ImSimQA™ closes the loop of testing by creating infinite test image data, and then applying quantifiable analyses with pass/fail metrics to the resulting data imported from clinical systems.

The software now includes automation; enabling faster preparation, results and analysis of test data.

It is the only commercially available standalone software designed for DIR and RIR QA.

- Practical, extensive, cost effective testing for new techniques.
- Increases confidence in complex clinical software.
- Reduces the physics QA time on scanners and RT imaging devices.
- Provides data and testing not available within physical phantoms.
- Provides 15 vector phantoms and 10* pair of H&N DICOM phantoms with realistic clinical changes.

ImSimQA is an essential software toolkit that generates **ground-truth DICOM test images** to validate clinical software systems and RTP like (OnQ rts®, MIM Maestro™, Mirada RTx, Velocity, Elekta ABAS & ADIMIRE, Pinnacle SPICE, Raystation Eclipse and Smart Segmentation®), and provides quantitative analysis of DIR algorithms.

**Get ready for AAPM TG-132 with ImSimQA.**

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Software Modules and Functions V4.1

ImSimQA DB/Main
- New & Improved GUI.
- New SQL database enabling automation.
- Task Scheduler
- Improved Storage of DICOM images, RTS, DVFs in the database.
- Client/Server Architecture

Dform
- Automatic deform protocols for H&N, Thorax & Pelvis using real CT data.
- Automatic loading of multiple DVF’s for fast comparison.
- Display of DVF and inverse DVF
- Automatic loading of DICOM images for quantitative comparison.
- Calculate DVF difference
- Display DVF error comparison histograms.
- Jacobian Map display.

Contour Analysis
- Comparison display of contours
- Quantitative analysis of contour pairs: Dice Similarity Coefficient, Inclusiveness Index, Conformity Index, Mean Distance to Conformity, Centre of Gravity Distance, volume size differences
- Qualitative evaluation of contours on images
- Error Histogram for slice and whole VOIs
- Over-contouring and under-contouring for slice and whole VOIs
- Automatic loading of paired RTS for contour comparison (DICE, Conformity Index, Mean Distance to Conformity).
- Fast general comparison results
- Detailed comparison results
- Printouts of results: general/detailed, variation only, slice by slice

Task Scheduler
- Off-line batch processing of multiple tasks and cases direct from DB
- Time and date scheduling
- Allocation of tasks to redundant PCs
- Automatic forwarding of results

DICOM Import/Export
- DICOM-3 and DICOM RT compliant
- Now supports Raystation proprietary DVF data and Elekta Admire for DVF comparison and improved workflow for Velocity

1) Why do I need to do DIR QA? – DIR algorithms are a mathematical solution to a physical problem in radiotherapy. QA educates users on the strengths and weakness of the system so that it can be used confidently and effectively in the clinic. Presentations at ASTRO from the AAPM TG-132 experts advise centres to perform comprehensive commissioning of image registration using digital phantom data as well as clinical data from the user’s institution. This is because implementation effects accuracy so accuracy cannot be inferred from the literature. The workflow and image quality of the clinical systems used affect the accuracy so clinic specific data is a must.

2) How do you know the data is clinically relevant? - With the Dform* module users have access to an additional library of 10 original and deformed synthetic head and neck phantoms created where the deformed dataset is based on actual anatomical changes seen during the radiotherapy treatment course. From these a ground truth deformable vector field (DVF) was created for each phantom. This allows the phantoms to be used to assess the accuracy and precision of the DIR algorithm in any available system, with clinically relevant data. This was developed through work with clinical partners.

3) How do I know that ImSimQA is not introducing errors into the process? – ImSimQA creates both a DVF and inverse DVF when the user makes deformations. So ImSimQA can be tested by applying the inverse DVF to the deformed image and checking the output is the same as the original image. This can then be compared using either the contour comparison and/or the image comparison functions of ImSimQA.

Technical and Hardware Spec
ImSimQA operates on IBM compatible PCs, within server-client architecture running Windows, utilising an SQL database. Remote, secure access can be achieved using a Citrix® platform.

Minimum system requirement: IBM compatible desktop / laptop PC, Windows 7 or 8.1, 10 Professional 64 bit. 100GB hard-disk space, 8 GB RAM, Multi-Core CPU, HD monitor displaying at 1920 x 1080 resolution, graphics card (NVIDIA preferred) with 1GB RAM or better. Mouse with two buttons and mouse wheel (through RDP or KVM for rack server). Windows 7/8.1 Professional 64bit or Windows Server Standard 2008 or 2012. Adobe pdf reader software for viewing user manuals. A Windows compatible backup application. Form factor rack or tower for server, desktop or laptop for client.

Recent References

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^ Requires Dform module