

During the past ten years we and other early adopters have observed and documented the transformation of the radiologist's interpretation process. This has occurred in the progressive phases:

1. **Film** based interpretation using alternators and multiple view boxes
2. **Static soft-copy** interpretation using workstations rather than film.
3. **Dynamic** interpretation of images
4. **Stack mode** which has been shown to increase interpretation efficiency as well as accuracy.
5. **Linked stack mode** which is a further enhancement that synchronizes multiple stacked images (e.g. MRI sequences) within a single examination or across a current and one or more prior examinations.
6. **Volumetric navigation** is a term that can be used to characterize the fifth phase in which the process of image review is separated from the manner in which they were acquired and reconstructed.

Radiologists are currently using several strategies to cope with this image overload. The most common of these is to acquire images using a multi-detector scanner using thin collimation and then reconstruct the images that are sent to PACS using much thicker (e.g. 5 mm. or 8 mm.) sections resulting in a three to ten fold reduction in the number of images sent to PACS. Additional reconstructions or rendering can then be performed by the technologists using a dedicated CT workstation. Unfortunately, this approach is unsatisfactory. It requires a large amount of additional technologist time, especially for angiographic rendering analogous to the extra time required for the technologists to produce films in multiple window/level settings. Due to the complexity and time required, technologists only perform this rendering in a small percentage of cases. Additionally, the reconstructed images unnecessarily take up a good deal of archival, network, and workstation memory space. Radiologists should have flexibility from case to case to determine whether the images should be reviewed in the sagittal or coronal or oblique planes or using a 3D perspective. Volumetric navigation frees the radiologist from the limitations of fixed slice axial images.

Perhaps the biggest barrier to the transition to the use of volumetric navigation has been the lack of integration of this capability in the current generation of PACS workstations. It is not practical for a radiologist interpreting a study using a PACS workstation to walk over to a dedicated 3D/multiplanar workstation for each case. Another challenge is the fact that image navigation is typically not a linear, sequential process as is review of a set of axial images but may be performed in a more haphazard fashion with a radiologist reviewing a portion of a dataset in one plane and other portions using other views which could result in portions of a dataset not being reviewed at all.

The transformation of the radiology interpretation process will continue to evolve at a rapid pace. Although image navigation and enhancement will continue to improve (including better support for multimodality fusion such as CT/PET), the next major phases will focus on decision support tools such as computer assisted diagnosis (CAD) and cuing and intelligent applications of informatics.