New Zealand

IPWEA
INSTITUTE OF PUBLIC WORKS
ENGINEERING AUSTRALASIA

Technology
Concurrent Sessions

401 Rawhiti Smart Water Network

Irmana Sampedro & Michele McDonald, Christchurch City Council

Christchurch City Council holistic approach to smart water, finding the right combination of smart technology and data analytics to design the future of water network management.

In order to meet the goals and objectives of the Te Wai Ora o Tāne Integrated Water Strategy and improve the safety and performance of our water network, a pilot smart water network is being undertaken across the Rawhiti water supply zone (11,000 Connections). The purpose of this pilot is to demonstrate that continuous monitoring of flows, consumption, leaks, transients, water quality, and water pressure will achieve the Three Waters smart water objectives to; improve water safety; optimise asset management; operational management, and sustainability.

We would like to share the lessons learned so far and our vision of how a holistic approach to water management using complimentary technologies together is the future path to manage our water network.

402 Where We Have Been and What the Future Entails – Low Emissions Asphalt

Greg Thompson, Fulton Hogan

With both carbon emissions and health and safety at the forefront of the construction industry, a solution that reduces the impacts in both these areas while ensuring field performance compliance should be considered as a win-win solution. CoolPave with L.E.A® existing performance over the last 14 years has proven this. With carbon emissions becoming increasingly critical in today's and the future environment, any ability to produce roading materials that result in reduction of carbon emissions should be at the forefront of our thinking. Fulton Hogan's proprietary product of CoolPave with L.E.A® significantly reduces the emissions of an asphalt plant through not heating both the binder and aggregates as high as normal hot mix asphalt. The lower temperatures has significant benefits in health and safety to crews laying the mix making it a twofold benefit solution.

Performance of low emission asphalts has been reviewed over the last 14 years with a number of sites still currently in service today including high volume roads and airports. This clearly shows that low emission asphalts will perform as well as conventional hot mix asphalt, but with reduced carbon emissions. Lessons learnt from the construction of this product will be discussed in this presentation to collectively promote the use of low carbon emission asphalt solutions.

403A All Models Are Wrong, but Some Are Useful

Nikita Slinko, TSA Management

A picture is worth a thousand words, so pictures with context are worth a million. A model that isn't used is a failed model. A model must be made with its

Sustainability through Reform.
Taking Aotearoa to 2050

users in mind. The model must consider the system of interest, organise, and categorise the elements at the right level of abstraction, and not get so complex it becomes unwieldly. Model Based Systems Engineering (MBSE) has the solution.

MBSE is both old and new - it is a development of Systems Engineering which seeks to match the subject complexity with the level of effort required. Don't spend four weeks in planning if the project is only one month. MBSE is a visual representation of any human based system, coupled with a systems thinking approach it becomes accessible and useful to all stakeholders.

This presentation will develop an approach from the ground up, how to collaboratively develop a model from the initial workshop, to how it may be developed in tools such as Enterprise Architect. The final section of the presentation is how I have used MBSE to develop parameters in a large project to better help management and integration activities.

403B Ones and Zeros…How do You Know What You Really Need?
Andy Holt, WSP
It is important to accurately identify the data required when creating an asset data standard that will enable effective, sustainable, future-focused decision making. What is the best approach to identify these requirements?

Unfortunately, published literature is light on potential approaches an organisation may use when developing their own standard(s). A worst-case scenario could see a company include requirements that are untenable to only realise when the project budget is blown, and the deadline is missed with no tangible outputs. This presentation showcases a dynamic framework that can assist businesses tackling this problem, be it big or small, and avoiding the worst-case scenario. WSP's solution facilitates discussion, ensuring a realistic outcome is achievable instead of pursuing a list of requirements with outputs that end up missing the mark. Come and chat with Andy Holt, an Asset Information Manager for WSP, during this session to learn more about this framework.

404 Engineering Evidence-based Decision Making: Bringing Data to Life
Tim Cross & Chris Needham, WSP
- How can engineers achieve evidence-based decision making with data?
- Data can be complex, how do we make working with it simple?
This session brings together our experience and lessons learnt from delivery of engineering-centred projects and organisation-wide solutions across New Zealand and Australia.

Engineering sectors benefit immensely from data systems as records of activity, enabling accountability for works completed, in progress and proposed for investment. However, data literacy and mature use of systems remain challenges in our sectors.

As a subject, data is often regarded as technical and/or ethereal by those less acquainted with it. Leaning in, it can be a bewildering and overwhelming experience. Using plain language and visuals, this presentation will showcase examples of where smart application of data by project teams has directly improved people and project outcomes for positive real-world impact.

This session also addresses the need for effective data governance, the primacy of purpose, the practice of data-as-an-asset, risk management, and principles for developing and implementing your own data strategy.

405 Implementing & Using an Asset Information Management System to Better Support Asset Management Processes and Decisions

Gladstone Brohier, Technology One, Brisbane

Underpinning an organisation's Asset Management System (AMS) is a well-defined and structured Asset Information Management System (AIMS). The organisation's capability to implement and maintain an AMS will largely depend on the competence of the AIMS and its ability to collect and store the required data to support asset lifecycle decisions and business outcomes. It should provide a single-source-of-the-truth for all asset activities and must assist the organisation in achieving its asset management objectives.

When planning, implementing and using an AIMS, an organisation must observe fundamental principles to ensure the desired asset management processes and business outcomes are achieved. While not meant to be exhaustive, this paper will focus on the following principles:

- The principle of value – an AIMS must deliver value to the organisation by supporting the AMS and delivery of business outcomes
- The principle of requisite complexity and progressive maturity – Complexity of the system is tailored to the organisational capability and maturity
- The principle of enabling and empowering its people – A people-centric system that encourages user adoption to confidently make informed asset life cycle decisions with a high degree of reliability
- The principle of data capture, storage, maintenance, and security – To collect and store the required data that the organisation will monitor, manage, evaluate, and analyse to construct information, knowledge, and wisdom about the asset base's past performance and future needs
- The principle of an integrated system – The AIMS must promote a single source of the truth, eliminate data silos and duplication, promote data reuse, and support data transactions seamlessly across the system.

Case studies, user stories, and real-life examples will be discussed to validate and reinforce each of these principles.

406A AAIF - Importance of Quality Asset Data for Automating Three Waters Renewals Planning

Chris Tredinnick, Abley

The Asset Assessment Intervention Framework was a CCC project to overhaul its three waters pipe renewal process for identifying and prioritising projects for future Long Term Plans. Project goals were to be on-tool, automated, auditable and trustworthy, which brought challenges and required a new approach in the technical implementation.

The goal for the final process to be on-tool and automated meant 100+ primary data sources needed to be live and available at any time. Integrations were built to access internal and external data. Data exports or data cleansing steps were intolerable, therefore the quality of corporate data in GIS and SAP had to be improved, maintained, and reported on. Business rules and FME process development constantly adapted to balance project outcomes and data realities. Results data was integrated back into business systems.

This enabled sound decision making, and efficient project investment based on the combination of reliable data and processes. The management and availability of quality asset, measurement and contextual data is critical to the success of renewals analysis, and will remain to be in the three waters reforms ahead.

407 Efficient and Effective Source Water Risk Management Plans
Bridget O'Brien, WSP

The need to prepare source water risk management plans for thousands of water supplies to meet the requirements of the Water Services Act presents a large challenge to the water industry. A tool has been developed which enables this to be done efficiently and effectively.

The Water Services Act 2021 requires all water suppliers to prepare a source water risk management plan as part of their drinking water safety plan. This must identify existing and potential hazards in the source water, assess the risks of those hazards and how they will be managed. In addition to the 1300 registered water supplies that need to do this by November 2022, an estimated 75,000 unregistered water supplies will need to prepare a source water risk management plan by 2028, unless they adopt an acceptable solution.

A tool has been developed which overlays multiple sources of data to enable source water risk management plans to be prepared efficiently and effectively. Information about land use, resource consents for water takes and discharges, hazardous activities, bore locations and water quality is compiled in a GIS based tool. From this, hazards within a source catchment can be easily identified and assessed. This information then feeds through into a standard template for a source water risk management plan.

408 AI: the Past, Present & Future
Adam Humphries & Elizabeth Parker, Fulton Hogan, Auckland Transport

Computer vision technology makes transportation asset condition data collection objective, repeatable and safe. But how can AI data be used to its full potential; unlocking powerful insights, improving investment decision making and setting the future direction?

Technology has revolutionised and disrupted our lives in many ways, it continues to move and evolve at a remarkable pace. This presentation starts by outlining the advances in road condition assessment techniques with a focus on cutting-edge artificial intelligence (AI) techniques. We then outline how vehicle mounted high-res cameras and New Zealand trained AI models are being used to provide powerful datasets and information which ultimately helps deliver an optimal service to road users. The presentation also provides a client's perspective on lessons from recent trials as well as the future of technology in the road asset space, outlining some aspirations and visionary applications to improve planning and delivery of sustainable transportation infrastructure.

409A Bridging the Gap: Data Standards to Data Quality
Chris Tredinnick, Abley

Nationwide, the state of three waters asset data is highly variable, but right alongside national asset data standards is the need for data quality in the new three waters entities. What does quality mean, how will a data standard drive it, can it be preserved, and is it an achievable goal?

Nationwide, the state of three waters asset data is highly variable, but right alongside national asset data standards is the need for data quality in the new three waters entities. Implementation of a data

standard will not alone resolve differences or result in fit for purpose data which meets business requirements.

Lessons can be observed in the amalgamations of Banks Peninsula District Council in 2006, and Auckland Council in 2010, where historic differences in codes of practice remain in the asset data despite migration to a better data standard. Christchurch City Council introduced a digital as-built data standard 2017, but contractors could produce valid but different representations of the same assets to the same standard. Despite stringent data quality checks, accurate and consistent data is not guaranteed.

There is a substantial gap between theory and reality which must be understood, if we are to reach the goal of consistent, quality asset data nationwide.

410 From 'Bling to a Thing' - Downer Road Fault Detection System – more than just AI

Peter Mortimer, Downer NZ

Consistent and complete road fault data is the foundation to sound evidence-based data driven asset management decision making. The use of video for fault inspection has become mainstream within Downer in recent years and has help remove people from the live lane whilst improving inspection efficiency and reduced trip cycles.

The addition of computer vision machine learning technology was the next logical step, however when this data is collected every inspection what do you do with the volumes of records that mount up? How do we convert this volume of data into actionable programmes of work?

The Downer Road Fault Detection System has been developed to detect various road fault types along with fault management workflows to aid the inspector with managing the changes in fault status and dispatch management to ensure there is operational value from the AI output.

This presentation will describe the development journey that Downer has undertaken and how they have developed a video machine learning road fault identification and fault management system for everyday network management turning the 'bling' into a thing.

411 Digital Transformation in Asset Management Using a Building Information Modelling (BIM) Based Platform

John Jiang, Hastings District Council

Digital technologies are taking place in all spheres of the society and affecting every business sector. Digitalisation in the local government asset management sector is not a question of "if" but rather "when". Emerging technologies such as BIM have the great potential to create a digital ecosystem that fundamentally transform the sector into a future-ready business.

Local governments nationwide will confront unprecedented challenges in the next 50 years to face issues such as climate change and aging infrastructure assets. When dealing with the challenges, government entities differ from one another: from asset portfolios, budget constraints, to the level of capability of adopting technologies, namely the "digital inequalities".

Furthermore, the silo nature and lack of collaboration have resulted in various forms of isolated proprietary information systems being deployed across the sector, where a unified approach is much needed. This study examines the concept of an open-sourced digital platform built on BIM. Using a case study of a local government's BIM implementation project, this research demonstrates the emergent phenomenon of digital platform economy that not only enhances an organisation's efficiency and productivity, but it also improves the sector's digital inequalities and collaborations through a standardised common data environment, modular and scalable applications, and a digital ecosystem that connects the stakeholders within the asset management community when facing the upcoming challenges.

412 Tips from the Front Line of Asset Management Data Standard Migration

Jeremy Hughes, Company-X

Software specialist Company-X is helping Road Controlling Authorities (RCAs) prepare for Asset Management Data Standard (AMDS) implementation. The team will share hot-off-the-press insights on migration to date.

The AMDS programme is developing and implementing a common language and data structure that defines and describes assets, their attributes, characteristics, properties, location, performance; all the information needed to perform efficient and effective end-to-end life cycle asset management.

The standard is being developed iteratively, with input from Waka Kotahi, industry SMEs and through sector engagement.

The implementation of AMDS is a collaboration between Waka Kotahi NZ Transport Agency, and the transport sector. Being shaped by the sector for the sector, the standard is designed to improve land transport asset information to support better decision making about New Zealand's land transport assets.

Company-X has been deeply involved with the development of the standard as well as preparing for and validating its practical implementation across Waka Kotahi, RCAs, and maintenance contractors.
The team has intimate knowledge of AMDS and a proven migration strategy and process, with in-depth knowledge of RAMM.

Company-X's overview will include updates on how AMDS migration is progressing, with useful tips learned through the pilot migrations for Marlborough Roads and Wellington City Council, and the first migrations as they get underway.

Learn from the insights gleaned so far and how they can help you as AMDS migration continues across the country.