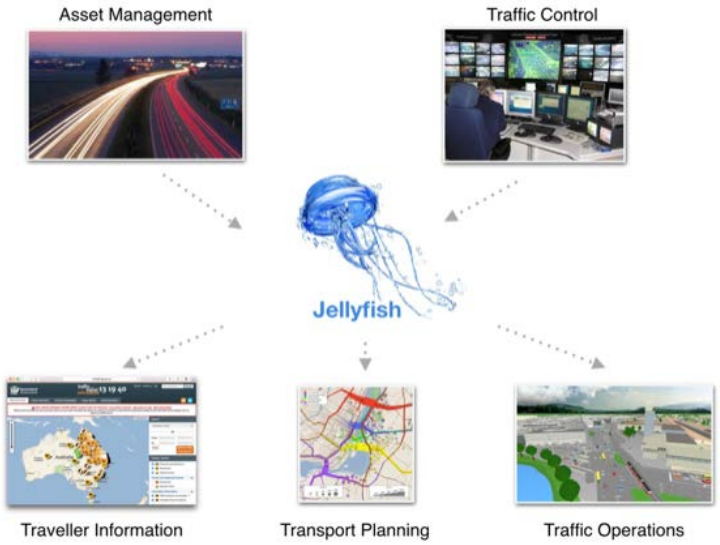
Submission to Inquiry into Smart ICT

Identifying innovative technology for the mapping, modelling, design and operation of infrastructure

The Smart Transport Research Centre at QUT, in collaboration with the Queensland Department of Transport and Main Roads, has developed *Jellyfish*, a data management framework for transport related data that provides a single point of truth for mapping, modelling, design and operation, in a way demonstrated by the image below.



Geo-spatially enabled data sets can be interrogated, overlaid and analysed to support decision-making from design to operation. Data sharing among all involved parties provides better, more accurate information, thus increasing the efficiency of infrastructure-related projects. The *Jellyfish* system is in use in Queensland as part of the preparations for the challenging transport task ahead of the 2018 Commonwealth Games.

Identifying the new capabilities smart ICT will provide

Limitations on storage capacity and computation power are becoming less and less relevant with the rise of cloud computing and cloud storage solutions. While Big Data is making headlines around the world, most data management systems of authorities dealing with infrastructure have not kept pace with today's technology. Utilising a model-free, spatially-enabled data management system unleashes new capabilities as it provides information to users within and outside of the authorities that was previously inaccessible. Ad hoc reporting, fact-based decision-making and innovation are only possible if knowledge about infrastructure is available programmatically and seamlessly. The *Jellyfish* system has not only provisioned its users with new functionality, but has opened the gate for third parties to develop against an open Advanced Programming Interface (API) that will accelerate developments and new capabilities.

Examining the productivity benefits of smart ICT

Enabling 'Big Data' interrogation has the potential to reduce efforts for modelling tasks by up to 40 per cent, which yields significant savings on projects. As data is held and managed by the owners, current information is available throughout departments for all purposes, including reporting, planning and modelling to 'real-time' traveller information.

Harmonising data formats and creating nationally consistent arrangements for data storage and access

Efforts to standardise data formats usually take a 'top down' approach and are guided by common industry requirements (ie applications). The problem arises when application-driven standardisation renders itself obsolete within a short time due to rapidly changing technology. Infrastructure is growing at a comparatively slower pace than technology and remains in place over decades. The *Jellyfish* approach of attaching data in a way that is descriptive way to the infrastructure (ie asset) allows generations of applications to interpret the information as required without jeopardising the usefulness of data stored. The existence of national performance indicators in transport demonstrates the need for harmonisation and highlights the costs that arise from antiquated systems that yield false or incomplete data sets. This can be eliminated through a simple paradigm shift and by storing asset data agnostic to application models.

Identifying international best practice in the use of smart ICT in the design and planning of infrastructure

Many efforts from standardisation committees are making headway in creating abstract data standards to fit all but, as mentioned, the approach of starting at the application level is preventing the effectiveness of standards in the short term and rendering them obsolete in the long term. Rapidly-changing technology requires responsive standards, and examples such as the General Transit Feed Specification from Google show that de-facto standards have the ability to regulate international data harmonisation without the need of lengthy ISO committee processes, if there is a real need. Trials of *Jellyfish* have shown a large acceptance with industry to adapt a non ISO standard, purely by solving a common and agreed problem - data access in transport.

Considering the use of smart ICT in related fields, such as disaster planning and remediation

Past disasters have highlighted the need for better information on infrastructure. Local events, such as cyclones in Northern Queensland, have shown that lag of knowledge on asset location (ie road signs) cripples recovery and makes planning more challenging than it should be. Better spatial data is able to show scenarios of floods (ie 3D modelling of infrastructure and terrain) that identifies infrastructure that may lie in the path of a cyclone, and provides information on household sizes for evacuation plans that is crucial and needs to be current. If standardisation of access to such information can be achieved, emergency service and authorities can plan for events faster and more reliably, even across State borders.

Considering means, including legislative and administrative action, by which government can promote this technology to increase economic productivity

Through establishment of a national data clearing house for infrastructure related data, government could promote harmonisation of data and pave the way even for smaller States to comply with it through reduction of costs. Infrastructure data should be government-owned and provided to 3rd parties; the way in which government considers purchasing such information from 3rd parties such as Google, HERE or others could be risky and lead to dependencies with unforeseen effect in the future. Data harmonisation is the task of the authority, and pursuing an application agnostic path would likely provide significant benefit for little investment.