

Enhancing Physics Chart Review Through Automation and Data Validation



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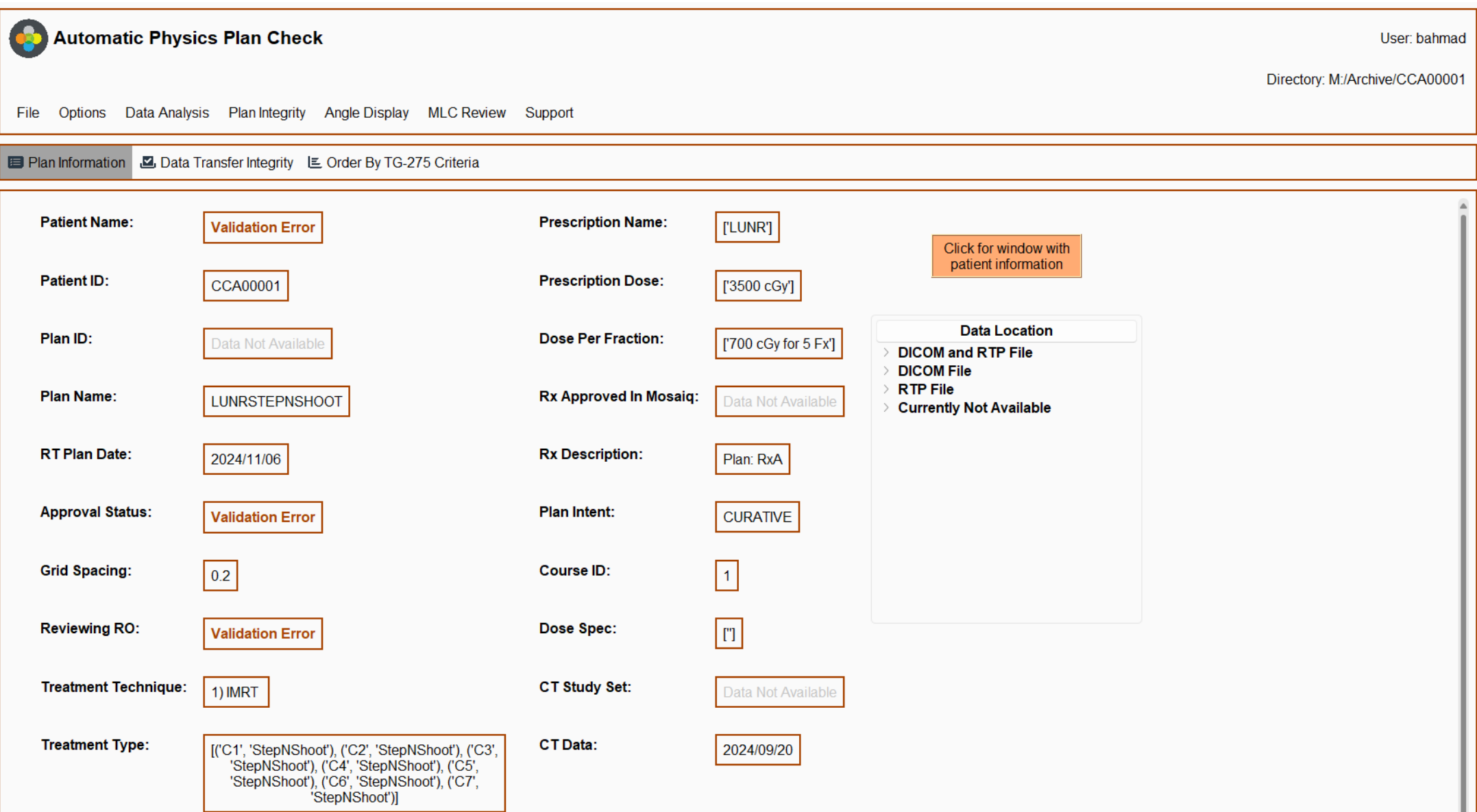
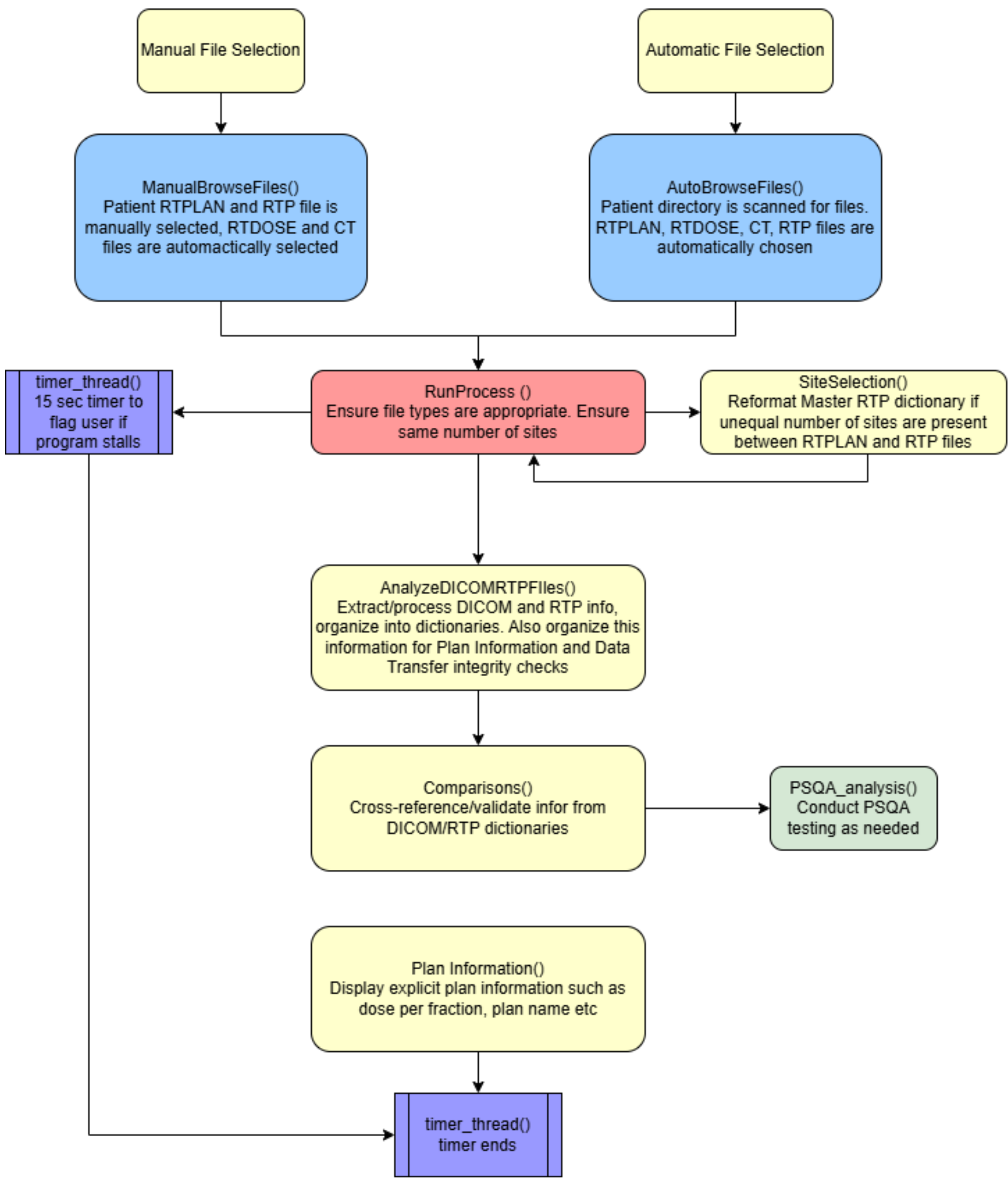


Introduction

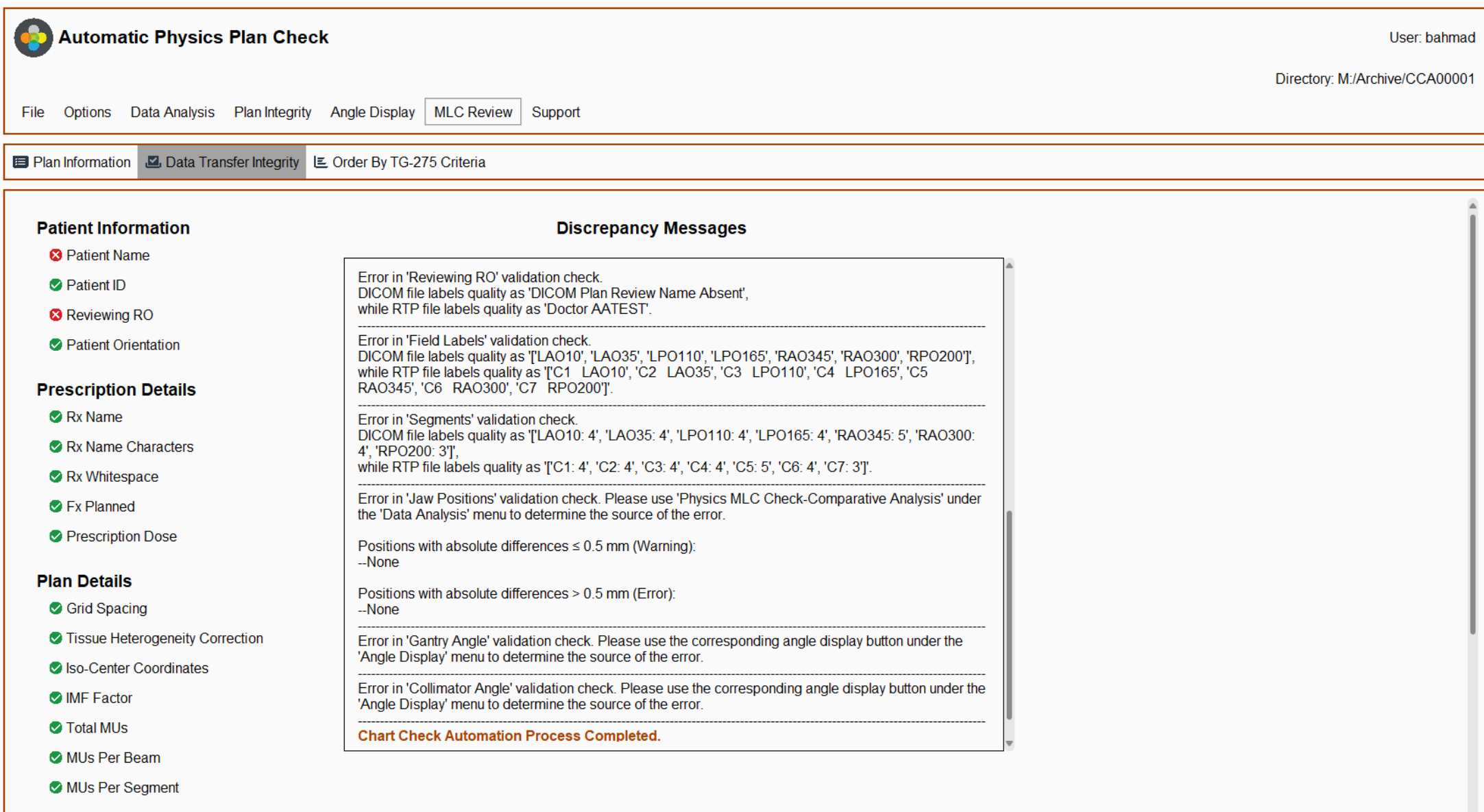
The medical physics chart check process is a critical safety step in radiation therapy, serving as one of the final validations of a patient’s treatment plan prior to delivery. Despite its importance, studies have shown that a significant proportion of treatment planning errors may go undetected due to the complexity of plan data, time constraints, and reliance on manual review. To address these challenges, this project explored the use of Python programming to automate portions of the physics chart check process.

A Python-based application was developed to compare treatment plan data exported from the MOSAIQ¹ patient information system and the Monaco treatment planning system (Elekta¹). The software parses RTP and DICOM files, validates key plan parameters, and presents results through a graphical user interface that highlights discrepancies and automates selected pass/fail checks. Additional features were implemented to support deeper data analysis, including visualization of gantry, collimator, couch, and multi-leaf collimator parameters. The software offers statistical analysis for the MU distribution through the control points. This is helpful in predicting PSQA requirements for the plan. Current version of the software is installed on a server and can be accessed by any node within the hospital network.

Description



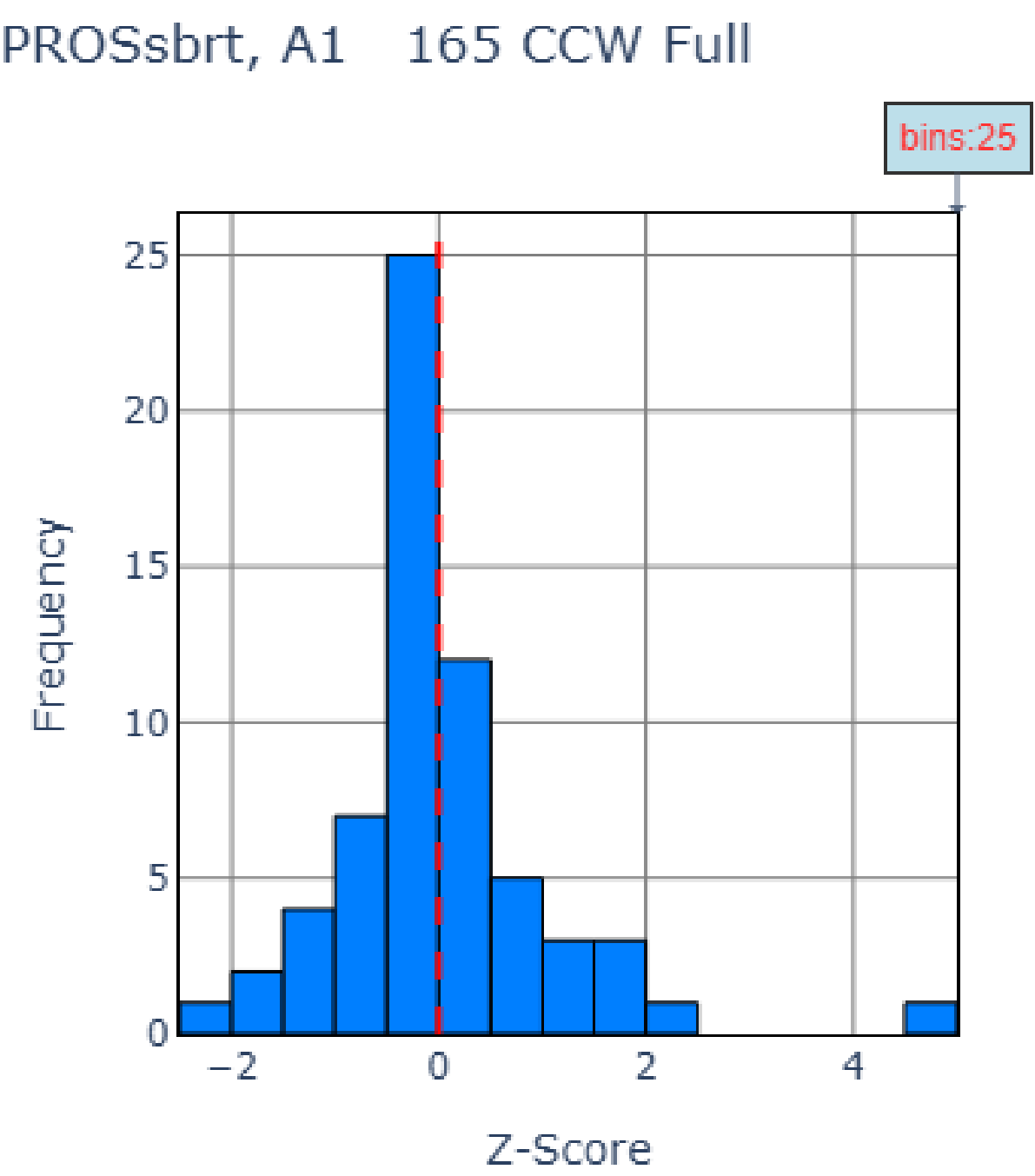
Test patient loaded into the chart check software showing some parameter that are validated across both platforms i.e. TPS and R&V



Data Transfer Integrity tab provides a comprehensive comparison of the transferred data from TPS to Record and Verify

Figure illustrates the workflow of the Tkinter-based application. Users export treatment plan data from the Treatment Planning System (TPS) and the Record and Verify (R&V) system to a shared network location. The software allows patient data to be loaded either automatically or manually for analysis and comparison. TPS data are exported in DICOM format, including CT, RTPLAN, RTDOSE, and RTSTRUCT files. As DICOM is the standard format for data exchange in radiation therapy, the software is designed to be compatible with TPS data from any vendor; however, it has currently been tested only with the Monaco treatment planning system. In contrast, the present implementation of the R&V import functionality is limited to MOSAIQ (Elekta)

References:
1. Elekta™, Stockholm, Sweden



(Left) Z-score histogram for the MU distribution through the control points (MUs normalized to the segment area). (Right) Box-whisker plot for the MU and segment area distribution. The above 2 figures are part of the web-based interface of Chart Check Automation

