# Automated Treatment Plan Check with Eclipse API

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## Abstract

**Introduction:** For several treatment planning systems, scripting can be used as a complementary tool to automate components of treatment planning, plan check and patient-specific quality assurance. During treatment planning, several iterations of a plan are generated until the expected dosimetric and plan quality constraints are met. With increased iterations, errors can be made in the plan that could affect patient treatment. Using Varian's Eclipse treatment planning system, several routine tasks and checks can be scripted to assist with document completion, identify gross errors, improve consistency, and enforce professional recommendations such as TG-263.

**Methods**: Based on our planning guidelines, a script was developed using the Eclipse Application Programming Interface (ESAPI) to be used during treatment planning and physics plan check. A total of 15 checks were programmed pertaining to planned dose and fractionation, treatment and setup fields, contour naming, and plan robustness. For each plan evaluated, the easy to read interface automatically generated a list of the aforementioned categories and checks, and reported either a compliance or error status for each parameter of interest.

**Results:** The script reduced the time spent in plan finalization by explicitly indicating those items needing attention and assisting with plan documentation. During the physics plan check, the script reduced the number of manual tasks performed and simplified the process by automating routine checks, such as Hounsfield unit overrides and correct labeling of treatment fields.

**Conclusions:** The use of scripting to aide with routine tasks in treatment planning and plan check has been beneficial to our clinic by increasing plan consistency, department efficiency and diminishing the number of undetected errors.

## Proton Plan Check with ESAPI

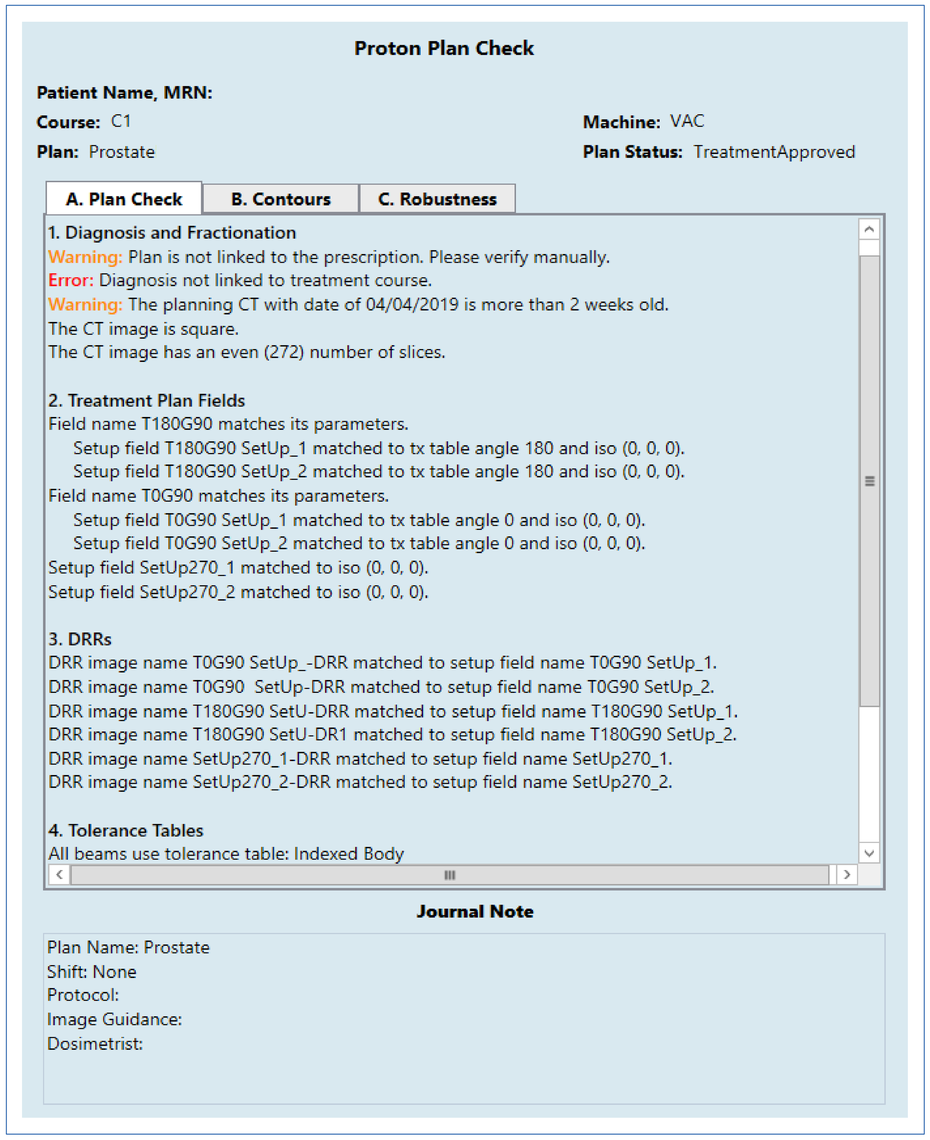


**Figure 1.** The main user interface displays a summary of the results for checks extending to the plan CT, treatment fields, DRRs, tolerance tables, target expansions and Hounsfield unit overrides. Identified warnings and errors are highlighted and presented to the user for evaluation and/or correction.

### Automated Plan Checks:

- Correct dose and fractionation
- DRRs exist and are named correctly
- Treatment field IDs match gantry and table parameters
- Correct setup fields exist
- Correct tolerance table is used
- CTV is included in STV expansion
- Field targets are inside body
- Correct HU overrides
- Plan robustness
- Contours check (laterality, number of parts, structure type and name)
- Editable journal note populated automatically

## Contours Check

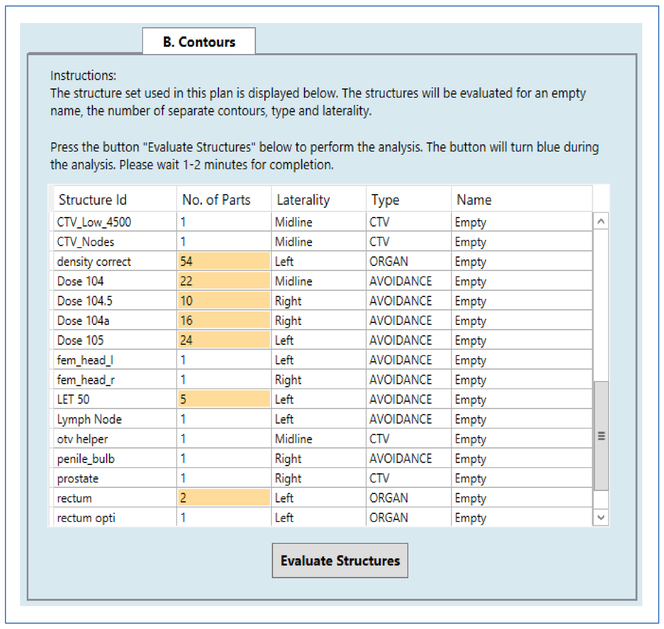


**Figure 2.** The contours tab evaluates each plan structure to identify the number of separate contours, laterality, DICOM type and name tag. Color highlights are used to identify warning and errors in each of the checks. Multiple separate contours are highlighted in yellow to indicate warnings, while issues in laterality, DICOM type and name tags are highlighted in red to indicate an error that requires correction.

## Plan Robustness

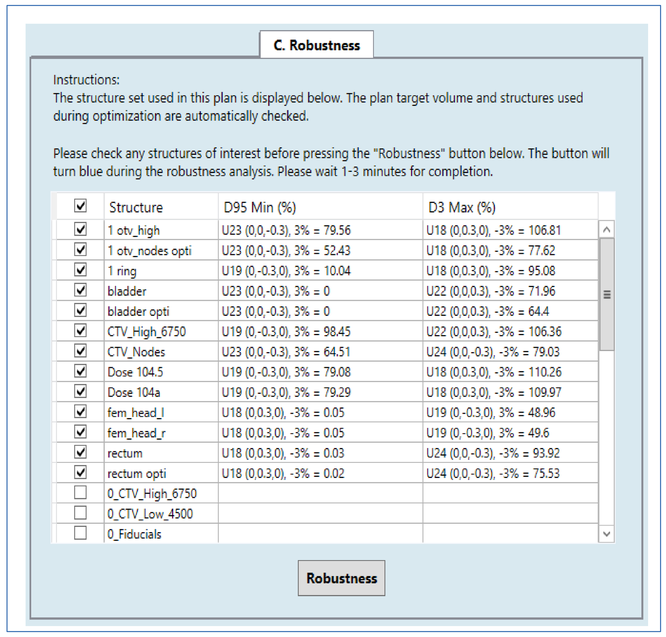


**Figure 3.** For the user selected structures, the robustness DVHs are evaluated to identify the minimum D95 and maximum D3. The results are presented to the user with a display of the resulting shift and dose variance.