IHS Kingdom®

Intuitive. Integrated. Interpretation.
IHS Kingdom Overview — The global demand for oil and gas is growing. Your company is under pressure to replace reserves and boost production. Management faces decisions that could make - or cost - the company millions. The question is, do your exploration and asset teams have the best geoscience tools to drive those decisions?

Kingdom Benefits

- Brings advanced geoscience, from AVO and attributes to geosteering, to every interpreter, not just the specialist.
- Enables new geoscientists to become productive faster using Windows-based, easy to use software that is all in one executable.
- Enables remote offices lacking IT Admins or GeoTechs to still enjoy full interpretation capabilities.
- Enables mobile interpretation, the ability to work while disconnected from the office, on an airplane or in the field.
- Dramatically reduces cost on software, hardware, IT, services and upgrades, and lowers fees to 3rd party specialists and processors.

Kingdom Provides

- The only fully integrated geoscience software.
- Integrated, multi-user, multi-authored, networked, 32-bit or 64-bit environment.
- The ability to handle large data sets and the flexibility to choose the database that's right for your business - Oracle®, Microsoft® SQL Server.
- Enhanced collaboration between the workforce.
- Full scalability from standalone PC, to local network or Internet network.
- The ability for networked clients to share software between offices.
- Tunnel Technology that allows projects to be easily and cost-effectively transferred to and from UNIX and PC platforms.

With Kingdom, exploration and asset teams can manage projects with flexibility and ease. Our modules are categorized by specific function, so you can use them as a fully integrated suite or you can select the modules that fit your interpretation needs.

Kingdom Streamlines Your Workflow

Easy to Use

- Familiar, Windows-based PC platform
- Intuitive workflows
- Connectivity with widely used data formats

Integrated Workflows

- Integrated interpretation from prospect to production
- Integrated curvature, spectral decomposition and similarity capabilities
- Integrated project and knowledge management

Workstation Flexibility

- Network or standalone licenses
- Portable from PC to laptop

Technical Support & Training Staff of Experienced Geoscientists and Engineers

- Effective and responsive technical support
- Comprehensive training courses

Geosteering with complete project and application integration in user selected, multiple Geosteering Case displays and workspaces.
IHS Kingdom Advanced — As oil and gas fields mature and new plays are discovered in remote terrain, field evaluation has become increasingly sophisticated. Today’s geoscientist must integrate geological data, multi-dimensional seismic, modeling, and economic analysis in a single interpretation. But just because interpretation has become more complex, it doesn’t mean that your software has to.

Kingdom Advanced-integrated software for your largest and most complex geoscience workflows - lets you complete work faster and with greater confidence.

Kingdom Advanced Differentiators
- Integrate real-time geosteering data with the interpretation.
- Microseismic data analysis to evaluate fracture jobs in unconventional plays.
- Patent-pending Auto-Tracker to reduce manual work picking complex structures.
- Surface Curvature, an edge detection attribute, to help reduce exploration risk.
- Multi-layer Volumetrics to better understand geologic uncertainty.
- Multi-segment Decline Curve forecasts to help accurately estimate reserves.
- Economic Analysis scenarios to help forecast prospect value and return.
- User Security provides project level password control to protect data.

Kingdom Advanced Benefits
- Bring advanced science to every interpreter, not just the specialist.
- Increase productivity through integrated workflows.
- Achieve high performance even in the largest data sets and in the most complex environments.

Geophysical Interpretation – 2d/3dPAK Advanced
Reduce the time between research and finding first oil while minimizing risk by using the industry leader for geophysical interpretation, Kingdom 2d/3dPAK.

Seismic Analysis
- Generate horizons and faults on in-lines, crosslines, arbitrary lines, and slices in both time and depth domains.
- Auto-track horizons on complex seismic data with patent-pending Illuminator technology.
- Produce seismic-based interpretation maps by combined utilization of horizon and fault picking tools.
- Structure and manage projects through user-defined work trees to organize data objects into smaller, more manageable subsets.

Mapping & Gridding
- Edit generated surfaces and grids using the unique graphical feedback displays found in Grid Editor.
- Produce accurate maps quickly with proprietary Flex Grid technology by balancing minimum curvature with minimum tension.

Well Control
- Display borehole and well log information on seismic sections in time or depth.
- Display straight, deviated, and horizontal boreholes and sidetracks.
- Display formation tops interpreted from log curves on vertical seismic displays, and then grid and contour the tops in the project area.

Seismic Data Processing
- Conduct 57 volume computations like Hilbert, Phase Rotation, Instantaneous Phase and Filtering.
- Calculate the survey spectrum and statistics.
- Compute or extract wavelets.

Produce accurate maps quickly with proprietary Flex Grid technology.
Geological Interpretation – EarthPAK Advanced and Geosteering

Make informed decisions and minimize risk with a clear and accurate vision of the prospect. Kingdom EarthPAK enables geoscientists to create presentation quality base maps, cross-sections, and crossplots, and conduct reserves estimations using geological data.

Manage Logs
- Import digital and raster logs. Create digital logs from raster logs.
- Create composite logs to add interpretive lithology and notes in a cross-section.
- Display log curves in structure/stratigraphic cross-sections with shading based on a constant cut-off value, facies log curve, or crossover shading.
- Analyze digital log curves with interactive log editing and log calculators including log statistics, log normalization, and predefined or user-defined equations.

Manipulate Cross Sections
- Generate structural and stratigraphic cross-sections with one-click interactive correlation. Use drag and drop well log correlation within a cross-section.
- Display raster logs in cross-section proportionally or within a specified track.
- Support multiple fault segments in cross-sections, with specified vertical separations.
- Display true vertical thickness for deviated boreholes in the cross-section.

Analyze Production
- Define zones from depth, formation tops, grids, and horizons.
- Calculate cumulative production using field, formation, and completion filters. Post using attribute and bubble maps.
- Calculate zone thickness with measured log, true vertical, and stratigraphic thickness.

Create Great Prospects Displays
- Control posting of well data by a scale-based level of detail (LOD) to increase the performance and avoid cluttering the Base Map.

- Emphasize structure, isopach, and reservoir properties with color-filled contours.
- Increase productivity by recalling work in progress.

Calculate Multi-Layer Volumetrics
- Evaluate multiple reservoirs simultaneously with multi-layer volumetrics.
- Analyze the range and probability of potential reserves with Monte Carlo simulation.
- Measure the impact of individual variables on reserves calculations with sensitivity analysis.

Conduct Multi-Segment Decline Curve Analysis
- Analyze the incremental effect of a workover or recompletion with multi-segment decline curve analysis.
- Model a proposed program by creating manual decline curve segments with user-defined production and decline rates.
- Conduct entity-based analysis by combining multiple wells into group wells.
- Create forecasts combining rate, volume and time limits.

Perform Economic Analysis
- Perform economic analysis linked to production forecasts.
- Accommodate multiple product streams in the analysis.
- Link multiple economic scenarios to a single forecast.

Conduct Quick Look Petrophysics
- Use advanced curve editing utilities like multi-well normalization, multi-well de-spiking, automatic depth shifting, and nearest value blocking.
- Neural network-based utility for the reconstruction of missing or corrupted log curve intervals.

Integrated Real-Time Geosteering
- Auto-generate real time views along the borehole.
- Map referenced and planned wells compared to the drilling well.
- Correlate (both automatic and manual) zone markers.
- Update structural and stratigraphic guiding surfaces to accurately interpret the position.
- Display seismic and/or interpret faults all in a single view.

EarthPAK integrated with seismic, well and log data for a more detailed interpretation.

Monte Carlo Simulation of Volumetric Analysis in EarthPAK.
Multi-dimensional Interpretation – VuPAK Advanced

Make more accurate interpretations and achieve higher productivity, even in the most challenging plays with Kingdom VuPAK.

3D Interpretation
- Interpret and display horizon and fault surfaces and grids with contours.
- Potential drilling targets using the interactive well path planner.
- Interpret horizons and geobodies using Illuminator technology.
- Co-blend multiple attribute volumes to easily identify ge-anomalies.

3D Visualization
- Control opacity, color, and lighting of volumes, horizons, faults, and grids.
- Display culture and log curves with formation tops along vertical and deviated boreholes.
- Rapidly scan volumes using interpreted horizons and co-blending multiple attributes.
- Interactively select subsets of a survey from a base map and view specific areas with zoom-ins while recording for playback.

Microseismic Interpretation
- Matches seismic data interpretation to microseismic events.
- Generates a better understanding of reservoir to well treatments.
- Dynamically updates with user manipulation of microseismic events.
- Includes easy tools to lasso or digitize desired subsets in any view in order to cut or crop points.
- Provides dynamic visualization of microseismic events by any attribute as applied to color, size, and visibility.

Kingdom Geosteering

Kingdom Geosteering enables geologists or geosteering specialists to collaborate with drilling engineers on the well plan before and during drilling. Full integration with the reservoir interpretation provides near real-time correlation of the drilling well to reference well so that the drill bit can be targeted accurately and efficiently.

Benefits
- Increase drilling productivity and accuracy.
- Integrate well data and seismic data to steer the drill bit.
- Improve recovery factor by maintaining wellbore in target zone over very long distances (5k-10k feet) to maximize reservoir contact.
- Reduce and manage costs by monitoring drilling progress against plan, calibrate and project ahead from the real-time bit position.
- Retain knowledge of geological, geophysical and drilling information into the Kingdom project.
- Easy access to desired data to provide driller updates.

Features
- Automatic Log Curve and Deviation Survey Loading.
- Auto-correlate logs for a quick look scenarios.
- Automatic Reference Well / Drilling Well Correlation.
- Fully integrated within Kingdom with access to any and all data in a Kingdom project.
- Geosteering Management for easy access of up-to-date drilling info.
- Utilization of seismic trace data backdrops.

3D Interpretation showing Valley Fill with GR Lathe.

3D Interpretation showing Valley Fill with GR Lathe.

Geosteering for Well Planning fully integrated with interpretation.
Add-On Modules — Not only does Kingdom provide necessary and fundamental interpretation tools but Kingdom also has fully integrated analytical tools that are needed for today’s environments. Kingdom Add-On Modules give you the tools you need to perform in-depth analysis on your projects.

AVOPAK - Interpret Pre-Stack Data
AVOPAK brings powerful visualization and interpretation of pre-stack gather data to the interpretation desktop by generating attributes that can be used to locate hydrocarbon indicators in rock volumes and presenting the gathers in a gallery. Using this gallery, you can dynamically compare gathers to multiple data types such as the stack trace, common offset or angle stack trace, well log curves, synthetics, or extracted seismic sections. This comparison can help reduce risk in prospecting for oil and gas.

• Integrated ability to view, interpret, and analyze pre-stack gathers in 2D and 3D views.
• Condition data and save processing to disk. This includes sorting, dip-based super gathers, flattening on a horizon or velocity, spectral balancing, angle gather generation, and other improved processing capabilities.

Colored Inversion – Seismic Inversion for Every Desktop
Kingdom Colored Inversion is a tool for enabling the interpreter to quickly generate a relative impedance data type for the purpose of more accurate, more confident seismic interpretation. It is a proven technique that is fast and easy to apply to seismic data, yet produces results that match more sophisticated and compute intensive techniques such as sparse spike inversion.

• Bring easy to use seismic inversion to the interpreters desktop.
• Match seismic to well log data within the seismic spectrum to reduce noise and signal instability.
• Quickly process seismic volumes to inversion volumes.

ModPAK - 2D Modeling of Stratigraphic and Structural Changes
In the absence of direct velocity control, ModPAK can automatically convert resistivity or density logs to velocity. For simpler models, blocks can be defined with a constant velocity and density. The time-depth function at each well is interpolated to convert the depth section to time before convolution.

• Interpret surfaces from formation tops or correlate on-the-fly.
• Model faults, channels, pinchouts and facies changes.
• Model onlaps, angular unconformities and reservoir fluid changes.

Rock Solid Attributes (RSA) - Advanced 3D Post Stack Attributes
RSA gives users access to 50+ advanced 2D and 3D post-stack seismic attributes, including curvature, spectral decomposition and similarity (edge detection processing). This capability is fully integrated to create a time-efficient, cost-effective solution for optimizing reservoir assets and increasing well accuracy.

• Curvature attributes indicate the rate of change of surface topology and accent features such as faults and fracture systems.
• Analyze Geometric, Instantaneous, Wavelet, and Spectral Attribute types.
• Detect faults, channels, unconformities, shaling out, and bedding anomalies.
• Attributes can be cross-plotted for in-depth analysis.

SynPAK - Synthetics and 1D Forward Modeling
A key task in working with seismic data is the ability to correlate and tie the seismic to the wells in the survey. SynPAK provides the capability of generating 1D synthetic seismograms from well log data that can be correlated with any survey in a project, allowing for calculating and accurately tying synthetic to actual seismic data. Using SynPAK 1D forward modeling, geoscientists can compare real and synthetic seismic data to make geological inferences from the observed data.

Synthetics
• Edit well logs through stretch/squeeze, bulk shift.
• Generate theoretical wavelets.
• Rotate phase of the data interactively.

1D Lithologic and Fluid Composition Modeling
• Create zone based models of P and S Velocity curves and Density curves.
• Calculate and model porosities or interval thickness.
• Use fluid substitution workshop based on Gassman’s equations.

VelPAK - Convert Seismic to Depth and Create Velocity Models
Depth conversion and velocity modeling can be a time and labor-intensive process that often leaves nagging questions about accuracy. Kingdom’s depth conversion capability, built in partnership with Equipoise Software, Ltd., is designed for all levels of depth conversion- from simple to the most complex. Geoscientists can construct velocity models to predict depth from seismic time.

• Derive parameters for VZ=V0+KZ and many others.
• Extract and smooth interval velocities.
• Produce velocity volumes and write to SEG Y or TDQ formats.
Kingdom Data Management — The Kingdom software solutions are built on open architecture for total database integration. This helps maximize your existing IT investment and historical data - and puts all available information at your finger tips to help your organization make better decisions faster.

Kingdom Data Management provides a full suite of tools that allows geoscientists, data managers, and IT organizations to fully understand, manage and share Kingdom project data.

Kingdom Connect

Kingdom Connect provides user with the ability to connect their Kingdom projects with any OpenSpirit enabled product. This enables the exchange of project information between Kingdom and the OpenSpirit project(s).

Benefits
- Reduces interpreter downtime waiting for data transfers between applications.
- Simple, drag and drop approach to sharing data between Kingdom and other OpenSpirit-enabled applications on the desktop.
- Fully preserved history of data movement.
- Complexities of OpenSpirit are hidden from the user.

Web Services

Kingdom Web Services provides users with the ability to easily manage their culture images/spatial data with a common interface.

Benefits
- Simple interface that allows users to preview all layers in a single UI prior to adding to Kingdom basemap.
- Multiple layers from multiple services can coexist in a single Kingdom session.
- Users can leverage subscription services as well as internal services in a single session.
- Users can add many spatial layers and always have the most up-do-date information without the need to reload data.

Kingdom Connectors - Transfer Data between Kingdom and Other Platforms

Kingdom offers integrated connector technology to ensure harmonious co-existence of data in organizations using multiple interpretation platforms.

Benefits
- Choose best of breed technology while still retaining interconnectivity to existing data sets being managed by other technologies.
- Use native connectors to common platforms.
- Use OpenSpirit enabled connectors to access diverse platforms.

Kingdom Data Management - Manage and Migrate Kingdom Information with Ease

Kingdom Data Management provides a fully integrated platform for proper stewardship of the ever-increasing complexity of data within an organization, allowing users to manage all information across the Kingdom environment. For example, geoscientists can compare multiple projects, query for key interpretation data, convert projects between multiple databases and make unique copies of projects to share with others.

Benefits
- Automatically search networks for Kingdom projects, and inventory data components.
- Use Project Comparison to look for similarities and differences between projects.
- Use Database Conversion to convert projects to and from Access, SQL Server or Oracle.