DAFNI:
Data and Analytics Facility for National Infrastructure

LAUNCH AND CONSULTATION EVENT

14:00–18:00, 6 July 2017

SUMMARY OF PRESENTATIONS

Introduction – Jim Hall, DAFNI Project Lead, University of Oxford

The Data and Analytics for National Infrastructure (DAFNI) project will create a national infrastructure database for visualisation and analysis. It will be a shared, secure system for academic research and a resource for businesses, innovators and policy-makers. This event is to generate some excitement about DAFNI, to initiate ideas about how DAFNI will work with different partners, and to start a conversation on issues such as: security, access, suitable business models; and next steps.

We know that an overview of DAFNI inevitably lacks detail, so there will be a series of short presentations on applications, to prompt ideas about the opportunities that DAFNI will offer, followed by an interactive session to gather participants' thoughts.

Ian Osborne, Head of Complex Systems, KTN

Innovate UK is particularly interested to see how information from infrastructure systems can be used to optimise performance of infrastructure services. We know that this will working with data in new and complex ways, but we also recognise that we need to invest in R&D that will help us to understand these systems, and DAFNI will be an important part of this.

James Stewart, Head of Global Infrastructure, KPMG

DAFNI is unique in the world, and so presents a huge opportunity. All countries have a commitment to increase infrastructure spending, driven by infrastructure's position as an engine of economic growth, and to meet the needs of a growing population.

The infrastructure market must deal better with uncertainties. Current decision-making processes tend to be poor with a narrow focus, based on a single planning scenario. DAFNI will help to create a better infrastructure decision-making system to deal with volatility and a changing infrastructure. It will support multiple planning scenarios, with integration across infrastructure sectors and will develop, for example, capability around convergence of services (electric vehicles / low-carbon energy).

As a research project, DAFNI needs to have a real-world legacy. Tasks ahead include: commercialisation, working internationally, and providing confidence in the quality of data.

Scott Thacker, United Nations Office for Project Services

There are an array of global challenges, and great opportunities in realising sustainable development outcomes. Developing countries will be making massive investments in new infrastructure, and it will be important to avoid locking these economies into unsustainable futures. Hence, there is a demand for evidence to inform policy-making and to provide confidence for investors. There are challenges: data is fragmented, non-standardised and difficult to compare; modelling needs to be responsive to different contexts; and communicating outputs is difficult even before factoring in different cultural contexts. But there's cause for optimism: with more global datasets; and technological innovations creating new data resources.

Jim Hall, DAFNI Project Lead, University of Oxford;
Erica Yang, Head of Visual Analytics and Imaging Systems, Science & Technology Facilities Council (STFC);
Stuart Barr, Geospatial Systems Engineering, University of Newcastle

DAFNI will provide a national infrastructure database with secure facilities for infrastructure datasets and we area already considering some of the main issues this raises, including: licensing, commitment to open data; and security. A key feature will be DAFNI's simulation and visualisation facilities to allow use of models in a more flexible way, enabling the systems of systems analysis and incorporating observed and simulated datasets.

DAFNI will benefit from the experience of the Infrastructure Transitions Research Consortium (ITRC) which has been developing the a one-stop database for UK infrastructure (National Infrastructure Systems MODel – NISMOD). It's much more than a curation of data, and allows representation of interdependencies to inform planning decisions, including via a visualisation dashboard. Although NISMOD contains over 400 data layers (representing multiple sectors, demographics, economics), the infrastructure sector needs greater detail, to represent individual buildings and to develop plausible connectivity networks, which DAFNI can deliver. ITRC-Mistral is developing a meta-database to give users the experience of a single interface, although it brings together many databases, and this is the model that will be applied to DAFNI.

QUICK-FIRE INTRODUCTION TO SOME EXAMPLES OF DAFNI APPLICATIONS

How we're using the benefits of big data

David Wallom, University of Oxford

One challenge will be how to make DAFNI successful operationally. DAFNI's vision is to build an environment where people can try different solutions, which means being responsive to all users. Existing models might include: JASMIN that uses the desktop as a service tool using a standard toolkit, with no restrictions on users; and Embassy Cloud, an accessible bio-infomatics cloud.

Bringing together data and infrastructure systems

Alex Wrottesley, Ordnance Survey

The geospatial framework that Ordnance Survey (OS) delivers is at the heart of forecasting decisions, and it will be important to get the right kind of geospatial data structures for the next 20 years. There is still plenty of data that we don't yet have, but we'll need this for the next level of analysis. DAFNI's collaborative platform will make it accessible to all: e.g. researchers, start-ups.

Integrating real-time data, infrastructure analytics and visualisation/ integrating infrastructure systems analysis with building information modelling

Stuart Barr, University of Newcastle

We will be introducing real-time data into DAFNI to help to create some predictive analytics (initially on intense rainfall and real-time impacts), starting with sensed data in Newcastle, and we are also working on real-time visualisation. There will also the be capability to bring building information modelling within DAFNI.

Tackling the challenge of the National Infrastructure Assessment

Bianca Letti, National Infrastructure Commission

The National Infrastructure Commission has been using NISMOD (National Infrastructure Systems MODel) to develop scenarios, based on combinations of drivers to test policy, e.g. the risk of drought and policies that would be robust across uncertainties. DAFNI will help us to look concurrently at more data and more complexity. This faster and more flexible modelling will be very helpful to policy-makers.

Understanding the complexity of population changes

Nik Lomax, University of Leeds

We need more accurate understanding of future populations to assist decision-making, and there are a wide range of uncertainties in national and global models. DAFNI will run SPENSER (Synthetic Population Estimation and Scenario Projection) which will let users change their inputs including: technology, policy, economy, and the outputs include dynamic visualisation.

Visualising infrastructure options in developing countries

Tom Russell, University of Oxford

Infrastructure provides essential services and we can investigate infrastructure interdependencies and use this to consider infrastructure options. For DAFNI, the use of open datasets to assist with rapid assessment of developing countries.

Transformations in transport planning

Simon Blainey, University of Southampton

Transport modelling demands lots of computer power and DAFNI will enable this dynamic modelling to take place. DAFNI will offer better representation of rail infrastructure with an opportunity to look at interdependencies. We are also looking a multi-modal transport planner, to allow investigation of the impacts of new infrastructure on millions of A-to-B journeys.

Major rail developments and their impacts – using QUANT

Richard Milton / Michael Batty, University College London

QUANT is a spatial interaction model which requires very complex modelling and is computationally intensive. DAFNI will assist with this, and will extend QUANT's reach to Scotland.

How data will help rewind our throwaway culture

Keiron Roberts, University of Southampton

DAFNI will work with the SWIMS solid waste system model to provide increased granularity. With greater computing power, it will be possible to understand the local authority level, where policy happens, and data at postcode level can help with tasks such as looking at waste collection routes. With DAFNI, decision-makers will be able to visualise, make decisions and share costs/benefits.

Better energy use in London's buildings

Philip Steadman / Paul Ruyssevelt, University College London

Two models that look at domestic/non-domestic buildings in an area – created from various data sources. Unit for modelling isn't buildings – relationship of buildings to premises which can be very complex.