

# IMAGING COMPONENT COLLECTIONS

Pipeline Pilot's dataflow automation and visual programming capabilities have revolutionized the way researchers are performing enterprise image informatics. The Imaging Collections for Pipeline Pilot bring together ease of use and extensive customization. The platform enables IT professionals, researchers and decision makers, to make timely informed decisions based on complete, accurate and easily accessible image and related enterprise data. This comprehensive scientific image informatics toolbox reduces the cost and complexity of application centric approaches to image data integration, while maximizing the value of existing technology. The platform enables sophisticated image analysis and scales to integrate images and associated data with a range of other scientific data types from diverse areas including – life science research, chemistry, materials, electronics, energy, consumer packaged goods, pharmaceuticals, and aero-space.

## INTEGRATE WITH ENTERPRISE APPLICATIONS

Integration with commercial and open source imaging software applications, enterprise data management systems and corporate portals in applications such as Oracle and SharePoint, enable IT professionals and users to leverage existing investments, improve productivity and reduce costs. Using a collection of components, you can bring images and associated data together with other scientific data from in-house databases, files, and instruments, located anywhere across the enterprise. Images, chemistry, biological sequences, text and numeric data from all popular formats are accommodated in a unified data structure and can be analyzed together in real-time.

## IMPROVE COLLABORATION ACROSS THE ENTERPRISE

Communication of complex scientific data leads to improved knowledge and decision making.

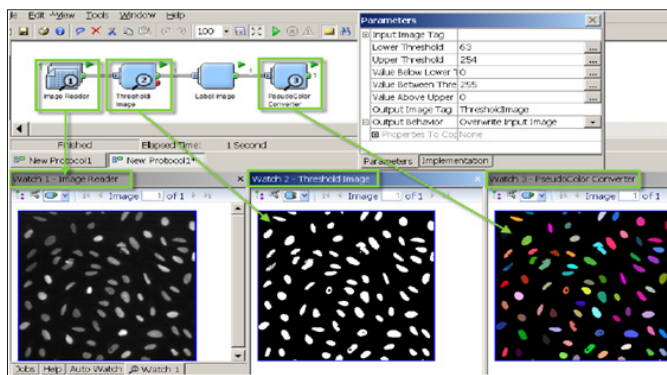
The Pipeline Pilot corporate portal integration capabilities allow companies to simply and easily increase collaboration among their extended teams and across the enterprise. Template protocols allow rapid development of custom drill-down reporting and image link capabilities. Association of images (or image regions) with specific reported data increases researcher productivity and cross-disciplinary understanding while significantly boosting productivity, reducing costs and time to market, and demonstrating a higher return on investment for Senior Management.



*Enabling enterprise informatics*

## INCREASE PRODUCTIVITY

Automation of error-prone manual tasks like gathering images and associated data, processing, analyzing, preparing and importing data, generating reports and distributing results often required custom built applications. Bypass lengthy coding cycles with “on-the-fly” debugging and immediate deployment with Pipeline Pilot’s Design Mode. This intuitive interface allows protocol developers to see the data at each step, update multiple caches with one click, view run time for each processing step to optimize the pipeline and quickly build high quality solutions.

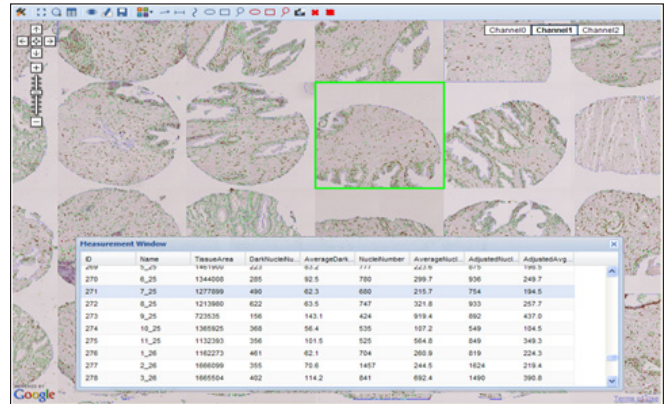


Custom image object gallery for viewing, training and classifying

Rapidly interact with your images in BigImage Explorer. This interactive image application interface allows users to view, zoom in and out, annotate and select regions of interest. Integration with the Pipeline Pilot platform enables users to process, segment, measure, export, apply advanced learning algorithms and create custom interactive reports with image-data links.

Capture and deployment of best practices – An intuitive web-based environment allows end-users to leverage the power of Pipeline Pilot within a simple point-and-click interface. Automatically capture, annotate and version your image processing and analysis procedures, allowing you to document and reproduce the steps used to achieve a particular result. Your resulting imaging protocols can be published and shared with others to facilitate cooperative development and knowledge transfer via the Pipeline Pilot web client.

Parallel processing – The platform supports parallel processing, grid engines and cloud computing to scale to the processing power that is right for your imaging needs.



Custom protocol development is made simple with multiple watch windows in Design Mode

## CUSTOMIZED REPORTING AND WEB APPLICATION DEVELOPMENT

Create customized reports that summarize your imaging data analysis or data mining protocols with powerful tables, charts, images, and text. The platform enables complete control over the layout, linkage and content, so that you can easily interpret and communicate your results. Display multiple images, overlays, interactive tables and charts in a single report. Other Pipeline Pilot collections such as Plate Data Analytics, Statistics and Data Modeling offer advanced interactive display tools for your imaging results data.

## IMAGING COMPONENTS

The collections are comprised of a suite of components, each a functional unit of tested code, with user definable input, output and control parameters. End users can combine these components into complete image processing and analysis protocols without ever performing complex scripting or programming. These protocols can range from simple image manipulation to advanced supervised and unsupervised learning. The collections offer best in class processing and analysis capabilities including recent innovations from leading academic and industrial imaging researchers, and new capabilities are added with each release.

## Readers and Writers and Viewers

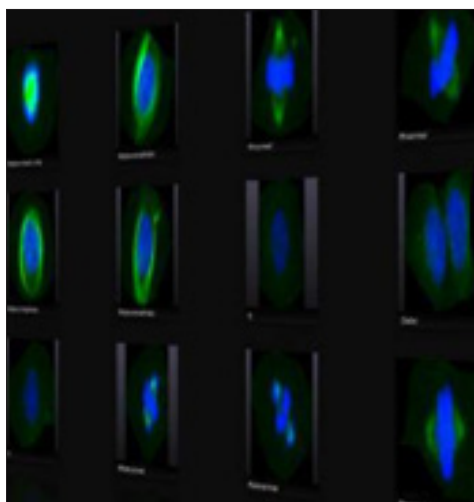
The Imaging Collection includes file readers and writers for all most any image file format used in research, including several proprietary formats used only by specific instrument vendors. Multiple viewer components provide simple and flexible output options for images and associated data. Integration with the Pipeline Pilot Reporting Collection allows rapid construction of sophisticated forms and documents. Connectivity with third party applications like MatLab, ImageJ allows the use of additional functionality and interactive image viewers. Image processing results data can also be read in from other platforms and linked with the respective images.

## Math and Statistics

Math components enable rapid execution of arithmetic and logical operations on pixel values from one or more images. Statistics components allow measurements to be made on entire images or on individually identified segments or regions of interest. Numerous measurements that are based on underlying pixel values, texture properties or object shapes are available.

## Color Manipulations

Color information can be split into its component channels (red, green and blue), flattened into grayscale, or synthesized from multiple gray channels. Conversion between different color spaces can also be performed.



*An interactive Explorer allows for rapid image object manipulation and results viewing*

## Image Analytics

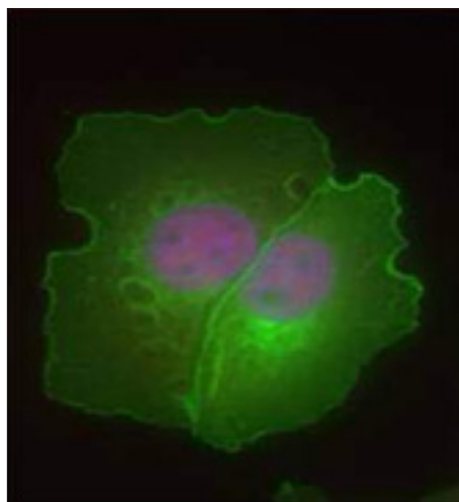
Image contrast, noise level, sharpness and other properties can be manipulated to enhance desired properties of the image, either for viewing, or to prepare the images for analysis. A number of components are provided that enable high quality segmentation of objects of interest such as morphological operators, Watershed Segmentation and Canny Edge Detection provide powerful tools for automated detection of regions of interest. Once the objects are identified, measurements can be performed, either on single channels or, using co-localization algorithms, flexible analysis can be performed on multiple channels simultaneously. Other object manipulation functionality is also available such as gating based on shape or intensity measurements or object image cropping.

## Geometric Manipulation

Standard tools for image manipulation are included in the Collection. The Rotate, Crop, Resize and Rescale Intensities components help prepare images for inclusion in reports and documents.

## Learning and Modeling

The Learning and Clustering components can be used to classify pixels, objects, images, or other types of data in both supervised and unsupervised learning techniques. The data points are grouped based on their statistical properties. All components in this group also work on color and 3D image stacks. Components



*Advanced cell processing and analysis*

include support for Gaussian Mixture, Kmeans, Segment by Distance, Principle Component Analysis, Support Vector Machines and more.

### Image Stacks and Sequences

Create and analyze 3D Image stacks and time series images. Use components to apply multiple transforms to an image resulting in a 3D stack, where each slice is the result of one transform. Capture different characteristics of local texture and view these as a collection of pixel vectors.

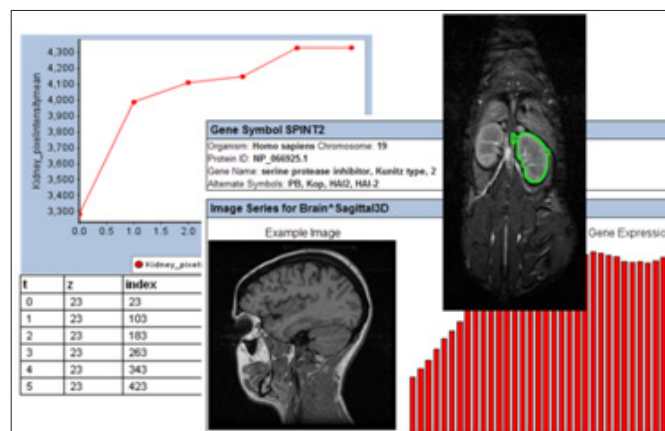
## IMAGE APPLICATION AREAS

- Microscopy
- Fluorescence, Brightfield, bioluminescence
- Cell based imaging - High Content Screening
- Pathology – Tissue, TMA
- Preclinical and Clinical DICOM – PET, MRI, CT, X-ray
- Small Animal Imaging
- Crystallography
- Agriculture
- Colorimetry
- Consumer Packaged Goods
- Material Science
- Quality Control and Visual Inspection
- Video and Behavioral Analysis

## THE LEADING PLATFORM FOR ENTERPRISE IMAGE INFORMATICS

The ability to integrate and process all types of data including numeric, text, chemical, biological, image and instrument data combined with an open server architecture makes Pipeline Pilot the ideal enterprise image informatics platform. Pipeline Pilot easily harmonizes data from multiple vendor platforms. With the ability to analyze data from multiple sources in real time - seamlessly guiding your data through processing and manipulation steps into

statistical analysis, modeling, and interactive reporting complete with easy drill down and image-data links, Pipeline Pilot reveals the power of your image based assay.



*Link images to other Biomarker related data*

## ABOUT PIPELINE PILOT

Pipeline Pilot is an enterprise scalable scientific informatics platform that enhances research and development organizations' ability to innovate by uncovering scientific value locked in disparate data silos, automating scientific workflows, and facilitating collaboration throughout the wider scientific community. Pipeline Pilot's Component Collections are the "scientific building blocks" of the platform and are grouped by category of science or function. By graphically combining components, you can construct workflows for data retrieval, filtering, analysis, and reporting.

To learn more about Pipeline Pilot, go to [accelrys.com/pipeline-pilot](http://accelrys.com/pipeline-pilot)