



House of Representatives Standing Committee on Infrastructure, Transport and Cities
PO Box 6021
Parliament House
Canberra ACT 2600

10 February 2016

Dear Chairperson Alexander,

We are extremely grateful for the opportunity to respond via a public submission to the House of Representatives Standing Committee on Infrastructure, Transport and Cities, inquiry into the role of transport connectivity in stimulating development and economic activity both in major urban areas and regional Australia.

We understand the Committee wishes to inquire into and report upon the following terms of reference;

- a. Identifying the likely impact on property values and property-related tax revenues as a result of transport connectivity;
- b. examining options for the application of value-capture mechanisms to sustainably fund transport infrastructure;
- c. considering means, including legislative and administrative actions, by which government and the private sector can best utilise value-capture funding mechanisms;
- d. considering the appropriate roles of each of the three levels of government in establishment sustainable value-capture funding mechanisms for planning and infrastructure construction;
- e. examining any international experiences of the delivery of high speed rail projects by value-capture methods and the impact of high speed rail on city and regional development;
- f. examining methods of implementing value-capture in both greenfield and brownfield developments; and
- g. examining ways to capture future value opportunity when reserving transport corridors.

Autodesk's submission focuses on terms of reference (b), (e) and (f) in particular. In our submission we will discuss aspects of the global challenge in relation to planning and financing infrastructure projects. In addition, we will bring a different perspective by discussing the value that digital technologies, particularly 3D modeling, can offer in the planning, design, construction and operations phases, combined with a more sustainable way of delivering infrastructure.

Autodesk not only provides the tools for people who are solving complex design, engineering or sustainability challenges, but through our focus on industry wide initiatives such as reality capture, 3D modelling and methodologies (such as BIM), Autodesk has a unique and practical viewpoint on how to improve environmental, social and economic outcomes for large infrastructure projects. In our view, utilising digital technologies can generate significant cost and efficiency savings and enhance a project's appeal to prospective financiers. In this respect, our work complements value capture initiatives.

Autodesk believes that an intelligent 3D model based approach to infrastructure design is fundamental to the cost-effective planning, financing, delivery and operation of infrastructure projects and additionally can assist in unlocking value capture. This submission



summarises Autodesk's perspective on the role of digital technologies in supporting infrastructure financing and deployment, relevant global projects and initiatives that could assist in stimulating economic development in Australia. At Autodesk we remain available to provide further information or meet with officials face-to-face to follow up our submission in more detail at any time. We would be delighted to appear at a future public hearing of the Committee.

What is Value Capture?

Autodesk acknowledges that understanding of the value capture concept may vary between countries, and between State and Federal counterparts. As used in this submission, the definition of value capture is broadly the economic benefits generated by the planning and execution of transportation infrastructure projects, in addition it is important to note that for value capture as a funding mechanism for these infrastructure projects to be successful the revenue generated should exceed costs.

Australian Infrastructure Challenges

When addressing new financing models including value capture for major infrastructure projects, it is important to understand the context of which these infrastructure projects are being planned and built. Infrastructure globally is facing challenges around what is termed metatrends, that is global factors and forces influencing the way humans live and exist in the world around them. These forces and trends such as globalisation, an increase in urbanisation, access to capital and demands on energy consumption are changing not only questions around what types of infrastructure is being built but more importantly why. Australia is not immune to these forces. The Australian Bureau of Statistics announced in February 2016 that Australia's population has reached 24 million and by 2030 it is predicted to reach 30 million. Australia's infrastructure policies and planning will need to accommodate the needs of a nation that is highly urbanised.

Other major challenges Australia faces appear in the planning and construction of major building and infrastructure projects. These projects tend to be characterised by time delays and cost overruns.

This poor performance by the architectural, engineering and construction (AEC) industry is due to a variety of underlying causes including fragmented industry structures, adversarial contractual relationships, lack of collaboration within project teams, and poor management of project supply chains and information.

These challenges come at a time when new capital projects are critically needed to support the population of not only Australia but that of emerging populations and economies worldwide. Project delays and cost overruns put increased financial pressures on those charged with delivering capital projects. This is particularly true for infrastructure projects, where some estimate the gap between the demand for critical infrastructure and the capabilities to fund that demand is as much as US\$30 trillion globally.

To assist in closing this infrastructure funding gap, initiatives such as value capture could be considered viable. The additional value of connecting regional hubs and the creation of new regional hubs by means of rapid transport could serve as an ongoing revenue stream for all forms of government.

The Future of Infrastructure Design

Since the early 1980's the traditional planning, engineering, construction and delivery approach to infrastructure could be summed up as a series of disjointed engagements. Manual and non-digital processes have meant that costing, and thus funding, for projects contained an added and unnecessary risk to the project. Additionally, unforeseen factors such as lack of relevant and current information, poor community consultation and



externalities driving cost overruns made it very difficult to identify projects where value capture could easily be identified.

Today new technologies are assisting governments, designers and operators, not only to deliver more cost-effective infrastructure, but to identify opportunities to achieve value capture. Extensive use of 3D digital based design has replaced traditional design methods. These intelligent, 3D project models serve as the principal means for communication between project activities and collaboration between project teams, as well as the foundation for advanced analytics, simulation and visualisation to optimise designs to achieve desired outcomes. This model can be shared between the design team (architects, surveyors, civil and structural engineers), then handed to the main contractor and subcontractors, and finally the owner/operator. Each team adds discipline-specific data to the project model. This reduces information losses that traditionally occur when a new team takes 'ownership' of the project, and provides more extensive lifecycle information to owners.

Digital Infrastructure Benefits for Government

Currently, projects where intelligent digital modelling is used report significant project benefits, including reduced conflicts and changes, improved project quality, lower cost of planning approvals, and reduced timeframes for delivery of projects. This in turn assists in driving better delivery of services. The adoption of an open and collaborative engagement environment by government, stakeholders and contractors will greatly assist in driving efficiency.

The benefits of intelligent digital modelling or Digital Infrastructure (DI) for public capital projects and owners are compelling:

- **Cost and time savings:** Matching the experience of private sector owners, one of the main benefits of DI for government owners is reduction of costs and compression of schedules during the development and construction of a building or infrastructure project. The most significant savings can be gained during the construction phase, by reducing rework through clash detection and visual analysis of digital models. The result is a project that meets the budget, schedule, and needs of the government owner.
- **Transparency:** Because modern digital design processes contain such rich and accessible data, government stakeholders will have much greater visibility into how the project is evolving and being built. If the government owner is working with multiple contractors and design teams, this transparency can help ensure that all the stakeholders are coordinated and the project is on track.
- **Stakeholder and public acceptance:** Some government-driven projects, particularly infrastructure projects, can be very complex—with many different stakeholders and diverse public bodies keenly interested in the project. Digital based processes and model-based project visualisations can provide greater visibility for all those stakeholders, leading to greater understanding and acceptance of the project, and an easier approval process.
- **PPP attractiveness:** An increasing number of global Public Private Partnerships (PPP) financiers and donors are requiring the use of intelligent 3D digital modelling in their projects to ensure best value for their money, and to help clarify and stabilise the return on investment (ROI) they generate over the lifetime of a project. Therefore, a government that embraces digital modelling—be it through standards, policies, or mandates—is better able to attract potential partners and investors.
- **Operations and maintenance:** Cost savings during planning and construction are only one element of the entire lifecycle of a complex building or infrastructure project. When using DI for design and construction, teams can add data needed for operations and maintenance to the project models. Once the capital project is complete, government owners can utilise these data-rich models ongoing life-of-project savings through improved management of the physical asset throughout its



operating life of many decades.

Digital Infrastructure Funding Capabilities

Digital Infrastructure can also help governments improve their capacity to deliver building and infrastructure assets by getting more projects in the pipeline funded and approved.

Digital Infrastructure helps attract private investment by using model-based planning to predict performance (such as the traffic flow on a highway), simulate construction processes, and experience the asset in a digital environment. This provides greater predictability and clarity about the project—helping to increase confidence of potential investors.

To get more projects in the pipeline, governments must shorten the time needed to gain public support and regulatory approvals. Negative feedback from public stakeholders can stall projects and communicating with 2D paper plans often leads to even greater confusion and frustration. Model-based visualisations enable teams to generate compelling visualisations that helps the public ‘see’ the advantages of proposed projects at the early stages of the approvals process and avoid potential community engagement issues prior to construction.

Integrated Digital Infrastructure Planning

The planning process is meant to define community needs and determine what systems are required to fulfil those needs. This is a critical step in ensuring that infrastructure is delivered effectively, and requires balancing varying interests and priorities. This means carefully developing long-term capital budgets to include deferred maintenance projects and new investments that support growth, and funding projects that will help reduce vulnerabilities that regions may face as a result of natural or manmade events. An immense amount of information and data must be gathered, sorted, analysed, and understood in order to do this properly and make decisions that balance economic, social, and environmental needs. Using this data in a meaningful way to develop good land use policy is another key factor in unlocking value capture, in particular when applied to rail planning in and around proposed stations where land values are higher.

Digital Infrastructure supports this more holistic planning, design and delivery by enabling advanced modelling, visualisation, simulation, and analysis of proposed or existing systems. Planners can use an intelligent digital model-based approach to add sustainability, economic, and other community objectives to the infrastructure model, and therefore take into account (and optimise) these factors in an integrated fashion.

By using a digital approach, government officials and community stakeholders have an opportunity during the planning process to look at the ‘future community’ and consider how best to coordinate infrastructure systems, public facilities, and land use to maximise collective benefits.

Digital Infrastructure, Rail & Value Capture: an Example

Crossrail in the UK is currently Europe's largest infrastructure project. The project consists of approximately 120km of new rail line through central London including 21km of tunnelling works. The design and construction of Crossrail uses a digital approach or what is termed in the industry Building Information Modelling (BIM). The key driver for the use of digital design and construction is the complexity and sensitivity of the design through the brownfield boroughs of London. Such is the complexity that to date over 1 million digital design files have been created for the project. The key benefits in using these technologies as identified by the Crossrail Authority as similar to the ones already identified in this submission.



Value capture is also a key component to the successful funding of the project. The funding of Crossrail in part is being generated by a 2% increase in property tax to businesses in the affected corridor over a 24 year period. It is estimated that this increase will generate funds in the order of £4.1 billion. Due to the complexity of the Crossrail project and high cost of delivery, the decision was made to expand the value capture scheme to include all business properties throughout London¹. This is one example where digital infrastructure engineering and a positive value capture scheme have combined to deliver positive benefits for stakeholders.

Autodesk Company Overview

Autodesk is a world leading design software and services company, offering customers business solutions through powerful technology products and services. For 31 years, Autodesk has been the engine driving the design of nearly everything around us. With tens of millions of customers around the world, Autodesk makes tools for the people who are imagining, designing, and creating a better world. Our portfolio of software and apps empowers organisations of all sizes to help create the world's most compelling media and entertainment and solve the most complex global design, engineering and sustainability challenges.

Headquartered in San Rafael (near Silicon Valley in California, USA), Autodesk has approximately 8,000 employees worldwide. Our professional software products are sold globally, both directly to customers and through a network of resellers and distributors.

Our longstanding flagship product, AutoCAD software is a customisable and extensible computer- aided design (CAD) application for professional design, drafting, detailing and visualisation. AutoCAD software provides digital tools that can be used independently and in conjunction with other applications in fields ranging from construction to manufacturing, civil engineering and process plant design. Autodesk has over 12 million professional customers, over 100 million consumer customers, and is used by employees at every Fortune 500.

Yours sincerely,

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APAC Infrastructure Development

¹ Accelerating Infrastructure Delivery New Evidence from International Financial Institutions - World Economic Forum 2014
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