Program Day One: 2 February 2015
Venue: Lecture Theatre 1, Melbourne Business School

<table>
<thead>
<tr>
<th>TIME</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00am</td>
<td>Arrival and Registration</td>
</tr>
<tr>
<td><strong>OPENING SESSION</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 9.30am –10.30am | Welcome  
Prof. Abbas Rajabifard (Symposium Chair), Prof. Iven Mareels, Prof. Ian Williamson (University of Melbourne)  
Symposium Keynote  
Mr. Drew Clarke (ANZLIC, Department of Communications)  
The Government is an important player in harnessing the benefits of the digital economy. The Commonwealth has a role in the development of effective standards and interoperability; making more government data openly available; supporting research and development; and fostering an investment environment for innovation.  
Government is also an important contributor of spatial data to the economy. Better access and use of government spatial data will help drive productivity improvements in the digital economy. ANZLIC, the peak national spatial governance body, and the spatial industry need to take a leadership role in improving the way data is managed and accessed by the market.                                                                 |
| 10.30am    | Morning tea                                                             |
| **SESSION 1: SMART FUTURE CITIES**  
Chair: Prof. Ian Williamson | Planning for the Future with the Community in 3D  
The Hon Gary Nairn (NT Planning Commission)  
Planning for future growth in any community can be a very emotional exercise. Change is never easy. But good strategic, land use planning is essential for orderly growth. Traditionally, concept plans are prepared by relevant planning bodies for use in community consultation workshops. Inevitably, individuals will perceive those plans differently and there are numerous examples where good planning was rejected due to ill-conceived perceptions of what is proposed.  
3D technology is now giving planners a wonderful tool to better present future plans. Individuals can see exactly the impact on existing properties of a proposal before a single sod is turned. My presentation will explore the use of 3D technology specifically with regards working with communities during the planning process.  
Towards Personal Spatial Data Infrastructures to Support Smart Cities  
Prof. David Coleman (GSDI, University of New Brunswick)  
In a personal spatial data infrastructure (or pSDI), individuals will employ a coming generation of mobile services that will: (1) learn and predict their patterns of usage, consumption and travel (especially indoor travel) over time; (2) select and integrate data from a wide range of different public, commercial, social and personal geospatial data channels; and subsequently (3) employ the result to intuitively and transparently serve their own unique collection of personal and business needs in different contexts through a given day. This presentation introduces technical and social tradeoffs involved in the transparent mixing and matching of multiple services to create such pSDIs.  
Four Key Statements on 3D Technology Development in Land Administration and the Compliance Between Spatial and Legal Data  
Prof. Stig Enemark (FIG, Aalborg University)  
The presentation unfolds four key statements on 3D technology development in land administration. The focus is on the need for compliance between spatial and legal data. In this regard the presentation offers some theoretical reflections and a few examples from Denmark. It is argued that the 3D technology opportunities in land administration require careful consideration of the “legal geography” to make the legal concepts fit better into a modern interactive digital environment.  
The Future of Australia’s Spatial Data Infrastructure  
Ms. Helen Owens (Department of Communications)  
ANZLIC’s Foundation Spatial Data Framework (FSDF) is a national level collaboration between Australian and New Zealand Governments and the governments of the Australian States and Territories, industry and academia to make access to spatial data as easy as possible. It was created in response to a clear need for leadership in reforming government data management practice and to support the objectives of the digital economy. Helen will present on how foundation data affects smart cities, the current evolution of Australia’s spatial data infrastructure and her vision for its future.  
Resilient Infrastructure  
Assoc. Prof. Colin Duffield (Infrastructure Australia, University of Melbourne)  
Integration of services and the robustness of facilities notionally underpins the development of SMART cities. Developments are progressing quickly in how we collectively integrate infrastructure planning, facility design, modelling and investment decisions. A reflection on the issues and policies driving the future are presented. |

| 11.00am – 12.30pm | Planning for the Future with the Community in 3D  
The Hon Gary Nairn (NT Planning Commission)  
Planning for future growth in any community can be a very emotional exercise. Change is never easy. But good strategic, land use planning is essential for orderly growth. Traditionally, concept plans are prepared by relevant planning bodies for use in community consultation workshops. Inevitably, individuals will perceive those plans differently and there are numerous examples where good planning was rejected due to ill-conceived perceptions of what is proposed.  
3D technology is now giving planners a wonderful tool to better present future plans. Individuals can see exactly the impact on existing properties of a proposal before a single sod is turned. My presentation will explore the use of 3D technology specifically with regards working with communities during the planning process.  
Towards Personal Spatial Data Infrastructures to Support Smart Cities  
Prof. David Coleman (GSDI, University of New Brunswick)  
In a personal spatial data infrastructure (or pSDI), individuals will employ a coming generation of mobile services that will: (1) learn and predict their patterns of usage, consumption and travel (especially indoor travel) over time; (2) select and integrate data from a wide range of different public, commercial, social and personal geospatial data channels; and subsequently (3) employ the result to intuitively and transparently serve their own unique collection of personal and business needs in different contexts through a given day. This presentation introduces technical and social tradeoffs involved in the transparent mixing and matching of multiple services to create such pSDIs.  
Four Key Statements on 3D Technology Development in Land Administration and the Compliance Between Spatial and Legal Data  
Prof. Stig Enemark (FIG, Aalborg University)  
The presentation unfolds four key statements on 3D technology development in land administration. The focus is on the need for compliance between spatial and legal data. In this regard the presentation offers some theoretical reflections and a few examples from Denmark. It is argued that the 3D technology opportunities in land administration require careful consideration of the “legal geography” to make the legal concepts fit better into a modern interactive digital environment.  
The Future of Australia’s Spatial Data Infrastructure  
Ms. Helen Owens (Department of Communications)  
ANZLIC’s Foundation Spatial Data Framework (FSDF) is a national level collaboration between Australian and New Zealand Governments and the governments of the Australian States and Territories, industry and academia to make access to spatial data as easy as possible. It was created in response to a clear need for leadership in reforming government data management practice and to support the objectives of the digital economy. Helen will present on how foundation data affects smart cities, the current evolution of Australia’s spatial data infrastructure and her vision for its future.  
Resilient Infrastructure  
Assoc. Prof. Colin Duffield (Infrastructure Australia, University of Melbourne)  
Integration of services and the robustness of facilities notionally underpins the development of SMART cities. Developments are progressing quickly in how we collectively integrate infrastructure planning, facility design, modelling and investment decisions. A reflection on the issues and policies driving the future are presented. |
Panel Keynote: Smart Future Cities: Trends in the Use of 3D Land, Property and Cadastre Information
Mr. Chris McRae (VIC Department of Environment, Land, Water & Planning)

This presentation briefly reviews the world’s urbanisation trends and suggests that, in order to prevent rapid urbanisation becoming a problem, there is a need to operate cities in an innovative way, i.e. with a ‘smart city approach’. It highlights the ‘cadastre’ data set as underlying foundation for any smart city framework and discusses the role of land authorities in maintaining this data set. The presentation includes a brief consideration of the Victorian 2D digital map base and a possible spatial future focusing on 3D digital land, property and cadastral information.

Korea 3D Cadastral & Land Registration System
Mr. Byungyong Kwak (Korea Cadastral Survey Corporation)

Land administration based on cadastral system has been rapidly changed according to chronological changes with technical development in geospatial area. In addition traditional cadastral map and surveying methods are also changed and improved from paper base to digital base. In this stage, remarkable project has been implemented so-called Korean cadastral resurvey project in Korea in 2012 in order to transform analog to digital format.

A purpose of this project is to give a solution for mismatching between real boundary and cadastral boundary, and integration of geospatial information for next generation. In this project, 3D cadastre is also considered to present 3D rights and objects such as apartments, tunnels, complex buildings, underground shopping malls, subway stations, subway line, and utilities to the cadastral map. Because those of objects are handled as one of properties and those of objects are deeply related to ownership.

New Zealand Experience: The Role of a 3D Cadastre
Mr. Mark Dyer (Land Information New Zealand)

While New Zealand has a 3D cadastre in that rights are defined in three dimensions, it has yet to develop a 3D digital cadastre. The NZ government is currently in the business case approval stage to build the second version of our integrated digital survey and title system and the intention is to build 3D capability into the design requirements. This is in accordance with a cadastral strategy - a strategy that recognises the benefit of accommodating a wider set of rights, restrictions and responsibilities, as well as a broader application of cadastral data such as in city scale models.

Critical success factors are meeting anticipated societal demand, the ability to support engineering level precision to allow the integration with built-environment related survey data, the need for a precise vertical reference frame, and the need to recognise the constantly changing earth crust by developing a dynamic geodetic datum. Given that we are in the earliest stages of implementing Cadastre 2034, the focus is on designing a system that enables interoperability and future integration of business systems such as with those of city administrators and asset managers.

Smart Property Information for Smart Cities
Assoc. Prof. Donald Grant (RMIT)

One of the layers needed for smart cities will be land-based property rights. The spatial representation of this layer is the spatial cadastre. The cadastral system exists in the real 3D dimensional world but we currently choose to view it only in plan-view and to model only 2 of the 3 dimensions in digital databases. Surveyors discard a significant component of the measurements and information they gather to flatten it out onto the ellipsoid or a projection. The techniques they use are clever – but that do not mean they are smart.

To fully integrate property rights information with the other 3 dimensional spatial datasets for smart cities, the cadastral system will need a redesign. It needs to be 3 dimensional (actually 4 dimensional to reflect changes over time). It will also need to be strongly linked to the geodetic system to be fit for purpose right across neighbourhoods and cities.

Transport Infrastructure Decision Support Platform
Assoc. Prof. Majid Sarvi (Monash University)

The Institute of Transport Studies at Monash University is developing a unique state-of-the-art multimodal transport infrastructure decision support platform with operational, planning and management applications. We believe this will significantly improve the way that cities conceive transport, urban form and mobility, providing a complete picture of how individuals’ activities interact with transport infrastructure. This spatially and temporally enabled platform is the cornerstone of real-time data integration, communication with networks of sensors and utilization of advanced information and communication technologies (ICT). The platform applies complex computational, optimization and visualisation techniques to tackle issues of modern transport systems. This will drive transport infrastructure productivity in a way that has never been realised before and creates a unique opportunity for policy development in a consistent fashion. The ultimate goal of this platform is to assist in better management of complex integrated transport and urban infrastructure systems with a focus on livability, resilience and sustainability.
### SESSION 3: SMART FUTURE CITIES AND 3D DATA: THE ROLE OF THE PUBLIC SECTOR
Chair: Prof. Stig Enemark

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker and Details</th>
</tr>
</thead>
</table>
| 3.45pm – 5.15pm | **Panel Keynote: Cadastre 2034- Powering Land and Real Property**  
Mr. Mike Burdett (ICSM, SA Department of Planning, Transport and Infrastructure)  
The Intergovernmental Committee on Surveying and Mapping has prepared a 20 year strategy for the Cadastral System of Australia. The strategy recognises the evolving urban form and technological advancement which will challenge the systems we currently have in place. The strategy sets out actions we need to implement if we are to meet the outcomes the community will expect in 2034.  

**Cadastral Dimensions – What lies ahead?**  
Dr. Daniel Steudler (swisstopo)  
A Swiss Think Tank identified trends that potentially will affect the cadastral systems. Those trends are the Internet of Things, Linked Data, Legitimate vs. Legal, Crowd-Sourcing, Augmented Citizen, Open Data, which all put pressure on institutional and organizational rethinking. A recent “3D Cadastre” study showed a clear demand for 3D issues to be documented, mainly in the underground. However, land registration authorities are not convinced that this is necessary.  

**State Government Perspectives: Land Victoria**  
Mr. Chris Lester (VIC Department of Environment, Land, Water & Planning)  
This presentation discusses the role of the public sector in assisting with the development of smart future cities using Land Victoria as a case study. It introduces the spatial vision of Land Victoria and reviews the existing information systems, data sets and projects involved in spatially enabling Victoria (e.g. SPEAR, LANDATA, LASSI, VOTS, Electronic Conveyancing, Vicmap and ePlan). The maintenance of Victorian digital cadastral map base, as an underlying foundation for a smart city framework, is then briefly discussed. The presentation concludes with a brief review of the 3D digital cadastre investigation currently underway in Land Victoria.  

**Cadastre 2020 Initiative**  
Mr. Adrian White (NSW Department of Finance)  
Cadastral 2020 Research aims to provide coordination, investigation and strategic planning for a number of activities related to the New South Wales cadastre. This presentation will discuss these activities and highlight the vital role the cadastre plays in the development process as a connector for enabling smart cities and access to 3D data.  

**Public policy for 3D Smart City**  
Dr. Changsup Han (Ministry of Land, Infrastructure and Transport, South Korea)  
Smart City is the concept of a future city where worldwide infrastructures will be built by integrating cutting edge information communication technology (ICT) and will provide ubiquitous services as transportation, environment and welfare anytime and anywhere. In order to make this concept a reality in fast time, the Korean government is currently focussing on 4 main areas: (i) to establish a realistic legislative framework, (ii) to invest in innovative research and technology development projects, (iii) to build several pilot projects in key locations and (iv) to secure the recruitment of high level expertise by investing in high level education and research.  

**The Challenge of Harnessing Big Data for Smart Cities Research and Policy Analysis**  
Prof. Robert Stimson (University of Melbourne)  
A challenge for research and policy analysis to underpin our understanding of the complexities of urban systems and to enhance planning for the sustainable development of our cities is how to harness big data from different sources and the integration of diverse types of data to address challenging social, economic, mobility, environmental, infrastructure and land use issues. Rapid advances in ICT technologies now makes that possible with research infrastructures such as AURIN (the Australian Urban Research Infrastructure Network) leading the way in Australia in providing the capability to integrate diverse data from multiple sources and perform on-line interrogation of data using e-research tools enabling statistical and spatial analysis and modelling and data visualisation enabling innovation in research and policy analysis.  

**3D City Governance: Towards an Integrated Sustainability**  
Dr. Jenny Yang (Dongbei University of Finance and Economics, China)  
3D technology leads smart cities. Through an integrated 3D information communication technology, economic, social and environmental sustainability are combined collectively, which leads 3D city governance beneficial to urban development. Key roles of public sectors are vital to 3D city governance. Successful ways that public sectors support industry can be learnt from 3D city governance from BIM experience in US. With the support from integrated 3D information technology and public sectors, city governance will drive cities towards an integrated sustainability.  

<table>
<thead>
<tr>
<th>Time</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00pm – 8.00pm</td>
<td><strong>Symposium dinner</strong></td>
</tr>
<tr>
<td>TIME</td>
<td>DETAILS</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>8.30am</td>
<td>Arrival and Registration</td>
</tr>
<tr>
<td><strong>SESSION 4: SMART FUTURE CITIES AND 3D DATA: THE ROLE OF INDUSTRY</strong>&lt;br&gt;<em>Chair: Mr. Mike Burdett</em></td>
<td></td>
</tr>
<tr>
<td>9.00am – 10.30am</td>
<td>Panel Keynote&lt;br&gt;<em>Mr. Glenn Cockerton (Spatial Industry Business Association)</em>&lt;br&gt;Abstract&lt;br&gt;<strong>Smart City Futures – Role of Industry</strong>&lt;br&gt;<em>Mr. Malcolm McCoy and Mr John Blackburn (AAM Pty Ltd)</em>&lt;br&gt;This presentation will detail how AAM are using the latest technology and expertise to create City Models and Building Information Models (BIM) for a range of clients. In particular it will detail examples of company projects that are using 3D data for a wide variety of purposes and touch on how 3D Land and Property Information will become increasingly important to facilitate smart future cities.&lt;br&gt;<strong>Where Governments and Industry Meet for Smart Cities</strong>&lt;br&gt;<em>Mr. Michael Dixon TBC (PSMA Australia)</em>&lt;br&gt;There are a number of fundamental issues which must be addressed for data and technology to effectively contribute to the development of Australian smart cities:&lt;br&gt;• What does that market need and what needs to happen to “raw” data to maximise uptake?&lt;br&gt;• Who pays to ensure a sustainable and consumable supply of this data?&lt;br&gt;• How is quality and provenance managed?&lt;br&gt;Industry provides solutions to these issues and will be a key enabler of smart cities.&lt;br&gt;<strong>Planning Our Cities with Urban IQ</strong>&lt;br&gt;<em>Ms. Joan Ko (ARUP)</em>&lt;br&gt;Our cities hold opportunities for urban regeneration. Using evidence-based 3D design tools, we can help optimise the liveability and resilience of these evolving neighbourhoods. Joan will introduce a case study of an inner city block in Adelaide, where Arup combined urban design, GIS and sustainability models to quantify the wider benefits of three alternative development scenarios. By providing rapid design feedback and engaging visualisations, 3D models can transform people's conversations about the city.&lt;br&gt;<strong>Smart Technology on Complex Projects: A Case Study Approach</strong>&lt;br&gt;<em>Mr. Peter Ryan (Probuild-Civil)</em>&lt;br&gt;All major projects are complex and require a different style of leader. The design of teams, experience of people, system controls and project governance must all be challenged as the infrastructure industry enters a new era of advanced technology. This presentation examines both the benefits and difficulties experienced by Project Leaders when delivering mega projects. A case study approach will identify the human behaviours that influence success when implementing a range of smart technological innovations.&lt;br&gt;<strong>Introduction of Korean 3D Spatial Information Construction and Application</strong>&lt;br&gt;<em>Mr. Doo Youl Park (Spatial Information Industry Promotion Institute, South Korea)</em>&lt;br&gt;Introducing Korean policy on indoor and outdoor 3D spatial information, and cases that applied indoor and outdoor 3D model in various fields.&lt;br&gt;<strong>The Role of Professional Association in the Development of Smart Future Cities</strong>&lt;br&gt;<em>Dr Zaffar Sadiq Mohamed-Ghouse (SSSI VIC)</em>&lt;br&gt;The presentation will explore the needs of the spatial professionals in the area of smart future cities. The discussion will also highlight the existing work of spatial professional bodies in the area of smart cities. An outline on the role of professional associations in capacity building, knowledge exchange, developing standards, thought leadership sessions, innovations, certifications and cross harmonization of other non-spatial professional associations to develop a platform for professionals to deliver new ideas for developing smart future cities will be presented.</td>
</tr>
<tr>
<td>10.30am</td>
<td>Morning tea</td>
</tr>
<tr>
<td><strong>SESSION 5: SMART FUTURE CITIES AND 3D DATA: THE ROLE OF ACADEMIA</strong>&lt;br&gt;<em>Chair: Mr. Chris McRae</em></td>
<td></td>
</tr>
<tr>
<td>11.00am – 12.30pm</td>
<td>Panel Keynote: The Role of Academia in Supporting Smart City Development&lt;br&gt;<em>Prof. Stephan Winter (University of Melbourne)</em>&lt;br&gt;This talk will identify the particular role of academia in the social contract of a nation. I will then line out specific examples how society benefits from work in our research groups.&lt;br&gt;<strong>Building Australian Urban Intelligence Network to support Smart Cities</strong>&lt;br&gt;<em>Assoc. Prof. Chris Pettit (AURIN/University of Melbourne)</em></td>
</tr>
</tbody>
</table>
The Australian Urban Research Infrastructure Network (AURIN) is building both a treasure chest of big data and a sophisticated suite of smart city tools. Importantly it is also fostering and connecting a network of smart end users who are accessing AURIN’s data and tool repository to support evidenced based planning and decision-making. This presentation will provide an overview of AURIN and discuss the importance of 3D data structures and visualization tools for envisioning future smart cities.

Smart Data Collection: Future Technologies Today
Dr. Daniel Paez (Universidad de los Andes, Columbia)

Smart cities are to be based on advanced decision-making where new data models, including 3D data concepts, play a fundamental role. New 3D data models need new data collection techniques. In this presentation we share our experiences with unmanned aerial vehicles (UAV) and drones in collecting cadastre, building and land use data on cities. Experiences have shown us that the academia needs to work cooperatively with the private sector and governments to: 1) regulate the use of new technologies 2) automate processes and 3) develop open standards for data models.

Integrated Data Infrastructure Platform as a Tool to Inform Sustainable Housing Affordability Analysis in Melbourne
Dr Muyiwa Agunbiade (University of Melbourne)

Existing knowledge reveals that greater attention is focused on the use of income-mortgage ratio and income-rent percentage for assessing housing affordability. There is sufficient evidence to argue that this is a narrow view of housing affordability assessment, hence the introduction of the sustainable housing affordability concept. With this perspective, the limited adoption of what 3D offers in policy formulation is emphasised. This presentation focuses on the benefits of using multi-criteria analysis by bringing together several datasets from different agencies, which satisfy the many parameters.

3D City Modelling Initiatives in Malaysia
Prof. Alias Rahman (Universiti Teknologi Malaysia)

Geospatial information based on 3D data gaining momentum in Malaysia as initiated by government agencies as well as research centres in academia. There are many aspects need to be considered for smart city development, one of them is building modelling. This presentation describes several efforts by the Malaysian government agencies and the University of Technology Malaysia (UTM). The projects are – 3D city model for Putrajaya city, and the new 3D spatial data acquisition for two major cities. The later initiative was meant for 3D cadastre information system. This presentation also describes two research initiatives towards the development of city model with smart city or buildings in mind, i.e. generalization for 3D buildings and fast database retrieval.

An Ontological Framework to link Policies, Activities and Indicators for Smart Sustainable Cities
Prof. Jane Hunter (University of Queensland)

Standardized indicators to assess the sustainability, services and quality of life in cities are being developed via numerous global initiatives including the Global City Institute, OECD and the United Nations. However, there are currently no common technological frameworks for defining and dynamically generating indicators, and for establishing the link between urban policies/planning decisions, activities or programs and indicator targets. This talk will describe a prototype framework that employs OWL ontologies and Linked SDMX data to: (i) aggregate multi-agency datasets; (ii) generate, visualize and compare relevant indicators over time and place; (iii) link policies, decisions and activities to indicators to help decision makers understand the impact of urban planning decisions and enable them to adapt their policies based on the evidence provided by indicators.

12.30pm
Working Lunch: Presentation on ARC Linkage Project on 3D Land and Property Project (cont.)
University of Melbourne

SESSION 6: DEVELOPING AN AGENDA FOR THE FUTURE
Chair: Prof. Ian Williamson

1.30pm – 3.00pm
Open Symposium Discussion

3.00pm
Afternoon tea

CLOSING SESSION

3.30pm – 4.30pm
Report from Conference Rapporteurs
Closing Remarks
Prof. Abbas Rajabifard, Prof. Ian Williamson (University of Melbourne)