

# STFC Global Challenge Exploration Award

## Programme final report



### Interactive Radiotherapy Image Simulator (IRIS) *Dissemination workshops programme*

The very high dose gradients used in modern radiotherapy techniques means that a small error in the spatial dose distribution can lead to serious complication. To date, visualisation methods based on iso-contours (2D) and iso-surfaces (3D) have been used to visualise and evaluate dose conformity with tumour shape and location. While helpful, these methods display only a fraction of the data, constraining clinicians to scroll through several different iso-levels to develop a full understanding of the spatial relationship between patient anatomy and dose distribution. To solve this problem, we have developed a prototype software tool that employs ray-casting technique to render all data at once, during a proof-of-concept project funded by STFC Impact Acceleration Account in 2014.

The STFC IAA fund enabled us to bring the IRIS idea to a demonstration stage. The Global Challenge Exploration Award has offered us the opportunity to investigate the impact of IRIS technology on the radiotherapy community by engaging with clinicians as potential users for the IRIS tool. We have successfully delivered three interdisciplinary workshops to groups of oncologists and physicists at the following sites:

- Department of Oncology at the University of Cambridge.
- Department of Oncology at the University of Oxford.
- Queen Elizabeth Hospital, Birmingham.

Each workshop was commenced with a brief background about the problem and our proposed solution, followed by a live demo of the prototype tool, and then a discussion and feedback from audience. Overall the feedback ranged from general comments about the prototype, through to requests for additional and specific functions. The majority believe that the prototype offers a novel set of various visualisation tools that are not currently available in radiotherapy software solutions. On the other hand, some comments suggest that the tool may complement current solutions but it is not essential for clinical radiotherapy. Indeed, the current quality assurance practice is largely focused on 2D visualisation tools, which makes the tool to be perceived as less important in clinical radiotherapy. We explained how the tool could be of a great benefit, especially that the modern workflow of radiotherapy is based on 3D imaging and planning methods, which requires an advanced 3D visualisation to harness their advantages.

The audience was engaged in discussion regarding the added-value of the tool in providing higher safety and accurate treatment planning for patients. The discussion has raised several interesting ideas on how the tool can be employed effectively to establish a better and quicker visual validation of treatment plans. We compiled those suggestions into a 'To-Do' list of users' priorities which we plan to implement in a follow-on, STFC-funded project. We aim to transfer our knowledge and expertise into an end-product solution via an STFC Innovation Partnership Scheme (IPS) research grant. We have demonstrated the tool to Oncology Systems Ltd (OSL) to identify potential opportunities for commercial exploitation. OSL believes that IRIS technology has the potential to aid the understanding of radiation dose, and risk associated with it, and to alter the use of image guidance in the UK.

It is worth pointing out that the Global Challenge Exploration Award has also provided us with the opportunity to publicise our research projects online via [www.comprt.org](http://www.comprt.org) and [www.iris-ga.org](http://www.iris-ga.org).