To counter falling reimbursement and increasing cost pressure many imaging facilities seek ways to both increase productivity and patient throughput. One example of these efforts can be seen directly in the continuously increasing number of patients scheduled for MRI per hour over the course of the last years.

Higher patient throughput not only increases the technologists’ workload but also their expectations towards the tools available to them. The user interface (UI) to the MR scanner is arguably the most important tool that technologists have at their disposal. Most interactions with the MR scanner over the course of the examination will happen via the UI. As such, the UI can have substantial influence over how productive an MR scanner is operated. Great care should be taken such that when designing a new UI, it will be easy to navigate, task cards for scanning and processing should not overlap, and the workflow should follow the natural course of the MR examination.

It is also crucial to carefully preserve the overall functionality and the known appearance of any new software, be it in MR technology or consumer electronics, in order to make the transition to a new UI for experienced users easy.

Our new 3T MRI system, MAGNETOM Vida\(^1\), introduces a completely redesigned MR UI running on a new hardware platform. Evolving from the successful syngo MR E11 platform, the new syngo MR XA10 software\(^1\) is a user-centric control center for patient registration, scanning, post-processing, and result distribution.

**Dual monitor setup**

Studies have shown that even standard office applications substantially benefit from a dual monitor setup, resulting in 45% easier task tracking, 32% higher performance, and 24% more comfortable use than single monitor setups [1].

To ease the work of the MR technologist in a similar manner, syngo MR XA10 software operates on a dual monitor scanning workplace with two large 24-inch monitors with a reorganized user interface.

For a more natural scanning and viewing process, different tasks have been clearly separated: The left screen is reserved for patient registration, scanning, and protocol management, while the right screen, especially with the new MR View&GO application which encompasses reconstructions, post-processing, image quality check, and distribution of results to the PACS and other DICOM nodes (Fig. 1). This dual monitor setup, with separated scan and viewing monitors, makes for a more natural working environment in which the technologist has a complete overview of the examination and results. Constant context switches and distractions are reduced, enabling stronger focus on the patient and true multitasking for increased quality and productivity.

syngo MR XA10 builds on the established syngo MR E11 platform, inheriting many known features and UI elements, which makes orientation for users of the existing platform easy.

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\(^1\) 510(k) pending. The product is still under development and not commercially available yet. Its future availability cannot be ensured.

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**Figure 1:** Dual monitor setup with two 24-inch screens. Clear task separation with image acquisition on the left-hand side and processing with MR View&GO on the right-hand side.
As shown in Figure 2, central UI elements and features on the left screen have been preserved but newly arranged on the larger monitor. Furthermore, the new layout now provides fixed positions for UI elements like the physio display and the inline display. Other useful components like the Dot Cockpit for protocol management have not been changed in their appearance. They do, however, offer the ability to be opened on the right monitor while scanning, therefore not interfering with other processes.

“The new interface is clearly structured. It is easy to get used to it.”
Andreas Lingg, MTRA
Tübingen University Hospital, Tübingen, Germany

Right-hand side with MR View&GO
MR View&GO is a dedicated MR viewer that allows viewing, routine post-processing, filming and result distribution in one comprehensive workflow with consecutive steps (Fig. 3A). As soon as a patient has been registered on the left-hand side, a corresponding MR View&GO automatically opens for the respective patient on the right-hand side. Every scan that has been acquired and reconstructed automatically appears on the right screen.

Pre-processing with Recon&GO
Powerful image pre-processing capabilities, e.g. automatic InlineSubtraction of dynamic series, InlineMPR calculation of 3D datasets or InlineComposing of multi-station exams, which are all standard, run automatically in the background. This helps to reduce the workload for the MR technologist.

Figure 2: The new workplace with syngo MR XA10 (2B) evolves from syngo MR E11. Planning segments (orange), queue (yellow), scan parameters (purple) have kept their appearance but were newly arranged. The new layout provides fixed positions for hovering UI elements such as the physio display and the inline display (blue).

Figure 3A: MR View&GO is a dedicated viewer for MR studies, offering consecutive steps for image viewing, processing and distribution. The user can configure an individual tool box of frequently used features such as image markers, distance measurements or ROI analysis in the lower left corner. Further analysis tools can be found in so-called “corner menus” in the edges of individual image segments.
Step-by-step from quality control to distribution

Following the natural workflow, MR View&GO guides you from basic viewing and quality control towards result distribution to the PACS and other DICOM nodes (Fig. 3B). Intermediate post-processing steps which might be indicated depending on the case can be easily launched by selecting an image series and transferring it to the respective step with one mouse click.

This, for example, enables the reformatting of images in 3D as Multiplanar Reconstructions (MPR), Maximum Intensity Projection (MIP), or with a Volume Rendering Technique (VRT). Furthermore, arithmetic image analysis or the interactive extrapolation of very high b-values (up to 5000 s/mm²) can be easily performed while the scan is running. The resulting images, for example multiplanar reconstructions of a 3D dataset, can be easily dragged-and-dropped back to the planning segments on the left monitor to precisely plan subsequent scans.

To evaluate dynamically acquired contrast-enhanced image series, MR View&GO also offers a dedicated MeanCurve analysis step as a standard feature. This, for example, helps in the evaluation of a test-bolus scan, prostate DCE series (Fig. 4) or contrast-enhanced breast MRI.

In addition to InlineComposing, MR View&GO provides manual composing for complex cases to support, e.g., whole-spine, whole-body, or angiography exams.

Advanced image processing

For more advanced image processing requirements, e.g. to perform neuro perfusion and mismatch analysis (Fig. 5), dedicated applications are optionally available. These applications cover the entire radiological spectrum from neurology (MR Neurology, Neuro3D Tractography and (MRI), cardio-vascular evaluations (Cardiac Perfusion, Cardiac Flow, 4D Ventricular Function, Vascular Analysis), to oncology (Breast, Prostate, OncoCare, 3D Lesion Segmentation). Many of these only require minimal user interaction; for example, flow quantification is fully automated after a vessel has been selected for analysis. This allows preparing MR datasets ready-to-read, saving one of the most precious resources: the radiologists’ time. Depending on the institutional setup and needs, it is also possible to operate a satellite console with a shared database for basic (MR View&GO) and advanced processing purposes (Fig. 6). This configuration has the particular advantage that licenses for advanced applications are shared between the acquisition workplace and the satellite console.

1 This reflects only a selection of advanced applications, further options are available.
2 Only one user can process data at a time with one license.
Finally, the appearance and usability of all applications has been harmonized with our departmental post-processing platform syngo.via, helping to improve workflow efficiency.

**Summary**

The new user interface syngo MR XA10 is designed to improve the technologist’s user experience with clearly separated tasks following the natural flow of their work. This not only helps to make routine exams more comfortable to perform and focus more on the patient than on the machine, but also supports in cases where rapid results are decisive. For example in imaging of acute stroke the combination of highly optimized exams using GOBrain, which only needs 5 minutes acquisition time, together with subsequent mismatch analysis (Fig. 5) right at the scanner can save precious time and may help to gain therapy-relevant information faster.

**Reference**


**Figure 5**: The standard MR Neurology workflow can be enhanced with the capability to perform mismatch evaluation. As shown, the penumbra (yellow outline) is substantially larger than the core infarction (turquoise area) in this patient, prompting immediate treatment.

**Figure 6**: Deployment overview and departmental integration of the MR acquisition workplace and the optional post-processing console.