supporting the Principles for Responsible Investment (PRI) international network of financial institutions working together to implement its six aspirational principles, often referenced as "the Principles".

This plan addresses both short-term and long-term responses and response strategies for spatiotemporal processes within 'Open Science'. Common to open science and ESG needs is the ability to integrate a variety of heterogeneous data and processes. The integration and ultimate visualizations and findings are a complex process. In all cases, a large amount and variety of data must be found and evaluated, data processing models must be understood and made mutually usable, and results need to be reliably generated, described, visualized, and communicated.

Based on core principles that include accessibility, reproducibility, inclusiveness, and transparency, Open Science enabled by technology creates the premises for better and faster scientific research results, comparison scenarios, as well as higher acceptance and impact on society while also meeting ESD objectives. Across the disciplines of Geosciences and Remote Sensing, Open Science is found at various degrees of maturity as well as applicability.

This plan compliments current initiatives while pioneering advanced solutions evolving spatial data, technologies, and related capabilities into valuable information for decision makers, science researchers, policy makers, data providers, software developers, and services providers to make informed decisions and improve science and societal data usage and understanding.

The Open Geospatial Consortium (OGC) will support the National and European Aeronautics and Space Agencies (NASA and ESA) by implementation of Open standards and solutions within

a persistent demonstration environment in support or and driven by ESA and NASA requirements.

- Ensure a long-term framework (i.e., the persistent Open Science Demonstrator), where agencies contribute with data, tools, and infrastructures in a coordinated approach, building on existing investments where appropriate.
    - Provide provenance with links to science and research publications, reducing uncertainty and enabling confidence for end users.
- Attract other disciplines to cooperate with the Earth Science community by demonstrating the value of integrated data provided by different disciplines in a neutral, web-based, permanently available framework, including such approaches as ESG.
    - Fully leverage on-premises and in-cloud capabilities, digital twins and newly accessible platforms through FAIR (Findable, Accessible, Interoperable, Reproducible) principles; create Analysis Ready Data (ARD) for diverse communities and accelerate standardization of ARD for a wide range of data products.
- Facilitate the direct participation of the scientific (and end user) community as key utilizers and understand how scientific results can make their way into the Open Metaverse. Leverage visualization platforms such as Google Earth, NVIDIA, IBM GeoDN.
    - Define manageable processes and best practices for communities conducting geoscience research in multiple domains with heterogeneous data and tools on a distributed infrastructure (e.g., exploring high-level abstractions).
- Enable collaboration within and across communities and community members with variable skills and competencies. Align on standards, vocabularies, and ontologies for data and workflows and develop community-wide Open-Source Science mechanisms.
- Compliment current initiatives, where possible include additional initiatives in this approach.

A1. OGC COSI Program Initiative

The Open Geospatial Consortium (OGC) is a collective problem-solving community of more than 550 experts representing industry, government, research and academia, collaborating to make geospatial (location) information and services FAIR - Findable, Accessible, Interoperable, and Reusable. The global OGC Community engages in a mix of activities related to location-based technologies: developing consensus-based open standards, solutions, and best-practices; collaborating on problem solving in agile innovation initiatives; participating in member meetings, events, and workshops; and more. OGC's unique development process moves at the pace of innovation, with constant input from technology forecasting, practical prototyping, real-world testing, and community engagement.

OGC's member-driven consensus process creates royalty free, publicly available, open geospatial standards. Existing at the cutting edge, OGC actively analyzes and anticipates emerging tech trends, and runs an agile, collaborative Research and Development (R&D) lab –

the OGC Innovation and Collaborative Solution Program – that builds and tests innovative prototype solutions to members' use cases.

This initiative is being conducted under the OGC Collaborative Solutions and Innovation (COSI) Program. The OGC COSI Program aims to solve the biggest challenges in location. Together with OGC-members, the COSI Team is exploring the future of climate, disasters, autonomy and robots, outer space systems interoperability, defense and intelligence, and more.

The OGC COSI Program is a forum for OGC members to solve the latest and hardest geospatial challenges via a collaborative and agile process. OGC members (sponsors and technology implementers) come together to solve problems, produce prototypes, develop demonstrations, provide best practices, and advance the future of standards. Since 1999, more than 100 funded initiatives have been executed - from small interoperability experiments run by an OGC working group to multi-million dollar testbeds with more than three hundred OGC-member participants.

OGC COSI initiatives promote rapid prototyping, testing, and validation of technologies, such as location standards or architectures. Within an initiative, OGC Members test and validate draft specifications to address geospatial interoperability requirements in real-world scenarios, business cases, and applied research topics. This approach not only encourages rapid technology development, but also determines the technology maturity of potential solutions and increases the technology adoption in the marketplace.

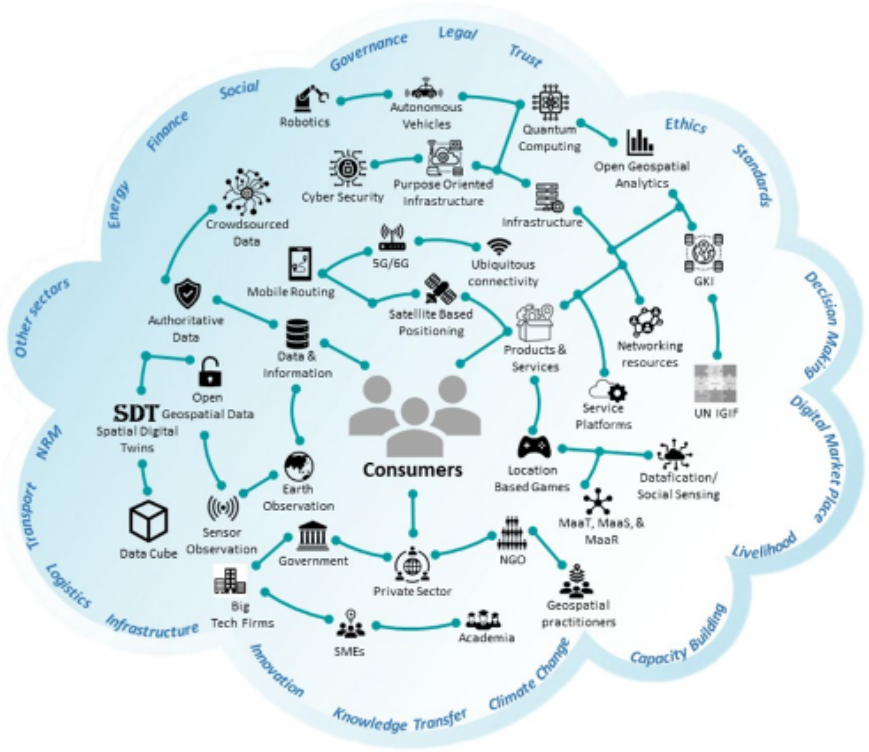

Figure 2: OSPD concept of community enabled platform interactions

A2. OSPD Multi-Year Master Schedule

The following table details the major Initiative milestones and events for **future years** of the Open Science Persistent Demonstrator initiative. Dates are subject to change.

Milestones	Project Month	Description
M1	Aug '24	Development and Release of the next Call for Participation (CFP) for the Open Science Demonstrator refinement based on Sponsor and Participant requirements.
M1.5	Aug '24 - Oct '24	Bidders Q&A; online answers as questions are submitted
M2	Oct ‘24	Proposals review, participants selection, and contracting
M3	Nov '24	Kick-off meeting, refinement and advancement phase
M4	Nov ' 24 - Apr ' 25	OSPD Project Work
M5	Apr '25 - May '25	Open Science Persistent Demonstrator ER and presentations

A3. OSPD Call For Participation

The OSPD Call For Participation (CFP) will ask for organizations to propose aspects of the development and implementation of the architecture as described above. The CFP will include the input and knowledge gained from the RFI, some specific requirements, and will request participants to submit the following information:

- What components the organization will include,
- Costs for participation
- In-kind services
- Anticipated component period of persistence, (1 year at a minimum, 3 years preferred)
- Will include three year procurement for OSPD portal demonstrator development and implementation.

Among other requirements consistent with an OGC CFP.