Agent Based Modelling, a Quiet Revolution in Asset Management
Presenter: Simon Bush
Authors: Simon Bush - University of Auckland/Opus Consultants, Theunis Henning, Jason Ingham, & Andrea Raith - University of Auckland

Over the years sophisticated technical models of the asset management process have been created, but asset management is a socio-technical process, with the interaction between the social and technical systems directly impacting strategy development and the long-term evolution of the asset. To combine both of the social and technical systems into one model a small number of researchers have started to use agent-based modelling. By creating these models, stakeholders’ reactions to proposed policies can be explored prior to policy implementation. This ability to explore stakeholder reactions means that, for the first time, asset management strategies can be developed that meet stakeholder expectations, while ensuring the on-going functionality of the asset.

This paper provides an introduction to this new modelling technique. This paper also describes how agent-based models can be used to improve performance measurement and management, thus creating a framework for improved decision making.

Simon Bush is principal engineer working with Opus Consultants and a provisional year PhD student at the University of Auckland. As part of his role Simon has worked with BCMoT in Canada developing an asset management approach for their inland ferries. Simon was also seconded to Network Rail for 8 months advising their buildings and civil team and drafting their funding submission to the Office of the Rail Regulator. More recently Simon has started his PhD. In his research Simon is developing a systems thinking approach for improved asset management of road bridges. This approach is based on agent-based modelling.

Optimising Investment in Transport Networks - connecting the dots
Presenter: Richard Sprosen
Authors: Richard Sprosen and Simon Whitely - GHD

The ability of New Zealand to invest in transport network infrastructure on the scale of its neighbours in Australia is not feasible. New Zealand’s population cannot support the capital required to keep up with demand by building ever larger infrastructure improvements. The Waterview Connection, with a price tag of $1.4 billion for 4.8 kilometres of highway, is very unlikely to become the norm.

Instead New Zealand will need to focus on maximising the efficiency and lifespan of existing networks before investing in major capital improvements. Innovative approaches to maximising the productivity of transport networks by only providing what is necessary, when it is necessary, are becoming more prevalent. The business case approach, road network classification, network optimisation, lifecycle asset management, and journey management are all examples of this.

While individually these approaches each represent a major step forward, there is a lack of coherence at present between the different processes. This paper sets out a potential framework for a ‘joined-up’ approach that will achieve value for money through better management of the operation and use of existing networks, and then targeting capital improvements where they will provide the most benefits.

Richard Sprosen is a Senior Transportation Planner in the GHD Auckland Office and has worked throughout New Zealand and Australia on a range of new infrastructure planning & design, operations & ITS, and research investigations. Richard has proven experience in the fields of network operations, transport planning, traffic engineering, ITS and traffic modelling, combining this expertise to develop innovative integrated transport solutions and operational management strategies in highly challenging areas.

Simon Whiteley’s career at senior levels in government service in the UK’s Department of Transport and New Zealand’s transport agencies, and latterly as a consultant with GHD, has given him an in-depth knowledge of transport policy and planning and its relationship with economic development and urban design. His career has also taken him into housing policy, and water and land use management. His particular focus is delivering economic objectives while minimising social and environmental ‘harms’ through effective management of system change.

Using Bluetooth Technology to Fill Information Pot Holes on our Road Network
Presenter: Richard Young
Authors: Richard Young - Beca and Andrew Temperley - NZ Transport Agency

New technology is revolutionising how we gather information on how customers use our highway networks. In New Zealand around one in seven vehicles has an active Bluetooth device, this figure is increasing. With robust technology, appropriate privacy protection, a length of Number 8 wire and a forward looking roading authority; the harvesting of
information on where these devices travel is proving to be a rich and valuable source of data.

The NZ Transport Agency, working with Beca and technology partner Blip Systems have pioneered the deployment of a roadside Bluetooth detection network to deliver strategic monitoring that provides levels of performance information that were previously near impossible to achieve. We now have the ability to remotely, in real time, provide answers to questions that industry previously struggled to reliably answer…….

What routes do people choose? How do routes choices vary over time? How reliable is that journey? Did we achieve the time saving on that new highway? How effective was the speed limit change? Can I have KPI data in real time? Can I cost-effectively monitor for incidents on rural highways in real time? Can I share this data? And finally, what is the real impact of those STOP/GO guys!

Richard Young is a senior manager at Beca and specialises in the application of monitoring technology to the roading sector to drive value for money. With the renewed focus of ensuring drive best value from our networks; the measurement, interpretation and presentation of performance data is a key metric in assessing if projects are delivering the benefits they were targeted to achieve.

Whilst previously leading the NZ Transport Agency’s $2.4Bn Waikato Expressway project Richard pioneered the use of wide-scale in-vehicle Bluetooth device detection to measure journey time savings on the newly opened Expressway. Within two weeks of opening this work enabled the Transport Agency and the Transport Minister to quote not only the time savings but the direct economic benefits of the new highway was delivering. The Transport Agency’s Bluetooth monitoring network, which Beca provides and supports, now stretches from Auckland to Wellington. Richard is actively involved in using the tens of millions of records gathered to date to assess real time incident management, route choice, driver behaviour, travel time and using Big Data methodologies to assess journey reliability at levels never previously undertaken in New Zealand.
101: Anticipation and Reaction – a Story of Seismic Alarms and Bursts in Porirua City  
**Presenter and Author:** Ben Davies - MWH New Zealand

Porirua City is located 20 km north of Wellington, has a population of around 53,000, and is part of the Greater Wellington area. Although the city has its own proud culture and identity, one aspect of life that it cannot avoid sharing with the capital is a susceptibility to earthquakes. Porirua City Council (PCC) not only recognised the seismic risk, but set about increasing the resilience of the network.

In 2008/2009 seismic shut off valves were installed on all 18 major reservoirs, designed to close if flow exceeds a trigger point. This prevents water loss through a potentially shattered network and locks down a supply of potable water in the reservoirs.

This paper outlines the journey PCC took together with MWH, starting with picking logical trigger points for the valves, monitoring performance of the system through the following trial period and finding that in addition to seismic protection, the system was able to prevent significant damage in non-seismic burst events.

Ben Davies, Water Supply Network Specialist, MWH New Zealand  BSc./BEng  Ben has been worked in water network analysis and planning for the last 12 years, initially at Thames Water (UK) as a Design Engineer in the Trunk Mains Leakage team, and lately in MWH New Zealand, working almost exclusively with local authorities. His specialties are modelling, strategic network development and water loss, and he has previously presented papers at Water NZ and Ingenium conferences focussing on various aspects of renewals planning.

102: Taupo Water Supply Upgrade, the Journey from Inception to Delivery  
**Presenter:** Jason Ewert  
**Authors:** Jason Ewert - AWT Water, Philip LaRoche - CH2M Beca & Colin Giles - Taupo District Council

With the implementation of the DWSNZ in 2000, Taupo District Council (TDC) identified the requirement to upgrade the Taupo urban water treatment plants and improve the reticulation network.

This paper describes how TDC investigated potential upgrades to the Taupo water supply to identify an affordable yet robust strategy for Taupo’s future water supply to meet the current and foreseeable future water supply needs of Taupo. The drivers and objectives of the project are described.

An evaluation of twelve potential sites and various treatment options was undertaken considering factors such as required consents and approvals, site footprint vs. plant footprint, required reticulation upgrades, risks and total project cost.

The outcome identified a single coagulation/microfiltration membrane plant at the site of the existing Lake Terrace water treatment plant (WTP) as the preferred option. The selected site had very significant space constraints. This paper explains how this challenge has been overcome to enable construction in a space many considered impossible and still accommodate cost effective chemical delivery, a modern treatment facility and a landscaped public access rooftop on the lakefront.

The WTP process configuration, unique plant layout, initial treated water quality results and costs vs. budget are presented and discussed.

Jason Ewert is the Design Team Director at AWT Water. He has considerable experience in the detailed design of numerous water and wastewater treatment plant upgrades and has considerable experience in construction supervision, contract administration, commissioning and process optimisation of high rate treatment processes. Jason was involved in the Taupo water upgrade strategy, responsible for mechanical aspects of the new Taupo WTP design and was the Engineers Representative for the Taupo WTP construction contracts. Philip LaRoche is the Technical Director - Water at CH2M Beca and is a leading water treatment process engineering specialist. Philip has been responsible for the process design and detailed design management of numerous water treatment plants throughout New Zealand including recently new membrane based WTP’s for the communities of Taupo, Stratford, Kapuni, Auckland (Waikato WTP) and Opunake. Philip was the design manager for the new Taupo WTP. Colin Giles is a civil engineer who has worked for New Zealand local authorities in various roles since the mid 1970’s. For the past 4 years he has been a Project Manager for the Taupo District Council. Colin had overall responsibility for the delivery of the Taupo Water Upgrade.

103: Huntsbury Reservoir - Post Earthquake Reconstruction  
**Presenter:** Dennis Hunt  
**Authors:** Dennis Hunt - Beca, Robert Clifton - Fulton Hogan and Mark Christison - Christchurch City Council
The 22 February 2011 Christchurch earthquake extensively damaged the 35,000 cubic metre Huntsbury reservoir and all stored water escaped. The 59 year old reservoir was the principal potable water storage facility in the city. A geological shear zone on a diagonal orientation across the site was subsequently discovered.

Partial replacement water storage was deemed essential by December 2011, and alternative sites were not available. Challenges this presented included:

- Could the 59 year old structure be reconstructed to reliably store water?
- Was a safe construction methodology feasible?
- Could investigation, design, construction and commissioning be done in the timeframe?
- How extensive was the shear zone, what future earthquake movements could be expected and what constraints did this impose?

This is a story of how teamwork, integration of design, construction and operations, prompt decision making, astute risk assessment and consultation with the community reinstated water storage on Huntsbury Hill.

The result is a completed facility with significant reuse of the existing structure and a landscaped community area.

Dennis Hunt is design manager and structural engineer at Beca Limited. He has lead design teams on infrastructure projects covering water, wastewater, power and roading sectors. Major water industry projects include the upgrade of the $450m Mangere Wastewater Plant (Project Manukau), the $100m Waikato Water Treatment Plant and Pipeline, and the $250m Hunua 4 pipeline. Dennis was the prime author of this paper which was reviewed by Mark Christison of Christchurch City Council and Robert Clifton of Fulton Hogan Limited.

104: Kapiti Water Supply: getting it right

Presenters: Andrew Watson & Phillip Stroud
Authors: Andrew Watson & Nathan Baker - CH2M Beca Ltd and Phillip Stroud, Kapiti Coast District Council

Water supply on the Kapiti Coast has been under stress for over 20 years. Council's application to augment the supply from the Otaki River was declined in 2001, leading to Council developing a groundwater supply to augment its river source. However, the groundwater quality was disliked by many in the community.

With continued population growth through the 2000s, the capacity of the supply was once again under pressure, and planning commenced on the search for a 50-year sustainable solution.

Over 150 reports from the previous 20 years were reviewed and checked for high level fatal flaws to develop a list of 32 options. Extensive consultation was undertaken to establish values and measurement criteria. Multi-criteria analysis was undertaken to shortlist to eight options (storage and groundwater).

In September 2010, following wide-ranging investigations, Council selected the innovative River Recharge with Groundwater option. Over the following two years Council undertook extensive groundwater and ecological investigations, concept design, and the AEE. Consent lodgement was in November 2012, and consents were granted in September 2013.

The paper will mainly focus on:

- planning the project
- iwi, community and stakeholder involvement
- difficulties of consenting under uncertainty and an innovative design
- lessons learned.

Andrew Watson is CH2M Beca’s Technical Director – Water Supply and is based in Wellington. His 30 years of experience includes water treatment and supply projects in New Zealand, Australia and Singapore. His role in the project that is the subject of this abstract was as the Project Director.

Phillip Stroud was Council’s Project Manager for the project from its inception through to its consenting. Phillip is a project manager with over 20 years’ experience in three local authorities and an engineering consulting practice.

105: Managing Stormwater Pipes – how to deal with the poor cousin

Presenter and Author: Phillip McFarlane, Opus International Consultants

The Government’s National Infrastructure Plan estimates the value of New Zealand’s stormwater infrastructure to be $8.9bil. This is 70% of the value of the wastewater infrastructure, but Capex budgets for stormwater infrastructure are
only half of those for the wastewater networks and Opex costs are only one third. This raises the question; are we giving our stormwater assets the attention that they deserve? Or are we neglecting our stormwater pipes because they are perceived as being less important and they are out of sight and out of mind?

This paper discusses approaches to management of stormwater pipes. The deterioration of stormwater pipes and the factors that affect the rate of deterioration over time are identified. The effect of deterioration on structural and hydraulic performance of stormwater pipes is discussed in the context of planning and prioritising repairs and renewals.

The paper considers the pipe scoring system in the New Zealand Pipe Inspection Manual that is often used by local authorities to assess the condition of gravity pipes and asks is this scoring appropriate for assessing the condition of stormwater pipes.

Key Words: Stormwater, CCTV Inspection, Condition Grading, Deterioration, End of Life

Philip is a Partner of Opus International Consultants Ltd. He is based in Auckland, where he leads Opus’ Water Strategy Work Group. Philip has 30 years’ experience leading design and project management teams, having worked in New Zealand, Asia and England. He is a Fellow of the Institute of Professional Engineers of New Zealand. Philip helps utility companies develop maintenance, operation and asset management practices that enable them to get the best possible performance from their existing assets. He is an expert in the planning, condition assessment, design and rehabilitation of wastewater, stormwater and potable water systems. Philip is a leader in the application and design of trenchless technology. He was one of the lead authors of the 3rd Edition of the New Zealand Pipe Inspection Manual.

106: Timaru’s District Wide Sewer Strategy
Presenter and Author: Ashley Harper - Timaru District Council

Over the last 15 years the Timaru District Council has developed and implemented a comprehensive wastewater treatment and disposal strategy.

The development of the strategy via a facilitated working party was a key feature and resulted in a $50 million work programme spanning 10 years.

The main drivers of the strategy were:-
- A requirement to cease discharging treated effluent to rivers resulting in improved environmental standards
- To reduce the risk of trade waste dischargers relocating
- To be cost effective and affordable
- To comply with the National Coastal Policy Statement.

The resulting strategy involved:-
- Upgrading three existing oxidation ponds
- Installation of an ‘inland towns’ pipeline to convey oxidation pond effluent to the existing Ocean outfall
- The separate piping of industrial effluent in the Washdyke and Port areas
- The construction of oxidation and maturation ponds and the planting of wetlands for the treatment of domestic wastewater
- The on site treatment of industrial effluent by industry.

The implementation of the strategy required integration with the existing network and pump station renewal programmes.

All physical work is now complete with the paper and presentation expanding and describing on the planning processes, community engagement, design features, the construction phase, costs and funding.

Ashley Harper is the Group Manager District Services at Timaru District Council. He is a Chartered Professional Engineer, Life Member of IPWEA and has been responsible for Council's infrastructure since 1989. He has been deeply involved in the development and implementation of the Timaru Wastewater Strategy.

107: Seismic Response of Underground Utility Systems
Presenter: Jonathan Morris
Authors: Jonathan Morris - Opus Environmental, Rosslyn McLachlan & Padmanathan Kathirgirtham – Opus Research and Jasmin Callosa Tarr - Opus

This paper describes progress in a four year research project funded by the Ministry for Business Innovation and Employment on the seismic response of underground utilities.

A key goal of the project is to help develop robust, evidence-based national recommendations and guidelines to help improve community resilience to seismic events.
This paper will describe how information on ground deformation, geology and seismic loading is being used together with underground utilities damage data to assist in understanding the risks from future earthquakes. While there is a focus on the Canterbury earthquakes, information from other earthquakes within and outside New Zealand provides complementary data.

Recent work has focused on improving understanding of how modern ductile materials respond to seismic events, through analysis, modelling and testing. The paper will compare examples of how ductile pipeline systems respond to earthquake loads with the response of more traditional materials. This provides insights into the forms of damage and the associated consequences, which are likely to differ as the proportion of modern materials increases through new construction and renewals. Even in the preliminary stages, the models are capable of providing guidance to reconstruction engineers on the likely responses of different installation and remedial options.

Jonathan is a Chartered Materials Engineer who has spent 30 years working on infrastructure assets and describes his work as “looking at how things change in service and what to do about it”. Jonathan is actively involved in asset management training within New Zealand and was lead author for a widely used assessment manual. Jonathan has a strong background in applied research and his doctorate was awarded for work on a non-destructive test system. He is presently a member of the ACA Water & Water Treatment Committee and a registered assessor for the New Zealand Diploma in Infrastructure Asset Management.

108: Chatham Islands Challenges – Upgrading New Zealand’s most remote community water supplies

Presenter: Graeme Glasgow - MWH NZ Ltd
Authors: Graeme Glasgow, Charles Mellislin – MWH NZ Ltd and Own Pickles - Chatham Islands Council

The Chatham Islands face significant water challenges despite large surface water lakes. Their remoteness, some 680km south-east of New Zealand, presents unique circumstances for the identification, design, construction and operation of water supplies. The settlement of Waitangi with a population of 300 faces shortages and relies upon a single groundwater source. The small community of Te One, 4km north of Waitangi has no public water supply and relies on rain water. Kaingaroa, located on the north-east promontory with a population of 60, relies upon a decaying former fish factory water treatment plant and a lake source prone to runoff. Owenga, in the south-east of the main island with a population of 40, relies upon erratic spring fed ponds, household bores and rain tanks but suffers frequent shortages and quality issues. Achieving the New Zealand Drinking Water Standards, providing quality, sustainability and affordability that can be constructed under the unique conditions on the Islands requires close collaboration between the stakeholders to transform the facilities and deliver solutions. This paper will discuss the challenge to secure water supplies, present details of the options proposed for Waitangi/Te One and Owenga and the design of the upgraded supply for Kaingaroa about to commence construction.

Graeme has over 20 years of experience in water and wastewater treatment engineering. He is a Chartered Engineer with the Engineering Council and a Chartered Environmentalist with the Society for the Environment. He is a Member of the Chartered Institute of Water and Environmental Management. He holds a Doctorate in water engineering from Loughborough University in the UK where he undertook research in rapid sand filtration. He has worked as a consultant engineer in both the UK and New Zealand. Graeme joined MWH NZ Ltd in 2009 and is based in the Dunedin Office.

109: Te Mato Vai - master planning a potable water supply for Rarotonga, Cook Islands

Presenter: Colin Gerrard
Authors: Colin Gerrard & Deborah Lind – AECOM, Latu Kupa – Kew Consulting Ltd, Mac Mokoroa - MOIP and Peter Tierney – MFEM

The Cook Islands Government are committed to supplying reliable potable water to all properties connected to the water network by 2015/16. The reliable supply of potable water affords an important opportunity to provide for population and economic growth and the continuing health of local communities.

This commitment is a substantial undertaking for the people of Rarotonga. It is the largest single infrastructure project in the Cook Islands since the International airport construction in 1974. As a legacy project it is important that the potable water system is designed to fulfil its obligations now, and for future generations.

A Master Plan has been completed with the aim of providing tangible benefits for the local community:

- An asset which is optimal in design so that it provides a reliable water source to all connected properties
- Treatment facilities that keep the local communities safe from pathogens, protozoa and viruses within their drinking water
- A prioritised programme of works to deliver the project to the committed budget

This paper will present the Master Plan’s development and recommendations for the delivery of this significant infrastructure project and highlight some of the unique challenges required to meet this step change.

Colin Gerrard is a Principal Consultant and leads AECOM’s Asset Management team in Wellington, NZ. Colin works with public and
private sector organisations in New Zealand and internationally. Colin has over 15 years professional experience in the NZ & UK water industry including Operational and Asset Management roles working for both water utility and consultancy companies. In addition to asset management, he has experience in master planning, project management, investigation, design and construction of water supply, wastewater & stormwater systems.
Working Collaboratively

201: Collaborationists
Presenter and Author: Luke McCarthy - GHD

In July 2012 a team of professionals from GHD was hand-picked by Auckland Transport to provide asset management services. The contract required collaboration. No longer would we hide behind our PCs, our tablets, or our smart phones sending txts or emails in capitals or italics to emphasise a point. We would be bold and communicate face to face. We would become “Collaborationists”. Our mission was to deliver credible pavement and non-carriageway forward works programmes for Auckland Transport. The challenge was to collaborate, to work together and to cooperate across Auckland Transports transport divisions to bring about change that would deliver on the levels of service that the stakeholders of Auckland would be proud of. To be a Collaborationist, one needs to truly understand the dynamics of actually talking to people, to guide, meld and unite towards the common purpose; the forward works programmes. This story is about the highs, the lows, the tears, the joy and the undeniable passion that people within this industry have to create an asset management legacy that Auckland would be proud of, that Auckland could share with the world and be known forthwith as leaders.

Luke has over 14 years experience that includes roading network management and operation, extensive knowledge of asset management principles and concepts and resource and environmental planning. He is flexible and his work covers a spectrum from managing flood damage programmes to writing transportation asset management plans. In all his work, his primary aim is to arrive at the best solutions for his clients that add value to their networks while maximising the design life of the asset.

202: Creating a Win-Win for Everyone: professional formality
Presenter: David Bridges
Authors: David Bridges & Annette Sweeney - Good Earth Matters

In today’s collaborative, consultative, consensual environment, this paper examines whether in fact we are achieving value for money or sampling blurring the lines of accountability through the way in which we are attempting to procure and deliver capital works. The paper examines a number of case studies of both highly successful and challenging, as well as routine projects, to identify the attributes that contribute to “best for project” – “value for money” outcomes. One of the key elements identified is that of “Professional Formality”. This element is explained and developed within the context of delivering successful projects.

David has over 35 years’ experience as a civil and environmental engineer specialising in public sector 3 waters infrastructure, roading, strategic planning, policy development and procurement. Since 1996 David has been the principal engineer and a Director of Good Earth Matters. David has extensive expertise in all aspects of sewage, stormwater and water infrastructure including treatment, modelling, inflow and infiltration detection, water loss management and reticulation construction and operation. He has been responsible for preparing structure plans for urban growth strategies to optimise infrastructure and is an accredited RMA Hearings Commissioner.

203: Raising the Performance of Consultants using Comparison of Key Performance Indicators
Presenters and Authors: Adrian Percival - Auckland Council and Pete Thomas - Auckland Council

The Auckland Councils Stormwater Unit has to evaluate Resource Consent requirements against nine legacy Council District Plans, three legacy Regional Plans and the Proposed Auckland Unitary Plan. An innovative approach to engaging and managing consultants was required to get consistent, good quality and timely outcomes.

To minimise ongoing and time consuming procurement processes, the Stormwater Unit decided to go to the market to recruit three Planning Consultancies for a 1+1 year contract. The work would be divided up regionally along some of the District Plan boundaries.

Having three consultants working for the Stormwater Unit, doing the same work, at the same time, presented an opportunity to measure and compare the consultants with each other to ensure Council was getting good, cost effective and reliable advice. Key Performance Indicators (KPIs) were developed to record performance on individual projects and on an ongoing basis. The assessment criteria included:

- Responsiveness;
- Performance against estimates;
- Quality of Deliverables;
- Performance;
- Staff Changes on Contract; and
- Innovations/Improvements/Streamlining Suggestions.

The result has been improved performance from the Consultants. This has been achieved through the comparison of scores and improved communications of expectations being achieved, or not.
A strategic shift is taking place in the way land transport must be delivered in New Zealand. The changes driven by the NZ Transport Agency Maintenance and Operations review and the Road Maintenance Task Force sees roading professionals working in increasingly challenging times. However the need for efficient, effective, safe and accessible roading services remains unchanged.

Gisborne District Council and NZ Transport Agency have collaborated to accept that challenge with innovation. We will establish a revolutionary co-managed, Gisborne-based unit to maintain and improve roading services in one of New Zealand’s most remote and challenging regions.

Council and NZ Transport Agency representatives are currently working through the implementation of the business unit, including stakeholder consultation, strategic plans, annual budgets, staff and performance models. This will see the grouping of state highway and local roading contracts using the performance-based Network Outcomes contract.

Dave Hadfield, Council’s land transport manager and Shaun Perrin NZ Transport Agency maintenance contract manager will speak about the process of establishing this ‘one-network’ approach, which will allow for smarter asset management, better decision-making and joint regional efficiencies predicted to result in savings of between seventeen and forty-three million over a ten year term.

Dave Hadfield is Land Transport Manager for the Gisborne District Council local government experience includes resource management and solid waste expertise. Previous work history includes NIWA and the Ministry of Works. He has found the challenge of developing the Tairawhiti Roads business case challenging and hopefully the industry will be able to learn from our experiences.

Shaun Perrin is currently NZ Transport Agency’s Maintenance Contract Manager for the Hawkes Bay; previously employed as Napier’s Principal/Senior Asset Manager. Shaun has 15 years’ experience within two National Contractors, Local Government and the NZ Transport Agency. He has worked across the south island and central north island. He has been involved in developing and collaborating with GDC to implement this business model and future Network Outcomes Maintenance contracts within the Gisborne and Hawkes Bay Regions.

The national land transport delivery model has essentially remained unchanged since the local government amalgamations of 1989.

The global financial crisis of 2008 and its continuing economic impacts, has required Governments worldwide to challenge their expenditure.

Delivery of the 2009 Government Policy Statement on Land Transport Funding (GPS), flat-lined the total funding available for maintenance and renewal activities. As a consequence the New Zealand Transport Agency (the Transport Agency) together with Territorial Local Authorities (TLAs) and industry representatives investigated options for improving the delivery of land transport activities in what was called the Road Maintenance Task Force (RMFT).

The RMFT identified collaboration, asset management and LoS road classification as some, among other, key areas to extract better value. Governance and implementation structures were set up jointly between NZTA and TLAs to pursue these opportunities: The Road Efficiency Group (REG) was formed.

Niclas Johansson and Edward Guy have led the REG collaboration initiatives across the country, and this paper is a stock take two years down the track. It will provide insights into the full range of models, what worked and what didn't.

Edward Guy founded Rationale Limited in 1999. His attitude that nothing is too hard and that a problem shared is a problem solved, has led to a strong culture of successful collaboration between Rationale, its clients and partners.

Having completed the Better Business Case practitioner modules as well as the reviewers’ course, Edward is well placed to provide working knowledge of content, structure and skills across all Better Business Case deliverables.
The ground model is an essential tool in developing design solutions for infrastructure development and maintenance. The cost of determining the ground model is a good investment, because understanding the geology and geomorphology of a project site is essential for assessing the most appropriate and cost-effective solution. Without a ground model, the risk of increased construction time and/or poorly performing infrastructure resulting from unexpected ground conditions is high.

This paper describes: what the ground model is, how it can be presented, how the ground model is constructed, who should construct it, what the ground model is used for and why it is so important in civil engineering projects.

This paper demonstrates the ground model's importance and value with examples of the ground model in use in the Waikato District for the design of mitigation of slip hazards on rural roads. In addition, it highlights successful elements of collaboration with Waikato District Council to provide not only cost-effective and 'best for project' design solutions but also a cost-effective approach to the development of the ground model.

Jonny studied Geology and Geography at Canterbury University and began work with Opus in Napier at the end of 2003 initially working on slip repairs on the Central Hawkes Bay road network. After studying Engineering Geology at Canterbury University in 2005-06, Jonny continued working for Opus in Hamilton. Jonny has experience in working collaboratively with a variety of clients including territorial authorities and contractors, providing geotechnical advice for engineering projects including slip repairs and other roading projects, wastewater, stormwater, irrigation and hydro schemes.

207: Collaboration, Consultation or Collusion – what you need to know
Presenter & Author: Chris Olsen - Road New Zealand

This paper explores the differences between consultation, partnership, and collaboration to understand how the Infrastructure Sector can benefit through leadership in their adoption and application. It considers popular misconceptions and identifies those situations where infrastructure users can benefit from the various agencies and the supply chain using each of these forms of engagement.

The outcomes from the Industry/NZTA regional workshops on collaboration held in November 2013 for the new State Highway maintenance contracts are a key input into this paper.

The paper also explores the boundaries between collaboration and collusion according to the recent amendments to the Commerce Act and the Commerce Commissions Guidelines for Competitor Collaboration. These Guidelines help to ensure that parties do not cross the line from collaboration to cartel behavior.

208: Councils' Roles in Negotiating Future Water Supply Solutions
Presenter and Author: Anna Robak - Opus International Consultants

Water is a basic human need, but the cost of supplying potable water is escalating due to increasing abstraction, drier weather, rising contamination levels in rivers and groundwater, increasingly stringent legislation, and ageing infrastructure. The combination of these factors is placing increasing pressure on many communities, and more water suppliers may be forced to consider alternatives such as discontinuing their water supply services or significantly reducing service levels.

Understanding the acceptability of an alternative is a dynamic process; it is a negotiation between supplier and consumer. As part of this negotiation process, water suppliers will need to understand what is important to their communities.

Councils, when entering these negotiations, must understand available alternatives that can achieve the same outcomes, and people's attitudes towards these alternatives.

This paper explains how a willingness to pay study was used to understand people's attitudes and preferred solutions for a sustainable water supply. The findings will help water suppliers develop strategies that offset costs while maintaining sustainable water supply at preferred service levels. The research finds that Councils do not have to do it all themselves; in the future, they may find roles as advisors and monitors, resulting in lower water supply costs.

Anna is a Senior Asset Manager with Opus International Consultants in Auckland. Anna specialises in evaluating the wider costs and benefits of public investment decisions using systems thinking and non-market valuation. Anna is passionate about non-asset alternatives and aims to help organisations identify more efficient investments based on their economic, social, environmental, and cultural impacts.
Natural and Community Assets: stormwater operations and maintenance as a driver for ongoing community involvement

Presenters: Mark Thomson
Authors: Mark Thomson & Sarah Sheeran, - Auckland Council, Heath Worsfold – Rural Design and Karen Turner – Whangaparaoa College

Auckland Council’s ownership of approximately 500 stormwater ponds and wetlands across the region, affords excellent opportunities to promote long term, community-inclusive stewardship and usage of these assets.

The Rata Road Wetland Restoration Project is an example of a successful, collaboratively-based joint venture. The project involved Auckland Council, a contractor, a local college, the community and the press.

This paper utilises this project to demonstrate how careful planning, good communication and robust engagement with the wider community, can provide assets that meet the requirements of stormwater management, the environment and the community alike.

Keywords
stormwater operation and maintenance, collaborative joint venture, sustainable, community involvement, engagement,

Mark Thomson is Stormwater Operations Engineer for Auckland Council. He has 30 years, three-water Local Authority Civil Engineering experience, 209 years with Auckland City Council / Auckland Council. Mark is a professional member of IPENZ, member of IPWEA, Water NZ and AC Engineering Disaster Relief Team, Christchurch – Feb 2011
Asset Management (300 series)

301: Asset Management Planning: is our journey on the right track?
Presenters: Grant Holland & Ross Waugh
Authors: Grant Holland & Ross Waugh - Waugh Infrastructure Management Ltd, Dr Theunis F.P. Henning - University of Auckland

Twenty years ago most of us hadn’t heard of Asset Management Plans (AMP); now many of us have been through several rewrites and our plans have become much more comprehensive. Our asset management plan journey has been driven by the need to meet several changes to legislation, signals from the Office of the Auditor General, and our personal and organisational initiative. Others, only recently embarked on their AM journey.

Many Developing Countries and Least Developed Countries are applying Asset Management techniques as they look to plan for their futures. With different priorities, these nations journeys differ from ours and there may be lessons we can learn as we look at the value our AMPs are delivering to us.

This paper will consider these questions:

• When we strip Asset Management planning back to the basics, how is the progress on our journey?
• What can we learn from others who are at a different stage of their journey?
• Are we focussing on the aspects that make a significant difference?

Grant Holland is a Senior Consultant with Waugh Infrastructure Management Ltd. Grant is an Asset Management specialist with a wide variety of experience in Local Government AM and Engineering. This includes surveying and land development, asset management system development, and infrastructure planning and management. Grant holds a degree in Surveying and a Post Graduate Certificate in Executive Management.

Ross Waugh is the founder of Waugh Infrastructure Management and is an Infrastructure Asset Management and systems integration specialist with over 30 years’ experience.

Ross has experience of five cycles of integrating infrastructure asset management planning with long term municipal government financial planning within the New Zealand context and is a section author of the IIMM 2011.

302: Challenges and Opportunities for Stormwater Asset Management
Presenter and Author: Sarah Dudson - Opus International Consultants

Stormwater is no longer just about drainage and simplified runoff calculations; it’s a lot more exciting. Computer modelling has become an increasingly powerful tool, able to seamlessly integrate piped networks, attenuation, soakage systems, surface and channel flows. Effective stormwater management now requires multi-disciplinary teams made up of engineers, modellers, ecologists, planners and landscape architects. Not to mention the diverse range of stakeholders and changing regulatory environment.

This paper uses the development of a stormwater model for Ashburton to illustrate how far stormwater management has evolved. Innovative new modelling technology joined with smart use of LiDAR, aerial photographs, sound engineering and ‘hands on’ validation was a powerful combination. This approach enabled us to graphically present, in a non-technical way, the remarkably good correlation between predicted flood extents and actual flooding observed which was invaluable in giving council and other stakeholders’ confidence in our work and the results.

We will also discuss the imminent changes to the Local Government Act and how the stormwater model can be used a powerful asset management tool. This enabled Council to make informed decisions, demonstrate effectiveness and efficiency in design and help councils in preparation of 30 year asset management plans.

Sarah Dudson is a senior engineer with Opus international Consultants in Christchurch who has experience gained in NZ and the UK working in the three waters sector, specialising in stormwater. Sarah has proven stormwater experience in the fields of catchment management and strategic planning as well as detailed design of stormwater conveyance and treatment systems. These fields of expertise have enabled her to lead the Ashburton Urban Stormwater Strategy project, which aims to effectively manage the town’s stormwater systems in order to minimise flooding and support development demands while protecting receiving environments and meeting changing legislative requirements.

303: Creating a Safety Assessment Tool for Diverse Council Assets
Presenter: Warren Bird
Authors: Warren Bird - Opus International Consultants and Richard Coles & Dukessa Blackburn-Huettner - Auckland Council

Responsible infrastructural asset management requires that public safety hazards are understood and, where necessary, mitigated. The Auckland Council Stormwater Unit required a way to assess more than 300,000 diverse assets, and rank them according to public safety risk. This ultimately led to the development of a stormwater safety risk
assessment tool based on risk management principles. The tool was further developed using GIS to screen large numbers of assets (e.g. manholes). This paper discusses the process of developing the safety risk assessment tool, including a number of fascinating insights gained as the development team investigated local and international practice, the practices of other utility industries, and sought to understand just how much risk urban stormwater facilities actually pose to the public.

The best-practice safety approach described here for stormwater assets is likely to be capable of adaptation to other classes of infrastructural assets.

Keywords: Stormwater infrastructural asset; public safety; hazard; risk assessment.

Warren Bird is a work group manager in the Auckland office of Opus International Consultants, who has specialised in stormwater management for the last 20 years. Ricki Coles is an environmental engineer working in the technical services team of the Auckland Council.

304: Curvature: the answer to our road network asset management prayers?
Presenters and Authors: Mike Tapper - BECA and Kevin Barry - Whangarei District Council

Whangarei District Council (WDC) has collected data on projected forestry harvest volumes for the next 20 years. The challenge is turning this data into an assessment of the impact road renewal and routine maintenance costs. WDC contracted Beca to undertake this analysis together with them.
To accurately assess and future impacts, a reliable parameter to determine varying surfacing life and maintenance costs is required for the individual treatment lengths, particularly in identifying vulnerable sections. Curvature from Falling Weight Deflectometer (FWD) data provided a reliable correlation with predicted overall pavement strength and surfacing performance and that observed in the field. Curvature was also used as a differentiator in assessing likely maintenance cost flows from various traffic loading scenarios. This has given confidence that the future expenditure profiles are robust and reliable. The relationships are network evidence based and not overly reliant on theoretical relationships.
The benefit is an improved method of predicting “project level” performance of vulnerable sections with a network level data collection methodology. With new NOC contracts and constrained budgets, improvements in identifying vulnerable treatment lengths are needed to collaboratively deliver long term maintenance strategies for the new environment.

Kevin Barry is a Roading Projects Engineer for Whangarei District Council. Kevin emigrated to New Zealand from Ireland and enjoys the lifestyle of the Northland district.

Mike Tapper has been with Beca in Tauranga for 18 years, operating in the road asset management space. Mike was born in Whangarei and misses the lifestyle of the Northland district!

305: Long Term Planning: eating the elephant one bite at a time – Asset Management
Presenter: Daniel Johnson
Authors: Daniel Johnson and Adam Wheeldon - Opus International Consultants

A perception towards long term and renewals planning is that we are all right, but are we. What do we know about the performance and condition of our pipelines, how can the right data and smart systems be used to make informed decisions and justify our expenditure.

Improved technologies to assess the condition of buried pipelines with the support of technical experts are now better understood and becoming more widely used and accepted, knowing when and where to use this approach is still not well understood by Councils.

Asset Management Systems are being developed for Councils, with expectations that they will provide the answer to system performance and financial reporting, this is largely not the case as the data requirements and quality is not currently sufficient.

This paper discusses the challenges that Asset Managers are faced with in developing an Infrastructure Strategy, and smart solutions to long term planning one bite at a time.

Daniel is an experienced water engineer with over 17 years in the industry, working on projects in the UK, Australia and New Zealand. Daniel is based in Christchurch and works for Opus International Consultants as Manager of Water Asset management and Engineering. Daniel has worked on a variety of water related projects specialising in non-revenue water, demand management, and long term planning strategies using smart solutions. Other projects have focused on urban and rural water distribution systems, encompassing emergency operating and planning, system optimisation, supply deficiency investigation and pressure management.
The Road Efficiency Group (REG) is a collaborative initiative by the road controlling authorities of New Zealand. Its goals are to drive value for money and improve performance in maintenance, operations and renewals throughout the country.

In mid 2013 REG established a joint working group comprising members of Local Government, NZTA, DOC and MOT commenced development of an integrated classification for the New Zealand road network (state highways and local roads) that:

- reinforces a “one network” approach and assists national, regional and local planning, investment, maintenance and operations decision making utilising existing frameworks where appropriate
- supports collaboration & cooperation between councils and between councils and the NZTA
- supports a customer focused approach to the seamless movement of goods and people

This presentation will share the work that has been done to develop performance measures to support the customer levels of service developed as part of the One Network Road Classification.

David Darwin is the State Highway Outcomes Delivery Manager responsible for development of the operation, maintenance and renewal components of the State Highway Asset Management Plan and the delivery of the annual programme of works providing the outcomes sought. He is a Chartered Professional civil engineer. His experience has been in infrastructure management including the development of the state highway maintenance and renewals works programme, development and implementation of asset information systems, management of transport and drainage operational business units, development of the national land transport management plan design and construction and asset management of urban storm water and sewerage systems.

He has been the NZ Transport Agency representative of the Assets Task Force for 16 months and Assets Program Manager for the last year. Achievements include the methodology used to manipulate the project content of the State highway improvement plan to target different balances between a safety and journey focused programme, and the development and implementation of a programme that removed sewage pollution from Wellington’s coast, harbour and streams within budget ahead to the timeframe set by resource consents.

Siri Rangamuwa is a chartered professional engineer with over 20 years’ experience in planning, design, construction and maintenance of civil infrastructure assets and facilities.

He has been involved in NZ asset management for the past 12 years and currently serving as Auckland Transport’s Regional Asset Planning & Policy Manager.

He holds bachelors and masters degrees in civil engineering and management.

Charlotte Reed is a chartered civil engineer with over fifteen years’ practical experience of the provision of technical consultancy services to governments, private companies and utilities in New Zealand and internationally. Her areas of expertise include asset and risk management, policy development and advice.
An experienced project manager, Charlotte has successfully led many multi-disciplinary teams and consortia. Her work in risk management has ranged from natural hazard risk assessments to technical due diligence studies.

Chris Cameron is Principal Policy Advisor at Hutt City Council. Previously with Wellington City Council (2008-2013), Chris led work to assess the city’s vulnerability to climate change impacts. The 2010 Climate Change Action Plan that he developed was recognised as a category winner in the 2011 New Zealand environmental “Green Ribbon Awards”. With the Ministry for the Environment from 2006-2008, Chris was a member of NZ delegations to international UN and IPCC climate change meetings. Chris has been invited to speak at a range of conferences and events in both Australia and New Zealand, and has developed local, national and international networks.

308: Use of Criticality and Risk to Identify Wellington Region’s Key Three Water Assets
Authors & Presenters: Nicola Chisnall - Capacity Infrastructure Services Ltd & Ian Martin - AECOM

As part of its continuous improvement programme, Capacity Infrastructure Services Ltd in conjunction with AECOM has developed a comprehensive, systematic framework and geo-spatial tool to identify those assets critical to the delivery of the three water services to its communities. Criticality is assessed with clear linkages through to the risk and service level frameworks with transparent consideration of economic, social, cultural and environmental aspects.

Capacity has built this criticality model within InfoNet to directly draw on data from within the established asset management information system, although the framework can be readily applied within other geospatially enabled systems. The criticality model is directly linked to the failure likelihood model to form an overall network failure risk model. The geospatial representation of these network risk profiles enables Capacity to:
- Target inspection and maintenance effort at optimum frequencies
- Identify optimum intervention points and maintenance/renewal thresholds
- Target renewal works
- Assist with emergency management planning

This paper overviews the approach adopted, presents the framework and outputs of the criticality model, and shows how these contribute to developing the most cost-effective works programmes.

Nicola Chisnall, Senior Asset Planning Engineer, Capacity Infrastructure Services Ltd Nicola is a member of IPENZ and a chartered professional engineer with 13 years of local government experience in the Asset Management and Investigation areas. Nicola is currently a Senior Engineer in a team that are responsible for developing asset management plans, continuous improvement in asset management practices, performance measurement and benchmarking across Wellington, Hutt, Upper Hutt and Porirua City Councils.

Ian Martin is AECOM’s Wellington Regional Manager and the New Zealand sector leader for Strategic Asset Management. He is a Chartered Professional Engineer and has specialised in asset management planning over the last 15 years to consolidate the engineering and management experience he gained over the 10 years before this. Ian has extensive infrastructure related asset management experience including completion of asset management practice reviews, development of improvement programmes and service level frameworks, and the preparation of asset management plans for a number of Australasian clients. Ian has led the development of risk and criticality frameworks for clients in Australasia and Hong Kong. This incorporated the development of tools to assist with management and analysis of information, including database and probabilistic models to forecast future renewals expenditure needs.

309: Using a 360° GIS Viewer to Innovatively Manage and Deliver Infrastructure Assets
Presenter and Author: Malcolm Archbold - Beca

A combination of existing technologies has created an innovative GIS imagery collection and viewing system allows an asset owner to view, assess, collaborate and add value to their existing asset management or GIS systems. This new type of GIS viewer provides a very efficient way of recording and viewing physical assets such as plant rooms, confined structures, and detailed infrastructure.

The system provides a complete 360° view of the asset’s environment from multiple locations. The system provides an excellent record for valuation, ownership and insurance purposes or simply “knowing what’s there”. In addition it can provide health and safety benefits by removing some of the needs to enter potentially hazardous locations. The viewer can be used in conjunction with an existing asset management or GIS system thereby adding value to an organisation’s existing AM/FM system. It helps an organisation to achieve its objectives of collaboration, reducing risk and increasing productivity.

Link to a sample 360° GIS viewer: http://www.radiusphoto.com/ingenium

Malcolm Archbold is the Technical Director Survey & GIS at Beca. He has over 30 years experience in surveying, land information specialising in GPS, data capture systems and spatial data management. He is a former Executive Committee Member of the NZ Spatial Industries Business Association and Vice Chairperson of the NZ Tonga Business Council.
401: 3910:2013 - So Far So Good?
Presenter and Author: Duncan Halliwell - Kensington Swan

This paper will review the new form of NZS3910:2013 contract published in October 2013 by Standards New Zealand. It will focus on:

- The key differences between the 2013 edition and the 2003 edition it has replaced;
- The effect of some key changes that are new to New Zealand and which have been imported from overseas practice including:
  - The early warning mechanism;
  - The Comprehensive programme requirements; and
  - The cost reimbursable option.
- Some of the key points of contention with the new 2013 edition and issues that have arisen on the contract to date.
- Some potential amendments that the 2013 review process missed, and which should form the part of any future review of the contract.

The paper will also briefly discuss the new forms following on from the 3910 drafting exercise, specifically the new NZS3916 Design and Construct Contract and the NZS3917 Fixed Term Contract, and evaluate the extent to which they have improved the procurement landscape in New Zealand.

Duncan is a construction lawyer in Kensington Swan’s infrastructure team in Auckland, and previously worked for seven years in the UK’s pre-eminent construction law firm, Pinsent Masons. Duncan advises all members of the construction industry, including developers, contractors, local and central government, subcontractors and consultants on effective construction procurement and dispute resolution. Duncan has extensive experience on all major contract forms used in NZ including 3910, NZIA, FIDIC and NEC and all major procurement methods including PPP, Design and Build, Collaborative Working and Alliance Contracts.

402: Best Practice Asset Management Planning Working Group
Presenter: Julie Muir
Authors: Julie Muir - Central Otago District Council and Gordon Hart - NZ Transport Agency

In order to harness and promote the existing body of good asset management practices, the Road Efficiency Group (governed by LGNZ and NZTA) has established a dynamic representative working group, made up of representatives from eight road controlling authorities. They’re working collaboratively to identify and encourage best practice asset management planning among road controlling authorities.

This presentation will illustrate how this Group will provide examples of best practice asset management plans (AMPs) and practises in a manner that fosters consistency of application across New Zealand. These AMPs will:

- assist asset management planners operating in urban, provincial and rural environments
- build on the best practice guidance currently provided by the industry i.e. RIMS, Austroads, NAMS
- be demonstrated through asset management approaches and plans of organisations participating in this working group

Julie Muir has been Central Otago District Councils Roading Manager for 11 years. Prior to working in Local Government she worked as a part of the Consultants team. Julie is currently Chair of the Road Efficiency Group Best Practice Asset Management Plan Group.

403: Is it Possible to Create Meaningful Benchmarks of a Council’s Infrastructure Management Performance?
Presenter and Author: Dan Bonifant - Morrison Low

Benchmarking has become a buzz word across Australasia, in New Zealand the Government has introduced standard financial benchmarks and across Australia, the various states are at different stages in developing KPI frameworks for mandatory reporting.

The key to benchmarking is having confidence in the comparability of the data. Reporting at the national or state level is generally at such a high level as to defeat the purpose or differences in interpretation make comparisons difficult.
Morrison Low, Xyst and a group of New South Wales Councils have created a pilot program to develop a series of benchmarks for the management and operation of roads which will seek to address these issues through:

- Industry involvement in the development of benchmarks
- Benchmarks that provide detail about the
- Provision
- Investment
- Operations
- Infrastructure; and
- Environment
- Development of detailed guidance notes; and
- An onsite audit of the data to ensure comparability and compliance with the guidance notes.

This paper will provide an overview of the pilot project, the benchmarks that have been developed and the results (due out in February 2014) and take some time to explore the benefits of having a benchmarking framework developed by the industry, for the industry.

Dan Bonifant is an experienced public sector lawyer who spent a decade working in central and local government in Australia, NZ and the UK. Dan has advised on a number of projects involving the use of shared services and Council owned entities as well as projects relating to the reorganisation of local government. This gives him a good appreciation of the different service delivery mechanisms and structural options available for local government, the different processes required to implement these and the need for better information about services and service provision on which decisions should be made.

404: Operating Characteristic Curves: giving quality a (calculated) chance.
Presenter and Author: Emily Craigie - Fulton Hogan

Tomorrow’s infrastructure requires a broader range of materials and innovations to deliver value for money and meet client’s expectations of design life performance. When adopting any new materials or technologies, it can be difficult to know whether quality is truly attained. Specifications that rely on a set of single pass/fail measures of properties to govern compliance do not always deliver the required product or performance.

This paper investigates the use of statistical analysis, in particular operating characteristic curves, and their role in ensuring all parties get a fair deal in quality control. In order for infrastructure owners to have confidence in material performance and construction methodology, a compliance scheme that accurately represents a product’s properties is required. The statistical approach to characterisation of sample values not only improves the effectiveness of testing plans but also provides a fuller picture than current deterministic pass/fail methods of quality control.

A case study is included to illustrate the power and value of operating characteristic curves. It highlights the cost saving and practical benefits of a statistics-based approach to analysing sample data.

Emily has been involved in many different aspects of Fulton Hogan’s business during her time as an engineering graduate, gaining exposure and experience in a broad range of contracting activities. Whilst enjoying being onsite and delivering outcomes, Emily also enjoys the technical challenge of R&D. During time spent within the Fulton Hogan Technical Team, she worked on a variety of research projects focused on technical issues faced by today’s business.

405: Re-designing Existing Waste Management Facilities for Improved Resource Recovery
Presenter: Phil Landmark
Authors: Phillip Landmark & John Cocks MWH NZ Ltd and David Stephenson, Tasman District Council

Legislative demands and public pressure to recycle have increased the need for improved waste reduction and resource recovery facilities. Most territorial authorities (TAs) do not have resources to design new resource recovery centres (RRC) and changes have to accommodate existing infrastructure.

The paper uses recent NZ projects as case studies to show how the re-design of existing waste management and resource recovery facilities have focused specifically on improving the recovery of resources.

The case studies highlight the importance of strategically reviewing facilities, getting stakeholders involved and establishing the need for facilities improvement from decision-makers. Key principles for the design and operations of RRCs are discussed and the case studies illustrate the importance of obtaining information on quantities of waste and recyclables, vehicles and charging methods, and show how such information impacts on various aspects of the site design.

The benefits of including operators in the design process from concept through to preliminary and detailed design were significant, and different contract procurement models were used to accommodate limited construction timeframes and
Outcomes from the improved facilities have included positive public feedback with increased usage, closer co-operation between TAs and operator staff, and significantly improved site safety.

Phil Landmark has over 25 years of engineering experience, including solid waste work. For the last 16 years Phil has worked in New Zealand for MWH, and is based in Palmerston North.

406: Sustainability Considerations in Infrastructure Procurement
Presenter and Author: Kerry Griffiths - URS New Zealand

Kerry Griffiths, Senior Principal Sustainability Consultant with URS New Zealand, is currently undertaking in-depth research into the use of infrastructure sustainability rating tools as a means of delivering business value and improved social and environmental outcomes. In this paper she will explore the drivers behind the use of such rating tools from the perspective of infrastructure developers – focussing on New Zealand and Australia. She will explore the extent to which innovation and transformation are important factors. Kerry will signal future research questions related to the use of rating tools in procurement decisions and project implementation.

Kerry will draw on her practical experience of applying sustainability measures and frameworks on state highway projects in New Zealand and on rail projects in Australia. More recently she has worked with the Australian IS Rating tool and the US-based Greenroads framework. Her colleagues in the UK are also assessors and verifiers of the well-established CEEQUAL rating tool, and will provide additional insight to the paper and its conclusions.

Kerry Griffiths; MA (Hons), MBA (Distinction), MSc. Kerry is a Senior Principal with URS New Zealand, where she has worked for over 10 years as a sustainability practitioner and consultant. A significant aspect of her practice has been on the integration of sustainability principles into infrastructure projects – particularly during the design and construction phases. Kerry has been the sustainability advisor on a number of road, building, rail and energy infrastructure projects. She has also led teams in the development of sustainability strategies, sustainability reports, baseline assessments, and investigations related to many aspects of sustainability from a technical, stakeholder and change management perspective. Kerry has an organisational change background and has strong experience and academic qualifications in business and sustainability. Kerry has worked at a project level in the use of the Infrastructure Sustainability and Greenroads rating tools. She is a qualified Greenroads Sustainable Transportation Professional.

407: The Safe Economic Road Surfacing for Tomorrow’s Infrastructure
Presenter: John Vercoe
Authors: John Vercoe - Downer Road Science, David Hutchison, Steve Booth & Allanah Berry - Downer New Zealand

Auckland Transport road maintenance contracts are a new initiative of a potentially long-term collaborative contractual relationship (up to 8 years). The New Zealand Transport Agency is also letting similar long-term (9 year) “Network Outcome Contracts” for the state highway network. In both of these, long-term cost minimisation is a key driver. Innovation will be required to improve the status quo.

Downer, being one of New Zealand’s foremost roading infrastructure providers, is well placed to operate in this new environment and has been developing greatly improved techniques for resurfacing & maintaining the chipseal network using materials and techniques which are a significant step forward in safety, sustainability, and economics.

This paper will describe the nature of these new techniques and developments, including for the first time in New Zealand a full carbon footprint sustainability assessment of the new techniques versus past methods. The paper will also give some detailed economic comparisons between the new techniques and those used in the past, as have been collated on the urban chipseal network in collaboration with Auckland Transport.

John Vercoe, Downer. Relevant Experience • 30 years involvement with the technical aspects of all surfacing techniques. • Have worked in France, Asia, Australia & New Zealand across a broad range of projects in technical roles. • Technical support for the contract in all surfacing techniques. • Advisor to Downer Operations on chipsealing and asphalt contracts throughout NZ. Leadership & Management Skills • Have fulfilled management roles up to the level of General Manager for New Zealand. • Have managed teams in many countries around the world including 3 years in France, 4 years in Asia & 4 years in Australia. • Have had teams in technical, sales and general management report to me. Have reported directly overseas to both Hong Kong and the USA. Technical Skills • Have been technically involved in chipsealing, asphalt and slurry seal for 30 years. Have represented NZ on Austroads committees. Was a member of the French team for the European CEN normalisation process for bitumen for Europe. • Currently manage and direct Downer R & D in the areas of bitumen, polymer modified bitumen, bitumen emulsions and asphalt.
501: Delivering a Risk-based Skid Resistance Strategy for a Roading Network
Presenter and Author: Simon Hunt - Fulton Hogan

Road safety is a significant risk, especially if the condition of its assets contributes directly to accidents. A key contributor to road safety is the road surface. Funding is tight, so we need to develop a risk-based skid resistance strategy for the roading network to give us a prioritised programme of work.

Working with several Councils, we have developed/implemented the following methodology:

- Familiarisation with the relevant Council and Transport Agency documents
- Road Segmentation: Splitting the roading network into segments based on road classification, accident history, high risk locations (as per NZTA’s T10 Specification)
- Site inspection to confirm the roading segments
- Weighted scoring system based on the risk of an accident to give a priority score
- Determine the skid resistance and texture testing regime based on the ranking of the road segments
- Develop a suite of treatments, based on performance, including proven aggregate performance
- Develop treatment programme, including temporary solutions, based on available funds and site ranking
- Develop and implement a monitoring programme to improve strategy

Through case studies, we will demonstrate how the development/implementation of this strategy delivers a risk-based prioritised skid resistance works programme tailored to the respective Council’s budget.

Simon has been involved in roading engineering with a particular focus on asset management for over 30 years. This experience has been in a wide variety of roading types – State Highways, and local authority and forestry roads, both in New Zealand and South East Asia involving sealed and unsealed roads. Simon’s areas of expertise include the development of road asset management strategies, road surfacing safety, forward works programming and value for money models. Currently, Simon is Asset Manager for Fulton Hogan.

502: Hamilton Southern Links - Leading Tomorrow’s Infrastructure: collaborate, transform, deliver
Presenter: Grant Eccles – AECOM
Author: Mike O’Halloran - AECOM

Hamilton Southern Links is a partnership between Hamilton City Council and the New Zealand Transport Agency to investigate and plan for the long term transportation and integrated land use infrastructure needs of the southern area of Hamilton in the Waikato.

The Southern Links project involves 32 kilometres of future transport network, including 21km of state highway (straddling Waipa District, Hamilton City, and Waikato District) and 11km of urban arterial roads located within Hamilton City.

This was a unique and complex investigation because the evaluation requires multiple considerations of economic, environmental, social and cultural elements for each link in the transport network.

Through extensive consultation, collaboration and working together as a community, the investigation has now confirmed the preferred route network which was typically 400 metres wide including a new crossing over the Waikato River, a taonga to Maori.

The Southern Links road network has been developed using a robust and comprehensive approach, the results of which have been publicly consulted to ensure stakeholder issues are understood and incorporated into the preferred option wherever practicable.

Protecting the corridor for the preferred network is important to allow Hamilton to grow and cater for future demands.

Grant is an Associate Director - Planning for the AECOM NZ business. He has 19 years’ experience in resource management and has been a consultant planner based in Hamilton for the past 17 years. Grant has particular expertise in preparing and assessing major resource consent and designation applications for network utility operations in the transport, electricity, and telecommunications sectors. After working with engineers of various types for most of his career, Grant has the dubious distinction of sometimes being mistaken for one! A first time presenter at an IPWEA event, Grant has presented papers at numerous conferences and seminars in the resource management field.
**503: Measuring the Resilience of Transport Infrastructure**

**Presenter:** Brian Sharman  
**Authors:** James Hughes & Brian Sharman AECOM

Internationally there is a growing call for building more ‘resilient cities’ and for improving the resilience of our critical infrastructure. This is in response to a realisation that the services we take for granted may be robust in the face of predictable hazards, but are in fact extremely fragile in the face of unanticipated shocks.

In the context of transport infrastructure, operators strive to ensure that transport assets and services function continually and uninterrupted in the face of a range of existing and emerging hazards. This has led to a specific focus on the concept of resilience and how this can be defined, measured and improved across the transport system.

In this paper (funded by NZTA) we research the theory of resilience and propose a measurement framework that broadly covers both technical and organisational dimensions of resilience and breaks these into specific principles and measures which can be utilised to qualitatively assess resilience.

We approach the measurement of resilience from a view that a risk management approach alone is insufficient and needs to be complemented by an awareness that resilience requires both consideration of events that fall outside of the realms of predictability and, importantly, that failure is inevitable.

Brian is a Chartered Professional engineer with over 40 years of experience in the infrastructure industry; including 15 years at Executive and Senior Management level in infrastructure based organisations in the UK and New Zealand and is a Member of the Institute of Directors in New Zealand. Brian is experienced in all aspects of network related infrastructure and business management, covering the whole asset lifecycle. These include senior management positions in Strategic Asset Management, Engineering, Planning, Project Management and Service Operations. Brian leads AECOM’s Strategic Asset Management team in Auckland, providing strategic asset management services across water, energy, buildings and transport related organisations.

He has developed and undertaken independent peer reviews of Asset Management Plans and organisational assessment of asset management practices against PAS55:2008 requirements, has lectured on New Zealand Asset Management Support (NAMS) industry training courses.

**504: Prioritisation Process for Funding of Unsealed Roads in the Auckland Region**

**Presenter:** Ayokunle Martins  
**Authors:** Ayokunle Martins, Hilario Cachero, Rex Harland & Veenay Rambisheswar - Auckland Transport

Prior to the amalgamation of territorial organisations in Auckland, each approved organisations have a unique policy for sealing their unsealed road sections. Consequently, after the establishment of Auckland Transport in November 2010, the task of sealing the unsealed road sections now rests solely on Auckland Transport.

Funding is provided by Auckland Council, it is considered unlikely that any remaining unsealed roads would attract NZTA funding.

Auckland Transport is committed to a process of ‘fair and transparent decision-making’ in regard to the allocation of rate payer’s funds to support the sealing of these unsealed road sections. This paper outlines the scientific process used by the Programming and Development Services team in relation to that funding allocation.

Currently, the regional prioritisation tool - An approach to prioritisation is Auckland’s regional tool for decision-making. The six regional guidelines from this regional tool are:

- Traffic movements
- Dwellings/km
- Amenities
- Gradient
- Incidents
- Heavy Commercial Vehicles

The process we have developed therefore includes adherence to these principles and has been refined to take account of lessons learned over the past three years of preparing and funding the Auckland regional transport programme.

Ayokunle was born in Lagos, Nigeria and has a Master’s degree in Mechatronics from the University Applied Sciences, Ravensburg Germany. Ayokunle has received a Masters of Transport Engineering Studies from the University of Auckland. Ayokunle moved to New Zealand with his family in September 2006. He has had an interesting career in the field of transportation spanning over 7 years and has worked on some very challenging projects, which include the development of the recently published Auckland Regional Land Transport Programmes. Ayokunle is presently the Capital Programmes Engineer at Auckland Transport. He has held this position since November 2010. During this time at AT, Ayokunle has reviewed and recommended for funding approval a long list of very important projects, some of which are the New
505: Starting from Scratch - the Fiji Roads Authority story
Presenter and Author: Neil Cook, Fiji Roads Authority

This presentation explores the challenges and highlights of the first year of operation for the Fiji Roads Authority, through the experiences of the author, who is the inaugural Chief Executive of the Authority.

The Fiji Roads Authority was established on 5th January 2012, and under the management of ‘Change Manager’ MWH the next 12 months were a transitional phase as the former Department of National Roads was dis-established and the new Fiji Roads Authority structure was built.

The Author’s involvement began with an initial contact in May 2012, which ultimately led to accepting the role of Chief Executive commencing 4th January 2013.

First year challenges that will be discussed include delivering a $428 Million (FJD) roading programme at the same time as building a corporate structure, populating key roles in the organisation, establishing core systems for running the business and managing the assets; all the while dealing with a government bureaucracy that can be pedestrian in many ways, and at its worse is deliberately obstructive and resistant to the reform process Government is promoting.

In addition to the challenges, the presentation will highlight the successes as Fiji Roads Authority delivers improved road management and maintenance delivery for Fiji.

Neil Cook is the Chief Executive of the Fiji Roads Authority. Neil moved to Fiji to take up this role in January 2013 after 7 years as Engineering Manager for Wairoa District Council. He spent 8 years on the Board of INGENIUM (IPWEA NZ), including a 2 year term as President from 2011 – 2013.

506: Transforming emulsions into Infrastructure Solutions
Presenter and Author: Sean Connaughton - Fulton Hogan

Client expectations from bitumen-based surfacing’s are continually increasing. Better performance, longer shelf life and greater value for money among a few. In response and coupled with a desire to consistently improve our products, Fulton Hogan has invested heavily in R&D to supply improved bitumen emulsion products to the market.

The primary objective of this paper is to explain how recent developments in bitumen emulsion products can deliver improved performance and value for money. The paper includes examples of emulsion solutions developed for three different market areas – roading, construction, and agriculture.

The methods used in the development of these emulsion products to ensure their performance meets client’s expectations in each specific application are also described in the paper. (1) Break and set time, washout resistance and chip compatibility for Roading Emulsion. (2) Tensile and elongation strength, water vapour transmission rates, puncture resistance and peel strength for Construction Emulsion. (3) Substrate adhesion, chemical and biological resistance for Agriculture Infrastructure Emulsion.

The results presented in this paper include the development from client concept to product delivery for end use. All have been specifically designed and engineered to provide winning emulsion solutions for our clients and their projects.

Sean is the Fulton Hogan Dunedin Laboratory Manager which includes the asphalt, aggregate, bitumen and environmental testing laboratories at the Dunedin facility. Originally from Ireland and with a R&D background in the waste/waste to energy sector. Sean, through Fulton Hogan has developed a strong appreciation for all things bitumen related.

507: An Asset Management Approach to Network Safety
Presenter & Author: Tracy ten Hove – Transfield Services

This paper describes a systematic approach to the identification, assessment and treatment of safety deficient sites as part of a Performance Specified Maintenance Contract (PSMC).

Typically, the development and implementation of Safety Management Systems is undertaken by experienced safety engineers, who decide what type of action is needed to address safety deficiencies on the network in isolation. This generally leads to the development of standalone projects that have little if any synergies with other major renewal programmes. This approach can lead to the loss of opportunity in combining projects and deliver efficiency through scale. Furthermore these programmes tend to be reactive to a treat a crash clusters, and miss the opportunity to proactively intervene to reduce the risk of crashes.
Transfield Services NZ Ltd has taken an asset management approach to address this problem through the development of an electronic Safety Management System (SOTERIA), so the Safety Engineer is able to get the best use of funding through optimisation of safety programmes.

The paper outlines the background to the methodology, putting specific emphasis on the PSMC context. The key motivators behind the system are described and a detailed description of the methodology, with example outputs, is presented.

Tracy has worked with Transfield Services in Hamilton for seven years, recently entering her fourth year in the role of Traffic Safety Projects Manager on the New Zealand Transport Agency PSMC006 State Highway Maintenance Contract. Having previously completed a Bachelor of Arts in History, she completed her Masters in Engineering Studies (Transportation) in mid-2013 to further equip her in her work. In addition to the road safety engineering and project management aspects of her current role, she has been exposed to various other aspects of road engineering and maintenance during her time at Transfield Services.