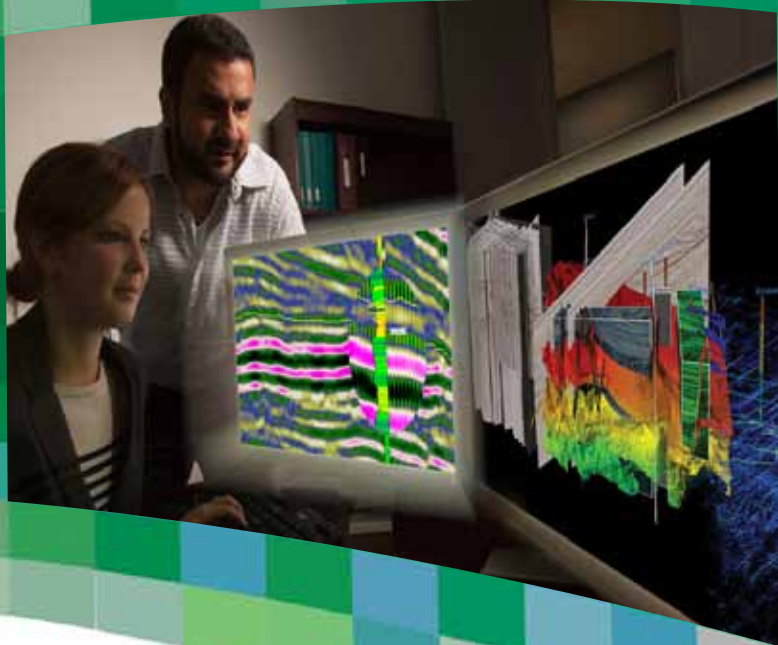


Paradigm 2011 Release

Our legacy of vision for energy continues



Paradigm 2011

Redefining Seismic to Simulation Workflows

The Paradigm™ 2011 release, the largest synchronized release of exploration, development, and production technology in the company's history, carries the signature of innovation that the industry has come to expect from Paradigm, with new, game-changing technologies that redefine workflows and best practices across the E&P chain.

In addition to the introduction of a rich set of geoscience and engineering applications, this release pays particular attention to collaboration, enabled and strengthened by improved software ergonomics, expanded use of shared components, and enhanced data integration in support of multi-disciplinary workflows.

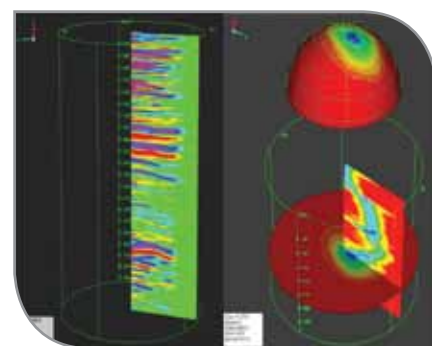
The release also delivers a quantum leap in application performance with the expanded use of multi-core (CPU and GPU) applications in the areas of seismic imaging, seismic attribute calculations, voxel interpretation, and subsurface modeling. Project productivity is enhanced with

significant integration improvements and new workflows, such as interpretation with modeling, and with new knowledge control and auditability solutions for multi-scenario management.

This release is provided on Epos® 4.1, Paradigm's scalable infrastructure and data management system. The release also expands Microsoft® Windows® 7 platform support to Paradigm's full interpretation suite.

Unique Advantages in Every Discipline

For the **seismic processing and imaging communities**, this release introduces breakthrough technology in the areas of full-azimuth imaging, analysis and characterization (EarthStudy 360®), with huge implications for fractured and stressed reservoir assets. It also includes significant enhancements to the Reverse Time Migration for imaging in areas of complex wave phenomena, a restructured Surface Related Multiple Suppression program for

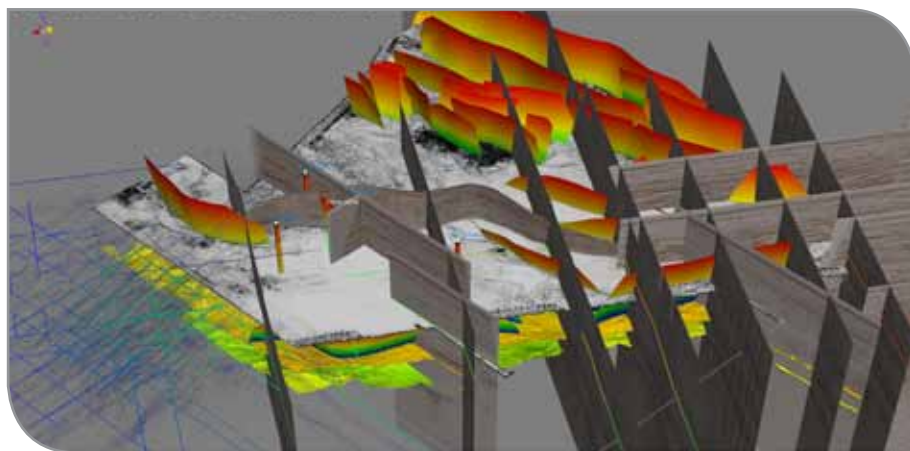


EarthStudy 360 full-azimuth directional and reflection angle gathers

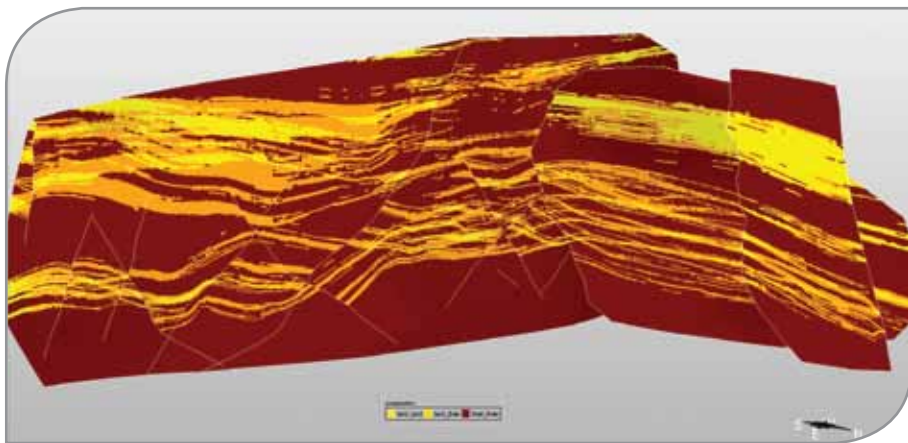
improved performance and usability, a new pencil repository for the exchange and QC of velocity data and structural data, multi-core semblance calculations to accelerate the velocity model building process, and additional geologic constraints for velocity model updating with the anisotropic grid tomography solution.

For the **interpretation and seismic characterization communities**, the Paradigm 2011 release enhances the usability, performance and functionality of its primary multi-survey viewers in the SeisEarth® interpretation and visualization solution – the 3D Canvas, Section and BaseMap Windows. Object identification, contextual menus, and an innovative user-defined pie menu greatly improve the user experience.

The release expands the scope of the interpreter's work process by incorporating pre-stack data and seismic inversion operations into the interpretation canvas, and by greatly improving the visualization and analysis of projects that use many seismic data attributes. It incorporates



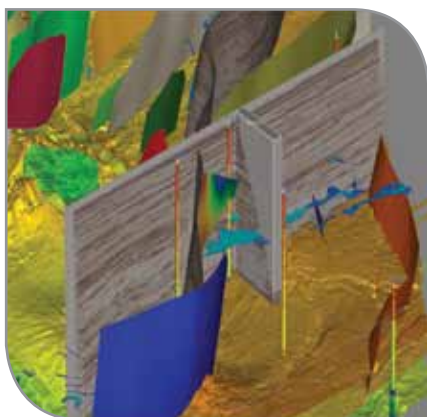
SeisEarth 2D/3D multi-survey interpretation and visualization



Facies juxtaposition, branching faults and horizon traces on a fault surface, computed on a geologic grid

a new, game-changing voxel rendering method with real-time operations that take advantage of GPGPU (General Purpose Graphic Processing Units). It offers an expanded seismic facies classification solution, tightly integrated with other Paradigm interpretation solutions, and new, 2D multi-line survey classifications in support of regional analysis. It implements a new well planning application, offering a unified well planning and engineering solution across the Epos 4.1 platform.

The Paradigm 2011 release incorporates significant performance, usability and functionality enhancements to its well log correlation and section application, with automatic correlations, automatic mapping, and support for production data. With this release, collaborative geologic and seismic interpretation workflow processes have become more transparent than ever.



Pre-stack data integrated into the interpretation environment

Geoscientists will enjoy the ease of use and power of Paradigm's interpretation-while-modeling workflows, with immediate identification and correction of interpretation errors, and improved identification of stratigraphic features carried out in true 3D paleo-space. This transformational workflow reduces iterations between interpretation and modeling, while ensuring the integrity of all interpretation data and better models for seismic inversion and volumetric calculations.

For the **modeling communities**, users of the Paradigm 2011 release will benefit from the re-engineering of its modeling solvers for GPGPU's, with performance gains of 5-10X for fault, horizon and flow simulation grid construction. **Velocity modelers** will enjoy the application of SKUA® technology to generate structurally-sealed and stratigraphically-constrained velocity models. **Exploration modelers** will be able to carry out prospect analysis while modeling, including fault juxtaposition and shale-gouge ratio analysis. For **structural geologists**, it is now possible to perform true 3D basin restoration with quantitative assessments of fracture probability.

Finally, **reservoir modelers and engineers** will be able to analyze and visualize time-dependent data (completion, production, simulation) screen models in support of history matching workflows, and better understand fluid flow with new analysis capabilities.

A Commitment to Usability, Ergonomics and Performance

Oil companies work in highly complex areas. Interpreting a heavily faulted zone, interpreting beneath structures, modeling those structures, performing regional interpretation on tens of overlapping 2D and 3D surveys, correlating thousands of wells, determining fault seal potential, well planning and drilling in a multi-episode deformation area and in over-pressured regimes, and managing hundreds of scenarios in carbonate reservoir plays - these are routine projects today. Consequently, every software release must pay particular attention to collaboration, ergonomic software design and enhanced data integration. Paradigm is guided by these principles when designing solutions that ensure common styles and behavior in workflows that are conducted across many disciplines.

COMMON INTERFACES: Adoption of the Nokia Qt cross-platform application and user interface, to ensure a uniform user experience across our application suite.

ERGONOMIC DESIGN AND AWARENESS: Assurance that every release adopts "best practices" in ergonomic design and awareness, to minimize repetitive stress injuries caused by excessive use of mouse movements and button clicks.

OPTIMAL USE OF APPLICATION WINDOWS: Maximum application performance with minimum application window redundancy.

WORKFLOW, APPLICATION AND ALGORITHM PERFORMANCE: Innovative workflows resulting in up to 5-10X reductions in elapsed project time; expanded use of multi-core parallel computing at the desktop.

Highlights of the Paradigm 2011 Release

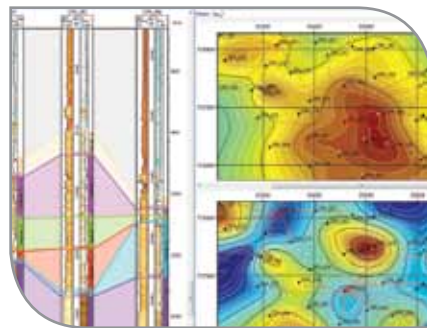
Seismic Processing and Imaging

- Full-azimuth decomposition and imaging for handling rich and wide seismic acquisitions
- Fracture and stress determination from full-azimuth seismic data
- A new GPU and CPU enabled Reverse Time Migration for imaging in areas of complex wave phenomena
- Pre-stack seismic data QC in a common 3D canvas
- New velocity topology based on SKUA true 3D paleo-stratigraphic modeling solutions
- New surface-related multiple attenuation for wide-azimuth acquisitions

Seismic and Geologic Interpretation

- Pre-stack data with post-stack data interpretation in a common canvas
- Embedded full-azimuth illumination as an interpretation asset
- Customized Section and 3D Canvas views for improved management and visualization of multi-attributes, including multi-panel and multi-layer (blending)
- New ergonomic data analysis and visualization tools, including magnifying glass visualization, object identification, user-defined contextual and graphical pie menus
- Enhanced multi-well, multi-line 2D, and traverse handling
- New data object support – GeoTiffs, Glyphs, Notes
- Advanced multi-data (map, section, volume) crossplotting

- Epos project data synchronization
- New multi-line 2D seismic facies classification for improved regional stratigraphic interpretation
- Expanded well-to-seismic correlations (with optimized lateral/vertical shifts) and synthetics (including wedge modeling)
- Embedded seismic inversion functionalities in the SeisEarth® interpretation solution
- A new, GPU-based, voxel rendering technology with scene changes “at will”
- Enhanced geologic interpretation with a focus on petroleum geology and production data
- Enhanced well log correlation and sectioning, including automatic correlation, automatic mapping, and optimum cross-section through wells



Marker correlation and associated elevation and thickness maps in StratEarth®

Structural and Facies Modeling

- New integrated workflows that use true 3D paleo-stratigraphic modeling for validating interpretation data while modeling
- New modeling workflows for prospect identification (fault juxtaposition,

- fracture probability, volumetrics)
- True 3D basin restorations
- Multi-point geostatistics for facies modeling

Reservoir Engineering

- Time-dependent data support with synchronized animations of production data, microseismic data, and well data
- Improvements to SKUA flow simulation grids, including stair-step pinch outs and erosions to ensure non-skewed cells
- New reservoir model screening workflows for history matching
- Dynamic uncertainty analysis through experimental design
- Multi-scenario management, quality control and auditability

Well Planning and Drilling Engineering

- Unified well planning solution
- Fully interactive well planning in Paradigm's interpretation canvas
- Target definition and management
- Constraint-based well planning
- Planning in depth and time migrated domains
- Geometric target definition, including 3D and polygonal targets
- Support for 'soft' targets
- Support for vertical, J, S, continuous build and multi-target wellpath profiles
- Side tracks and platforms
- User-editable wellpath design
- Export of designs in common formats (Epos WDS, LAS, WBP)
- New Epos drilling database and services
- Compatibility with Sysdrill® drilling engineering software

The Paradigm Advantage

In every workflow, from seismic to simulation, Paradigm solutions deliver the most accurate and comprehensive information obtainable from existing subsurface data. This enables geoscientists and engineers to make optimal decisions, based on a profound understanding of uncertainties and risks.

Paradigm solutions are fully scalable, from a single user on a laptop to enterprise-wide global deployment, on Linux and/ or Windows, with extensive capabilities for customization, third-party integration, distributed data management and collaborative project work on a global basis.