

## AbstractID: 13630 Title: dicompyler: An Open Source Radiation Therapy Research Platform with a Plugin Architecture

**Purpose:** Currently no fully open source software platform exists for research in medical physics and radiation therapy. In this study, we use open source technologies to develop a cross-platform application, "dicompyler", for evaluating radiation therapy treatment plans and to provide a research platform extensible via third party plugins.

**Method and Materials:** Using the high level programming language, Python and open source tools, an environment was created to import DICOM / DICOM-RT data that can be viewed, analyzed and modified. The application can import and display full treatment plans with the corresponding dose and structures and additionally display DVH data. A plugin model was developed so that the user can extend the software as needed. The platform was tested with anonymized data from various treatment planning systems using 3DCRT, IMRT, and brachytherapy plans. Additionally, in order to test the plugin system, a DICOM tree view and anonymization features were created.

**Results:** Isodose curves and DVH values generated in dicompyler were successfully compared against the original planning system for various treatment plans. The plugin system was used to anonymize a radiation treatment plan in preparation for teaching purposes. The application ran successfully on Windows, Mac OS X, and Linux.

**Conclusion:** This work shows that an accessible research platform can be created using solely open source technologies and be compatible across operating systems. As DICOM is pervasive in radiation therapy, it is critical that a fully free, open source system be in place for individuals to analyze and understand the data that they work with. With an extensible system, future plugins such as treatment planning and image registration can be developed.

**Conflict of Interest (only if applicable):** N/A