# Ikaros 7.0 - Features

With Ikaros 7.0, we are proud to present a completely re-designed version of our proven karyogram creation software. Based on decades of experience and valuable feedback from our users worldwide, this new software version offers enhanced automation, improved interactivity, and many new features. Whether you are upgrading from a previous version or discovering Ikaros for the first time, Ikaros 7.0 offers you a smarter, faster, and more intuitive digital work environment.

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MetaSystems
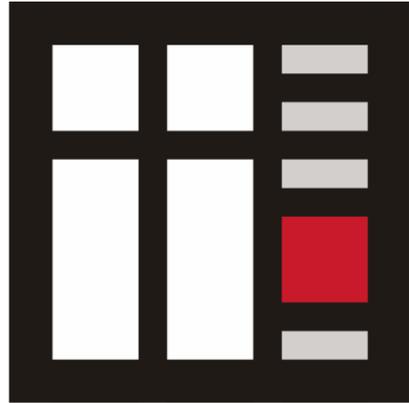
IKAROS 7.0

Imagine Your Lab...

... with fewer repetitive steps and more time where it matters. Microscopy-based analyses often rely on manual routines that demand time, concentration, and consistency. When staff resources are limited and case numbers rise, these steps can become a bottleneck.

Ikaros 7.0 addresses these challenges with software-driven automation and lab-specific adaptation. What once required sustained manual input can now be handled more efficiently – helping you maintain performance while easing the pressure on your team.

New Features - New Possibilities

Ikaros 7.0 introduces a newly designed user interface that adapts to your workflow – not the other way around. Every element of the main window is configurable: from the display of metaphases, karyograms, and the cell gallery to commands, case trees, and information panels. You can create workflow-specific views for tasks such as case analysis or final review, making navigation clearer and interactions more focused.

In Ikaros 7.0, Deep Neural Networks (DNNs) support key tasks in chromosome processing, including segmentation, classification, and the estimation of chromosome overlaps and banding resolution. When used together with the slide scanning platform software Metafer 4.4, karyogram proposals can be computed directly during automated image acquisition and are instantly available in Ikaros 7.0.

Alongside configurable views and advanced DNN capabilities, Ikaros 7.0 offers a suite of workflow-oriented enhancements — from automated image adjustments to streamlined cell processing with the new, configurable cell workflow and macro automation.
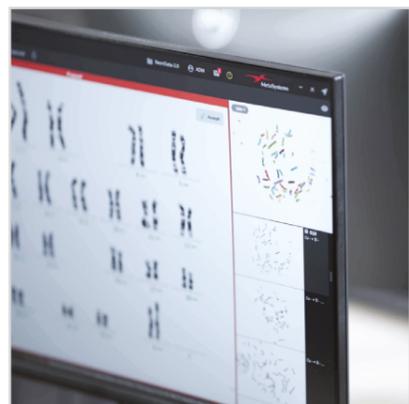
YOU MAY BENEFIT FROM

New, Configurable User Interface

- Central workspace is fully configurable.
- Elements, such as the display of the metaphase and karyogram, commands, cell gallery, and more, are organized into so-called views.
- Users can quickly switch between workflow- or user-specific views, making it simple to set up dedicated layouts for tasks such as analysis or review.

Instant Karyogram Proposals

- Ikaros 7.0 automatically generates a complete karyogram proposal and keeps it up to date during additional manual segmentations.
- Proposals are clearly indicated by a red border and labeled "Proposal." They are excluded from reports, statistical analyses, and combined karyograms until they have been explicitly accepted by the user.
- DNN-based estimation of chromosome overlaps and banding resolution supports quality control.

New, Configurable Cell Workflows

- Configurable cell workflows allow easy documentation of the analysis process for each captured cell.
- Workflow stages are indicated by colored squares in all cell galleries and lists.
- Cell Workflows support conditional stages, automatic transitions, cell locking, and macro-triggered actions.

Advanced Image Processing

- The Automatic Contrast function adjusts display settings dynamically for optimal chromosome visibility.
- Features such as Saved Zoom, and Display Chromosomes as in Metaphase enhance efficiency and clarity.
- The Repeat Image Processing function enables efficient application of identical adjustments across multiple cells.

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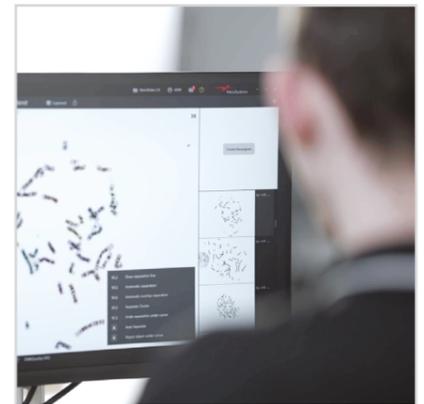
MONOCHROME MODE

Single-channel Images

As with previous software versions, Ikaros 7.0 enables users to manually capture and process single-channel images - either brightfield or fluorescence. The software screenshot below illustrates one possible configuration of the workspace.
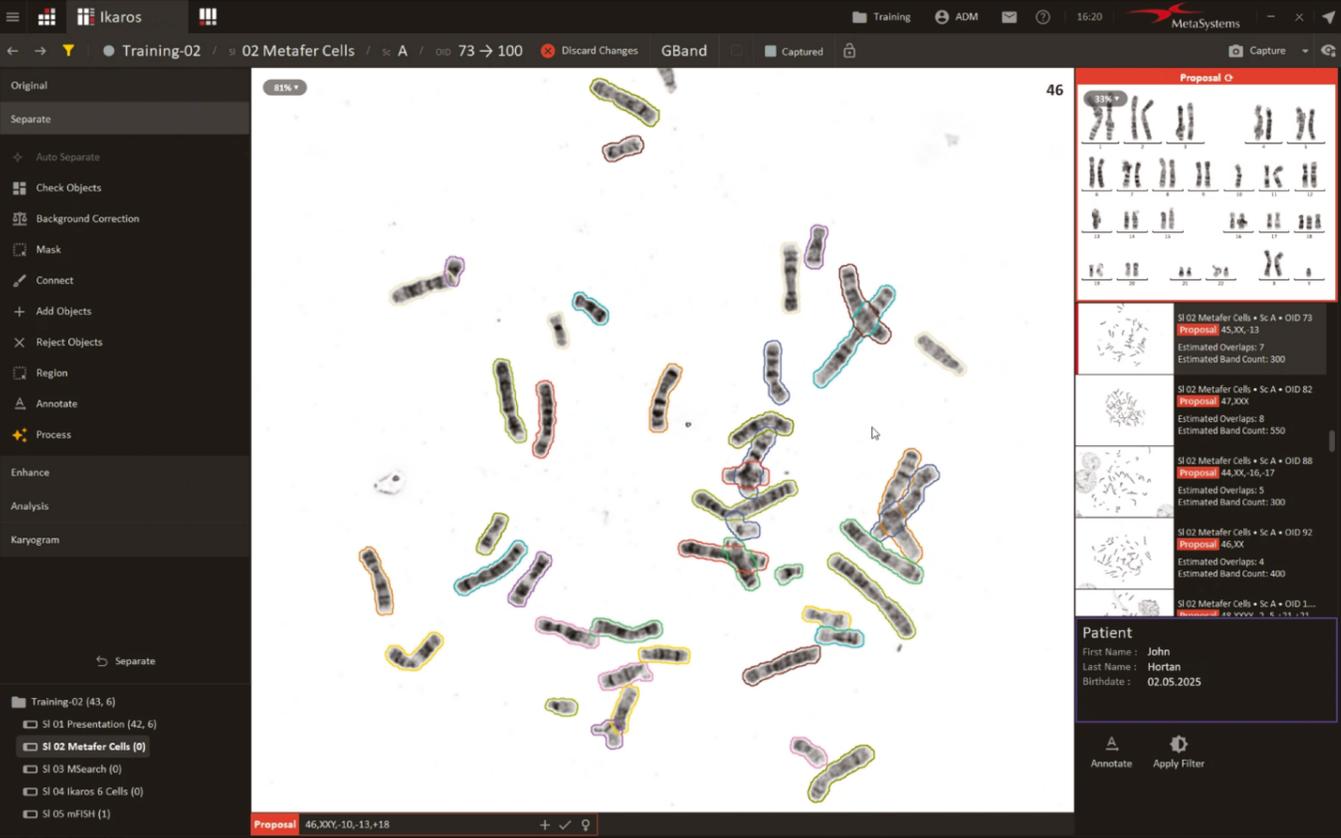
COLOR MODE

Multi-channel Images

Multicolor fluorescence images can be manually acquired with a single mouse-click and processed in Color Mode. The screenshot below illustrates one possible configuration for displaying these multi-channel images, enabling a clear and comprehensive visualization of all fluorescence signals.
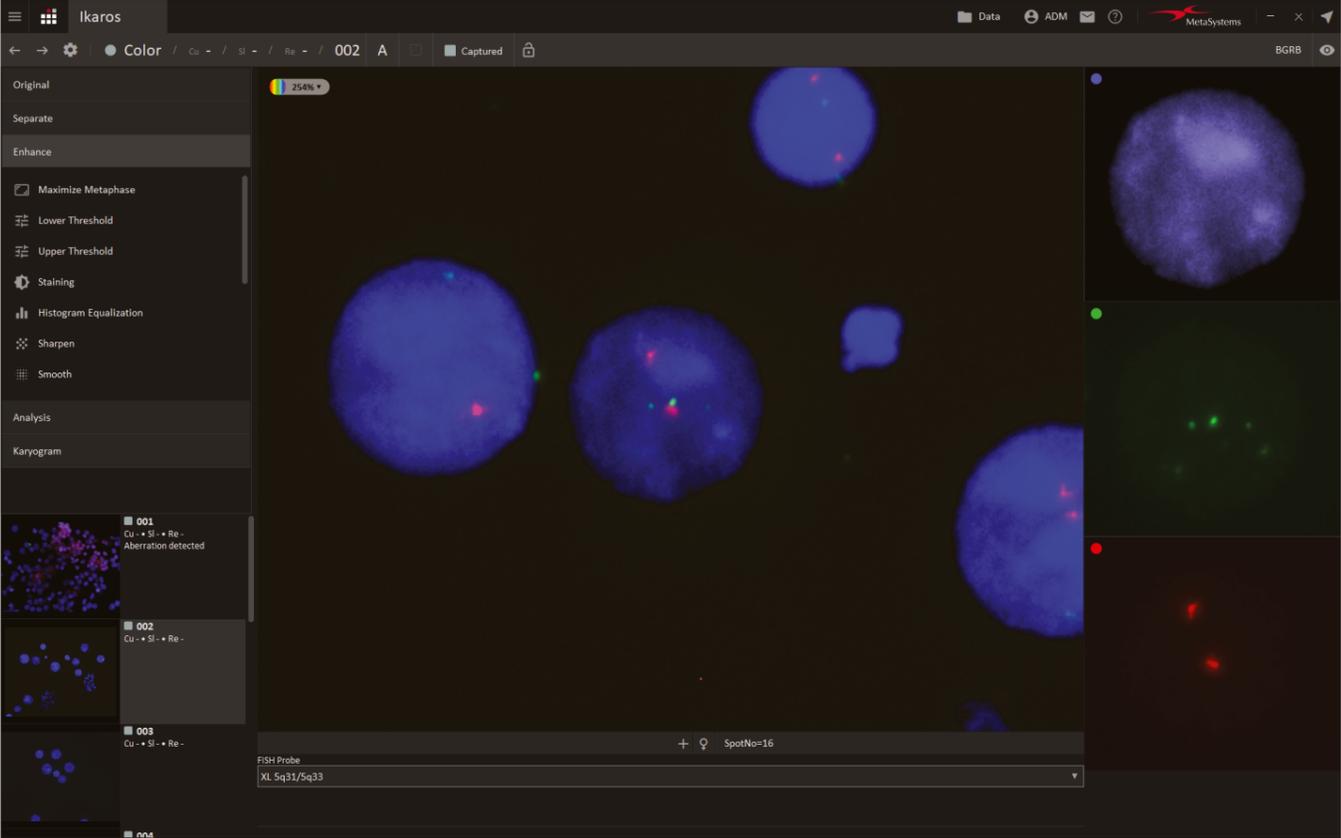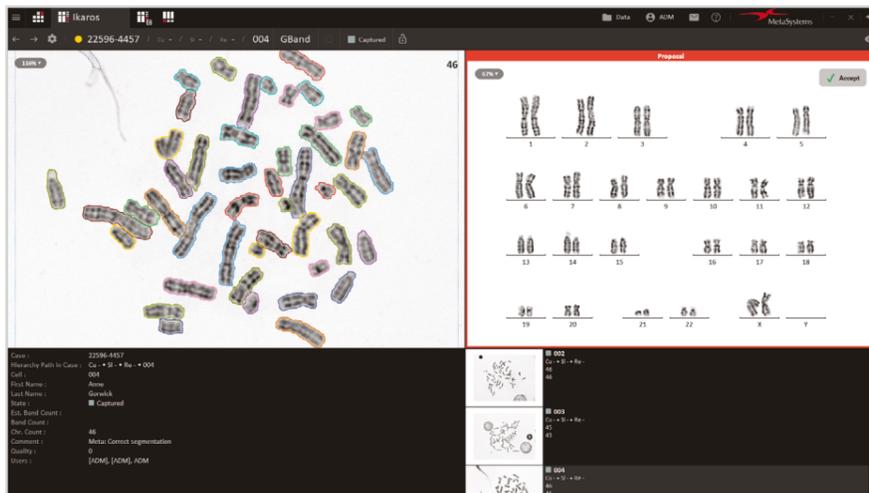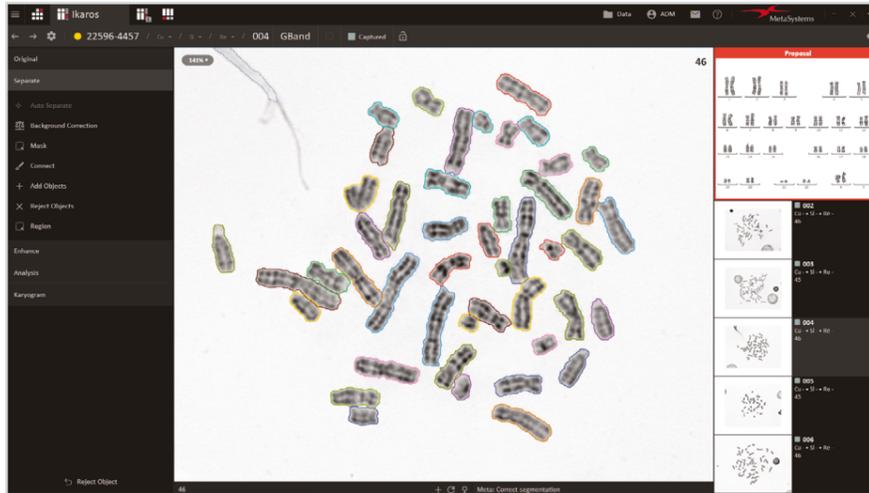
USER INTERFACE

Configurable Views

The core layout of the Ikaros 7.0 interface can be freely arranged to match different workflows and user preferences.

Individual elements can be organized into so-called views to provide a precise overview. These elements include:

- The **Commmands** element groups processing tools into different sections for easy access.

- The **Case Tree** shows a hierarchical overview of cultures, slides, and regions within a case and can be used for filtering.

- The **Data** element displays information on the case, culture, slide, region, and cell.

- The **Data Field Edit** is a user-editable field for entering data, such as results and count values.

- The **Gallery** element shows the digital microscopy images in a scrollable cell gallery or list.

- The **Label Image** displays an image of the slide label captured during automated slide scanning with Metafer 4.4.

- The **Primary Image** and **Secondary Image** are the displays and workspaces for interacting with the metaphase and karyogram.

- The **Toolbar** is a configurable list of commands and macro command icons.

- ... and more elements.

▲ The two software screenshots show the Ikaros 7.0 user interface whose central workspace can be freely organized into so-called views to match different workflows and user preferences. The same cell can be seen in both screenshots, but the software interface with its elements has been configured into two different views.

RESULT PROPOSALS

DNN-based Tools

Deep Neural Networks (DNNs) are advanced statistical models, loosely inspired by the structure of the human brain. In Ikaros 7.0, they assist with chromosome segmentation and classification helping users to ease their manual workload. Each time the **Auto Assign** command is used, Ikaros 7.0 generates a karyogram proposal clearly indicated by a red border with the text "*Proposal*". It must be reviewed and accepted before it is visible in combined karyograms, statistics, and reports.

For the first time, Ikaros 7.0 also supports the DNN-based estimation of chromosome overlaps and banding resolution. For quality control purposes, the mean estimated overlap count is available, along with the mean, minimum, and maximum estimated band counts if the DNN-based function is used.

When combined with the slide scanning platform software Metafer 4.4, Ikaros 7.0 can access karyogram proposals computed directly by Metafer 4.4, making them instantly available for review. Information on chromosome overlaps and band counts, if used, is also displayed in cell galleries, enabling users to make informed decisions when selecting cells for analysis. On top of that, using Metafer 4.4 with the Customization Package Metaphase DNN offers the added advantage of DNN-based metaphase detection. Our users therefore enjoy all the benefits of a workflow for karyogram creation that uses advanced DNN technology in all key steps.
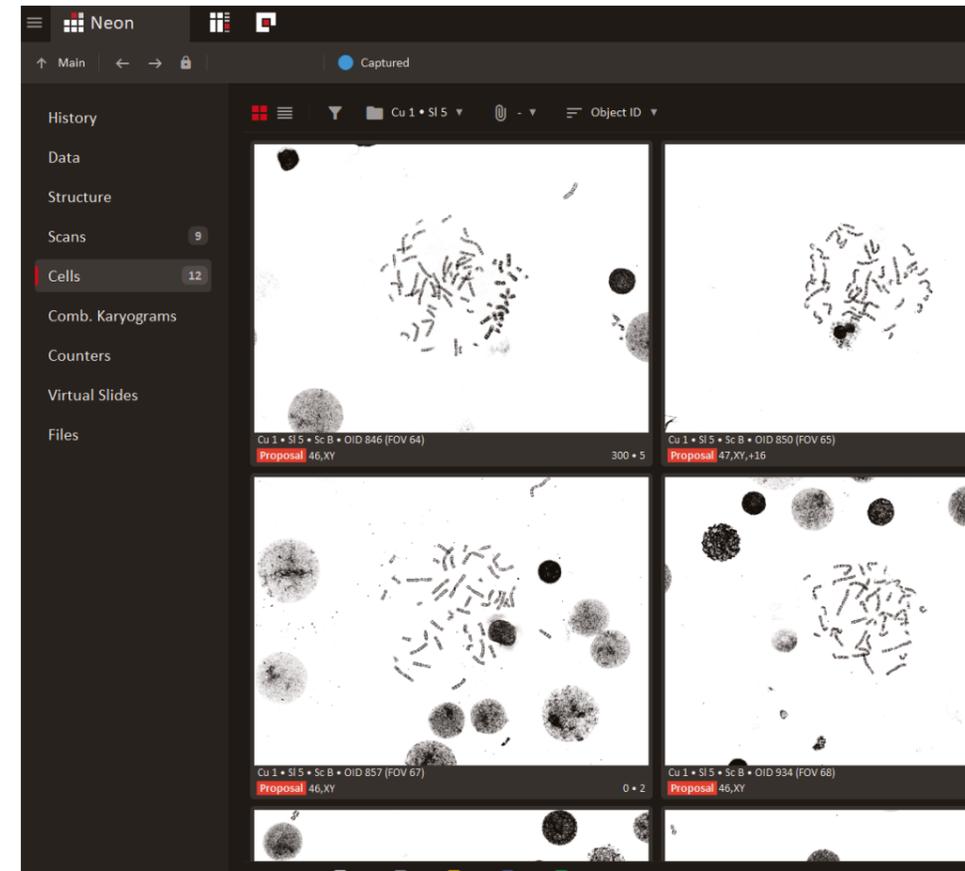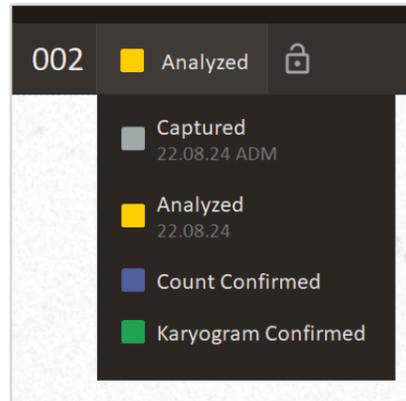

▲ In the included case and image management software Neon 2.0, the cell gallery presents metaphase images captured with Metafer 4.4 and pre-processed by Deep Neural Networks (DNN). Each image is automatically labeled with an identifier and a result proposal, which can be reviewed in Ikaros 7.0.

MetaSystems

WORKFLOW MANAGEMENT

Cell Workflows

Our users of Ikaros 6.3 are already familiar with the configurable case workflows in the case and image data management software Neon. Now Ikaros 7.0 introduces configurable cell workflows that enable users to document the analysis process for each captured cell with ease.

In order to distinguish the individual stages of a cell workflow at a glance, each stage is assigned a colored square that is clearly visible across all cell galleries and lists for quick reference. Like the case workflows, the cell workflows support conditional stages and can perform automatic transitions between them. Cell workflow stages can be configured to lock a cell automatically, and macros can be triggered when the workflow stage changes, ensuring consistent and efficient processing.
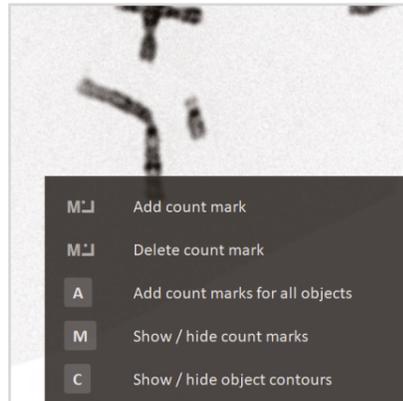
Powerful Macros

Macros offer another level of flexibility for customizing workflows in Ikaros 7.0. Macros can be assigned to any keyboard shortcut, executed automatically via a wide range of available triggers, or integrated into commands and toolbar elements with configurable icons.

Help Mode

The Help Mode supports users in becoming proficient with Ikaros 7.0. When activated, the **Commands** element displays all relevant keyboard shortcuts, and available keyboard and mouse actions for the current command are shown on screen.

Improved Navigation

While the **Case Tree** element enables filtering by culture, slide, or region, cell galleries or cell lists can be accessed directly from the cell dropdown in the header breadcrumb, through the navigation sidebar, or embedded in a view as a **Gallery** element.

The current case can be changed by selecting a recent, new, or bookmarked case from the case dropdown in the header breadcrumb, searching by name, or scanning a barcode.

▲ The individual cell workflow stages are editable and marked with a colored square.

▲ Instantly access relevant shortcuts and available actions to work efficiently.
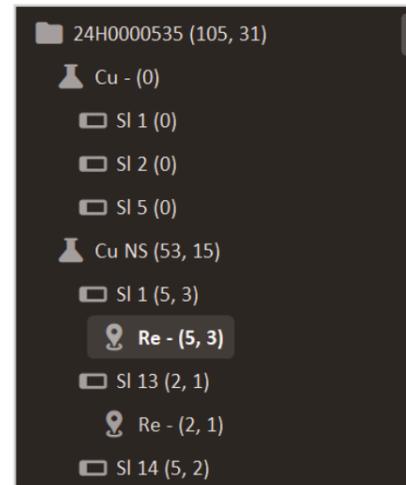
▲ The Case Tree element provides a case overview and can be used for filtering.

IMAGE PROCESSING

Flex Mode

The new DNN-based tools also require an advanced interactive processing environment. The new **Flex Mode** in Ikaros 7.0 streamlines the revision of DNN-based chromosome segmentations. Adjustments can be made directly without switching commands by simply drawing lines to separate, add, connect, extend, or reject objects.

Automatic Contrast

The **Automatic Constrast** feature enhances chromosome visibility by automatically adjusting the lower and upper thresholds based on the processed image. This ensures optimal contrast, for example after DNN-based segmentation, artefact removal, filtering, or sharpening.

Repeat Image Processing

Frequently used image processing steps can now be applied more efficiently. The user performs the image processing for the first cell. On all subsequent cells, the **Repeat Image Processing** command or the F4 key can be used to apply the same image processing.

Saved Zoom

The user can define the region of interest in an image by saving the current display zoom. The saved zoom is applied when opening the cell or when re-setting the zoom. If the option **Gallery Images / Apply Saved Zoom** is enabled, gallery images only contain the region of interest defined by the saved zoom. The region of interest / saved zoom is also available in reporting.

Live Display

With the new option **Display Chromosomes as in Metaphase**, the display of chromosomes in the karyogram becomes more transparent. Changes made in either the metaphase or karyogram element are reflected in both, unless a specific chromosome is edited independently.

Chromosome Highlighting

Simply by moving the mouse over a chromosome in the metaphase or karyogram, this chromosome is highlighted in other image elements. If there are chromosomes selected in the karyogram, these chromosomes are highlighted in the metaphase.

Traceability and Cell History

All processing steps, including karyogram edits, are documented and visualized in the cell history grouped by sessions. Every single processing step can be reviewed, traced, and, if necessary, invalidated.

Metafer Cells

With the slide scanning platform software Metafer 4.4, scanned cells can be opened directly in Ikaros 7.0. Modifications to scanned cells can be reverted until the cell is saved for the first time. This prevents unnecessary data duplication for cells that are ultimately not analyzed, minimizing the need for subsequent data cleanup.


▲ Before and after applying the Automatic Contrast feature that optimizes chromosome visibility by automatically adjusting the lower and upper thresholds based on the processed image.

AND MANY MORE FEATURES

Custom Idiograms & Idiogram Library

The Cut & Join functionality, familiar from earlier Ikaros versions, has been completely reworked. With Ikaros 7.0, custom idiograms can now be created more easily by combining segments from different chromosomes and, if desired, applying color highlights. Once defined, custom idiograms can be saved for future use and conveniently reused in new analyses.

Info Area Element

The Info Area element is a versatile display component that can be integrated into any view. It can present conditionally formatted text or diagrams. For example, the object count may be shown in green when it equals 46 and in red otherwise. In another setup, the Info Area can illustrate the distribution of chromosome counts across the entire case, dynamically updating as cell karyotypes are added.
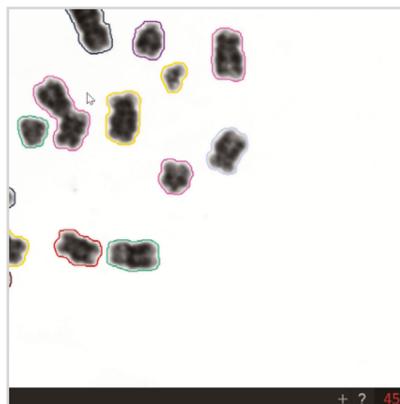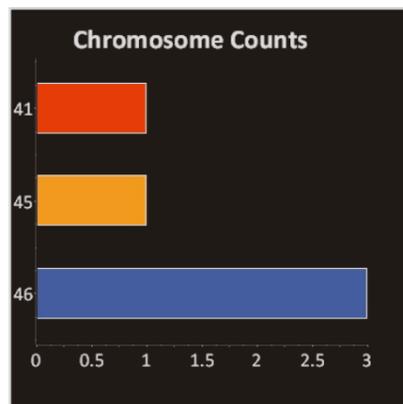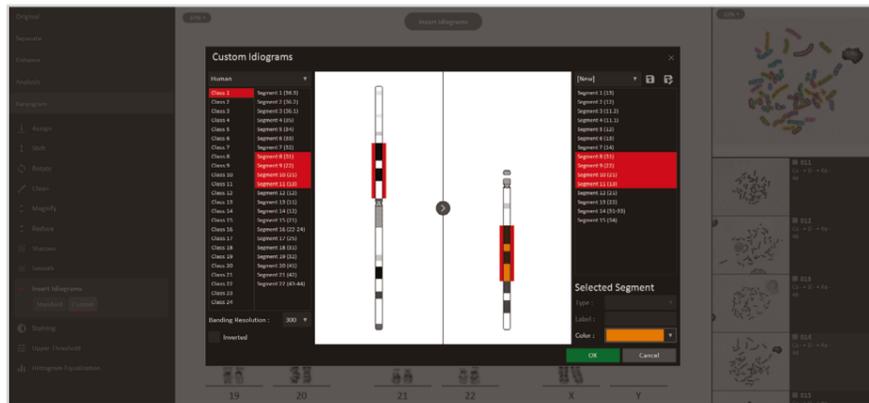
▲ Easily design and reuse custom idiograms with the enhanced idiogram functionality and idiogram library in Ikaros 7.0.

◄ Gain instant insights with the configurable Info Area element, e.g. dynamically highlighting chromosome counts.

CASE & IMAGE MANAGEMENT

Neon 2.0

Neon 2.0 serves as the central platform for managing case and image data generated with Ikaros 7.0 and Metafer 4.4. Neon 2.0 organizes all relevant images, results, and metadata in a structured, case-based format. Its powerful search functions, multi-user capability, and compatibility with Laboratory Information Systems (LIS) support efficient collaboration across workstations. By ensuring secure data handling, full traceability, and seamless workflow integration, Neon 2.0 enables laboratories to manage complex imaging and analysis processes with clarity and efficiency.

MORE SOFTWARE & SERVICES

Metafer 4.4

Metafer 4.4 is the latest version of MetaSystems' versatile platform software Metafer, designed to automate slide scanning and image processing. Metafer enables automated imaging of up to 800 slides per session while supporting a wide range of contrasting methods, including brightfield, fluorescence, phase contrast, and darkfield. Its modular design and intelligent scanning provide precise measurements, customizable workflows, and well-structured access to image data. User-trainable classifiers allow flexible adaptation to specimen-specific requirements.

Customization Packages

Customization packages are a service offered to tailor workflows to the specific needs of individual labs. The Customization Package Metaphase DNN enhances the workflow to find metaphases on a slide by using Deep Neural Networks (DNN) to automatically detect suitable metaphases from low-magnification scans. Complementing workflows in cytogenetics, the Customization Package Spot Counting streamlines FISH analysis by automatically locating suitable nuclei, detecting and enumerating fluorescent signals, and allowing parameter adjustments tailored to specific probe layouts and fluorochromes. Together, these packages significantly reduce manual workload, improve standardization, and deliver results that can be reviewed quickly and with ease.
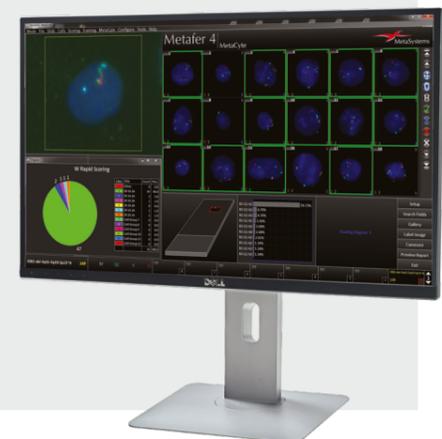
MetaSystems

About MetaSystems

For almost 40 years, MetaSystems has been developing innovative solutions for automated microscopy-based imaging for the healthcare and biotechnology sectors. Our headquarters are located in the southwest of Germany near Heidelberg.

We are a global company with an international team working in Germany and in our subsidiaries in North and South America, Europe, India, China, and Japan. Our customers can be found in institutes, hospitals, and universities in over 100 countries around the world.

We continuously develop our products in close connection with our users, thus combining innovation with tradition. Our modern approaches include an advanced workflow management and the use of artificial intelligence. In many segments, this has enabled us to achieve an international top position.

CE IVD   Ikaros 7.0 and Metafer 4.4 are classified as in vitro diagnostic Software as Medical Device (SaMD) Class A in the European Union in accordance with the In Vitro Diagnostics Regulation (EU) 2017/746 (IVDR) and carries the CE label unless otherwise indicated.

Neon 2.0 is classified as an accessory for in vitro diagnostic medical devices (IVD) in the European Union in accordance with the In Vitro Diagnostics Regulation (EU) 2017/746.

MetaSystems products are used in many countries worldwide. Use all MetaSystems IVD products only within the scope of their intended purpose and the regulations of the respective country or region.

Hardware components supplied by third-party manufacturers are not included in MetaSystems IVD products.

MetaSystems software provides, among other functions, features to assist users with image processing. These include, but are not limited to, the use of machine and deep learning algorithms for pattern recognition. The output generated in this process should be regarded as preliminary suggestions and, in any case, mandatorily requires review and assessment by trained experts.

MetaSystems offers **Customization Packages** for application workflows that have been successfully implemented for customer labs using standard Metafer platform functionality. It is expected that they can be implemented for other customer labs using similar workflows and slide preparation procedures. If a Customization Package is purchased, MetaSystems product specialists will - based on their experience from other similar application cases - support the customer lab in adapting the Metafer software configuration to their needs. The performance of the solution will depend on the quality of the customer slides and the expertise of the users, MetaSystems cannot specify or guarantee any performance parameters. The validation of the solution for clinical use is the sole responsibility of the customer lab.

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