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RE: Formalizing a Standard for 3-D Digital Geospatial Data
(At times ‘Spatial’ and ‘Geospatial’ are used interchangeably.)

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A common universal 3-D spatial data model can provide significant benefits to spatial data users worldwide. If not NIST, what organization would be best suited to “formalize” such a standard?

Two competing practices currently include (www.globalcogo.com/true-versus-pseudo.html):

- Use of separate horizontal and vertical datums. These 3-D data are called **pseudo 3-D** because the horizontal and vertical datums are based on disparate origins.
- Use of an integrated 3-D datum. These data are called **true 3-D** because there is a single origin for 3-D spatial data worldwide and rules of solid geometry are applicable throughout.

The digital revolution is the driving force behind modern practice which includes concepts of digital twins and high-definition maps. The convergence of abstraction/technology/policy/practice provides context.

The impact of geospatial data in the global economy is growing exponentially. Not surprisingly, many talented persons and organizations are “getting on the bandwagon” – providing an ever-expanding array of geospatial related products and services. Marketing is competitive (example – see [GeoWeek 2023](#)) and successes within prescribed scopes are very impressive. But some use pseudo 3-D, others use true 3-D.

Licensed professionals, such as surveyors and engineers, have an obligation to protect the health, safety, and welfare of the public and are responsible to the public for competent use of both old and new technology. That service record (although not perfect) is exemplary, and society stands in their debt. Part of that reputation depends upon using traditional computational methods and models, but disruptive innovation driven by the digital revolution creates on-going challenges – e.g., increasing use of true 3-D.

The American Society of Civil Engineers (ASCE) is to be applauded for promoting the [Future World Vision](#) which entails meeting the challenges of sustainable development and improving the quality of life for humankind while addressing concerns of climate change. Disciplines such as engineering, surveying, mapping, and navigation rely heavily on the use of pseudo 3-D. That is, the use of coordinates and elevations is ubiquitous worldwide. But leading-edge practice (including autonomous vehicles & AI/ML) leap-frogs directly to using true 3-D. What needs to be done? Mindful of the public interest, well-planned accommodation of both true 3-D and pseudo 3-D is essential while developing standards for inevitable transition to worldwide use of true 3-D. Research on gravity and equipotential surfaces should continue in support of those applications actually needing them. But if true 3-D is adopted as a standard, many spatial data users can be relieved of the burden imposed by geoid modeling and low-distortion projections.

The following Mission and Vision statements were copied from the NIST website and are viewed as compatible with the suggestion that developing a 3-D geospatial data standard might be an appropriate project for NIST.

Mission: To promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

Vision: NIST will be the world's leader in creating critical measurement solutions and promoting equitable standards. Our efforts stimulate innovation, foster industrial competitiveness, and improve the quality of life.

Background:

Additional information related to spatial data, digital twins, high-definition maps, robotics, role of a model, GIS, and educational focus is included in a paper posted at www.globalcogo.com/proposal.pdf. Talented persons within various interest groups have developed sophisticated methods and procedures for meeting the challenges fostered by the digital revolution. Those accomplishments are impressive but, for many, the difference between true 3-D and pseudo 3-D is still the “elephant in the room.” Is it possible that NIST has the resources and third-party independence needed to develop a credible plan and standard for the spatial data community. Benefits derived from standardization can be shared by many!

Not being tuned in to things “military,” the presumption is that NGA, and others, are well-versed in these issues – see [CJCSI%203900.01D.pdf](#). On the other hand, incidental discussions with knowledgeable professionals and published articles provide evidence that pseudo 3-D concepts are well entrenched in many military applications. And, a recent item posted in GPS World notes that NGA is requesting [feedback](#) to improve Earth modeling (the deadline for feedback has passed).

In the big picture, issues raised herein are only the tip of the iceberg for “political geodesy.” But the “geometrical geodesy” of 3-D digital spatial data is well in hand and covered by the 3-D Global Spatial Data Model ([GSDM](#)).