At CERN, physicists and engineers probe the fundamental structure of the universe. They develop and use particle accelerators for high-energy physics experiments to study the basic constituents of matter, the fundamental particles. Most of the electronic components and systems as well as materials used in these scientific instruments have to be qualified for their radiation resistance before being installed in the CERN accelerators. Irradiation facilities are used to perform these qualifications.

After performing a thorough survey on irradiation facilities characteristics and information systems, we are developing an Irradiation Facility knowledge graph, to be used for the automatic generation of adaptive graphical user interfaces (GUI) for the control of such infrastructures. Since actual instances of GUIs are not initially available in our framework, this knowledge graph will be used for generating the HTML and CSS code of (plausible) instances of different types of facilities GUIs. These instances will be then fed as input to a Neural Network with the aim of training it to generate automatically dedicated GUI code. This system will be later tested and validated within the development of the Proton Irradiation Facility (IRRAD) Data Manager (PrIma) at CERN, which is a reference facility for the qualification of components for high-energy physics.

By combining the Irradiation Facility, User Interface and Interaction knowledge graphs, Django user interfaces are generated, using the Owready2, Semantic UI and Jinja2 template tools.

We conducted an extensive survey on the irradiation facilities existing worldwide in order to find the important semantic entity domains. With the data collected we developed and populated an irradiation facilities database and web application.

Entity domain examples:
- Contact information
- Institute
- Facility data
- Safety
- Accessibility

Future work: UI Adaptation
Using generated Django User Interface instances, we intend to perform machine-learning-based classification on the different user configuration files set by the scientists who use the automatically generated data manager. This classification will then enable an semi-automated UI display customisation in order to adapt the data manager to the users’ needs and preferences.