TOD™ Operational and Strategic Options

"The Age of Tissue Computing has Arrived™"

Energy and Mineral Exploration

Seismic Processing, Mapping, Research, Others

Purpose: Rapid, thorough and accurate mapping of subsurface conditions in 2D, 3D and 4D, married with other data such as consolidated supporting data and reports, is of paramount importance to the successful discovery of resources and treasures. As an explorer for petroleum, natural gas, minerals, or other subsurface materials, the mission is to acquire and operate the most advanced and effective automated subsurface resource specific analysis and detection system available, enabling timely and cost effective resource evaluation.

Process: The main source of data for mapping and discovery efforts comes from analyses of data resulting from seismic waves. The Earth's crust is composed of different layers, each with its own properties, seismic energy, and interactions with other layers.

There are many parameters varied in setting up exploratory seismic waves. The size and shape of the sourcing events, wave strength, pulse rates, field point directional phasing, and other variables impact the seismic wave generation, the data that are returned, and the ability of the analytical teams to draw accurate and definitive results.

Given the potential magnitude, diversity, and complexity of received seismic waves data, current real-time digital data processing is often limited in providing immediate, and definitively accurate results to on-site exploration teams.

If more thorough and conclusive results were available to on-site exploration teams within minutes of a specific seismic event, the on-site team could immediately adjust the wave production system configuration and parameters to refine the exploration program, focusing on the most promising aspects of obtained results. This refinement process would enable exploration teams to clearly and quickly locate and identify relevant resources, or with firm and accurate knowledge, decide to move to another exploration site.

Solutions and Strategies: BCM's forthcoming Tissue Operating Device (TOD™) family of real neural computers, powered by millions of living neurons, will provide exploration teams the tool they need for rapid, cost effective and flexible real-time resource evaluation. Unlike inanimate silicon chips and the digital computers TOD™ is built with living neurons and naturally capable of the complementary capabilities of processing Assembled Knowledge (AK), and Adaptive Thinking (AT), providing TOD™ users with intuitive neural intelligence (much more powerful than artificial intelligence (AI) simulated by digital computers and 'neural' chips. BCM confidently predicts that the difference between AI and "actual" intelligence will prove hugely significant for resource explorations and many other applications across a wide range of human enterprises.

The TOD™ platform provides the operational hardware and software to perform advanced analysis, high-speed exploration 2D, 3D, and 4D mapping, subsurface data analysis, and deliver results. The user provides the core data analysis mythologies, analytics, and algorithms through which to train TOD™ to learn the desired processes to deliver the desired Exploration Mapping and Analysis Results (EMAR).

To provide EMAR to all types of energy and mineral exploration customers, BCM offers four configuration options. Some require special ruggedized TOD™ Models, and others require the design and development of customized mobile TOD™ platform data center containers.

> <u>Centralized EMRA</u> - One or more standard fixed location TOD™ cabinet models located within a securely managed, environmentally controlled, data center with source data provided from seismic field data collection operations and other sources.
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> <u>Land Mobile EMRA</u> - One or more customized land mobile ruggedized TOD™ cabinet models located within a securely managed, environmentally controlled, land mobile data center with source data provided from local seismic field data collection operations and other sources.
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> <u>Sea Mobile EMRA</u> - One or more customized saltwater performance, sea mobile, ruggedized TOD™ cabinet models located within a securely managed, environmentally controlled, sea mobile data center with source data provided from local seismic field data collection operations and other sources.
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> <u>Blended EMRA</u> - A user defined combination of TOD™ Models located within a Centralized EMRA as well as either a Land Mobile EMRA or a Sea Mobile EMRA where the data is processed based on a user-defined split of the processing tasks, and data is transferred between the participating facilities by user selected data networks.

Data Collection Formatting Options

BCM provides two distinct TOD™ configurations beneficial for seismic wave response data collection and processing.

The “Sensor Processing” (SP) TOD™ configuration directly accepts, and immediately processes the actual analog data returned to the large field of sensors collecting the seismic wave feedback. This is direct analog acceptance, there is no conversion of the seismic data to digital format.

The TOD™ SP configuration includes an internal array of signal processing sensor neurons. These special neurons convert the analog seismic wave data into neural network intelligence. The processing neurons accept seismic wave sensory input to generate the required 2D, 3D and 4D maps, images, and reports.

The TOD™ “Full Processing” (FP) configuration does not include sensor neurons or SP functionality. All input data must be digital.

Both the SP and the FP configurations offer the full processing benefits, including neural intelligence, addressed above. However, the SP configuration has the potential ability to deliver higher resolution and accuracy of results, probably faster than the FP configuration, which will have to perform additional conversions and analyses.

Using the SP configuration, all received seismic wave feedback is analog and actual, with no distortion brought into the mapping or analyses due to the need to estimate the wave data pathway in between digitally acquired data points.

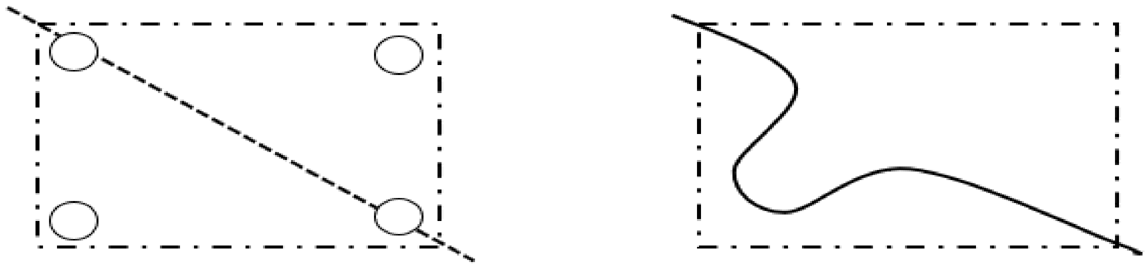
The two Figures illustrate, by example, how the SP’s actual analog process is superior to the FP’s digitalized data processing and resulting distortion of results. These examples address the “Dimple” distortion and the “Spike” distortion. Depending upon the exploration application and the subsurface structure, these digital distortions may be significant. Of course, such distortions are unavoidable, using even the most advanced digital computers or supercomputers.

For additional support in reviewing these operational and strategic options, please review the data available using the TOD tab at the BCM website or contact a BCM Representative.

Analog and Digital in Dimple Data Example

TOD™ Direct Processes Analog Sensor Inputs

Obtaining and processing accurate dimple data can change results



Code:

○ Digital Data Collection Point

- - - - Digital Estimate of Data Path

—— Actual Data Path

— · — Frame of Data Snapshot

Analog and Digital in Spike Data Example

TOD™ Direct Processes Analog Sensor Inputs

Obtaining and processing accurate spike data can change results

Code:

○ Digital Data Collection Point

- - - - Digital Estimate of Data Path

—— Actual Data Path

— · — Frame of Data Snapshot