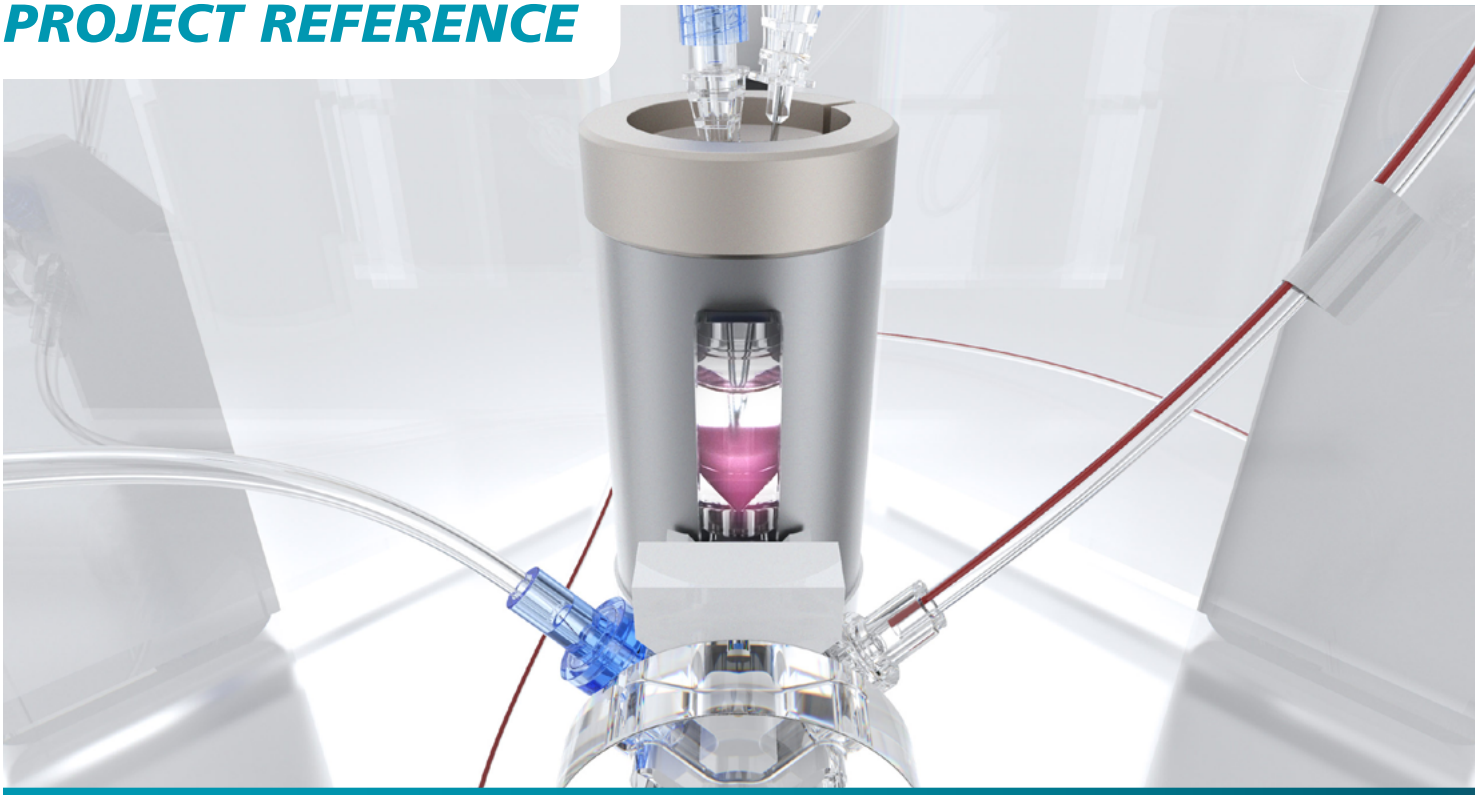
PROJECT REFERENCE



Q-Suite™

Enabling dosimetry after SIRT with QuiremSpheres®

QUIREM Q-Suite™ is a CE-marked proprietary software tool, that can be used to verify therapy with QuiremSpheres®. By calculating the 3D dose distribution based on SPECT or MR images, verification of dose-to-tumour and dose-to-tissue after the QuiremSpheres® therapy can be performed. The healthcare unit of ICT Group was involved in developing the 2nd generation of Q-Suite™. ICT Healthcare supported the customer from the creation of a user testable proof of concept to the conversion into a product.

QuiremSpheres®

QuiremSpheres® are bèta radiation emitting microspheres, containing the isotope Holmium-166, that can be used for Selective Internal Radiation Therapy (SIRT). This is a minimal invasive therapy for treatment of primary and metastatic liver tumours in which high doses to the tumours can be delivered while limiting the dose to the healthy tissue. QuiremSpheres® can be visualized with both SPECT and MR imaging, even in low concentrations, enabling quantitative dose evaluation which is critical to predict clinical effect of the treatment.

Q-Suite™

The first generation of Q-Suite™ that has been developed by Quirem was primarily a dose engine to convert MRI and/or SPECT-CT images of QuiremSpheres® into 3D dose distributions. The generated 3D dose images could be imported into radiation oncology/radiotherapy software for further evaluation.

The second generation of Q-Suite™ provides a complete solution for post-treatment evaluation, guiding the clinical users through the image processing workflow to improve efficiency and safety. Features include: smart selection of image data, a step by step data processing flow, a minimalistic user interface and automatic dose report generation. The implemented “one-click” approach not only provides efficiency, but also warrants a short learning course and prevents user induced errors.

ICT smarter solutions

Second generation Q-Suite™ development

For the development of the 2nd generation Q-Suite™ an agile approach has been used to efficiently manage the different new requirements, activities and quality aspects. Since feedback from the field was important the project was divided into two phases:

Phase 1 – Creating a field testable user interface prototype for obtaining feedback:

Optimizing the user guidance and workflow, starting with a new prototype developed in Microsoft WPF. Involved stakeholders and roles were:

- Quirem manager Imaging & Software Solutions, the product manager of Q-Suite™
- ICT consultant with radiation oncology domain expertise, supporting the Quirem product manager
- ICT UI software designer and developer of the prototype.

Phase 2 - Developing the actual product:

- Updating software documentation by extending and restructuring the user, system and software requirements.
- Implementation of new Q-Suite™ features (i.e., Generation of PDF dose report).
- Productizing the prototype, combining the refactored and extended Q-Suite™ with the user interface.
- Improving software validation by extending and restructuring test cases.

Role of ICT Healthcare

ICT was asked to create a new GUI for Q-Suite™ as a prototype for field feedback, with the focus on usability. Because ICT Healthcare has a proven track record in the radiation oncology domain and has strong Windows Presentation Foundation (WPF) Graphical User Interface (GUI) competences within their resource pool, ICT Healthcare was able to immediately support the Quirem team on their request.

After finishing the prototype, ICT was asked to create requirements and test cases for Q-Suite™ according to the ISO 13485 and IEC 62304 medical software development process. The Quirem software development team was extending and building up their competences, and to accelerate this, developers from ICT started in parallel to improve the existing Q-Suite™ source code. In the final stage of the product development, knowledge was transferred to the new Quirem software development team to ensure successful maintenance.

PROJECT RESULT

ICT Healthcare was able to successfully create the new GUI prototype in a highly efficient way and in close cooperation with Quirem. The combination of competence within the radiation oncology domain together with the expertise on WPF GUI was a perfect fit and made a quick result possible. User interfaces and experience were modelled in detail by Quirem which were transposed to the GUI prototype. A structured and smooth transition was executed to meet CE certification in alignment with the required Design History File. At the final stage of the product development, Quirem was able to maintain and market the product themselves.

About Quirem

Quirem Medical is an emerging medical device company with a mission to develop the next generation microspheres for selective internal radiotherapy (SIRT) treatment of liver malignancies. Their core product, QuiremSpheres®, consists of holmium microspheres that have the ability to be accurately and quantitatively imaged. For more information, visit their website: http://www.quirem.com/

Keywords

OncoRadiology, Prototyping, Requirements, Test Cases, Design, Contouring/Segmentation, TFS, C#, .Net, WPF, XAML, Model-View-ViewModel, MongoDB, FO DICOM library, DICOM Encapsulated PDF, DICOM MR, DICOM CT, DICOM SPECT, DICOM Conformance Statement, DVTk (DICOM Validation Toolkit), ISO 13485, IEC62304, Design History File

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