**Facilitating Exchange Between Spatial Data Generators and Users**

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The digital revolution continues to drive development of sensors for generating spatial data and has spawned innumerable spatial data applications worldwide. Spatial data careers captivate the interests and talents of technicians, professionals, researchers, and entrepreneurs alike. Additionally, many managers, administrators, and support personnel enjoy participation in the spatial data arena.

The overall scope of spatial data activities is huge to the point of being overwhelming. That challenge can be mitigated by recognizing a division of focus (and talents needed) between generating spatial data (science and measurement) and using spatial data in myriad applications (characterized by GIS). Notwithstanding a difference of focus, the geometry of spatial data is common to both camps and the 3D global spatial data model (GSDM) provides a modern-day Rosetta Stone for bridging the gap between those activities devoted to generating spatial data and those using spatial data.

Bill Hazelton is a visionary who has written a comprehensive summary of the spatial data revolution and puts many issues into perspective. In private correspondence Dr. Hazelton highlighted the view of Nobel Laureate Peter Medawar (see comments on page 3) who noted that as science matures, overarching concepts serve to simplify complex issues. Such is the case with the GSDM, a common rigorous spatial data model, which serves both camps. That area of common interest can be inferred from Diagram 1.1 and Table 1.2 of "3D Imaging of the Environment: Mapping and Monitoring," Edited by john Meneely, CRC Press 2024.

Diagram 1.1 includes a schematic of activities associated with generating spatial data. Various activities are grouped under the following categories – Planning & Advanced Work, Control Survey, Primary Spatial & Image Data Capture, and Data Processing. Regardless of the technology involved, those measurement processes culminate in determination of Earth-centered Earth-fixed (ECEF) coordinates which are then "handed off" to Data Export and/or Archival. Data dissemination is divided into Public and Professional categories. The point is that all spatial data users benefit from sharing a common geometrical heritage. A 3D database is the primary storage for ECEF data and the GSDM provides a simple reliable exchange format for the Export/Archival portion of the diagram.

Table 1.2 summarizes the scales (>km, <km, <cm), specific techniques (LiDAR, scanning, photogrammetry, total station, GNSS, etc.), illustrative accuracies (30 cm down to 0.1-0.2 mm), and output data types (primarily X/Y/Z & RGB). Spatial data location is uniquely defined by X/Y/Z. Given the convergence of abstraction/technology/policy/practice, the case is made that the GSDM is an appropriate standard for spatial data exchange and usage worldwide – see Part I and Part II.

In addition to supporting the features and benefits described in Diagram 1.1 and Table 1.2, the GSDM accommodates all levels of spatial data accuracy by allowing the user to track errors in the measurement process, to store the stochastic information in the 3D database, and to determine the uncertainty of any quantity computed from the stored elements. That means there are no restrictions on the quality of data stored (so long as appropriate error estimates are included in the measurements) and that the quality of data retrieved from the data base can be screened with a user-selected numeric filter – see http://www.globalcogo.com/accuracy.pdf.

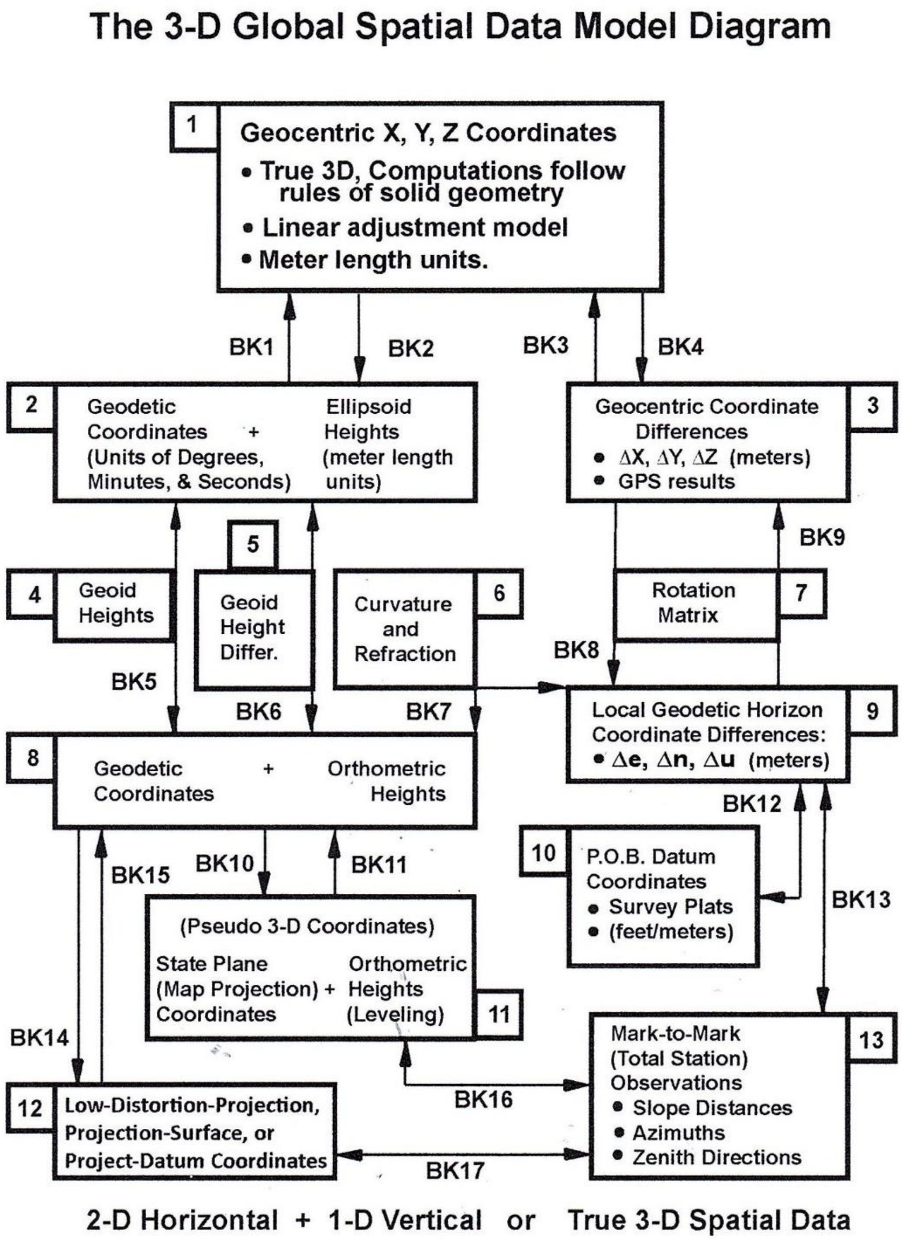


Figure 1.4 Diagram Showing Relationship of Coordinate Systems