

# **New Technologies in Mature Gulf Basins – Multidimensional Modeling of Ontologically Derived Historical Petroleum Exploration Data Properties for Effective Basin Knowledge Mapping**

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Resources data warehouse is usually constructed by integrating multiple heterogeneous sources such as relational databases, flat files and OLTP files. When data reside in many separate applications in an operational petroleum company environment, data integration and encoding of data are often inconsistent. When data are moved from individual operational environments into an integrated data warehouse, a consistent coding convention is assured. Data cleaning and data integration are applied to maintain this consistency in the naming convention, measures of variables, encoding structure and physical attributes with their properties. In our study, Ontology is used for constructing various logical schemas for petroleum data warehouse design.

Multidimensional views of heterogeneous historical petroleum data properties can routinely be accessed from ontologically designed resources data warehouse. Data cubes, lattice of cubes, dimensional modeling, and OLAP operations are carried out for exploring geological knowledge from historical petroleum Metadata properties and mapping them in an operational environment for decision support purposes. ROLAP and MOLAP are core concepts of ontology-derived multidimensional view design implementation in our present study. Petroleum ontology serves the necessary data integration, as it is often warranted for petroleum industry operational environment. Petroleum exploration data, extracted from different sources and applications are proved to be consistent by ontology base integrated warehouse approach. This new technology is an opportunity to explore many more oil and gas fields from Middle East mature basins.