Submission to the House of Representatives Standing Committee on Infrastructure and Communications

Inquiry into the role of smart ICT in the design and planning of infrastructure

July 2015

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Relationships creating success

Downer is a leading provider of infrastructure and engineering services across transportation, utilities, communication, resource and property sectors. Downer is an ASX100 company with over 20,000 employees across Australia and New Zealand.

Our technical capability covers data transfer, data storage, field devices and managed services. We have a number of information technology partnerships that allow us to service the connected infrastructure environment and we are active participants in ng Connect and Australia's IoT think-tank.

Current initiatives our teams are working on include:

- Geographic Information System (GIS) development and design, including 3D geospatial imagery;
- Development of 'connected' infrastructure, including a prototype connected bus shelter in collaboration with Auckland Transport, Solta, Alcatel Lucent, Samsung, Chorus and Designbrand;
- Smart/Managed motorway design and implementation;
- Intelligent Transport Systems;
- Multi-modal public transport ticketing systems;
- Design and management of datacentres;
- Infrastructure support for EV charging systems;
- Smart parking systems;
- Managed lighting networks.

We are excited about the role of smart ICT in the design and planning of infrastructure and are keen to see the increased understanding and adoption of the technologies currently available and emerging.

Our submission provides commentary on each part of the Inquiry's terms of reference.

INNOVATIVE TECHNOLOGY FOR THE MAPPING, MODELLING, DESIGN AND OPERATION OF INFRASTRUCTURE

GIS systems are designed to capture, store, analyse, model, manage and present data. They are powerful and interoperable whilst being relatively affordable and available across a broad section of public and private organisations. Currently Downer uses GIS in road and rail transport, mining, and energy projects

3D capability is available, which allows an improved perspective for better decision making and communication on a citywide basis. This feature is hugely beneficial to managing services related impacts and community impacts.

NEW CAPABILITIES SMART ICT PROVIDES

Smart ICT will better connect people, data and things and from this new capabilities are already emerging.
Street lighting is a current example of how smart ICT is enabling energy use reductions. Combining LED installation with central control systems can achieve energy savings in excess of 40%, provide improved and adaptive lighting and eliminate the mercury waste generated by traditional lamps.

Improved camera technology and data transfer capability, combined with improved lighting, can enhance safety and security in cities. High definition facial recognition will be one aspect of technology that will become increasingly important to security and enforcement agencies.

For public authorities, smart ICT can improve parking collection rates. Smart parking technology increased parking revenues by $50m annually in Barcelona, whilst reducing congestion (Cisco, IoE- Smart City Barcelona, January 2014).

Smart motorway technologies provide the capability to better manage congestion and increase capacity of existing motorways. Key applications include ramp metering, ITS, VSLS/VMS, and in-car journey management applications that help road users find the best route given prevailing traffic conditions. Combining these technologies with new car technologies such as driverless vehicles (also known as autonomous vehicles) increases capacity of existing networks and the ability to improve road safety and infrastructure efficiency.

Capability will evolve as we move from multiple standalone control systems towards networks of interacting elements with physical input and output.

PRODUCTIVITY BENEFITS OF SMART ICT

Smart ICT has the potential to significantly enhance productivity but will challenge existing paradigms.

Congestion is a key issue in all cities and the cost of congestion to Australia was $22.3bn in 2011. This value is expected to grow to $30.5bn by 2031, according to Infrastructure Australia. With constrained funds to invest on new infrastructure, smart ICT is a cost-effective tool for managing congestion.

Likewise crime has an annual cost to the Australian economy of $36bn, based on figures from the Australian Institute of Criminology. Nearly all classifications of crime can be reduced through smart ICT in the form of lighting, surveillance and data analysis and visibility.

Availability and analysis of data in a way that enhances knowledge also aids productivity. Greater knowledge improves decision making and this in turn enables operations and maintenance strategies that maximise availability of infrastructure assets. As we see a greater push into IoT/M2M technologies,

Downer and other contractors will continue to embrace sensor technologies in a wide array of infrastructure to report asset condition, asset effectiveness, and assess asset replacement/ renewal. One example is the use of sensors on rubbish bins around municipalities to assess odour and rubbish levels. Through implementing and monitoring these sensors, Councils and other government agencies are better able to manage routine collection and asset condition – leading to improved amenity for all citizens.

Technologies such as autonomous vehicles reduce labour-cost and improve capacity of infrastructure, hence reducing the overall cost of infrastructure per unit of production. It is not hard to envisage mining and construction sites where the operations are autonomous. The development of such technology does, however, highlight the potential impact on patterns of employment and the increasing need for ICT skills in the workforce.

CONSISTENCY IN DATA FORMATS, STORAGE AND ACCESS

Standardisation in data management is an important consideration in the ongoing development of smart ICT. How we manage data affects the ability to create a cyber-physical system that has collaborating computational elements controlling physical entities.

With different organisations investing in developing technologies and tools, there is a risk of disparate approaches to data management that prevents interoperability and therefore reduces the benefit for infrastructure owners and operators.

Downer is committed to the open standards architecture for the Internet of Things and partners with like-minded organisations.

BEST PRACTICE IN THE USE OF SMART ICT IN THE DESIGN AND PLANNING OF INFRASTRUCTURE

We understand that Singapore, Barcelona and Amsterdam are well progressed on smart ICT strategies for infrastructure and have working examples of the initiatives highlighted. They are the leaders amongst 26 major cities who have embraced smart city technologies and who have credentials in the eight recognised characteristics of smart city infrastructure - smart governance, smart energy, smart building, smart mobility, smart infrastructure, smart technology, smart healthcare and smart citizen.

Transport for London and UK Department of Transport are also progressing initiatives with camera technology, smart motorways and driverless vehicles.

Finally in New Zealand, Auckland Transport is developing a ‘connected bus shelter’ which Downer is the lead participant in the prototype development. We are also working with Christchurch City Council who have a sensing city strategy that is linked to the post-earthquake rebuild. Wellington City Council is currently evaluating opportunities for optimising their networks through smart city management.

USING SMART ICT FOR DISASTER PLANNING AND REMEDIATION

Disaster planning and remediation is a project management area where Downer is engaging ICT based solutions. Disaster planning traverses the management of biosecurity outbreaks, crisis management, emergency response, and recovery.

Downer was heavily involved in Christchurch during the post-earthquake response and subsequent horizontal infrastructure rebuild. The challenge of maintaining essential services during this time included a huge effort in completing visual inspections of all assets, with access challenges in parts of the city.

This experience highlighted how smart ICT could assist in effective response and remediation work. Having complete and visible asset data on a common platform (e.g. remote monitoring of water flow, water quality and street light function) enables resources to target faults and expedite critical repair activities. Deploying wireless cameras, temporary lighting and temporary signals enables agencies to manage safety, security and traffic flows. Similarly, journey time modelling and matrix boards to inform motorists of changes and monitor the impact of traffic movements due to relocation of business operations out of the centre, are valuable tools during these times.

A number of the above technologies have been employed as individual solutions but there is great potential to combine them as part of a structured response toolkit.

MEANS BY WHICH GOVERNMENT CAN PROMOTE THIS TECHNOLOGY

Government structure and procurement practice may be the biggest administrative challenges. Infrastructure assets tend to be managed by different agencies and across jurisdictions. Notwithstanding, smart ICT is best applied with a single overarching strategy across all infrastructure. This avoids duplication, ensures interoperability, maximises benefit of data and eliminates the waste of discrete point solutions. In major urban centres we would envisage centralised control rooms and OMCS with an overview of complete networks, resources and assets, which is a major shift from current arrangements but necessary for productivity to be maximised. This leads to the key question of whether State and Local Governments are the best placed parties to manage the future rollout of ICT for smart infrastructure. One alternative model would be for Government to partner with contracted parties to drive ICT rollouts and smart infrastructure applications with a commercial model whereby margins and profits are aligned to actual realised savings in Government’s actual budgets.

We note that success in the application of smart ICT requires collaboration and flexibility, as it involves a number of parties with diverse skill sets and the ability to flex as new technologies come to market. Street lighting PPPs from five years ago that locked in old technology and still have 20 years to run provide a good example of how long-term contracts need to provide for flexibility in the ICT world.

RECOMMENDATIONS

- Review suitability of current federal, state and local government structures for development of joined up implementation of ICT;
- Consider Government’s future role in the contracting of smart ICT infrastructure services and the provision of core services
- Review suitable procurement options that will engage the private sector and provide for collaboration and flexibility;
- Consider what change management frameworks are required to move Government employees from manual operations to a connected network of infrastructure (training implications, IR implications, infrastructure upgrade and renewal, and asset management);
- Review the use of GIS and other spatial information sources for data storage, analysis and presentation across all infrastructure assets;
- Review existing ICT solutions such as managed lighting, managed motorways and smart parking;
- Review current developments worldwide in smart cities and smart transport;
- Review lessons learnt in Christchurch and other cities which have recovered from major natural disasters or biosecurity outbreaks.

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