

Road Asset Management (RAM) Training

10-13 August 2020

Session 2-2: Inventory and Condition Data

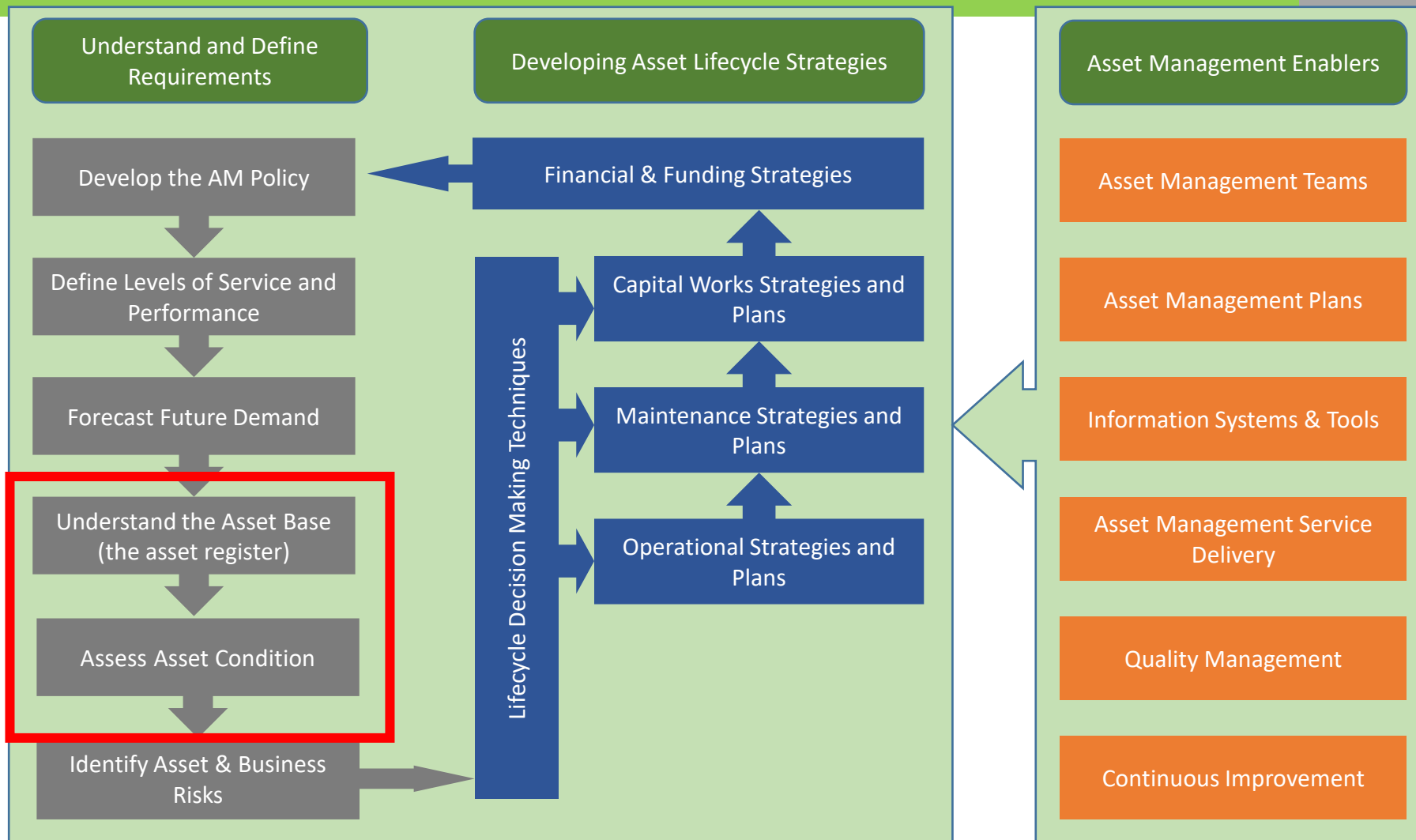
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Training Sessions

1. Introduction to Road Asset Management
2. Overview of the Components of RAM
3. Levels of Service and Performance Measures
- 4. Inventory and Condition Data**
5. Lifecycle Decisions Making and Funding
6. Asset Valuation
7. Asset Management Plans, Teams and Tools
8. Contracting Models and Impact on RAM

International Infrastructure Management Manual (IIMM) AM Process



- RAM involves the collection, storage and analysis of significant amounts of data
- The data in the asset data systems represent a significant investment by the in time and money
- Asset data are used for a variety of tasks throughout the Agency and its supply chain
 - From justifying funding requests, to allocating funds, to defending legal action.
- Therefore, we need to manage data as an asset it in its own right.

What Data Is Needed?

- Asset Register or Inventory (static until a change is made)
 - Unique identifier
 - What type of asset?
 - Where is it?
 - What materials is it made of?
 - When was it Constructed?
- Condition (changes over time and with works)
 - What condition is it in?
- Traffic (changes over time)
 - AADT
 - Axle loading
- Social service location information
 - Schools, hospitals, civil defence etc
- Geographic boundaries
- Other

What About Other Data?

- Emergency events
 - Location, size, duration of flooding
 - Location, size of landslides
 - Location, size, duration of snow storms
- Climate change information
 - Weather station data
- Traffic management information
 - Road closures
 - Approved traffic management plans
- Customer management
- Sometimes data only has a value once you have a time series of it
 - Useful to calibrate prediction models, and also to allocate risks in contracts

What is the data used for/Why collect it?

- Scheme Identification
- Risk Mitigation
- Works Planning
- Valuation of the Asset



Highways Agency (UK), ASSET INFORMATION GUIDELINES
Guidelines for the Management of Asset Information
Web Version 1.3 May 2009

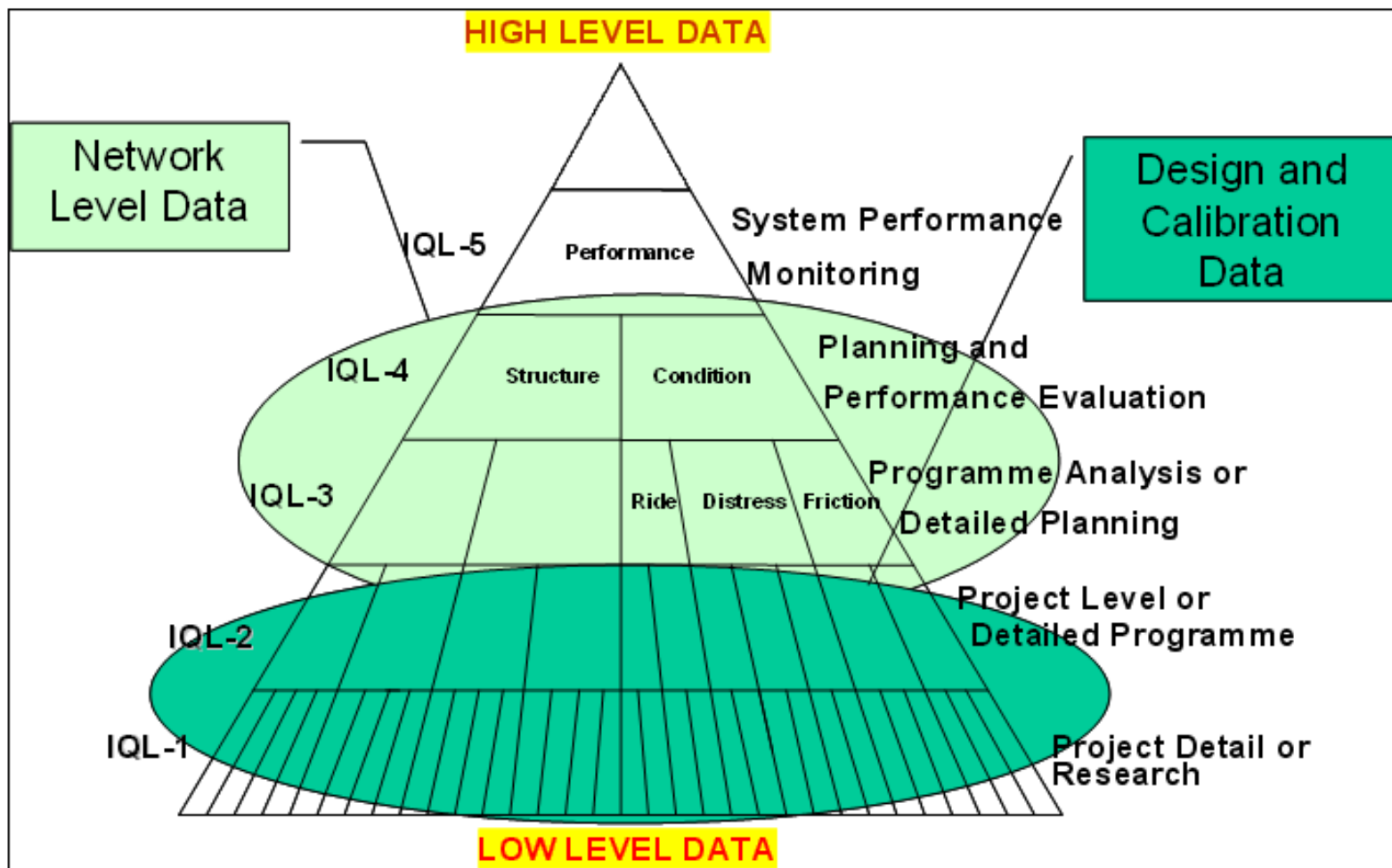
How Good Does Your Data Need to Be?

What is high quality data?

Data are of high quality "if they are fit for their intended uses in operations, decision making and planning"

(J.M. Juran).

Information Quality Level (IQL)



Can Vary IQL by Type or Frequency of Data Collection

- Example

- FWD at 500m centres every 3 years for planning purposes = IQL 4
- FWD at 25m centres for pavement design purposes = IQL 2
- FWD at 5m centres every 2 years for long term pavement performance calibration sites = IQL 1

- Example

- Visual inspection from a moving vehicle for low class roads = IQL 4
- Machine based laser/photo based system for high class roads = IQL 1-2

- So need to work back from the information need to determine the means of collection

- Just because you can collect IQL2 everywhere, doesn't mean you should.
- One road authority collects pavement photos every 2m, manually processes every 5th photo for planning purposes, then processes the rest for those sites where works are likely required. Saves time and money, without significantly impacting the quality of the decisions being made.

How do we collect data?

- Historic asset data records
 - Scheme asset data records
 - Inspections
 - Visual Surveys
 - Machine Surveys
-
- Can be collected in-house, but also plenty of data collection companies around the world

SCRIM



TRACS



Visual



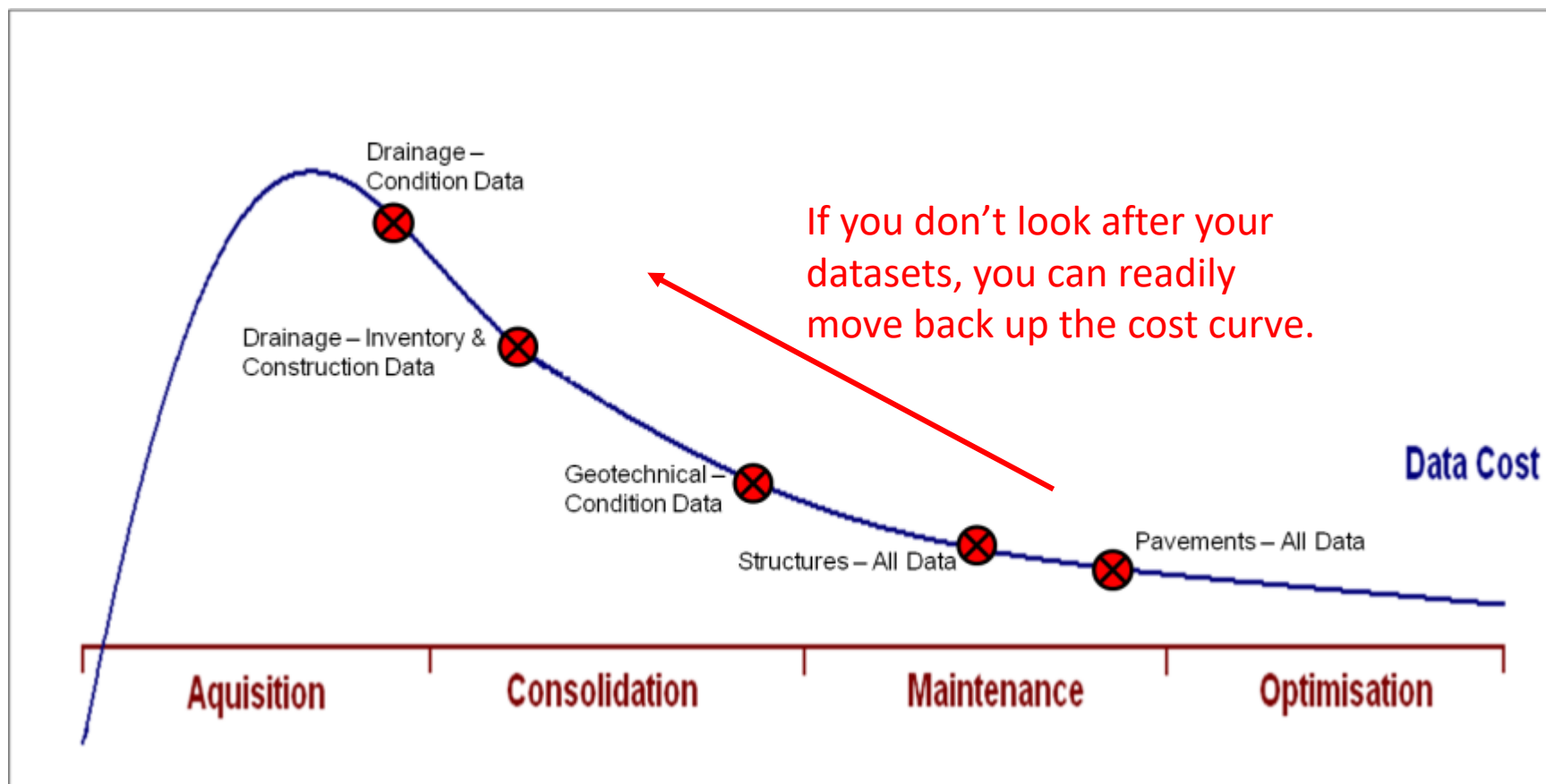
Where Do We Store the Data?

- Processed data goes into the Asset Management Information System (AMIS)
 - Typically modular systems – pavements, bridges, safety, traffic
 - GIS interface etc
 - Session 3-2 has more on AMIS
- What about the raw data files?
 - Traffic count data
 - Machine road condition surveys
 - Photos & videos
- Need to have a sound data management plan in place, or data sets can be corrupted with invalid or out-of-date information.

Asset Data Maturity

Maturity Stage	Description	Example Data Sets
Acquisition	Data records are being obtained therefore the number of records is rapidly rising and the initial capital costs of collecting and storing data may be high.	Signs Guardrails
Consolidation	Data are mostly complete and undergoing refinement and consistency checks. Data attributes and requirements are still being defined, but costs have reduced from initial outlay.	Geotechnical Drainage Traffic counts
Maintenance	Data inventory are fit for purpose and routine updates are part of business as usual. Data costs have stabilised.	Structures
Optimisation	Data inventory are fit for purpose and is being regularly reviewed for compliance with requirements and the benefits of all data collected. Costs may be reducing as maintenance processes become more developed and effective.	Pavements

Asset Data Maturity vs Cost Graph



What is Data Governance?

Data Governance is;

- a **system** of decision rights and accountabilities for information (data) related **processes**,
- executed according to **agreed-upon models** which describe who can take what actions with what information,
- when,
- under what circumstances,
- and using what **methods**

The Data Governance Institute: The DGI Data Governance Framework

- As data are often used for multiple purposes within the road authority, need a clear governance structure to ensure:
 - Data is collected once
 - Data meets the needs of all users
 - Limitations on accuracy are understood by all users

Example Roles and Responsibilities in Data Governance

- Executive Sponsor
 - Executive sponsorship of the ADM processes and manual
 - Executive responsibility for asset data quality
 - Executive responsibility for internal and external publication of asset data
 - Executive ownership of the strategic risks associated with asset data to the road authority
- Senior Responsible Owner
 - Senior management ownership of the ADM process
 - Provide senior asset data stewardship
 - Chair the Data Governance Board
 - Provide strategic direction for asset data management
 - Ensures that the ADM process is meeting its objectives and is delivering the projected benefits
 - Ensuring that reviews of the ADM process are carried out at appropriate stages
 - Broker relationships with stakeholders within and outside the road authority
 - Monitor and control progress of the ADM process and the maturity of Data Governance

Example Data Governance Board

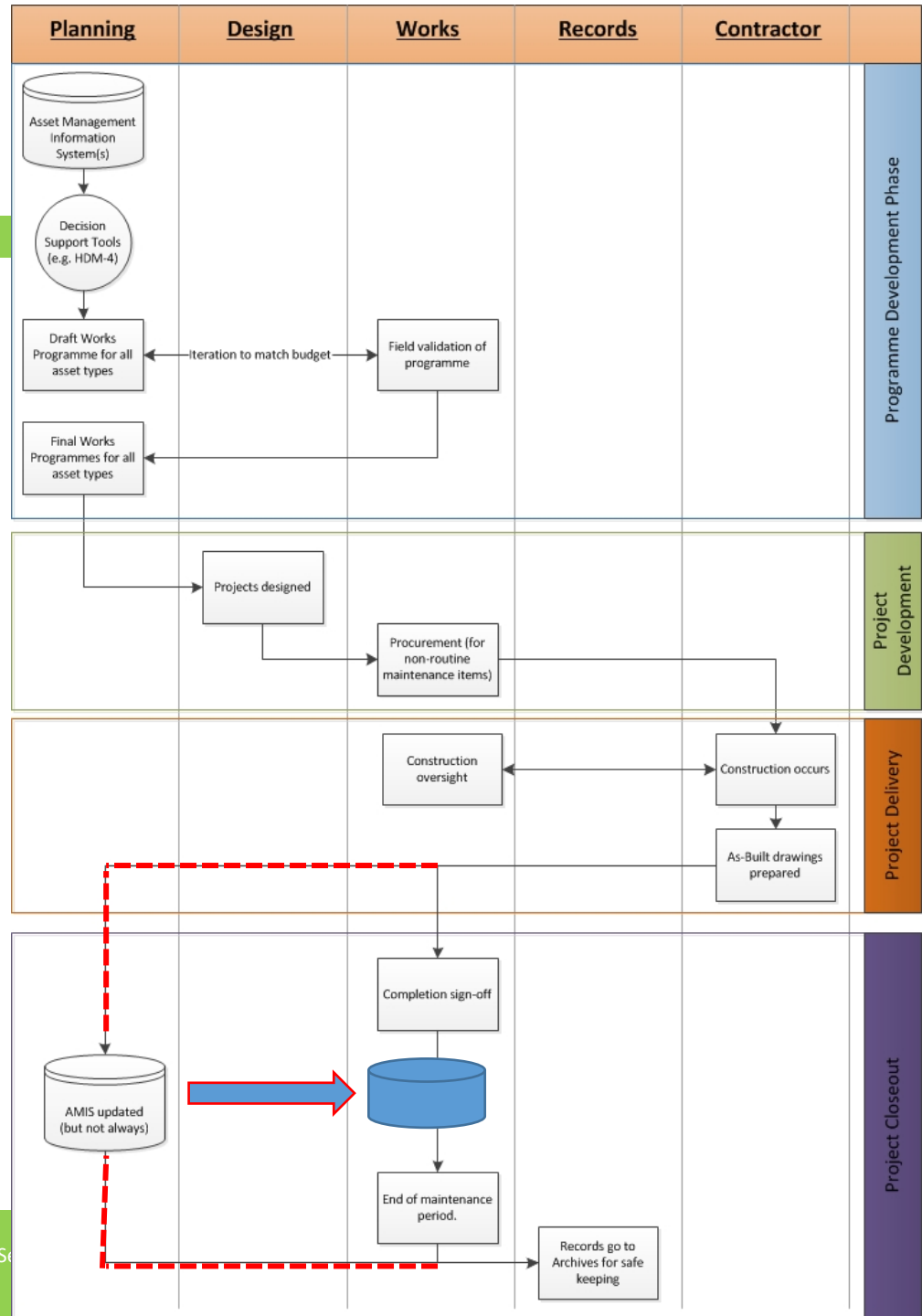
- Ownership of
 - the Asset Data Management (ADM) process
 - the Asset Data Management Manual (ADMM)
- Ensure that all business requirements for data are considered (Strategic, Tactical & Operational)
- Provide sign off for proposed asset data management projects
- Setting the asset data management strategic direction
- Administration of the asset data management policy change control
- Setting access rights and approved uses of asset data within the road authority and its supply chain
- Setting access rights and approved uses of asset data to outside organisations and persons
- Setting required asset data quality levels
- Tracking
 - Asset data use
 - Asset data quality
- Assuring legal and organisational compliance
- Prioritising asset data projects

As-Built Data, Not Just As-Built Drawings

- Drawings and reports are useful, but ultimately information in them is difficult to access and of limited value
- Need to get the information off the drawings and out of the reports, and into the AMIS
- Most AMIS systems enable importing of Excel or similar file formats for updates
- Part of any works (in-house or outsourced) must be the provision of updated data sets
- Ideally bring the asset data team into the signing off of works
 - Include a reasonably large retention on data to ensure it is provided

Example

- Many road authorities have a good process to:
 - Identify works that are needed
 - Deliver those works
 - Collect as-built drawings
- But are weak at ensuring the AMIS is updated
 - Often sitting with a different team



New Zealand Asset Management Data Standard (AMDS)

- Jointly developed between NZTA and Road Efficiency Group (REG)
- <https://www.nzta.govt.nz/roads-and-rail/asset-management-data-standard/#:~:text=The%20Asset%20Management%20Data%20Standard,assets%20%E2%80%93%20our%20roads%2C%20highways%2C>



The current release of the AMDS, has draft technical specifications, and contextual data for the following four asset types:

- Pavement and surfacing
- Poles and gantries
- Signs
- Barriers.

Purpose of the AMDS



This Asset Management Data Standard (AMDS) provides a basis for a consistent, integrated approach to establishing data standardisation for land transport asset data management.

It is inefficient, counter-productive and ultimately unsustainable to continue to develop individual solutions to improve the management of asset management data. **Consistent, reliable, and shareable information for land transport assets, across the whole value chain and lifecycle, is a key outcome of public investment in infrastructure**, and enables:

1. Long-term cost savings in delivery, maintenance, and operation of the transport system through the systematic use of well-structured, consistent, and high-quality data, information analysis and reporting which minimises the risk of service disruption to customers.
2. Improved delivery of appropriate customer levels of service through the proactive use of asset intelligence to inform transport-based asset information.
3. A clearer linkage between transport asset levels of service and customer outcomes provides for more-efficient investment decision making.

Purpose of the AMDS ...



- The purpose of implementing the AMDS is that land transport asset data:
- Is easily shared within organisations and reliably exchanged between organisations, so that decision makers can access to, and confidently use all relevant information wherever they are, whenever they want it, from whoever provided it.
 - Can be sustainably accessed throughout the entire life and use of an asset, and beyond its use where applicable.
 - Is managed in a way that meets asset owners' legislative obligations and can be easily used for reporting and analytical purposes.

The standard provides technical specifications for managing digital information on any land transport asset in line with Waka Kotahi funding obligations as defined in the Land Transport Management Act 20031 .

Benefits of AMDS

- Adopting this standard will increase the efficiency of information access, and result in greater effectiveness when dealing with inquiries from engineering consultants, surveyors, developers, and asset managers by:
 - **Improving the quality** – of land transport asset information held in council, utility and road controlling authority systems for audit and financial requirements, as well as operational and business requirements. Includes identifying relevant assets in private ownership.
 - **Establishing data consistency** – consistent and comparable recording of all asset data owned by councils, utilities and road controlling authorities, including those created through internal programmes such as capital works and renewals.
 - **Eliminating duplication of effort** – significant duplication exists in the digitising of as-constructed/as-built information. This duplication occurs between the private sector (which captures as-constructed/as-built information) and council, utility and road controlling authority staff (who may digitise that information from paper plans).
 - **Improving process efficiency** – in data processing, making it easy to find and process data for asset management operations and practice. Standardised repeatable processes with consistent, trustworthy data will enable streamlined and effective service provision.
 - **Improving customer service** - through improved speed and quality of delivery of asset information to both internal and external customers.
 - **Better managing assets** to reduce the need for capital works and/or to reduce ongoing maintenance costs. Having an ‘end-to-end’ national overview of the land transport asset fleet to make evidence-based informed investment choices for NZ Inc.
 - **Enable Innovation** – having the consistent high-quality information to be able to employ new innovative products and methodologies to drive greater service provision and investment choice, e.g. LiDAR capture and multidimensional modelling of the land transport corridor.

New Zealand AMDS Example

Title	Description	Download
AMDS Standard	Purpose and scope, sets out the high level overview and context.	[PDF, 2.8 MB]
AMDS Technical Specifications and Design Schema Handbook	Design principles and concepts, sets out the high-level design principles, models, and concepts.	[PDF, 663 KB]
Data model in RDF/XML format	Model name: AMDS – 0.1 – 2020-07-30	[ZIP, 509 KB]
AMDS Data model in Turtle/RDF format	Model name: AMDS – 0.1 – 2020-07-30	[ZIP, 607 KB]
Entity – hierarchical	Entity – hierarchical report with details in JSON format	[ZIP, 113 KB]
Entity – hierarchical	Entity – hierarchical report with details in CSV format	[ZIP, 103 KB]
Control – hierarchical	Control – hierarchical report with details in JSON format	[ZIP, 46 KB]
Control – hierarchical	Control – hierarchical report with details in CSV format	[ZIP, 40 KB]
Asset – hierarchical	Asset – hierarchical report with details in JSON format	[ZIP, 2 KB]
Asset – hierarchical	Asset – hierarchical report with details in CSV format	[ZIP, 2 KB]

Summary

- Data is an important part of RAM
- But it can also be a costly part of RAM
 - Both time and money
 - Easy to lose confidence in data sets, harder to get it back
- Need to consider the IQL of all data sets
- Need a clear governance arrangement around data
 - Manage it as a key asset of the road authority
 - Data standards are essential
- Ensure you are getting as-built data, not just as-built drawings
 - And ensure that data gets into the AMIS

Questions?