DAFNI

Environmental Impacts

DAFNI Conference 2022
5 July

Data & Analytics Facility for National Infrastructure

CONTENTS

Audience participation is welcomed throughout various points in the programme.
To pose your questions and get involved, please download the Slido App from your
app store or access Slido at the following address **sli.do** and enter event ID **#3755206.**

WELCOME

Welcome to the DAFNI Conference, 2022. This year I am pleased to be able to welcome delegates in person in Manchester; it is great to be able to meet people in person again, as well as engage with our lively online audience.

Exactly one year ago we launched the DAFNI platform at our 2021 conference. At that conference we presented our vision of DAFNI as a data and analytics facility to support research into infrastructure systems, including how they are planned, interact and change, and to form a basis for collaboration across academia, government and industry. We demonstrated what the platform offered and invited the community to join the DAFNI community, to use the platform to support their research.

At this year's conference, we focus on how users are now using the platform. Our theme is Environmental Impacts, reflecting the essential connection between our infrastructure and the natural environment in which we all live. We shall see how DAFNI is being used, for example, to explore the effects of climate change, and to support the use of water resources. Further talks consider how DAFNI is contributing to the developing concept of a national Digital Twin, including how they interact with the environment.

I am particularly pleased to welcome our two keynote speakers, who give us the strategic picture. Professor Jim Hall, now a Commissioner on the National Infrastructure Commission, will tell us how computational modelling can affect strategic decision making. Mark Enzer will then describe the vision of connecting Digital Twins to support strategic planning and monitoring of our valuable infrastructure assets.

I hope that you have an enjoyable and informative day!

Dr Brian Matthews
DAFNI Facility Lead
Scientific Computing, STFC

Dr Brian Matthews leads the DAFNI and Data Science and Technology Group at Rutherford Appleton Laboratory (RAL).He has over 30 years of experience in R&D development in computing, with a focus on tools, methods and standards for managing accessing research data from scienti c experiments. He took a leading role in the development of the data management infrastructure that supports the ISIS Neutron and Diamond Light Sources, and has worked extensively on European programmes on data infrastructures. He leads the DAFNI team, developing data and modelling infrastructure to support research into national infrastructure, and is Co- Investigator on projects extending its use including OpenCLIM and the UK Centre for Greening Finance and Investment initiative. He is Co-Investigator and Technical Lead on the Physical Sciences Data- science Service, one of EPSRC's National Research Facilities.

DAFNI Governance & Executive Board

Dr Asaad Faramarzi,
University of Birmingham

Professor Liz Varga,
UCL

Professor Michael Batty,
University College London

Dr Aruna Sivakumar,
Imperial College

Dr Nik Lomax,
University of Leeds

Professor Theo Tryfonas,
University of Bristol

Professor Stephen Hallett,
University of Cranfield

Professor Daniel Coca,
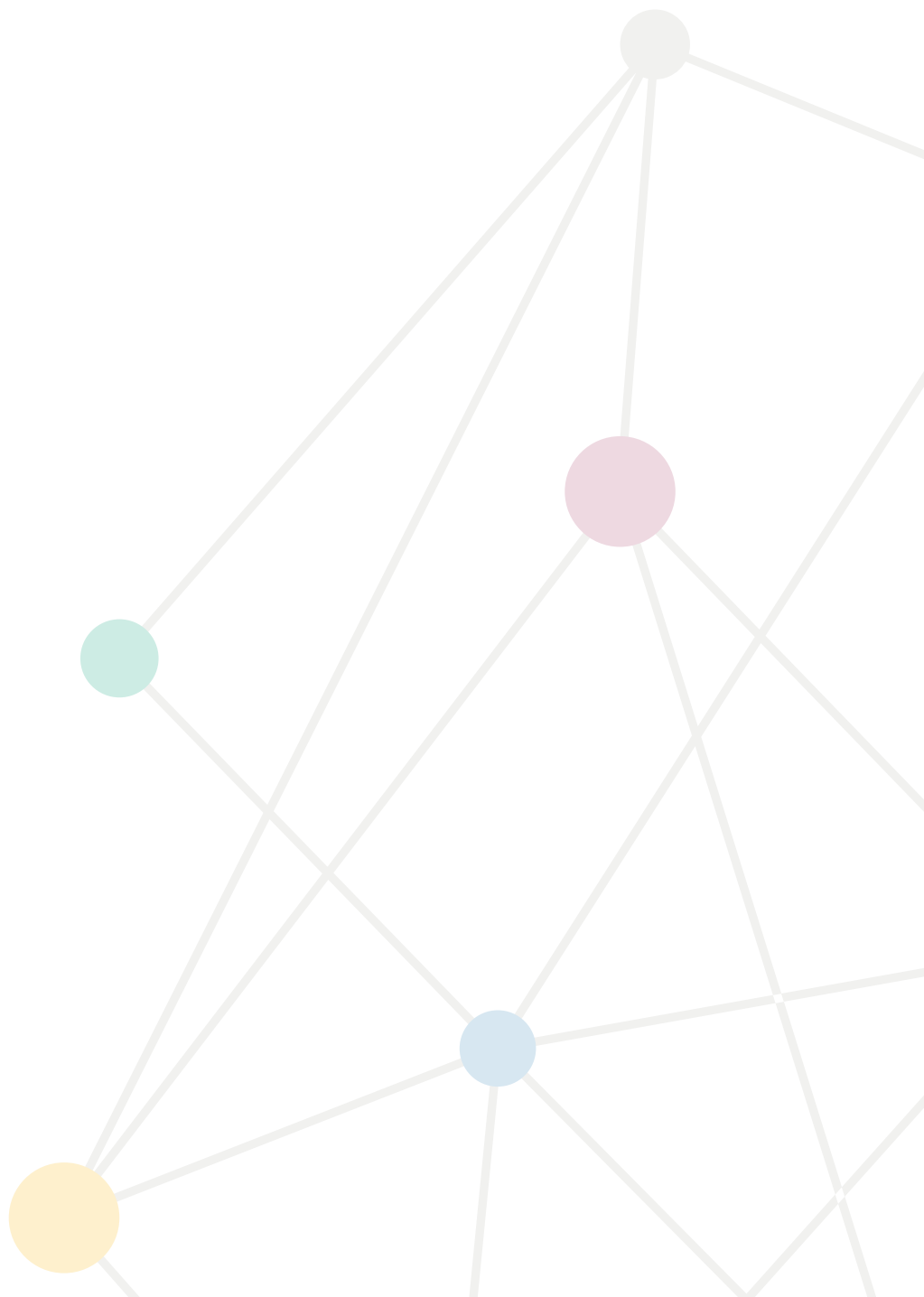University of Sheffield

Dr Simon Blainey,
University of Southampton

Professor Jim Hall,
Oxford University

Professor Julien Harou,
University of Manchester

Dr Ruchi Choudhary,
University of Cambridge

Professor Phil James,
Newcastle University

Programme

PROGRAMME

09:00 **Arrival and breakfast networking**

09:30 **Welcome and introduction**
Professor Stephen Hallett, Chair of Applied Environmental Informatics, Cranfield University

09:40 **Keynote presentation**
The future of modelling in support of infrastructure decisions
Professor Jim Hall, new Commissioner for the National Infrastructure Commission

10:10 **DAFNI – Platform as a service**
Dr Brian Matthews, DAFNI Facility Lead, Scientific Computing, STFC

DAFNI is supporting research to understand environmental impacts: OpenCLIM and water modelling projects

10:30 **The OpenCLIM Project: supporting future risk and adaptation assessments**
Professor Robert Nicholls, Director of the Tyndall Centre, University of East Anglia [virtual]

10:45 **OpenCLIM: Developing a framework for a national scale assessment of climate change risk and adaptation**
Dr Craig Robson, Research Associate in Geospatial Data Science, University of Newcastle

11:00 **How DAFNI's platform is supporting water modelling in the UK**
Dr Jonny Wilson, Water Resources Modelling Lead, The Environment Agency

11:15 **Refreshment break and networking**

11:35 **Building NERC's Digital Solutions Hub – a user centric approach**
Professor Richard Kingston, University of Manchester and PI for NERC's Digital Solutions programme

11:50 **Q&A panel session**
Chaired by Professor Stephen Hallett, Chair of Applied Environmental Informatics, Cranfield University
Panel:
Professor Jim Hall, National Infrastructure Commission
Dr Brian Matthews, STFC
Dr Craig Robson, University of Newcastle
Dr Jonny Wilson, Environment Agency
Professor Richard Kingston, University of Manchester

12:20   **Networking lunch, poster session and exhibition**

13:30   **Welcome back and introduction to the afternoon session**
Professor Liz Varga, Professor of Complex Systems, Head of UCL's Infrastructure Systems Institute, UCL

13:40   **Keynote presentation: The future of connected Digital Twins**
Mark Enzer, OBE, Strategic Advisor, Mott MacDonald and Former Head of the National Digital Twin Programme

14:00   **Q & A Session**

A series of talks showcase DAFNI - how DAFNI is supporting research

14:15   **Engaging with UKCRIC: An overview of UKCRIC facilities, clusters, scientific missions and systemic perspectives**
Dr Tom Dolan, UKCRIC Senior Research Fellow, UCL

14:30   **Analysis pipeline for hydrological simulation in the PYRAMID project**
Dr Robin Wardle, Research Software Engineer, Newcastle University

14:45   **Maritime shipping Digital Twin for construction waste distribution**
Dr Evangelia Manola, Research Fellow in UCL Department of Civil, Environmental & Geomatic Engineering

15:00   **Refreshment break and networking**

15:15   **CReDo – Climate flood resilience Digital Twin**
Dr Jens Jensen, Scientific Computing, STFC
Dr Ben Mawdsley, Hartree Centre; Dr Jethro Akroyd, CMCL Innovations

15:35   **A flexible approach to local energy modelling**
Dr André Paul Neto-Bradley, Research Associate, University of Cambridge

15:50   **Q&A panel session**
Chaired by Professor Liz Varga, UCL
Panel:
Mark Enzer, Mott MacDonald
Dr Jens Jensen, Scientific Computing, STFC
Dr Robin Wardle, Newcastle University
Dr Tom Dolan, UCL
Dr André Neto-Bradley, University of Cambridge

16:15   **Conference closing remarks**
Dr Brian Matthews, DAFNI Facility Lead, Scientific Computing, STFC

Keynote Speakers

Professor Jim Hall FREng, DAFNI Governance Board Chair; Commissioner, National Infrastructure Commission; and Professor of Climate and Environmental Risks, Oxford Programme for Sustainable Infrastructure Systems, University of Oxford.

Jim Hall FREng is Professor of Climate and Environmental Risks in the University of Oxford and Director of Research in the School of Geography and the Environment. Before joining the University of Oxford in 2011 to become Director of the University's Environmental Change Institute, Prof Hall held academic positions in the Newcastle University and the University of Bristol. Prof Hall is internationally recognised for his research on risk analysis and decision making under uncertainty for water resource systems, flood and coastal risk management, infrastructure systems and adaptation to climate change. Professor Hall is a member of the National Infrastructure Commission and the Prime Minister's Council for Science and Technology. He is Chair of the Science Advisory Committee of the International Institute for Applied Systems Analysis (IIASA). He was a member of the UK independent Committee on Climate Change Adaptation from 2009 to 2019.

The future of modelling in support of infrastructure decisions

Computer modelling has been an essential aspect of infrastructure decisions, e.g. energy systems planning and flood risk management, for decades. We now have a complex modelling ecosystem which is not well-matched to the needs of decision makers. The evolving technological nature of infrastructure means that it is increasingly necessary to understand local details (like time-of-day use of electricity) at the same time as large-scale systems interdependencies. This potentially points to more complex models, but on the other hand transparent and robust decision-making benefits from simple accessible models. Using examples from water resources planning, flood risk management and the work of the National Infrastructure Commission, this talk will examine the challenges of model-based decision analysis and propose some solutions.

Mark Enzer OBE FREng, Strategic Advisor at Mott MacDonald and Former Head of the National Digital Twin Programme

Mark is a keen champion of innovation in the context of collaborative delivery models and he is particularly interested in the transformation of the infrastructure industry, including: systems-thinking, digital transformation, connected digital twins, data infrastructure, low-carbon sustainable solutions and the circular economy in the built environment.

As the former Head of the National Digital Twin programme, Mark contributed to the leadership of this ambitious programme to enable an ecosystem of connected digital twins across the built environment. For five years, mark was Mott MacDonald's Chief Technical Officer and was accountable to the Executive Board for technical excellence across the Group. As Strategic Advisor for Mott MacDonald Digital Ventures, Mark provides strategy-level advice to key clients on digital transformation, connected digital twins and broader industry transformation. Mark is a co-chair of the Construction Leadership Council's Digital Network and he is the Digital Transformation workstream lead for the Infrastructure Client Group, which represents the UK's major infrastructure client organisations. Mark was the Lead Author of the Infrastructure Carbon Review, published by HM Treasury.

Future of connected Digital Twins

The work of the Centre for Digital Built Britain (CDBB) on the National Digital Twin programme is now complete, but the development of ecosystems of Connected Digital Twins very much continues across Government, industry and academia. While it is clear that the market for individual digital twins is taking off, it is far from certain that the necessary interoperability will be built in to enable federation of digital twins. This requires a level of data quality and consistency that the market alone cannot initiate; it requires cross-industry leadership to create the conditions that will enable the market for connected digital twins to develop and thrive. This talk will highlight the key high-level lessons from CDBB and will point towards the promises and challenges of connecting digital twins as part of future cyber-physical infrastructure.

Invited Speakers

Dr Jethro Akroyd, CMCL Innovations

Jethro is a research-focused chartered chemical engineer who works at the interface of academia and industry, with experience cutting across multinationals, start-ups and universities. He is a Fellow Churchill College and holds positions at CMCL Innovations, a multi-award-winning SME, and as a Senior Research Associate in the Computational Modelling Group at the Department of Chemical Engineering and Biotechnology (CEB), University of Cambridge. Jethro has worked extensively with the Cambridge Centre for Advanced Research and Education in Singapore (CARES) to develop solutions to enable the cross-domain interoperability of data and models, with a focus on applications relating to sustainability and the energy transition. He recently led work by CMCL Innovations to implement parts of the first cross-sector digital twin of energy, water and telecoms infrastructure networks as part of the Climate Resilience Demonstrator (CReDo), which is a climate change adaptation digital twin demonstrator project to improve resilience across infrastructure networks.

CReDo – Climate flood resilience Digital Twin

The CReDo project developed a way to assess the impact of flooding on critical national infrastructure. As the real data was sensitive, we had to develop a way to work on it without violating the infrastructure operators' policy. In this talk we will demonstrate the work (on synthetic data) and discuss how it was achieved and future directions

Dr Tom Dolan UKCRIC Senior Research Fellow, UCL

Systemic research focused on infrastructure systems as enablers of societally beneficial outcomes, with particular focus on:

•The systemic interdependencies, emergent properties and dynamic contexts that underpin the normal operations of infrastructure, and the potential to enable the realisation of systemic outcomes that are net zero; sustainable and resilient to the disruptive impacts of resilience challenges (e.g. global warming); enhance the quality of the local environment; and helps catalyse an urgent transformation to a net zero GHG emission economy.

•The challenges of how we systemically govern, regulate, manage (including plan, design, procure, construct, operate, maintain, enhance, repurpose, measure, account for, value and incentivise investment in) complex infrastructure systems for the safe emergence of these system characteristics.

My research has led me to propose and develop a range of novel concepts, new terminology, conceptual frameworks, systemic perspectives and characterisations. Selected examples include:

•The systemic characterisation of National Infrastructure (NI) as an open complex interdependent system comprised of the a) Physical infrastructure networks, b) Governance structures, c) Regulatory frameworks d) Management processes associated with the six economic infrastructure sectors of which it is comprised e) Interdependencies within and between each of the above f) Interdependencies with the Dynamic External Context (DEC) within which it is embedded.

•A conceptual framework, new terminology and systemic perspectives to illustrate the systemic mechanisms through which National Infrastructure simultaneously enables societal and economic activity, supports realisation of socially beneficial outcomes, drives the emergence of undesirable outcomes such as sustainability challenges (i.e. GHG emissions, other polluting emissions and waste streams) and resilience challenges

•The development of concepts related to: Net resilience gain, cascade successes, The climate emergen(t) cy, systemic resilience, resilience challenges, sustainability challenges; with the purpose of illustrating the potentially catalytic role of national infrastructure at the heart of strategic systemic responses to societal and environmental grand challenges

Engaging with UKCRIC: An overview of UKCRIC facilities, clusters, scientific missions & systemic perspectives

Dr Tom Dolan will share details of what UKCRIC is, its research facilities, research focuses and overarching vision and purpose. The talk will include details of a range of different ways to engage with the UKCRIC team and facilities.

Professor Stephen Hallett BSc (Hon), MSc, PhD, SFHEA
Chair of Applied Environmental Informatics, Cranfield University

Chair of the morning session

Prof. Hallett's research focuses on developing the scientific understanding of environmental risks and challenges relating to land resource management in the natural and built environment and understanding the role and opportunity data science and digital technologies offer in addressing research and development. His leadership has contributed to securing significant research funding, with work centring on natural ecosystems, agriculture and infrastructure and understanding the impact of a changing climate. His work draws on expertise in environmental big data, analytics, decision support, GIS/remote sensing, software development, 3D data visualisation, virtual/augmented reality, and geospatial decision-support systems applied across four strategic themes: (1) Agricultural and Environmental Informatics; (2) Soil and Land Resource Management; (3) Geohazards and Urban Infrastructure; and (4) Environmental Risk Mitigation and Climate Change. He is widely published and cited internationally and has supervised many PhD students. Stephen was appointed one of the NERC Digital Environment Champions within the Constructing a Digital Environment Strategic Priorities Fund programme (www.digitalenvironment.org). He has a responsibility for Cranfield's Land Information System (www.landis.org.uk), holding the soil datasets for England and Wales, and its international equivalent (www.wossac.com). He is the Director of the NERC Centre for Doctoral Training in big data and environmental risk mitigation, DREAM (www.dream-cdt.ac.uk), Cranfield lead on the NERC Doctoral Training Partnership CENTA, and sits on the governing board of the Data & Analytics Facility for National Infrastructure (www.dafni.ac.uk).

Dr Jens Jensen, Scientific Computing, STFC

Dr Jens Jensen (he/him) is a Mad Scientist in STFC's Scientific Computing Department. Much of his work so far is in the security that underpins global computational collaborations, such as the Large Hadron Collider computing grid, or, currently, the Square Kilometre Array, ensuring that research infrastructures such as the European Open Science Cloud can interoperate securely with other infrastructures. His recent DAFNI work has included designing and implementing data security for CReDo, a project modelling the impact on flooding on critical infrastructure.

CReDo – Climate flood resilience Digital Twin

The CReDo project developed a way to assess the impact of flooding on critical national infrastructure. As the real data was sensitive, we had to develop a way to work on it without violating the infrastructure operators' policy. In this talk we will demonstrate the work (on synthetic data) and discuss how it was achieved and future directions.

Professor Richard Kingston, University of Manchester and PI for NERC's Digital Solutions Programme

Richard is Professor of Urban Planning and GISc, a chartered Town Planner and Deputy Director of the Spatial Policy Analysis Lab at The University of Manchester. He is currently Director of NERC's 5 year Digital Solutions Programme which is investing £7m in the development of an online platform and set of toolkits that will exploit environmental and other data to create innovative digital services that deliver economic, societal and environmental benefits across the UK. Richard specialises in web-based decision support systems to support spatial decision making from national to local scales and has spent the past 25 years developing, testing and implementing these approaches across Europe. Further details can be found at http://www.digital-solutions.uk/

Building NERC's Digital Solutions Hub – a user centric approach

NERC holds around 40 peta-bytes of environmental data across its five data centres across a range of academic disciplines and domains. The aim of the NERC Digital Solutions Programme is to build an innovative 'hub' to bring together all of this data with a range of social, economic, health and other environmental data across the whole of the UK. The presentation will explain our approach to meeting this aim over the coming years.

Dr Evangelia Manola, UCL Research Fellow

Evangelia is a Research Fellow in UCL Department of Civil, Environmental & Geomatic Engineering. She is working with Professor Liz Varga on Eco-design technical characterisation of mineral-based construction materials with a focus on transport infrastructure projects. She is a qualified Civil Engineer (MEng., 2012) from Aristotle University of Thessaloniki where she also studied for her MSc. in Environmental Protection and Sustainable Development (2013). She was awarded her PhD at De Montfort University in 2019 which focused on Composite Pavement numerical modelling and distress prediction. Her previous research experience involved working as a KTP research associate investigating the behaviour of bituminous emulsions on a 2 year Innovate UK funded project in a collaboration between Liverpool John Moores University and Colas Ltd.

Shipping Digital Twin to solve logistical carbon challenges

As part of the Interdisciplinary Circular Economy Centre for Mineral-Based Construction Materials (ICEC-MCM) we are looking for ways to implement Circular Economy in transportation infrastructure projects. Maritime shipping could provide an alternative to transporting these materials (for example, cement) instead of the traditional movement with trucks on roads. An innovative idea of a Digital Twin of maritime shipping is presented in order to improve the distribution of construction waste but also reduce carbon emissions.

Dr Ben Mawdsley, Senior Data Scientist, Hartree Centre

Ben is a Senior Data Scientist at the Hartree Centre, promoting the adoption of machine learning and artificial intelligence techniques. Working with the experts in their fields, he seeks to find new opportunities for these technologies to solve pressing problems in industrial and academic domains. Ben's background is in observational cosmology, having completed a Ph.D. using large astronomical datasets to produce maps of dark matter, before moving to the Hartree Centre where he now leads the delivery of projects seeking to extract new value from varied datasets. Most recently, Ben has been working on the CReDo project, leading the implementation of predictive models for asset failure and contributing to the inter-organisational project management that ensured successful delivery.

CReDo – Climate flood resilience Digital Twin

The CReDo project developed a way to assess the impact of flooding on critical national infrastructure. As the real data was sensitive, we had to develop a way to work on it without violating the infrastructure operators' policy. In this talk we will demonstrate the work (on synthetic data) and discuss how it was achieved and future directions

Dr André Neto-Bradley, Research Associate, University of Cambridge

André is an engineer and data scientist, and has been a Research Associate at the Energy Efficient Cities initiative (EECi) since completing a PhD on modelling energy inequalities in urban India at University of Cambridge. His research interests focus on understanding and modelling the role of socio-cultural context in urban residential energy, as well as the use of data science approaches to characterise barriers and inequality in energy access and decarbonisation - leveraging publicly available data to support local decision making. He has recently started working as a Senior Energy Advisor at BEIS.

A flexible approach to local energy modelling

This talk will explore the design, implementation, and uses of EnergyFlex – a microsimulation model that uses public data to synthetise a representative housing stock for any local authority, and estimate energy efficiency and characteristics of the housing stock in the area. The model has been run using DAFNI and the outputs can be used to locally tailor and target energy efficiency and decarbonisation efforts. This model has been developed through a collaboration between the University of Cambridge, University of Leeds, the Alan Turing Institute and DAFNI.

Professor Robert J. Nicholls, Director of the Tyndall Centre, University of East Anglia

Robert Nicholls is an expert in assessment of environmental and climate problems, taking an interdisciplinary system approach which facilitates policy analysis. This includes the ITRC/Mistral projects on national infrastructure provision and the CLIMSAVE integrated assessment of climate change in Europe. Much of his work has focused on coasts and climate change. He led the Tyndall Coastal Simulator, the NERC-funded iCOASST (Evolving coastal geomorphic sediment systems), "Coastal landfill and shoreline management", and "Coastal resilience in the face of sea-level rise projects. He has extensive international experience, especially in coastal cities, deltas and small islands. He has advised national governments (e.g., UK, Netherlands, Bangladesh, Singapore, the Maldives) and intergovernmental organisations (e.g., OECD; World Bank) on climate change and coastal issues. He was a lead author to five reports of the Intergovernmental Panel for Climate Change (IPCC) assessment process. He currently co-leads the World Climate Research Programme Sea-Level Rise Grand Challenge to deliver sea-level science to support better coastal impact and adaptation assessment and is a member of the ASCE/COPRI Coastal Engineering Research Council. Of relevance here, within the UK Climate Resilience Programme he leads the OpenCLIM project which is developing integrated methods for future Climate Change Risk Assessments using DAFNI.

Dr Craig Robson, Research Associate in Geospatial Data Science, School of Engineering, Newcastle University

Craig Robson is a lecturer at Newcastle University within the Geospatial Engineering group (School of Engineering), a member of the Tyndal Centre for Climate Change and is a DAFNI champion. His research interests are across spatial data science, digital twins, the resilience of infrastructure to climate change and spatial data management. Craig is currently a Co-Investigator on the OpenCLIM project 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 has worked on a number of successful integrated assessment platforms for critical infrastructure analysis and for real-time hazard and risk modelling for flooding in urban areas, using latest technologies and data science methods to reduce risk to climate based hazards; projects such as ITRC, MISTRAL and FLOOD-PREPARED. He has been working with DAFNI for over 4 years and continues to engage with the platform and the team supporting it further development and use.

OpenCLIM: Developing a framework for a national scale assessment of climate change risk and adaptation

OpenCLIM is building a framework enabling the next generation of climate risk and adaptation modelling at a national scale, bringing together domain experts and models to create a novel and integrated platform. The framework enables greater consistency then achieved previously across multiple domains for climate change risk analysis, providing new insights. To address the many challenges associated with coupling independently developed domain specific models, the DAFNI platform is employed providing a host platform on which the models and the required tools can be co-developed to build the OpenCLIM framework. Progress towards this new framework will be shown in this talk, demonstrating how the DAFNI platform can be employed.

Professor Liz Varga, Head of UCL's Infrastructure Systems Institute, UCL

Chair of the afternoon session

Professor Liz Varga, FCABE, FAcSS, has a chair in Complex Systems in the Civil, Environmental, and Geomatics Engineering Department, University College London (UCL). She leads the Infrastructure Systems Institute and is principal investigator for the coordination node of UK Collaboratorium for Research in Infrastructure and Cities (https://www.ukcric.com/) and a co-investigator for the Data and Analytics Facility for National Infrastructure (https://dafni.ac.uk/). She teaches, writes, and advises globally on energy, transport, digital communications, water, and waste. Her key research themes are infrastructure resilience, sustainable innovation, circular engineering, and decarbonisation, using digital twins, hybrid models, and self-healing systems.

Dr Robin Wardle, Research Software Engineer, Newcastle University

Robin joined the Research Software Engineering team in May 2021, on completing a PhD in Energy at Newcastle University. He graduated with a Masters in Electro-mechanical Engineering from Manchester University, and has additionally worked as an RA in Newcastle University's School of Engineering on energy systems demonstrator and modelling projects, including in collaboration with the Centre for Energy Systems Integration. He has also worked extensively in industry, principally in scientific and simulation software environments, and has significant project management experience in both industrial and university contexts. Robin is training to be a Software Carpentries Instructor and to deliver Degree Apprenticeship modules in collaboration with the Institute of Coding. Robin is presenting his work on the Pyramid project and how DAFNI has supported this model.

Analysis pipeline for hydrological simulation in the PYRAMID project

PYRAMID is a collaboration between researchers from Newcastle and Loughborough Universities to develop a near-real-time flood-forecasting and flood-risk management demonstrator platform. The project requires the orchestration of computational models to form a coordinated analysis pipeline, with input data for the flood risk assessment being gathered from a variety of sources including live-streaming from online sensor APIs. DAFNI offers the project a pragmatic and ready-made framework for deploying the pipeline workflow, hosting hydro-geographic datasets, and linking together simulation and conversion tools of varying origins. Existing DAFNI experience within Newcastle University, such as in the OpenCLIM project, has also helped to accelerate the development of the PYRAMID analysis pipeline.
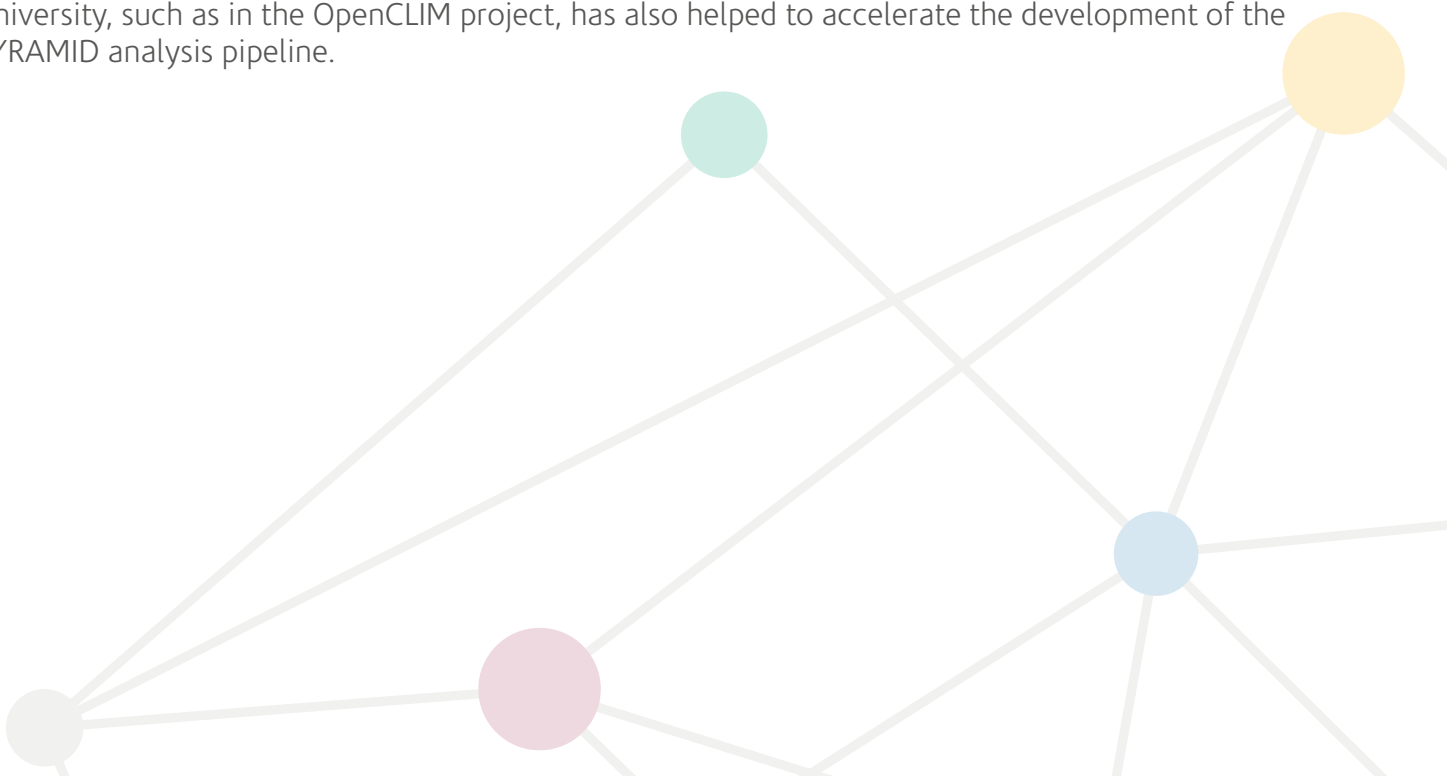
Dr Jonny Wilson, Water Resources Lead, The Environment Agency

Jonny Wilson is a senior officer in the Environment Agency, where he leads on establishing in-house capabilities for national water resources modelling, to help support regulatory decision-making processes. His career in the environmental sector began only recently in 2018, when he joined the Environment Agency to work on the National Framework for Water Resources project, which helped set out England's long-term water needs, and the scale of action required to ensure resilient supplies.

Before joining the Environment Agency, Jonny spent several years working in research and development at a leading consulting firm for oil and gas services, where he created predictive tools for sub-surface exploration using integrated modelling approaches. Prior to this, Jonny started his career in geophysical research at the University of Cambridge, applying inverse modelling techniques to explore how deep earth processes have shaped Earth's topography over geological time. Jonny leads a team of modellers who currently support the Environment Agency's involvement in a national water resources system simulation modelling project, which has been commissioned by the Regulators' Alliance for the Progression Infrastructure Development (RAPID) and is led by the University of Oxford. The project aims to give regulators independent insight on how effective new large-scale water supply infrastructure schemes are at ensuring security of supply for parts of England that face significant and mounting pressure from population growth, environmental protection, and natural climate variability and climate change.

How DAFNI's platform is supporting water modelling in the UK

England's water supplies face significant and mounting pressures from social, environmental and climatic factors. In order to help meet these long-term challenges, Ofwat have set aside £500million to allow water companies to explore a series of large-scale water supply infrastructure schemes to help maintain supplies in future decades. The scale of the challenges facing the nation requires a joined-up approach to water resources planning, including solutions such as long-distance transfers. Only a national-scale water resources system analysis approach can reliably account for large-scale system interactions and the spatial correlation of droughts, which are important factors for assessing the resilience of combinations of strategic solutions including large-scale strategic transfers. The Regulators' Alliance for Progressing Infrastructure Development (RAPID: Environment Agency, Ofwat and Drinking Water Inspectorate) have developed a national water resources system simulation model to independently assess the drought resilience benefits of the new strategic resource options and help support the decision-making process around them. The DAFNI platform is a critical part of the modelling process and has allowed regulators to establish capabilities in a new and important area of work.

Exhibitors

Thank you to our exhibitors:

• Centre for Postdoctoral Development in Infrastructure, Cities and Energy (C-DICE), funded by the Research England Development fund, is driving developments in net zero carbon research and innovation through the postdoctoral talent, linked to facilities and observatories. Open to researchers in any discipline and at any partner university in the UK Collaboratorium for Research in Infrastructure or Cities (UKCRIC) or Energy Research Accelerator (ERA) we provide extensive and innovative support including funding, training, networking and bespoke development opportunities with industry.
https://www.cdice.ac.uk

• DAFNI is the National Platform to satisfy the computational needs in support of data analysis; infrastructure research; and strategic thinking for the UK's long term planning and investment needs. **www.dafni.ac.uk**

• STFC Food Network + (SFN) brings together STFC researchers and facilities with research and industry in the agri-food sector in order to help the STFC community to make a meaningful contribution to the food system. **www.stfcfoodnetwork.org**

• STFC Air Quality Network (SAQN) brings together industry, policy and research to address air quality challenges, using the capabilities of the Science and Technology Facilities Council. At the DAFNI conference learn more about the research projects funded through the network and discuss potential collaborations. **www.saqn.org**

• The UK Collaboratorium for Research on Infrastructure and Cities (UKCRIC), and national network of integrated research facilities with an ambition to underpin the renewal, sustainment and improvement of infrastructure and cities in the UK and elsewhere. **www.ukcric.com**

• The Hartree Centre, part of the Science and Technology Facilities Council, is the UK's centre of excellence for challenge-led innovation in digital technologies. Our experts work collaboratively with industry to apply the latest research in High Performance Computing, Data Analytics, and AI to solve industrial challenges. We work across all sectors, helping to accelerate the adoption of technologies which can deliver transformative gains to UK companies. **www.hartree.stfc.ac.uk**

• Michael Banjoko: Conceptual 3-Dimensional Structure for Neighbourhood Scale Visualisation
3-dimensional framework that has concepts, structure and principles for sustainability within the built environment. Discussions from my literature review and these outreaches strongly suggests that behavioural change amongst people is a major driver for achieving sustainability, especially for the built environment. The 3-model depicts sustainability through its amazing formation. The result of structural and interactive connections between a number of the same basic element.

DAFNI
Team

DAFNI Team

Dr Brian Matthews
DAFNI Project Lead

Dhiwagaran
Thangavelu
Senior Software
Engineer

Rose Dickinson
Senior Software
Engineer

Sarah Byrne
Software Engineer –
Graduate

Matt Jones
Senior UX Developer

Josh Owen
Software Engineer –
Graduate

Marion Samler
DAFNI Partnership
Manager

Catherine Dhanjal
Media Manager

Dr Juan Bicarregui
Head of Data Division,
Scientific Computing

Dr Jens Jensen
Data Scientist

Rocio Garavito Ramirez
Project Co-ordinator

Dr Bethan Perkins
Product Manager

Georgia Lomas
SCD Events
Coordinator and
Administrator

James Hannah
Linux Systems and
Service Manager

If you would like to get involved in DAFNI,
please contact Marion Samler, DAFNI Partnership Manager
marion.samler@stfc.ac.uk
+44 1235 567217

Follow DAFNI: @DAFNIfacility

Contact us on: info@dafni.ac.uk
Keep up to date with latest news and sign up for our DAFNI Mailing list at:

www.dafni.ac.uk