

Petroleum Club, 800 Bell (downtown)
Social 11:15 a.m., Lunch 11:45 a.m.

Cost: \$25 Preregistered members; \$30 Nonmembers & Walk-ups

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by H. Roice Nelson, Jr.
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The Impending *Obsolescence* of Maps

Abstract

Maps have provided critical information and knowledge for society for the last millennium. A map is a representation, on a plane and at a reduced scale, of part or the whole of the earth's surface, according to the 1910 *Encyclopaedia Britannica*. We regularly use maps to define mineral rights, data coverage, drilling locations, pipeline routes, etc. However, maps only become indispensable when there is more information available than we can hold in our head, or when we need to confirm artificial or legal boundaries (for example, ownership). Computer databases and visualization technologies are providing explorationists with real-time 3-D views of complex interrelationships of their data as it changes across time. When new presentation technologies are combined with the innate ability of explorationists to visualize complex 3-D relationships in their mind's eye, there is no longer a need for paper representations of the subsurface. This presentation illustrates how databases and computer earth models, in combination with data mining tools and new visualization technologies, are replacing maps and enabling widespread application of Wallace Pratt's statement that "in the final analysis, oil is first found in the mind."

Databases and models presented in an immersive environment provide a new way to evaluate data traditionally studied as surfaces, cross-sections, and other types of maps. By improving the bandwidth to transfer digital information from computer storage to the mind, or at least by making digital data available for interactive access by the minds of decision makers, decisions are improved. Displays move from the 2-D map plane to a true 3-D

visualization using immersive environments to drive computer-controlled, human-scale stereo display and audio systems. A regional example of identifying a new exploration concept is shown in Texas Railroad Commission District IV, derived by simply visualizing data from Richard Nehring's database. This process works at basin or at prospect scale. Movies of interpretations of Fairfield Industry 3-D seismic data using Chroma Energy's pattern finding tools demonstrate how visualization helps extract geology from a 3-D seismic survey. With development of these types of complex models, and because 3-D displays help understanding, immersive environments and related technologies are becoming common both inside and outside the petroleum industry. They are expected to become ubiquitous over the next decade.

Rapid comprehension of complex spatial information can be achieved when data are evaluated simultaneously and proportionally to the sources of the data. In the oil and gas industry, many models require N-dimensional data integration. Multi-dimensional models render major improvements, beyond what can be derived from 2-D maps. This is particularly true when data mining tools have been used to correlate and high-grade relevant data relationships. Seeing and hearing spatial relationships between data types highlights inconsistencies, and the process of reconciling these differences greatly enhances understanding. Because databases and models have embedded knowledge and users can interact with a human scale visualization

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as if it were another individual, a visceral understanding of the data can be obtained simply by walking around the model in an immersive environment. The conventional "map reader" can more easily replicate the three or more dimensional model in his or her mind and then show it to others, allowing better communication and better collaboration, either being in the same theater or being in different networked theaters separated by large distances. As more data and information become available in every walk of life, understanding interrelationships requires adaptation of new methods to understand spatial complexity, which the conventional planar 2-D map can not encompass.

Biographical Sketch

H. ROICE NELSON, JR. likes to find things, particularly promoting exploration, exploitation, and production of hydrocarbons. His accomplishments in interactive seismic interpretation

technologies have impacted how oil companies explore for and produce hydrocarbons. As a co-founder of Landmark Graphics Corporation, HyperMedia Corporation, Continuum Resources International Corporation, and now Dynamic Resources Corporation, Roice has moved from developing new immersive interactive interpretation tools to using these technologies to explore for hydrocarbons. He is the author of more than 140 professional papers and a 1983 book, *New Technologies in Exploration Geophysics*, which was later published in Chinese. His professional activities include membership in AAPG (visiting petroleum geologist, associate editor *Geobyte* [1985–1986], and member AAPG/SEG Geophysical Integration/Interpretation Committees); GSH; HGS; SEG (on the Research Committee for more than a decade, associate editor *Geophysics* [1989–1990], and Enterprise Award 1999); and instructor for a variety of domestic and international schools. Mr. Nelson earned a BS in geophysics from the University of Utah (1974) and an MBA from Southern Methodist University (1981). □