Project Background: ACDS Calibrations Data App (CLOVER)

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Client

The Australian Clinical Dosimetry Service (ACDS) is an independent dosimetry auditing program, providing quality assurance for radiation oncology providers and patients (Australian Clinical Dosimetry Service | ARPANSA). ACDS works with the government to find the intensity of radiation equipment across Australia and New Zealand. It conducts dosimetry audits at radiotherapy clinics across Australia and New Zealand to find this data. These audits are performed with specific oncological equipment with factors used in the dose calculations. The factors are updated on 2-year cycles including the information for multi machines used in the dosimetry processes.

Dosimetry

Dosimetry is the measurement and assessment of radiation doses absorbed into an object. As a dosimetry auditing program, ACDS studies the effects of radiation being absorbed into the human body. These measurements are done to ensure that the dosage is sufficient to target the diseases while minimizing the dose to the surrounding normal tissue. Models (called phantoms) simulate the shape of a patient, ranging in density to more accurately simulate organs and bones. The information gathered from these phantoms is split into 'cases' and 'points'. A case is a different treatment delivery or beam configuration. A point is a different location measured within the phantom. During an audit, between 50 and 70 pieces of equipment will be audited and each piece will have between 5 and 10 calibration factors per piece of machinery. Each machine is audited individually when an audit is conducted.

Current System

Information is kept in an Excel spreadsheet. The data in the Excel spreadsheet is updated every 6 months manually by employees of ACDS. Each time it is updated, a copy is created to be stored as a record of the previous version. The Excel document is split into 2 separate tabs, 'Info' and 'Data'. The 'Info' tab details the history of changes showing the date, author's initials, version number and text detailing the change. Consequently, the 'Data' tab contains multiple tables each detailing data readings used in the dosimetry processes. Each row in each table is shown to be either 'Expired' or 'Current'. Each column is a different section of data, and each cell contains dosimetry measurements which can be represented by integers or strings.

Technical Information

ACDS is a Microsoft based company. They use the Office 365 suite for handling everyday work and their staff are used to these programs. ACDS has staff that are familiar with Python and MATLAB. These languages are what the technical employees of ACDS prefer to work with when compiling and analyzing data.

Project Aim

Problem

ACDS is not satisfied with keeping this data in an Excel spreadsheet. The current system is outdated and clunky. They are looking for this system to be replaced by a database with a graphic user interface (GUI) that will allow them to extract and write information from and to this database respectively. This will replace Excel as their main data source and provide for a more consistent, version controlled and modern approach to dosimetry audit information.

Scope

The scope for this project is split into two distinct sections. There will be a frontend GUI and the back end database that will house the audit information. These two systems must be delivered in full and should be designed to work together in accordance with the project requirements.

Front End

The frontend scope encapsulates building and delivering a smooth and functional GUI that will allow employees of ACDS to interact with the database. The frontend will need to support creating new entries and displaying data from the backend database. The solution should allow ACDS employees to easily interact with the systems throughout the audit and post-audit process.

Back End

The backend scope involves the creation of a database that will contain and manage the interactions of the dosimetry audit findings. The database solution must be secure, reliable and consistent and it should provide a performance uplift to the existing Excel-based solution