

# Eye-Witness to GIS's 40 year Evolution/Revolution

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Maps and mapping have been with us for thousands of years; however, digital maps are a recent phenomena occurring over the past four decades. [Joe Berry](#) has been involved in geospatial technology throughout this thin slice of mapping history— as a student, professor, consultant, software developer, and entrepreneur. *This presentation relates these experiences that began in the very, very early years of GIS (1960s) through the present ...sort of an "eye-witness" view of the evolution/revolution over the past four decades of the radical change of what a map is (and isn't) brought on by the digital map and mapped data analysis and GIS modeling—definitely not your grandfather's map.*



**Joseph K. Berry** is a leading consultant and educator in the application of Geographic Information Systems (GIS) technology. He is the principal of Berry and Associates // Spatial Information Systems (BASIS), consultants and software developers in GIS technology. He has written over two hundred papers on the theory and application of map analysis techniques, and is the author of the popular books *Beyond Mapping* (Wiley, 1993), *Spatial Reasoning* (Wiley 1995), *Map Analysis* (GeoTec Media, 2007) and *GIS Modeling* (BASIS Press, 2014).

Joe Berry's initial exposure to the GIS process began as a young boy in the **1950s** with a *Manual GIS* used by his forestry consultant father that involved specialized index cards, a map on the wall and a lot of worn-out shoe leather moving between them. As an undergraduate research assistant at UC Berkeley in the late **1960s** he was at the grassroots of developing an early digital map by replacing the drafting arm on a stereo plotter with potentiometers that recorded the X,Y,Z coordinates from stereo aerial photographs to several boxes of punch cards, that in turn, were read into a specialized plotting program driving the only bed plotter on the campus. In his doctoral studies in remote sensing at Colorado State University in the **1970s** he focused on image classification and pattern recognition software (*RECOG software package* for CDC Super Computer environments) and a 3D stochastic for tracking solar radiation and vegetation canopy interactions through funding by NASA and DOD model (*SRVC software package*). During this "raster-head" period he became immersed in quantitative methods of image analysis and developed an early appreciation of "maps as numbers first; pictures later." From the late 1970s and **1980s** he served as a professor and associate dean at Yale University's School of Forestry and Environmental Studies where his thoughts on digital maps as sets of discrete spatial objects (vector) expanded to that of continuous map surfaces (raster) representing spatial distributions in a true mathematical/statistical context. He collaborated with a doctoral student in the development of the *Yale Map Analysis Package (YMAP)* supporting the concepts of Map Algebra and Cartographic Modeling and presented the first graduate course on GIS Modeling in 1977. Working with a fellow faculty member, YMAP's unstructured Fortran IV code was rewritten in Pascal then Modula and finally C++ and distributed for PC's as *Professional MAP (pMAP)*. In the **1990s** Dr. Berry returned to Colorado State University where the original Map Algebra concepts were extended to a more rigorous mathematical/statistical framework and additional grid-based analytical capabilities were developed and applied in various commercial applications to include *Precision Agriculture, Geo-business, Pipeline/Power-line routing* and *Wildfire Risk/Behavior mapping*. The "map-ematical" approach to quantitative analysis of mapped data supported hundreds of national and international presentations/workshops for professionals. The perfect storm of Geotechnology (RS, GIS, GPS), powerful personal computers and the Internet were coming of age but the lion's share of industry focused on GIS as a "Technological Tool" (mapping, navigation, geo-query, and display) while it's potential as an "Analytical Tool" (spatial analysis and spatial statistics) received much less attention. In the **2000s** he sold his companies and software rights and joined the University of Denver faculty's as the Keck Visiting Scholar in Geosciences to concentrate on GIS Modeling courses, outreach and speaking engagements. During this period, two continuing interests have taken form— 1) development of the *Spatial/STEM* approach and materials for understanding and teaching map analysis and modeling fundamentals within a mathematical/statistical context that resonates with science, technology, engineering and math/stat communities; and 2) completion of the *Beyond Mapping Compilation Series*, based on the popular "Beyond Mapping" columns in GIS World/GeoWorld magazine that discuss the new breed of map analysis tools, how they can be used to better characterize and communicate spatial relationships, be organized into effective GIS model solutions, and spark entirely new spatial paradigms. For the pending next generation of GIS'ers the future looks bright. As geotechnology fully matures and "thinking with maps" takes hold, there will be boundless opportunities for integrating the new spatial paradigm into our science, workplaces and daily lives.

(PowerPoint [slide set](#) and supporting materials for this presentation are posted at [www.innovativegis.com/basis/present/CentroidCSU2014/](http://www.innovativegis.com/basis/present/CentroidCSU2014/))

## Reference:

- [Beyond Mapping Compilation Series](#) — a compendium of nearly 300 Beyond Mapping columns appearing in GeoWorld from 1989 to 2014 organized as four online/hardcopy books providing a comprehensive and longitudinal perspective of the underlying concepts, considerations, issues and evolutionary development of modern geospatial technology. *J.K. Berry*. See Book IV, Epilog, Section 2, "Where Do We Go from Here?" as further reading for this presentation. <http://www.innovativegis.com/basis/BeyondMappingSeries/>