

## **Input to the National Geospatial Advisory Committee (NGAC) on Policies Related to the Use of Spatial Data**

by:

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The FGDC website states, "The National Geospatial Advisory Committee shall: (1) provide advice and recommendations relating to (A) the management of Federal and national geospatial programs; (B) the development of the National Spatial Data Infrastructure; and (C) implementation of the Geospatial Data Act; (2) review and comment on geospatial policy and management issues; and (3) ensure the views of representatives of non-Federal interested parties involved in national geospatial activities are conveyed to the Federal Geographic Data Committee."

Now retired, I taught in the NMSU Surveying Engineering Program from 1999 to 2010. My career has included various assignments, but my passion is promoting the use of 3-D digital spatial data for surveying, engineering, GIS, and other applications. The current push to embrace artificial intelligence (AI) portends an unknown impact of geospatial data use at all levels. In the same way that AI needs "algorithmic justice," AI also needs algorithmic integrity – <http://www.globalcogo.com/3D-and-AI.pdf>.

Acknowledging the talent and dedication of many individuals and recognizing the excellent work being done, there are challenges that beg for attention, both from the top down and from the bottom up.

1. As related to spatial/geospatial data, vendors, consultants, professionals, and technicians at many levels have done an excellent job of adapting space age technology to data collection, processing, storage, and display of information. Significant problems are being addressed and solved.
2. A consequence of the digital revolution is the emergence of "silos" of information, processes, and specific applications at all levels – federal, state, local, regional, tribal, and private. Each group has the luxury of solving problems within a given context or activity. Standards, specifications, processes, and best practices continue to evolve and to be implemented, often tailored to specific applications. Although that is not necessarily bad, duplication and disparate applications can be wasteful.
3. The natural technological evolution is to apply new procedures and methods to existing practice. That has and is being done. Measurement sensors have been miniaturized, computational capability greatly expanded, spatial/geospatial data digitized, and workflows streamlined to solve an impressive array of location-sensitive challenges. People are rightfully congratulated and awards for outstanding performance are justified. Even so, the number of silos can be reduced.
4. Here is the rub. Since time immemorial and for legitimate reasons, location is routinely referenced to horizontal and vertical datums separately to accommodate the impact of gravity. When considering the convergence of abstraction/technology/policy/practice, the advantages of a 3-D model for 3-D data emerge as justification for implementing an integrated 3-D datum in place of separate horizontal and vertical datums. Not surprisingly, the inevitable influence of AI creates additional demand for standardization and adoption of a common 3-D spatial data model.
5. Although a well-documented 3-D model exists, challenges of adopting a 3-D model may parallel the experience of AT&T in "going digital" – see <http://www.globalcogo.com/ATandT-Story.pdf>. The 3-D

global spatial data model (GSDM) grew out of the author's sabbatical experience at the University of Maine in 1990/91 and is documented at <http://www.globalcogo.com/gsdmdefn.pdf>.

6. Formally filed with the U.S. Copyright Office in 1997, the GSDM has encountered pushback within the user community. But challenges to the technical merit of the GSDM have been successfully refuted – see for example <http://www.globalcogo.com/validation.pdf>. The GSDM is also sufficiently robust to accommodate emerging concepts of “PPP,” “digital twins,” “high-definition maps,” and spatial data applications involving use of AI – see <http://www.globalcogo.com/GSDM-Nutshell.pdf>.

### **What are implications for spatial data users, NGAC, and other organizations?**

To reiterate, the current leadership of NGAC is doing an excellent job, and it appears that activities of the NGAC are competently serving the spatial data user community. Although no immediate formal action is requested, it is always prudent to be aware of emerging technologies. A statement of the status quo includes many worthwhile ongoing activities – not the least of which is modernization of the National Spatial Reference System (NSRS) by the National Geodetic Survey (GS). Their stated goal is to publish separate horizontal and vertical datums in the near future ([2025](#)). The efforts of NGS are commendable and noteworthy. Their results will be relied upon by the user community for years to come – with the exception of two derivative products. Geoid modeling and low-distortion projections are both technically elegant, but the need for each is obviated with adoption of a single 3-D datum.

**Here is where the dreaming begins!** Regarding future use of spatial/geospatial data, a simultaneous approach of working “from the top down” and “from the bottom up” may be preferred. Those approaches can be pursued independently but overlapping interests and activities will be unavoidable. Coordination at all levels (details to be developed) will be needed. From this author's perspective, it would be appropriate for NIST to become involved as suggested at <http://www.tru3d.xyz>. Their independence, mission, and vision bode well for success. A broader perspective such as provided in the [Innovator's Dilemma](#) should also be considered. The listings below are not exclusive to a category – some may be found in both categories. Finally, other groups and/or organizations should be added as appropriate.

#### Top down (policy):

- NGS/NIST
- FGDC/NGAC
- USDOT/FAA
- ASCE/MAPPS/NCEES
- Manufacturers

#### Bottom up (practice):

- NGAC clients/users
- NSGIC
- GIS professionals and technicians
- Surveyors/Engineers
- Photogrammetrists
- Vendors

Both groups share common issues although intermediate milestones may be different. Optimistically top-down and bottom-up efforts should both lead to common beneficial policies and practices.