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Industry, Government & Academia – A relationship paradigm Fit for the future of Transport Infrastructure Assets....

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Abstract

By 2031 the population of NSW is expected to increase by 2 million. Almost 80% of growth will occur within the Sydney metropolitan area. This will place increased pressure on our transport infrastructure as customer demands for an effective and integrated transport system in and around Sydney grows.

The context for our unprecedented program of infrastructure build is clearly set. So too, is the imperative to develop our asset base responsibly to ensure we establish and maintain a legacy network that can serve the City and the State for generations to come – ensuring Sydney continues to be a great place to live, work and do business. The imperative to work smarter, to learn and to harness and deploy the knowledge and experience gained across the globe to our projects and our assets is set.

The Asset Standards Authority was created as part of the reform of the metropolitan rail system and has evolved to become a primary assurance vehicle providing technical and governance expertise and advice across Transport for NSW (TfNSW) as well as providing linkages to and access for industry. With a clear focus on ‘whole of life’ multi-mode transport infrastructure, the asset standards authority has led an unprecedented program of engagement centred on competency and capability development across the supply chain. In concert with this, the authority has developed focussed relationships with global academia and R&D entities - providing the ‘asset-owners’ perspective and drawing on the considerable intellect that the relationship offers.

The paper will describe the early evolution of the ASA’s role as an enabler of asset-focussed concepts and knowledge, innovation and R&D as part of a broader Industry Engagement task. It will draw on our experiences to date including industry acceptance and readiness and provide insight into our future direction geared towards incorporating the ‘knowledge business’ as BAU.

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1. Introduction

The Asset Standards Authority (ASA) is an independent unit within Transport for NSW (TfNSW) responsible for developing engineering governance, frameworks and standards to assure the safety and integrity of transport assets across their life. The scope of the enterprise is illustrated in the graphic below: -



Fig. 1. Transport network assets (TfNSW, 2016 (p2))

Reform has positioned the business within the new 'Freight, Strategy and Planning division' (itself the result of merging three divisions into one). The logic is to house ASA (as the standard-setter) with the policy and legislation advisors within TfNSW.

The ASA has established and deployed a significant programme of engagement with industry participants focussed on the primary objectives of enabling greater private sector participation in building and operating transport infrastructure while developing capacity and capability sufficient to resource a sector experiencing unprecedented growth. This is essentially an exercise in concurrent opening and growing of the market.

This paper details a number of the approaches and concepts deployed by the ASA on behalf of TfNSW to reform and refine industry capability and competency articulating the 'total asset management' concept including asset-life configuration control and life cycle costing which are central to the provision of 'fit for purpose' and sustainable transport infrastructure. In essence, much of the ASA's work centres around applying the academic and theoretical concepts of asset management in practice and providing interpretation and establishing the TfNSW position and expectation regarding effective asset stewardship.

2. Asset management and assurance

A central element of the ASA has been to establish foundational models and assumptions geared around assuring the transport asset base across its life and developing capabilities within the supply chain to develop self-assurance and within the procurers of infrastructure (primarily on behalf of the NSW Government) to develop ‘informed buyer’ capabilities.

One such foundational model is the TfNSW Asset Life-Cycle as shown below: -

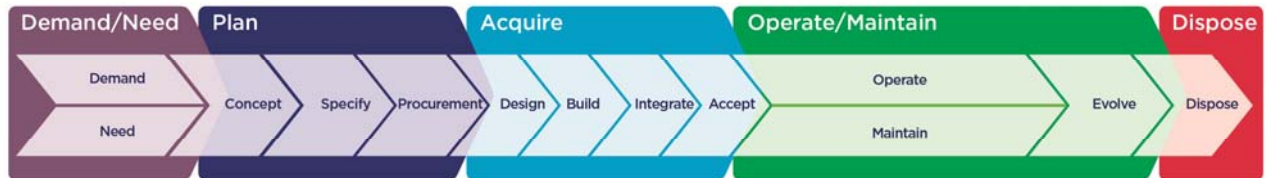


Fig. 2. TfNSW Asset Life Cycle Model

This model is applied as part of a broader asset management framework that aligns the organisation with the key elements of ISO 55001 – Asset Management.



Fig. 3. TfNSW Asset Management Framework Model

Much of the ASA-led engagement with industry participants has centred on defining a workable and practical model to represent the concept of assurance, as shown in the graphic below:



Fig. 4. TfNSW Progressive Assurance Model

It is notable that sustainability is presented as a key and integrated element of assurance. The concept of sustainability is presented by the ASA in discourse with industry against the dimensions of social, economic and environmental.

3. Addressing industry capability – Authorised Engineering Organisations (AEOs)

Transport for New South Wales works collaboratively with industry to improve engineering governance of transport projects and to utilise resources from both government and industry organisations to greatest effect. A key initiative to achieve this objective is to authorise engineering organisations to manage and assure the outcome-quality and resource-competence of their service provision on behalf of TfNSW.

The AEO authorisation requirements are a minimum set of standards set by the ASA to enable the AEOs to demonstrate assurance of their engineering services to TfNSW.

The model in Fig. 5.0 is a generic representative of the core business deliverables (transport outcomes) of TfNSW namely, integrated transport services and management of assets supporting the service concept and transport service levels.

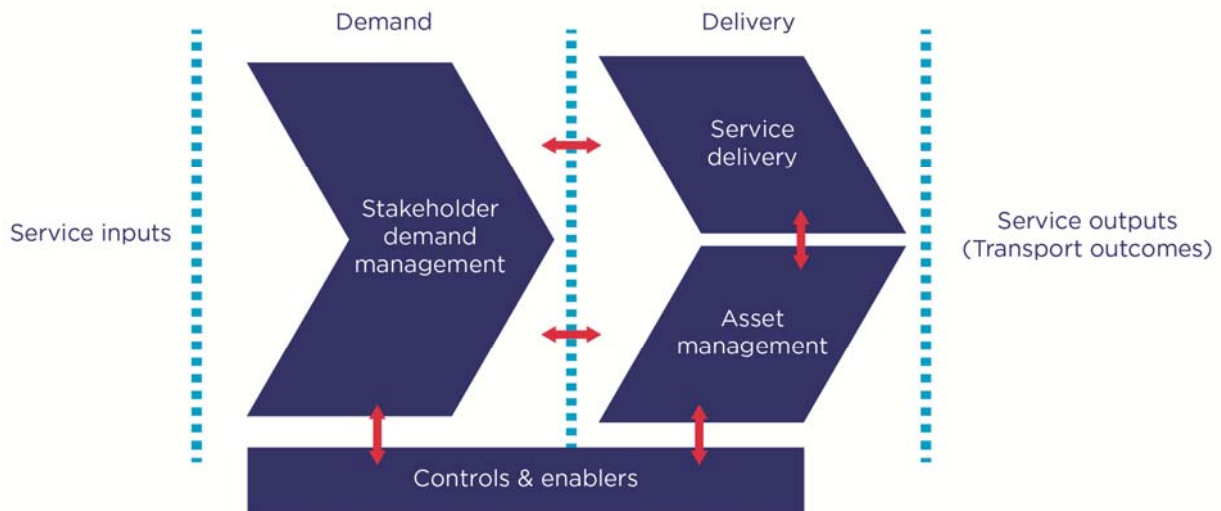


Fig. 5. Generic Services Delivery Model

4. Configuration Management

The ASA deploys a number of standards, procedures and guidance around setting minimum requirements for effecting asset change – whether adapting or enhancing the existing network or commissioning new infrastructure. This is essentially ‘change management’ for the network that calls upon all entities engaged in asset change to demonstrate, through assurance, that they have considered the whole of the life of the asset in making decisions and committing to the asset to a changed configuration. The gated process is as shown below:

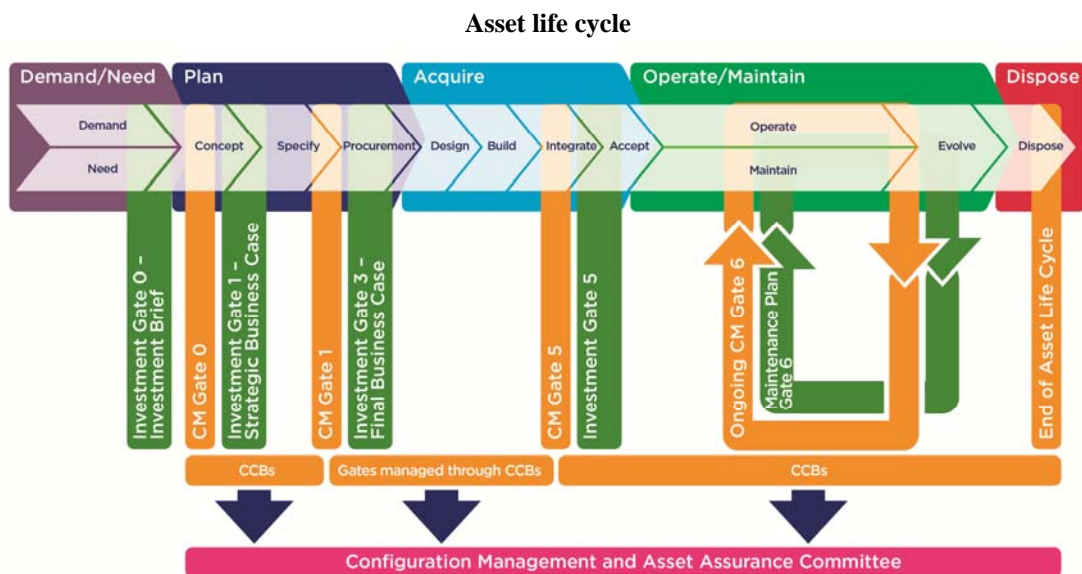


Fig. 6. TfNSW Configuration Management Process

Essentially, authorised engineering organisations (AEOs) are required to provide evidence to the appropriate Change Configuration Boards (CCBs) that, through an assured approach, they have met the requirements of both contract and asset. Recent developments of this model have included Gates 0 and 6 notably to inject additional rigour in the processes of asset-creation and asset-operation (monitoring). In the former, this presents a much needed focus on service demand and need before considering solutions. In the latter, this enables TfNSW to reflect on the results of investment to determine if the new asset-configuration is performing as designed.

Much of the ASA's messaging and communications around this model is in presenting this approach as a means by which we assure and ensure a sustainable asset outcome that can be evidenced socially, economically and environmentally.

5. Asset Lifecycle Costing

The ASA is committed to effective and efficient management of TfNSW assets. ASA is collaborating with government and non-government organisations to continuously improve capability, performance and condition over the full life cycle of the assets. In 2014, The ASA published T MU AM 01001 ST – Management Standard – Lifecycle Costing (TfNSW, 2014).

This standard defines the life cycle costing (LCC) requirements. It is essential that service providers (including consultants, designers, maintainers, manufacturers and so on, providing asset management related services for TfNSW) are able to demonstrate to TfNSW that physical assets are managed efficiently and that those assets will support service and project outcomes in the long term. LCC shall provide a framework for service providers in demonstrating the relationship between the performance of their physical asset portfolio and the services they deliver. Effective lifecycle costing enables the provision of high quality information that can be used as the basis for effective decision making. The attributes of this approach are as illustrated in the graphic below:



Fig. 7. Attributes of asset life cycle costing

This standard defines the LCC requirements (including frameworks) to substantiate asset investment and maintenance decisions supporting the asset management policies and strategies of TfNSW by those government and non-government organisations engaged in providing asset management services to TfNSW.

The LCC requirements and frameworks cover whole of life management of assets that include but are not limited to the following aspects:

- proposed capital projects
- asset type approvals or sub-component type approvals
- new asset proposals either within an existing system or a new system
- significant configuration and operational changes including changes in asset strategy
- changes during
 - the asset life cycle (such as changes in maintenance requirements), or
 - system requirement development (includes changes throughout the project development and construction phase)

LCC is most effectively applied in the project's early design phase to optimise the total development and maintenance costs. However, it should also be used during maintenance and operational phases of the life cycle to optimise maintenance strategies and facilitate efficient allocation of resources. Fig. 8.0 outlines the costs and stages of the life cycle.

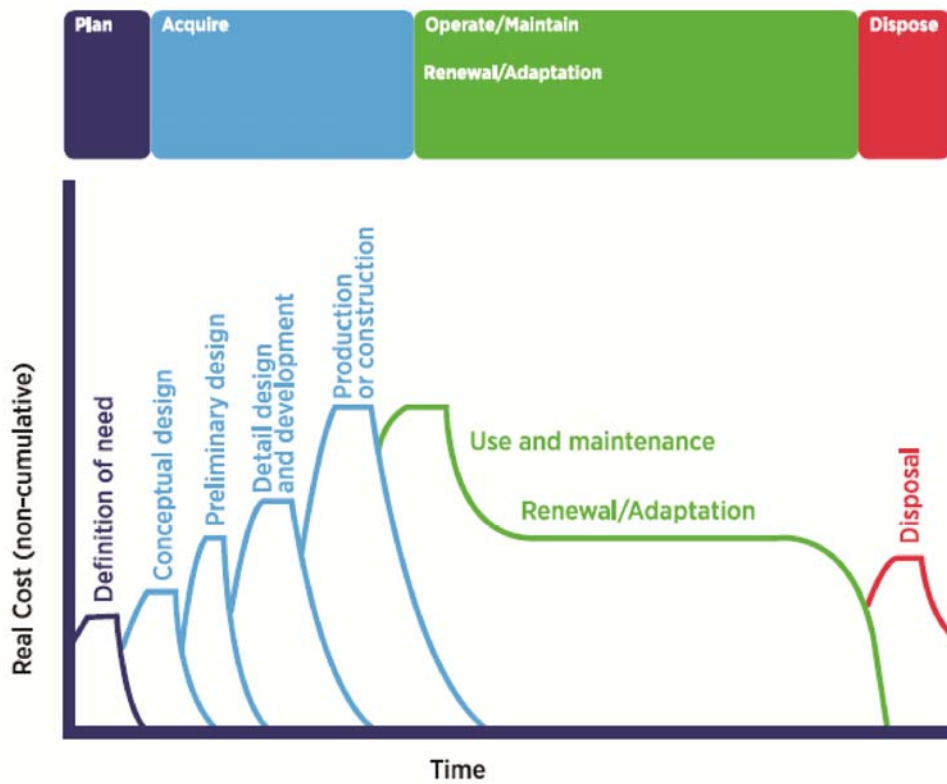


Fig. 8. Costs and stages of the life cycle (TfNSW, 2016 (p9))

6. Pulling it all together - Total Asset Management

Total Asset Management within TfNSW at a strategic level is achieved through the establishment of

- The TfNSW Asset Management Policy
- Asset Strategies
- Service and Operational Concepts
- Asset Management Plans (aligned with the corporate business plan)

The Total Asset Management concept is depicted in Fig. 9.0 The TfNSW total asset management system hierarchy is closely aligned with NSW Treasury's Total Asset Management (TAM) guidelines.

At program and project level the acquisition and utilisation of assets to support established service levels is achieved through third party engineering services' providers (AEOs) using a whole of life approach in most basic sense comprising of the 'design phase' 'construction phase' and 'maintenance and disposal phase' interventions engaged through contract.

From an Asset Management perspective, the various services provided by the AEOs could support any part of the Total Asset Management System hierarchy for example: An AEO could offer services relating to development of Asset Strategies and Asset Management Plans at strategic level for a comprehensive group of assets. At the Asset Lifecycle Activities' level contracted engagements are executed throughout the 'design phase', 'construction phase' or 'maintenance and disposal phase'.

Asset Lifecycle Activities for specific assets (indicated by the service scope of a prospective AEO) are assessed during the AEO authorisation assessment, in the following requirements' categories for a nominated project/work package:

1. engineering management
2. systems engineering
3. competence management
4. configuration management
5. quality management

The ASA assesses organisations for authorisation as an AEO and subsequently conducts annual surveillance audits on the authorised organisations on the above requirements' categories and the subsets there-off. The management, technical and support processes operationalising these requirements' categories may be incorporated by the AEO within a Business Management System or an Asset Management System based on ISO9001 - Quality Management System Standard or ISO55001 - Asset Management System Standard respectively.

In this way the ASA has established a means of linking contracted activities on transport infrastructure to the governing strategies for the network and furthermore, accounting for the capabilities of engaged entities at any stage in the asset life. This brings strategic, tactical and operational considerations and attributes together in the context of the provision of assured engineering services.

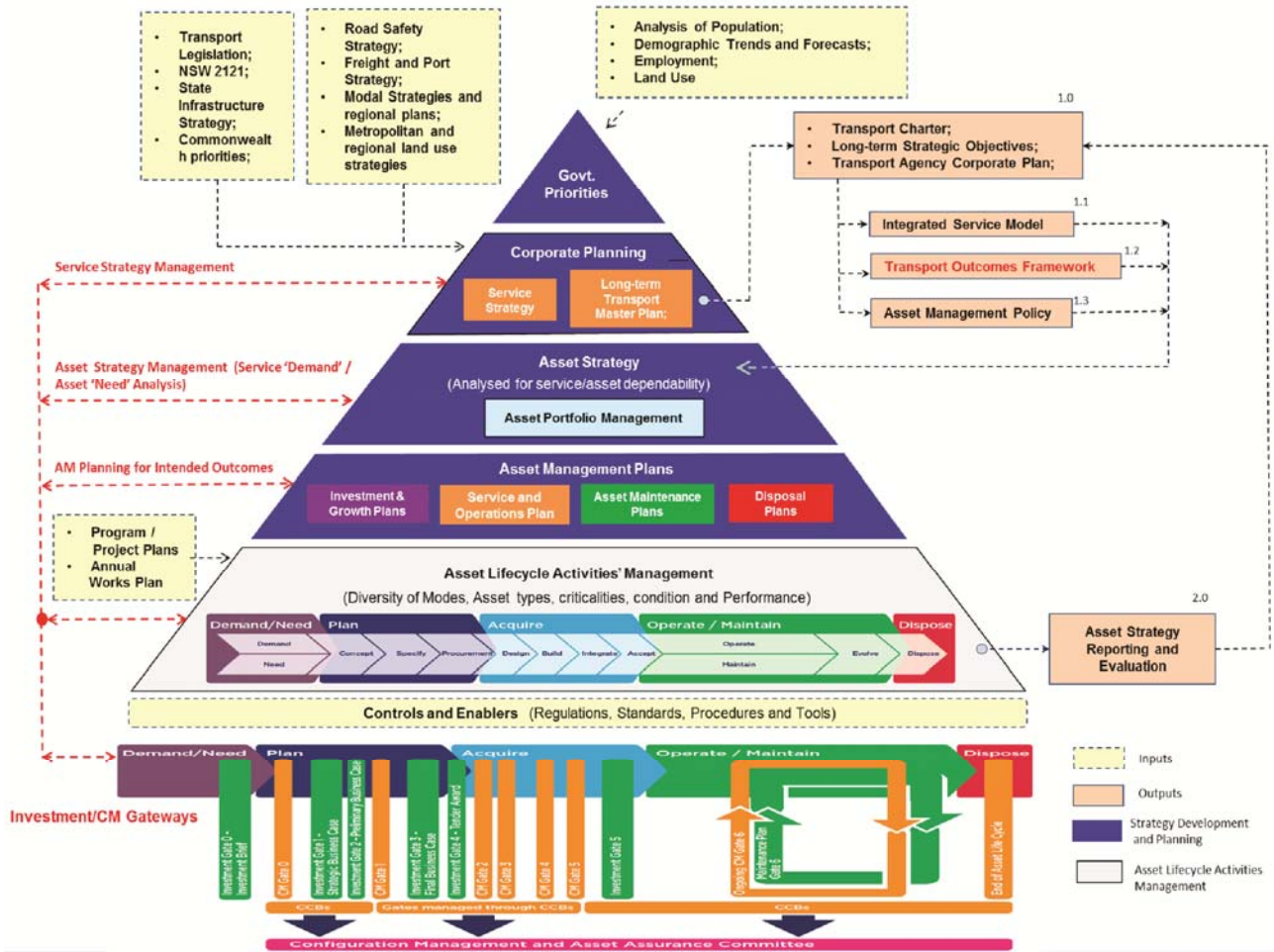


Fig. 9. Total asset management system hierarchy

7. Industry Engagement

The asset management framework and concepts described in this paper form the basis of dialogue and active engagement between Transport for NSW as the asset owner and industry participants and the wider stakeholder base. The engagement mechanisms that are deployed by the ASA and serve as the ‘platform’ for engagement to take place are as shown in Fig.10.0 below:

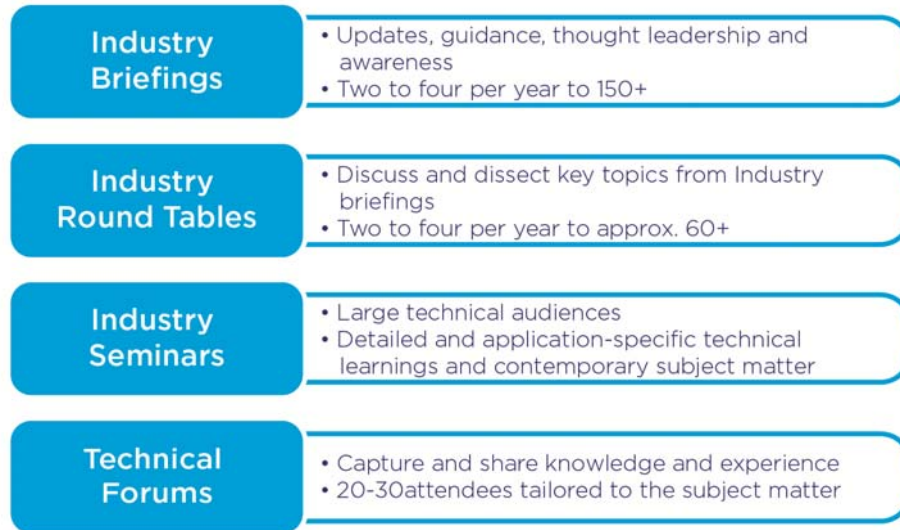


Fig.10. TfNSW Asset Standards Authority - Industry Engagement Mechanisms

For the most part, while our engagement activities are proactive and leading we have significant scope for better engaging the triadic relationship between Government (the policy makers), Industry (the practitioners) and Academia (the researchers).

Our progress to the ‘next level’ of engagement that centres on leveraging intellect and knowledge has started. Initiatives such as the 2016 ‘Future Transport Summit’ focussed on recognising sustainability as a primary challenge for the network – with a remit to protect and enhance transport assets and the environment within which they operate (See attachment 1)

A strategic approach to stewarding the transport network and effective ‘Enterprise Asset Management’ are clearly identified as primary means of responding to this challenge and are fundamental to changing the approach towards network sustainability to more effectively recognise and manage the social, economic and environmental dimensions that interact to create a transport network fit for the future.

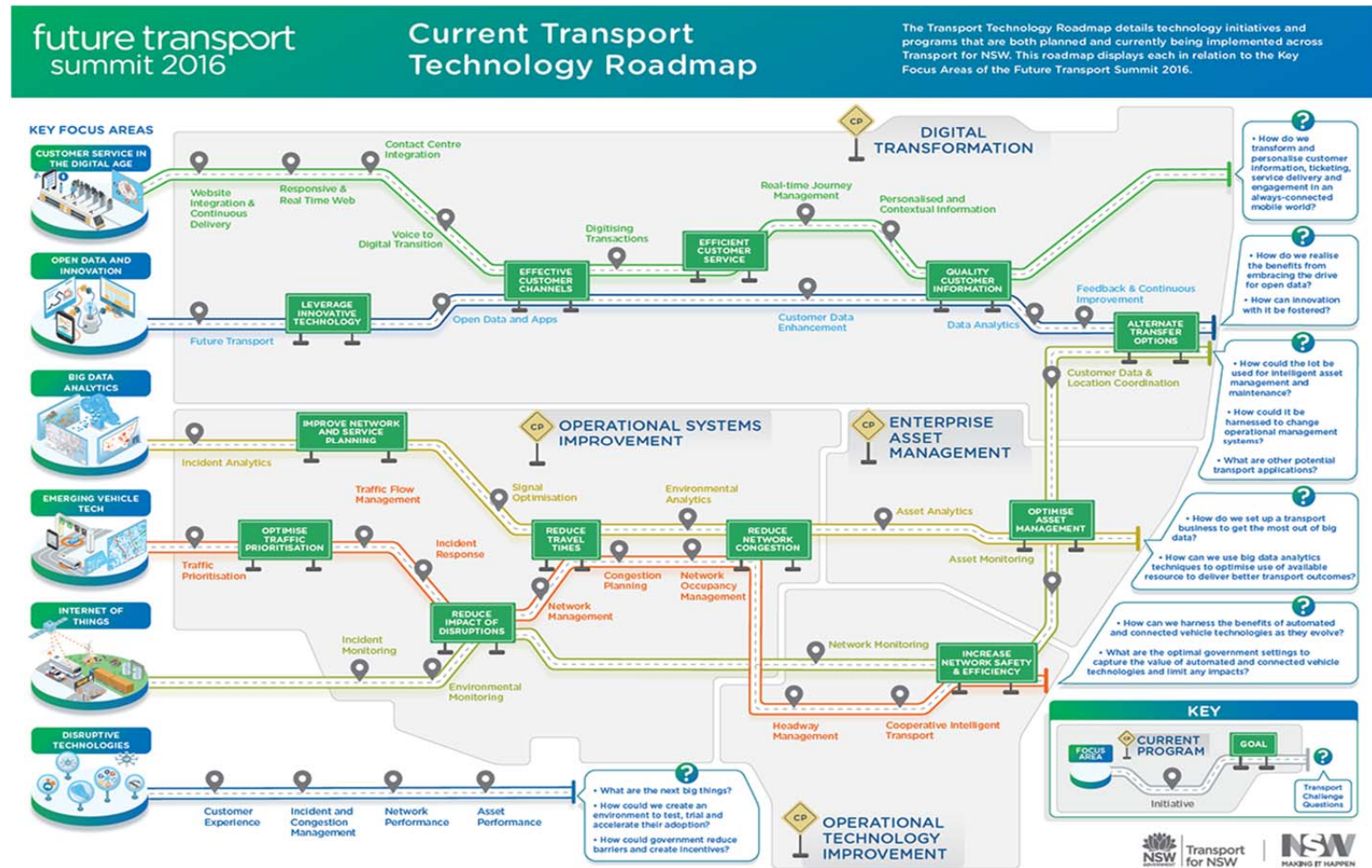
8. References

1. Transport for NSW (TfNSW). 2016. ASA Standard Presentation for External Use 4_3). Transport for NSW.
2. Transport for NSW (TfNSW). 2014. T MU AM 01001 ST – Management Standard – Life Cycle Costing. Accessed 21/06/16 : <http://www.asa.transport.nsw.gov.au/sites/default/files/asa/asa-standards/t-mu-am-01001-st.pdf>

Attachment #1

Future Transport Summit 2016 – Current Transport Technology Roadmap

Source: <https://future.transport.nsw.gov.au/focus-areas/>



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