Amira 6.1.1

3D Data Visualization and Analysis Software for Life Sciences

Dear Amira User,

With this document we would like to inform you about the most important new features, improvements, and changes in this version. Please read these Release Notes carefully. We would appreciate your feedback regarding this version. If you encounter problems, but also if you have suggestions for improvement, please report them to fei-sw-support@fei.com. We would like to thank you in advance for your efforts.

May 2016, the Amira and Avizo team

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OVERVIEW

The Amira 6.1 release includes some important new features, enhancements, performance improvements, and issue fixes.

For major changes introduced in Amira 6.0, please refer to the *Amira 6.0 Release Notes* document.

USER-INTERFACE ENHANCEMENTS

Some components of the GUI, such as buttons or combo boxes, have been reworked (size, look and feel, color, margins, etc.), in order to have a more homogeneous interface on all platforms.

SEGMENTATION WORKROOM ENHANCEMENTS

Amira 6.1 comes with an improved segmentation workroom. The user interface was redesigned with a focus on ergonomics and intuitiveness. In addition to the improvements of the user interface, new tools were introduced and other enhancements made.
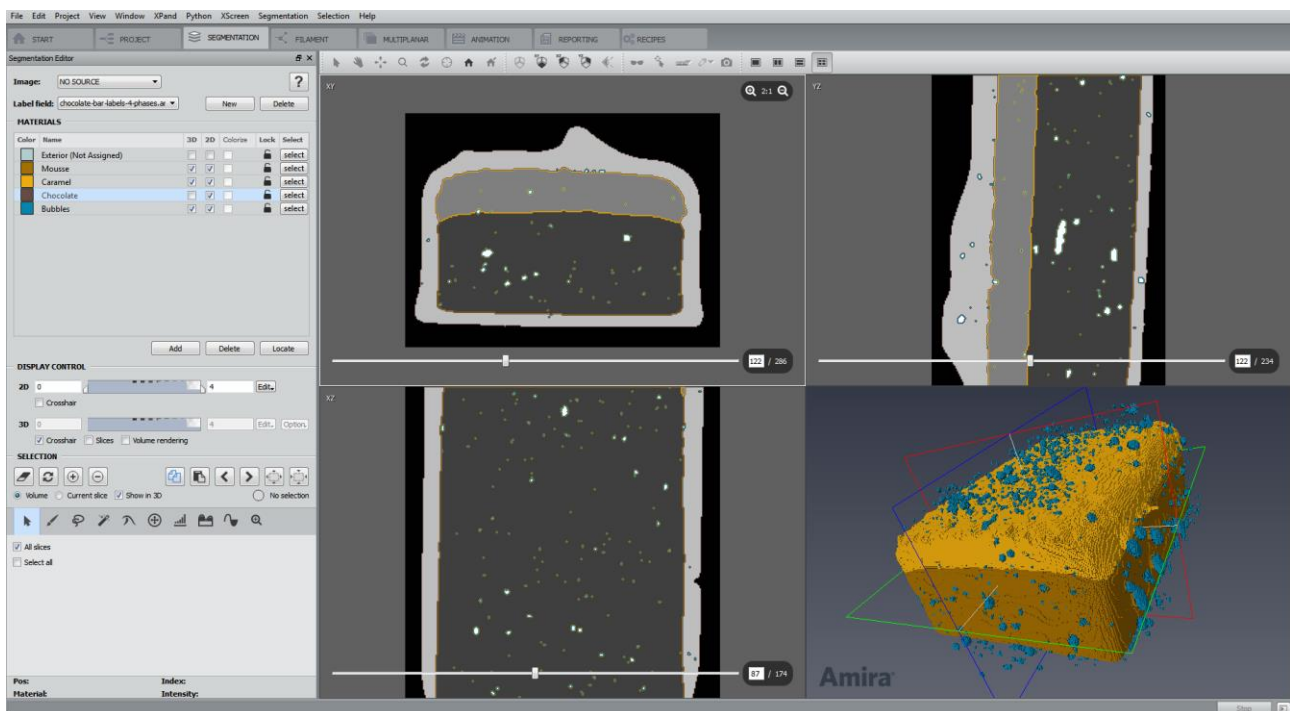

NEW DISPLAY CONTROL AREA

2D DISPLAY CONTROL

2D crosshairs can now be activated using the associated checkbox in the 2D display control area.

3D DISPLAY CONTROL

Two new checkboxes are available in the 3D display control area to activate 3D crosshairs and slices. The *Slices* checkbox is enabled only if *Crosshairs* is checked. When *Crosshairs* is selected, crosshairs and a frame appear in the 3D viewer. When *Slices* is checked, slices also appear.

A *Volume rendering* checkbox is available to activate a volume rendering visualization in the 3D viewer. A colormap allows the user to update its state. Volume rendering settings are now available in a dedicated menu *Option*.
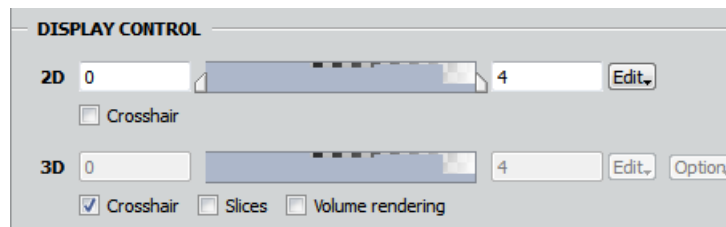
MATERIALS LIST ENHANCEMENT

The column in the materials list setting the material color has been renamed to 'Color' (previously '*Col*'). And the column allowing each material color of the 3D volume rendering to be set directly from the *Materials* list (formerly known as '*Color*'), has been renamed to *Colorize*.
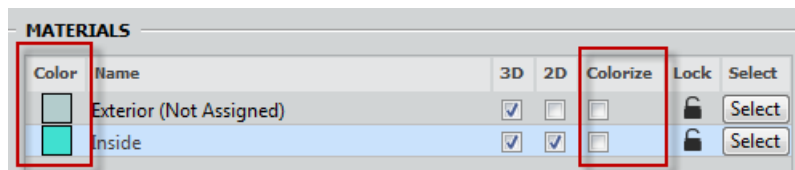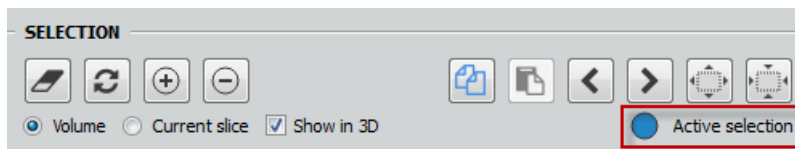

SELECTION AREA ENHANCEMENTS

SELECTION STATE

The state of the current selection is now displayed using a label in the *Selection* area. This label can display three different messages: *No selection*, *Active selection*, *Hidden selection*. The last two states indicate whether an in-plane selection is shown in one of the 2D viewers or located in a different slice.

MASKING FEATURE ENHANCEMENTS

The masking feature has been reworked. It allows the user to control the masking by setting its range, and its visibility in 2D/3D viewers, and to enable/disable it in some tools. This masking feature is optional for the *Brush* and *Lasso* tools. It is used in the workflows for the *Magic Wand*, *Threshold*, and *TopHat* tools.

TOOL ENHANCEMENTS

Some brush size presets are now available in the Brush tool.

A new mode *Intersect* is now available in the Lasso tool for interaction in the 3D viewer.

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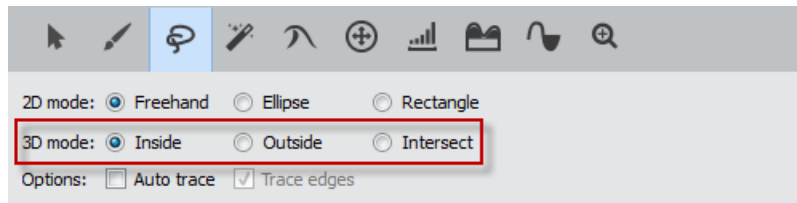
The performance of the Magic Wand tool has been improved when *All slices* is activated. A new option named *Relative range* allows the masking slider to take a relative policy.

A new Propagating Contour tool is added. It computes a boundary front from a number of specified seed points.

A Zoom tool is now available to manage the zoom factor on all and individual 2D viewers. A shortcut for the zoom tool has been added to the individual 2D viewers.
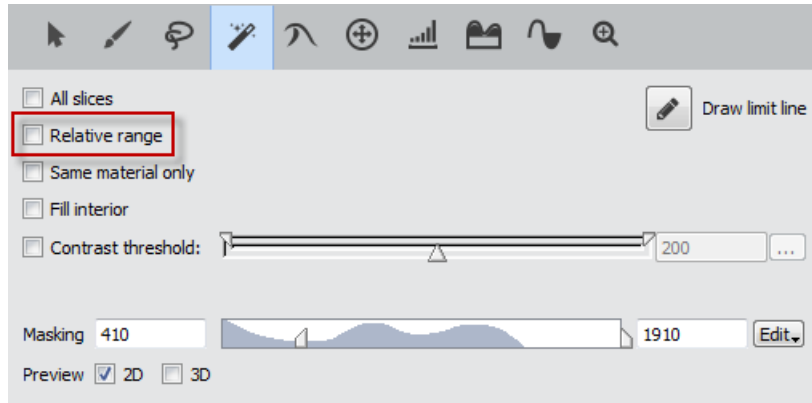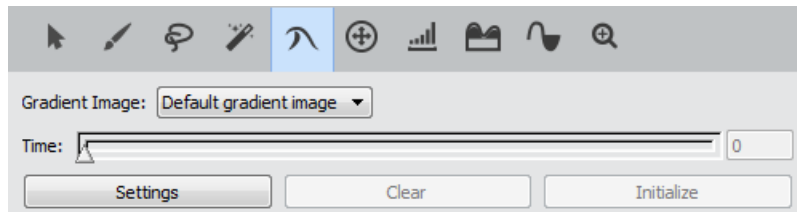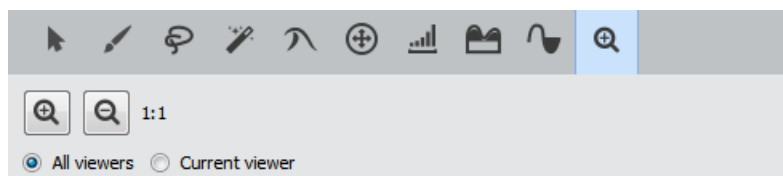

VIEWER ENHANCEMENTS

The viewer layout is now stored and restored each session. The default is still 1-viewer mode.

Scrollbars are now visible in the active 2D viewer.

When a 2D viewer is active, the **XY**, **XZ**, and **YZ** buttons of the viewer toolbar are enabled. Pressing one of these buttons causes the 2D viewer with the specified orientation to become the current viewer, instead of changing the orientation directly in this viewer. These buttons are grayed out when the 3D viewer is active.

Slices in the 3D viewer are pickable and can be moved in *Interact* mode. The crosshairs can also be moved to a picked location by pressing and holding down the **Ctrl** key.

In the 3D viewer context menu, a new sub-menu *Visible objects* was added to *Object visibility in viewer N* entry. It allows the user to show or hide a particular display module in the project directly from the viewer.

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Zoom buttons are now available in each 2D viewer, allowing the user to specify the zoom factor for each viewer independently.

SEGMENTATION MENU ENHANCEMENTS

The *Undo* action in the *Segmentation* menu is now moved to the *Edit* menu.

The *Orientation* sub-menu in the *Segmentation* menu is now grayed out when the 3D viewer is active.

The sub-menu *Current viewer* was removed from the *Segmentation* menu, as the **XY**, **XZ**, and **YZ** buttons of the viewer's toolbar can be used instead.

NEW SEGMENTATION PREFERENCES

A new *Color* preference is now available in the *Selection Draw Style* area of the *Segmentation* preferences.

A new *3D Viewer Position* preference is now available in the *Viewers Layout* area of the *Segmentation* preferences. By default, it is set to **Bottom Right**.
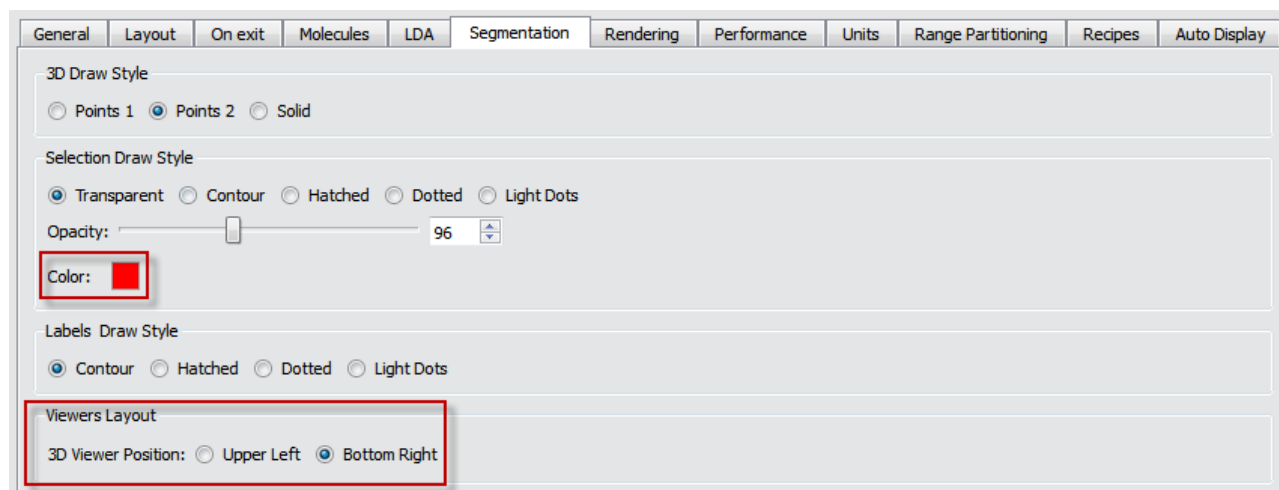
ENHANCED FEATURES

SCRIPTING ENHANCEMENTS

A new command **getState** is available for all modules and objects from the *Project View*. In the Console, type the name of the object followed by **getState**. It gives a view of the object's state, as done when saving the project.

A new command **isOfType** is also available for all the modules and objects from the *Project View*. In the Console, type the name of the object followed by **isOfType <type>**, where *type* is the object type you want to check. It returns 1 if it's correct, 0 otherwise.

OPEN INVENTOR UPGRADE

Amira now uses Open Inventor 9.6 as its graphic engine. This upgrade includes bug fixes and improvements such as enhanced *Delayed* and *Sorted* transparency algorithms, and enhanced *JPEG 2000* and *3D TIFF* readers.

XPAND UPDATE

The new version of Amira XPand is a major evolution bringing many enhancements to improve your programming experience. The new version introduces a more homogeneous API, is better documented, and will guarantee fewer compatibility breaks in the future. To reach this goal, the new version of Amira XPand introduces some incompatible source changes. A porting guide included in the Amira XPand distribution lists those changes. Please refer to this document for more information.

Custom extensions to Amira can no longer be developed using Microsoft Visual 2010, as it is no longer supported by Amira XPand. Microsoft Visual Studio 2013 should now be used on Windows operating systems.

NEW MODULES

Line Set Cross Contour shows the intersection of a line set and a cutting plane.

Point Cloud Cross Contour shows the intersection of a point cloud and a cutting plane.

Copy Parameters copies parameter bundles from one data set to another.

Tcl Command Module allows execution of Tcl code.

ENHANCED MODULE AND EDITOR

A new option is added to the Register Images module to disable rotation. If this option is checked, the transform used will have no rotation component. It can be used with any transform settings.

The Simplification Editor algorithm has been improved to dramatically reduce the occurrence of intersections in the computed simplified surface.

ENHANCED READER

The JPEG 2000 reader now supports large JP2 images, accessing only the part of the images that is needed. This avoids loading unnecessary data and reducing peak memory usage.

ENHANCED WRITER

The DICOM Export now allows the user to export 3D DICOM by selecting *Enhanced CT* from the existing dialog which pops up when saving as DICOM.

XIMAGEPAQ EXTENSION - ENHANCEMENTS

SEGMENTATION WORKROOM ENHANCEMENTS

A new TopHat tool has been added to the *Segmentation Workroom*. It detects dark or light areas in the image, corresponding to the valleys or the narrow peaks of a function *f* using morphological operators.
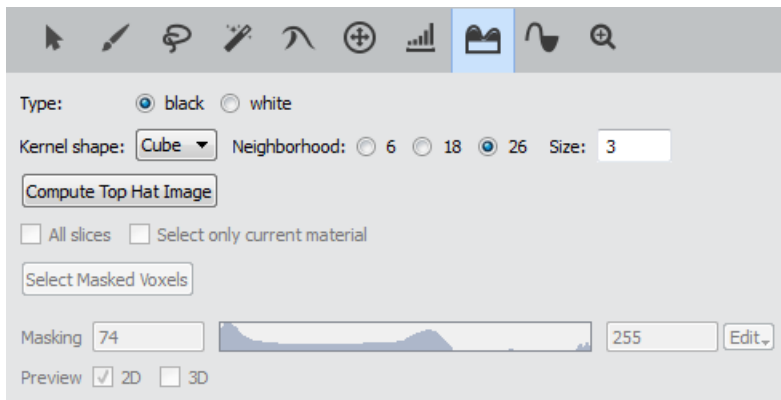
A new Watershed tool has been added. It combines the powerful Watershed algorithm with interactive techniques to provide a highly effective strategy for segmenting complex 3D structures.
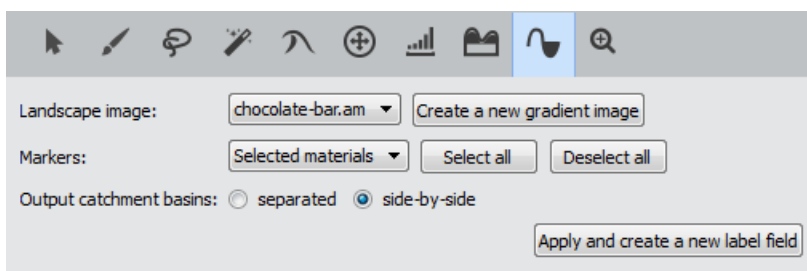
MEASUREMENT TOOL ENHANCEMENTS

The measurement tools available in the viewer window and the associated Measurement module have been changed. The new toolsallow snapping of anchor points to high or low image gray or gradient intensities (edges) or nearest points of linesets.

The snap area size can be defined by the user. Customizable callouts can now be attached to measurements. The angle and circle manipulators have been enhanced. The new Measurement module is now fully scriptable.
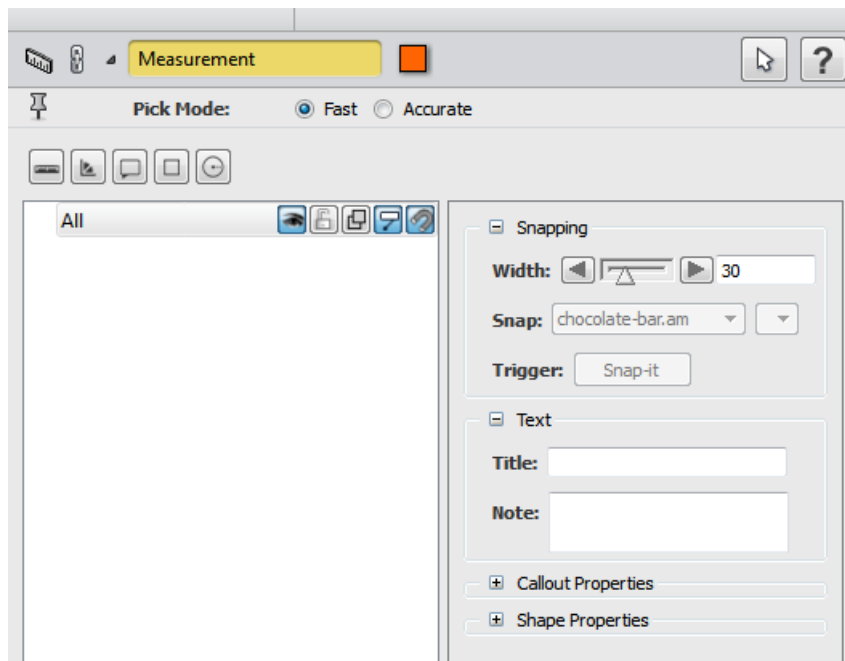
Note that the previous 2D measurement tools are now replaced by 3D measurements.
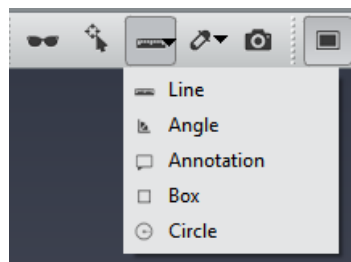
NEW MODULES

Variance operates on the first-order statistics of an image. It creates a result image where pixel values are functions of values of this pixel in the initial image and its neighborhood of a specified size. In order to calculate this value, a local histogram is calculated.

Thickness Map computes the local thickness for each voxel in a binary image, defined as the diameter of the largest ball containing the voxel and entirely inscribed in the object.

XSKELETON EXTENSION - ENHANCEMENTS

NEW MODULE

Spatial Graph to Volume generates a binary or label map that provides a voxel-based representation of a continuous geometry input, which can be an opened or closed surface, a set of lines or spatial graph, or a set of points.

NEW XBIOFORMATS EXTENSION

Bio-Formats is a popular Java library for handling life science image data. The Bio-Formats integration enables Amira to read image and metadata from over 140 file formats. For a list of all supported file formats and additional information, please visit http://www.openmicroscopy.org/site/support/bio-formats5.1/supported-formats.html.

To facilitate data exchange between different software packages and organizations, Bio-Formats converts data stored in proprietary file formats into an open standard called the OME data model, in particular the OME-TIFF file format.

Bio-Formats categorizes metadata in three tiers:

- **Core metadata**: only includes information necessary to understand the basic structure of the images, e.g., image dimension; number of focal planes; time points; channels; byte order; dimension order; color arrangement (RGB, indexed color, or separate channels); and thumbnail dimensions.
- **Original metadata**: is information specific to a particular file format. These fields are key/value pairs in the original format, with no guarantee of cross-format naming consistency or compatibility. The nomenclature often differs between formats, as each vendor is free to use their own terminology.
- **OME metadata**: is information from **Core metadata** and **Original metadata** converted by Bio-Formats into the OME data model. Performing this conversion is the primary task of Bio-Formats.

The integration into Amira then organizes the opened image and metadata into the native Amira data structure, with its well-known parameter bundles. During this process, standard image information, e.g., voxel size, matrix dimensions, etc. are assigned to the corresponding standard Amira parameter bundles. All metadata is stored in a dedicated Bio-Formats parameter bundle. The Bio-Formats integration is able to open data as scalar-, color-, and multi-channel fields, as well as tiled images and time series.

AMIRA XSCREEN EXTENSION – ENHANCEMENT

Volume Rendering performance has been greatly improved in some **XScreen** immersive configurations.

OPERATING SYSTEMS

Amira 6.1 runs on:

- Microsoft Windows 7/8/10 (32-bit and 64-bit). This is the last version of Amira to support 32-bit Windows. Amira **XBioFormats** is not supported on 32-bit Windows.
- Linux x86 64 (64-bit). Supported 64-bit architecture is Intel64/AMD64 architecture. Supported Linux distribution is Red Hat Enterprise Linux 6.
- Mac OS X 10.7, 10.8, and 10.9 (64-bit).

In order to add custom extensions to Amira with Amira **XPand**, you will need:

- Microsoft Visual Studio 2013 (VC12) Update 4 on Windows. Microsoft Visual Studio 2010 is no longer supported.
- gcc 4.4.x on Red Hat Enterprise Linux 6.
- gcc 4.2.x, provided by the standard Xcode development environment on Mac OS X.

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KNOWN ISSUES

Here is a list of known issues that will be fixed in the next release of Amira.

- Colormap ports in the Properties Area are hidden when the *Show connection ports in Properties Area* preference is unchecked. If you are bothered by this behavior, go to the *Edit* menu, open the *Preferences*, and uncheck the option in the *Layout* panel.
- Batch jobs are not working properly on any supported platforms.
- Thickness Map module doesn't belong to the right category, for now you can find it in *Experimental / Measure and Analyze* category or by typing the module's name in the search field of the *Object Popup.*

Amira 6.1 provides many enhancements and solutions to known problems, including the following:

Align Surfaces	**42587**	**The computation now works correctly when an ROI is attached to the module.**
Analysis Filter	37869	Running multiple Label Analysis Filters could result in incorrect label fields. This has been fixed.
Animation Director	34867	A pack&go project using the Animation Director is now correctly loaded and played.
	37632	A Tcl interface has been added to the embedded Movie Maker module of the Animation Director.
	36253	Deleting a selected event now works properly.
	41711	When side-by-side stereo mode is selected in the Movie Maker video export, the produced video now has the expected size.
DICOM Reader	41956	Slice spacing (0018,0088) and slice thickness (0018,0050) tags are now taken into account to define z voxel size when a single slice is loaded.
Extract Subvolume	30646	Applying this module to a 2D data set works correctly now.
	38165	In some cases, the dragger was not correctly positioned. This has been fixed.
Filament Editor	40312	Creation of an inconsistent Spatial Graph is now impossible.
Generate Surface	42797	The module could generate surfaces with wrong colors when used on some input label fields saved with versions previous to Amira 6. In some cases the material IDs were not arranged in a correct way in the parameter bundles. This can now be worked around by typing the following command in the console before using the module *data removeMaterialsIds* where data is the input label field.
	40459 37835	The module no longer modifies its input label field by changing some of its parameter bundles.
	37770	The Tcl command showMaterialList allowing to select a single material to generate a surface from has been restored.
Image Filters	40065	The Gaussian filter performance has been restored on Mac OS X.
JPEG 2000 Reader	23235	Large JP2 files can now be read.
Label Analysis	41306	When the Seek Label tool is activated, the cross-hairs and slice are now positioned correctly on the material currently selected in the list.
Labeling	38085	The documentation has been improved to provide information about important usage requirements.
License Activation System	35601	Highlights are now used to indicate whether the activation code syntax is correct or not.
	36472	The Test button now checks not only the existence of the FNP license server but the connection too.
LS-DYNA Reader	40212	Deleted cells in time series data could cause errors in the rendering. This has been fixed.
Mask	30277	Material bundles are now copied to the module's result.
Material Statistics	39037	Units are now correctly exported when exporting the result spreadsheet to CSV format.
Pack&Go Export	36280	When saving a project as pack&go, data objects were saved in Amira native format but retained their original file extension. The .am extension is now appended to the data original format.
Relabel	37868	16-bit label input no longer causes an error.

Remesh Surface	37822	Density contrast and Density range ports' visibility has been restored when a surface curvature is used instead of a density field.
Save / Export	37752	Data objects over 4GB saved in Amira ZIP format are now correctly read.
	35783 39751	Files and projects can now be saved into folders containing non-ASCII characters in their name.
Scalebars	39989	The measure was not correct when the module was in fixed size mode. This has been fixed.
Segmentation Workroom	37974	Material lock statuses are no longer lost in the Segmentation Workroom when a Generate Surface module is attached to the label field.
	28505	Sometimes parts of the selected material were not replaced when using the Replace selection tool. This has been fixed.
	40262	The pointer of the Lasso tool cursor for setting control points has been restored for more accuracy.
	34507	Using the Pick tool on large data no longer causes an error.
	43351	When the Segmentation Workroom preference selection draw style was not set to the default value (transparent), operations on the label field in the project view could fail. This has been fixed.
	39642	When using the Substract button with Current Slice selected, the display is now correct and the substracted voxels are no longer highlighted.
Shadowing	29279	The shadow rendering now works properly.
Slice	38081	2D data sets are now displayed correctly.
Snapshot	39595	An error occured when the snapshot size was too big due to too big values of render tiles and antialias options. This has been fixed by limiting the snapshot size and therefore the render size and antialias values. A warning is displayed when the user tries to specify a value that would result in a too big snapshot.
	41814	Export to PDF format has been fixed.
Surface Area Volume	38999	Even when the surface is not close to the origin, the volume results are now correct.
Surface Editor	37696	The draw tool to highlight triangles now works when 'visible triangles only' is checked.
	35331	The Fix Intersections option now displays the correct number of intersections fixed.
Surface Thickness	31434	Displaying a large surface with its thickness information could produce artifacts in the colorization of the surface. This has been fixed.
Surface View	40124	An XImagePAQ license was abnormally required when using the module. This has been fixed.
Template Projects	38153	Syntax errors in a saved project or template project could prevent its correct loading. This has been fixed.
TIFF Reader	37800	Data sets over 4GB saved in Amira 3D TIFF format are now correctly read.
Units Editor	42979	The resolution values displayed in the Units Editor are now correctly updated after the display units are changed via the Preferences dialog.
Volren	36760	Performance issues when using spin animation are now fixed.
Volume Rendering	34322	Initializing the module with Tcl commands and then displaying its properties no longer causes an error.
	40850	Zoom is no longer reset when moving through time steps of a time series data.
Voxelized Rendering	35868	The display could freeze and/or display low resolution images when rendering time series data. This has been fixed.
XPand	30792	Example package can now be generated on Mac OS X 10.9.

XScreen	36687	Limitations are now described in documentation.

Our team permanently focuses on solving as many issues as possible to make your experience of Amira as satisfactory as possible. To this purpose, we would appreciate your feedback regarding this version. If you encounter problems, or if you have suggestions for improvement, please report them to fei-sw-support@fei.com.