

SIMPLIFYING LOCATION DATA ACCESS AND PROCESSING

NEXT YEAR'S OGC'S TESTBED-17 WILL SEE THREE TECHNOLOGY TRENDS PRIORITISED FOR INVESTIGATION. **INGO SIMONIS** LOOKS AT THE CHALLENGES AND OPPORTUNITIES AHEAD

OGC is best known for its free and open location standards, but it also runs an idea-to-market accelerator: the OGC innovation programme (IP). This provides a forum for OGC members to come together to solve problems, produce prototypes, develop demonstrations, provide best practice and advance the future of location standards. OGC IP initiatives range in size from small interoperability experiments run by a single OGC working group up to our annual multi-million dollar 'testbeds' with hundreds of OGC-member participants.

OGC's 2021 testbed, Testbed-17, is currently looking for participants to help address some major challenges concerning the widespread adoption of location information on the web, including: cloud-based data processing apps; 'convenience' Web APIs that combine data access and processing; semantic consistency between the different datasets behind standardised APIs; and the exploration of discrete global grid systems (DGGs) as a simplified reference system for the Earth (and other planets).

OGC IP initiatives promote rapid prototyping, testing and validation of location-related specifications and architectures. Within an IP initiative, OGC members use real-world scenarios, business cases and applied research topics to test and validate draft specifications that address sponsors' geospatial interoperability requirements. 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.

OGC IP initiatives help move technologies up through the technology readiness levels (TRLs), with initiative types available that validate early ideas (TRL 2-4), while others take them through prototyping and market readiness (TRL 5-8) (see Figures 1 and 2). Testbeds are our most far-reaching initiatives, in terms of the number of technologies involved and their range of TRL.

TESTBED-17: BRINGING IT ALL TOGETHER

The technical scope of 2021's Testbed-17 (www.ogc.org/testbed17) was determined by a requirements collection process led by OGC staff that involved multiple sponsors from around the globe. Using experience gained during recent IP initiatives, insights from the OGC technology trends process, ideas put forth by testbed sponsors and the results of an OGC member-wide technology survey conducted in June, three current trends have been prioritised for investigation during Testbed-17:

The evolution of cloud solutions to enable developers to submit data processing apps (see 'An App Store For Big Data' in *GeoConnexion International's* July/August edition), coupled with a growing appetite and appreciation for holistic 'convenience APIs' from application developers and data consumers alike

A shift towards simplified 'Web APIs' in previously specialist domains. These are convenient for the web developer but won't solve existing challenges – such as differences between data models – unless they're shifted to a higher semantic level by applying linked data principles backed by strong semantics and linked ontologies



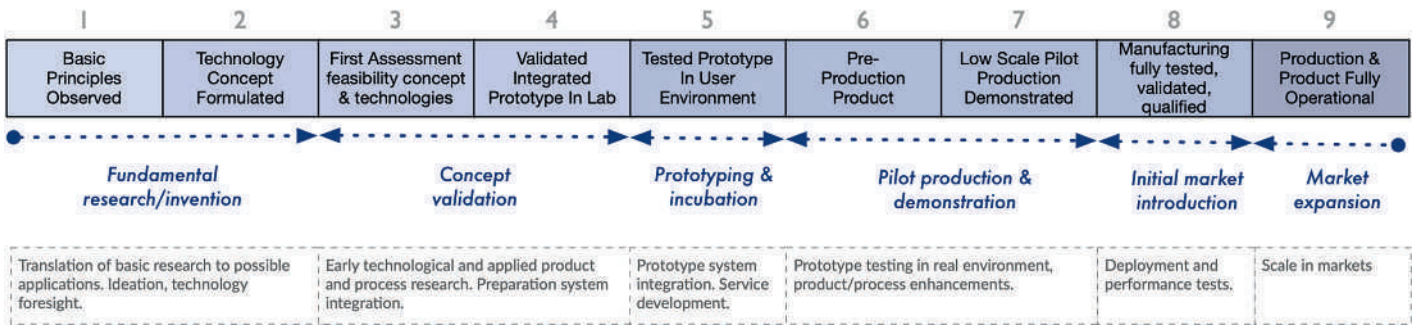


Figure 1. The OGC Technology Readiness Scale, adapted from the European Association of Research and Technology Organisations

Current exploration of new location definitions based on DGGS that use simple indices for place and space and therefore abstract away the complexities and uncertainties behind addresses and areas of interest based on coordinate reference system (CRS)-heavy polygons

Each of these trends will be addressed in Testbed 17.

CLOUD APPS AND ‘CONVENIENCE’ APIS

This trend is borne from three concurrent issues and addressing it will require the weaving together of much work undertaken in past OGC IP Initiatives.

Issue 1

The many different cloud environments available for data storage, publication and computation each use different interfaces, access mechanisms, security settings, data models, processing functions et al. Standards help provide consistency, but they need to be flexible enough to support diverse business cases, community best practices and domain requirements.

Issue 2

Data product volumes grow faster than storage infrastructure can. Therefore, many organisations store only the raw data in the cloud and process it for use on-the-fly. This makes processing chains more susceptible to failure as data processing fails more often than simple data access.

Issue 3

A preference towards ‘convenience APIs’ where the distinction between ‘data access’ and ‘processing instructions’ is less clear. For example, a user may want to use an API to extract features from Landsat, Sentinel-1, -2 and -3, and PeruSat-1 datasets using deep learning and/or artificial intelligence technologies. All that data is deployed on different platforms and in different formats, but the user expects just a single, convenient interface.

Standards development organisations (SDOs) face a challenge – they need to continue developing base API building blocks for raw data access, but at the same time, domains expect these holistic convenience

APIs. There is a risk, then, that convenience APIs may proliferate faster than SDOs can design the base APIs, best-practices, patterns and design principles that should underlie them, leading once again to inconsistencies and poor interoperability between APIs.

Testbed-17 will bring these various pieces together and define convenience APIs based on building blocks that enable single sign-on and data-centric security where required and support asynchronous interactions (when raw data needs time to be processed) and complex processing chains with intermediary input and output products. This will build on work undertaken during Testbed-16 and the OGC Earth observation apps pilot, which looked at aligning multi-cloud environments with findable, accessible, interoperable and reusable (FAIR) data principles.

Web APIs with semantic interoperability

Web APIs are a convenient way to interact with data services, but they do not address data model variety and inconsistency. Semantic web technologies have promised much in the past and often worked well in laboratories but rarely in the real world. With increasing data availability, we need to ensure that consumers receive what they expect and won’t unintentionally

compare apples to oranges. The challenge for Testbed-17 is to look at promising linked data principles to see what we can use.

DGGS to simplify location

CRSes are complex and not well understood by many users, which can lead to interesting and unexpected data integration problems. DGGS offer a possible solution, as they remove a lot of the complexity caused by projected systems and use a more intuitive indexing system. Indeed, we’re seeing data providers such as what3words, locationkey and others use similar grid-based indexing schemes to overcome challenges related to addresses and coordinates. However, we need an indexing solution that accommodates areas and lines, not just points. Testbed-17 will explore DGGS as a potential solution.

Detailed information on the scale, scope and objectives of Testbed-17 will become available when OGC issues the Testbed-17 call for participation in December. Testbed participants have a unique, funded opportunity to join the collaborative research at OGC, while boosting their own R&D, making contact with major geospatial players, and developing future business opportunities.

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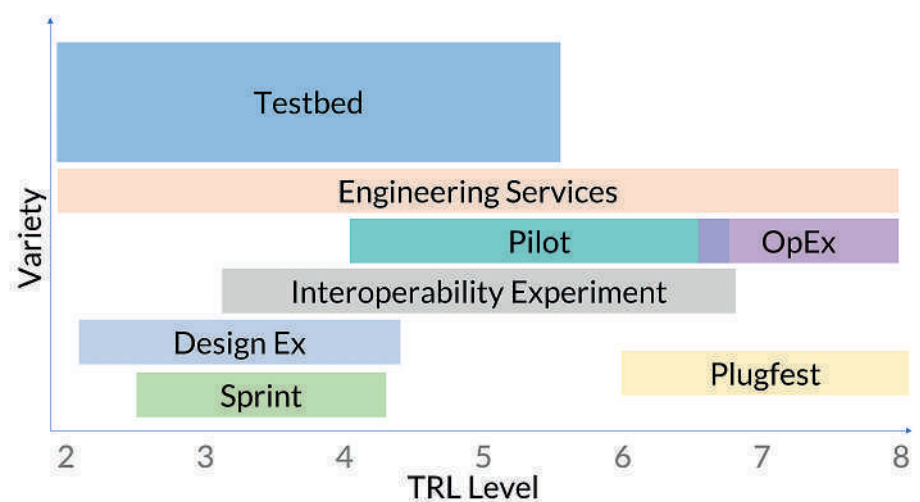


Figure 2. OGC initiative types and their relationship to the TRL scale (OpEx: Operational Exercise; Design Ex: Design Experiment)