Acta Geologica Sinica (English Edition), 2019, 93(supp.1): 28–31

Data Strategies – Lessons and Examples from the Frontier Lines of an International Oil and Gas Company

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Citation: Leary et al., 2019. Data Strategies – Lessons and Examples from the Frontier Lines of an International Oil and Gas Company. *Acta Geologica Sinica* (English Edition), 93(supp. 1): 28-31

Data strategies and tactics used to create and promulgate robust databases across a wide organization are subject to a number of constraints and challenges. This presentation reviews lessons learned from one company in the oil and gas industry, and illustrates how that company met and overcame challenges during the database design and implementation phases.

Clarifying strategic intent of use of the data allows an organization to add value to data and create knowledge and wisdom that can be put to business purposes (Fig. 1). Perhaps the most important lesson is to design the database to only address the questions asked by generalist users most routinely. Early attempts to design a database based upon a single expert's view of the topic usually resulted in a system that had many spaces for entries, but was unwieldly, poorly populated and cumbersome to use. Database design is best done as a collaborative exercise between topical experts, end users, data scientists and commercial organizations with expertise in building databases. While the design of a database may seem like the most important goal, its care and feeding must also be taken into account once the database has been rolled out. In implementing these strategies, one must be aware of the fact that 'database builders' rarely get 'credit' for building a clean, well-characterized database and dataset. Further, most users generally see only a 'cost' associated with populating a master database, so a 'pull' must be created to make sure that the database continues to grow in terms of entries and capabilities. Two examples of the results of this strategy focus on creation of (1) global- and regional-scale digital geologic maps, as well as (2) a global hydrocarbon occurrence database.

The geologic map data-capture project was not merely an exercise in digitizing existing maps. Creation of a series of regional and global digital geologic maps was the result of collaboration of the client and Geologic Data Systems (GDS), who categorized geologic polygons and faults according to an initial data model for ArcGIS. GDS further improved the original map by updating coastlines using state-of-the-art digital datasets (Fig. 2). Mapping was enhanced by correcting and updating maps to the latest digital elevation models and LandSat imagery (Fig. 3). In this manner, regions had coherence that extended beyond any individual map series, and 'edge of map' issues were resolved within a robust data model (Fig. 4). The global hydrocarbon occurrence developed into a Digital Analogues Knowledge System (DAKS). C&C Reservoirs leveraged a client's data model and enhanced its capabilities to capture information for 1200 of the world's most important hydrocarbon occurrences in a standardized format (Fig. 5). This achievement was the result of a market-driven collaboration with the world's largest oil companies, and the painstaking development of standard definitions and extraction of data and information from public-domain literature. This collaboration developed a robust product that can be used in ways not originally contemplated when work was undertaken – in helping understand primary controls on reservoir characteristics as well as the risk and likelihood of encountering a range of values in an undrilled prospect.

Fig. 1. Strategic intent in proper data handling.
The value of raw data increases as it is turned into Information, which can be used to develop Knowledge. When combined with other types of information and knowledge, one can develop an Insight. When placed in context of an overall Company Strategy, the data can be brought to bear and create business Action. Graphic copyright by PresentationGO.com.

Other more 'pedestrian' concerns surrounding data ownership and confidentiality must be taken into consideration as well, necessitating adherence to contractual and funding constraints. While sharing data and research results are (1) a basic tenet of open scientific inquiry, and (2) provide the means to judge the reliability of scientific claims, the terms that govern the use and availability of the data must not be dropped from the data. More challenging still is that people may suffer lapses of judgement and damage to scientific reputations by not releasing scientific

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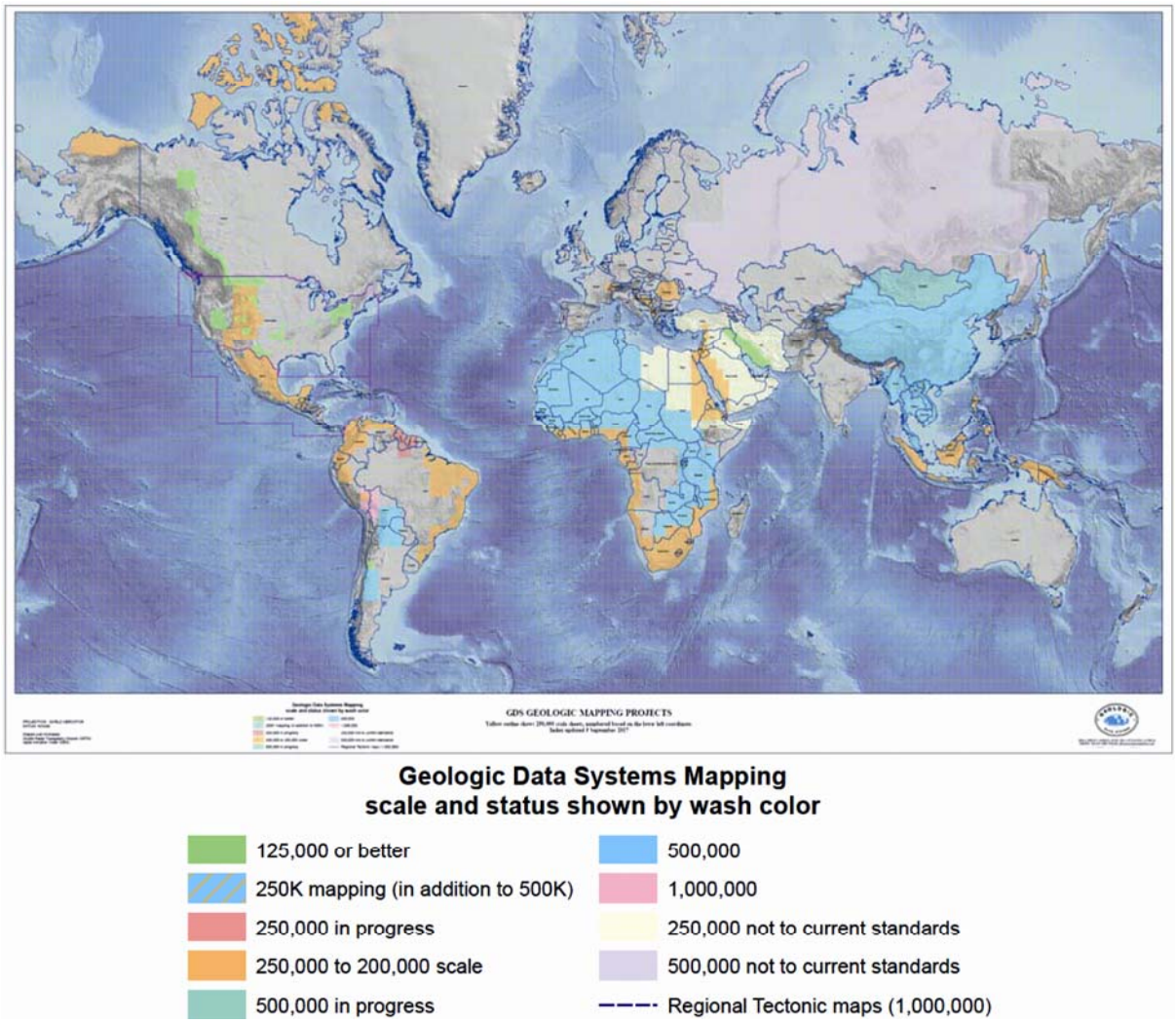

Fig. 2. Value of commercial partnerships.
Geologic Data Systems improved regional geologic maps by a) rectifying to state-of-the-art Digital Elevation Models and LandSat imagery b) capturing geologic data in a structured manner and c) resolving 'edge matching' issues. The result is a power collection of maps to aid interpretation of provenance and surface geology as it is brought to bear in subsurface exploration efforts. https://geologicdata.com/index-map/.

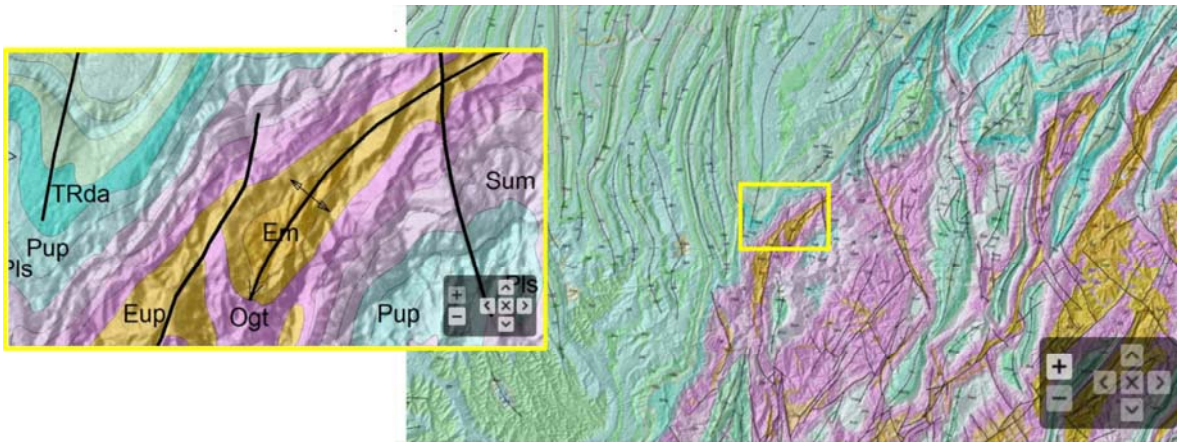

Fig. 3. Detailed capture of Regional (1:500k) Geologic Maps.
Geologic Data Systems completed a Project for China which captured the Regional Geologic Maps in an ArcGIS format that provides the end user with a geologic base for his or her own mapping purposes (https://geologicdata.com/lg-maps/).

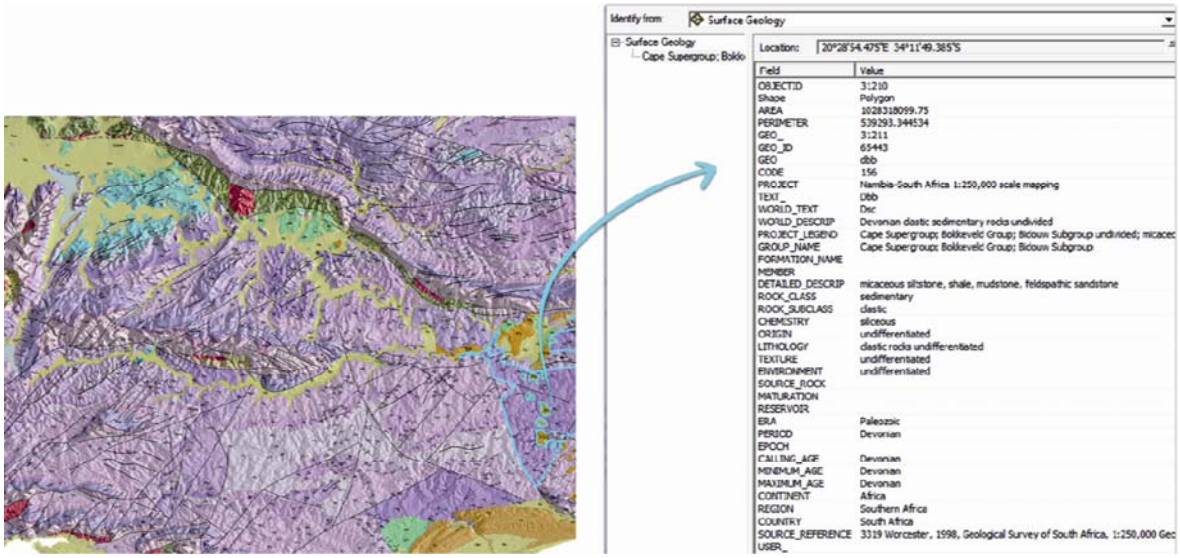

Fig. 4. Structured data provides value across projects worldwide.
Geologic Data Systems improved an initial Data Model which provides a solid basis for subsequent interpretation and analysis (https://geologicdata.com/products/).

Fig. 5. Structured data provides value across hydrocarbon occurrences worldwide.
C&C Reservoirs documented key facts on 1200 of the world's most important hydrocarbon occurrences, and established rigorous rules and definitions that provide a robust basis for comparison across basins and plays (https://ccreservoirs.com).

data in support of published assertions. Lack of trust across organizations, pressure to publish, and tribalism further complicate the open sharing of data. An additional issue of great concern is the volume of legacy data requiring capture once a database has been created. The ongoing capture of new data and the retroactive capture of legacy data present very different challenges. When done properly, however, one may find that you sometimes large volumes of data are not needed to create interesting and innovative insights. Rather, this may require merely the 'right' data in a readily-digestible form be available

for analysis. An example will be provided that recounts a recent exploration effort.

Key words: database strategies, database challenges, oil and gas

Acknowledgments: This work is based upon the recollection of senior author's collaboration and experience as Supervisor of Global Database at ExxonMobil Exploration Company in the early 1990s.

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