

DAFNI hardware boosts climate modelling at Newcastle University

Dr Craig Robson – Lecturer in Data Centric Engineering – Newcastle University



Introducing the Civil and Geospatial Engineering Group

The Civil and Geospatial Engineering Group within the School of Engineering at Newcastle University purchased a number of desktop machines using monies from the DAFNI hardware fund to enable PhD students to test and hone their models before deploying them onto DAFNI.

Dr Craig Robson, School of Engineering, Newcastle University, is a lecturer within the Geospatial Engineering group, a member of the Tyndall Centre for Climate Change and a DAFNI champion.

He is a Co-Investigator on the [OpenCLIM project](#) (Open Climate Impacts Modelling Framework) where he co-leads on the development, from a technical and data perspective, of a modelling framework for climate change risk and adaptation assessment for the UK.

Craig explains:

Within our research group of the Civil and Geospatial Engineering Group within the School of Engineering at Newcastle University, we have around 45 academics and more than 30 PhD students, representing a sizeable group.

I work across a range of projects related to complex networks, infrastructure network resilience to hazards, model workflow design, spatial data management as well as data visualisation.

Honing models

In order to help the PhD students, such as those in our geospatial Centre for Doctoral Training, and other potential DAFNI users such as researchers refine their models and to use the DAFNI platform for their research, we purchased two Windows machines and one Linux machine with DAFNI hardware monies. These act as a test environment so users can hone their models before moving them to the DAFNI production environment platform which offers greater scalability to undertake larger amounts of processing.

As well as our PhD cohort, the new machines are also available to others in the university researching in geospatial and civil engineering fields working on a range of topics from hydrological modelling, to transport accessibility analysis.

This equipment complements the GPUs also purchased with the DAFNI hardware fund and used mainly in projects analysing CCTV data and spearheaded by Phil James, Director of the National Urban Observatory Facility at Newcastle University but available for use by others in the research group too.



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The new machines give us high performance computing power beyond a standard laptop or desktop machine, providing PhD students who don't have access to High Performance Computing with a safe place to run models and code, whilst testing and developing their models for the DAFNI platform and getting them ready. It also means that the research group or students don't bear the expense of cloud computing or require further training that maybe needed to use cloud services.

Having this additional resource is helpful when potential PhD students are considering joining Newcastle University and know that modelling will be an important part of their research. Being able to offer access to high performance computing through equipment such as the new machines can be an important factor in attracting them to join our research group.

The machines were set up in summer 2022 and have been fully accessible to students since.

Scaling up analysis and research

Students are already using the DAFNI-funded machines to dockerise their code and to explore the process of getting the models ready for DAFNI. The new machines act as a sandbox environment where they can upload their models and carry out test runs in a separate environment to their day-to-day work environment, a space more similar to the DAFNI platform.

The new machines sit in our building at the heart of our research team. They are accessible to any PhD student within the group via remote access and are managed by the university IT team. They are also available to other researchers although are proving more popular with PhD students some of which would otherwise not have access to sort of higher computing power the machines offer.

When the students upload their models onto the DAFNI platform, they will be able to scale up their analysis and research, to run more scenarios and research finer outputs than on the standalone machines. On the DAFNI platform they can also access other researchers' models and access datasets from public bodies and other research groups much more easily.

Newcastle University PhD students are already exploring models on DAFNI, such as the UDM (Urban Development Model). This model was developed by Dr Alistair Ford and Professor Stuart Barr, both based at Newcastle University. The Urban Development Model is an established research tool which can be used to explore areas in the UK suitable for future residential development for under different scenarios.

The UDM model has been available on DAFNI since 2019 and is being explored by both researchers and PhD's at Newcastle University including how it can be coupled with other models already available on DAFNI as well as to work with new models they are developing themselves.

Find out more about Craig's use of DAFNI at: https://www.dafni.ac.uk/insights/craigrobson_newcastle/

Find out more about the OpenCLIM project at: <https://www.dafni.ac.uk/openclim/>

The DAFNI high performance computing we purchased with the DAFNI hardware fund allows us to provide PhD researchers with a useful staging environment where they can test and hone models and code before going onto the DAFNI platform itself.

