

DAFNI

CONFERENCE 2023



BUILDING A SECURE AND RESILIENT WORLD



IMPERIAL COLLEGE, LONDON. 12 SEPTEMBER 2023





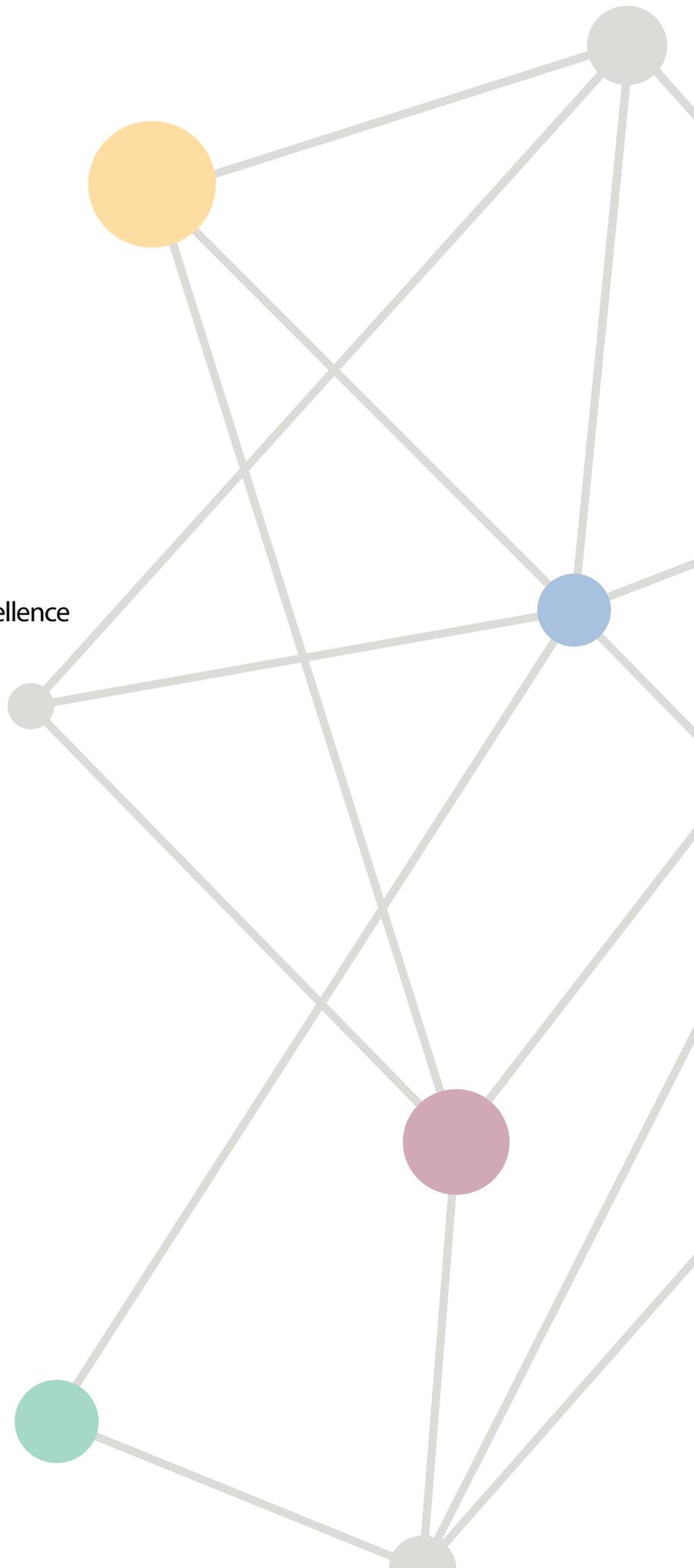
Data & Analytics Facility for National Infrastructure

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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 **#2299756**.



WELCOME

Welcome to the DAFNI Conference, 2023. This year we are back with an in-person event in London. I look forward to catching up with the DAFNI community and building new networks!

At last year's conference, our theme was Environmental Impacts and we saw how users are now using the platform. The platform has changed since last year and today you will be able to hear from the DAFNI technical team on DAFNI's new features and see the platform live in demonstrations during the breaks.

This year's conference is focused on 'Building a Secure and Resilient World', a new research theme within UKRI that DAFNI is a part of. We have an exciting programme today, with keynote and invited speakers, DAFNI demonstrations, and the launch of our Centre of Excellence for Resilient Infrastructure Analysis.

Today we will learn more about the grant holders' projects that form an essential part of the Centre and look forward to its further activities. The outputs from this community can provide policymakers, private companies with the analysis and scenario-planning vital to ensure the UK is resilient against potential future risks.

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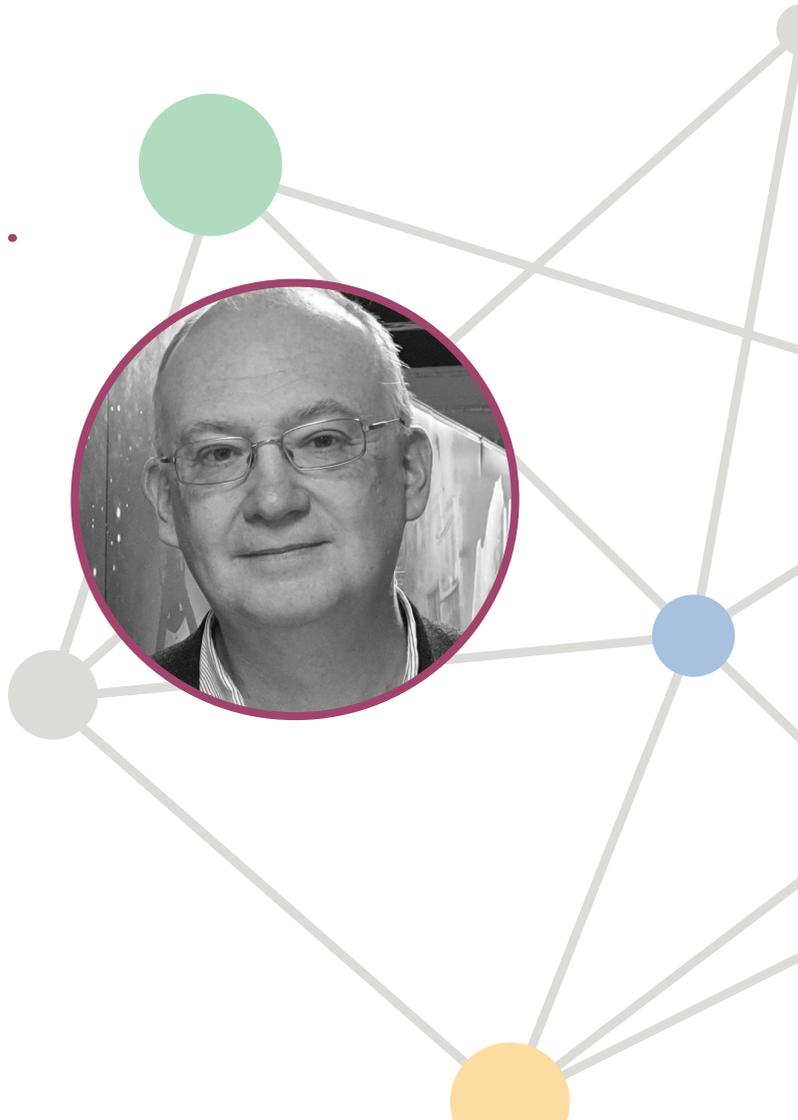
Dr Brian Matthews leads the DAFNI programme at Rutherford Appleton Laboratory (RAL).

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 scientific 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 UK Centre for Greening Finance and Investment initiative. He is Co-Investigator and Technical Lead on the Physical Sciences Data Infrastructure (PSDI) Service, one of EPSRC's National Research Facilities.

I very much look forward to working with these exciting projects over the next 2 years.

I am delighted to welcome our two keynote speakers, who will help paint the picture for 'Building a Secure and Resilient World'. Bridget Rosewell, a Non-Executive Director at UK Infrastructure Bank (UKIB), will tell us how DAFNI helps to improve capacity and resilience of infrastructure. Wei Yang, a Co-Founder of the Digital Task Force for Planning, will then discuss her work on Spatial Planning Reimagined. We also have invited speakers, Kristine Zaidi and Russell Price. Kristine is a programme lead on the UKRI BSRW programme and will give a talk on the challenges of resilience for research. Russell is the Chair of ISO Technical Committee TC262 and will discuss using standards in practice, embedding resilience in infrastructure.

I look forward to meeting you and hope that you enjoy the day.



DAFNI Governance & Executive Board



Professor Michael Batty
University College London



Professor Julien Harou
University of Manchester



Dr Simon Blainey
University of Southampton



Professor Phil James
Newcastle University



Dr Juan Bicarregui
STFC



Dr Nik Lomax
University of Leeds



Dr Ruchi Choudhary
University of Cambridge



Dr Giuliano Punzo
University of Sheffield



Professor Daniel Coca
Newcastle University



Dr Aruna Sivakumar
Imperial College



Dr Asaad Famarzi
University of Birmingham



Professor Theo Tryfonas
University of Bristol



Professor Jim Hall
Oxford University



Professor Liz Varga
University College London

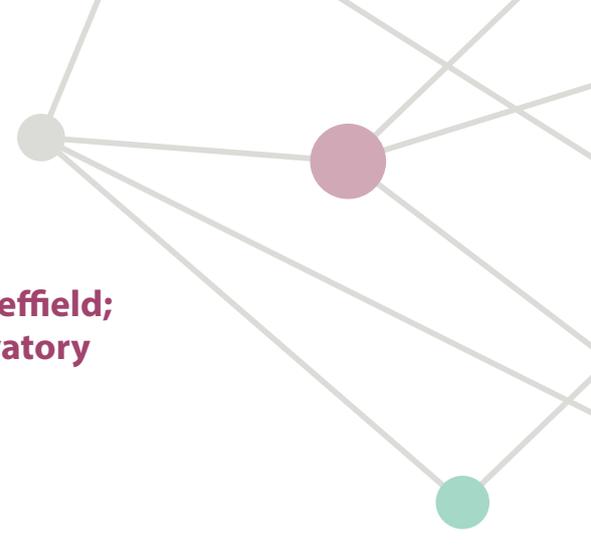


Professor Stephen Hallett
University of Cranfield



Programme

PROGRAMME



Chair: Dr Giuliano Punzo, Lecturer, University of Sheffield;
Director of the Sheffield Urban Flows Observatory

09:00 Arrival and Breakfast Networking

09:25 Welcome and Introduction

09:30 **Keynote Presentation: DAFNI to Improve Capacity & Resilience of Infrastructure Systems**

Bridget Rosewell, Non-Executive Director at UK Infrastructure Bank (UKIB), Formerly Commissioner of the National Infrastructure Commission (NIC)

10:10 **DAFNI – Exploring Resilience**

Dr Brian Matthews, DAFNI Facility Lead, Scientific Computing, STFC

10:35 **Presentation - DAFNI Technical Team**

Dr Bethan Perkins, DAFNI Team Leader

10:55 **Break, Demos, Networking**

Building a Secure and Resilient World

11:25 **The Challenges of Resilience**

Dr Kristine Zaidi, Associate Director of Programmes, UKRI AHRC

11:45 **Presentations from Centre of Excellence**

Resilience Scenarios for Integrated Water Systems - RIWS

Dr Ana Mijic, Imperial College London

An Agent-Based Model of Flood Infrastructure Resilience – FIRM

Professor Richard Dawson, Newcastle University

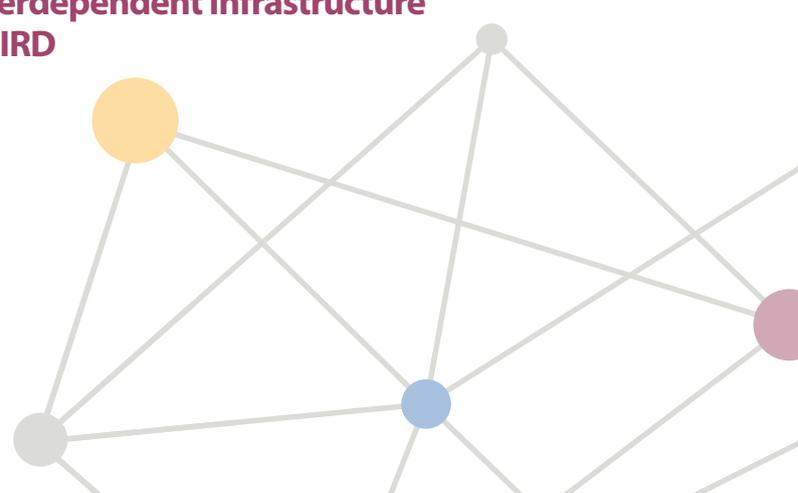
Uncertainty Quantification and Sensitivity Analysis for Resilient Infrastructure Systems – USARIS

Dr Francesca Pianosi, University of Bristol

Building Systemic Resilience of Interdependent Infrastructure Networks at the National Scale – NIRD

Dr Raghav Pant, University of Oxford

12:45 **Networking Lunch and Demos**



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- 13:45 Welcome Back and Introduction to the Afternoon Session**
- 13:50 Keynote Presentation: Spatial Planning Reimagined**
Dr Wei Yang, Co-Founder & CEO, Digital Task Force for Planning; Chairman, Wei Yang & Partners
- 14:30 Standards in Practice - Embedding Resilience in Infrastructure**
Russell Price, International Standards Organization
- 14:50 Break, Demos, Networking**
- 15:20 Presentations from Centre of Excellence**
- Strategies and Tools for Resilience of Buried Infrastructure to Meteorological Shocks – STORMS**
Dr Xilin Xia, University of Birmingham
- Pywr-WREW, a Water Resources model for England and Wales Built in Python Water Resources Simulation System**
Dr Anna Murgatroyd, University of Oxford
- Sewer Overflow Flood Risk Analysis Model DAFNI Enabled - SOFRAMODE**
Dr Vassilis Glenis, Newcastle University
- Small Changes and Computer-Generated Spatial Interaction Modelling with QUANT – SCQUAIR**
Dr Richard Milton, UCL
- 16:20 Panel**
Dr Giuliano Punzo
Dr Wei Yang
Russell Price
Dr Brian Matthews
- 16:50 Conference Closing Remarks**
Dr Brian Matthews, DAFNI Facility Lead, Scientific Computing, STFC
- 17:00 Close of Conference**



Keynote Speakers



Bridget Rosewell

CBE, MA, MPhil, FICE, FACSS, FSPE

Non-Executive Director, UK Infrastructure Bank (UKIB)

Bridget Rosewell is an experienced director, policy maker and economist, with a track record in advising public and private sector clients on key strategic issues. She chairs Atom Bank and the M6 Toll Company and is a non-executive for the UK Infrastructure Bank and Northumbrian Water Group. Among other roles, she has been a Commissioner for the National Infrastructure Commission, chaired DVSA, been Senior Independent Director for Network Rail and Chief Economic Adviser to the Greater London Authority.

She was appointed CBE in December 2018 and is also a Fellow of the Institution of Civil Engineers, the Academy of Social Science and the Society of Professional Economists. She writes on finance, risk and uncertainty as well as infrastructure and modelling validation.

She has worked extensively on cities, infrastructure and finance, advising on projects in road and rail and on major property developments and regeneration. She has advised on changes to planning regulation and TfL's finances and has appeared at planning Inquiries.



Dr Wei Yang

Co-Founder & CEO, Digital Task Force for Planning;
Chairman, Wei Yang & Partners

Dr Wei Yang is an internationally renowned town planner and urban designer who champions a place-based, whole-systems approach to tackle the grand challenges of our times. She is an influential thought leader and a powerful advocate for climate action, nature-based solutions, health and well-being, and social equality. She was named a Net Zero Hero by Digital Leaders in 2022.

Wei is the Chairman of Wei Yang & Partners, an award-winning master planning firm in London. She possesses extensive experience in managing multi-disciplinary teams. Her professional strengths lie in combining innovative planning inspirations with feasible implementation solutions.

Wei is a leading figure in researching, promoting, and implementing 21st-century garden city and green and low-carbon development approaches worldwide.

Wei is a Fellow of the Academy of Social Sciences, a Fellow of the Royal Town Planning Institute (RTPI) where she served as President in 2021, and an Honorary Professor at the Bartlett Centre for Advanced Spatial Analysis, University College London.

She will serve as the first female Chair of the Construction Industry Council (CIC) from June 2023.



Invited Speakers



CHAIR

Dr Giuliano Punzo

Lecturer, University of Sheffield;
Director of the Sheffield Urban Flows Observatory

Giuliano Punzo obtained an MEng in Aerospace Engineering at the University of Naples (Italy) before getting his PhD in swarm engineering at the University of Strathclyde, Glasgow. With a core focus on distributed systems, Giuliano moved from aerospace to infrastructure and socio-technical

systems, using modelling techniques in the areas of network science, control theory and game theory. Dr Punzo is a Lecturer at the University of Sheffield, Director of the Sheffield Urban Flows Observatory, where he also leads the transport theme and member of the DAFNI Governance Board.



INVITED SPEAKER

Dr Kristine Zaidi

Associate Director of Programmes, UKRI AHRC

Kristine Zaidi joined the Arts and Humanities Research Council (AHRC) in September 2017 as Strategic Lead for Literature, Languages and Area Studies. Her current portfolio includes Public Policy, Public and Engagement and International. She is a programme lead for the UKRI strategic theme on Building a Secure and Resilient World.

Prior to AHRC, she held various positions in the Economic and Social Research Council (ESRC). Her work included data policy, research infrastructure, security and urban studies. Kristine started her professional life as a civil servant in the government of the Republic of Latvia, working in international relations at the Ministry of Defence, and strategic planning in the State Chancellery.



INVITED SPEAKER

Russell Price

Chair of Risk Management Committee,
International Standards Organization

Russell brings a unique perspective to Risk, Continuity and Resilience Management based on a breadth and depth of experience across multiple sectors in organisations. He has been at the forefront of development across Risk and Resilience fields for over 20 years and continues to lead industry thinking and professional practice. Russell is an adviser to governments, regulators, and businesses on the management of risk around the world.

He is currently Chair of the Risk Management Committee (TC262) for the International Standards Organization (ISO) responsible for ISO 31000 - the global risk management standard. He also serves on other International Standards Organisations' Technical Committees covering Climate Change (4Cs), ESG Coordination, Governance (TC309) and Security and Resilience (TC292), as well as Information Security (ISO/IEC JTC 1/SC 27).



**Centre of
Excellence
Grant
Holders**



Dr Ana Mijic

Reader in Water Systems Integration; Director of the Centre for Systems Engineering and Innovation, Imperial College London

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Project Acronym: RIWS

Dr Ana Mijic is a Reader in Water Systems Integration and Director of the Centre for Systems Engineering and Innovation at Imperial College London. Her research focuses on advanced systems modelling and water systems analysis. She is leading the development of novel simulation tools focused on quantifying interactions between the water cycle and sustainable development. The work has aimed to inform policy, regulatory bodies, and the water industry around if and how we can support economic growth whilst ensuring sustainable water use and flood and water quality management under future uncertainties. Prominent areas of research include developing frameworks for a systems approach to catchment and urban water management, including applications to irrigation water use in India, Blue-Green infrastructure and water infrastructure planning under deep uncertainty and urban water-energy nexus. To support systems-level water management analysis, her team has developed the Water Systems Integration Modelling (WSIMOD) framework. The WSIMOD includes urban and rural water system models at a catchment scale and simulates flow and water quality. The model can flexibly integrate elements of the whole water cycle, including land management, water and wastewater infrastructure, operational rules, demand behaviour and river water quality, supporting integrated and collaborative decisions for long-term planning of water and land systems. Ana is passionate about pushing the boundaries of scientific evidence for policy and water management plans development and implementation. She worked on multiple knowledge transfer projects and supported steering committees and policy forums. Through her innovation placement with the Environment Agency, she has developed a systems approach to water management in the context of the UK's 25-Year Environment Plan. Her work was featured in media such as Guardian, Evening Standard, ITV, and Sky News.

Abstract:

The resilience of water systems in the context of climate change, weather extremes, planning and operational decisions is crucial to water infrastructure service delivery and environmental management. In the UK, water systems are under extreme pressure from exceptional droughts like in the Summer of 2022, or challenges to manage sewage spills. At the same time, the latest report on river water quality shows that only 14% of rivers in England meet good ecological status.

Therefore, there is a need to develop resilience assessment to address the challenges of water systems and the environment. This project (RIWS) led by Ana Mijic, Imperial College London, addresses a critical knowledge gap in resilience scenarios for integrated water systems for various stressors.

It also aims to develop scenarios that can provide evidence for water companies, planning authorities and environmental regulators on the feasibility of water systems adaptive planning when assessed by resilience metrics.



Professor Richard Dawson

Professor of Earth System Engineering
and Director of Research in the School of Engineering,
Newcastle University

Project Acronym: FIRM

Richard is Professor of Earth Systems Engineering and Director of Research in the School of Engineering at Newcastle University. Richard's research has focused on infrastructure resilience to extreme weather and climate change. He is a member of the UK's Committee on Climate Change and Lead Author of the Cities, Settlements and Infrastructure Chapter of the Intergovernmental Panel on Climate Change 6th Assessment Report.

Flood resilience simulation on DAFNI:

Actions taken before, during and after the shock of flood infrastructure can threaten lives and damage infrastructure through slow evacuation, or failure to erect temporary flood defence infrastructure.

Principal Investigator from Newcastle University is heading a project called the Flood Infrastructure Resilience Model (FIRM), a computational model that is used to explore the impact of flood infrastructure failure on flood resilience, and to test strategies to mitigate the impact of these shocks.

Through the funding awarded, the project aims to re-code FIRM into Python for great inter-operability and integrate FIRM onto DAFNI to make it more accessible to the community, and to provide virtual and in-person training to support the wider uptake of the model and DAFNI.





Dr Francesca Pianosi

Senior Lecturer in Water and Environmental Engineering,
University of Bristol



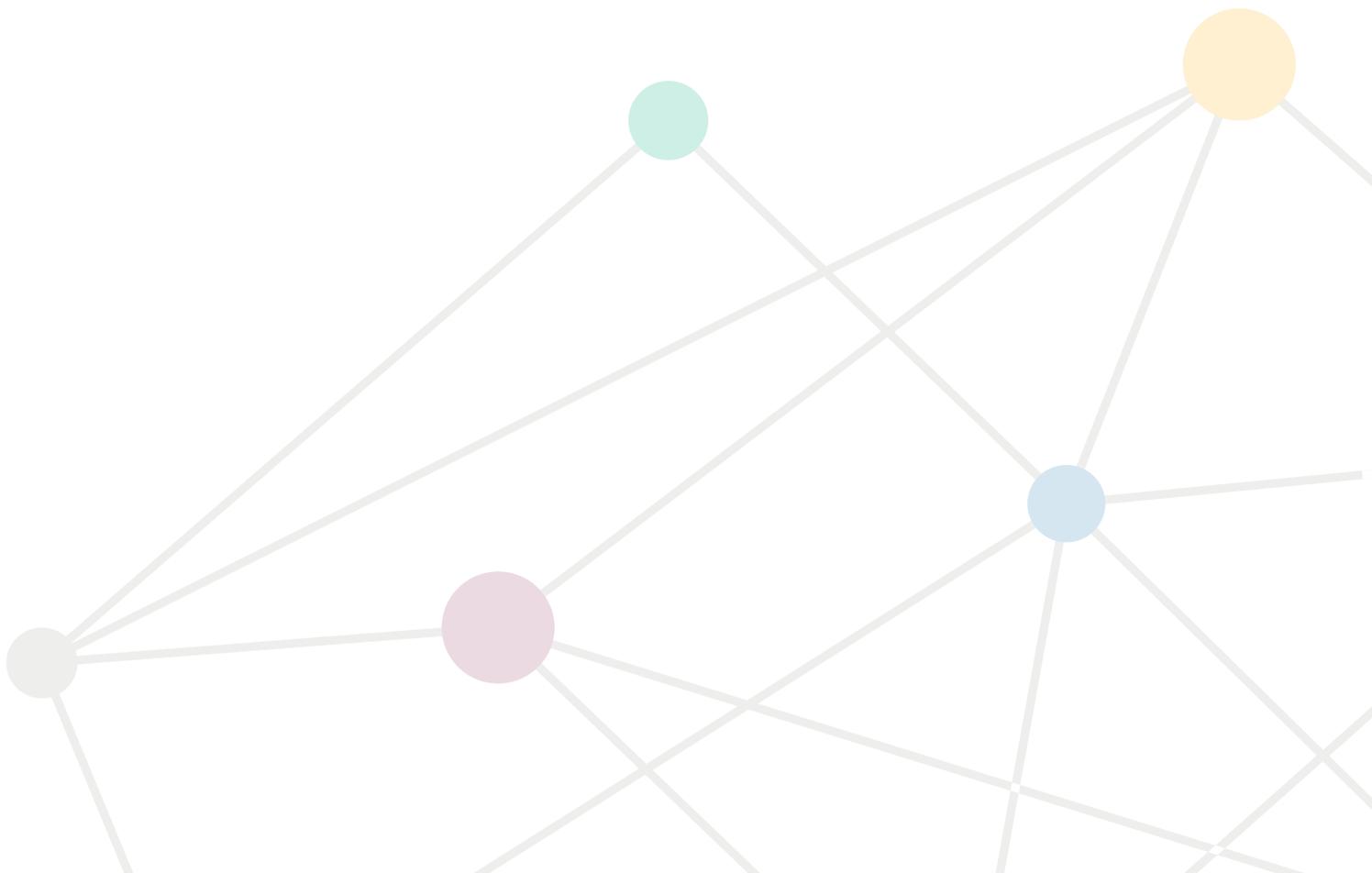
Project Acronym: USARIS

Francesca is Senior Lecturer in Water and Environmental Engineering based in the School of Civil, Aerospace and Design Engineering at the University of Bristol. Her research focuses on advancing the way mathematical modelling is used to inform decision-making under uncertainty, particularly for water resource and natural risk management. She is an international expert on uncertainty quantification and sensitivity analysis and the lead author of the open-source SAFE toolbox, which is used by thousands of scientists and practitioners worldwide to analyse the propagation of uncertainty in mathematical models.

Uncertainty quantification and sensitivity analysis for resilient infrastructure systems:

Principal Investigator, Francesca Pianosi from the University of Bristol, is delivering a computational model allowing the evaluation of risks and benefits of different infrastructure options on a virtual system. The model will allow a design to be tested through various constraints before committing to a particular design, and combat overconfidence in model results and insufficient consideration of the breadth of possible futures.

For example, when planning water infrastructure for drought resilience, we need to make a set of uncertain assumptions about the way that future climate will affect water sources and how changes in the economy, society and lifestyle will affect future water demand.





Dr Raghav Pant

Senior Research Associate at the Environmental Change Institute, University of Oxford



Project Acronym: NIRD

Dr. Raghav Pant is a *Senior Research Associate* at the Environmental Change Institute, University of Oxford. He holds a Bachelors in Technology in Civil Engineering for Indian Institute of Technology in Kanpur, a MSc in Civil and Environment Engineering from Princeton University, and a PhD in Industrial Engineering for University of Oklahoma. Raghav is associated with the *Oxford Programme for Sustainable Infrastructure Systems (OPSIS)*, and has led risk and resilience analysis research teams as part of the EPSRC funded *Infrastructure Transitions Research Consortium*. His analysis of failure criticality of Great Britain's national infrastructure networks, undertaken in collaboration with Infrastructure UK in HM Treasury was the first piece of evidence *instrumental in moving the policy thinking from silo-sectored to a multi-sector and cross-sector one*. He led the first evidence-based *systems analysis of interdependent network vulnerabilities* of UK's interconnected networks to support the National Infrastructure Commission's recommendations of a new resilience framework in UK. Raghav has worked with a range of organisations within UK and globally such as World Bank, Global Centre for Adaptation, Department for Transport, National Grid, Network Rail, JBA Group, ARUP, Scottish Water, HR Wallingford, CH2M. He held and holds PI and Co-I roles in UKRI funded project to *plan for resilience of interdependent infrastructure networks exposed to multi-hazard impacts* and EU H2020 funded project *Multi-hazard Infrastructure Risk Assessment for Climate Adaptation*. His research paper on vulnerability assessment of Great Britain's railway infrastructure was awarded the *2016 Lloyds Science of Risk Prize in Systems Modelling*, while another paper in co-authorship was runner-up at the *2021 Lloyds Science of Risk Prize in the cyber category*.

Building systemic resilience of interdependent infrastructure networks at the national scale

In recent years, extreme flood and storm events across the UK have affected large numbers of infrastructure networks and their customers, resulting in economic damages and losses of the order of tens of millions of pounds.

Government agencies and infrastructure operators have noted the lack of coherent datasets of interconnected networks and cross-sectoral resilience metrics which makes it challenging to plan for and respond to extreme large-scale weather events. This project led by Raghav Pant, Principal Investigator from the University of Oxford, aims to address the above challenges by delivering an open-source modelling framework on the DAFNI platform for stress-testing interdependent network resilience against flood and storm events.





Dr Xilin Xia

Assistant Professor in Resilience Engineering within the School of Engineering at the University of Birmingham

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Project Acronym: STORMS

Project partners: UK Centre for Ecology & Hydrology (UKCEH), British Geological Survey

Xilin is an Assistant Professor in Resilience Engineering within the School of Engineering at the University of Birmingham. He is mainly working on computational modelling of natural hazards and their impacts. His research interests cover computational hydraulics, high-performance computing, machine learning and their applications in modelling and understanding physical processes involved in natural hazards such as flooding and landslides. His research was funded by UKRI, the UK Met Office and The Royal Society. He has published over 30 peer-reviewed journal papers. Xilin's papers have been highlighted as 'featured article' and 'top cited paper' by prestigious journals such as Water Resources Research and Advances in Water Resources. By developing new algorithms and models, his work has been critical for new applications such as large-scale impact-based flood forecasting and digital twin for climate resilience.

STORMS: Strategies and Tools for Resilience of Buried Infrastructure to Meteorological Shocks

Buried infrastructure, which include cables and pipes vital to city and urban lives, are vulnerable to meteorological shocks or extreme weather events, such as floods and droughts. Such events can lead to soil movement, thermal contraction and expansion, sinkholes, and various other problems.

Despite the urgency to be prepared for these impacts, our understanding of what the UK's buried infrastructure can cope with remains poor, because existing risk assessment tools do not comprehensively consider impacts from these extreme weather events.

The framework will be applied to understand the potential impacts of extreme weather events, or 'shocks', and climate change on these infrastructures. This will lead to fewer service disruptions, potential cost savings, and increased resilience of infrastructure systems in the face of meteorological shocks and climate change.



Dr Anna Murgatroyd

Postdoctoral Researcher at the Environmental Change Institute (ECI), University of Oxford



Project Acronym: Pywr-WREW

Dr Anna Murgatroyd is a Postdoctoral Researcher at the Environmental Change Institute (ECI), University of Oxford. Anna is currently a member of the Environment Agency (EA)/Ofwat National System Simulation Modelling (NSSM) project, the GCRF Water Security and Sustainable Development Hub, and the Food and Climate systems Transformations Alliance. Anna has pioneered risk-based approaches to defining and managing water security in the UK, exploring key trade-offs between competing goals of water resource systems such as ecosystem resilience and the reliability of public water supply. Anna led the technical development of new climate simulations and the Water Resources model for England and Wales (WREW) for the NSSM project, and is working with the EA to undertake joint resilience assessments exploring the impact of climate change on regional and national water resources.

Pywr-WREW, a Water Resources model for England and Wales built in Python water resources simulation system

With growing concerns to England's water supplies due to population growth, climate change, and ecological needs, traditional water resource management, focused on individual companies, is no longer sufficient to address the complex issues posed by these factors.

Anna Murgatroyd, Principal Investigator from the University of Oxford, in collaboration with the Environment Agency and Ofwat, initiated the National System Simulate Modelling (NSSM) project. As part of this, they developed a comprehensive Water Resource model for England and Wales (WREW) that integrates various water usage sectors and future scenarios to assess potential water shortages and solutions.

However, they are limited by the model's reliance on commercial software, and the Centre of Excellence for Resilient Infrastructure Analysis provides a way to address this limitation and aims to enhance the model's accessibility and usability for researchers and practitioners.





Dr Vassilis Glenis

Senior Lecturer in Hydroinformatics,
School of Engineering, Newcastle University

Project Acronym: SOFRAMODE

Vassilis Glenis is Senior Lecturer in Hydroinformatics in the School of Engineering at Newcastle University. His research background is in hydrodynamic modelling, where he has developed advanced shock-capturing finite volume methods and applied them using cloud computing. As the originator and main developer of the CityCAT hydrodynamic simulation software, his work has focussed on flood modelling in urban environments, coupling the surface and pipe networks and incorporating blue-green interventions. He has also developed and applied stochastic weather generators for climate change impact assessments, notably for the UKCP09 national climate projections.

Sewer Overflow Flood Risk Analysis Model DAFNI Enabled (SOFRAMODE)

Using DAFNI, Vassilis Glenis from Newcastle University, aims to develop and demonstrate a state-of-the-art platform for understanding and simulating urban drainage related to surface water flooding and high-profile storm overflow events, for any UK town or city.

The scenarios will encompass a wide range of current and future rainfall event magnitudes, and provide functionality for industry and researchers, to design and test strategies to mitigate surface water flooding. This platform will be underpinned by CityCat model.





Dr Richard Milton

Senior Researcher, Centre for Advanced Spatial Analysis, UCL



Project Acronym: SCQUAIR

Richard Milton is a senior researcher at UCL's Centre for Advanced Spatial Analysis where he has worked since 2005. Most recently he has been on secondment to the Alan Turing Institute for AI and Data Science, where he has been developing the current evolution of the "QUANT" spatial interaction model with an emphasis on AI for building new transport infrastructure scenarios for carbon net zero. He has been working on different versions of the QUANT spatial interaction model since the initial development, which was funded by the Future Cities Catapult in 2014. This includes using his QUANT expertise to build a model for the Royal Society's pandemic response project (RAMP), leading to a RAMP Early Career Investigator Award (RECIA) in 2021.

Simulating the Resilience of Transport Infrastructures using QUANT

Principal Investigator, Richard Milton from the University College London has developed a model, called QUANT, which simulates the pattern of land use and transportation for Great Britain.

The model will act to look at "what-if" scenarios so that users can run thousands of scenarios of the use of land and transport to predict impacts that enable stakeholders to test various plans. It will also demonstrate how AI can be used to inform the generation of many scenarios, including the impact of shocks to the land by new infrastructures such as High Speed TWO in Birmingham.

To develop the model, Great Britain was configured into thousands of small zones and identifies three modes of transport, which bind together employment at place of work and population at place of residence.

The inclusion of identifying three modes of transport networks across GB enables to trace the repercussions of land use and transport change across networks which is key to assessing the repercussions of major changes on the UK's urban system.





**Meet the
DAFNI Team**

DAFNI TEAM



Dr Brian Matthews
DAFNI Programme Lead



Sarah Byrne
Software Engineer



Katie Cartmell
DAFNI Partnership
Manager



Joel Davies
Scientific Computing
Graduate



Catherine Dhanjal
Media Manager



Rose Dickinson
Senior Software Engineer /
Technical Lead



Caroline Haigh
Research Software
Engineer



Lyndsey Harding
Administrator



Jack Haydock
Software Developer



Dr Jens Jensen
Data Scientist



Archit Mantry
Project Co-Ordinator



Dr Bethan Perkins
DAFNI Team Leader



Marion Samler
Business Development
Manager



Lewis Sampson
Research Software
Engineer



Kyle Stevenson
User Liaison



Esther Turner
Senior Research
Software Engineer



About DAFNI



About the Data & Analytics Facility for National Infrastructure (DAFNI) and the Centre of Excellence for Resilient Infrastructure Analysis

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The **DAFNI platform** supports research that aims to provide the UK with a world-leading infrastructure system that is more integrated, efficient, powerful, reliable, resilient and affordable. It is enabling the community to conduct research that is able to generate new insights at a higher level of detail and accuracy than ever before.

The **Centre of Excellence for Resilient Infrastructure Analysis** fosters research in the area of resilience in the natural and built environment as part of the overarching UKRI programme 'Building a Secure and Resilient World' (BSRW), a 5-year programme which seeks to tap the UK's research and innovation system to tackle large-scale, complex challenges for the UK.

In March 2023, UKRI awarded a £4m grant to the Scientific Computing Department, part of the Science and Technology Facilities Council (STFC), to establish a national Centre of Excellence for Resilient Infrastructure Analysis, and moves DAFNI into its new phase.

DAFNI was originally funded by an £8 million EPSRC investment in the UK Collaboratorium for Research in Infrastructure and Cities (UKCRIC) and a £1.2m grant under EPSRC's Resource Only Strategic Equipment. Its aim has been to become the national platform to satisfy the computational needs in support of data analysis, infrastructure modelling and visualisation, and encourage whole-system thinking for the UK's infrastructure research needs.

The DAFNI platform offers:

- A hybrid high-performance computing platform
- A secure repository for heterogeneous national infrastructure data and models.
- A place for sharing and combining data and models

Including a hybrid high-performance computing platform and a secure repository for national infrastructure data and models

- A place to support collaborations and deploy applications through a collaborative platform to research multi-system models of infrastructure
- A place as a legacy where researchers can make data and models available for the long-term

Apply for your DAFNI account

UK Academic Organisations and other bodies where there is a clear link to research may register their interest at: <https://www.dafni.ac.uk/accessing-dafni/>

Access DAFNI training

If you're an existing DAFNI user, access our support team through the Slack channels.

If you're interested in becoming a DAFNI user, consider joining one of our technical training sessions, run regularly online. Find out more at: <https://www.eventbrite.co.uk/o/dafni-31793198351>



DAFNI

Use Cases

DAFNI Use Cases



Dr Patrick Tully
Project manager for UKCRIC activities
at the University of Bristol

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“ The unique value of the DAFNI platform lies in the ability that it gives researchers to combine existing datasets regarding infrastructure — and there’s a lot of interest in that across the UK and further afield.

We will also be able to analyse and visualise data on DAFNI to use with the immersive space. ”



Professor Stephen Hallett
Chair in Applied Environmental Informatics in the Centre
for Environmental and Agricultural Informatics
at University of Cranfield

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“ DAFNI is an integral part of Digital Twin and environmental projects running at Cranfield and further afield.

The DAFNI platform offers a powerful and unique facility offering enormous HPC powers coupled with an advanced workflow user interface, plus access to absolutely enormous stores of data which can come from external sources as well as other people’s model runs. ”



Dr Ben Waterson
Associate Professor in Transportation at the University
of Southampton’s Transportation Research Group

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“ I’ve been a data scientist and analyst for many years but it’s become harder and harder to understand what is going on with data. . . We can analyse it but need to be able to see the data, what it means, what the consequences are in reality, and to be able to interact with it.

For us the DAFNI hardware fund represented a fantastic opportunity to develop the ‘human in the loop’ part of visualisation; to go beyond tables and graphs and to enable people to interact with it – with simulated real-life situations and models. ”

DAFNI Use Cases



Professor Daniel Coca

Formerly, Honorary Professor of Nonlinear and Complex Systems, University of Sheffield. (Professor Coca is now Head of School of Engineering and Professor of Nonlinear and Complex Systems at Newcastle University.)

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The DAFNI hardware is being used to develop a Sheffield Traffic Digital Twin. The Digital Twin uses historic and real-time traffic data from more than 640 sensors in the Sheffield area to predict the evolution of the traffic and where congestion might occur.

The DAFNI hardware is being used to carry out computationally expensive simulations as well as to train very large machine learning models that continuously learn from incoming data the traffic patterns to produce more precise traffic forecasts.



Dr Liz Varga

Professor of Complex Systems at the Infrastructure Systems Institute in the Department of Civil, Environmental & Geomatic Engineering, UCL

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Using the DAFNI platform will increase the visibility of researchers' models to the wider research community and it also acts as a repository so that other researchers can build on previous work.

The DAFNI platform, analytics and visualisation tools is an opportunity to highlight insights into infrastructure challenges and opportunities for industry and government.





DAFNI

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If you would like to get involved in DAFNI, please contact
Katie Cartmell, Partnership Manager: katie.cartmell@stfc.ac.uk +44 1235 394480

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