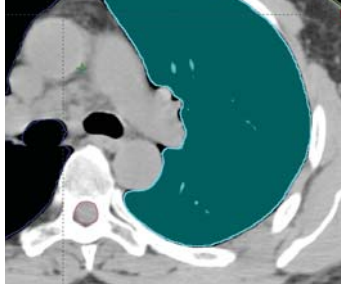
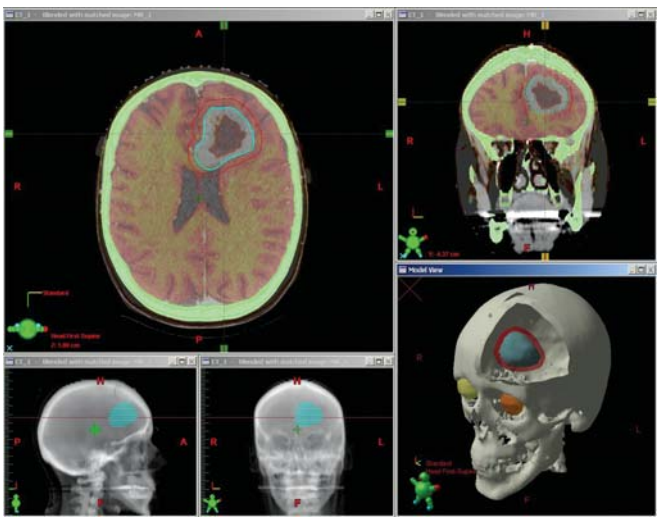


Contouring

For intensity-modulated radiation therapy (IMRT) and 3D conformal therapy planning, segmenting organs at risk and accurately delineating target volumes are critical. Structure segmentation time is reduced from hours to minutes with the powerful contouring tools in Eclipse. Clinicians can accurately define target and critical structures on fused multi-modality images with advanced drawing and editing capabilities. Enhanced templates and powerful post-processing of structures accelerate the contouring process.

Comprehensive Image Visualization

Targets and structures can be accurately defined using multiple image modalities, such as CT, MR, cone-beam CT, PET, and SPECT. Images can be fused or registered manually using fiducial markers or anatomical landmarks. Either DICOM coordinates or mutual information may be used for automatic matching. The clinician can interactively adjust the relative weights and colors of the different images to better visualize soft tissue or functional information while contouring. Structures and targets defined on one image set may be copied and pasted onto another image set, accelerating structure segmentation especially for 4D CT images.



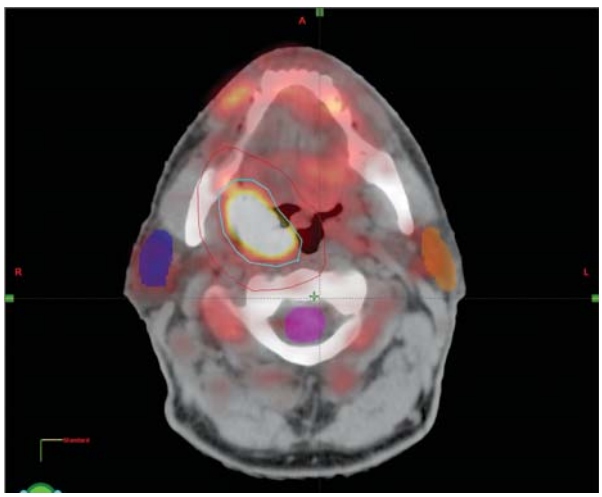
Fused images can be blended to better visualize tumors or critical structures during contouring.

Eclipse renders segmented volume data with user-specified colors and styles to enhance visual interpretation of 3D image data. In addition to the traditional transverse CT view, clinicians can display and work on coronal or sagittal views. A non-divergent digitally reconstructed radiograph (DRR) simplifies navigation through a series of CT images. Using model views, the clinician has a room's eye view of all patient structures rendered in 3D for easy spatial orientation. Image data is easily interpreted in Eclipse using window leveling and image processing, which is crucial for accurately defining structures of concern.

Flexible Structure Definition

In the contouring process, defining structure names and properties is tedious and repetitive. Structure templates in Eclipse make this process more efficient. These templates are based on an anatomical database that includes the structure name, display properties, ICD code, volume type, and automated segmentation parameters. Clinicians can create custom templates and modify existing ones. Structure templates are part of the clinical protocol templates that accelerate the entire planning process by pre-populating all of the plan parameters from physician's intent. These customizable protocol templates promote standardized clinical protocols by ensuring the same structures are contoured in the same way from patient to patient for any treatment site.

Eclipse completely supports the DICOM RT Structure Set object. Therefore, structure sets imported from other virtual simulation and treatment planning systems are reproduced accurately. Patient structures can be shared or transferred to other systems through DICOM RT. To facilitate DART™ dynamic adaptive radiation therapy and image-guided radiation therapy (IGRT), the user can copy structures from one image set to another registered image set.



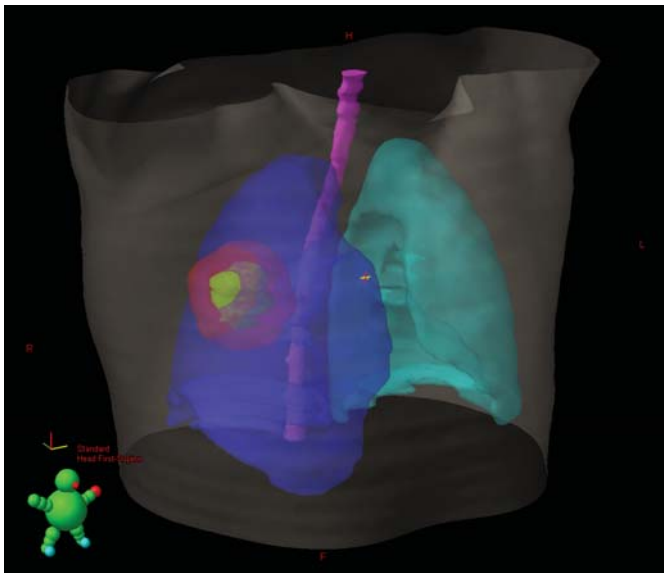
Fused PET and CT images highlight a head and neck tumor.

Eclipse™ Treatment Planning System

Efficient Segmentation

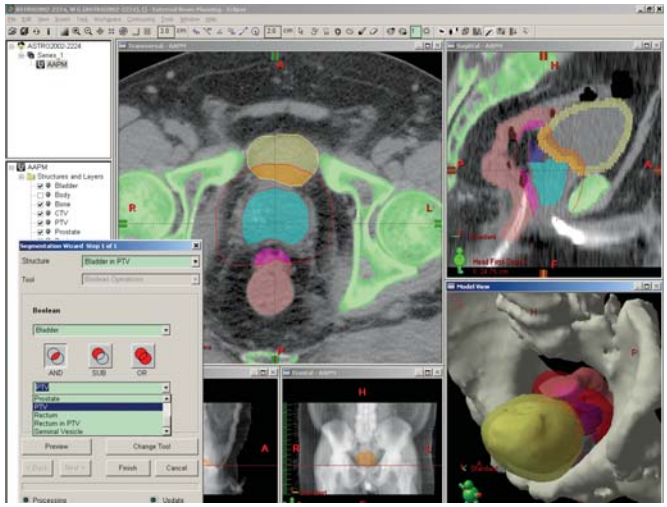
Defining targets and organs at risk is a large part of the segmentation process. This is accelerated by supporting the clinician's preferences — from drawing freehand with the all-in-one mouse tool to drawing volumetrically using an adaptive paintbrush that is sensitive to differences in image values and gradients. The user can easily zoom, pan, and scroll through image data using the mouse wheel.

Eclipse uses both logic-based and image-based automatic segmentation to increase speed and efficiency. Logic-based segmentation automatically creates new structures by forming Boolean combinations of existing structures and extracting walls or shells of a given thickness. For example, automatic cropping of structures to fit within the body saves time when correcting a PTV expansion. Image-based segmentation automatically fills regions based on organ-specific parameters or a user-defined range of CT values. Segmentation from one CT slice can be automatically extended and adapted to the next slice. A segmentation wizard contours some structures with a single click of the mouse.



Using the segmentation wizard, the lungs and spinal cord are contoured automatically.

The clinician can confine the action of automated segmentation tools to a rectangular or free-form volume of interest. For example, applying automatic segmentation based on a CT value within the user-defined volume of interest quickly completes the typically time-consuming task of contouring the femoral heads.



Using Boolean logic, dosimetrists create custom optimization structures for a prostate IMRT treatment.

Powerful Editing and Post-Processing

Much of the extensive labor associated with editing, modifying and "cleaning up" segmentation work is eliminated with the advanced editing and post-processing capabilities of Eclipse. In addition to freehand outline correction and cut/copy/paste contour editing, Eclipse has automatic clean-up, extraction, and enhancement functions to process structures after they have been defined.

These functions remove, keep, connect, or disconnect pieces of structures either by manual selection or automatically based on size. For example, the treatment couch and head-frame in images of a head and neck treatment case can be eliminated from every CT slice in just one processing step. Structures in Eclipse can also be trimmed at the boundary of other structures, smoothed, and cavities filled according to criteria provided by the clinician.

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