Integration of a standard Monte Carlo code into a commercial treatment planning system

The Monte Carlo code EGS4 has been integrated into the commercial treatment planning system Theraplan Plus. This step is part of our program to implement clinical MC electron beam treatment planning. The Theraplan Plus source code was made available to us from the vendor, so the MC functionality was incorporated as an added feature to the standard system, while utilizing the inherent input/output features of the standard system, such as the capturing of patient CT information, the setting-up of beam properties, and the display of EGS4 dose distributions. The MC simulation could be run in batch mode and over multiple computers on the same network (non-Theraplan Plus systems), with the results from different history batches combined automatically. Two users codes have been implemented. One is the standard DOSXYZ code, for benchmarking purposes, and the other, MCRTP, is a custom user code specifically tailored for clinical use, and includes features such as shielding. The beam data input is based on phase space files generated using the BEAM code, but will be replaced in the future by a beam model currently under development. The implementation will be used initially in parallel with Theraplan Plus for evaluation purposes, to pave the way for a fully clinical MC treatment planning program for electron beams in the near future.