

Helping advise on the pandemics of the future

A group of UKAEA Research Software Engineers and Advanced Computing specialists have played a major role in developing software and data that could help governments respond to the challenges of future pandemics.

The Scottish COVID-19 Response Consortium (SCRC) brought together over 150 epidemiologists, mathematical modellers, software engineers and other scientists to develop new computer models to assess strategies for controlling the COVID-19 pandemic in Scotland and the UK in the medium and long term.

The Royal Society's RAMP Scheme gave the SCRC access to huge numbers of volunteers from research organisations and companies across the UK as part of the national COVID-19 response. UKAEA was the first external organisation to join the initiative in April 2020, with 11 staff taking part.

Experts from UKAEA and other organisations worked on the models to improve their structure and code quality, add functionality, set up automated tests and improve the performance of the software.

The SCRC code was developed on open software development platform Github and the consortium has developed a prototype data pipeline – a set of data management tools to store details of all input data, software versions, model runs and outputs and how they are related. This is essential to ensure traceability and quality control of all the elements that go into producing results that can feed into policy decisions. Another team developed a visualisation platform giving modellers insights into the raw data and modelling results.

It is hoped that these tools and approaches will improve the ability of epidemiologists to advise government, in the case of future pandemics.

UKAEA's Alys Brett is part of the SCRC core management group and was responsible for coordinating the software engineering effort.

She said: "The initial challenge was to channel this vast amount of enthusiastic and skilled volunteer effort without overwhelming the original model owners who had typically been the sole developer until this point. We paired each of them with a lead Research Software Engineer to get the project ready for team development and three of these leads were from our UKAEA team.

"This has been a fantastic example of what can be achieved by a modern, team-based approach to scientific software with modellers, Research Software Engineers, statisticians, visualisation teams and data experts working together without boundaries."

UKAEA Research Software Engineer, Peter Fox, said: "Working on this project has been both exciting and challenging. It has been very interesting to be

involved from an early stage in a large-scale effort to address a problem of national importance.

“Obviously many challenges presented themselves – from getting up to speed with the terminology and practice of disease modelling, to working with a team of scientists and engineers from all over the country.”

This work is continuing under two research grants to take forward the data management and visualisation aspects. UKAEA is a core partner on the million pound grant to develop a FAIR data pipeline to make epidemiology data Findable, Accessible, Interoperable and Reusable. This enables engineers to address challenges that have close parallels for managing fusion research modelling data and workflows, in collaboration with colleagues at the Science & Technology Facilities Council’s Scientific Computing Department.

Current and past UKAEA contributors to the project are Rob Akers, Alys Brett, James Cook, Nathan Cummings, Peter Fox, Sanket Gadgil, Jonathan Hollocombe, Andrew Lahiff, John Nonweiler, Qingfeng Xia and Kristian Zarebski.