Meeting the new demands of ultrasound:

LOGIQ® E9 Scan Assistant software from GE Healthcare improves speed, ease and consistency of ultrasound exams.

Along with advances in imaging technology, the environment for medical ultrasound has changed. The ability to view anatomical structures and processes clearly and in real time, without radiation, has led to ultrasound’s expanded application into reproductive medicine, cardiology, urology and emergency rooms, as well as other medical specialties. The increased demand for ultrasound exams has presented challenges for sonographers, radiologists, and administrators, who must balance their increased workload against the need for diagnostic accuracy, process documentation, and the cost concerns of each healthcare facility.

The growing need for ultrasound efficiency tools

As workloads have increased, sonographers must see more patients each day. The increase in larger and sicker patients presents particular imaging concerns and physical demands. Repetitive stress injuries have become common for sonographers, and the resulting high turnover in the field affects productivity.

Automating the ultrasound scanning sequence offers the opportunity to increase productivity and standardize documentation while lowering the risk of sonographer injury. Improved workflow allows sonographers to concentrate more on their patients rather than on keystrokes, increasing clinical accuracy and reducing the potential for keyboarding errors. Standardization of scanning protocols through automation also aids in new sonographer training and increases the consistency of ultrasound images between sonographers — in turn helping the radiologists who must interpret the study.

From the administrator’s perspective, the ultrasound department must achieve maximum patient volume to realize
a return on investment for medical equipment and personnel costs. Additionally, while there are not currently standards for licensure in diagnostic medical sonography, there is an increased demand in clinical environments for accreditation and credentialing of ultrasound users and facilities, a process that requires specific, consistent documentation.

To meet these demands, the GE Healthcare development team created Scan Assistant, a software tool that intuitively assists the sonographer with customizable automations at each step of the ultrasound exam. The result is a faster, more comfortable process for sonographers and increased image consistency from exam to exam and user to user. Scan Assistant also offers the opportunity to establish user-specific or department-driven protocols that can aid in staff training, documentation and accreditation.

Fewer keystrokes, better results
The Scan Assistant software guides the sonographer through the entire exam, automatically invoking the correct mode and imaging parameters and advancing to the next step of the exam, guiding the user smoothly through the process with one-button operation. Rather than overriding the user, Scan Assistant gives sonographers more control over important exam decisions by improving the efficiency of the system itself, minimizing keystrokes and speeding the flow of image capture.

The system is designed with exam-specific, built-in programs for all exam types, such as vascular, thyroid, abdominal, urology and OB/GYN. Automation of several common scanning actions speeds the exam and ensures consistency of imaging and measurement procedures by exam type and/or department protocols.

Automation features include:
• Automatic insertion of comments
• Automatic setup of imaging controls and modes
• Automatic steering in color and pulsed Doppler modes
• Initiation and autocompletion of required measurements
• Intuitive advancement to the next step in an exam
• Automatic preset selection by transducer, exam type and user

When pathology is found and more images are needed, the Scan Assistant built-in flexibilities allow the program to be paused while the user acquires the additional images. Then the established program can be resumed.

Users of the new program have found that by reducing keyboard entry, Scan Assistant helps ensure clear results communication. Jenelle A. Beadle, RDMS, Inland Imaging in Spokane, Wash., said, “I like that I do not have to type my annotations. It promotes consistency within the department.”

Standardized communication notations help both sonographers and radiologists, who must interpret the reporting and measurements of multiple sonographers. Ultimately, standardization protocols available via Scan Assistant will help to ensure accurate clinical evaluations of images and reduce the need for re-imaging of patients to achieve an accurate and complete diagnosis. This, in turn, translates to a more efficient, cost-effective clinical department that can more easily recoup its investment in new technology and staff training.
Customizable by location, exam or user
Each Scan Assistant exam program is easily customizable to specific user preferences and/or department protocols. Using the Scan Assistant Creator Tool, users or administrators can easily customize program requirements, including imaging sequences, imaging parameters and required annotations for any given care area. This allows for the development of standardized, departmentwide or user-specific programs that increase imaging consistency, while also allowing each operator to customize the system in the way that is most comfortable and efficient for them.

According to John S. Crowley, RDMS, RVT, Inland Imaging in Spokane, Wash., this feature has proved a vital teaching aid: “Scan Assistant is a good training tool for new sonographers and new employees. It helps them learn the protocol of the department.”

Developing Scan Assistant: Understanding the process
To ensure that the Scan Assistant software would be useful to both experienced and novice sonographers, and relevant to their specific needs across various applications, the GE Healthcare development team worked with ultrasound users in multiple clinical settings, including a university hospital, a community hospital, and an imaging center. The team worked with multiple users at each site, noting their scanning processes and functional needs. The team then developed an intelligent algorithm that replicates the user’s natural scanning sequence.

This collaborative process resulted in many Scan Assistant features, including:

- Automatic program selection based on the DICOM worklist exam description
- The capability to store two images, one with and one without color based on a single user action
- A navigation interface that includes both descriptive names and icons for essential scanning steps — especially useful for new users to the system or the specific Scan Assistant program
- Intelligent evaluation of current state and next steps to ensure exam consistency
- The ability to create personal Scan Assistant programs
- Dynamic learning of transducer and imaging presets for specific programs
- Smart algorithm parameters that work with and adapt to individual sonographer decisions
- The capability to provide instructions for the user associated with the current protocol step

The Scan Assistant software for the LOGIQ E9 offers many features that make it innovative among leading ultrasound systems. In particular, the system is able to dynamically “learn” transducer and imaging presets tied to a particular Scan Assistant program — avoiding the need to select preset and transducer type for each exam.

Proven benefits
User testing has shown that Scan Assistant significantly reduces keystrokes and exam time — offering many opportunities for improved productivity with each exam performed. Direct comparison of thyroid, carotid, abdominal and lower extremity venous (LEV) exams with and without Scan Assistant illustrate the benefits. (See Fig. 1.)

The abdominal exam completed for this study required 575 keystrokes without Scan Assistant.

The same exam required only 189 keystrokes when using Scan Assistant — a 67 percent reduction in user actions and a corresponding reduction in time of five minutes, 38 seconds. The carotid exam without Scan Assistant required 698 keystrokes, compared with 238 keystrokes with Scan Assistant. This result reveals a 66 percent reduction in keystrokes and a five-minute, 34-second reduction in exam time. Thyroid and venous exams reveal similar savings in effort and time, offering clear advantages in terms of streamlining sonographer workflow and helping to avoid repetitive stress injuries caused by constant interaction with the imaging console.

Standardization of scanning sequences can improve both workflow and the consistency of image capture. For example, one lab using the LOGIQ E9 ultrasound system had recently adjusted internal protocol for unilateral LEV studies to include an image on the opposite leg. The second image was often overlooked until the lab used Scan Assistant to guide the process. By using the program to establish department standards, the system can reduce patient callbacks due to missed images as well as help ensure adherence to department protocols that are key to accreditation.

With the proprietary automated features of Scan Assistant, GE Healthcare has created an ultrasound-specific software tool that increases user comfort, improves scanning workflow and increases department productivity while maintaining the high-quality ultrasound images critical to accurate diagnostics and extraordinary patient care.
Fig. 1

**ABDOMINAL EXAM**

67% Keystroke Reduction  
51% Exam Time Reduction

**CAROTID EXAM**

66% Keystroke Reduction  
42% Exam Time Reduction

**LOWER EXTREMITY VENOUS EXAM**

79% Keystroke Reduction  
54% Exam Time Reduction

**THYROID EXAM**

79% Keystroke Reduction  
50% Exam Time Reduction

1Internal study done with third-party consultants.