

# A REFLECTION ON SPATIAL DATA IN 2018

## Development of Spatial Grids and Structure of Spatial Data Models



During the AGI's Annual Conference, GeoCom2017, on 25 November 2017 at the Royal Geographic Society in London, I was asked about our journey so far toward a 'smarter way of mapping the world'. I was also asked by the convenor, Rollo Home, about the challenges which face us in the fast changing climate and economy. The question: "Are there better ways to quantify, model and predict geospatial data, which are growing exponentially?"

In the current context of Big (Geo) Data, in general, and Smart Cities, in particular, accurate positioning is increasingly important. In addition, while remote sensing and ground surveying offer centimetre and millimetre accuracy respectively, these techniques typically still rely on the legacy WGS84 coordinate system. As a trained geologist,

however, I'm keenly aware of the dynamic nature of the earth's crust, in the same way that I, as a GIS professional, am aware of the inherent complexities of projections and datums.

"So what's the fuss", you may ask? Well, I'd like to draw attention to the fact that Australia's CSIRO just proposed an entirely new datum update in response to a tectonic challenge which has, I should add, displaced some locations by as much as 1.5m on the old global datum, WGS84. This applies to the northern hemisphere as well, I should add.

As a career proponent of standards, I once discussed at an ESRI meeting how, in the North American (geologic) Data Model (NADM), the spatial object model carries the notion of "concept vs. occurrence". Details of lithology can vary over time as field work progresses, but the location of map units typically will not. In other words, in distinguishing the metadata from geolocation, one can create an abstraction of spatial objects separate from geodetics that can vary over time. Considering this, the 2002 NCGIA Second International Conference on Discrete Global Grids should be considered as an excellent introduction to discrete grids as a global mapping reference, recently popularised by what3words.

Data models are, however, in my opinion, more effective, when proposed by a community as a standard. Open Geospatial Consortium (OGC), for example, proposed just last November such a standard for a Discrete Global Grid System (DGGS). As per the OGC's announcement "The goal of DGGS is to enable rapid assembly of spatial data without the difficulties of working with projected coordinate reference systems. The OGC DGGS Abstract Specification standard defines the conceptual model and a set of rules for building highly efficient architectures for spatial data storage, integration and analytics." It concludes: "One of the core contributions of a DGGS is geospatial data fusion on demand. In a multiple provider environment, fusion is only possible with an information system architecture based upon open standards. The OGC DGGS Abstract Specification provides a platform to enable interoperability within and between different DGGS implementations, while promoting reusability, knowledge exchange, and choices in the design of individual DGGS implementations." In this context, the efforts by the Australian DGGS co-sponsor, CSIRO, is illustrated.

Meanwhile, back at AGI GeoCom17, delegates were intentionally "challenged to think about the developments of spatial grids and the structure of spatial data models". Questions which I presented included:

- Are coordinates, projection, datum etc. always à-propos?
- Are there better frameworks for real-time crowd-mapping?
- Do robotics 'think' or work in Cartesian coordinate space?
- Are base 2 or 10 the best calculation primitives there are?
- How about "good enough" or "close enough" computation?

To conclude this reflection on the state of grid reference systems in 2017, it is both a challenge and an opportunity for GIS professionals to provide the best underpinning for geodata to an industry which is beginning to embrace the complex worlds of IoT, robotics, autonomous vehicles etc. Therefore, just like a swarm of starlings in flight, is the ultimate challenge in geo-robotics instead not to automate geo-location in real-time?

