MDR compliant in-house developed software

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Name of software	Purpose of software	Software meets the GSPR requirements
ETR Chair translation sheet	Calculates chair positions based on a given translation.	Yes
ETR Clip simulation sheet	Gives 2D projections of clips for the requested gazing angle.	Yes
ETR Gazing angle sheet	Calculates the required gazing angle of the non-treated eye required to achieve the planned gazing angle of the treated eye.	Yes
ETR Tumor length calculation sheet	Calculates the length of a tumor along the base of the eye.	Yes
ETR Patient QA sheet	Validates the treatment plan and calculates the number of MU required to satisfy the prescription dose. Also contains an independent check for the eye treatment proton dose calculation.	Yes
EyeEyeCaptain	In-house software where kV-images before and during treatment at the ETR can be viewed. Also used for aperture shape verification.	No

Commented [AW1]: GSPR: General Safety and performance requirements.

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Digibord	Workflow management system that tracks all pre-treatment steps, enables task handovers, and provides clear visibility into available work.	No
Interplay simulation	This is an in-house software that simulates the interplay effect for a dose map. It is a tool to help assess how robust the plan and fractionation is against the interplay effect.	Yes
Independent Dose Calculation	Independent check for proton dose calculation.	No
SPEAR WIZARD	RayStation script that runs clinical workflow for plan comparison, planning and plan evaluation, using the available steps as described in SPEAR rack.	Yes
SPEAR RACK	RayStation script that runs steps from the clinical workflow, aimed at reducing the RTT/MD/medical physicst wordflow. Includes: • Data processing/Imaging: ○ Dicom_parameter_check Checks if the planning CT has the correct DICOM tags, so that we make sure the proper CT is used for treatment planning. ○ Dicom_import Dicom Import script imports dicom files to RayStation from either PACS or StorageSCP, and sets the RTStructureSet's dicom tag, so that they are "unapproved". It is a necessary step so that we can work with external data. ○ Rename_and_group_images Renames all the images (CT, MR, PET) to the HPTC CT naming convention, and creates image groups if possible. ○ Set_imaging_system Set imaging system according to the **kernel**, **protocol** and **station** of the CT. The configurations are stored in the config_db.	Yes

- Image_registration
  Module to perform image registration between CTs, and between other imaging modalities (MR, PET) and CT.
- Remove_empty_rois
  Show all empty rois, allow for selection and remove selected when no delineation present on all images for the ROI.
- Adjust_struct_type_name
  This script adjusts the ROI name, type and exclusion from export.
- Split_4dct
  This script is used to split the 4DCT dicom files under a folder into different new folders, separating the phases to unique CTs to allow for import into RayStation

- Contouring:
  - Apply_structure_template
    This script is used to apply RayStation structure template to the current CT.
  - Combine_ctvs
    This script reads the list of CTVs structures delineated by an external institute
    of the current patient, and combines the small CTVs into a complete CTVs. The combination is based on a table in the configuration database.
  - Contour_propagation
    The contour propagation module propagates contours from one CT to antoher CT. Image registration is
    required.
  - Contour_update
    This script updates the composite contours
  - Create_external
    This script mainly creates the external structure for the current patient on the selected CT/4DCT (on 4 phases of 4DCT)
  - Create_planning_structures
    The script create some help structures for planning (e.g, block stuctures, opt_ctvs, etc).

  - Rename_structures
    This script rename the structures based on a predefined standard structure names and wildcards (possible names for each standard names). In addition, the color of the structures will be changed to the standard colors as well.
  - Table_placement
    This script is used the place the Flat table top or the Bosframe beneath the patient contour.
  - Find_localization_point
    This script is used to find the localization point for patient.
    setup based on the marker of the patient.
  - Split_ctv
    Splitting left and right part of the CTV below the parotid glands for use in H&N treatment planning.
  - Create_match_box
    This script creates a Matach_Box structure for the patient. The Match_Box is used for image registration.
  - Add_to_current_roi
    This script combines the ROIs that are imported from
    an external institute with the existing ROIs on the planning CT.
- Planning:
  - Create_plan
    This script creates an empty plan, which can be directly used for the "Plan Optimization" script. The empty plan has already defined the beam parameters (range shifter, beam angle, iso center, etc.).
  - Plan_optimization
    Script to
    set the optimization settings, load objectives and optimize the plan (using robustness analysis).
  - Continue_optimization
    Script that continues the optimization by the number of times defined by the user.

- Merge_repaint_layers
  Script that can combine layers in a repainting plan to create a layer with sufficient spots above the threshold for detecting incorrect delivery.
- Plan evaluation
  - Dose_evaluation_3d
    The robustness analysis tool evaluates the robustness of a treatment plan against the potential setup and range uncertainties. Clinically, this tool is used to check the robustness of the treatment plans. The user can select the clinical, which defines the robustness settings (setup and range errors), as well as the dose parameters to evaluate in the report. When the perturbed doses are generated, one can generate a robustness report for the current patient. The report contains a summary of how many dose parameters exceed the clinical constraints, as well as the dose parameters for each OAR of interest per scenario.
  - Dose_evaluation_4d_summary
    This script uses a more complex method to assess the robustness of a 4D treatment plan. It calculates the average dose map of the wrapped perturbed doses on full inhale, mid exhale, mid inhale and full exhale phases.
  - Low_weighted_spot
    Evaluate the number of spots below the detection threshold for incorrect delivery.
  - Let_rbe_conversion
    Calculate an LET-corrected RBE dose according to the McNamara model.
- Plan Wrap up/Documentation
  - NTCP comparison
    Script to calculate ntcp according to the national LIPP models, and calculates whether patient qualifies for proton therapy.
  - Find_dsp
    Find a point in the treatment plan that exactly matches the prescribed dose, required for delivery on the Probeam system.

	○ Setup_coordinates_report This scripts retrieves the information of a loc point, or a H5 point. By comparing those points and the isocenter of a selected plan, the table shift is calculated.The results are stored in a spreadsheet. ○ Plan_check This script checks numerous aspects of the plan and generates a partly pre-filled PDF template used by MP to check the plan. • Other ○ Respiratory_amplitude This script calculates the respiratory amplitude of the chosen structure using the deformable registration between two scans. The respiratory amplitude is calculated as the 90th percentile of the deformable vector field magnitudes. The output can be exported in PDF format.	
Add voxelwise max	This script adds up the dose parameters of all selected voxelwise max dose maps, based on the fractions assigned to each dose map. It is used to estimate the dosimetric impact after replanning. This script greatly reduces RTT workload.	No
Copy spots to CT	This script copies the spots of a treatment plan from one CT to another CT. It is used for evaluation purposes only (no clinical planning).	No
Create beam specific CTV	This application created a beam specific CTV in order to account for density/range uncertainties of metal clips in the optimization process. The working of this script is based on the manual workflow. This script greatly reduces RTT workload.	No
Dicom Export	This script exports the Dicom files stored in RayStation to ARIA and PACS.	Yes
Imaging System Selection	This script automatically selects the imaging system (i.e., CT to density table) based on the DICOM tags of the CT images. This script greatly reduces RTT workload and prevents human errors that can affect dose calculation.	Yes
Off center position	This scripts allows the user to shift the patient 4cm relative to the table; either left of right. This is achieved by shifting the table structures in the opposite direction. This script reduces RTT workload.	Yes

PET CT pixel padding	Raystation cannot import PET-CT scans with varying padding pixel values. This script override the padding pixel of all slices to be the same value as the first slice. Without this script, importing certain PET-CT scans would not be possible.	Yes
Prepare for 4D delination	This script contains a series of actions that are required for structure delineation for patients with 4DCTs. The actions include renaming CTs, creating 4DCT groups, assigning imaging systems, creating External/Body structures, creating image registrations, etc. This script reduces RTT workload.	Yes
Robustness analysis multiple CTs	Same functionality as the robustness analysis script, but then for plans optimized on multiple CTs. This script greatly reduces RTT and MD workload.	Yes