

# UniCoord

## Unification of Coordinates from various CT Devices

All CT devices nowadays create CT image series with coordinates whose origin can change from day to day depending on the device initialisation. A constant relation of the CT couch to the treatment table cannot be derived from the CT coordinates of the series or the isocenter of an RT (Ion) plan. Therefore the patient is usually positioned for radiotherapy treatment with external lasers and skin markers. This procedure is time consuming and time is a crucial issue for the utilization of expensive treatment devices for instance in particle therapy.

UniCoord is a software system that unifies the CT coordinates of CT image series. It is positioned in a DICOM network between the CT device and the DICOM archive or a treatment planning system. It receives the CT series from the CT device via DICOM networking operations and unifies the CT coordinates with respect to a fixed reference coordinate system on the patient table defined by a table inlay.

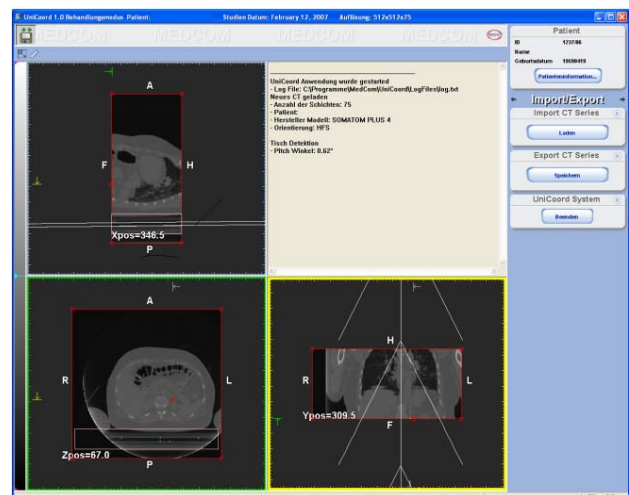
After full automatic detection and confirmation by a user the CT series is exported to the DICOM archive or any other DICOM capable system for further processing, e.g. treatment planning.

With the unified coordinates of the CT series it is possible to calculate the coordinates of a patient positioning device for radiotherapy treatments directly and move the patient to the treatment position immediately.

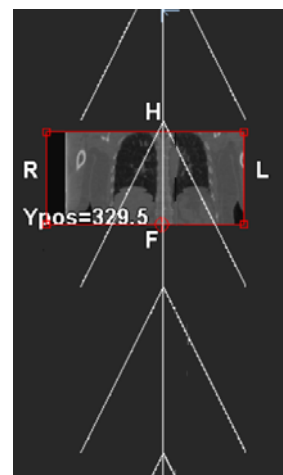
The system loads the CT slices, displays the patient data and visualizes the volume data in three orthogonal slice views for control of the process. UniCoord is able to locate the position of the scan relative to the tabletop with high accuracy by automatically identifying a special table inlay in the CT scan.

In addition, UniCoord is able to detect table misalignments and displays a warning message if, for example the table pitch exceeds a tolerance.

The new CT series is identical to the original CT, except for the *Slice Location* and *Image Position* tags, which are now related to the fixed coordinate system, which is shared among the scans of all CT devices in use, independent from the current machine configurations.



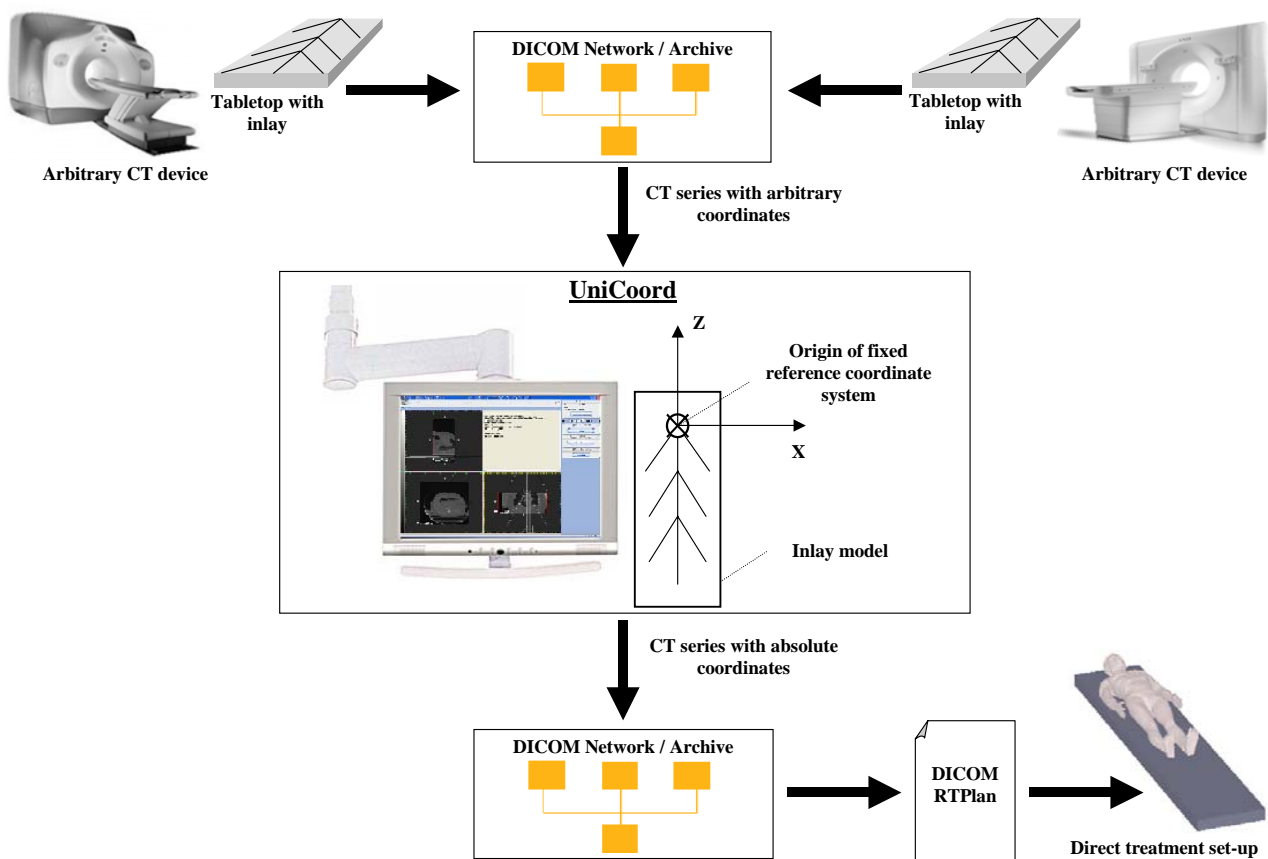
Display of three orthogonal slice cuts with the model of the table inlay and the inlay detected in the CT series; Message window, displaying relevant information on the CT device and the patient



The model of a table inlay is fitted into a short CT scan (here 22 cm). The position of the scan relative to the tabletop is visualized and used to generate absolute CT coordinates

## UniCoord's main features:

- Comfortable CT Series import and export via configurable DICOM networking operations
- Full-automatic detection of CT series alignment and position - fast and highly reliable
- High accuracy of 0.5mm - 1mm and better ( $\pm 1$  voxel, even in short CT scans)
- Detection of CT table pitch for quality assurance
- Visualization of patient data and graphical visualization of results in orthogonal CT slices
- Export of CT series with absolute coordinates, preserving original DICOM tags
- Support of all DICOM transfer syntaxes, patient positions and orientations
- UniCoord is able to locate the absolute table position in short scans of less than 15cm
- Configurable reference coordinate system with respect to the CT table
- Designed to require minimal user intervention, just one click is needed for confirmation of results



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