AUSTROADS HARMONISING ASSET DATA STANDARDS

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Abstract

The Transportation Sector, like all sectors, is on the cusp of a massive technology-driven data revolution. The biggest challenge to this is our sector's ability to control and order our 'Master Data' and 'Business Data' – reserving the best of our time and efforts for the data we actually need for business.

Austroads' development of a metadata specification is a significant step forward towards a common data environment for defining Australasian road assets and asset components. The project requires validation of an effective Business Case for delivery to all state, territory and national members; setting the course for mutual high-value outcomes through cross-member and cross-partner consultation.

This paper provides details of what metadata is, the Strategic Business Case for an Australasian standard developed by Austroads and the potential impacts that the implementation of a standard could have for the future of the New Zealand Road Sector.

Introduction

Investment in data in all business sectors is booming! The Transportation Sector is no exception.

The world is realising the value potential from data, information and knowledge at an unprecedented pace. Open data platforms and open source technologies are proving informed decisions are no longer in the exclusive hands of executives, but in consumable forms for all customers.

What used to be a privilege is now a requirement. Informed governors used to work with asset analysis dashboards, now they need to consider customer requirements for security and safety to enable real time decisions for our customers' transportation choices. The volumes of data we are talking about today are huge – as transportation engineers, much more than we ever thought possible 20, 10 or even as little as 5 years ago.

Getting this data investment picture right is vital to making continuous improvement, as demonstrated in ISACA's[1] Information Cycle in Figure 1.

[1] As an independent, nonprofit, global association, ISACA engages in the development, adoption and use of globally accepted, industry-leading knowledge and practices for information systems. Previously known as the **Information Systems Audit and Control Association**, ISACA now goes by its acronym only, to reflect the broad range of IT governance professionals it serves.

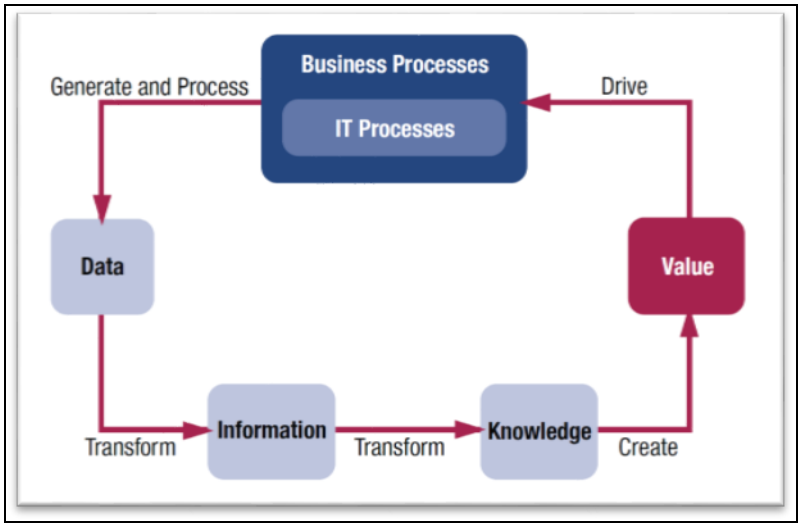


Figure 1: Figure 35 - COBIT 5 Metadata - Information Cycle

Ideally, generated processed data should be transformed into information, information can then be transformed into knowledge to create value that drives change in Business and IT processes – which then influences the design of datasets we choose to generate and process for the next cycle.

When we are generating the value we want from the data we are investing in, we will find ourselves making the most of our time, money and effort. If we are going to change our business and IT processes then we need some significant value and robust rationale to do that; we need trustworthy evidence, information and knowledge in front of us.

Data Types Explained

It is therefore little wonder that the order that we put our data in is very important to the way we invest in IT. The common phrase “garbage in, garbage out” is better phrased “high quality & high value in, high quality & high value out” for the purposes of this paper; from my experience, we only get good things out if we choose to invest well in the first place.

If the data we work with is well-scoped (for example: trustworthy, accurate, current) then we have much greater potential to generate high value information and knowledge. No better cause to be “well-scoped” than the Master Data and Business Data we work with every day.

Master Data (Figure 2) is defined as the consistent and uniform set of identifiers and extended attributes that describes the core entities of the enterprise including customers, prospects, citizens, suppliers, sites, hierarchies and chart of accounts (Gartner, 2015).

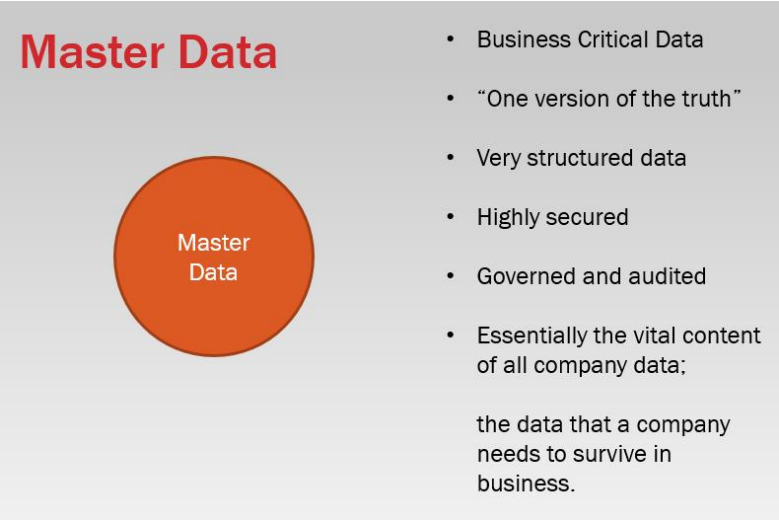


Figure 2: Definition of Master Data, "Big Data in the Transport Sector - An Overview" (Cross, 2015)

You will commonly find Master Data in business systems; for example: accounting, finance, human resources, enterprise resource planning (ERP), business process/practice systems, and intellectual property. It's the data that defines a business, and if mastered well, is a key store of consistent "one version of truth" data – registers of people, names, addresses, contact information, projects, and assets.

"Business Data" is a phrase I have formed that encapsulates the data that is important to a particular organisation's everyday internal activities, in order to differentiate it from Master Data or data sourced from outside the organisation.

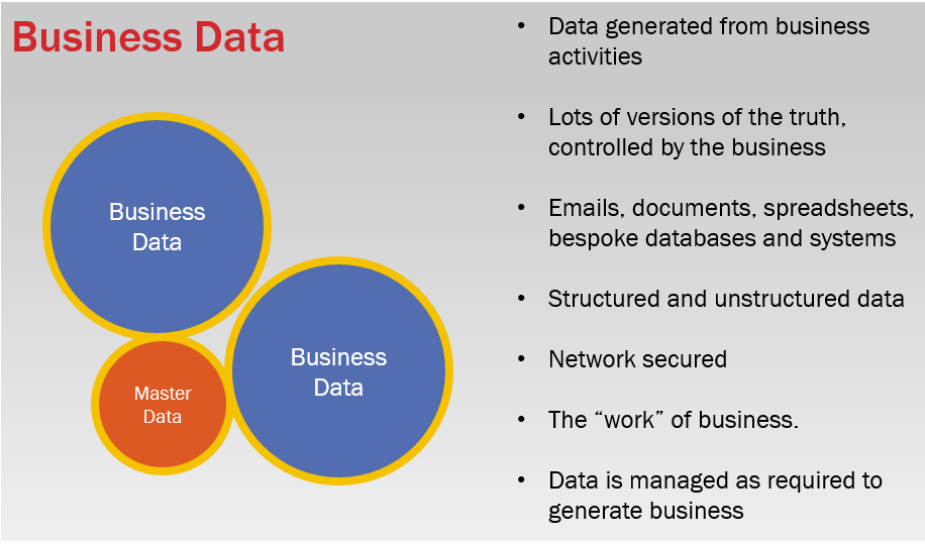


Figure 3: Definition of Business Data, "Big Data in the Transport Sector - An Overview" (Cross, 2015)

Typical business data will include data collected from a smart device or from a survey, project documentation, emails, books, spreadsheets. This data is essentially the product of applied business processes.

Business Data could be structured or unstructured, so is much less prescriptive than Master Data. We can pursue "one source of truth" from Business Data, but it is typically challenged by different business processes within different working groups, unless there is an agreed, common specification or standard that sets out what "well-scoped" data looks like.

This common specification/standard of well-scoped data is what we call Metadata, or the data that defines the data we hold interest in.

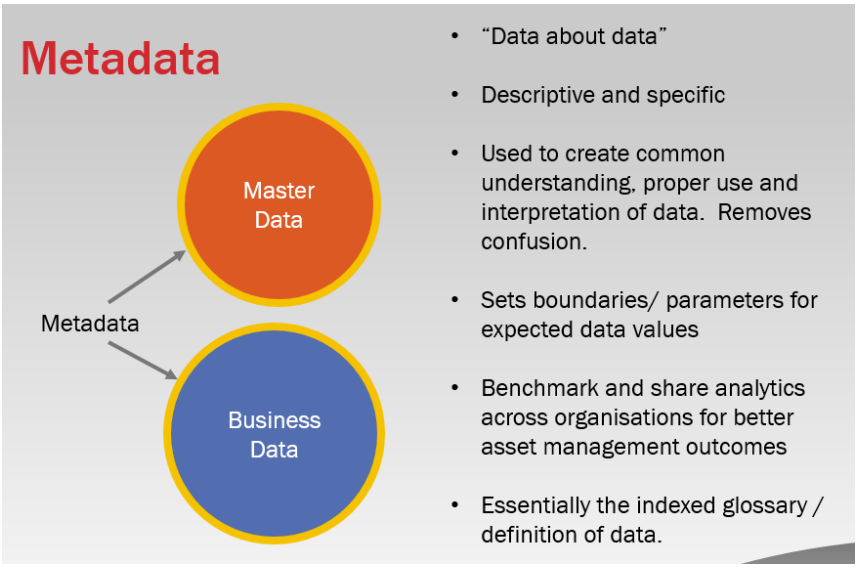


Figure 4: Definition of Metadata, "Big Data in the Transport Sector - An Overview" (Cross, 2015)

Effective corporate governance in organisations should make clear what Master Data is required for a sustainable business, through vision, objectives, and short and long term goals. So the Metadata required here tends to be reasonably simple.

Where metadata is needed most is in the Business Data we collect and use.

It's that data which can so quickly and easily blow out due to bespoke technology investment, or over scoped system solutions. Without a standard frame of reference it makes it very hard to achieve "well-scoped" data.

Current Technology Challenges, Commentary

For some years now, technology has driven the desire for change in the Road Sector. We need data to inform evidence-based decisions. Consequently, stakeholders demand an increasing quality of data.

Typically this has been dealt with in the sector by investing in bespoke data collection, storage and reporting technologies - often without a firm grasp of stakeholders' views of what they want out of the data until post-investment.

Increasingly, value is being found through integration or harmonisation of data in order to be better informed of trends or change of patterns on the network.

For example, travel time data on its own is very useful in accounting for customer journeys, but linking individual journeys with road use volume and road capacity data can then inform network productivity.

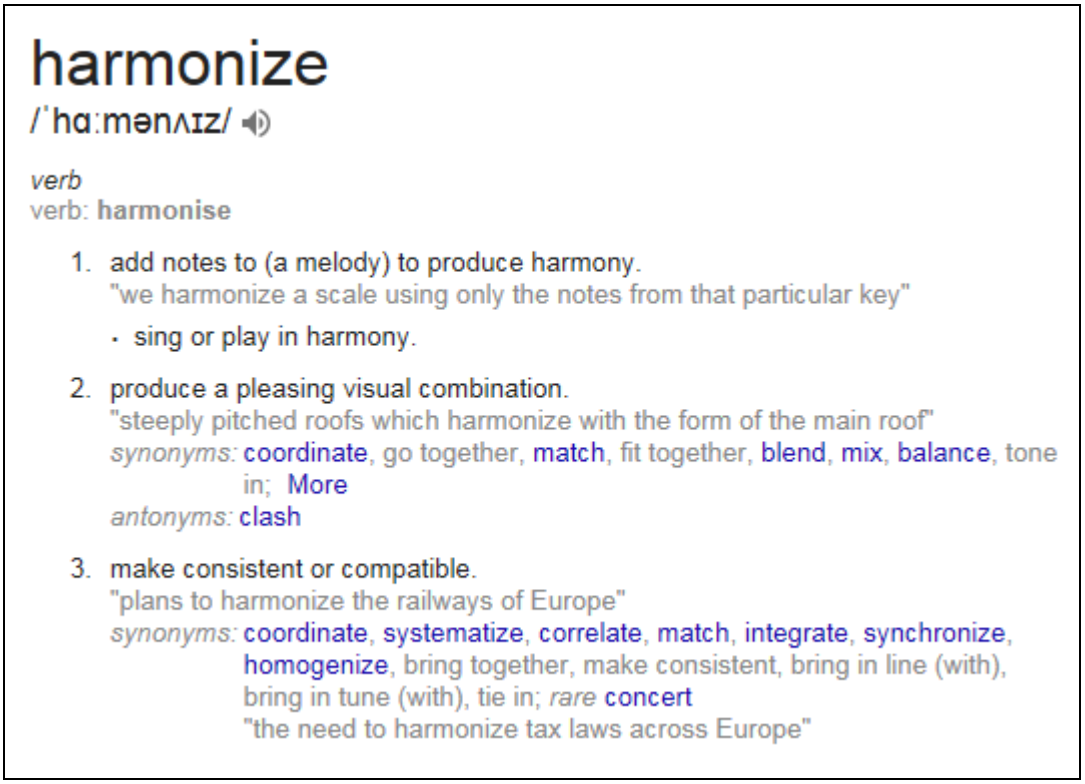
Add road maintenance records, road design, social media sources, weather information and call centre information and you have greater potential to understand particular causes of congestion, rather than making assumptions.

Essentially our sector needs the control to drive our technology future, rather than the technology dictating what can or cannot work.

A metadata standard will enable the sector to get the data it needs, and enable software vendors to focus more on the quality of their offerings in a competitive software market – which will be of immense benefit to the sector.

Austroads' decision to invest in harmonising asset data standards is a significant step forward towards securing a positive future for sector data and technology investment.

Harmonisation of Asset Data Standards



harmonize

/ˈhɑːmənʌɪz/

verb
verb: **harmonise**

1. add notes to (a melody) to produce harmony.
   "we harmonize a scale using only the notes from that particular key"
   - sing or play in harmony.
2. produce a pleasing visual combination.
   "steeply pitched roofs which harmonize with the form of the main roof"
   synonyms: coordinate, go together, match, fit together, blend, mix, balance, tone in; More
   antonyms: clash
3. make consistent or compatible.
   "plans to harmonize the railways of Europe"
   synonyms: coordinate, systematize, correlate, match, integrate, synchronize, homogenize, bring together, make consistent, bring in line (with), bring in tune (with), tie in; *rare* concert
   "the need to harmonize tax laws across Europe"

Figure 5: Google Definition for Harmonize, viewed 24 November 2015

Harmonisation is a word that resonates strongly for me personally.

As a musician, harmonisation holds true in the way I play and perform. I am a member of a band of musicians and singers that varies from one week to the next, but it is surprising that week in, week out, regardless of our musical ability, we can find a common chord of performance. When we find that groove of rhythm and tone, we sound brilliant! But we need to purposely align ourselves with a strong lead musician or singer. If we fail to play and sing strong, we can lose pace and the band struggles to keep together.

Similarly with the formation of a data standard, the need for leadership and ownership is vital to the initiative's success.

The following media release and information bulletin outlines Austroads' intent and planned direction for harmonising asset data standards:

Media Release (19/11/2015):

Road Data Harmonisation will improve practice and drive innovation

Austroads have commenced a new and ambitious project to establish a harmonised road asset data standard for use in Australia and New Zealand.

Project Manager Angus Draheim said "The project has been initiated in response to requests from stakeholders who increasingly need to share data with other road management agencies but are frustrated by the lack of common data standards."

"The project will deliver a recommended harmonised road data standard for core road asset management activities and a business case demonstrating the value of adopting the new standard. Austroads anticipates that once a model standard is provided road management agencies and councils will see the benefit and steadily work towards aligning their systems with it."

"A business case developed by Austroads in 2014 shows significant benefits and cost savings can be obtained by road management and governance agencies being able to readily share common data between each other. Benefits could include improved understanding of road assets, direct savings to agencies for data management and reporting, consistent and comparable data to support better government decision making and supporting new technology and transport innovation."

Road managers include national, state and local government agencies which each collect information to inform their asset management strategies and to determine expenditure priorities. The lack of a harmonised road asset data standards means that each road manager collects similar, yet slightly different, information. The minor but consequential differences in road asset data limit the comparability of asset information between road networks, and increases the costs of working across different road networks.

An example of an area where a common data standard is anticipated to be Heavy Vehicle road reform policy development where more reliable and consistent policy is dependent on having reliable and consistent information about the road network across jurisdictions.

Other types of data to be considered in the project include descriptions and locations of assets, maintenance activities and cost metrics, asset condition and performance and road classification. Opus International Consultants and GISSA (authors of "A Spec") have been appointed to deliver the project which will involve extensive research into existing data requirements and current practice. It will be developed in close consultation with local governments and road agencies in Australia and New Zealand. The project will take approximately 12 months to complete and the first stage involves gathering and reviewing information.

Information Bulletin (November 2015):

Competing priorities for government funds means that road agencies need to provide a safe and reliable road network with increasingly limited funds. Understanding how road assets perform, given changes to the use of the network through time, is crucial to ensure that road performance is not compromised.

Austroads has recognised the benefits associated with the establishment of a harmonised road asset data standard to support improved road management and investment decisions.

Acknowledging the substantial benefits to road managers, Austroads has recently awarded a consultancy to develop a Metadata Standard to Opus International Consultants (Opus), supported by GISSA.

It is expected that the greatest benefits are likely to be gained by local governments and third party suppliers. A harmonised road asset data standard will lower the costs of third parties developing and providing information to road managers, thereby lowering barriers to smaller road managers obtaining important asset management information. This will then give them access to insights on road assets to facilitate expenditure prioritisation and decision making.

A harmonised road data standard will facilitate communication between road managers and improve the comparability of road asset information across different road networks. The benefits from harmonising road asset data standards include:

- *an improved understanding of road asset performance – particularly for local councils – leading to better prioritisation of maintenance activities and investment decision making*
- *direct savings to road agencies and others from reduced information management costs*
- *consistent and comparable asset data to inform national initiatives, particularly for heavy vehicle*
- *road reform;*
- *consistent asset data to accommodate new technology and transport innovations; and*
- *facilitate alignment with ISO55001 International Asset Management standard*

The Metadata Standard will define information requirements for core road asset management activities. The following road data types will be covered:

- *inventory*
- *works and costs*
- *demand*
- *condition*
- *performance*
- *access*
- *classification and*
- *customer levels of service.*

Austroads will engage widely with stakeholders to develop the Metadata Standard. Impacts for key road agencies will be assessed and used to update the existing business case. A plan for the implementation of the new standard will be produced to inform the rolling out and ongoing maintenance of the standard.

Opus and GISSA have been commissioned to deliver the Metadata Standard, Impact Statements, revised Business Case and Implementation Plan to the Austroads Board in May 2016.

Benefits and Costs

HoustonKemp's Strategic Business Case (2015) provides the following benefits and costs (Table 1) to developing an Australasian Road Asset Metadata Standard:

Costs	Harmonising data standards
	Implementation
Direct Benefits	Reduced time/effort for data conversion requests
	Reduced staff training
	Improved communication in data collection
	Reduced cost of national research
	Reduced contractor bidding costs
Indirect Benefits	Better decision making
	Fast tracking reform
	Fast tracking technologies

Table 1: Benefits and Costs Detail

Opus has been brought on-board, amongst other things, to provide clarity on the Benefit Cost Ratio attached to this project, and verify and confirm the impacts from metadata standard investment.

Benefits for the New Zealand Road Sector

Each Austroads Member's scale of operation and IT investment varies, so we expect impacts to vary between all Austroads Members – and particularly within New Zealand due to differences in legislative policy, processes, practices and systems.

At the time of this paper's release, consultation has not been undertaken to determine precise *impacts for the NZ Transport Sector[2], but in consideration of perceived benefits from the Strategic* Case, we expect the following to occur for all Member Agencies:

Political

- Greater ease of policy development and reform.
- Focused governance, with better detailed information for governors to work with.

Economic

- Greater accountability for investment dollars spent, and Return on Investment.
- Greater ease in measuring financial metrics, including valuation.

Social

- Suppressed travel demand indicators
- Labour market benefits around improved inter-city transport accessibility
- Improved approaches to capturing/standardising public response data with transport assets

Technological

- More innovation, sourced across public and private information products and services
- Technology agnosticism, more market choice in a more competitive software market.
- The standard will enable the sector to influence a "Metadata standard compliant" requirement on fit-for-purpose asset management software.

Legal

- Clearer terms of reference

Environmental

- Better investment decisions that can consider environmental concerns and policy points.

[2] Findings from our Australasian consultation were not available at the time of this paper's publication. All effort will be made to provide confirmed details of New Zealand findings at conference time.

Conclusion

Austroads Metadata, if it becomes standard, will transform the way the Road Sector does business, and has the potential to influence other key transport network players to consider their asset and asset use data standards.

This is an important step forward towards New Zealand's future transport system:

We need better data and modelling capabilities

In order to inform a discussion on the future transport system for New Zealand, we need better information on the current system and its users. We also need to be able to test the effectiveness of changes to the system before making new investments.

The Ministry must grow its capacity to process and use information. Solid data and trend analysis is key to being able to provide good guidance to the government and we must continue to improve our skills in this area.

As a start to this, in these strategy projects, we have developed new models for demand, economics and revenue that will support the debate. These need to be taken forward and continually improved so that we can more effectively forecast changes, and also assess the implications of planned interventions.

Ministry of Transport Strategic Policy Programme, What have we learned? (Nov 2014)

Working with Austroads in support of a Road Asset Metadata Standard, New Zealand will benefit from:

- **Visibility / Transparency**, enabling NZ stakeholders to benchmark road asset data internally across all Road Authority stakeholders, and within Australia. To recognise holistically what is influencing key metrics, and master ways forward to improve future performance.

- **Consistency**, so NZ stakeholders can review past planning and investment decisions, and understand what we can do to improve decision process in the future. Better communicate network outcomes and operations with customers.

- **Collaboration**, the ability for people to work together across previously existing borders. Ease in considering investment across multiple NZ Road Authorities, rather than considering these in part with different qualities of data.

- **Order**, like a good library, road asset and asset use data will be indexed. Information will be much easier to source, so all NZ stakeholders including customers can proactively contribute to the decisions made for future use and investment in the transport network.

- **Strength and quality of decisions**, the ultimate action that will benefit New Zealand most. Better decisions will influence positive change in current and future road and road use investments, enable money to be spent effectively in the right places, and improve the quality of life for all New Zealanders.

The future is bright for our sector, and we should look forward to all that an Austroads Metadata will provide – now and in the future.

Acknowledgements

As Commercial Analysis Team Leader, I wish to acknowledge Austroads for the opportunity to analyse and promote this vital advancement in the sector's future technology and data investments.

I would also like to acknowledge the tremendous support that I receive from the NZ Transport Agency, and my colleagues and managers at Opus, who have all provided me with immeasurably valuable opportunities to connect and innovate with many brilliant people across our organisations, across the world, and deliver high value data solutions to the respective organisations and the Road Sector. I will be forever grateful.

And to my fellow musicians, keep up the harmonisation!!

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