IVAAP (Enterprise Subsurface Data Visualization Platform)

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E&P Data Visualization Workflows Supported

G&G (Geology and Geophysical)

- Visualize and interact with Seismic and Well data (seismic volume, horizons, faults and well log, well trajectories and tops)
- Visualize multi-well tops correlation
- Web portal to access and visualize geo-referenced G&G data
- Map Search & filter of G&G data and visualize Wells, Seismics documents and other G&G data iinto predefined dashboards
- Support for ArcGIS layers and features
- User based workflow integration for processing and Machine Learning

Drilling

- Monitor real-time drilling data by streaming from WITSML server (1.3.1, 1.4.1)
- Geosteering workflow
- Combine seismic and well data views
- Connect and visualize 3rd party scientific drilling engines with Well Data (drilling string mechanics, torque and drag, vibration motors....)
- Display directional data (actual versus planned trajectories)
- Display BHA data and schematics from external database (Peloton, WITSML...)
- Monitor NPT (Non Productive Time) and rig activity

Wireline

- Conduct Quality Control (QC) on log data
- Visualize formation evaluation
- Combine displays log data, directional, lithologies, formation tops
- Monitor in real-time wireline data

Completion

- Run casing monitoring
- Display well schematics—plan vs. actual

Production

- Monitor multiple individual well parameters connecting to external production data servers (OSIsoft server)
- Display and monitor sensors, captors and equipment data from SCADA systems
- Provide alarm messages for abnormal conditions
- Control real-time opening and closing valves
- Analyze declination curves—plan vs. actual
- Visualize break-even point
- Automated reporting capabilities

Interactive Visualization

Generic

- Responsive web design interface
- Interactive docking framework (dashboard organization by users)
- Interactive visualization manipulation (pointing, clicking, selecting, dragging, dropping)
- Touch screen support
- Visual/gestural manipulations: multitouch operations such as pinch and zoom, rotate, and flick. 3D visualization rotation by three (x, y, z) axes.
- Dashboard and Template system with sharing capability
- Capability to publish a dashboard and share it with other users
- User driven Dashboards templates management (save, restore)
- Synchronization between charts
- Access to math engine (integrate with external math engine or use internal formula engine)
- Formula macros: Moving Average, Despiking, Lower Despiking, Fill Gaps
- Real-time visualization refresh screen
- Rich chart editing with formatting options
- Global data search
- Global data filtering or per data set
- Thumbnail preview for patterns
- Conditional formatting
- Printing capability with PDF report generator
- Coordinate system transformation

Navigation Features

- Show/hide data tree
- Dark UI mode
- Favorites, Recents, Home, Dashboard pages
- Right side menu to access State definition, formula editing, themes and publishing

Home page

- Home page Map Centric, Well Centric, or Dashboard Centric
- Shared dashboards with users or groups
- Search, list of dashboards
- Dashboard menu options available from thumbnail and dashboard list NEW
- Thumbnails of most recent dashboards and dashboard templates
- Access to most recent projects from Home page
- Map page accessible from the navigation bar with search and filtering options
- Create and update projects using maps

Dashboard Page

Data Tree

- Data tree access to Project data, dashboards and templates
- Quick access to project content
- Collapse data tree
- Manage and share dashboards
- Manage and share templates
- Group data sets by categories
- Shows widget type as title after widget creation
- Set interval for data requests
- Access to metadata information (for well metadata)
- Support floating toolbar in publish mode
- Project content updated automatically
- Delete top and top set from data tree
- Delete formula curves
- Color well icon by group

Visualization Area

- Organize chart widgets using the docking framework
- Custom widget grouping
- Add a new row of widgets
- Full screen widget
- Move widget
- Split area horizontally or vertically
- Display metadata into widget title
- Tooltip displayed on active widget only
- Notification dialog for errors, warnings, and process status
- Theme manage globally or locally inside a widget

Toolbar

- Quick access to widget functionalities
- Quick access to object properties
- Quick access to tools
- Quick access to data filtering
- Quick access to shortcut
- Quick access to processor
- Dashboard name visible into the navigation bar

Types of Visualization

Well Log

Support for Single Data, Multi-Data, Multi-Parent mode
Time or Depth indexed data
View log curve / array curve / discrete curve
Array log vertical interpolation
State definition support for annotation curve
Display log curve line / symbol / value with micro-positioning
Display log fill between curves / track borders / base lines with gradient
Display lithologies
Display annotations
Display stacked curves
Display tops
Display schematics
Display perforations
Display casing
Display Open Hole section
Display interval curve
Converts curve to logarithmic automatically when adding to a logarithmic track in WellLog widget
Support for annotation curve editing
Combined display (log, mudlog, trajector, schematics, images) synchronized while switching well
Real-time mud log
Switch main index
Follow real-time updates
Support real-time updates with ascending or descending depth index
Support multi-datasets
Support vertical / horizontal orientation
Discrete editing
Top editing
Annotation curve editing
Support for tadpole
Support state definition for symbol color filling
Manage order in curves displayed in track
Shortcut to favorite templates
Curve dictionary and Curve aliases support
Autofit to quickly scan multiple wells
Scale visible in the header of index track (optional)
Scroll bar position save/restore
WellLog widget header (PDF printing)
Export to PDF with interval settings
Support for footer
Curve value tooltip at cursor position

Well Section

Display vertical fence along a well trajectory in TVDSS versus Measured Depth
Option for project ahead trajectory display
Display seismic background
Display well log template
Display well tops

Correlation Display

Add/remove wells and wellbores
Apply well log template
Zoom in/out individually or all wells
Scroll up/down individually or all wells
Reset well position
Synchronize spacing between wells
Apply well log template
Horizontal scale
Add/remove tops
Top editing
Save tops to database
Raster log support
Supports horizontal scales
Switch raster log
Switch log
Curve dictionary and curve aliases support
Create correlation fence from Correlation widget and edit in Map widget
Interval name in top state definition
Shortcut to favorite templates
Ghost curve support
Flatten on top
Flatten on index value
Align Wells to top or bottom measure depth
Definition for colors and pattern created from displayed tops
Print to PDF

Map

Support for Web Map Tile Service (WMTS): Google, Bing, OpenStreetView...
Support for GeoJSON
Support for multiple feature layers
Support for ArcGIS feature layer
Support for multiple ArcGIS servers
Support for Bing Aerial Maps
Support for search directly through data store
Display seismic lines
Display welllhead location
Display and edit well correlation fence
Select seismic line and wells
Individual or area selection
Metadata for selection object displayed on map
Interactive well grouping on map

3D View

Display 2D seismic, inline, crossline, time slice, arbitrary line
Display multiple inlines, crosslines and time/depth slices
Display surface map
Display horizons
Display faults and fault sets
Display reservoir grid and properties
Support state definition on reservoir data
Display wellhead
Display well tops
Display correlation fence
Display trajectory fence
Display trajectory line
Display trajectory tube
Display survey stations
Display curve tube
Display cylinder log
Display plane log
Drag & drop multiple objects from the data tree
Use state definition on curve tube, cylinder log and plane log
Display point set data with symbol color and size based on properties values
Display intersection between inlines/crosslines and horizons, surfaces, faults, triangle mesh, reservoir
Highlight selected object
Apply property change to current object or all same objects
Trajectory vertical elevation support

3D crosshair with projection on 2D plans
Switch between free camera and follow cursor mode
Synchronize cursor tracking with 2D Seismic widget
Option from time slice compression
Support for AGC noise reduction
Support data with no CRS
Seismic support for transparency
Support for contour lines on horizons and gridsurfaces
Support for well casing, casing shoe, tubing, perforations
Synchronize well cursor with Schematic widget
Synchronize cursor between seismic volume and Basemap widget
2D Seismic
Display inline, crossline, horizons
Quick access tool bar for inline and crossline selection and navigation
View SEG-Y / SU / SEP / JavaSeis / ProMAX / SEGD / SEG2 / OpenVDS
Support seismic compression
Navigate seismic survey
Display wiggles
Display variable and interpolated density
Display positive and negative fill with solid color or gradient
Reverse polarity option
Reverse gradient option
Display gaps in seismic profile
Display EBCDIC information
Binary/EBCDIC copy to clipboard NEW
VDS 2D dataset support NEW
Header information dialog
Apply Filter / AGC / Reverse processors
Fault display support
Fault editing
Create Fault set
Support for overlay display
Report
Display report template
Support for tables and metadata
Spectrum
Analyze seismic data spectrum
Compare multiple parts of data in one chart
Support both time domain and depth domain data
Switch between analysis modes: Amplitude, dB Linear, Phase, Wrapped Phase, Power
Apply Filtering / Windowing / Smoothing / Phase Trend Removal processors
Drilling Status
Display real-time BHA position
Zoom in and out
Select among pre-defined BHAs
Schematics
Display schematic data
Support for casing, tubing and BHA
Animated BHA (fluid, debris...)
Support for perforations
Cursor tracking with WellLog
Display Open Hole section
Display deviated schematics
Tracking with 3D widget
Tabular version display in table widget
Scatter Plot / Cross-plot
Support third dimension using gradient color or state definition
Curve dictionary and Curve aliases support
Support for regression line linear and non-linear
Cross-hair in color bar
State definition support
Filtering content based on state definition
Discrete editing
Export to PDF
Time Series Chart
Support for Single Data, Multi-Data, Multi-Parent mode
Display one or multiple time series
Support for color filling between series
Support for state definition
Support for real-time
Support for table data
Support for Annotations
Support for Perforations
Support for logarithmic mode
Bar Chart
Range support for tabular data
Lock on name for tabular data
Accumulation mode
Display discrete curve
Line display option with show / hide markers
Support for continuous curve with state definition
Support for table data
Support for real-time update
Basemap
Display seismic slices, inline, cross-lines
Display horizons, gridsurfaces, triangle mesh, faults
Display reservoir layer
Display well locations, well trajectories
Drag & drop multiple objects from the data tree
Support for contours
Support for transparency
Export to PDF
Pie Chart
Support for tabular data NEW
Lock on name for tabular data NEW
Multi series support for tabular data NEW
Cursor tracking for tabular data NEW
Display discrete curve
Support continuous curve with state definition
Support for real-time update
Line Chart
Lock on name for tabular data NEW
Range support for tabular data NEW
Cursor tracking
XY line chart with option for markers display
Support for multiple data series
Display mode for Single Data, Multi-Data or Multi-Parent
Support for multiple axis
Support for annotations
Curve dictionary and Curve aliases support
Multi-data set and multi-parent support for logs
Option for tracking along wellpath in 3D View widget
Histogram

Analyze seismic data distribution
Support frequency types: absolute, normalized, relative
Export to PDF
Curve dictionary and Curve aliases support

Table View

View log curve
Support multi-datasets
Follow real-time updates
Support for state definition
Lock on name NEW
Create State definition from the widget NEW
Customize column (filter, align) NEW
Support for header wrapping
Support for column sorting
Ablity to hide Title NEW
Fit Column to the width of the widget NEW
Improve template saving NEW
Supports formatting for each column
Display top set table
Support cell wrapping
Optimized default column width

Pivot Table

Display pivot table
Calculate statistics
Aggregate table data

Spreadsheet Table

Display table data
Support multiple spreadsheets
Curve dictionary and Curve aliases support

Value Tracker

View log curve value
Support multi-datasets
Support and follow real-time updates
Support for state definition
Curve dictionary and Curve aliases support

Report

Custom created reporting dashboard

Gauge

Support for real-time updates
Support for visual alarms
Gauge type Tracking NEW
Gauge type Tracking Bar
Gauge type Digital
Gauge type Full Circular
Gauge type Half Circular
Gauge type Quarter Circular
Gauge type Multiple Tracking
Gauge type Vertical / Horizontal Bar
Gauge type Real-time gauge used to display activity status
Curve dictionary and Curve aliases support

Statistic

Support multi-datasets
Curve dictionary and Curve aliases support

HTML

iframe support
Time or Depth indexed data
Support switching between well and wellbore

Title Widget

Display data set name
Display real-time status
Option for free text
Support for metadata keywords

Image Widget

Display PNG, JPEG and TIFF files

Diagram Widget

Display SVG file
Support for simple animations
Support display curve values updated with cursor position or real-time
Support for state definition

Platform

HTML5 (JavaScript) based client
SDK based workflow integration for Machine Learning
Cross-platform desktop, tablet, mobile support
Cross-browser IE11+ / Chrome / Firefox / Safari / Mobile Safari
White label / branding support
Help system
Highly scalable
Micro-services architecture
Real-time support / acquisition live status determination / near real-time (1s)
Math engine / expression based math solver, statistical functions
Plug-in support for customer processes
Software development kit (SDK) for custom connectors
Software development kit (SDK) for frontend developments
Data Versioning
Annotations
Support for global mnemonics, aliases, units of measure and conversion
Use of Apache SIS for CRS transformations
Resilient and fault-tolerant
Importer/loader for Excel and CSV file

Extensibility (add contextual menus, launch scripts, create own plugins and workflows, public Java API...), embeddability
Support for Seismic indexing for Azure Blob Storage seismic (and soon AWS S3)
Support of OSDU M8
Support for OpenEarth
Support for MinIO and Cloudian storages

Data Management

Connectors

MongoDB
NoSQL
OpenEarth
INTGeoServer
INT Geofiles
SQL
Peloton
WITSML (data streaming directly into WITSML server)
OSIsoft
Relational Query Access
PPDM
ArcGIS
Amazon AWS S3
Microsoft Azure Blob Storage
Google Cloud Data Storage
EIA (US Energy Information Administration)

MinIO
Cloudian
CosmosDB

File Formats Supported (Extensible)

Seismic: SEG-Y, SEG-D, SEG-2, INT Indexed XGY, SU, INT Indexed SU, SEP, OpenVDS, JavaSeis, Promax, Indexed Promax, CST, Indexed CST
Grid Surface: Open Works, Petrel, Global Mapper, ASCII R5000/OSDU, GeoCraft, Kingdom Horizon, XYT
Horizon: IXTA, INT XML Horizon, ASCII R5000/OSDU
Fault: INT ASCII Fault, ASCII OSDU, Petrel ASC, Kingdom Fault
Point Set: INT ASCII PointSet, INT XML PointSet
Reservoir: RESQML, Eclipse ASCII Grid
Triangle Mesh: GOCAD/TSURF, XYZ, Petrel DAT
Cultural Data: PNG, JPG, GIF, SVG, TIFF
Tops: ASCII
Well Data: LAS 2.0, LAS 3.0, DLIS, ASCII
Well Survey: ASCII
Well Document: PDF
Diagram: SVG

Objects Supported

Static and real-time data
Well log curve (single and multi-value)
Well tops
Well Lithology and Annotation
Well documents
BHA, Schematics, Completion, Casing, Perforations (SVG, CAD)
Seismic inline, crossline, time slice
Seismic geometry: Prestack, volume, 2D lines
Horizons, Faults
Grid surfaces
Reservoir grids
Point Set
Time series data, OSIsoft tag
Table, SQL queries
WITSML 1.3.1 and 1.4.1 objects (Well, Wellbore, ChangeLog, Log, Message, MudLog, Risk, Trajectory, Tubular, WbGeometry)

Security / System Management

User Management / Preferences

Manage domains, groups and users
Manage data access permissions
Manage connectors and queries
Manage projects
Manage dashboards and templates
Manage domain resources (pattern files, audop files, templates,, map services)
Manage sharing between users and groups
License management

Admin

Import files (CSV, LAS, ASCII, WITSML)
Import wellhead information
Import formation tops
Import new users list NEW
Import curve, curve alias, and unit dictionary NEW
Import schematics dictionary
Import raster files NEW
Import JPEG, PNG and SVG files
Import pointset data
Import by reference for well documents, LAS, grid surfaces, point set, horizons
Time zone support for CSV NEW
Added date/time services to the table NEW
Server pagination for Users, Groups, Projects NEW
Active / Deactivate users in bulk
Share and copy templates to groups NEW
Share state definitions and formulas
Manage cloud services
Seismic cloud indexer

Security

Authentication (Single Sign-on, SSL)
SAML support
Authorization
Encryption
Usage monitoring, auditing
Auditing support

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