Dot for productivity

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Breaking the status quo is not an optimal strategy for any viable, fast paced institution. However, developing and implementing a robust Dot platform can overcome any of the anxiety and disruption that typically characterize change. The Dot platform has not always been the highlight of protocol building, but with the advances introduced by the *syngo* MR E platform, creating and using protocols far surpasses the expectations that came with the earlier *syngo* MR D platform. We began our Dot journey by stumbling through the early iterations of Dot development, and now find ourselves equipped with an efficient and user-friendly software that streamlines processes and increases functionality, but only as far as we allow the platform to go.

The *syngo* MR D line was the jumping off point for our Dot journey – and it really was a matter of jumping off. This new software was meant to ease the workload for the user, but adopting the design elements took some acclimatization. The D line allowed the user, or rather the application specialist, to build site protocols into a multilevel user platform that organized the workflow into strategies that achieved efficiency by making it possible to quickly switch scanning patterns for different patients. To better explain this, I will use an everyday example of a typical MRI patient: The exam begins with the patient asking what MRI is and how MRI differs from CT scans. After listening to a brief explanation of how MRI uses a large magnet to make detailed pictures from the protons inside the body, the technologist makes the patient as comfortable as possible and begins the exam. Some of the streamlined efficiencies start at this point. In the case of basic brain or abdomen scans, the MRI system knows the common centering points for certain body regions and automatically positions the patient at the center of the magnet. Technologists do not have to turn on the laser light to initiate location of isocenter. Instead, they simply press and hold the toggle wheel on the front of the scanner to center the patient directly at isocenter. By handling simple tasks like this, the scanner allows technicians to concentrate on the patient and the exam. Dot was created to relieve users of some monotonous tasks by having the system perform them without demanding too much expertise. At the console equipped with the D level software, technologists can choose the
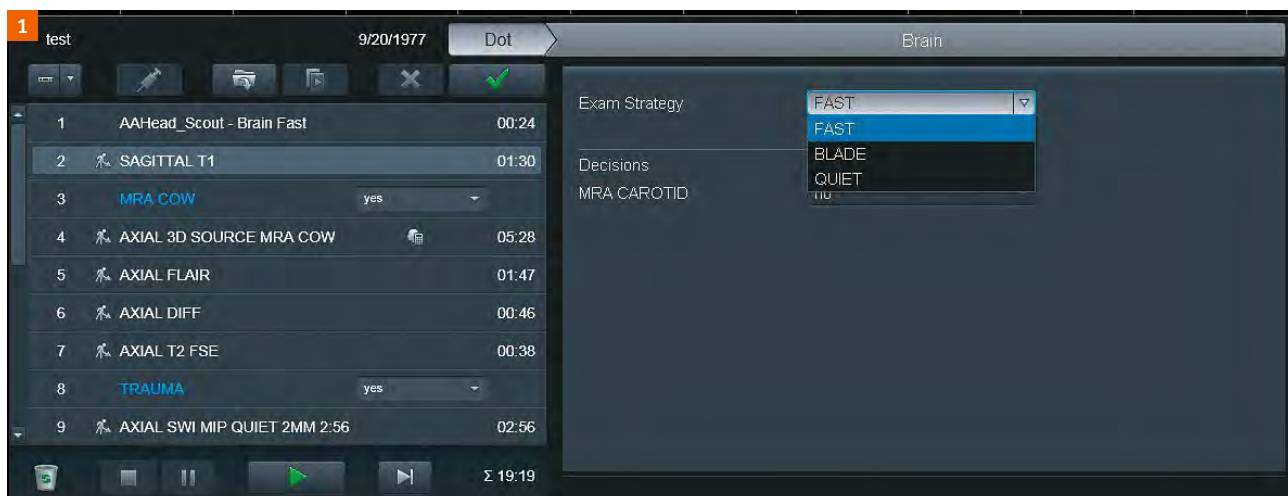

Figure 1:
The window on the right shows the Dot exam strategy chosen from a simple dropdown menu. The three strategies that we built are FAST, BLADE, and QUIET.

exam strategy that best fits their assessment of what the patient can tolerate. Dot allows users to determine if the patient is compliant enough for the routine exam or if a fast strategy is needed to accommodate the patient's needs. With Dot, users can simply choose a strategy from the Dot menu and start the exam. It is also possible to change the exam strategy along the way.

Back in our example patient scenario, the patient in the scanner begins to wonder where the loud noise is coming from and starts to look around. The diligent technologist asks the patient to stop moving and to remain still for the exam. After a few more minutes, the patient starts to move again, but this time the technologist decides to employ a different strategy. By simply clicking on the Dot menu again, the technologist can switch the pulse sequence strategy to BLADE sequences. The Dot menu makes it possible to change the manner in which the exam is delivered with four mouse clicks. For busy technologists managing patients who need extra attention, this ease of altering the exam strategy is key. The D platform changes the routine series into a BLADE series without the technologist having to enter the user tree and locate the sequences manually – as demonstrated in this Dot Cockpit screenshot.

For a fast-paced, patient-centered facility, the efficiency gains here are monumental. The speed at which technologists can alter the scan to accommodate the patient reduces scan times and improves exam quality.

The Dot platform added another ingenious option that streamlines throughput: AutoAlign is a user-preference feature that allows the scanner to attempt to align the slices as set out in the protocol. To illustrate this, think of the basic axial brain. The scanner has built-in options that tell the software to align the slices in an axial fashion with the base of the brain, orbits, temporal lobe, etc.

With the slice set-up fixed in the protocol, the scanner will attempt to align the slices as programmed, which means users can simply accept the scanner's decision or adjust the slices as they see fit. This may seem like the scanner is taking over the job of the technologist, but it is simply a tool that helps technologists achieve the efficient throughput that today's busy MRI departments require. As mentioned above, this option is entirely user-induced, and the creator of the protocol can choose the extent to which the scanner operates on behalf of the technologist. This feature also allows for reproducibility across different users in a single facility, which benefits the patient and the radiologist.
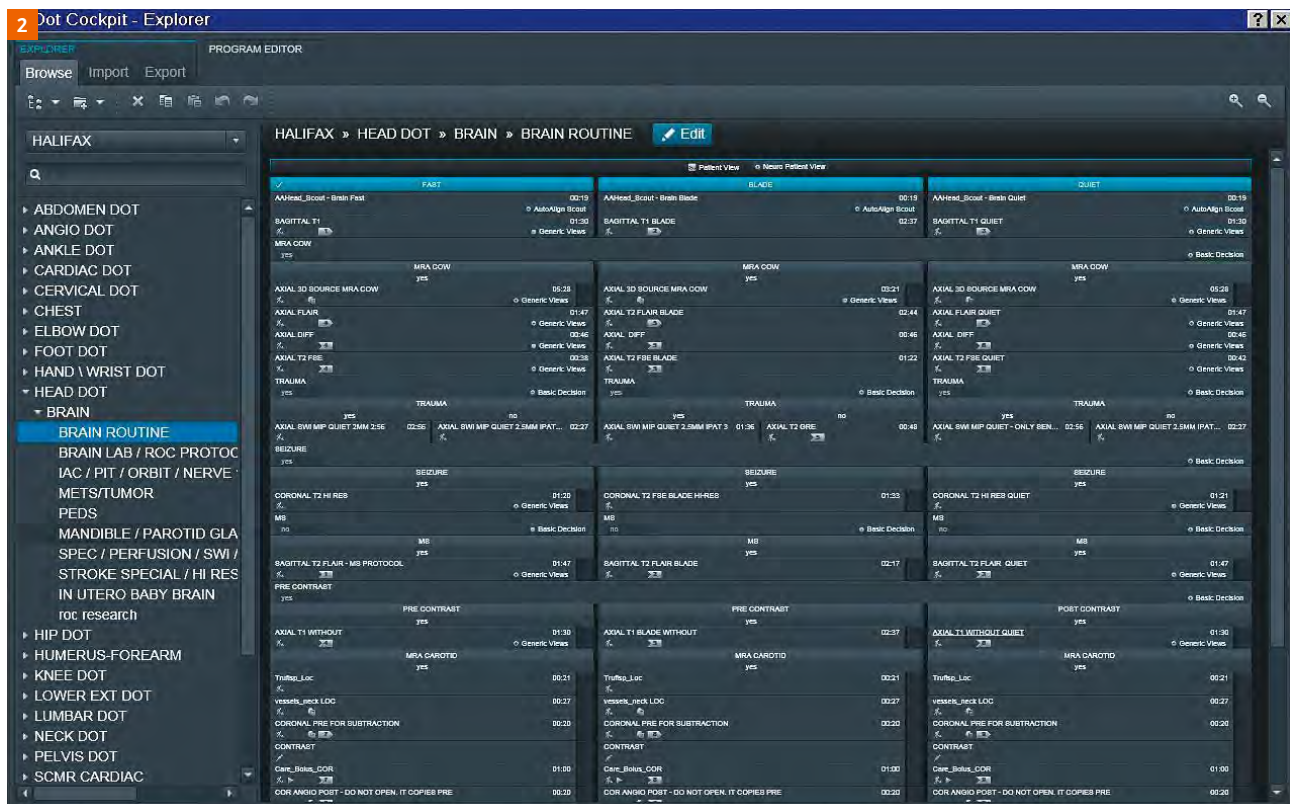

Figure 2: The Dot Cockpit with all the brain strategies tailored for our facility.

Advances to the D platform came with some limitations. The software would occasionally freeze when attempting to mix pulse sequences that were not in Dot protocols with Dot scans. This sometimes left users with only one option: Restarting the software. In addition to this shortcoming, my earlier comment about an application specialist
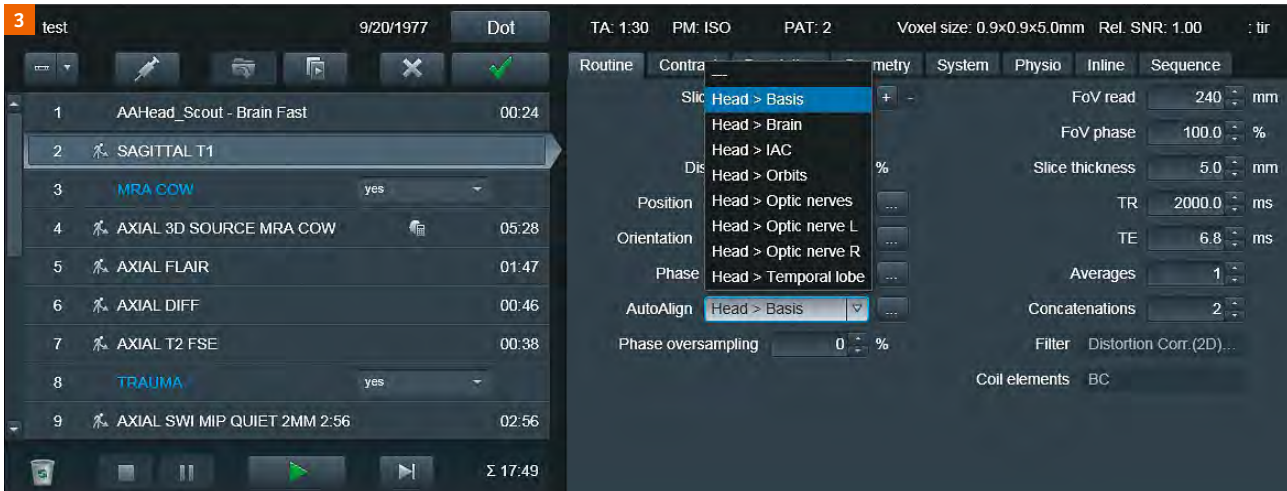

Figure 3: Screenshot illustrating the different AutoAlign features that are preprogrammed for brain imaging.
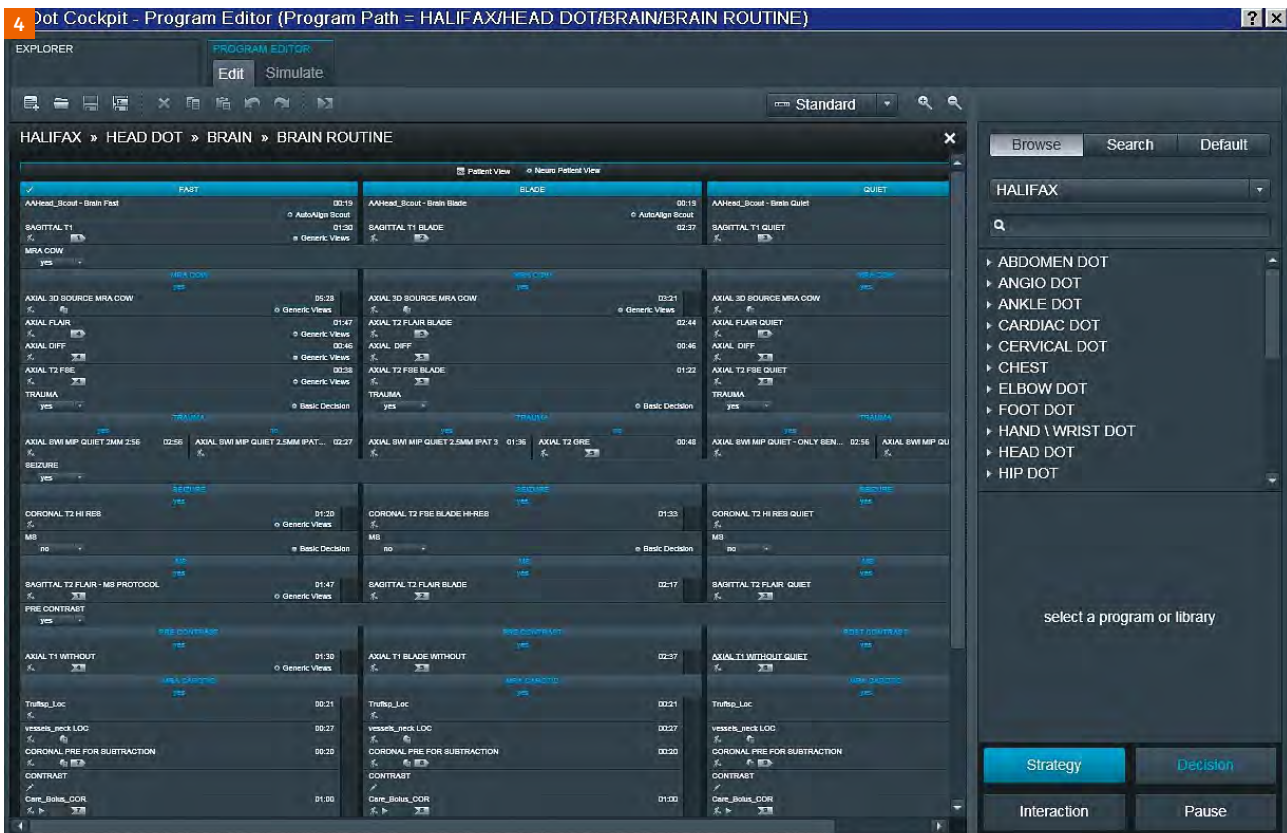

Figure 4:
The bottom-right corner of this screenshot shows the Strategy option, which can be dragged directly into the exam series list for ease of protocol building.

building the Dot tree for users was not lightly made. The Dot building in the D platform did not make it easy for authors to navigate the string of pulse strategies. This statement is not characterizing the platform as a useless toy, but as a sophisticated tool that can enhance a department's productivity once the software has been implemented in a logical and user-friendly fashion.

After working with the D line for two years, we acquired the E line with Evolve. The benefits of this version exceptionally enhanced our workflows both in terms of daily throughput and protocol management. The E line is what the D line needed. To start with, the protocol-building portion of this upgrade is fast and user-friendly. After a day of application training, users can build a Dot protocol with multiple strategies from scratch. Some of the best
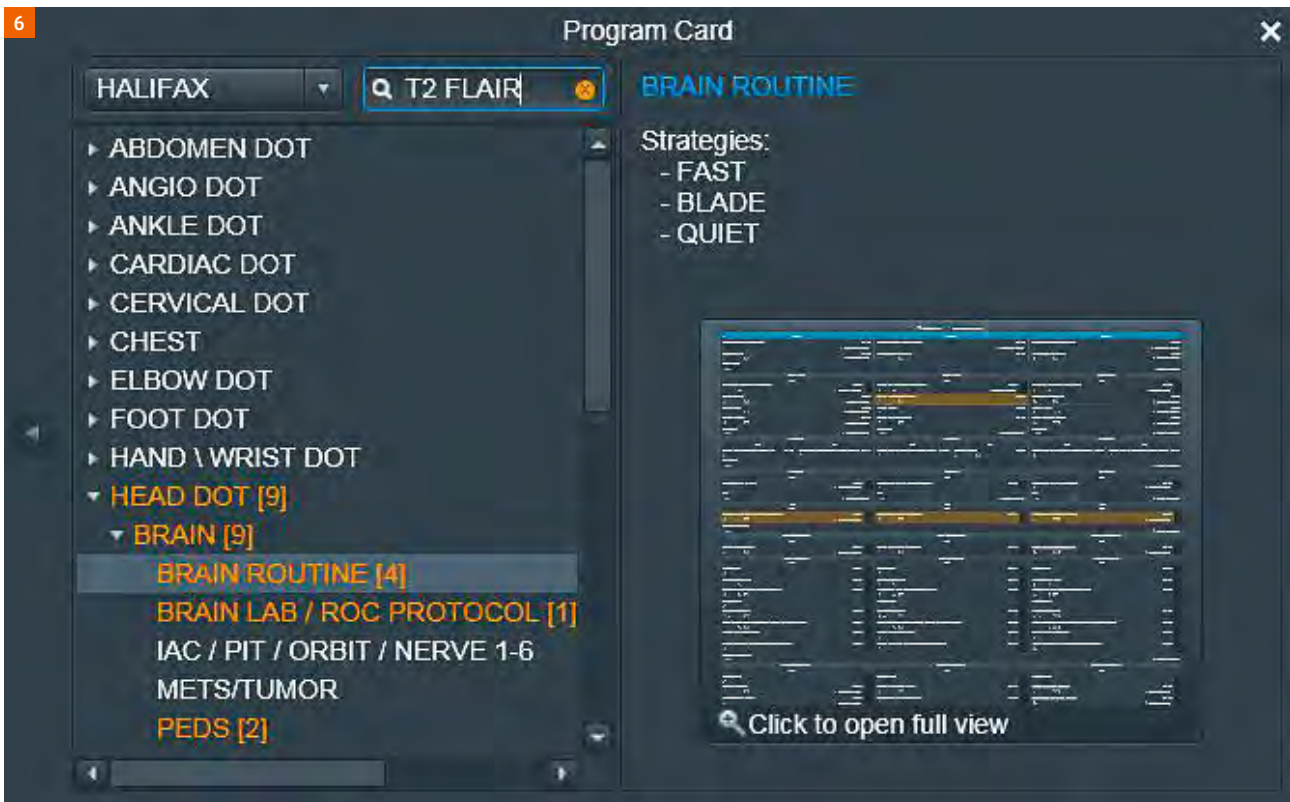

Figure 6: Screenshot showing the ease of finding a sequence using the search function.

Figure 7: Copy series options

additions are the drag-and-drop AddIns that appear directly on the protocol screen.

Users can decide whether a decision such as giving contrast should be built into the protocol or added to the options in the Dot screen so that technologists can choose it at the same time as the strategy. Adding images and text for guidance is simple. It can be done for any sequence so that all technologists can reproduce difficult or rare exams accurately and easily.

This is also a good feature for new technologists who might need assistance in achieving proper characterization of an exam. Another excellent workflow improvement is the ability to intertwine Dot and non-Dot sequences without overwhelming the scanner. Sequences can be easily added to an exam by simply opening the Dot Cockpit to the desired protocol and using the drag-and-drop function. In addition to locating sequences by protocol, Dot also offers an ingenious search feature. If a sagittal T2w FLAIR is needed for an MS patient but is not already built into the protocol, users can simply open the Dot Cockpit and type 'T2 FLAIR' (or the name of any

other pulse sequence). The scanner will search all the sequences in the active user tree and highlight relevant protocols in yellow.

This allows the user to see all the protocols containing T2 FLAIR, and to choose one that will fit the needs of the patient. Although this might not sound like much, the feature can help alleviate the anxiety that a technologist might feel when a radiologist stops by and asks to have a special pulse added to an exam.

Another excellent Dot feature is the speed at which it can preset copy references. Again, this sounds basic, but the ability to build the exact slice copy into a sequence allows the technologist to set the orthogonal slices as desired and have the scanner copy options such as slices and saturation bands, or indeed everything about the sequence.

This function makes it possible to set the basic axial brain and have the following axials copy the slice locations. Technologists might therefore only have to set up one sagittal, one axial, and one coronal for the entire exam. For the remainder of the time, they are free to complete other tasks involved in the exam or workflow. In a high-volume facility, every minute counts, and relieving staff of some monotonous tasks improves patient care and increases efficiency.

MRI scans can still be performed without Dot. However, to effectively accommodate the needs of today's patients and fulfil clerical expectations, using Dot to streamline repetitive or mundane tasks is the far superior option. By allowing the scanner to handle basic user tasks without removing the autonomy of the technologist, a well-developed Dot system can simplify workflows and enhance efficiency. Entrusting the scanner with these tasks does take a leap of faith, but once users see the consistency and reliability that is available through the Dot system, the benefits will greatly outweigh the concerns. The one thing to remember is that Dot is a tool and not a replacement. Working with the system to improve patient outcomes and efficiency is paramount in modern healthcare, so embrace the technology, but rest assured that you are always in control.

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