MANAGING DATA AS AN ASSET

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AGENDA

1. Context:

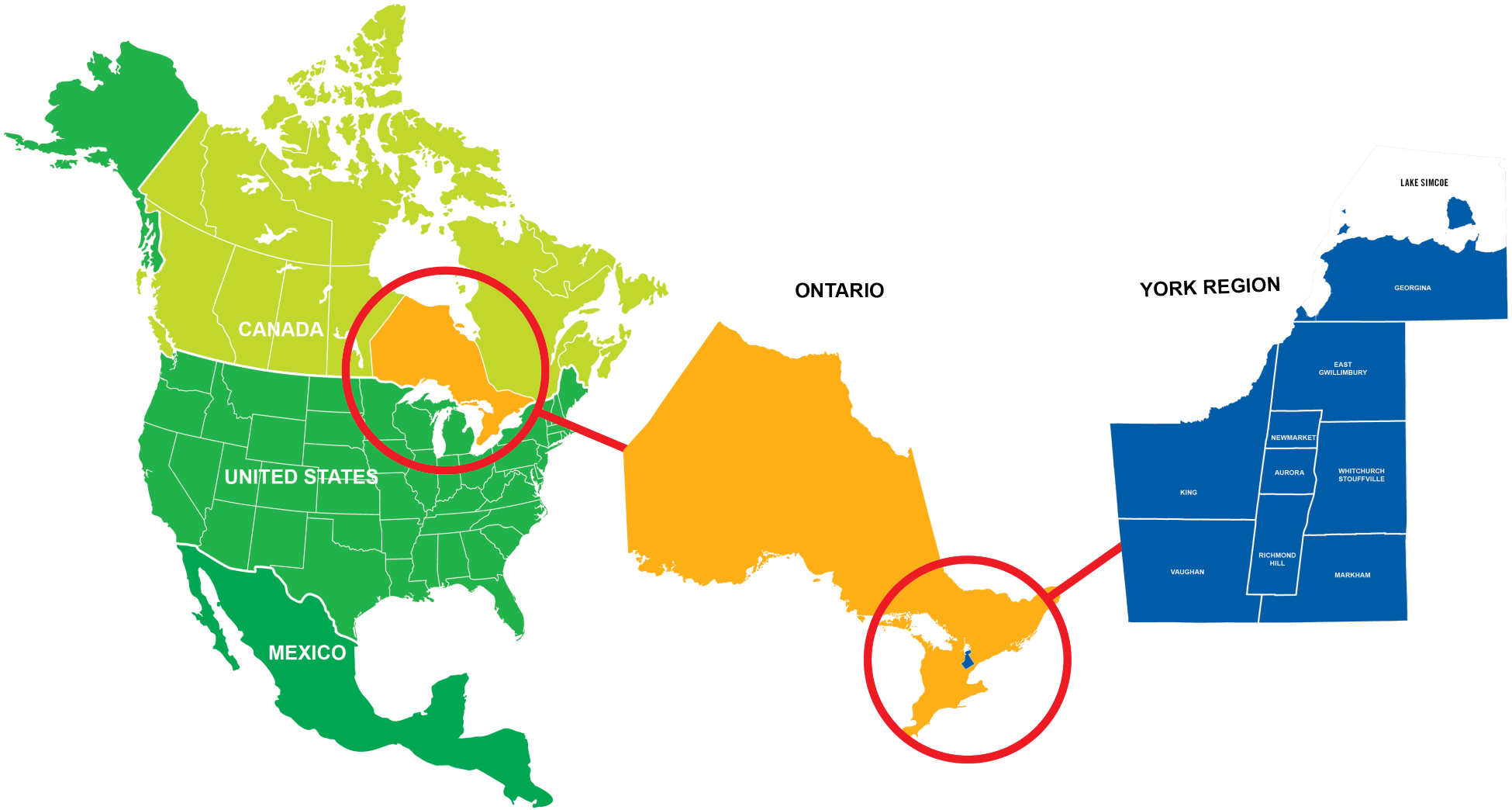
   Asset Management at York Region

2. Transportation Data Asset Management Plan
   - State of Asset Data
   - Levels of Service
   - Future Demand
   - Risk Management
   - Lifecycle Strategy
   - Financial Strategy
   - Improvement Plan

ASSET MANAGEMENT AT YORK REGION

WHERE IS YORK REGION?

Located just north of Toronto, Ontario



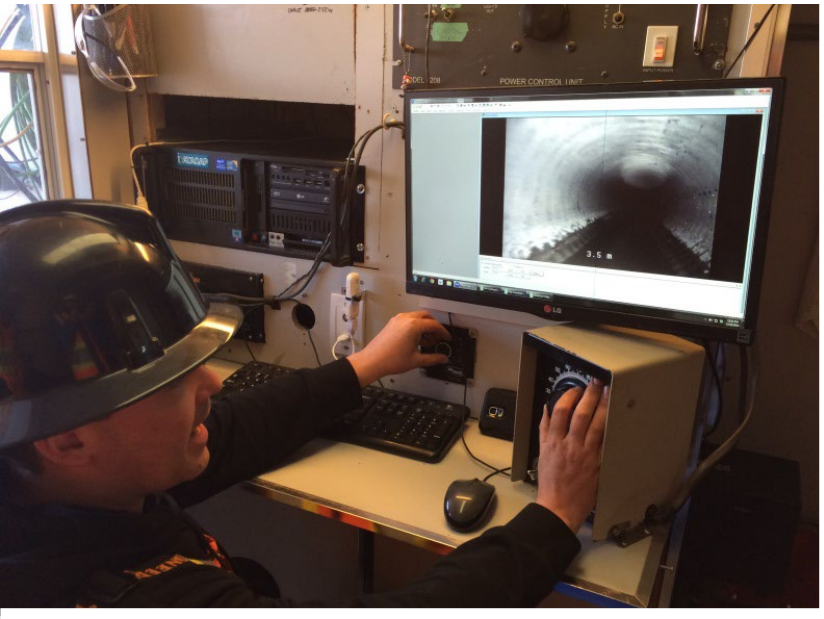
COUNCIL LONG-TERM INVESTMENT

PERFORMANCE MANAGEMENT

“Performance Management is an umbrella term that describes
the methodologies, metrics, process and systems used
to monitor and manage the business performance of an organization.”
(Gartner.com)

PERFORMANCE MEASUREMENT TYPES

DATA INVESTMENT



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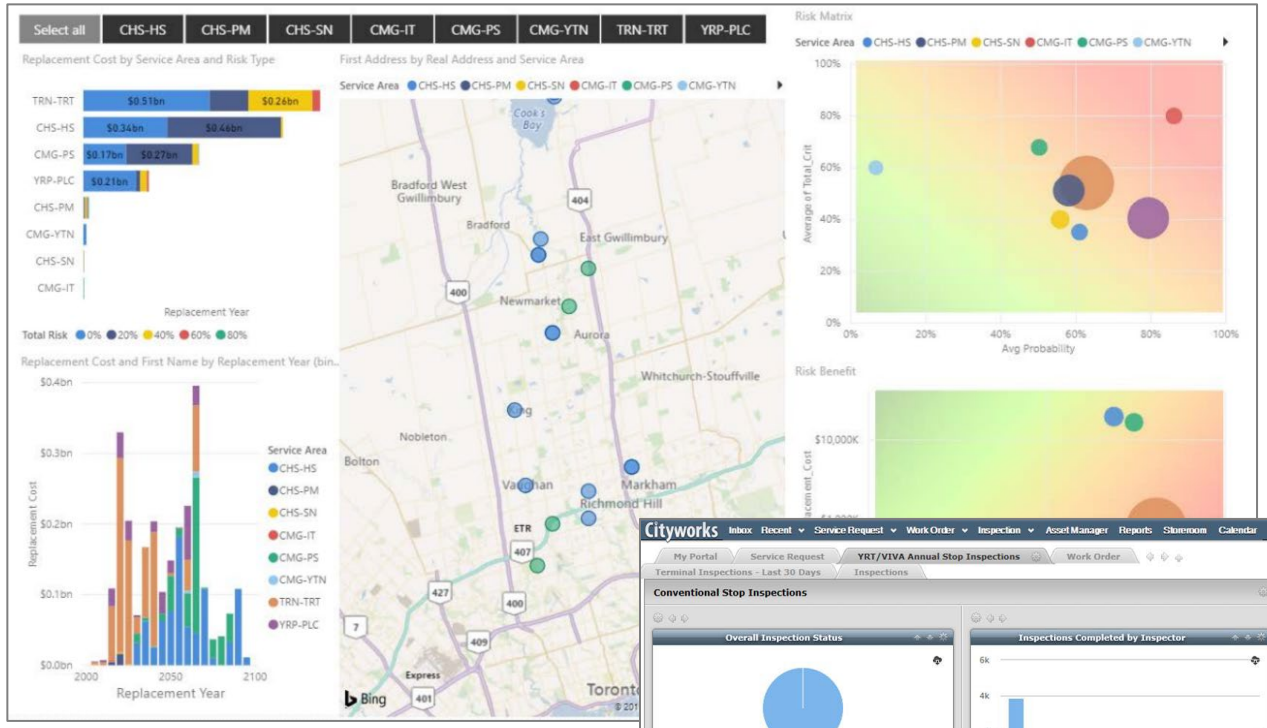
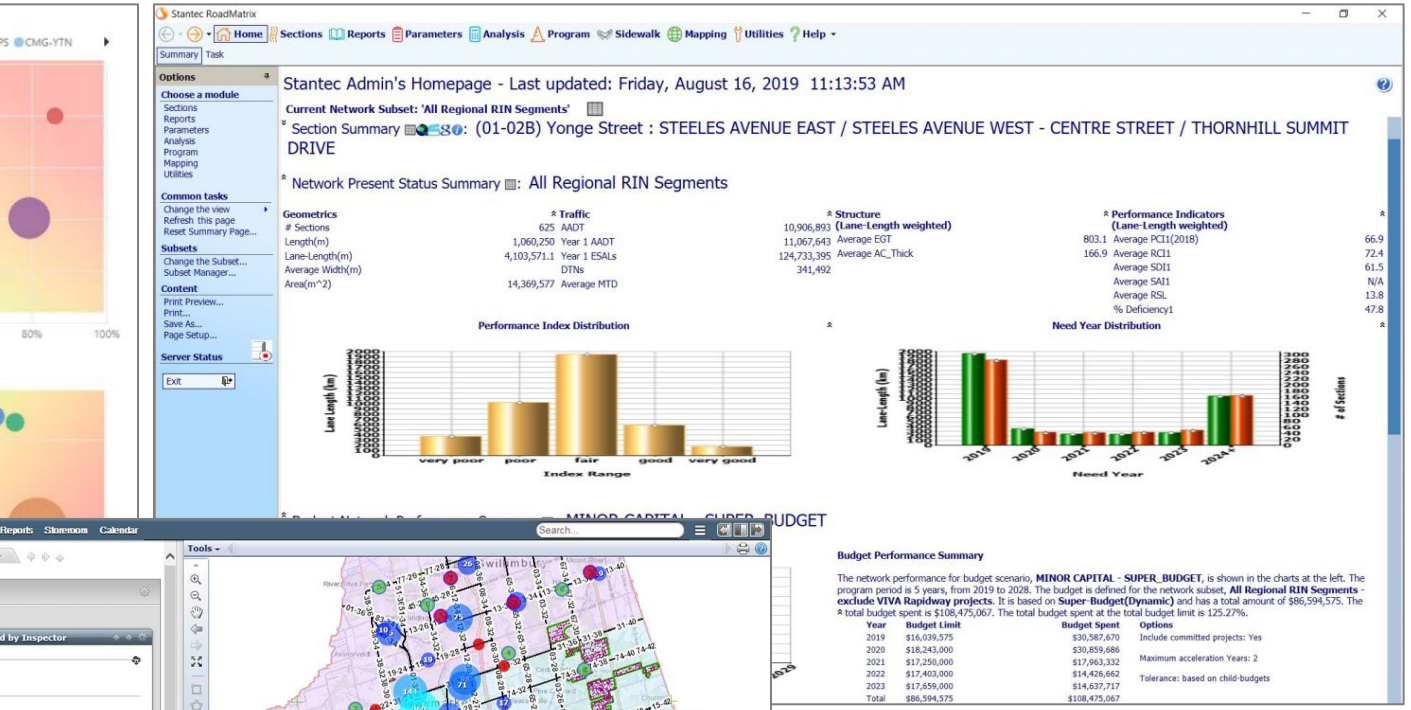
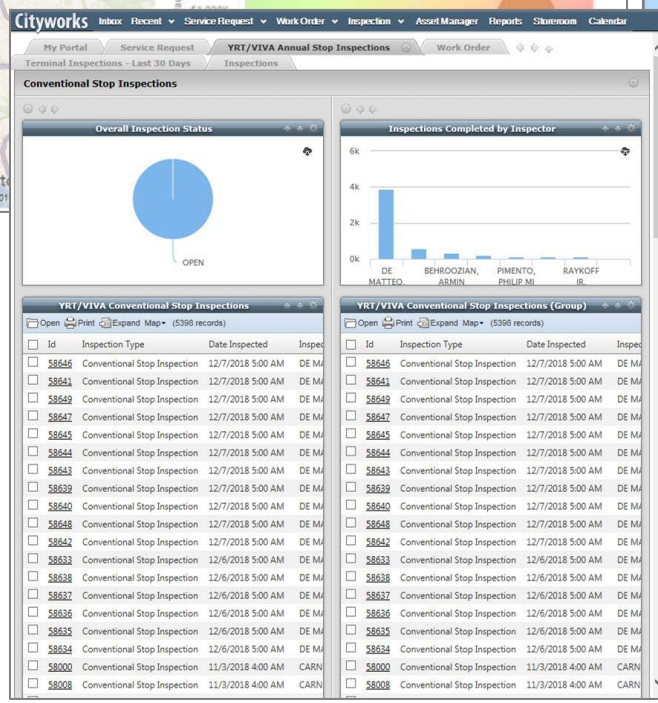
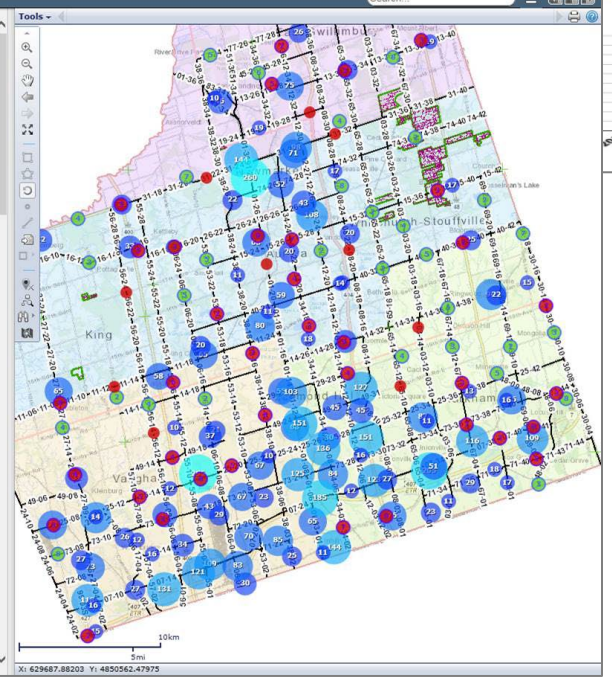
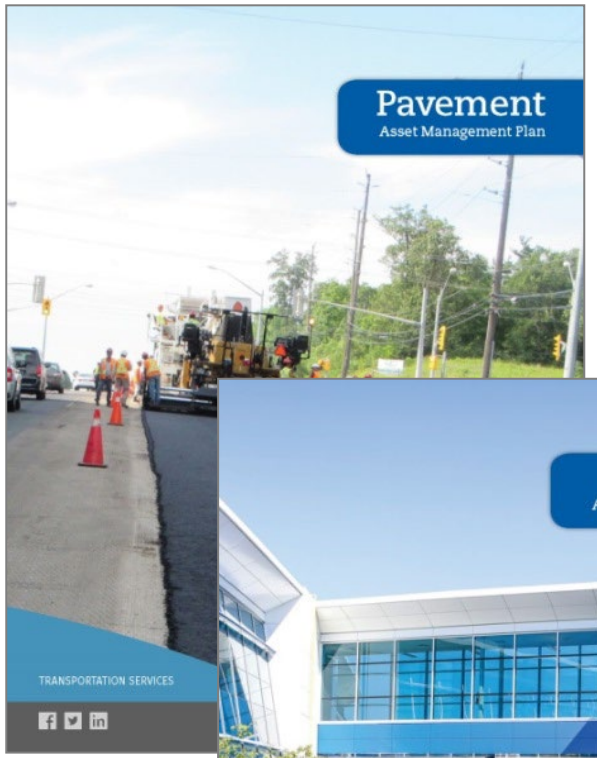


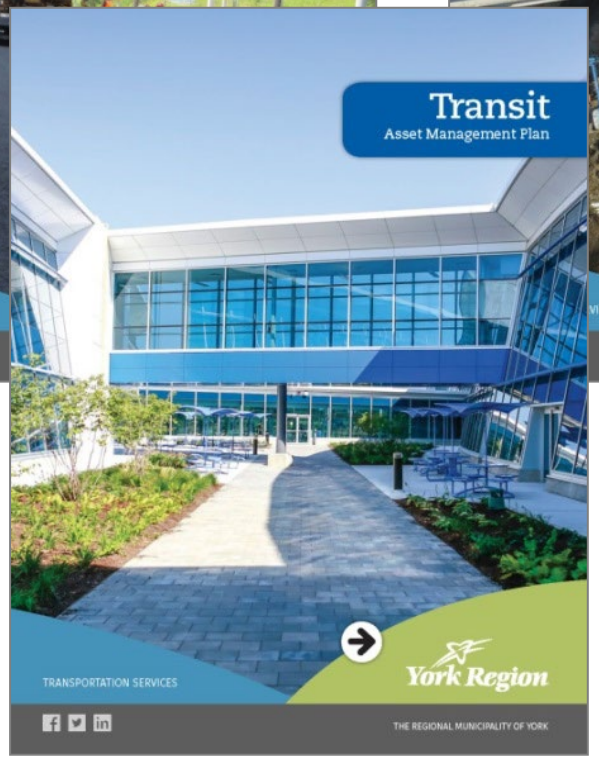


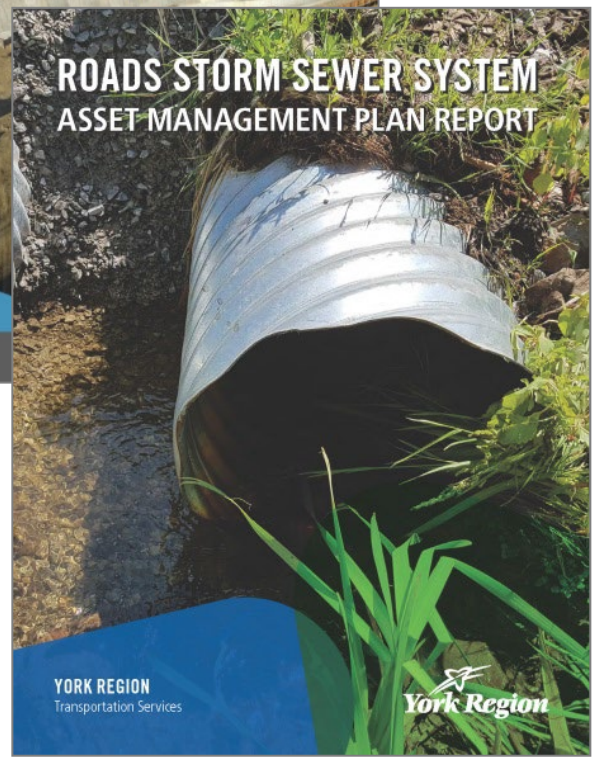




ASSET MANAGEMENT PLANNING





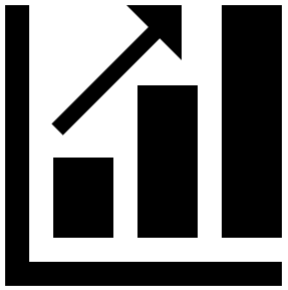


PERFORMANCE-BASED DECISIONS: SERVICE BENEFITS

Increased Business Knowledge

Increased Decision Confidence

Increased Business Effectiveness



Consistent Delivery

TRANSPORTATION DATA ASSET MANAGEMENT PLAN

State of Assets

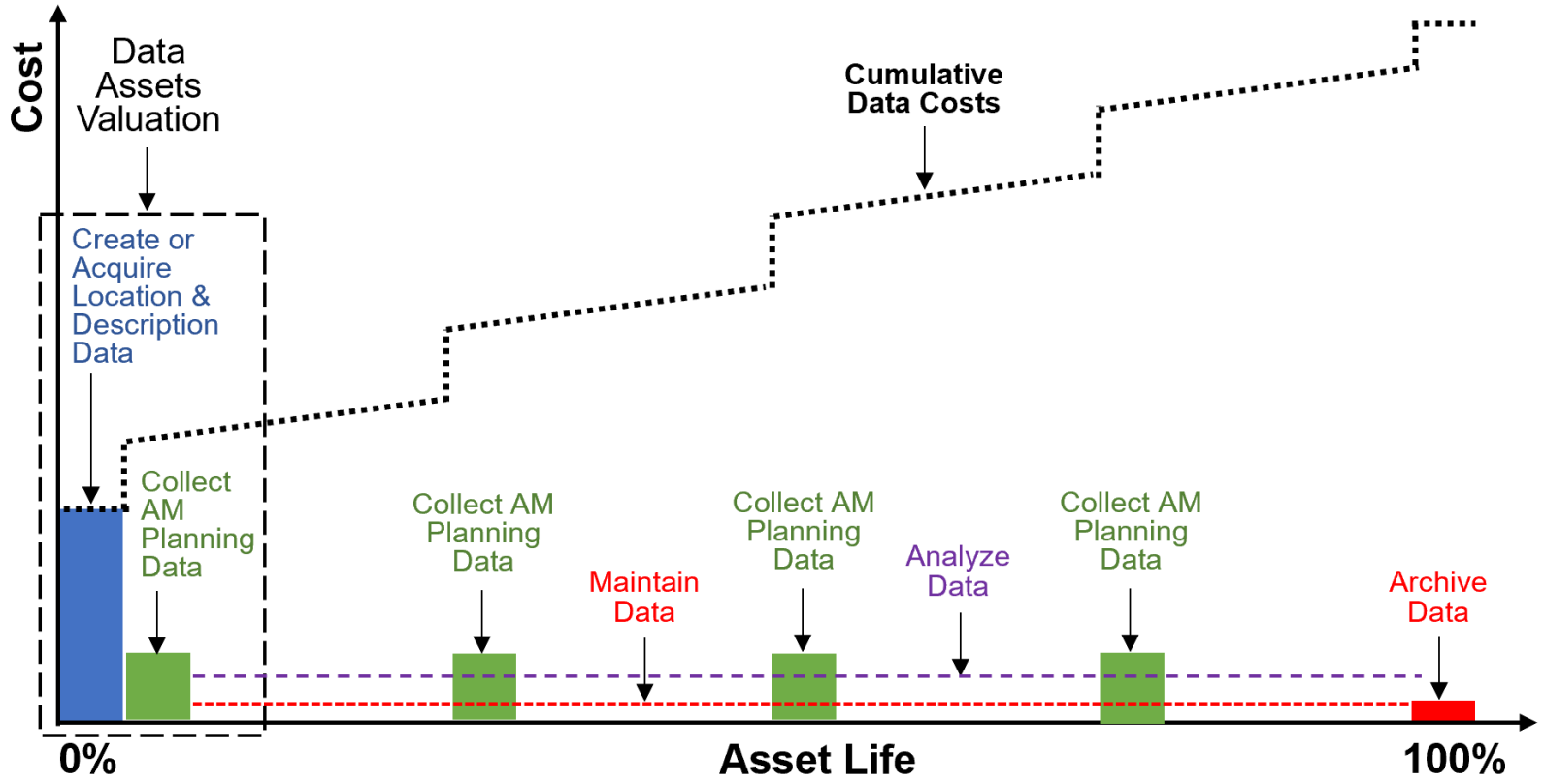
- Inventory
- Valuation
- Condition

What data assets are included in the Data AM Plan?

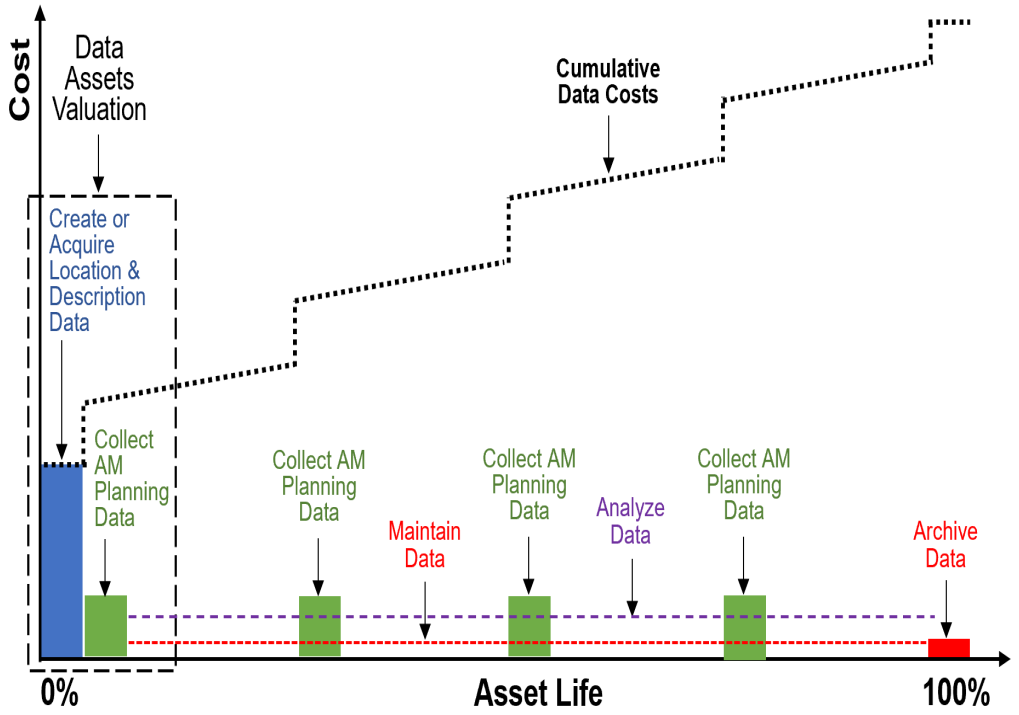
Asset Type

- Road Pavement (4,140 lane-km)
- Bridges and Structures (359 structures)
- Road Structures
- Sustainable Mobility
- Traffic Management (784 intersections)
- Stormwater Management (596 km of mains)
- Road Operations Capital Assets
- Fleet (~300 units)
- Transportation Business Systems
- Rapidways (27.3 centreline km)
- Transit (577 buses, 4 garages, 7 terminals, 5000+ stops)

Data Valuation & Asset Data Lifecycle



Data Valuation & Asset Data Lifecycle



- **Data creation costs**: activities to provide location and description data
- **Data collection costs:** activities to provide AM planning data as well as the base data for analysis of asset condition, maintenance, utilization, operations and performance
- **Data analysis costs**: activities to examine raw data to make AM performance decisions
- **Data maintenance costs**: activities to make data available when needed , consistent between databases and to identify data that can be put into long term storage.
- **Data archiving costs:** activities to archive and store data

State of Asset Data

Location + Description Data

Initial AM Planning Data

Cost to create data / AARR

Valuation Summary

Asset Type	Annual Cost to Create Data	Annual Cost to Collect Data	AARR	Value of Created Data	Total Valuation
Bridges and Structures	$0.051	$0.352	1.25%	$4.10	$4.45
Roadside Structures	$0.300	$0.404	4.00%	$7.50	$7.90
Road Pavement	$0.237	$0.965	2.50%	$9.50	$10.46
Sustainable Mobility	$0.100	$0.054	3.33%	$3.00	$3.06
Traffic Management	$0.145	$0.207	10.00%	$1.45	$1.65
Roads Stormwater Management	$0.107	$0.368	1.15%	$9.33	$9.69
Road Operations Capital Assets	$0.000	$0.015	2.10%	$0.00	$0.02
Fleet	$0.034	$0.218	10.00%	$0.34	$0.56
Rapidways	$0.117	$0.414	2.50%	$4.70	$5.11
Transit	$0.649	$0.794	6.05%	$10.73	$11.53
TOTALS	**$1.741**	**$3.790**		**$50.64**	**$54.43**

Value of Created Data = cost to create data / Average Annual Renewal Rate

Total Valuation = Value of Created Data + cost to collect data (year 1)

State of Asset Data

Data Condition Profile

Quality	Technical performance indicator
Complete	Proportion of stored data against the potential of 100% complete
Accurate	Degree to which data correctly describes the real-world object or event at the required point in time
Available	Degree to which data is available when needed
Consistent	Absence of difference, when comparing two or more representations of a thing against a definition

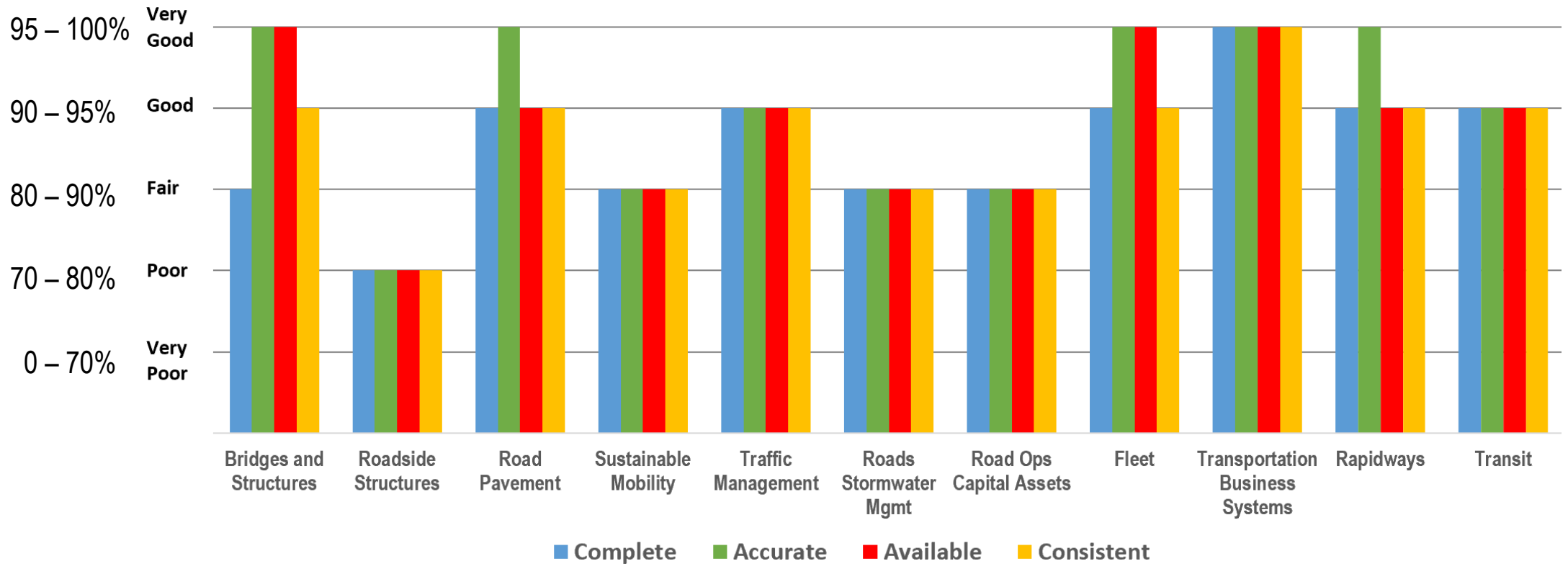
State of Asset Data

Data Condition Profile

Grade	Rate	Scale	Complete	Accurate	Available	Consistent
Very good	1	95% to 100%	Required data is there	Accurately reflects reality	Available when needed	Across datasets
Good	2	90% to 95%				
Fair	3	80% to 90%				
Poor	4	70% to 80%				
Very poor	5	0% to 70%				

State of Asset Data

Data Condition Profile



Levels of Service

Levels of Service

Customer & Technical LOS

Customer service statements		Technical performance statements	Technical performance indicator
Capacity	Data is complete	Provide data required to meet demand.	The proportion of stored data against the potential of 100% complete.
Reliability	Data is accurate	Provide data that accurately reflects reality.	The degree to which data correctly describes the real-world object or event at the required point in time.
Condition	Data is available and consistent	Make data available when needed.	The degree to which data is available when needed.
		Provide data that is consistent across datasets.	The absence of difference, when comparing two or more representations of a thing against a definition.
Financial	Data services are affordable and sustainable	Data services are affordable.	The degree to which data services are funded in the short term.
		Data services are sustainable in the long term.	The degree to which data services are funded in the long term.

Levels of Service

Capacity and Reliability LOS

Service Attribute	Customer LOS		Technical LOS			
	Statements	Current Performance	Performance Indicators	Asset Category	Current Performance	Performance Confidence
Capacity	Data is complete	Fair	Provide data required to meet demand	Bridges and Structures	F	Medium
				Roadside Structures	P	Medium
				Road Pavement	G	Medium
				Sustainable Mobility	F	Medium
				Traffic Management	G	Medium
				Roads Stormwater Mgmt	F	Medium
				Road Ops Capital Assets	F	Medium
				Fleet	G	Medium
				Rapidways	G	Medium
				Transit	G	Medium
Reliability	Data is accurate	Good	Provide data that accurately reflects reality	Bridges and Structures	VG	High
				Roadside Structures	P	Medium
				Road Pavement	VG	High
				Sustainable Mobility	F	Medium
				Traffic Management	G	Medium
				Roads Stormwater Mgmt	F	Medium
				Road Ops Capital Assets	F	Medium
				Fleet	VG	High
				Rapidways	VG	High
				Transit	G	Medium

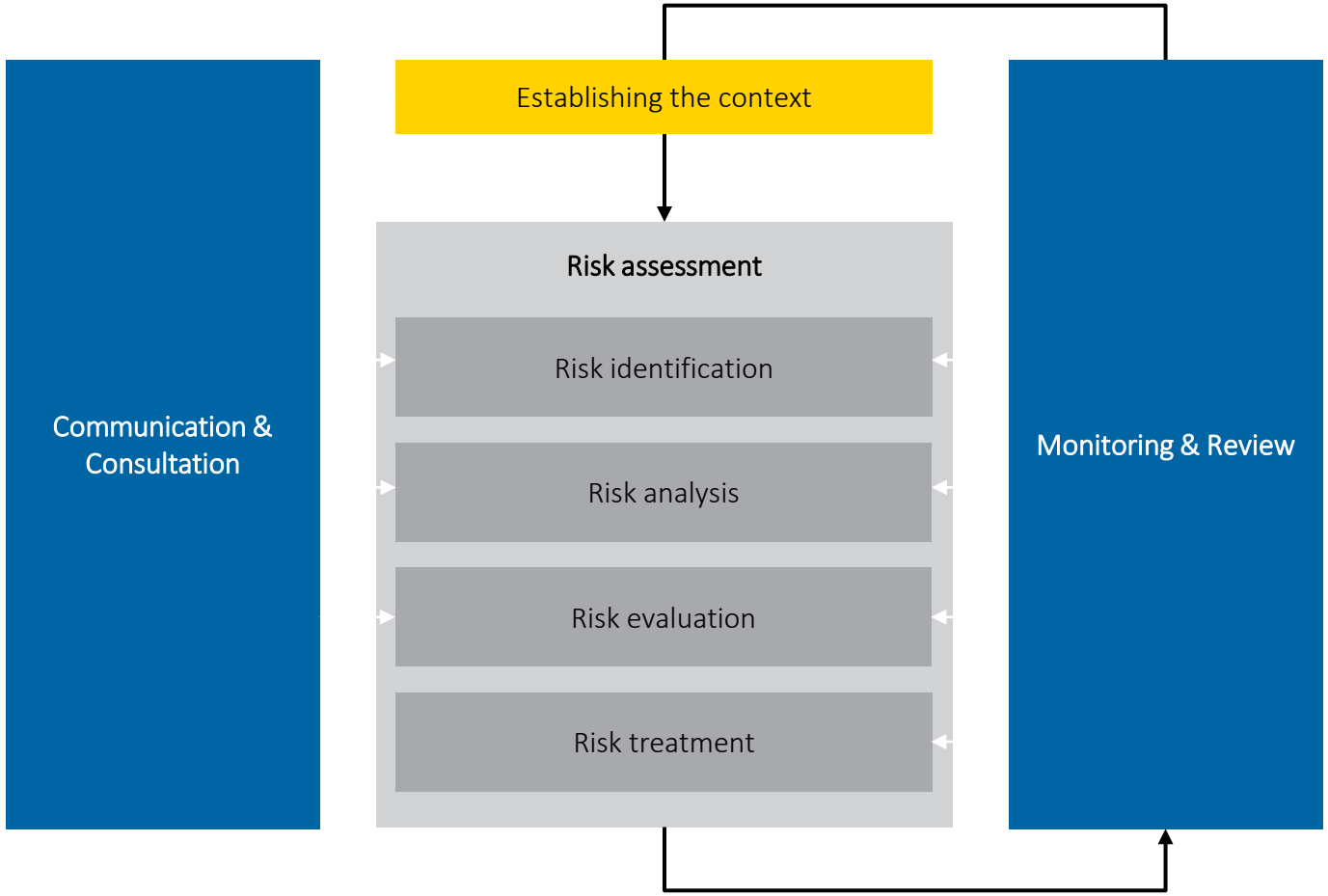
Future Demand

Demand Management Plan Summary

Demand Drivers	Impact on Data Services	Demand Management Plan
Growth	Increased demand for all data lifecycle activities (create location and description data, collect AM Planning data, analyse data, maintain data)	Non-asset solutions to reduce asset portfolio size including operational efficiencies
Service and Asset Downloads and Uploads		Non-asset solutions to reduce the data services including improved as built and asset handover data
Aging Infrastructure	Increased demand to collect dynamic AM planning (condition) data	Automate data collection
	Increased demand to recreate location and description data and condition data upon rehabilitation or replacement	Non-asset solutions to reduce the data services including improved as built and asset handover data
AM Planning for O.Reg. 588/17	Increased need to create and collect different data attributes and analyse different measures	Improve AM processes, people, systems and data including business intelligence
Technology Innovations	increased demand for real-time AM planning data	
	Increased need for “big data”: volume, velocity, value and variety	Increase understanding of benefits and use of business intelligence among stakeholders
Data Sharing	Increased demand to maintain data (more stakeholders to make data available to when needed and more datasets to assure consistency across)	Educate data managers, stewards and producers about the needs of all consumers

Risk Management

Risk Management Plan



ISO 31000 Risk Management Standard

Risk = Likelihood x Consequence

- Identify critical data assets
- Quantify Risks
- Inform Lifecycle Activities

Risk Management Plan

Service attribute	Community LOS statement	Technical LOS performance Indicators
Capacity	Data is complete.	Data required is there.
Reliability	Data is accurate.	Data accurately reflects reality.
Condition	Data is available and consistent.	Data is available when needed. Data is consistent across datasets.

Risk Management Plan

Likelihood Evaluation Table

Likelihood Grade	Description	Probability of event occurring in a year	Data Quality
1	Rare	< 10%	Very Good
2	Unlikely	10% to < 35%	Good
3	Possible	35% to < 65%	Fair
4	Likely	65% to < 90%	Poor
5	Almost certain	>= 90%	Very Poor

Consequence Evaluation Table

Grade	Description	Criticality of Data	Service Delivery	Financial
1	Very Low	Data provides aspirational information on assets or is considered optional	Small number of customers experiencing impact (less than 1% or up to a few hours)	Damages, losses (including 3rd party) or fines from $1k to $10k
2	Low	Not used	Localized service impact (1% to 2.5% or up to 1 day)	Damages, losses (including 3rd party) or fines $10k to $100k
3	Moderate	Data provides an enhanced view and supports greater details in analysis, visualisation and understanding of the current and predicted state of assets	Significant localized impact (2.5% to 10% or less than 1 week)	Damages, losses (including 3rd party) or fines $100k to $1M
4	High	Not used	Major service impact (10% to 50% or for more than a week)	Damages, losses (including 3rd party) or fines $1M to $10M
5	Very High	Data required to meet regulations, develop AM plans, report on asset performance, program proactive AM and maintenance, or share with stakeholders	Wide service impact (50% to 100% or permanent loss of services)	Damages, losses (including 3rd party) or fines > $10M

Risk Management Plan

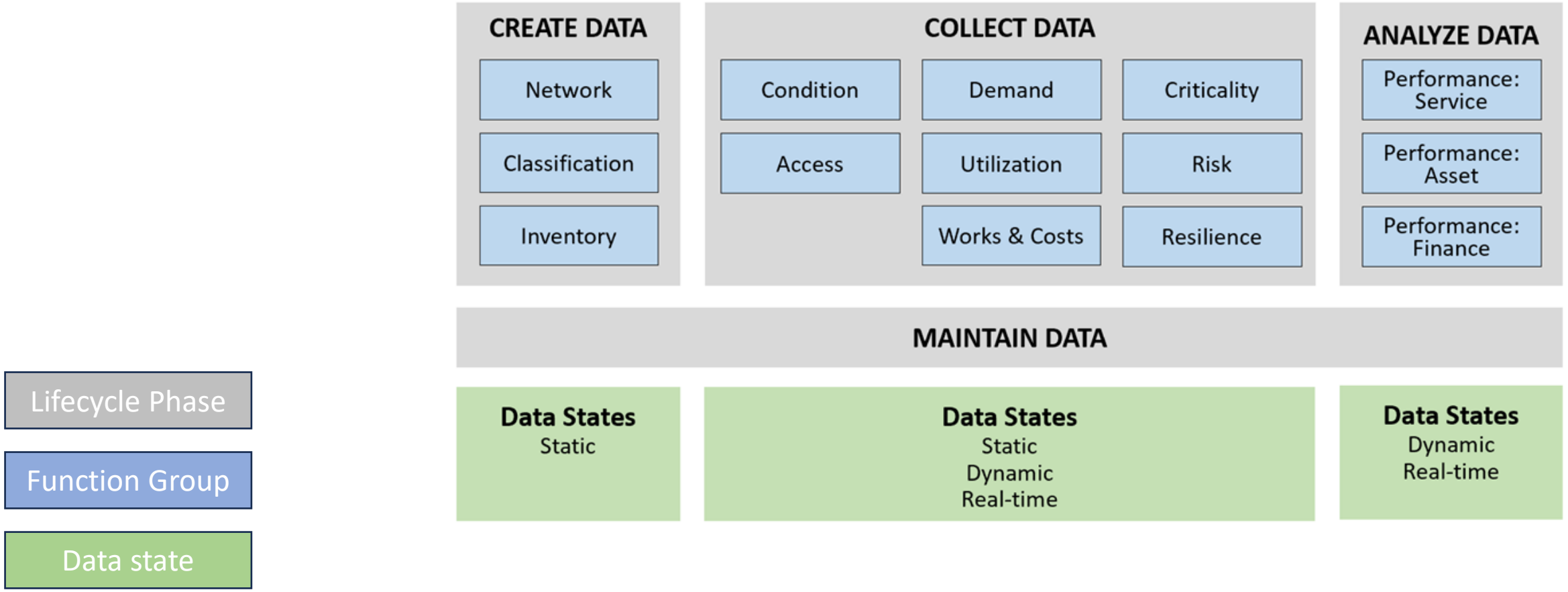
Shortlist of Very High and High Risks

Identify Risks		Analyze Risks		Evaluate Risks	Treat Risks
Risk Trigger Category	**Possible Event**	**Likelihood**	**Consequence**	**Current Risk Score**	**Proposed Risk Control**
Poor Quality Data	causes poor quality location and description data	4 (Likely)	5 (Very High)	**20 (Very High)**	Add rigour to the QA/QC process for as-constructed drawings and handover documents for new assets and downloads / uploads
					Improve the data quality for existing assets by creating location and description data and collecting AM planning data where incomplete or inaccurate
Growth	causes expansion of regional transportation services and assets	5 (Almost Certain)	5 (Very High)	**25 (Very High)**	Decrease service and infrastructure demand through non-asset solutions
Service and Asset Downloads and Uploads					Increase service and infrastructure capacity by maximizing effectiveness of existing road network
					Increase data service capacity by adding staff and expanding existing datasets
Aging Infrastructure	causes increased frequency to collect AM Planning data	4 (Likely)	5 (Very High)	**20 (Very High)**	Automate data collection where possible
					Increase AM planning data capacity by adding staff and expanding existing datasets
Funding Gaps	causes underfunded data practice	4 (Likely)	3 (Moderate)	**12 (High)**	Add much more detail to the budgets and link budget accounts to data management activities and associated resource requirements, by program and asset type

Lifecycle & Financial Strategy

Lifecycle Strategy

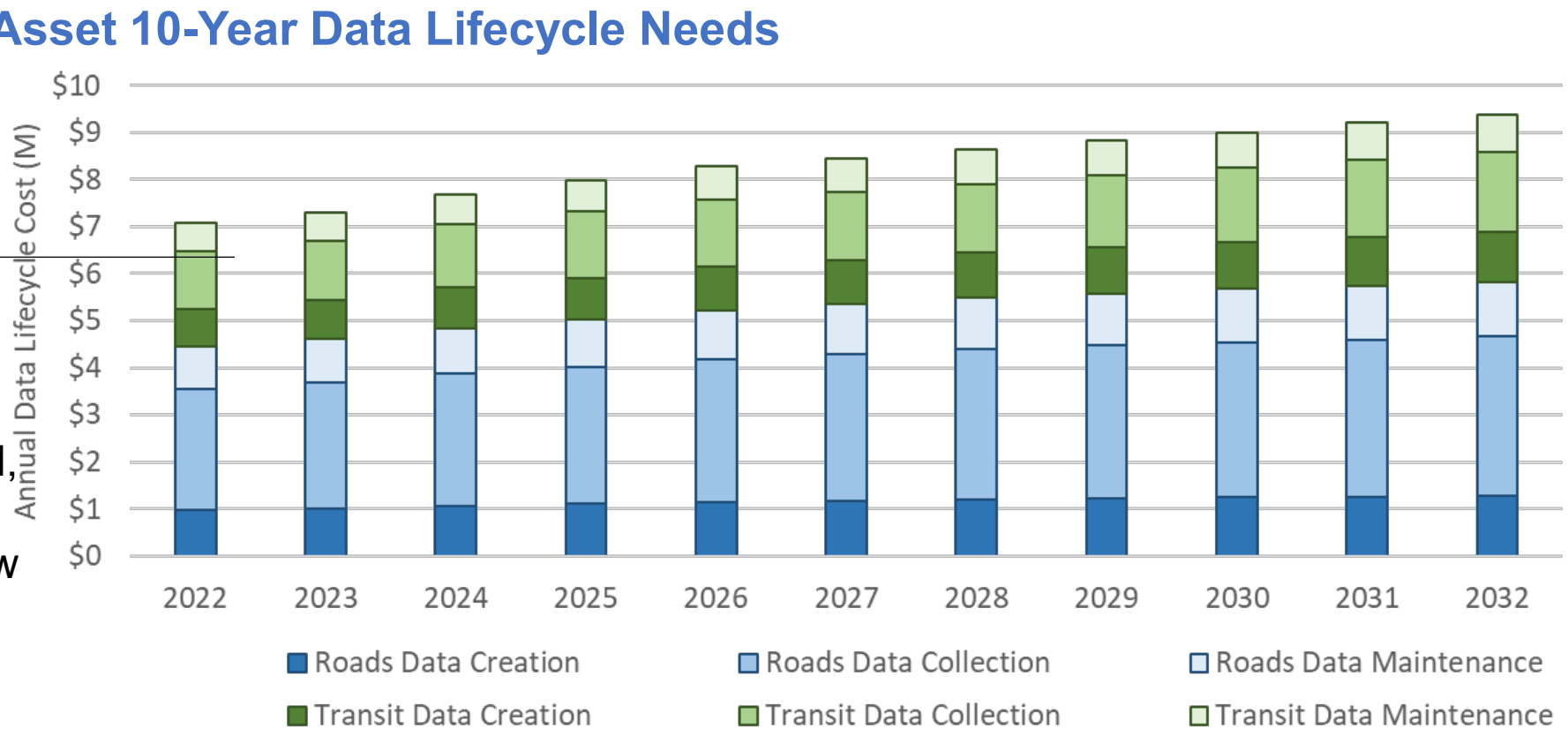
Asset Data Phases, Function Groups and Data States



Lifecycle Strategy

2023 Budget allocation for data:
- Capital: $1.2 M
- Operating: $5.1 M
- Total: **$6.3 M**

Gap for 2023 ~$0.8 M, and increasing as asset data needs grow



Financial Strategy

Funding gaps over the next 10 years based on available information:

- **$5 million** to improve the data quality for existing assets
- **$2.32 million** to expand data services for creation, collection and maintenance required to meet the needs of the growth of the roads and transit asset portfolios
- **$0.5 million** to modify collection of AM planning data including processes, people, systems, and data
- **$250,000** to modify data maintenance processes, people, systems, and data to accommodate greater sharing of data among stakeholders.

Plan Improvement

Improvement Plan

No	Task	Description	Responsibility	Resources Required	Timeline
1	**Expand Data Services**	Plan for ~ 30% increase in demand for data creation, collection, maintenance and analysis over the next 10 years due to growth of the asset portfolio.	Data Managers	5.0 FTE	Over next 10 years
2	**Improve Budgeting for Data**	Add much more detail to the budgets (particularly operating) and link budget accounts to data management activities (i.e., data creation, collection, maintenance and analysis) and associated resource requirements, by program and asset type.	Data Stewards	0.5 FTE	Next budget cycle
3	**Share Data**	Map the use of data across the Region and by external stakeholders to fully understand the benefit derived from the data, the associated risks of poor data management practices, and appropriate costs for data management.	Data Stewards	1.0 FTE	Over next 2 years
4	**Plan to Improve Data Quality and Availability**	Add more rigour to: a) QA/QC processes for as-constructed drawings and handover documents and data b) data creation and collection processes for assets uploaded from or downloaded by others and following changes to assets in the field, including developing condition assessment protocols c) managing metadata for easy data retrieval.	Data Stewards	0.5 FTE	Over next year (before ~ 30% expansion in asset portfolio)
5	**Improve Data Quality**	Improve the data quality for existing assets by creating location and description data and collecting AM planning data where incomplete or inaccurate.	Data Stewards	5.0 FTE	Over next 10 years
6	**Modify Practices for More Complex Data**	Modify collection of AM planning data including processes, people, systems and data to accommodate O.Reg. 588/17 requirements, more complex assets, new real-time data collection technologies and use of business intelligence tools, and communicate changes to all stakeholders.	Data Custodians	1.0 FTE	Opportunistically over time

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