

Information Item – Request for Help!

Date: April 20, 2015

TO: Surveying/Geomatics/GIS Educators

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RE: Soliciting input for Second Edition of “The 3-D Global Spatial Data Model”

The non-exclusive intended audience for this request for help includes Surveying/Geomatics/GIS educators.

The whole issue of 3-D digital spatial data and spatial data accuracy is huge and deserves serious consideration by spatial data professionals in various disciplines worldwide.

This initiative attempts to look at the Big Picture and requests feedback from spatial data educators related to the use of 3-D digital spatial data. Many users in various disciplines worldwide have a vested interest in efficient procedures for handling geospatial data but society at large stands to realize enormous benefits achieved through collaborative standardized practices. The Global Spatial Data Model (GSDM) is viewed as an appropriate mechanism for achieving some of those benefits.

A step in the right direction is gathering information for that Second Edition:

1. A book, “The 3-D Global Spatial Data Model: Foundation of the Spatial Data Infrastructure,” was published by CRC Press in 2008. The manuscript for the Second Edition of that book is due to the publisher on April 1, 2016.
2. In March 2014, NOAA issue a request for [information](#) (RFI) “intended to inform NOAA about the current state of industry sources, business practices, technical capability, and operational capability. . .” The suggestion made in the Global COGO, Inc. response was that “The best thing NOAA can do is adopt a standard model that accommodates 3-D digital geospatial data and supports continued use of any/all derivative (existing) models.”
3. In response to the NOAA RFI and recognizing the growing importance of spatial data in various sectors of the worldwide economy, the publisher, CRC Press, solicited material for a Second Edition of the 3-D book published in 2008. This inquiry is part of that Second Edition process.
4. I am happy to report that, although the treatment of network/local accuracy in the first edition was questioned, subsequent evaluation has shown that material to be both correct and rigorous. And, the subtitle of the first edition, “Foundation of the Spatial Infrastructure” was criticized as being too presumptuous. Whether true or not, the subtitle and focus of the Second Edition is, “Principles and Applications.” The Second Edition will contain additional material on least squares, network/local accuracy, and numerous examples in which the efficiencies of the GSDM are demonstrated.

5. In February 2015, the Coalition of Geospatial Organizations (COGO) issued a [Report Card](#) on the Spatial Data Infrastructure. I had an opportunity recently to [discuss](#) that report card with the Rio Grande Chapter of ASPRS at their Annual Spring meeting. In my opinion, that report along with [Surveying Body of Knowledge](#) lay out the challenge facing Surveying Educators. Yes, the profession has a part to play as well. My version of what that might be is given in a [report](#) to the Board of Directors of the Western Federation of Professional Surveyors. I know that the SaGES conference is a time for relaxed interaction among colleagues and I wish I could attend in June 2015. However, I will be delighted for feedback from educators individually and/or the collective wisdom of the SaGES conference.
6. As background information, the Global Spatial Data Model (GSDM) concept was first presented to the Surveying Educators at the 1999 Purdue Surveying Educators [conference](#). Much has happened since then but lots of progress remains to be made. At the 2005 SaGES conference I opined that GSDM concepts should be formally included in a spatial data [curricula](#). I am personally convinced that the “genie will never return to the bottle” and I believe that promotion and use of an integrated 3-D model is a huge contribution we (the surveying educators and profession) can make to society.
7. Civil engineers also use geospatial data in all forms and need to become more informed as to the geometrical characteristics of 3-D spatial data. I had an opportunity to share that conviction at the 2012 ASCE International [conference](#) on Computing in Civil Engineering.
8. The GSDM concept has much to offer persons at various positions on the technology spectrum. On one end, the GSDM readily accommodates flat-earth use of 3-D data and geometry. It offers a way to marry GPS and plane surveying. See for example a series of [articles](#) written for the surveying profession and published in Professional Surveyor. At the other end, the GSDM accommodates [abstract](#) considerations without sacrificing mathematical rigor and the ability of the GSDM to handle issues of network and local accuracy has been [validated](#).
9. But, yes, using the GSDM is a new paradigm that requires some new learning. But, isn't that what surveying education is all about? The following is offered for those who might be a bit curious.
 - a. The GSDM is built on the assumption of a single origin for 3-D geospatial data.
 - b. The GSDM uses the earth-centered earth-fixed (ECEF) developed by the DoD for the GPS NAVISTAR satellite system.
 - c. Rules of solid geometry, vectors, and matrices simplify the computations.
 - d. Positions are computed in 3-D space (not on the ellipsoid or on a mapping grid)
 - e. The user specifies a point (P.O.B.) from which all other points (in the cloud) are viewed. That view includes the tangent plane horizontal distance and the true direction from the standpoint station.
 - f. Adhering to those concepts/principles obviates learning and using a lot extraneous detail.
10. Please feel free to provide feedback. I'm in over my head and need all the help I can get. Thanks!
11. The deadline for the Second Edition manuscript is April 1, 2016. The Second Edition should be available prior to the 2017 SaGES conference in Corvallis, Oregon.
12. This file is posted at www.globalcogo.com/EducatorsApril2015.pdf.