# New Work Item Proposal: Layer Segmentation

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## On Behalf of Working Group 9 Ophthalmology

## Introduction/Scope

This work item proposes to add a new segmentation technique, layer segmentation, to the DICOM standard. Layer segmentation is a processing- and coding-efficient method for representing segmentation of retinal or epithelial layers. Layer segmentation describes one or more layer surfaces within a 3D volume, where a layer surface has one Z position for each (X,Y) coordinate.

## Limitations of Current Standard

Currently, the DICOM standard supports two methods (and related IODs and SOP Classes) for 3D segmentation – voxel-based, and surface-based. Neither of these is efficient for encoding layer segmentation, as they require significant processing both to compute from the raw collected data and to convert to a form appropriate for clinical analytic applications. Voxel-based segmentation requires reproducing a volume for each layer and does not support fractional pixel Z positions. Surface-based segmentation requires complete (X,Y,Z) coordinates for each surface point; although this allows for arbitrary 3D surfaces, layer segmentation requires only one Z position for each regularly spaced (X,Y) coordinate, and the (X,Y) coordinates need not be encoded as they can be inferred from the data stream.

The current DICOM segmentation methods have proven to be infeasible for ophthalmic optical coherence tomography angiography (OCT-A) applications. The proposed segmentation method may also be useful for dermatologic applications.

## Description of Proposal

The proposed layer segmentation IOD will specify a data structure that provides, for each layer, the Z offset for the layer at each (X,Y) coordinate. This would thus be similar to the Corneal Topography or Ophthalmic Thickness Maps, but would instead be a map of the Z offset for the layer. Existing data elements for segmentations would be reused where appropriate.

## Parts of Standard Affected

This work item will affect Parts 3, 4, 6, and possibly 17 of the DICOM standard.

## Resources & Time Line

WG-09 has active participation from professionals and industry, and will be meeting regularly by teleconference to progress this work. Harry Solomon will be editing this supplement. It is estimated that the work will take about 12 months, and the supplement will be approximately 40 pages. A first draft will be available by mid-2023.

It is anticipated that four hours of WG-06 meeting time will be required on each of four occasions during 2023 and 2024 to review and approve an early draft as well as public comment, letter ballot, and final text versions of the supplement.