



IHS Markit™

# Kingdom® Product Summary



## Kingdom Product Summary

BUNDLES AND MODULES	DESCRIPTION
<b>Geophysics</b>	<p>Kingdom Geophysics software is the market leader for geophysical Interpretation. Exploration and field development teams all over the world rely on it to make critical drilling decisions every day. Geophysicists and geologists use the product to complete their day-to-day tasks effectively. Many companies involved in both conventional and unconventional markets choose Kingdom Geophysics to be their primary interpretation package.</p> <p>With Kingdom Geophysics you can:</p> <ul style="list-style-type: none"><li>– Visualize the subsurface in Base Map and Vertical Display windows</li><li>– Perform Horizon Interpretation: manual and auto, patented Seeker and Illuminator technologies, flexible editing tools</li><li>– Pick faults and create fault polygons</li><li>– Perform Contouring &amp; Gridding: create accurate maps of subsurface</li><li>– Create Seismic Attributes: run attributes like Sweetness, Envelope, Instantaneous Phase and other trace calculations</li><li>– Create patented Fault Attributes to uncover discontinuous features in seismic data with a great level of details</li><li>– Take advantage of multi-author collaboration: allow large teams to work in a single project while tracking authorship</li><li>– Work efficiently in time or depth with Dynamic Depth Conversion</li><li>– Directly attach SEG-Y files to multiple Kingdom projects for 2D seismic data interpretation with a lot of flexibility around handling complex survey geometries and avoid data duplication</li></ul>
<b>Geology</b>	<p>Kingdom Geology is the market leader for user friendly, integrated, geological interpretation. This easy to use product provides comprehensive well log correlation, mapping, cross section, production data and volumetrics analysis to unravel the complexities of the subsurface. Tightly integrated with Kingdom Geophysics, the geologist can immediately integrate the geophysical data into a consistent subsurface interpretation to identify oil and gas sweet spots and make better drilling decisions every day.</p> <p>Kingdom Geology:</p> <ul style="list-style-type: none"><li>– Presentation plots with Spatial Explorer including connections to Esri layer based mapping</li><li>– Completion optimization with Frac Explorer</li><li>– Investment made on an integrated GG&amp;E platform</li><li>– Allows structural and stratigraphic interpretations from regional exploration to detailed development – including well planning, steering and field management</li><li>– Supports multiple sections that are easy to create and manipulate for picking formation tops with and without digital and raster logs, 2D and 3D seismic data, perforations, cores, production data, and other borehole information</li><li>– Scalable to very large well data sets</li><li>– Allows posting attributes, bubble maps, culture, log signature maps, and highlight wells using multiple colors and symbols</li></ul>

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	<ul style="list-style-type: none"> <li>- Enables easy creation of structure and stratigraphic maps with contours using highly performant and accurate algorithms such as Flex Gridding</li> <li>- Build multiple structure and thickness maps that honor geological framework rules with a single click of a button transforming mapping to an entirely new level of efficiency</li> <li>- Geologists can now access seismic data</li> <li>- Allows to incorporate seismic data from time to depth using Dynamic Depth Conversion</li> <li>- Innovative Geosteering enables integrated workflows across the entire asset team for better decision making</li> <li>- Supports multi-author collaboration allowing large teams to work in a single project while tracking authorship and updates</li> </ul>
<p><b>VuPAK</b></p>	<p>VuPAK is a 3D visualization and interpretation tool that is fully integrated within Kingdom Software. VuPAK allows geoscientists to perform data analysis from 3D perspective from regional to the basin scales by allowing users to work with multiple surveys and data volumes (both post- and pre-stack seismic) in the same 3D display window as well as project wells, formation tops and logs.</p> <p>The key features include:</p> <ul style="list-style-type: none"> <li>- 3D visualization of both 2D and 3D seismic data using multiple animation modes</li> <li>- Display and manipulate geological cross sections, create fence diagrams</li> <li>- Perform geological interpretation by utilizing Unit Fill Modeling functionality</li> <li>- Visualize multiple surveys and data types in the same 3D display window</li> <li>- Horizon interpretation in 3D space: manual, auto and voxel-based.</li> <li>- Fault surface interpretation: vertical (both seismic and cross sections) and/or z-slices</li> <li>- Display grids and contours, wells and well data: tops, logs (including the lathe option), perforations and completion intervals, display and edit control point sets</li> <li>- Opacity and color histogram, data co-blending</li> <li>- Highlight special features using 2D crossplot</li> <li>- Record VuPAK movies in AVI format</li> <li>- Microseismic data analysis and display of AVO attributes</li> <li>- Integration across Kingdom modules, including the Dynamic Map Update</li> </ul>

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<p><b>Microseismic</b></p>	<p>Microseismic comes with VuPAK Advanced and is integrated with all of the Kingdom interpretation objects provides a platform for petrophysicists, reservoir engineers and the geoscientist to work together to analyze microseismic and treatment data in an integrated, collaborative environment facilitating improved effectiveness of fracture treatments, optimal well placement, and ultimately, enhanced oil and gas production.</p> <p>The use of passive seismic to monitor existing production also benefits from this integration and assists the reservoir engineer and geoscientists in making key decisions regarding possible injection well placement and field enhancement techniques to minimize passed over reserves.</p> <p>The key features are:</p> <ul style="list-style-type: none"> <li>- Visualization, and interpretation in time or depth display for any 2D or 3D survey loaded into Kingdom</li> <li>- Correlate Fracture Treatment curves with microseismic events.</li> <li>- Utilize very large well data sets</li> <li>- Import ASCII files or Excel spreadsheets (.xlsx files)</li> <li>- Animate Treatment curves and use as a filter on the microseismic data</li> <li>- Generate multiple attributes as defined by users</li> <li>- Analyze Microseismic and Treatment curve data using histograms, crossplots, and data spreadsheets</li> <li>- Export Microseismic data and results to Excel spreadsheets for custom work.</li> </ul>
<p><b>Geosteering</b></p>	<p>Geosteering comes with Kingdom Geology/Advanced enables geologists or geosteering specialists to work quickly in correlating the drilling well with the selected reference well so that the drill bit can be targeted accurately and efficiently. With Geosteering, you can select a planned borehole and show it in a vertical display, mirroring the drilling wells deviation survey. It is also possible to select a drilling well and display it in a vertical view. Log curves can be shown along the drilling wellbore. As the drilling progresses, the incoming updates can be automatically loaded to the drilling well. These incoming update segments are correlated with a user selected reference well log curve. With this action the geologists are able to ‘track’ the drilling borehole in relation to the target geologic interval. The engineer can then determine if the drilling path needs to be adjusted: Add or Drop angle to point the drill bit up or down.</p>
<p><b>AVOPAK</b></p>	<p>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. AVOPAK is fully integrated with Kingdom for AVO analysis and interpretation in both 2D and 3D seismic data and brings pre-stack interpretation and analysis to the interpreters desktop.</p> <p>Some of the functionality provided includes:</p> <ul style="list-style-type: none"> <li>- Interpretation in time or depth on pre-stack data for any 2D or 3D survey loaded into Kingdom</li> <li>- Interpret pre-stack horizons using manual and auto tracking capabilities.</li> <li>- Utilize very large well data sets</li> <li>- Display gather data, log curves, synthetic seismograms, multiple stacks or sub-stacks, and AVO attributes</li> <li>- Generate regional AVO attribute horizons or volumes</li> <li>- Condition pre-stack data using a user friendly, well documented, workflow based set of processes</li> <li>- Multi-author Collaboration: allow large teams to work in a single project while tracking authorship.</li> </ul>

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<b>Seismic Inversion</b>	<p>Seismic Inversion consists of multiple inversion capabilities which include the Colored and Seismic Annealing Inversion algorithms. Colored Inversion is a proven technique that is fast and easy to apply to seismic data, yet it produces results that match more sophisticated and compute intensive techniques such as sparse spike inversion. Kingdom Colored Inversion matches the well character within the seismic bandwidth and automatically performs phase correction, thereby minimizing the risk of interpreting incorrect or unwanted seismic events and improving the speed and accuracy of the interpretation. This increase in interpretation efficiency easily offsets the time spent creating the inversion data.</p> <p>Simulated Annealing Inversion requires further analysis by the user, with more complex inputs. However, relative to many other inversions on the market it is still easy to parametrize and run. As a technique it is also robust and less prone to unintentional bias than other inversions. Simulated Annealing can generate both relative and absolute impedance volumes, of value to both the seismic interpreter and petrophysicist alike.</p>
<b>Rock Solid Attributes*</b>	<p>Kingdom's Rock Solid Attributes (RSA) module 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 with the Kingdom platform to create a time-efficient, cost effective solution for optimizing reservoir assets and increasing well accuracy.</p> <p>The following Attribute Categories are provided within RSA:</p> <ul style="list-style-type: none"> <li>- Instantaneous Attributes</li> <li>- Wavelet Attributes</li> <li>- Geometric Attributes</li> <li>- Spectral Decomposition</li> <li>- Time and Depth (Frequency and Wavenumber) domains are supported</li> </ul>
<b>GeoSyn</b>	<p>GeoSyn is a cost effective 1D and 2D modeling tool designed to be used by geoscientists who want to bring geology into seismic interpretation. The ability to generate 1D synthetics, do AVO analysis and create 2D models is enhanced by the ability to edit and model the original log data allowing a better tie with the seismic and try “what if’s” to better understand your geophysical interpretation.</p> <p>GeoSyn is a state of the art 1d and 2d synthetic modeling package. It is standalone and can be run with any other software package. It is integrated into IHS Petra and IHS AccuMap products and is currently being integrated into Kingdoms Geophysics. As an integrated package, GeoSyn reads key information directly to and from the project database and can be started from within the Kingdom and Petra applications. It also will read and write LAS and SEG Y Files, Tops and wavelets. GeoSyn 1D will generate a variety of models that will benefit the geoscientist including normal incidence synthetics, filter panels, and pre-stack gather models. The interface is easy to use and extremely user definable. Multiple templates can be created by the user to define their desired formats. GeoSyn 2D provides an easy way to generate standalone or well based cross section models in depth and then see the seismic response immediately in time or depth. The user can quickly and easily generate simple or complex structural and stratigraphic models. Tools are available to allow easy and accurate editing of log data. This allows for minimal need to stretch and squeeze, and provides cleaner and more accurate 1D and 2D Models. A Time Depth Chart editor allows you to select and modify any existing Time Depth Chart in the project Database Log calculators exist with a large library of pre-existing formulas to generate new logs as needed. Users may also add equations to this library.</p>

\*Rock Solid Attributes™ is a trademark of RDSP I, L.P. Solid Attributes™

## BUNDLES AND MODULES

## DESCRIPTION

### VelPAK

VelPAK brings advanced depth conversion to the Kingdom software where Kingdom's Dynamic Depth Conversion cannot handle the structural complexities of the geologic reservoir. Accurate depth conversion is essential to convert time domain seismic interpretation into the depth domain, from which reserves estimations and accurate drilling plans can be made. VelPAK maximizes all the available velocity data (from wells and seismic velocities) to build a velocity model that honors the data. VelPAK Risk Reduction tools enable the user to get derive probability distribution functions (P90/P50/P10) of Gross Rock Volume, probability of closure maps and spill point analyses. Log scale detail can be added to existing velocity volumes (generated by VelPAK, Kingdom Dynamic Depth Conversion, or imported from the seismic processor) adding immense value for purposes such as quantitative reservoir characterization, pore pressure prediction and seismic inversion studies. Unique features, such as the patented numerical optimization for the determination of best fit parameters, and multi-z interpretation depth conversion, and most importantly the "no black box" philosophy, make VelPAK best in class for depth conversion software. VelPAK provides a complete solution that satisfies the depth conversion needs of seismic interpreter and geophysicist.

VelPAK main features include:

- Kingdom database integration enables rapid incorporation of well log velocities, time-depth curves, event & fault interpretation and seismic velocities into a consistent velocity model
- Supports a wide range of industry standard depth conversion methods, which can be extended or adapted to the specific project requirements
- Risk Reduction tools enables multiple realization of depth conversion using a Monte Carlo approach to give an estimate of P90/P50/P10 volumetrics
- Extensible workflow system allows for rapid model construction & updating
- Seismic velocity data can be smoothed and calibrated accurately to well data for control away from well locations
- Unique ability to generate pseudo-well from seismic stacking velocities for spatial velocity control and data cross-validation
- The Hi-Def Velocity tool adds detail to existing velocity volumes, adding
- Unique numerical optimization technique to derive best parameters for many depth conversion methods

## Geoscience Bundles - All the technology you need at one low price

	Geophysics	Geology	VuPAK	AVOPAK	Rock Solid	1D Synthetics (GeoSyn 1D)	2D Seismic Petrophysics (GeoSyn 1D)	Geosteering	Microseismic	VelPAK	Inversion
<b>Kingdom Geoscience</b>	X	X	X	X	X	X	X	X	X		
SME	X	X	X	X	X	X	X	X	X	X	X
Unconventional Interpreter	X	X	X			X		X	X		
<b>Kingdom Geophysics</b>	X		X			X	X		X		
Express+	X		X			X			X		
Express	X		X						X		
+ AVO & RSA				X	X						
+ AVO, Attribute & Inversion				X	X						X
<b>Kingdom Geology</b>		X	X					X			

## Kingdom Module Summary

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<b>Kingdom Gateway plug-in for Petrel* software</b>	Kingdom Gateway provides a direct data connection between Kingdom and Petrel. The Gateway uses simple drag-and-drop functionality to allow users to easily perform their interpretation in Kingdom and “send” the results to Petrel for geo-cellular modeling workflows
<b>Kingdom Connect</b>	<p>Kingdom Connect provides seamless data sharing with any OpenSpirit enabled 3rd party application. Providing integrated connector technology through Kingdom Connect and OpenSpirit ensures harmonious co-existence within organizations using multiple interpretations and mapping systems.</p> <p>Leveraging Kingdom Connect, users are able to perform their daily interpretation and analysis in Kingdom and easily share the data with additional modules while still retaining interconnectivity to existing data sets being managed by other platforms.</p>
<b>Kingdom Data Management</b>	<p>Kingdom Data Management provides a full suite of tools that allows geoscientists, data managers, and IT organizations to fully understand and manage the Kingdom project environment. Data Management staff can locate and inventory all projects across the enterprise. This inventory may then be used to generate reports, QC data loads and correct erroneous data entries.</p> <p>Project comparisons allow users to determine data overlap between projects. Kingdom data can be transferred between projects consolidating information and promoting a clean environment. In addition, seismic data files may be centralized on a shared server and linked to multiple projects.</p> <p>Project conversion tools allow staff to make Oracle or SQL Server projects portable in SQL Server Express, or project copies may be created to share with partners.</p>

\*is a mark of Schlumberger

## Kingdom Service Offering Summary

SERVICE OFFERING	DESCRIPTION OF SERVICES
<b>Public Training</b>	IHS Markit offers comprehensive, effective and quality training courses to geoscientists and geophysicists all over the world. Our goal at IHS Markit is to educate within the industry and provide a solid foundation for Kingdom software use. Training courses are a cost effective and efficient way to get up to speed on industry applications and are globally available on a periodic basis.
<b>Private Training</b>	Similar to the public training described above, but personalized classroom training designed specifically for your organizational needs, at your location. Customer supplies the facilities and the hardware, IHS Markit provides the Software and the Trainer.
<b>On-site Mentoring</b>	IHS Markit offers hourly/daily consulting while running Kingdom live on your project data.
<b>On-site IT Support</b>	IHS Markit consultants will analyze and resolve problems resulting from poor network or workstation performance, improper IHS Markit project management, and/or operating system issues.
<b>Geo Tech Services</b>	IHS Markit consultants will provide onsite and/or remote data management services relating to Kingdom projects and other G&G application needs.
<b>Technical Account Manager</b>	IHS Markit offers dedicated and/or shared onsite and/or remote services to manage technical support issues, mentoring on the use of Kingdom, data management issues, and other best practices relating to maximizing usage and your investment in Kingdom applications.
<b>QuickStart</b>	The QuickStart program offers experienced consultants to assist in the rapid staging and rollout of your new Kingdom environment. QuickStart is designed to help you avoid pitfalls and delays as you prepare an efficient path of software implementation, data preparation and exploration.
<b>HealthCheck</b>	The HealthCheck program offers experienced consultants to review and optimize your Kingdom project environment to the most out of your IHS Markit software investment. HealthCheck is designed to help you target areas of underutilized functionality, or to rapidly deploy changes to your Kingdom installation to improve user satisfaction, data security and overall Kingdom performance.
<b>Kingdom MyAccount</b>	When you become an IHS Kingdom user, you gain access to so much more than just software. With Kingdom MyAccount, you have access to a one stop portal for support, our knowledge base of help resources, software updates, and training.

For more information [www.ihsmarkit.com](http://www.ihsmarkit.com)

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## About IHS Markit

IHS Markit (Nasdaq: INFO) is a world leader in critical information, analytics and solutions for the major industries and markets that drive economies worldwide. The company delivers next-generation information, analytics and solutions to customers in business, finance and government, improving their operational efficiency and providing deep insights that lead to well-informed, confident decisions. IHS Markit has more than 50,000 key business and government customers, including 85 percent of the Fortune Global 500 and the world's leading financial institutions. Headquartered in London, IHS Markit is committed to sustainable, profitable growth.