OGC TESTBED-18 Developing Location Interoperability

OGC Testbed-18 Call for Sponsors

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Chapter 1. Help Boosting Location Interoperability

OGC Testbeds are OGC's largest Innovation Program (IP) initiatives. Testbeds boost research and development to make location data and information more FAIR: Findable, Accessible, Interoperable, and Re-Usable. Testbeds provide a unique opportunity for sponsors to tackle location data and processing challenges together with the world's leading geospatial IT experts.

Building on the success and outcomes of Testbed-16 and Testbed-17 as well as other IP initiatives, OGC is now preparing Testbed-18. If you are interested in being part of this critical, once-a-year opportunity to shape collaborative innovation activities, please contact OGC's CTIO, Dr. Ingo Simonis, via the OGC Innovation Program contact form to discuss your organization's technology integration and other technological challenges before September 15th.

As part of the Testbed development process, challenges put forth by sponsoring organizations are refined and mapped to a set of work items that OGC member organizations will compete to address. The Innovation Program team, together with the Testbed sponsors, will then select the most qualified organizations to join Testbed-18. In a collaborative effort, all Testbed participants, sponsors, and the OGC team work jointly on the goal to stepwise increase Technology Readiness Levels (TRL) of geospatial IT solutions, including software architecture, interface design, information and data models, as well as any related standards and specifications.

Chapter 2. Synergistic Effects

OGC Testbeds provide a unique opportunity to explore technologies that appear disconnected at first glance. Combining these technologies in a single initiative and bringing several sponsors together allows us to create an interoperability environment that comes much closer to real-world situations. In consequence, Testbeds allow leveraging an outstanding quality of synergetic effects and address challenges that require collaboration among several sponsors and experts from member organizations.

As multi-sponsor initiatives, Testbeds benefit from synergistic effects caused by overlapping interests. Sponsorship for individual tasks can be shared across sponsors, which enables the Testbed to explore new technology more deeply and ensures more realistic use cases and scenarios. The IP team collects the sponsors' areas of interest early in the process and shares the full picture among all sponsors. This allows sponsors to identify common interests and leads to more efficient use of the available resources.

To start the discussion process, this OGC Testbed-18 Call for Sponsors provides suggestions for the upcoming Testbed-18. The suggestions reflect recent discussions in Testbed-17 and other OGC Innovation Program initiatives as well as requirements collected from direct conversations with geospatial scientists, software architects, and practitioners. The following listed suggestions are by no means exhaustive and will be complemented with additional requirements as identified by sponsoring organizations.

Chapter 3. Suggested Topics

Data and Data APIs: In many situations, integrating data from various providers is essential to decision making, scientific research, or policy setting. With data now commonly being served through Web APIs, these APIs need to be enabled to expose useful information about the data they serve or can process. Testbed-18 shall advance both the mechanics of this process (expose data as JSON-LD, use of JSON-Schema for validation, Open API implementation patterns and client support), as well as context scalability aspects. The latter allows data about an object to be discovered from the object as a starting point, i.e., addresses the "inbound link" problem. Mapped to concrete activities, Testbed-18 shall: first, address modularity and reuse of data description mechanisms for data access APIs; second, commonalities of data description across components (catalog, API description, API invocation and client presentation of data); and third, the flexibility of data views and accommodating third-party provisioning of some data elements.

Sensor Integration: Current efforts address the integration of multiple sensors into a common infrastructure by either providing service endpoints for sensors (i.e., abstraction by API), or by providing drivers for these sensors to connect to some type of common infrastructure. Testbed-18 should explore the usage of graph-based structures where drivers are provided as nodes in a graph. With all integration knowledge being part of the graph, solutions can be easily shared, distributed, and embedded into new environments. Shared semantics need to be addressed similarly to the aforementioned data integration work item.

Moving Features: Recent testbed activities have demonstrated the extraction of objects identified in video streams as OGC Moving Features. In this context, a new API is emerging to store and access detections in and out of moving feature stores or databases. The API allows querying individual detections in order to merge them stepwise to short tracklets and eventually full tracks. The emerging API needs to be extended to express track uncertainties and needs to be explored in multiple contexts to enhance maturity.

Web APIs for the Aviation Community: Research on the transition of existing SWIM services to modern Web APIs. Testbed-18 shall explore how dynamic data with frequent updates can be managed efficiently using Web APIs.

Data Centric Security: Testbed-17 is developing API extensions to handle OGC API Features, Tiles, and Map data securely. In addition, secure GeoPackages are currently being explored and demonstrated. Testbed-18 should apply these technologies in a multi-vendor, multi-cloud environment and explore offline use cases in detail. These are particularly interesting for secure GeoPackages, given that the technology was developed to take data into the field where no internet connectivity is available.

Service Security: Finalization and testing of the emerging GeoXACML 3.0 standard in a multistakeholder environment. Federated Cloud Analytics: Exploration of shared semantics, rapid discovery of related data, user handling, data and service security.

Augmented Reality & Virtual Reality: With AR & VR becoming more and more main stream, one key aspect is the actual integration of real world data coming from sensor streams and models. Testbed-18 should look into enhanced interoperability for data from secure sensor networks with focus on live streaming.

Machine Learning & Artificial Intelligence: SampleML is an OGC effort to describe data that has been used to train models. The precise description of that data and ideally its availability online should be further investigated. From an API perspective, OGC API-Processes should be further explored, which links to the application-to-the-data efforts described below.

3D Data Streaming: With GeoVolumes, OGC has created a new candidate standard to boost discovery and access to 3D data. Testbed-18 should continue the work from the Interoperable Simulation and Gaming sprint that advanced interoperability of 3D geospatial and computer graphics using OGC CDB, Khronos glTF, and related 3D standards.

GeoPackage: Data containers exploration in the OGC API environment with its capabilities and limitations. Exploration of asynchronous delivery of GeoPackages to consumers or use of SQlite extensions that allow synchronous streaming access to GeoPackages under construction.

Data Warehouses, COG and Cloud Native Vector Format: COG (Cloud Optimized GeoTIFF) has hit the geospatial domain very successfully. It efficiently allows the querying of cloud-stored raster data through a series of HTTP range requests. What is the counterpart on the vector side? Current data warehouses all handle geospatial aspects slightly differently. What is the common denominator? Is there a need for geo-enabled formats such as geo-Avro, geo-Parquet, or geo-ORC?

Cloud Native Processing: Geospatial functionality as part of Web APIs. Includes typical operations such as re-gridding, subsetting, filtering, interpolation etc. but even more complex operations that can be made available as function calls to cloud-hosted data.

Applications to the Data: With the EO Application Package as a container descriptor format and specialized processing APIs for application registration and execution, recent initiatives have provided a solid architecture to support the "applications-to-the-data" paradigm. Testbed-18 should next develop a series of real-world examples and best practices on how to package and aggregate simple applications and more complex workflows and deploy them in different Clouds. The resulting report would provide the most complete coverage of current EO applications paradigms and packaging and deployment strategies. In addition, existing services would see a concrete consolidation in terms of portability between platforms and interoperability evaluation.

Model Driven Standards: A user who wants to publish or process a specific data set is currently confronted with a long list of possibly relevant standards. The vision is that the user can formulate a request in natural language and the standards knowledge engine provides all relevant pieces in a single document. To make this happen, we need to abandon our current document-based approach and manage all standard components (i.e. title, purpose description, links to other standards, conformance classes, requirement classes etc.) as individual resources that can be extracted from a standards knowledge graph or other resource repository.

Privacy and Data Ethics: OGC has joined the Locus charter, which describes risks and seeks solutions related to the use of location data from both individuals and the general public. Testbed-18 should address geospatial privacy and ethical aspects in more detail. How can we share high-value data without violating privacy laws?

Compliance Testing: Compliance tests play an important role in the context of standards-based APIs. Testbed-18 should develop or further enhance compliance tests of OGC APIs - Coverages, Maps, Tiles, Styles, or encodings such as Moving Features, IndoorGML, or CDB.

API Adoption: The OGC API suite of standards is developing splendidly. Testbed-18 should further support this process by exploring the use of OGC APIs in different domains, e.g. geo-sciences, climate change, meteorology, or aviation. The use of OGC API - Processes needs to be further explored in the context of applications-to-the-data, i.e., where applications need to be executed close to the physical location of data to avoid expensive data transfers. Further on, OGC APIs need to be evaluated in demonstration scenarios, e.g. OGC API - Routes for multi-modal routing, OGC API - Records for ISO 19115-1/2/3 profiles and in context for data centric security, or OGC API - Features for filtering and CQL or full CRUD (Create, Read, Update, Delete) support.

API Enhancements: While existing and emerging APIs need to be tested and profiles created, other underlying technologies are developing further as well. OpenAPI, the underlying interface description standard for all OGC API Standards, was recently updated to version 3.1. What does this mean for OGC APIs? Another enhancement path is the possible adoption of OpenAPI's AsyncAPI as a suitable notification mechanism for Web APIs. Testbed-18 could prototype an AsyncAPI conformance class for OGC API - Common.

Linked data and Semantics: The OGC Definition Server needs to be stress-tested in a multistakeholder environment. This could be done by e.g. exploring its usage to register applications with their signature (type of processing, inputs, and outputs).

Chapter 4. The Testbed-18 Development Process

The development of Testbed topics is a collaborative process between OGC and interested sponsors. During the first phase (August, September), sponsors and the OGC team work together to refine use cases and requirements on the sponsor side and transform these into actual work items. Each work item will be assigned to an OGC member organization for implementation during the Testbed-18 execution phase. Once these discussions are complete, OGC will develop a Call for Participation that is planned to be released to the public in early December. After a 45-day response period, OGC together with the sponsors will select the best participants based on the received proposals to form the Testbed-18 team. The execution phase, the phase of system design, rapid prototyping, testing, and documentation will be executed from April to December 2022.

Chapter 5. Testbed Timeline

The following timeline highlights all major milestones of Testbed-18.



Chapter 6. Call to Action

Interested? Please contact OGC's CTIO, Dr. Ingo Simonis, via the OGC Innovation Program contact form. The first sponsor coordination telephone conferences are planned for early and late September. If you are interested, please get in contact no later than September 15th. To download a PDF copy of this Call for Sponsors, please click here.