# Technical Challenges in the Petroleum Industry and Future Trends in Improved Oil Recovery*

Paul de Groot[1] and Fred Aminzadeh[2]
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[1] dGB Earth Sciences, Boulevard 1945 nr 24, 7511 AE Enschede, The Netherlands
[2]dGB-USA, 1 Sugar Creek Center Blvd., Suite 935, Sugar Land , TX 77478, USA,
Paul.deGroot@dGB-Group.com, Fred.Aminzadeh@dGB-Group.com, www.dGB-Group.com

**What are the significant advances in geosciences technologies in the past decade? What are current trends? Where do we want to be within the next ten years? These questions will be addressed in conjunction with our most challenging exploration and field development problems with an emphasis on reservoir characterization / simulation, reservoir management, and monitoring reservoir performance. The need for introduction of advanced geosciences and petroleum engineering technologies and the concept of true integration of different disciplines in order to meet those challenges will be discussed. The ever increasing role of geophysical methods and the contributions geophysicists are already making in the petroleum industry ranging from instrumented oil fields to seismic while drilling and the time lapse (4D) seismic for determining reservoir fluid flow and reservoir monitoring will be highlighted. This presentation will build on and update earlier surveys by oil industry professional societies such as SEG, AAPG and SPE.**

**Can we provide plausible answers to the following questions: How to benefit from and efficiently handle data explosion problem, how best can we combine a basin model and seismically derived fluid migration information, and what are the main uncertainty / risk factors in exploration and field development. Among topics to be covered here are the state of the art and expected future developments in the following areas: New acquisition and time lapse methods, non-linear seismic data processing and analysis, unconventional statistical methods (fuzzy logic/neural network and genetic algorithms) , combining human and machine intelligence, combining statistics and physics for integration, seismic inversion and meta-attributes, vector exploration (such as 3-C and OBS Data), seismic imaging, dynamic reservoir characterization, and recent advances in information / visualization Technologies.**

**Practical applications of these concepts from deep water exploration and production to E&P in difficult data areas, anticipated environmental and geo-hazard problems and how to use technological advances to minimize their impact will be highlighted. We will then offer a glimpse of a future oil fields where their management, production optimization and improved oil recovery is accomplished through real time reservoir model building and updating, using real time production and other data being acquired.**

**Paul de Groot** is co-founder and managing director of dGB Group (de Groot-Bril Earth Sciences), which specializes quantitative seismic interpretation, stratigraphic analysis, seismic inversion, neural networks-based reservoir characterization and gas chimney/fracture detection. He began his career in 1981 with Shell with many international assignments including in Nigeria and Oman. He then became director of Quest Geophysical Services and subsequently served as senior geophysicist for TNO Institute of Applied Geoscience before co-founding dGB in 1995. He holds a MSc and a Ph.D. in geophysics from the University of Delft.

**Fred Aminzadeh** is president and CEO of dGB-USA and FACT. He has a MSc from University of Tehran school of engineering and a Ph. D. from University of Southern California. He was VP of Society of Exploration Geophysicist. He is a member of Russian Academy of Natural Sciences and Azerbaijan Oil Academy and a fellow of the IEEE. He has three patents and an extensive list of publications including 10 books in diverse areas such as reservoir characterization, soft computing, pattern recognition, 3-D modeling and seismic signal and image processing. Previously, he has worked for University of Tabriz, Bell Laboratories, Exxon and Unocal.