

Resume - Earl F. Burkholder, PS, PE

Current: NMSU Emeritus Faculty – retired 7/1/2010 President, Global COGO, Inc.
(July 2011) Surveying Engineering Prgm MSC 3566 P.O. Box 3162
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Education: University of Michigan: BS Civil Engineering, 1973 – graduated “cum laude”
Purdue University: MS Civil Engineering (Geodesy), 1980
University of Maine: (no degree) Study applications of global positioning systems (GPS) to surveying while on sabbatical leave during the 1990-91 academic year.
On sabbatical from NMSU 2005-06 to finish writing a book, *The 3-D Global Spatial Data Model (GSDM)*. The book was published by CRC Press in April 2008.

Registration: State of Michigan: Professional Surveyor '74 to '82, Professional Engineer 1979 to 2003.
State of Oregon: Professional Land Surveyor and Professional Engineer 1981 to 1997.
State of Ohio: Professional Surveyor and Professional Engineer since 1996 to 2004.
State of New Mexico: Professional Surveyor and Professional Engineer since 2000.

Experience:

Before retiring July 1, 2010, he held an appointment as an Associate Professor and successfully taught 14 different courses at NMSU including Surveying Fundamentals, Advanced Surveying for Civil Engineers, Fundamental Concepts for GPS, Spatial Data Concepts and Models, Introduction to Photogrammetry, Construction Surveying, Field Surveying Techniques, Computer Applications to Surveying, Geodesy, Introduction to Satellite Geodesy (GPS surveying), U.S. Public Land Survey System Boundaries, Introduction to Survey Measurement, Analysis & Adjustment (statistics), Advanced Survey Measurement, Analysis, and Adjustment (least squares), Advanced Topics in Mapping Science (map projections), and Senior Seminar. He served as Faculty Advisor for the ACMS/NMPS Student Chapter from 2001 to 2007, on several College of Engineering Grade Appeal Committees (three times as Chair), two departmental search committees, and on the NMSU College of Engineering Dean Search Committee which culminated in the selection of Dean Castillo in 2004.

He was self-employed as a consultant from 1993 to August 1998 and offered services related to use of GPS data and Geographic Information Systems (GIS's). During that time he pulled together concepts from various disciplines to define a Global Spatial Data Model (GSDM) which utilizes a 3-dimensional BURKORD® database. The GSDM concepts are described in various papers and summarized in a report prepared for the Southeastern Wisconsin Regional Planning Commission, Waukesha, WI and published in 1997. More recently, he completed a comprehensive report for the Commission to establish bidirectional transformations between old (2D/1D) datums and the new NSRS (2007) 3-D datum. The [report](#) was published in May 2010.

He was at the Oregon Institute of Technology (OIT) from September 1980 to December 1993 where he taught upper division surveying courses including geodesy, astronomy, control surveying, state plane coordinates, least squares adjustment, computer applications to surveying, instrumentation, introduction to GIS, and global positioning system (GPS) surveying. In addition to serving several years as Surveying Program Coordinator, other administrative activities at OIT included service on the Faculty Senate, the institutional Curriculum Planning Commission, and (as a Full Professor) on the OIT Engineering Technology Division Tenure Review Committee – one term as Chair.

From 1973 to 1978 he was employed by Commonwealth Associates, Inc, Jackson, Michigan, as an Assistant Engineer and assigned to the Surveying Section of the Transmission Line Engineering Division. At Commonwealth, he became a Project Manager and participated as a member of multi-disciplinary teams in many different engineering projects located throughout the USA, one in South America, and one in Iran.

Professional Activities:

Height Modernization: Height modernization is a formal program of the National Geodetic Survey (NGS) in which the global positioning system (GPS) and other new technologies are being implemented to establish reliable elevations on bench marks. Beginning while on sabbatical leave in 2005-2006, he has been instrumental in bringing height modernization to New Mexico. Working with surveying and engineering professionals, local spatial data users and others, he was able to bring NGS professionals to New Mexico to present two forums (one in Las Cruces and one in Albuquerque) on the details of Height Modernization. Since then he served as Co-Chair (along with Garry Nielsen of the NM DOT) of the Height Modernization Working Group working in conjunction with professionals throughout the state to bring Height Modernization to New Mexico. A proposal submitted jointly with the Texas Spatial Reference Center was approved effective 10/01/2008.

ASCE: In 2006 he was invited to be a member of the ASCE Geomatics Division (GMD) Executive Committee and in February 2007 he was also named Chair of the GMD Education Committee. As Chair of the Education Committee, he organized a panel discussion on the Surveying Criteria for EAC ABET accredited surveying engineering programs at the 2007 North American Surveying & Mapping Educators Conference in Big Rapids, Michigan. He also represented ASCE GMD at the ACSM meeting of the Curriculum, Accreditation, Registration, and Education (CARE) Committee meeting in Spokane, Washington, March 8, 2008. On March 29 and 30, 2008, he Chaired a meeting of the GMD Education Committee at which time resolutions were passed requesting the ASCE Board of Direction to make a determination as to whether or not surveying engineering is an engineering discipline. He currently serves as Secretary to the Geomatics Division of the American Society of Civil Engineers.

Prior ASCE Committee service included Geodetic Surveying Committee (Chairman 1985 & 1986), Education & Professional Practice Committee, Land Surveying Committee (1992-1994), Engineering Surveying Committee (1992-1996).

He served as Chair of the ACSM Education Committee from 2000 to 2003.

Accreditation: From 1990 to the present he has served as a Surveying Program Evaluator for the Accreditation Board for Engineering & Technology (ABET). He was a member of Applied Science Accreditation Commission (ASAC – formerly the Related Accreditation Commission) 1994-1998, on the ASAC Executive Committee 1998-2002, and Chair of the ASAC 2000-2001. He continues as an ABET Surveying Program Evaluator.

Editor: 1985 to 1989 and 1992 to 1996 - Journal of Surveying Engineering, a refereed scholarly journal published by the American Society of Civil Engineers, Reston, VA. In 2007 he was asked to serve as the Review Editor for a paper, “On Geometric Combination of Multiple Terrestrial Network Solutions” for the Journal of Surveying Engineering because the current Editor was a co-author of the paper.

NSF involvement: In the late 1980’s he served as a reviewer for the National Science Foundation on two occasions for their Laboratory Improvement Grant Program. He also served as PI on two separate NSF grants – one was curriculum modification, the other was laboratory equipment improvement.

Peer Review: He has reviewed technical papers for the *Journal of the Urban and Regional Information Systems Association*, for the American Congress on Surveying & Mapping and their *Journal of Surveying and Land Information Systems*, and for the American Society of Civil Engineers' *Journal of Surveying Engineering*. Since 1994 he has reviewed five separate proposals for the Research Grants Council of Hong Kong (the most recent in 2003 and again in 2004). More recently, in 2007, he reviewed an article "Official GNSS-Derived Orthometric Height Control Network" for *Surveying & Land Information Science*, Dr. Steve Frank, Editor, and in March 2008, he reviewed an article, "Towards Dynamic Coastal Land-Use Planning Using Geospatial Technology: Conceptual Design of a Collaborative Web-based GIS," for *Technology Interface*, Jeff Beasley, Editor.

Chairman; 1989 to 1991; ASCE/ACSM/ASPRS Joint Committee - Definition of Terms Project to compile the Glossary of The Mapping Sciences published August, 1994.

Memberships; American Society of Civil Engineers, American Congress on Surveying & Mapping, American Society of Photogrammetry & Remote Sensing, American Geophysical Union, Institute of Navigation, American Society of Engineering Educators, and New Mexico Professional Surveyors.

New Mexico Professional Surveyors (NMPS): Served as Secretary for Southern Rio Grande Chapter NMPS 1999-2002. Named Director on NMPS Board of Directors by local chapter for 2004 and 2005. During 2006 he was President of the Southern Rio Grande Chapter NMPS and in 2007 he was Vice President of NMPS. During 2008 he served as President Elect and as President during 2009. He is currently serving as NMPS representative to the Western Federation of Professional Surveyors.

Seminars: Prior to joining NMSU, a significant portion of his income was from seminars. The following is a summary of seminars presented since joining NMSU in August 1998.

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| 1. 1-day: | Oklahoma City | Oct 1998 | Geodesy for Surveyors |
| 2. 1-day: | Oklahoma City | Oct 1998 | Integrating GPS & Terrestrial Survey Data |
| 3. 1-day: | Portland, OR | May 1999 | Geodesy, Photogrammetric Mapping & the GSDM |
| 4. 1-day: | El Paso, TX | Oct 1999 | Bringing GPS & Positional Tolerance into the Same Arena |
| 5. 1-day: | Albuquerque | Feb 2000 | Geodesy for Surveyors |
| 6. 1-day: | Albuquerque | Feb 2000 | Integrating GPS & Terrestrial Survey Data |
| 7. ½ day: | Providence, RI | Dec 2000 | Geodesy, Photogrammetric Mapping & the GSDM |
| 8. 1-day: | St. Louis, MO | Apr 2001 | Geodesy, Photogrammetric Mapping & the GSDM |
| 9. 1-day: | Rochester NY | May 2001 | Integrating GPS & Terrestrial Survey Data |
| 10. 1-day: | Wash. D.C. | Apr 2002 | Geodesy, Photogrammetric Mapping & the GSDM |
| 11. 1-day: | Denver, CO | May 2004 | A GSDM for the Digital Revolution |
| 12. 1-day: | Ruidoso, NM | Aug 2005 | Integrating GPS & Terrestrial Survey Data |
| 13. 4-hr: | Verona, NY | Jan 2006 | Using GPS for Reconnaissance in Boundary Surveying |
| 14. 4-hr | Verona, NY | Jan 2006 | GPS Data Processing and Computations |
| 15. 1-day | Boise, ID | Mar 2006 | The Impact of the Digital Revolution on Surveying |
| 16. 1-day | Las Cruces, NM | Dec 2009 | 3-D Global Spatial Data Model |
| 17. 4-hr | SPAR 2010 | Mar 2010 | 3-D Global Spatial Data Model |

Recent Publications:

Book: "The 3-D Global Spatial Data Model (GSDM): Foundation of the Spatial Data Infrastructure" was published by CRC Press in April, 2008. The impact of this book will be far-reaching as it addresses the fundamental characteristics of spatial data and very well could become the global standard.

Editorial: A February 2008 Guest Editorial in the ASCE *Journal of Surveying Engineering* describes surveying and engineering contributions to the spatial data user community and promotes interaction between disciplines as essential for continued participation in the digital revolution.

President's Columns: While serving as President of New Mexico Professional Surveyors during 2009, he authored a series of columns labeled "President's Column." A compilation of all six articles is posted at www.globalcogo.com/pcolumns.pdf. He continues writing for the NMPS Benchmarks Newsletter.

Other Publications (partial listing) – for a web link see www.globalcogo.com/refbyefb.html

28. "The Digital Revolution – Whither Now?," May 2006, www.globalcogo.com/Digital RevR.pdf
27. White paper, February 2006, "Need for and benefits of a Modern Spatial Reference Network in Southern New Mexico," coauthored with Gilbert Chavez, Las Cruces City Surveyor and member New Mexico Board of Licensure for Professional Engineers and Professional Surveyors, www.globalcogo.com/whitepapr.pdf
26. "Geomatics Curriculum Design Issues" presented at XXth Surveying & Mapping Educators Conference, June, 2005, Corpus Christi, Texas.
25. "Accuracy of Elevation Reduction Factor," ASCE *Journal of Surveying Engineering*, Vol.130, No. 3, August 2004.
24. "A 3D Datum for a 3D World," *Geospatial Solutions*, Vol. 14, No. 5, May 2004, pp 38-41.
23. "Viewing Spatial Data from a 3-D Perspective," (**Best Paper Award** for conference) Science, Engineering, and Technology Education (SETE) Conference, New Mexico State University, Las Cruces, NM, January 9, 2004.
21. "The Digital Revolution Begets the Global Spatial Data Model (GSDM)," *EOS Transactions*, American Geophysical Union, 15 April, 2003, pp 140-141.
20. "Elevations and the Global Spatial Data Model (GSDM)," presented at 58th Annual Meeting of Institute of Navigation, Albuquerque, New Mexico, June 25, 2002.
19. "The Global Spatial Data Model (GSDM): A New Paradigm for Spatial Information," presented at the FIG International Surveyors Conference, Washington, D.C., April 2002.
18. "Spatial Data, Coordinate Systems and the Science of Measurement," ASCE *Journal of Surveying Engineering*, November 2001, Vol. 127, No. 4, pp 143-156.
17. "The Global Spatial Data Model" presented at the International Conference on Discrete Global Grids hosted by the National Center for Geographic Information & Analysis, Santa Barbara, CA, March 26-28, 2000. See web book at www.ncgia.ucsb.edu/globalgrids-book/spatialdata.
16. "Geomatics Education and the Global Spatial Data Model" presented at the North American Surveying Teachers' Conference, Purdue University, July, 1999.
15. "Spatial Data Accuracy as Defined by the Global Spatial Data Model (GSDM)", *Surveying and Land Information Systems Journal*, Vol. 59, No. 1, March, 1999.

14. "3-D: A Challenge for Surveying in the 21st Century," printed in The AGGIE Surveyor published by the NMSU Department of Surveying Engineering, Spring, 1999.

Publications 14-28 were published since joining the NMSU faculty in 1998. The following publications were written prior to joining the Surveying Engineering Department at NMSU.

13. "A Practical Global Spatial Data Model (GSDM) for the 21st Century," presented at Navigation 2000 - the ION National Technical Meeting, Long Beach, CA, 23 January 1998.
12. Professional Surveyor (series of three articles) -
.... October, 1997: "The Global Spatial Data Model: A Tool Designed for Surveyors"
.... Nov/Dec, 1997: "Using the Global Spatial Data Model (GSDM) in Plane Surveying"
.... Jan/Feb, 1998: "Positional Tolerance Made Easier with the GSDM"
11. "A 3-D Global Spatial Data Model (GSDM)," 1997 GIS/GPS Supplement of The Civil Engineering Surveyor, UK, pp 15-18.
10. "The 3-D Azimuth of a GPS Vector," *ASCE Journal of Surveying Engineering*, Vol. 124, No. 4, pp 139-146, November, 1997.
9. "Definition of a Three-Dimensional Spatial Data Model for Southeastern Wisconsin," May, 1997, a report published by the Southeastern Wisconsin Regional Planning Commission, Waukesha, WI.
8. "Definition and Description of a Global Spatial Data Model" registered with the U.S. Copyright Office, Washington, D.C., April, 1997. www.globalcogo.com/gsdmdefn.pdf.
7. "The 3-D Geodetic Model as the Basis of a Global Coordinate System for Mobile Mapping," presented at the Mobile Mapping Symposium, Columbus, Ohio, May 23-26, 1995.
6. "GIS Applications of GPS Technology via Local Coordinate Systems: Past, Present, and Future," published in Technical Papers of ACSM/ASPRS Annual Meeting, March, 1995, Charlotte, NC.
5. "3-D Coordinates - A Universal Rectangular Coordinate System for a GIS and Other Spatial Databases" published in the Proceedings of the ASCE First Congress on Computing in Civil Engineering, June 20-24, 1994, Washington, D.C.
4. "Design of a Local Coordinate System for Surveying, Engineering, and LIS/GIS," *ACSM Surveying & Land Information Systems Journal*, Volume 53, No. 1, March, 1993.
3. "Using GPS Results in a True 3-D Coordinate System," *ASCE Journal of Surveying Engineering*, Volume 119, No. 1, February, 1993.
2. "Computation of Level/Horizontal Distance," *ASCE Journal of Surveying Engineering*, Volume 117, No. 3, August, 1991.
1. "Geometrical Parameters of the Geodetic Reference System 1980," *ACSM Surveying and Mapping Journal*, Vol. 44, No. 4, 1984, pp 339-340.