

THE EXPANDING GEOSPATIAL ECOSYSTEM

NADINE ALAMEH SAYS THE POTENTIAL IMPACT OF GEOSPATIAL DATA INTEGRATION AND ANALYSIS HAS NEVER BEEN GREATER THAN IT IS NOW

Over the decades, we've witnessed the scope of geographic information science expand to support new domains, applications, use-cases and technologies. Simultaneously, we've also seen the evolution of web technologies – such as cloud-native computing, web APIs, streaming data and 3D immersive experiences – transform and influence what we think of as 'geospatial'.

Notably, the commodification of cloud services has resulted in a proliferation of data published on the web. No longer do we need to rely on central authorities to build and maintain spatial data infrastructures: the complexities of hosting data on the web are now hidden behind easy-to-understand web interfaces and APIs, and the costs have fallen so low that even individuals can afford to host terabytes in the cloud.

Best of all, as accessible cloud storage and processing has been used with open data STANDARDS and best practices aligned with the FAIR (ensuring the data remains Findable, Accessible, Interoperable and Reusable) data principles, we've seen emerge a beautiful thing: a self-organising, decentralised geospatial data/information ecosystem with low barriers to entry for publishers and where the data users want is just a search engine and API call away from their interface of choice.

Further to this, as the publication and consumption of geospatial data continues to grow simpler and cheaper, it is encouraging the publication of not just refined "analysis ready data" but "decision ready information" and contextualised

FAIR knowledge being developed and disseminated by subject matter experts without geospatial backgrounds.

An exciting moment

It is truly an exciting moment for us involved in geospatial as we grow a data ecosystem that seamlessly provides the data, information and knowledge used by powerful decision-making tools – such as Digital Twins and their more immersive cousin the Metaverse – that are playing an increasingly important role in some of humanity's most pressing issues, such as our mitigation of and adaptation to changes to earth's climate. The potential impact of geospatial data integration and analysis has never been greater.

This is why the OGC community is developing, refining, and publishing free and open standardised ways (whether it's through OGC-developed standards, adopted community standards, published best practices, or other documents) that make data FAIR and ensure that it is easy for users, developers and decision-makers – not just geospatial experts – to find the data they need, access it, integrate it with other data and create reusable workflows around it.

For example, OGC's Innovation Program is running or participating in several initiatives seeking to improve the availability and usability of data in support of climate actions to keep the effects of climate change in check. One such initiative, the OGC Climate Resilience Initiative, will over several years develop interoperable building blocks to

make available FAIR information at each stage of the climate resilience information chain. Raw data is first processed to produce and publish "analysis ready data" that can be seamlessly ingested into a GIS for analysis. The data can then be further refined by fusing it with other data, or otherwise analysing or processing it to produce and publish value-add products such as visualisations that are useful for stakeholder engagement with non-technical scientific experts.

Further along the chain is the crystallisation of multidisciplinary expert insight that uplifts the refined data into "decision ready data" that can be used to create and publish products tailored to international climate policy frameworks for use by decision-makers and experts to inform or report risk reduction, evidence-based policy, social science or other applications.

Ensuring climate services are FAIR will increase their efficiency and produce data that can be relied on to improve science- and evidence-based policy and its outcomes.

FAIR twins

The OGC community is also working to ensure the tools that inform decision-makers are similarly aligned with FAIR data principles. Both Digital Twins and the Metaverse will greatly benefit from the FAIR geospatial data ecosystem (see the Winter 2021 issue of *GeoConnexion International* for more info on geospatial's relationship to the Metaverse). Digital Twins at the scale of cities or municipalities inherently require

The diverse geospatial data ecosystem thrives when FAIR data principles are combined with cloud services

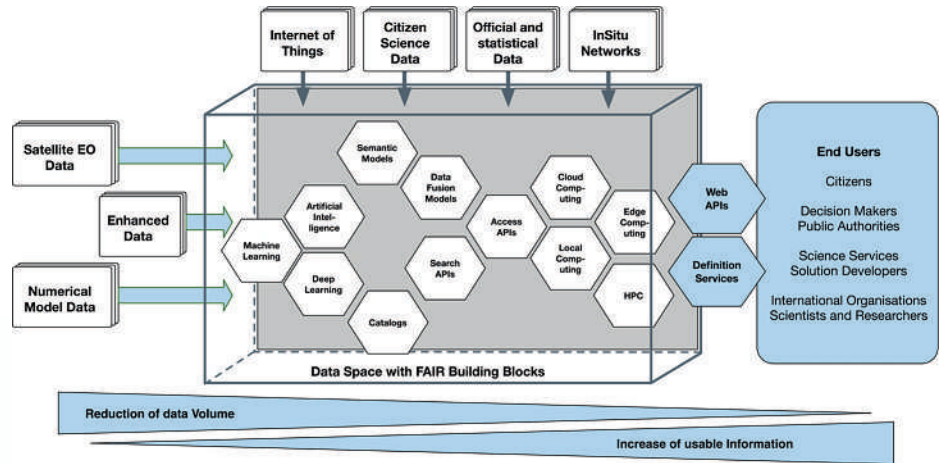
data concerning many different aspects of an area's form, function and operation, such as topography, Building Information Models, transport and traffic conditions, underground infrastructure, socioeconomic and demographic data and business locations. Trying to integrate the many different data sources has only proven feasible by using standards and FAIR principles – ideally those that allow the latest (and even real-time) data to stream in from the provider using simple API calls (see the March/April 2021 issue of *GeoConnexion International*). As such, OGC runs Digital Twin and Metaverse Domain Working Groups that identify key implementation specifications and standards and interoperability requirements and issues related to each technology. OGC is also a founding member of the recent Metaverse Standards Forum.

Of course, the beating heart of such a data ecosystem is the connectivity, accessibility, and scale enabled by cloud technologies, which is why for almost a decade OGC has been supporting and developing standards and best-practices that address interfaces, applications, encodings and operations within the “cloud-native geospatial” paradigm. These efforts have resulted in the development of the OGC API family of standards based on OpenAPI and OGC/W3C spatial data on the web best practices, the adoption of popular community standards into OGC, such as 3D Tiles, Zarr, GeoParquet and FlatGeobuf, and the publication of many free engineering reports that document the R&D efforts and outcomes from relevant Innovation Program initiatives.

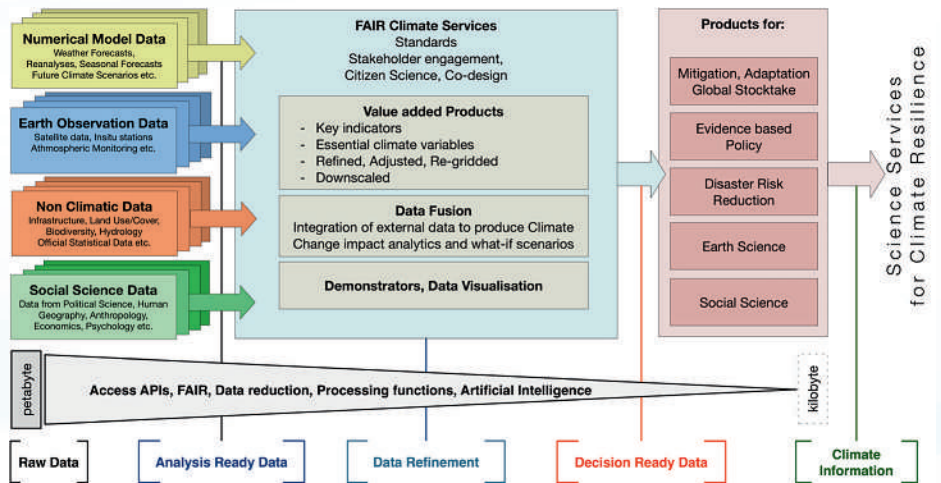
Underlying all of this is the work of the OGC community, who come together from a variety of backgrounds and industries with a variety of skill sets and perspectives to collaborate on solving real-world interoperability problems experienced by our members and the wider geospatial community.

Join us!

It's important to recognise not only the technical ability of standards to improve data integration and interoperability, but also how



A FAIR data ecosystem allows small and large players to participate and benefit from a wide range of data and technologies via simple APIs and interfaces



The OGC Climate Resilience Pilot seeks to crystallise multidisciplinary climate knowledge and make it available via FAIR climate information services

their creation and adoption are conduits to innovation, collaboration, and partnerships within and across communities and regions.

From those of us involved in standards development, this is an invitation to you to join us to not just enable but actually drive the expansion of geospatial toward its full potential. The more voices that are involved in standards development and testing, the more useful the standards become and the more likely

they are to be adopted and create impact. We all need to engage in deciding the standards of the future if we are all to benefit.

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