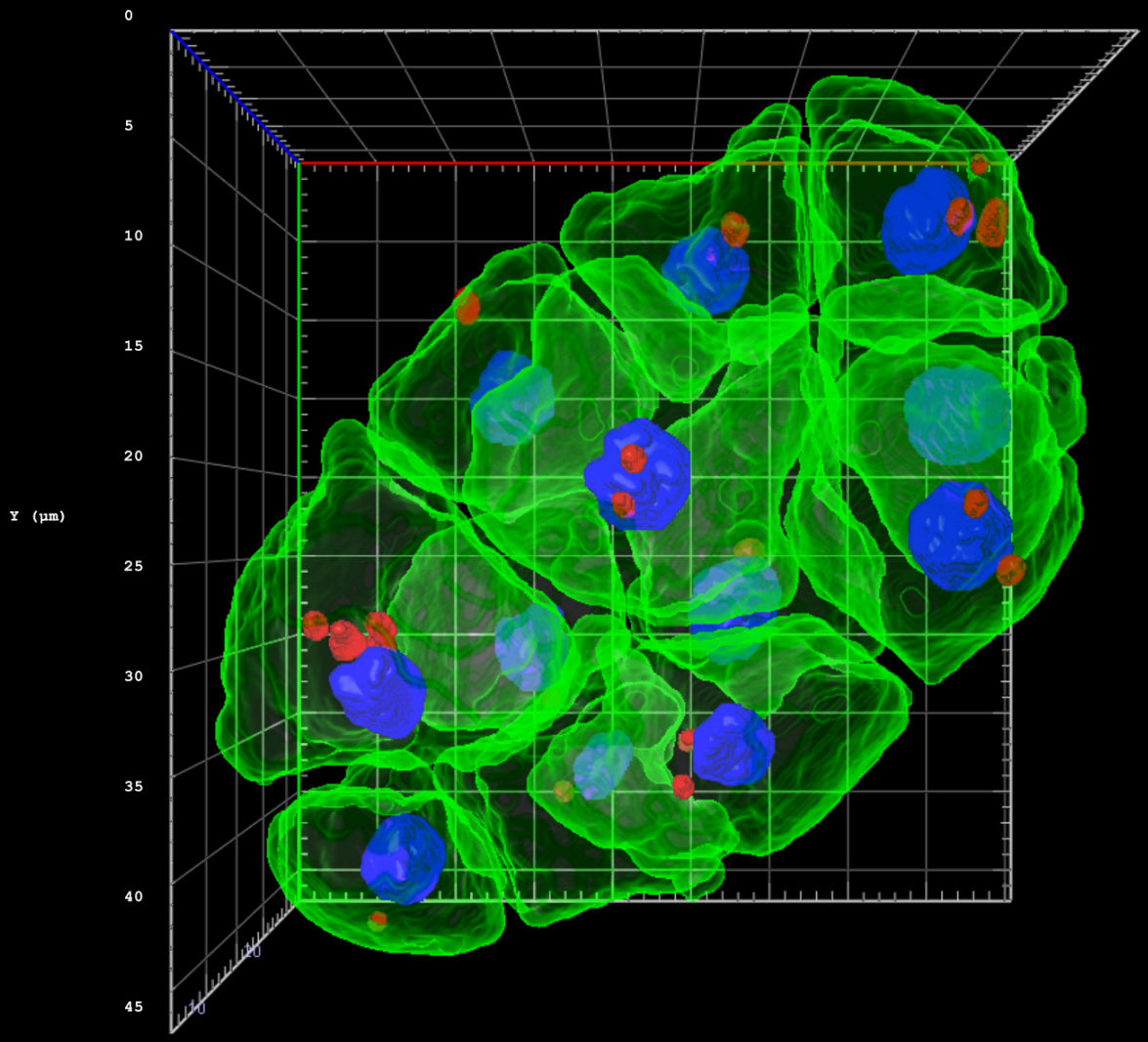
Explore the three-dimensional context



ZEN 3D Toolkit

Visualization and Analysis of 3D Volume Models

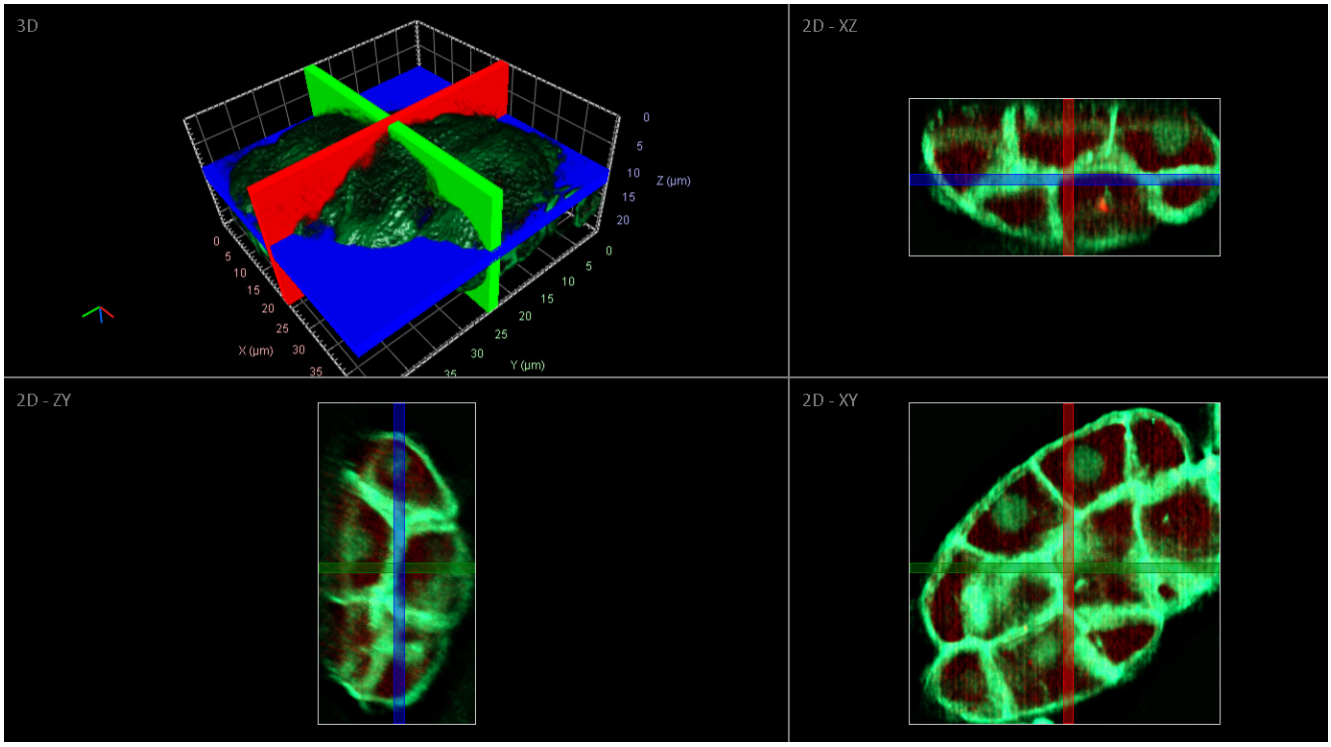
ZEISS

Seeing beyond

3D Visualization and Rendering

Seeing is Believing

Life Science research has a growing demand for imaging of complex samples. Meaningful scientific insights are increasingly generated via imaging of whole organisms or organs. Modern high-content screening experiments make use of 3D models like organoids or spheroids. ZEISS microscopes from the LSM family, Celldiscoverer 7, Lightsheet 7 or Lattice Lightsheet 7 are especially designed for 3D imaging with superior optical quality. The ZEN 3D Toolkit package allows you to efficiently work with the acquired 3D data.



C.elegans *dataset acquired with ZEISS Lattice Lightsheet 7. 3D view and orthogonal 2D views facilitated by the Tomo3D viewer.*

3D imaging basics: 3D Viewer

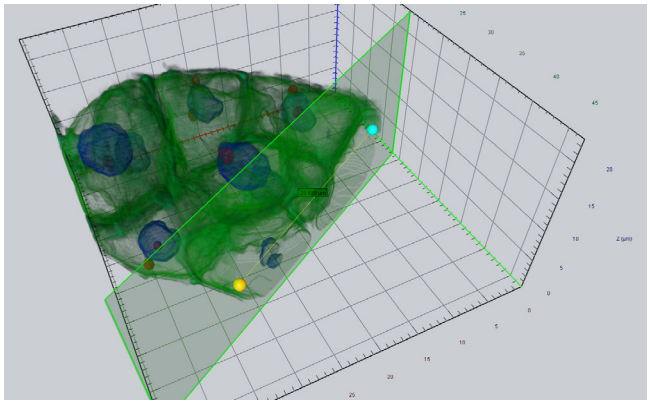
A dedicated viewer enables high-quality representation of your datasets in 3D. A set of navigation tools, including fly-through methods and zooming and panning, enables intuitive inspection. The viewer is equipped with efficient ray tracing technology, providing Transparency, Volume, Maximum, Surface, and Mixed methods. It allows adjusting channel visibility, intensity, and opacity. Clipping planes can be introduced to pronounce regions of special interest and perform basic 3D measurements. For visualization and documentation, snapshots and movies can be rendered.

Dissecting the sample: Tomo3D Viewer

Having a nicely rendered 3D visualization is impressive. But to rigorously inspect a sample, tools are needed that allow fast navigation through planes and slices. The Tomo3D viewer combines a 3D view of the sample with view of arbitrary 2D orthogonal clipping planes. These allow you to navigate to any position of interest while retaining the context of the whole sample. Clipping planes allow you to show not only a specific section through your sample, but also arbitrary section areas, so you can quickly and insightfully create maximum projection views.

3D Segmentation and Object Analysis

Quantification is the Proof



C.elegans *embryo, acquired with ZEISS Lattice Lightsheet 7. Sample courtesy of William Okafornta, Core Facility Cellular Imaging (CFCI), TU Dresden*

More than nice images: 3D Image Analysis

Your scientific work is not limited to examining a sample or creating high-quality images for presentations. The ultimate goal of any imaging experiment is to obtain meaningful quantitative data. The 3D Toolkit provides powerful tools for segmenting 3D objects, working within the established workflow of the Image Analysis Wizard. This comes with the convenience of many built-in processing functions that further optimize the segmentation, e.g., watershed functions.
The 3D Toolkit allows you to work with arbitrarily complex class definitions and derive parent-child relationships. It also operates with 3D previews.

Extract information with the Object Table

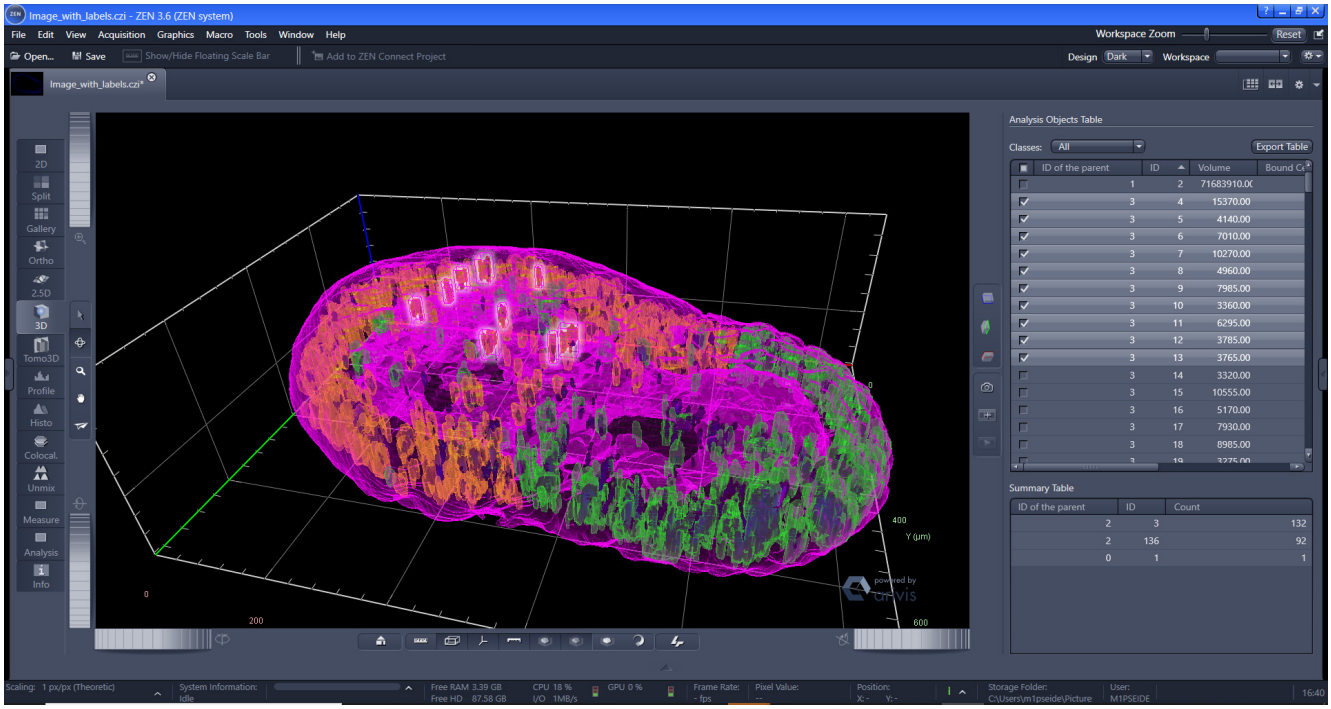
Read-outs in Life Science imaging can be particularly diverse. Once object groups have been defined by 3D segmentation, you might want to access information concerning morphology, object size or numbers, or the distribution and intensity of fluorescent signals of any sort. With the Object Table, you can access hundreds of measurement parameters. Different object classes can be accessed separately and sorted by measurement parameters. Arbitrary object subsets can be selected and highlighted in the 3D viewer.

Experimental feedback in the 3D space

A very useful and popular ZEN feature is experimental feedback via Guided Acquisition, which allows pre-selection of sample areas prior to acquisition based on automatic image analysis. With 3D Image Analysis, segmentation is now extended to 3D space, where it is especially relevant to shorten time-consuming 3D acquisitions.

Crack the tough nuts with arivis Vision4D

The ZEN 3D Toolkit enables convenient work with 3D datasets. For more complex image analysis, your data sets can be easily transferred to arivis Vision4D. Via a data bridge, the advanced analysis tools of arivis Vision4D are directly accessible from ZEN. Data integrity is ensured by full compatibility with the .czi file format.



Intestinal organoid acquired with ZEISS Celldiscoverer 7 and analyzed with the ZEN 3D Toolkit. Two separate types of segmented cell nuclei (orange, green) are shown within the organoid lumen (magenta).

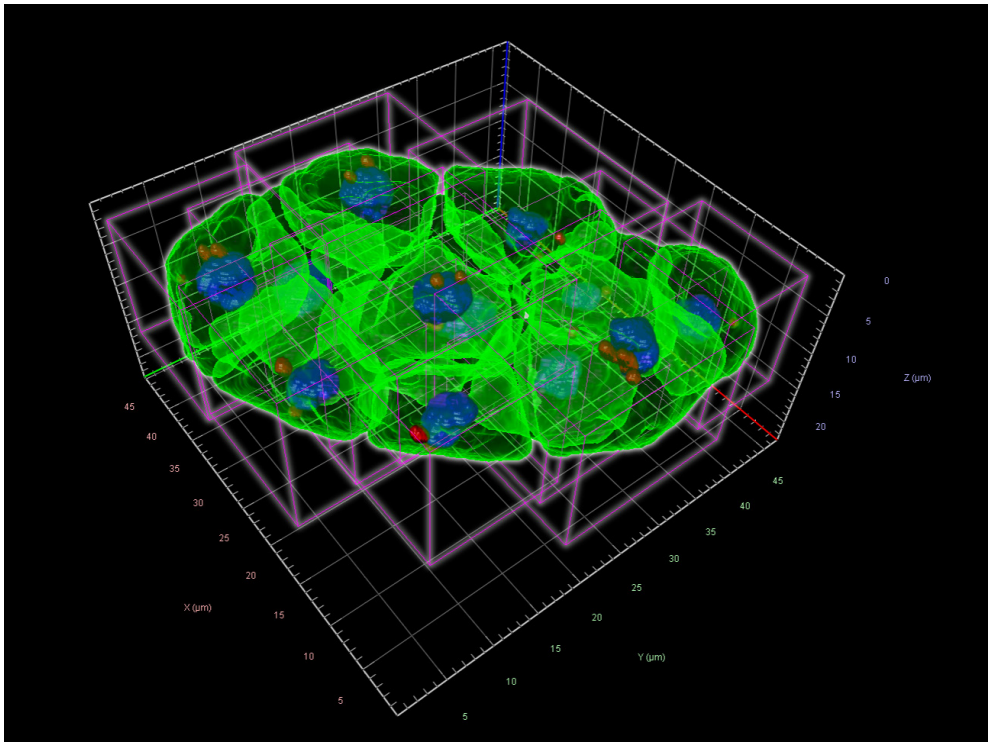
Facilitate Your 3D Applications

Efficient Ray Tracing Technology, Even for Large Data

ZEN 3D Toolkit		
3D Viewer Basic 3D visualization and rendering	**Tomo3D Viewer** 3D tomography	**3D Image Analysis** 3D segmentation and data analysis
Visualize up to six channels and time series data	Define orthogonal 2D views	3D segmentation using the Image Analysis Wizard
Choose from five render modes and work with clipping planes	Display maximum intensity projections using cut lines	Flexible object representation using different transparency modes
Rotation, zooming, panning	Adapt the view to your needs by changing the number and position of the 3D and 2D views	Sort and highlight objects
Create render series and export images (choose your resolution)		Export .csv data
Measure lines and angles		
Bridge to arivis vision4D		

Requirements

- ZEN (blue edition) 3.5
- Windows 10, 64 Bit Systems
- 64 GB RAM + 8 GB GPU (recommended)



This image and title image: C.elegans *embryo, acquired with ZEISS Lattice Lightsheet 7. Sample courtesy of William Okafornta, Core Facility Cellular Imaging (CFCI), TU Dresden*

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