IVAAP 2024

Features and Architecture Overview

E&P Data Visualization Workflows Supported

G&G

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

Support for dynamic range intervals

Map Search & filter of G&G data and visualize Wells, Seismics documents and other G&G data into predefined dashboards

Support for ArcGIS layers and features

User-based workflow integration for processing and Machine Learning

Support for Shapefiles and GeoTIFF files

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

Decline curve analysis

Visualize break-even point

Automated reporting capabilities

Drilling

Monitor real-time drilling data by streaming from WITSML server (1.3.1, 1.4.1)

Support for WITSML 2.0 (for historical data)

Geosteering workflow

Connect and visualize 3rd party scientific drilling engines with Well Data (drilling string mechanics, torque and drag, vibration motors....)

Combine seismic and well data views

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

Support for WITSML 2.0

Support for WITSML 1.4.1 over ETP 1.1

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

Display perforation intervals

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 dashboard 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

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

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

Navigation

Show/hide data tree

Dark UI mode

Favorites, Recents, Home, Dashboard pages

Access State definition, formula editing, themes and publishing

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

Data tree organization using labels

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

Export dashboards as PNG

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 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

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

Title Widget

Display data set name

Display real-time status

Option for free text

Support for metadata keywords

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

Histogram

Analyze seismic data distribution

Support frequency types: absolute, normalized, relative

Export to PDF

Curve dictionary and Curve aliases support

Support for State definition

Report

Display report template

Support for tables and metadata

Custom created reporting dashboard

Image Widget

Display PNG, JPEG, and TIFF files

INT

Empowering Visualization

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Features and Architecture Overview

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
- Display raster files
- Display stacked pattern curves
- Converts curve to logarithmic automatically when adding to a logarithmic track in WellLog widget
- 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
- Curve editing
- Top editing
- Annotation curve editing
- Lithology 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
- Filter objects displayed into the tracks
- Display line color using state definition
- Change order of the objects displayed into a track
- Support Cutoff mode
- Support multiple index with different unit
- Drag & drop log display all curves
- Support for dynamic range interval

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
- Support Shapefiles, GeoTIFF and well symbols

Line Chart

- Lock on name for tabular data
- Range support for tabular data
- 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
- Ability to move annotations
- Manage display order of data series

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
- Calculate reservoir volume of visible cells
- Reservoir properties visible into the data tree
- Reservoir properties to support logarithmic mode
- Filter reservoir on multiple properties
- Seismic support for ZFP compression

Correlation

- 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
- Switchindex between MD, TVD, TVDSS
- Support Top unconformity
- Dispay well group in well header
- Support for proportional distances between wells

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

Statistic

- Support multi-datasets
- Curve dictionary and Curve aliases support
- Support for Dynamic Range intervals

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
- VDS 2D dataset support
- Header information dialog
- Apply Filter / AGC / Reverse processors
- Fault display support
- Fault editing
- Create Fault set
- Support for overlay display
- Support for ZFP compression
- Support different scales between inline, crossline, slice

Gauge

- Support for real-time updates
- Support for visual alarms
- Gauge type Tracking
- 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

HTML

- iFrame support
- Time- or Dept-indexed data
- Support switching between well and wellbore

Table View

- View log curve
- Support multi-datasets
- Follow real-time updates
- Support for state definition
- Lock on name
- Create State definition from the widget
- Customize column (filter, align)
- Support for header wrapping
- Support for column sorting
- Ablity to hide Title
- Fit Column to the width of the widget
- Improve template saving
- 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
- DIsplay Shapefile and GeoTIFF in tabular form
- Drag and drop a log displays all curves
- Support for Lock on Type
- Support for duplicated curve names
- Support search for specific depth index
- Ability to search for curve values
- Ability edit curve value
- Ability to delete multiple rows of a log

Diagram Widget

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

Empowering Visualization

IVAAP 2024

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Types of Visualization

Scatter/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
- Highlighting based on basemap polygon
- Support for interval data as Z axis
- Support for horizon attributes
- Support for Dynamic Range intervals

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
- Drag and drop log displays all curves
- Change display order of data series

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
- Support for Dynamic Range intervals

Basemap

- Display seismic slices, inline, cross-lines
- Display horizons, gridsurfaces, triangle mesh, faults
- Display reservoir layer
- Display well locations, well trajectories
- Drag and drop multiple objects from the data tree
- Support for contours
- Support for transparency
- Export to PDF
- Support for Shapfiles
- Support for GeoTIFF
- Seismic support for ZFP compression
- Display correlation fence lines
- Display 2D seismic lines
- Create and edit arbitrary lines
- Support for well symbols
- Reservoir property support for logarithmic mode
- Support editing order of displayed objects
- Support for polygon
- Support for reservoir compression

Pie Chart

- Support for tabular data
- Lock on name for tabular data
- Multi series support for tabular data
- Cursor tracking for tabular data
- Display discrete curve
- Support continuous curve with state definition
- Support for real-time update
- Support for Dynamic Range intervals

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
- Data versioning
- Annotations
- Resilient and fault-tolerant
- Plug-in support for customer processes
- Software development kit (SDK) for custom connectors
- Software development kit (SDK) for front-end development
- Support for global mnemonics, aliases, units of measure and conversion
- Use of Apache SIS for CRS transformations
- 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 and AWS S3
- Support for OSDU
- Support for OpenEarth
- Support for MinIO and Cloudian storages

Data Management

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)

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

Connectors

- OSDU
- MongoDB
- PPDM
- OpenEarth
- INTGeoServer
- INT Geofiles
- SQL
- NoSQL
- Peloton
- WITSML (data streaming directly into WITSML server)
- OSIsoft
- Relational Query Access
- ArcGIS
- AWS S3
- Microsoft Azure Blob Storage
- Google Cloud Data Storage
- MinIO
- Cloudian
- CosmosDB

Security/System Management

Admin

- Import CSV, LAS, ASCII, WITSML files
- Import wellhead information
- Import formation tops
- Import new users list
- Import curve, curve alias, and unit dictionary
- Import schematics dictionary
- Import raster files
- 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
- Server pagination for Users, Groups, Projects
- Added date/time services to the table
- Activate/deactivate users in bulk
- Share and copy templates to groups
- Share state definitions and formulas
- Manage cloud services
- Seismic cloud indexer

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, audio files, templates, map services)
- Manage sharing between users and groups
- License management

Security

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

Empowering Visualization