1. Purpose
This document provides a brief overview of new features and improvements in Living Image 4.7. This release adds acquisition support for the new Lumina S5 instrument on instrument controllers running Windows 10 64-bit. It is not intended as a general update to Living Image 4.5.x, and does not support instruments other than the Lumina S5. The Living Image 4.7 release also provides improvements to existing software features and bug fixes.

2. New Features
Windows 10 Support for Acquisition
The 64-bit version of Windows 10 is now fully supported for acquisition using the following instrument models:

- Lumina S5

3. Other Improvements
Improvements to the user experience

- The lens distortion correction can be applied to images or sequences that only contain a photograph.
- The Stop button in the Acquisition Control Panel now is disabled once it is clicked. It is not re-enabled until the instrument is back in the idle state and the button has change back to "Acquire."
- Delay unlocking the door until slightly later in the CT acquisition process.
- The ROI Measurements window is now sorted by the Image Number column by default.
- The auto-background service has been re-written to be compatible with Windows 10.
Fixes to reported issues

Acquisition:

- The User Preferences now specify the default minimum f-stop to be used with the X-FOV24 lens.
- The fluorescence exposure time is now correctly set from the user Preferences after instrument initialization.
- Fixed multiple issues that could cause a crash when loading a previously saved sequence setup in the Control Panel.
- When the Imaging Wizard setup includes changes that affect auto-exposure, the auto-exposure setting will be turned off in the Acquisition Control Panel after completing the wizard.
- When setting up a sequence in the Imaging Wizard, an error message with always be displayed if the excitation and emission filters overlap.
- Fixed an issue that could cause the wrong spectrum to be displayed in the Imaging Wizard when Cy7 is selected.
- Fixed an issue in the Imaging Wizard that could result in the wrong filters being used for acquisition if the set of filters is manually changed in the wizard.
- Fixed an issue that prevented the CT Acquisition mode from being reset to its default value when restarting the Imaging Wizard.
- Eliminated an erroneous warning that could appear in the Control Panel when setting up to image fluorescence in FOV D.
- The Acquisition Control Panel is updated correctly when selecting multiple rows from the sequence setup.
- Fixed an issue where multiple lines of text that were entered in the Comment 1 or Comment 2 field during acquisition would be hidden from view when acquisition was complete.

Spectral Unmixing:

- Fixed an issue that could prevent drawing on the image cube after deleting a spectrum in the Spectral Unmixing window.
- Fixed an issue that could result in incorrect filter labels on the image in the Spectral Unmixing window.
- Fixed a number of minor issues in the Spectral Unmixing windows that could result from a spectral component being deleted.
- Fixed a crash that could occur when importing a single spectrum library file for use with Guided or Manual Unmixing.

ROIs and Analysis:

- Fixed multiple issues involving aggregate vs individual color scales in sequence display.
- Fixed an issue that could cause well plate quantification plot data to not be saved correctly when exporting to a csv file.
- Fixed a crash that could occur when checking the "Entire Sequence" radio button in the Background ROI tab of the ROI Properties dialog.
• Fixed an issue that could cause the Refresh button in the ROI Measurements window to not fully update the contents of the table.
• When exporting a 3D Animation, the state of the "Display Organs" check box is correctly reflected in the exported animation.
• When re-using a photo for all images in a sequence, only display the Photo Mask window once during the Adaptive Fluorescence setup.

4. Known Issues

Quantum/ Spectrum co-registration with carbon bed
Registration of a Quantum µCT image with the structured light surface from an IVIS Spectrum is facilitated by a hardware bed with a custom designed fiducial. In some cases, unexpected deflection in the hardware bed makes it algorithmically challenging to detect the fiducial. A modified hardware bed is available upon request.

Access to network locations on Windows 8
Living Image requires administrative privileges to run on Windows, which can cause conflicts with User Account Control (UAC) when accessing network resources on Windows 8. Drive letters that correspond to network locations will not be visible to Living Image when it is run as an administrator. To access network locations from within Living Image, specify the UNC path to that location instead of using the mapped drive letter. For more information, see https://support.microsoft.com/en-us/kb/937624.

Windows 8/10 on high DPI displays
On “high DPI” displays, that is, displays with better than 96 dpi, Windows 8 and Windows 10 will default to scaling buttons and other UI elements to make them larger. This can cause display problems with certain parts of Living Image, such as the tool palette. To avoid these problems, click the Control Panel link to “Make text and other items larger or smaller” and then set the scaling to “Smaller – 100%” on Windows 8 or move the slider all the way to the left to the “smaller” setting on Windows 8.1. After changing that setting, you will need to log out of the computer and log back in for the changes to take effect.

On Windows 10, in the “Display” Settings panel, set the value of the “Change the size of text, apps, and other items” slider to 100%. After changing that setting, you may need to log out of the computer and log back in for the changes to take effect.

Connection to PharmaSeq wand
After scanning IDs using a PharmaSeq wand, the connection to the wand can be lost if the “Scanned IDs” window in Living Image is closed and re-opened. If this happens, re-launch Living Image to reconnect to the wand.
3D settings on computers with dual graphic cards
If your computer (mostly laptops) is equipped with dual graphic cards, please follow the next figure to default the high-performance graphics card for the Living Image software. Otherwise, Living Image 3D viewer, especially with the 3D Multi-Modality tool, may not function correctly when running on low-end integrated graphics hardware. The image below shows an example of a laptop with both Intel integrated graphics and NVIDIA graphics. Open the NVIDIA control panel and click on “Manage 3D settings.” In the “Program Settings” tab, add the Living Image executable (livingimage.exe) as the program to customize and then set the preferred graphics processor to “High-performance NVIDIA processor.”

![NVIDIA Control Panel](image)

5. Analysis PC System Requirements

PC:
Windows 7 32-bit
  2GHz Core 2 Duo or higher processor recommended
  4GB RAM

Windows 7/8/10 64-bit
  2GHz Quad Core (i5, i7) processor
  8GB RAM recommended for IVIS Spectrum CT data analysis

Mac:
OS X/macOS* 10.10 to 10.12
  2GHz Core 2 Duo or higher processor recommended
4GB RAM or higher recommended for IVIS Spectrum CT data analysis

*Note: Support for Mac OS X 10.9 and earlier has been discontinued in Living Image 4.7. MacOS 10.13 is not yet fully supported in Living Image 4.7.*

* OS X/macOS is supported for the analysis module only. A Mac computer equipped with an ATI Radeon video card or certain Intel Iris Graphics chipsets is required for 3D Multi-Modality support on OS X.

## 6. Video Card Requirements

3D Multi-Modality tools require that the graphics processing unit (GPU) meet the minimum specifications shown below. If the appropriate license is not installed or the GPU does not meet these specifications, the 3D Multi-Modality tools will not appear in the tool palette.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenGL Version Requirement*</td>
<td>OpenGL 2.0 and above</td>
</tr>
<tr>
<td>OpenGL Extension Requirement*</td>
<td>GL-EXT-Texture3D</td>
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<tr>
<td>Graphics Card Memory:</td>
<td>Recommended: 1GB (Dedicated)</td>
</tr>
</tbody>
</table>
| Consumer Graphics Cards (Desktop/ Mobile, Windows/Mac) | Supported:  
  - NVIDIA® GeForce® 8 Series and above (8, 9, 100, 200, 300 and 400 series)  
  - ATI Radeon™ HD 4000 Series and above (4000 and 5000 series)  
  - Intel HD 3000 and above and Intel Iris/Iris Pro Graphics (Mac) Recommended:  
  - Desktop - NVIDIA GeForce GT 240 and above  
  - Mobile - NVIDIA GeForce GT 230M and above |
| Workstation Graphics Cards (Desktop/ Mobile, Windows/Mac) | Supported:  
  - NVIDIA® Quadro® NVS Series and Above (NVS & FX series)  
  - ATI FireGL™ V5600 and Above (FireGL, FirePro & CrossFire series) Recommended:  
  - Desktop - Quadro FX 1800 and above  
  - Mobile - Quadro FX 880M and above |

*If these specifications are not met, the 3D Multi-Modality tools will not appear in the tool palette.*