

Version 2.0 of our software is a significant upgrade for both p:IGI+ and Metis. It is a strongly recommended upgrade, that involves significant changes to the underlying data storage, offering the opportunity to further improve things moving forward.

The changes made require a 'migration' of existing projects and databases to the new format (preserving the original .pigi / .Metis file). The process to migrate older projects to version 2.0 will begin automatically when selecting to open a previous version project file in the new software. A separate application will start to run the migration, and then, as p:IGI+/Transform 2.0 has been registered to open .pigi2/.metis2 files, once finished p:IGI+/Transform v2.0 will launch opening the migrated project. The need for project migration means projects created/edited in version 2.0+ will no longer be usable in version 1.xx of the software.

It is possible some files will have problems when migrating. In this case we suggest you send these files to [support@igiltd.com](mailto:support@igiltd.com) and we will investigate and fix any issues.

### New/Improved features (p:IGI+ and Metis Transform)

- Performance has been improved across the software. Memory usage has been reduced in many places, and speed enhanced in some. This remains a work in progress. There are known performance issues when exporting all data from large projects (>30,000 samples)
- The .pigi2 and .metis2 file extensions will be registered with Windows as part of the installation, meaning the files can be double clicked to open in the applications, and will have the p:IGI+ and Metis icons associated with them
- Sample data can be exported directly in Excel format from p:IGI+ and Transform
  - users can select to export whatever subset of samples and data they want based on the use of pages and sample sets, however it is not possible to export very large projects to Excel due to memory limitations in Excel
  - when .Any properties are included in the export, users can select to export either the .Any property value , or the raw measurements that contributed to them. Note if the .Any property value is chosen the source of the value is not recorded
  - the export of the data is complimented by an export summary sheet added to the Excel file that documents the source of the data
- Date-time support has been added across the property model and software features
  - for existing projects date-time properties (but not the Historical entry date properties) will be migrated from text to date-times
  - the since data within a project might have come from many different sources, the migration will attempt to convert the strings to valid date-times using a range of different cultures / national conventions. Where a unique conversion is possible the value is written to a date-time result. Where multiple conversions are possible, or where no conversion is possible the original date-time string is moved to the following comment properties, being appended if an entry is already present:
    - Date.XXXX -> Lab comment.XXXX
    - Sampling date.Sample -> Sample comment.Sample
    - Start date.Well -> Well comment.Well
    - End date.Well -> Well comment.Well
    - Compl date.Well -> Well comment.Well

- internally the date-time data is stored in a standard ISO8601 format ("YYYY-MM-DD HH:MM:SS.SSS") with time store in universal time coordinates (UTC, or Z)
- when importing date-time data, by default the users current Windows region/country settings are used to determine date-time format, however the user can over-ride this to force the software to assume month – day – year order (US style) or day – month – year order (Europe and most of the rest of the world style)
  - all times are assumed to be specified in UTC (universal time coordinates) unless an explicit time zone relative to UTC is provided (e.g. 2021-10-24 12:34-06:00). If only a date is provided, the time is assumed to be 00:00 (midnight) in UTC. This is true for all input mechanisms: import, pages, merge
- when editing date-times in the spreadsheet the software attempts to parse the users input assuming the current windows region/country settings and will warn the user if conversion is not possible. It will accept many date-time formats
  - the user can select to display date-times on pages in a range of visual formats
- date-time data can be merged as part of the well and sample merge processes
- date-time data is exported in the ISO8601 standard to ensure unambiguous values are provided
  - when exported using the .zip option, if the included .txt is opened in Excel, the Excel application does not treat date-time data correctly, and consequently will require some modification to use the data correctly, although the strings will be absolutely correct – we suggest users use the new Excel export option in p:IGI+ which does not have this issue, with date-time presented in an appropriate custom format
  - when manually copied, date-time data uses a format which Excel will recognise as a date-time when pasted
- sample sets can be created based on date-time criteria, being able to query for samples before a date-time, after a date-time or during a date-time interval. If time is specified this will be assumed to be in UTC format (universal time coordinates)
- palettes can be created for date-time properties enabling users to explore, for example, the temporal evolution of property relationships
  - the binning of date-times uses an intelligent algorithm to select sensible bin edges, depending on the scale of the variation, preferring the start of years, months, weeks, days, hours, minutes and second, with naturally sized bins
- date-time series can be plotted using the new Time Series Plot type
  - the time axis uses an intelligent algorithm to select sensible tick marks by default – time is always shown as UTC
  - it is possible to show a time series for any numerical property – by default all data for that property is assumed to come from the same time-series
  - where there are multiple values at the same time an envelope is drawn to include all data from that time-series
  - the user can select to show points only, points and lines or lines only from Graph Manager → Layout tab → Data

- where there are multiple time series for a given property, the user can identify each time series by using a colour palette. The colour palette is used to group the data into separate series which are then shown in the relevant colour
- the brush selection of samples is possible to and from time series plots
- data point labelling can use date-time properties
- visual query supports date-time properties
- overlays, underlays and range underlays can be added to time-series plots, although editing these is purely manual using drag and drop
- Sites on maps can now be labelled:
  - the user can select any property as the label
    - numeric data presents the mean +/- standard deviation, and in brackets the number of samples used to calculate the site statistics
    - text and date-time data shows a list of the values/strings present at the site, ordered by frequency
  - the user can select which sites to label using brushing
  - labels are drawn on top of the data points so are always visible
- Increased the limited on the number of shapefile that can be added to Maps. Users can now add a maximum of 20, but the user is reminded that large numbers of shapefiles will impact the performance of pan-zoom on the map
- Samples can be selected for brushing from pages using a right-click option or keyboard shortcut Ctrl+B on an active page (Ctrl+Shift+B clears the selection of single samples) styling of brushed and selected points has been enhanced to show selection alongside all other stylings
- Ctrl+L works to clear the whole brushed set across all contexts, not just graphs
- Users can link to external resources (described using a URI – web pages, web links, file paths) from pages and visual query. Users can quickly launch dynamic links to open the resource in whatever viewer is registered for this on their system. Add a text link like <https://www.igiltd.com/> or D:\Data\Chromatograms\XYZ1234a.png to a text cell and this becomes navigable *if the link resolves to a resource on your computer*
  - use Ctrl+E to open the external resource from a cell if selected, or right-click and select to “Open external resource...”
  - when external links are shown in visual query, simply click on the link to open the external resource
- Updated the right click menus on pages to reduce clutter. Put page configuration actions on the page’s property header right click menu, and sample manipulation / data actions on the data grid right click menu
- Improved the treatment of properties IGI has deleted from the property model. On pages, the page can be opened, and the deleted property is automatically removed from the list of properties shown.
- Added many symbols to the shape palette to provide the user with 100 distinct shapes.
  - improved the user selection of shapes to use a grid
  - improved the autofill option for shape palettes to autofill from the first user selected shape, allowing the user to easily autofill from a specific point in the list of shapes
  - improved the palette legends to remove clipping of the later palette elements

- Editing of discrete palettes has been improved, allowing the user, when in the edit palette assignment dialogue, to sort the palette entries alphabetically, or on frequency of occurrence
- The Import data route has been heavily revised, to improve the robustness and performance of the autodetection, and improve the flexibility of what can be imported
  - import will attempt to automatically detect headers and data rows – the logic for this has been re-written to improve the robustness of the detection
    - import will now attempt to identify the presence of indicators, units and ratios
    - ion channel detection has been improved
    - indicators, units and ratios can be on separate rows, or contained in the main property description row, enclosed in a symbol e.g. ( ), [ ] etc.
    - aliases for indicators and ratios have been extended and where these are present they will be used to auto-link
    - this will greatly simplify the import of APT lab data once this export route is finalised
  - when linking manually, if you select 'Accept and Next' the indicator and unit from the previous selection is retained
  - table detection for Excel import no longer removes cells with a colon in them, for example 'nC23:1' would be retained in the header
  - metadata is better detected and always placed on the correct rows no matter how many header rows there are
  - data being imported is stripped of all leading and trailing white space
- the use of aliases in the property search has been enhanced to make it simpler to find properties based on their aliases
- The import well data route has been revised, adding autodetection of incoming well file structure to determine the well information being imported (p:IGI+ well file, stratigraphy, well information from Excel etc.)
  - stratigraphy information from Excel files can now be imported to one of two stratigraphy schemas (each now with its own tab in the artefact well manager)– the primary stratigraphy (tops) scheme or an alternative stratigraphy (tops) scheme. Once loaded these will populate the primary and alternative sample level stratigraphy respectively, allowing you to manage e.g. company tops, and official national oil and gas authority tops in the same project
    - this is available for both Chronostratigraphy and Lithostratigraphy tops
    - when importing stratigraphy tops (primary / alternative) the user can opt to provide a label to indicate the source of these tops
    - primary and alternative tops are exported with .igi\_well files
  - when populating stratigraphy from formation tops all existing values of sample stratigraphy are blanked to ensure a single source of stratigraphy in a given property
  - stratigraphy provided at the sample level with the data can be stored in the Reported stratigraphy properties
  - the user can select whether to show the primary or alternative tops on depth plots using graph manager

- when importing a .igi\_well file created in a version 1.x of the software into version 2.0 the stratigraphic tops are imported to the primary stratigraphy (tops) scheme
- Well names are now case sensitive across the software
- For dynamic sample sets a descriptive Expression Summary has been added to the create dialogue. This is automatically generated as the associated query string is built up
  - the Expression Summary has also been set as a tooltip on hover over the sample set icon, allowing the users to easily see what the sample set is comprised of
- Removed the 'out of range' data shortcut icon from the toolbar (as it was previously unclear whether the feature had been toggled on or off). Operation of the out of range feature now sits on the Page menu with options to turn it on or off
- Added an application help dialogue with information about where to get support – linking to the online user guide, and providing the support email. This is located on the Help Menu
- Added new autographs:
  - Line plot: n-Alkane d13C C7-33.GC-IRMS
  - Line plot: n+i-Alkane d13C C7-33.GC-IRMS
  - Line plot: Galimov Diag
  - Line plot: %Homohop[a].Sat-GCMS
  - Scatter plot: Oil Density vs Pour Pt
  - Scatter plot: nC17/nC27 vs Pregnanes[\*].Any
  - Scatter plot: nC17/nC27 vs Pr/Ph[\*].Any
  - Scatter plot: t22/t21 vs t24/t23[\*].Any
  - Scatter plot: t26/t25 vs H31abR/H30ab[\*].Any
  - Scatter plot: C2/C3[mol].Gas vs d13C C3-C2.Gas-Iso
- Various graph name, plot title, and axis title edits made across existing autographs

### p:IGI+ specific features

- PCA has been updated to make it a full artefact, allowing retraining and providing improved sharing between projects
  - PCA models are launched from either the new Model menu or from the right click menu on pages
    - models can be created, trained and applied to subsets of data defined by pages and sample sets
  - normalisation of data (for e.g. raw GC measurements) is applied prior to mean replacement options ensuring sensible replacement of missing values
  - options for replacing missing values have been expanded to include replacement with the minimum observed value, or replacement with a user specified value (relevant for e.g. missing GC peak heights / areas, which are likely to result from non-appearance of a specific peak in the chromatogram)
  - when applying the model users can control on which sample set to calculate the model and what they wish to do with missing values, allowing users to predict the 'principal components' (component scores) for samples with partial information
    - the same range of missing value options is available, as provided in training
  - project properties are created for the principal components (scores) automatically and renamed if the model is renamed

- principal components (scores) are calculated on demand, and written into project properties which will be blanked prior to writing the scores into them
- the user can later select to predict more (or fewer) principal components using the trained model without the need to retrain
- PCA is a full artefact, so for example training options can be changed in the PCA model, with a graph showing the outcome live, allowing you to visually explore the effect of changing training options
- PCA models can be cloned to allow users to develop and compare models
- Clustering has been added – the first version provides k-means clustering
  - Clustering models are launch from either the new Model menu or from the right click menu on pages
    - users can select the data set on which to train their clustering model, with the same missing value replacement options, and pre-processing as available in PCA
  - users can select the target number of clusters to create, up to a maximum of 20 clusters
  - once trained the model can be used to cluster samples from the same, or a different sample set as used in the training
  - users can select which property the cluster labels are written to ('Cluster 1', 'Cluster 2', etc) – this can be a project property, indeed we would recommend creating a project property for cluster labels as any other values in this property will be deleted before writing the cluster assignments
  - a palette for the selected label property is automatically created and entries added for the clusters – this palette is ready to be applied to any graph, map or other artefact
    - the palette interacts dynamically with the cluster training allowing users to explore different clustering options and see the effect on graphs, maps and even statistics
  - cluster labels are written as text and can be harmonised (to change names to something more meaningful) or used in other artefacts, for example sample sets
  - cluster models can be saved as templates and applied in other projects
  - cluster models can be cloned, to allow users to easily compare different model choices

### Metis Transform specific features

- As well as the general improved performance and scalability, the scalability of upload to Staging has increased, allowing more efficient updating of data.

### Metis Discover specific features

- Query performance has been significantly improved
- Introduced several new types of criteria that can be used to query data
  - Data updates criterion can be used to query when samples have been added or updated in Metis
  - Geographic criterion specifically query location data in Metis
  - Measurement criterion can be used to query any individual property within the property model

- Stratigraphy criteria can be used to search for either lithostratigraphy or chronostratigraphy data across the database
- Queries can now be bookmarked and saved for later use. They can also be shared with colleagues, edited, and removed
- Wellbore viewer. Each wellbore returned by a query can be viewed in detail.
- Export performance has been significantly improved. Users can now export up to 40,000 samples
- As well as exporting data by analysis groups, data can also be exported by properties. Up to 20 properties can be selected to export a subset of the data
- Discover can be integrated with an ArcGIS or Web Map Service (WMS) to show layers on the map. Layers are configured at a server level, as a result they are visible to anyone who has access to the environment. IGI are happy to provide support to configure this feature
- Metis now captures queries and exports performed by users in an activity log. The activity log is only viewable by data managers within an organisation. The who, what and when of each query or export, along with the time taken, is recorded

### Property model changes

- The interpretation aspect of the property model has been completely overhauled
  - the previous interpretation property group has been replaced with separate dedicated interpretation groups for Rock, Liquid, Gas, Mudgas and Fluid (interpretations from the combination of Liquid and Gas)
  - these interpretation groups have an enhanced range of interpretation properties, with source and confidence for each
    - codelists have been added to suggest appropriate interpretation labels
- Added a series of mode, min & max VR equivalent reflectance properties to the MatCalc property group
- Added a rig name property to the well property group
- Added sample temperature (Sam Temp) to the physical analysis group
- Added the reservoir mode properties S2a and S2b properties to the PyrolHawk & Extr analysis group
- Added specific bulk and extracted TOC.Any properties (TOC\_Bulk & TOC\_Extr) and updated relevant pyrolysis equations to use the appropriate .Any property as an alternative to the analysis specific TOC property as a fallback
- The Pol-GCMS analysis group has been expanded to include ethyl- & dimethyl-carbazoles, Fluorenone & methyl- equivalents and Xanthone & methyl- equivalents
- Deleted several duplicate properties in the model, with a migration of the data to an appropriate property. Data is preserved in the target property if that is already populated
- A series of Alkylbenzene ratios, 1-12, added to the WO-GC and Py-GC analysis groups
- Extended the range properties measured from the m/z 183 ion trace in the Sat-GCMS analysis group
- Added a series of Alkylcyclohexanes (13-34) from the default 83 and alternative 82 ion channel trace, with associated n-Alkylcyclohexane CPI equation properties
- Extended the range of Alkybenzenes in the Arom-GCMS and WO-GCMS analysis groups up to 34ABenz

- The sequence and biostratigraphy properties in the Geol property group have been redefined to be reported properties, capturing values reported alongside the sample
- Source properties have also been added to record where the sequence and biostrat values came from

## Fixes

- The software will now work on high resolution 4K displays, at all font scaling sizes
- When creating project properties the equations are now shown using the correct display names for properties
- Users can no longer harmonise on well name – this never worked correctly – instead users should delete incorrectly named wells and assign the samples to the correct well(s). Users are advised of this, but can still access the list of distinct well names provided in the harmonise dialogue
- It is possible to edit the long name for project properties without changing the short name
- Auto-import is more robust, having improved the auto-detection of the column separator
- The definition, and interaction with numerical palette bins has been improved, with clearer feedback to users
- Fixed an issue where it was possible to crash p:IGI+ by resizing a graph to be too small. Also made the resizing of graph windows more responsive, and improved the speed of interaction with graphs slightly
- Fixed a map visual query bug that left a site looking selected when it was not even brushed
- Fixed the positioning of axes ticks / grid lines on the multi-depth plots
- Fixed clipping of ticks on inverted graph axes
- Fixed an issue with the display of formation tops on depth plots, where tops could be drawn at the wrong depths with a very specific combination of different datums being used
- Added a scroll bar to visual query to prevent the window becoming unusable if too many properties were added

## Known issues

- It is not possible to use the project merge in Metis Transform using date-time properties if there are missing values those properties – this is being addressed and will be fixed in the next release.
- The “Sitka” font family does not work when copying graphs – it displays fine, but the graphs will not copy correctly. We advise users to not use this font family, which has some known issues in Windows
- When a lot of graphs are open at the same time, or after long use of p:IGI+ sometimes you get no points shown on a graph, and a text error message saying “E\_OUTOFMEMORY: Ran out of memory (\*\*\*\*)”. To address this save the project, close p:IGI+, restart, and open the project. We are still exploring the issue
- Occasionally when resizing graph windows the data view can pan unexpectedly. This is a rare event, and we have not yet been able to isolate a fix. If the original zoom extent is saved, then the user can recover to the desired view by opening graph manager (Ctrl+G) and selecting to restore the zoom

## Installation issues

- Requires .NET framework version 4.8



- Projects will be migrated from earlier version to .pigi2 / .metis2 files. This can take time for large projects
- Requires DirectX 9 for the graphs to work