VR Application Examples

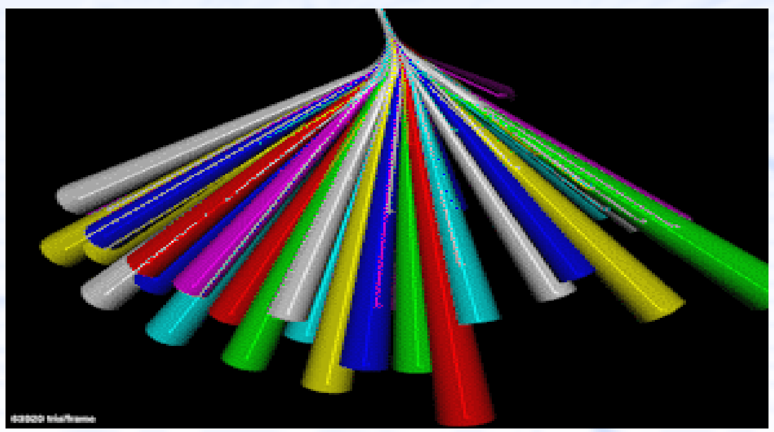
WVS, the leader in providing immersive environments for the Oil Industry, started using virtual visualization environments in 1973 and has been working with the University of Houston VETL (Virtual Environment Technology Laboratory) since 1990. Incorporated in 1997, WVS resells best-of-breed software and systems for immersive environments; provides access to these technologies and VR expertise through service centers, and develops VR related applications for the Oil Industry.

WVS, in conjunction with the VETL, has developed several virtual reality demonstrations illustrating the benefits of virtual visualization for Oil & Gas Exploration & Production. These demonstrations utilize VR-Viz (sm).

SOFTWARE	SYSTEMS
• Visual Navigation • Data Conversion • Data Integration • Development Tools	• VR-OFFICE (sm) • TABLE (sm) • WALL (sm) • ROOMS (sm) • ROOF (sm)

DRILL A WELL

TITLE: AIOC Well Design



This 3-D presentation demonstrates the relationship between 48 targets and the first of 8 platforms AIOC (Azerbaydzhan International Oil Company) is in the process of placing in the Caspian Sea. WVS is developing software which allows drillers to visually move platforms, relative to the sea floor, thus allowing them to calculate and optimize the cost of the platform, drill pipe, casing, and other material based on platform location, associated water depth, and the locations of known targets.

DESIGN FACILITIES

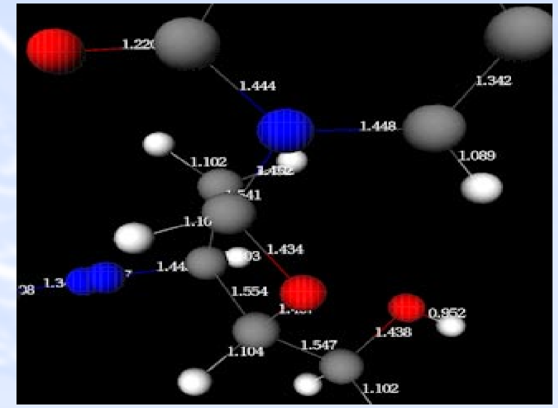
TITLE: International Space Station

Just as there are significant economic drivers requiring the computer simulation of space exploration and habitation in a Virtual Environment, there are similar cost justifications for spatial integration of E&P data. This example, showing the completed International Space Station, is similar to Virtual Environment simulation of deep water completion facilities, which will allow engineers to optimize components, practice assembly, practice running a remote operated vehicle, measurement and monitoring of results, safety training, and practicing disaster response.

INTERPRET WELL LOGS

TITLE: Molecular Structure

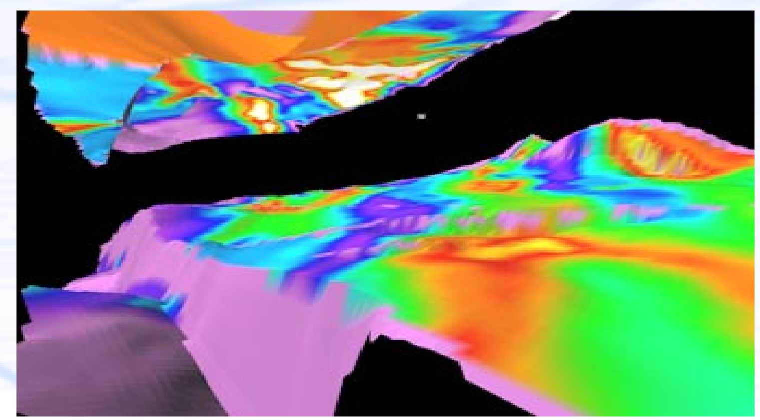
Molecules are designed and routinely shared across the Web between UH scientists and their counterparts at The University of California at San Diego. The ability to change the display from `backbone'' to `balls' and 'sticks' to `cylinders' to `spheres', and to add annotation illustrates the power of Virtual Environments to aid scientists in evaluating complex spatial relationships. For a geoscientist these 1-D molecules in 3-D space could represent well bore locations in true 3-D space. The balls could represent perforations for production or injectors. The annotation could represent production histories. Virtual Environments allow hundreds of wells, with all of their associated tops and logs, to be evaluated simultaneously. Man's ability to identify spatial patterns allows interactive identification of mispicked or mislocated tops and fault picks.



INTERPRET SEQUENCE STRATIGRAPHY

TITLE: BEG

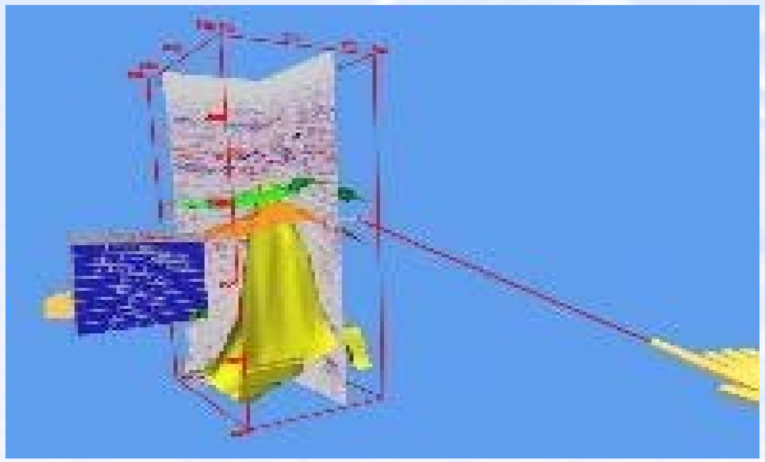
This South American oil field example, interpreted by the BEG (the Bureau of Economic Geology at The University of Texas at Austin), illustrates the power of adding dimensions to data displayed in a Virtual Environment. The surfaces were picked using a standard industry interpretation workstation, exported, and displayed using VR-Viz (sm). This particular field is 2 miles by 1 mile in extent and the two displayed horizons are only 60 feet apart. The Virtual Environment allows vertical exaggeration and artificial separation of the horizons to better study the 2-D data in 3-D space. In addition, the porosity measurement SoH, has been texture-mapped onto the two surfaces. This integration of engineering and geophysical data allows interactive identification and presentation of high-porosity distributary bar sands in the area of study.



DEVELOP PLAY FAIRWAY

TITLE: Salt 3-D

Geophysicists thoroughly enjoy holding their 3-D seismic survey in one hand, and moving a clipping plane through the survey with the other hand. The reaction is tied to the wonder of discovery. In just a few minutes, using these techniques, it is easy for the interpreter to unravel structural style, stratigraphic play fairway trends, and the locations of anomalies to be studied in more detail than using standard interactive interpretation tools. In the past, geoscientists have accomplished this type of data review by animating through the survey. This example illustrates data animation in the virtual environment. However, the real strength comes in being able to sculpt the data in a natural and intuitive way.



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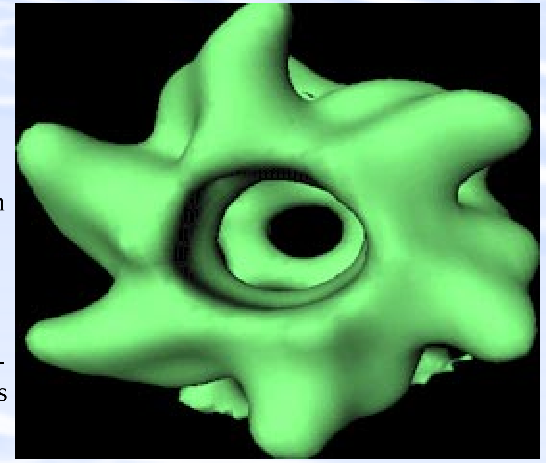
DEVELOP GEOLOGIC MODEL

TITLE: Protein Structure

Placing 3-D data in a true 3-D Virtual Environment opens windows of understanding. This example is of the protein Actin, which wraps a structural “backbone” of muscle fibers. The data was collected through electron microscopy and is at the scale of porosity in a core. This illustrates an exciting application of Virtual Environments, namely the ability to evaluate data at all E&P scales, in an environment which humans understand and can intuitively interact.

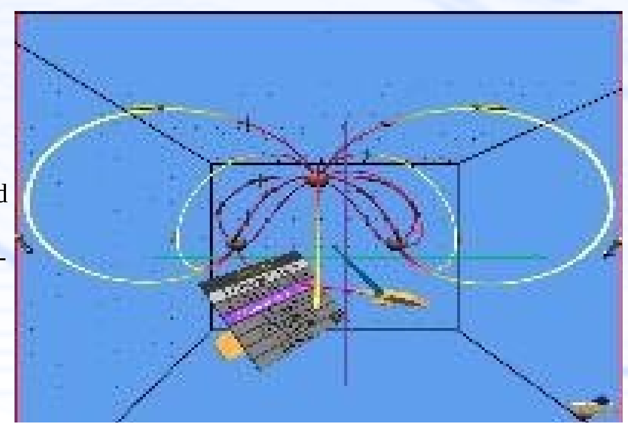


This interaction allows geologic development models to be easily communicated horizontally to other supporting disciplines.

BUILD RESERVOIR MODEL

TITLE: Maxwell World

The dynamic interaction with electric charges in a Virtual Environment demonstrates the principles of electrostatics and illustrates a new way to build, test, and evaluate a reservoir fluid flow model. In this example, source charges, test charges, electronic field lines, electronic field vectors, and equipotential surfaces are used to show dynamic interaction with a computer simulation. In E&P this interaction allows the human mind to optimize injector locations, perforations, and field production interactively which significantly enhances the bottom line.



GENERATE PROSPECTS

TITLE: Rudman 2-D

When interactive seismic interpretation workstations were first introduced to the oil industry, a common way to get a manager's attention was to say "We recommend you replace your 15¢ colored pencils with a $300,000 personal computer." Once attention was focused on this claim, it was easy to justify the interpretation cycle-time improvements, and the improvement in recovery of by-passed and unidentified reserves. The Rudman 2-D example shows foreshortening of paper seismic sections with colored pencil marks, by dynamically walking around or by rotating the data in your hand. This illustrates the ability to integrate a paper location map with paper seismic with well locations with scanned paper well logs with fault interpretations with horizons. Also, available as the ability to interactively turn on and off any piece of data to allow real-time evaluation of the data volume. Not only can horizons be interpreted in this environment and passed back to the standard interpretation system, it also becomes intuitively obvious where potential prospects are located. After spending only 40 minutes in the ROOM (sm) [Reservoir Objective Oriented Manager], an individual, who had evaluated this prospect area off and on for 40 years, said: "I never understood the prospect that well before." Vertical communication, convincing a manager or selling a prospect, is critical in all E&P organizations. Virtual Environments provide natural methods for enhancing communication.