Asset Management Webinar Series

Establishing Asset Hierarchy & Conducting Data Gap Analysis

This initiative is delivered through the Municipal Asset Management Program, which is delivered by the Federation of Canadian Municipalities and funded by the Government of Canada.

Contact ccbf@amo.on.ca for more information

Asset Management Webinar Series

1) Leadership and Governance in Asset Management

2) **Establishing Asset Hierarchy & Conducting Data Gap Analysis**

3) Understanding Service Levels
   - October 22

4) Using Risk Assessments to Identify Local Priorities
   - October 29

5) Developing a Financial Strategy Using Whole Lifecycle Costs
   - November 5

AMO Association of Municipalities Ontario

AGENDA

- Managing Asset Data and Information
  - Troy Mander, Director, Asset Management Ontario
- County of Huron
  - Michael Blumhagen, Treasurer & Director of Corporate Services
- Q&A

AMO Association of Municipalities Ontario

Managing Your Asset Data & Information

Troy Mander

October 15, 2021

AMONTario
ASSET MANAGEMENT ONTARIO

Connection to O.Reg. 588/17

- Maintaining accurate, complete data & information is foundational to asset management

- Supports key requirements of the Regulation:
  - Asset (Technical) Levels of Service targets
  - Asset condition & performance measurement data
  - Maintenance history, estimated remaining service life & other life cycle information
  - Life cycle costs for replacement, refurbishment, operations & maintenance of the assets

AMONTario
ASSET MANAGEMENT ONTARIO

The Asset Information System:

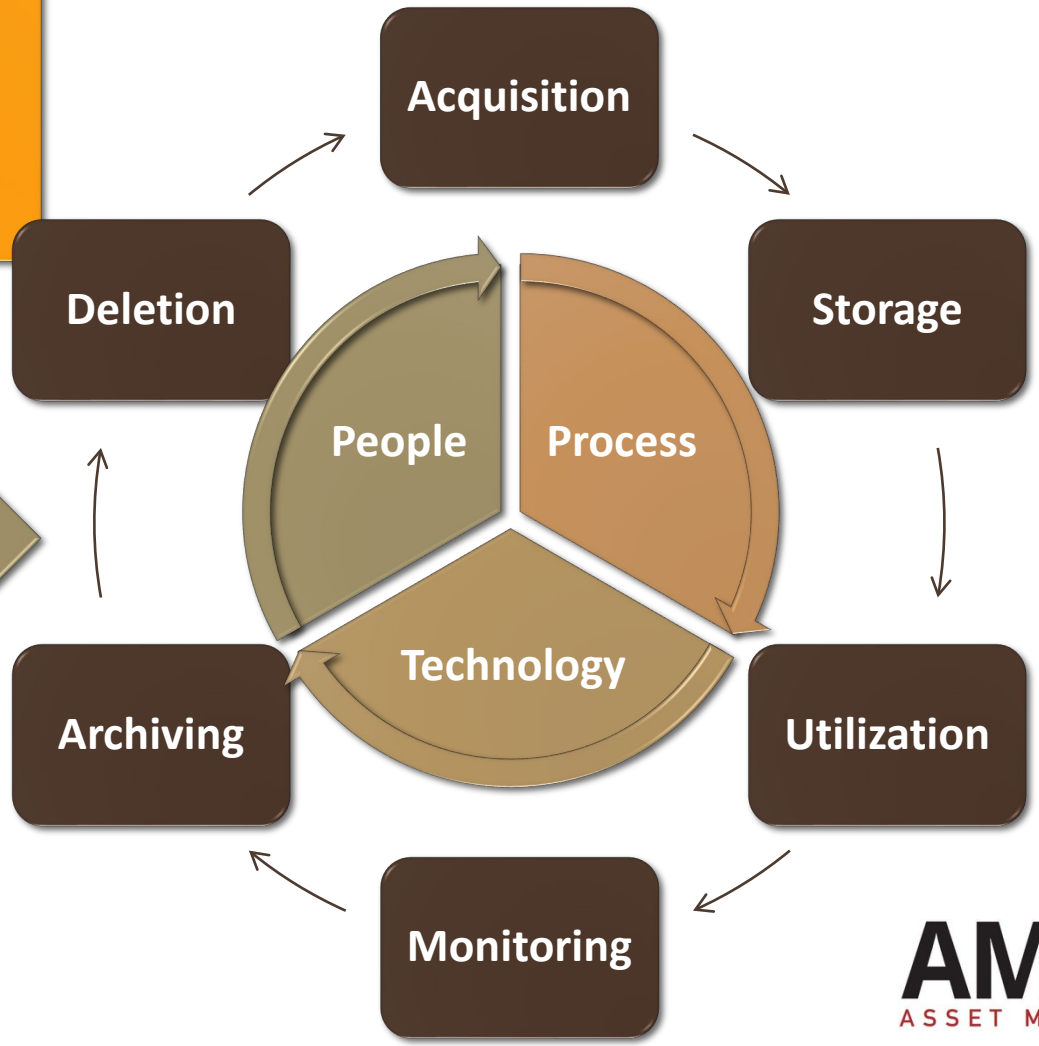
Managing Asset Information around the Data Life Cycle

Asset Information Strategy

- Data requirements & collection plans
- Service to Asset Hierarchies
- Data formats
- Data management processes
- Reporting needs
- Governance structure & competencies
- Technology plan

Asset Information System

- Policy
- Strategy & Processes
- Data & Information
- Technology
- Asset Register
- Human resources



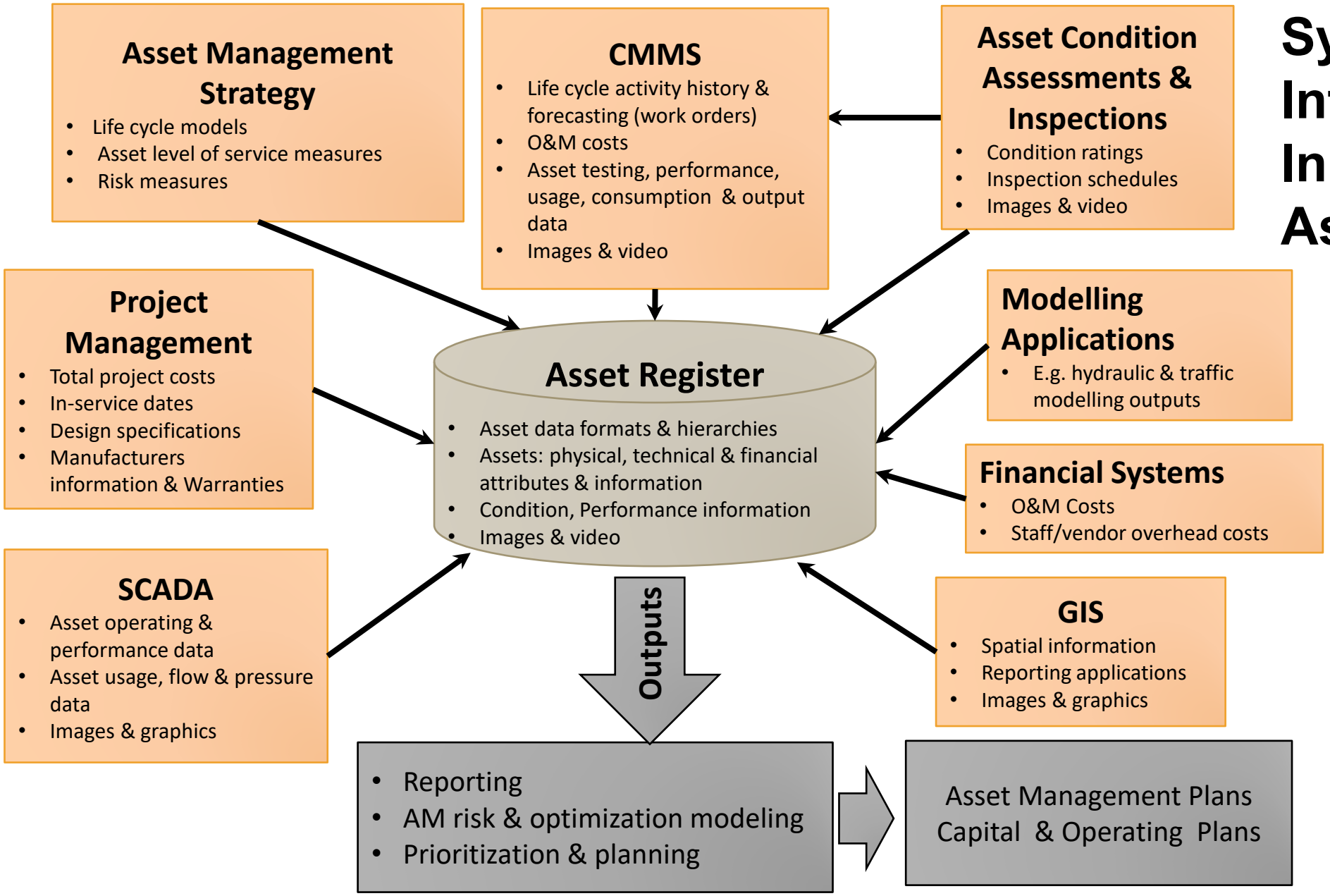
AMONTario
ASSET MANAGEMENT ONTARIO

The Asset Register

- The heart of the Asset Information System
- The repository for essential asset data & information
- The source of data ‘truth’
  - All asset data is sourced from & fed back to the Asset Register
  - Each asset must have a unique ID number.
  - Critical if asset data attributes appear in multiple systems
  - The Asset Register may by dispersed across multiple specialized systems
  - Can reside in a CMMS, GIS or other Asset Management system
- System integration with the Asset Register should be a key objective for efficient data management

AMONTario
ASSET MANAGEMENT ONTARIO

System Integration & Inputs to the Asset Register



AMONTario
ASSET MANAGEMENT ONTARIO

Asset Hierarchies

Service to Asset Hierarchies

- Structures the Asset Register to create a ‘line of sight’ between the assets & associated services.
- Creates consistent naming & numbering conventions for business functions, planning & reporting needs
- Maps asset relationships & creates consistent definitions & data formats
- Facilitates analysis & decision making at all levels of the organization for strategic & tactical (operational) planning

AMONTario
ASSET MANAGEMENT ONTARIO

Establish a Common Hierarchy Framework

- Important to first establish a common hierarchy framework for the organization's portfolio
  - Establishes how the assets will be organized for consistent & comparative cross-organizational analysis, planning & reporting

- The hierarchies will vary by municipality
  - Should be developed according to each municipality's portfolio planning & reporting needs
  - E.g. What is required for capital & operating plans, identifying capital projects, maintenance planning, assessing strategic priorities etc.

Establishing a Common Hierarchy Framework

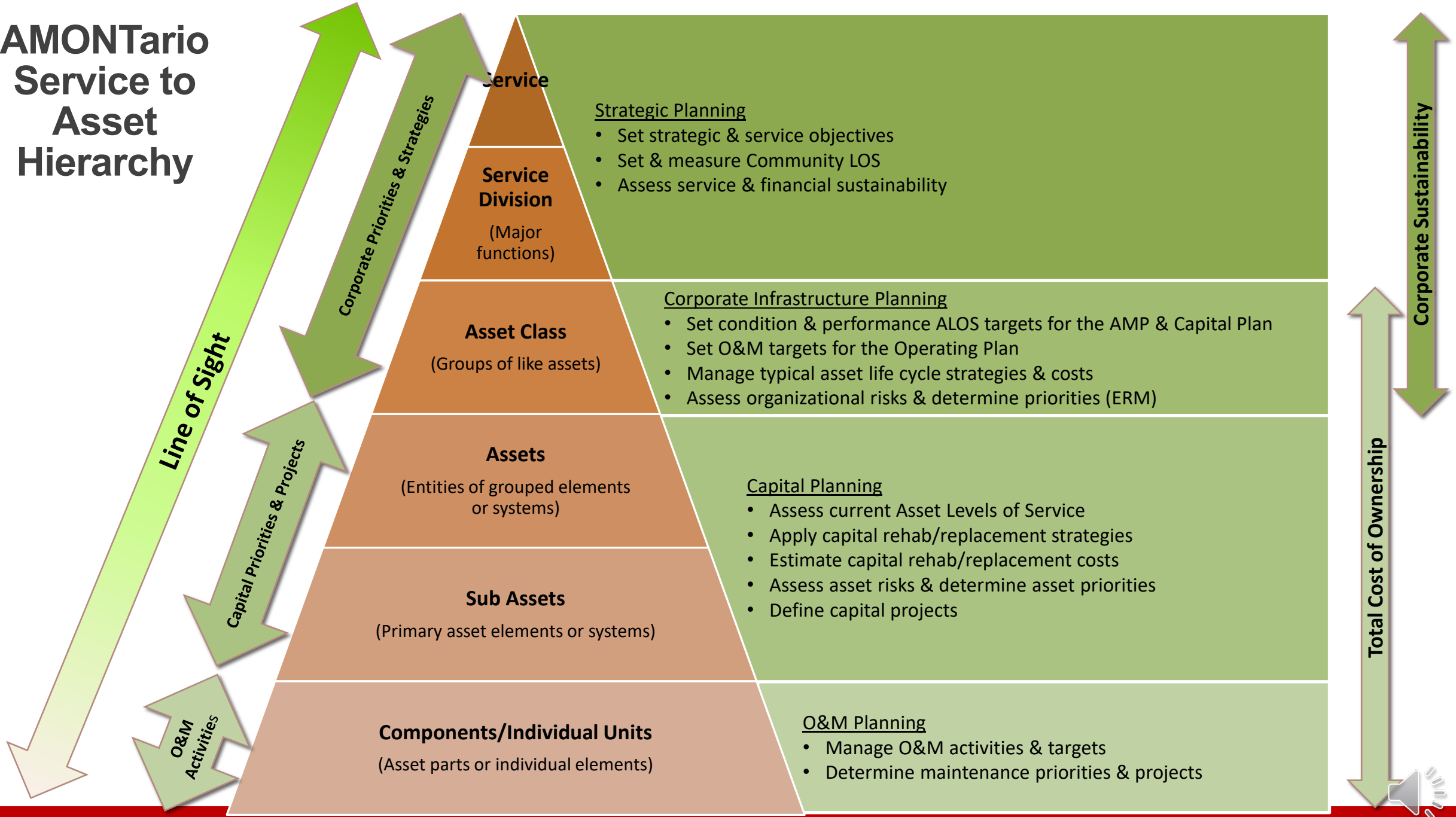
- Establishing the hierarchy can be challenging
  - Different interpretations
  - Different information requirements
  - Requires input from all stakeholders (e.g. Engineering, Finance, Planning, Service Operations)
  - It will evolve – not perfect the first time
- Avoid going too granular
  - Difficult & costly to manage all of the data
  - Provides little additional value for analysis, decision-making & planning
- Avoid going too high level
  - Excludes some important analysis & planning capabilities
- Avoid using pure financial definitions
  - Disconnected from the purpose of the asset

AMONTario
ASSET MANAGEMENT ONTARIO

AMONTario's Asset Information Management Package

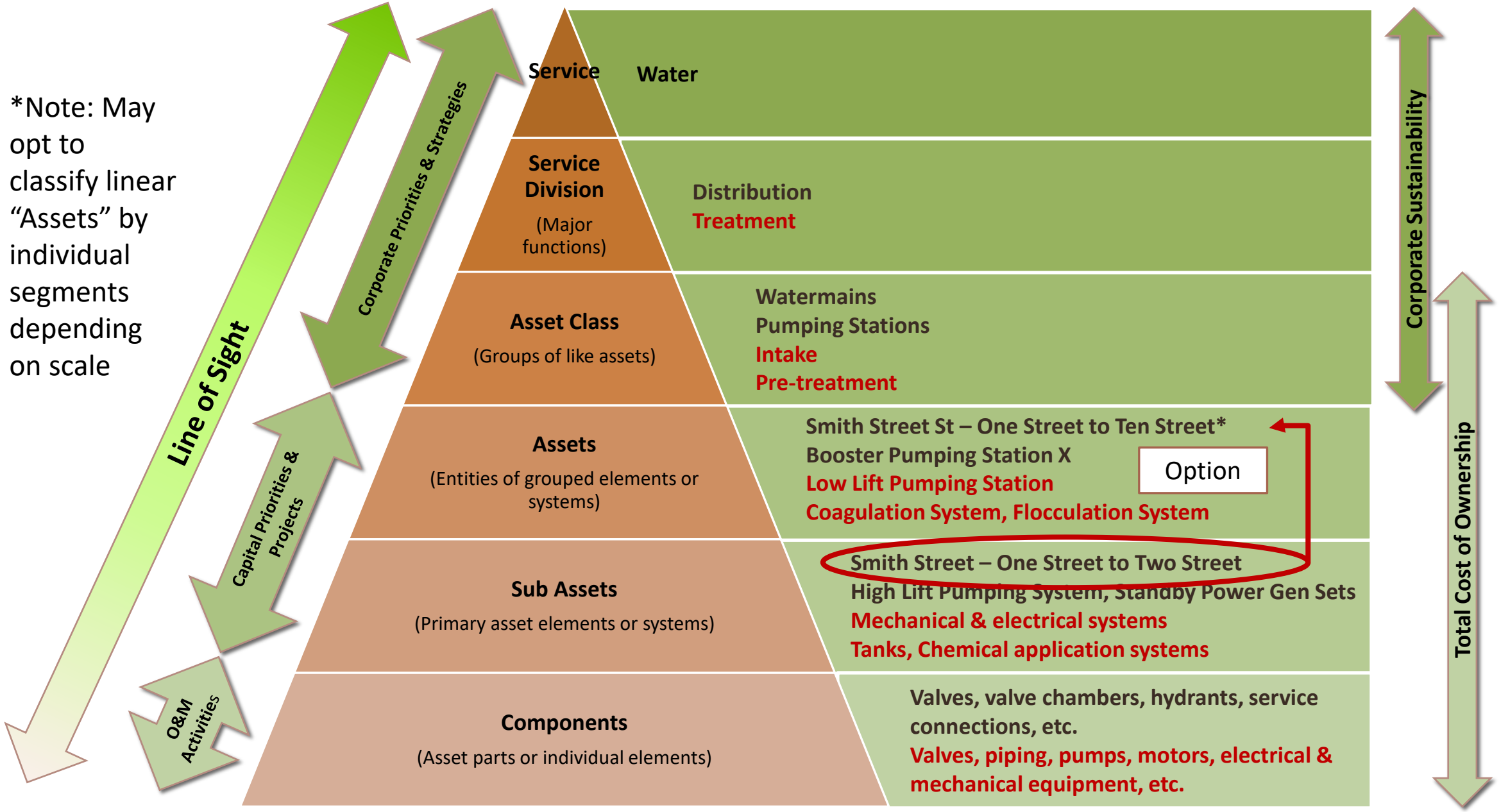
The Service to Asset Hierarchy Framework

AMONTario Service to Asset Hierarchy



Example Water Service to Asset Hierarchy

*Note: May opt to classify linear "Assets" by individual segments depending on scale



Water Service to Asset Hierarchy Template

Distribution

Service	Service Division	Asset Class	Assets	Sub Assets	Individual Units/Components
Water	Distribution	Transmission mains	The entire length of pipe distinguished by source and destination	Pipe segments (node to node/valve to valve)	Valves, chambers etc.
		Feedermains	The entire length of pipe distinguished by source and destination or diameter, function, road or easement sections. *(Note: Where fully located under roads, should be consistent with Road Assets)*	Pipe segments (node to node/valve to valve) *(Note: Not required if 'Assets' are already defined node to node/intersection to intersection)*	Valves, chambers etc.
		Large watermains	The entire length of pipe distinguished by source and destination or diameter, function, road or easement sections. *(Note: Where fully located under roads, should be consistent with Road Assets)*	Pipe segments (node to node/valve to valve) *(Note: Not required if 'Assets' are already defined node to node/intersection to intersection)*	Valves, chambers, hydrants, industrial service connections, etc.
		Small watermains	The entire length of pipe distinguished by source and destination or diameter, function, road or easement sections. *(Note: Where fully located under roads, should be consistent with Road Assets)*	Pipe segments (node to node/valve to valve) *(Note: Not required if 'Assets' are already defined node to node/intersection to intersection)*	Valves, hydrants, service connections etc.
		Pumping Stations	High Lift Pumping Station Low Lift Pumping Station Standby Power Generation Surge Protection Power Supply	Pumping systems, standby power generator units, electrical system, transformers, surge control tanks	Valves, pump units/parts, motors, electrical panels, piping, etc.
		Elevated Tanks	Elevated Tank Facility	Tank/Vessel, Riser structure, chlorination systems	Valves, piping, electrical & mechanical equipment, etc.
		In-ground Reservoirs	Reservoir Facility	Reservoir cells, chlorination systems	Valves, piping, membrane, baffles, chemical tanks, electrical & mechanical equipment, etc.

	Capital Items
	Operating Items

AMONTario
ASSET MANAGEMENT ONTARIO

Water Service to Asset Hierarchy Template

Treatment

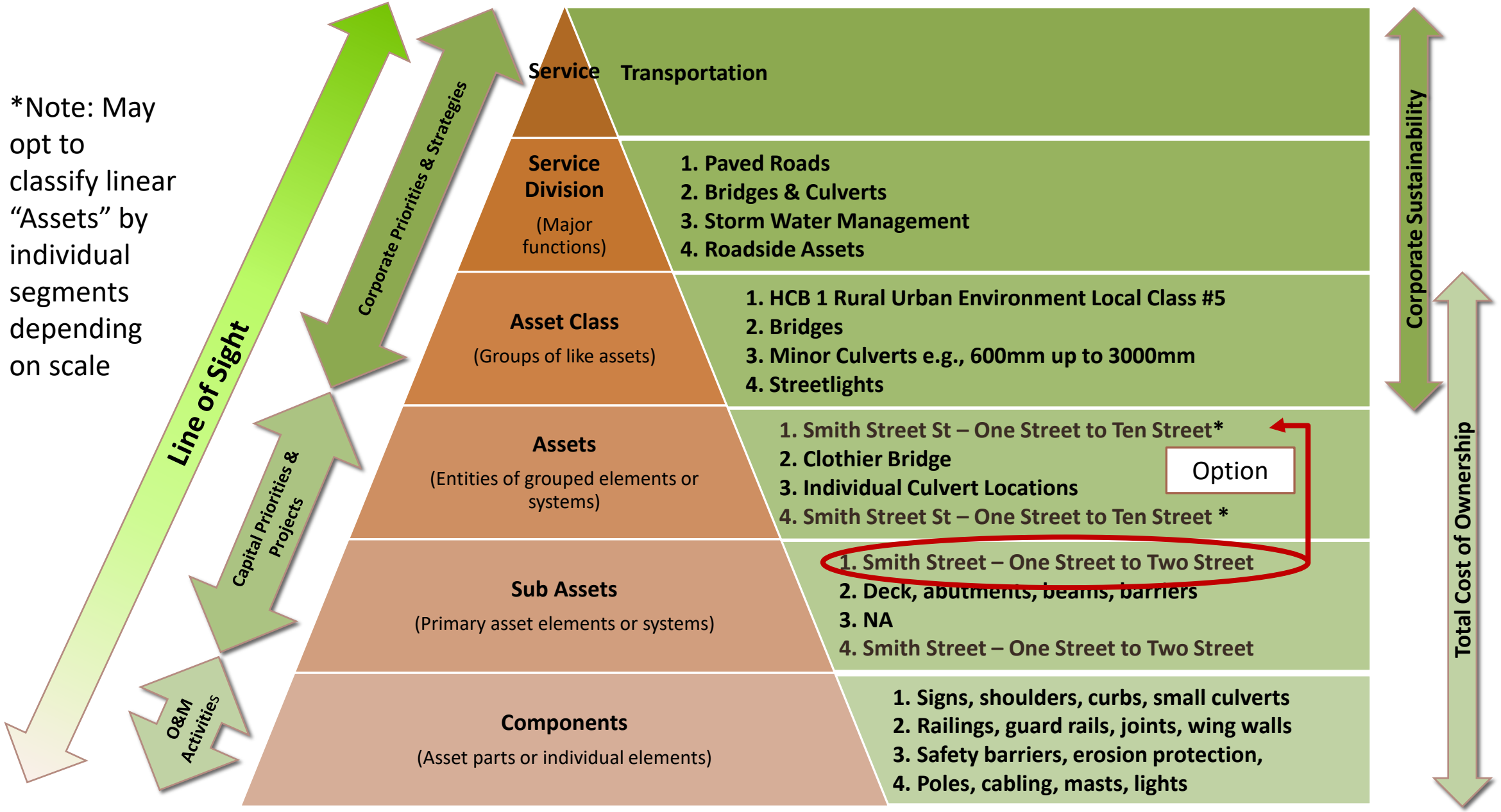
Service	Service Division	Asset Class	Assets	Sub Assets	Individual Units/Components
Water	Treatment	Intake	Intake Pipe Preliminary Treatment System	Screens, chemical application systems, electrical systems	Valves, piping, pumps, motors, electrical & mechanical equipment, etc.
			Low Lift Pumping Station	Pumping systems, electrical systems	Valves, piping, pump units/parts, motors, electrical & mechanical equipment etc.
		Pre-treatment	Coagulation Systems	Tanks/Cells, mechanical and electrical systems, chemical application systems	Valves, piping, pumps, motors, electrical & mechanical equipment, chemical feed lines etc.
			Flocculation Systems	Tanks/Cells, mechanical and electrical systems, chemical application systems	Valves, piping, pumps, motors, electrical & mechanical equipment, etc.
			Sedimentation Systems	Tanks/Cells, mechanical and electrical systems, chemical application systems	Valves, piping, pumps, motors, electrical & mechanical equipment etc.
		Filtration	Filtration Systems	Tanks, Membrane Filter units mechanical and electrical systems, chemical application systems	Pipes, valves, motors, media, membrane cartridges etc.
		Disinfection	Disinfection Systems	Ozone generators, evaporators, liquid oxygen tanks, Chlorination/UV Disinfection Units, mechanical and electrical systems	Pumps, Chemical Storage Tanks, Chemical Feed Lines, transformer, electrical panels, etc.
		Treated Water Storage	Reservoir Facility	Reservoir cells	Baffles, Ladders, Membrane, etc.
		High Lift Pumping	High Lift Pumping Station Surge Protection	Discrete pump assemblies Surge Protection Tanks	Valves, pumps, motors, electrical panels, piping, etc.
		Plant Wide Process Support Systems	Standby Generation Electrical Power Supply	Standby power generator units, electrical system, transformers, mechanical and electrical systems HVAC System	Mechanical & electrical components and equipment
	Groundwater Treatment	Wells	Well Facility Standby Power Generation Power Supply System	Well Pumping Systems Standby power generator units, electrical system, transformers, mechanical and electrical systems	Valves, piping, pumps, motors, electrical & mechanical equipment

	Capital Items
	Operating Items

AMONTario
ASSET MANAGEMENT ONTARIO

Example Roads Service to Asset Hierarchy

*Note: May opt to classify linear "Assets" by individual segments depending on scale



Facility Service to Asset Hierarchy Template

Service	Service Division	Asset Class	Assets	Sub Assets[1]			
				Interior & Exterior Space Uses[2] (To meet service requirements)	Uniformat II Hierarchy[3] (Partial Listing)		
					Level 1 Major Group Elements	Level 2 Group Elements	Level 3 Individual Elements
Public Service	Sub Service	Examples (may be multiple or individual facilities):	Facility Name	Interior Use Examples:	A. Substructure	A10 Foundations	A mix of Individual Units and Components. See full Uniformat II Hierarchy for additional information
		Community Centres		Staff Meeting Rooms		A20 Basement Construction	
		Recreation Centres		Washrooms	B. Shell	B10 Superstructure	
		Administration Offices		Garages		B20 Exterior Closure	
		Libraries		Kitchens		B30 Roofing	
		Fire Halls		Offices	C. Interiors	C10 Interior Construction	
		Operations Yards		Showers/Changerooms		C20 Staircases	
		Long Term Care Centres		Community/Public Meeting Rooms		C30 Interior Finishes	
		Museums		Storage Rooms	D. Services	D10 Conveying Systems	
		Cultural Centres/Facilities		Library Areas		D20 Plumbing	
		Tourism Information Centres		Rink Areas		D30 HVAC	
		Storage Facilities		Pools		D40 Fire Protection	
		Maintenance Facilities		Gymnasiums		D50 Electrical	
		Paramedic Stations		Fitness Facilities	E. Equipment & Furnishings	E10 Equipment	
		Garages		Common Areas		E20 Furnishings	
		Storage Facilities		Information Areas	F. Special Construction & Demolition	F10 Special Construction	
		Treatment Plants		Confectionary Areas		F20 Selective Building Demolition	
		Pumping Stations		Control Rooms	G. Building Sitework	G10 Site Preparation	
		Well Pumphouses		Electrical Rooms		G20 Site Improvements	
		Light Industrial Facilities		Treatment Process Areas		G30 Site Civil/Mechanical Utilities	
		Medium Industrial Facilities		Maintenance Rooms/Areas		G40 Site Electrical Utilities	
		Heavy Industrial Facilities		Elevators		G50 Other Site Construction	
				Living Spaces			

Data & Information

Evaluating Data Quality

- **Accuracy** — Does the data correctly represent the asset it relates to?
- **Completeness** — Are all assets & required attributes populated?
- **Consistency** — Does the same asset have the same identifier & formatting across all data sets?
- **Uniqueness** — Is each asset recorded only once?
- **Timeliness** — What is the time delay between a change to an asset & the corresponding data change?

AMONTario
ASSET MANAGEMENT ONTARIO

Collecting Asset Data

- Knowing how asset information will be used & the decisions that need to be made will shape data collection:

  - What asset information do we need to support decision-making?
  - How can we efficiently collect the relevant data?
  - How will this data be processed to deliver useful information?
  - How will the information or analysis of data be shared to support various levels of decision-making?
  - What is the cost-benefit in terms of resources to collect & analyze the information vs. value to decision-making?

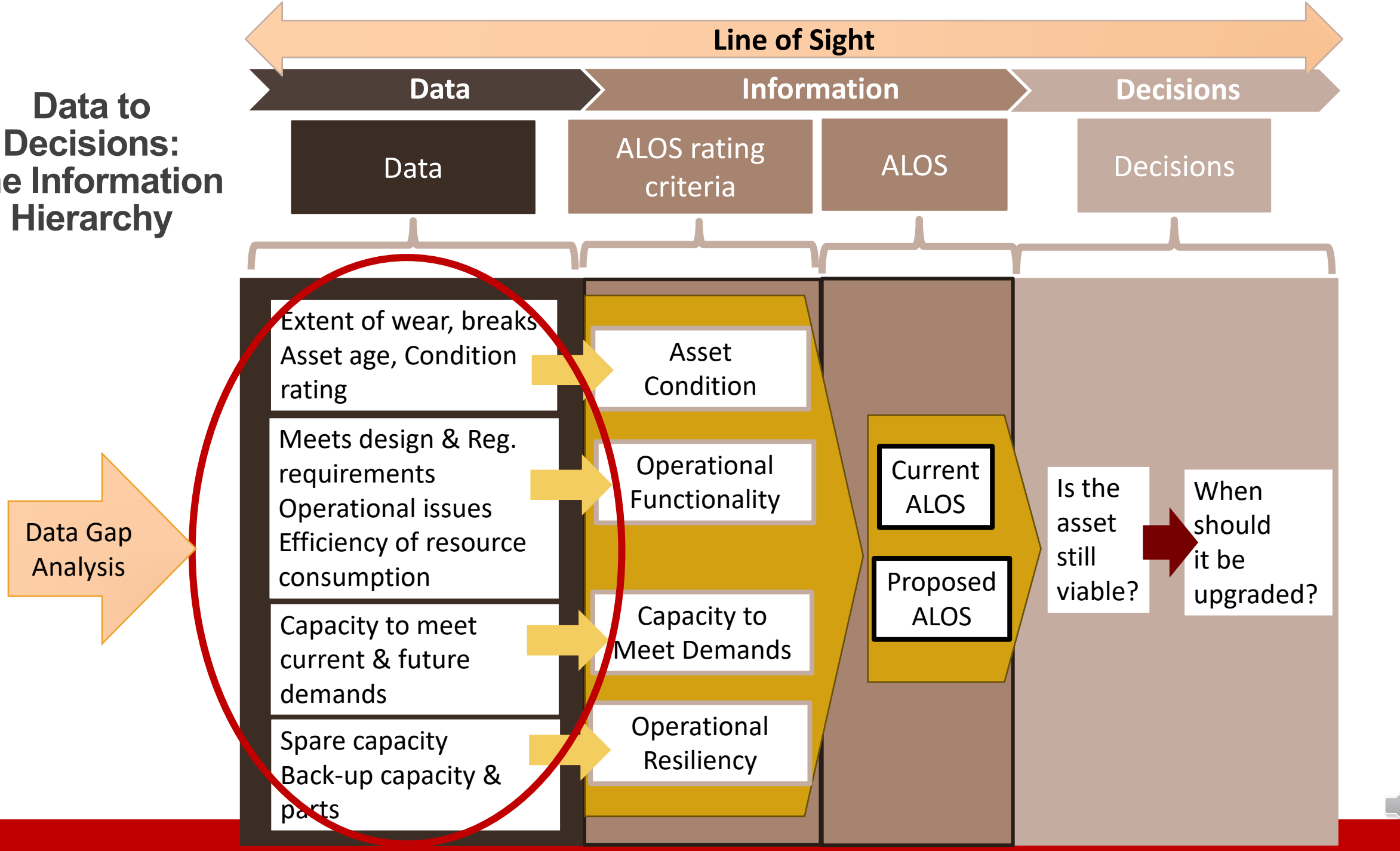
AMONTario
ASSET MANAGEMENT ONTARIO

What the Asset Data needs to Answer

- What assets do we own, where are they & what are they worth?
- What services are the assets providing?
- How old are the assets & what condition are they in?
- How are the assets performing & are they satisfactory?
- What is the asset maintenance & rehabilitation history?
- What are the costs to operate, repair & replace the assets?
- When should the assets be repaired or replaced?
- What are the priorities for repairs or replacement?
- Are the assets technically & financially sustainable?

AMONTario
ASSET MANAGEMENT ONTARIO

Data to Decisions: The Information Hierarchy



AMONTario's Asset Information Management Package

Data Management Tools

Asset Data & Information Framework (Partial Listing)

Data Type	Attribute Data	Description	Purpose	Typical Sources[1]	Frequency & Triggers for Updates[2]	Archiving & Deletion Protocols[3]	Accountable[4]	Data Status[5]
Technical	Asset Design & As-built Characteristics	A description of the key physical characteristics and/or design parameters of the asset at the time it was constructed including size, diameter, length, width, output, capacity, performance, material, manufacturer etc.	A means to readily understand original asset design parameters in order to assess current asset status and changes over time, including rate/amount of deterioration, capacity utilization and to estimate remaining service life and future replacement costs.	Project design documents, project planning information, as-built records or Capital Project Management Information System	As required, according to changes in the asset portfolio.	See notes.	See notes.	See notes.
Financial	Construction Unit Costs	Typical material, labour and construction costs per unit or unit length	To document, monitor and adjust base construction costs as an input to the asset replacement values and investment forecasting. To create repeatable project budget estimates for different project scopes and sizes.	Capital Project Management Information System, final payment certificates, quantities from completed construction projects.	Annually or as required according to changes in material and labour costs.	See notes.	See notes.	See notes.

AMONTario ASSET MANAGEMENT ONTARIO

Asset Data & Information Gap Analysis

Data Type	Attribute Data	Asset Category NAME		
		Yes	Source[1]	Accountable[2]
Hierarchy	Service Name & ID Convention			
	Service Division Name & ID Convention			
	Asset Class Name & ID Convention			
	Asset Name, Location & ID Convention			
	Sub Asset Name, Location & ID Convention			
	Individual Unit/Component Names & ID Convention			
Technical	Asset Design & as-built Characteristics			
	In Service Date/Asset Age			
	Estimated Total Useful Service Life			
	Estimated Remaining Useful Service Life			
	Maintenance/Refurbishment History			
	Operations and Maintenance Schedule			
	Date of Last Inspection/Condition Assessment			
	Date of Next Inspection/Condition Assessment			
	Condition ALOS Measures[3]			
	Performance ALOS Measures[3]			
	Condition ALOS Targets[3]			
	Performance ALOS Targets[3]			
	Current Condition ALOS			
	Current Performance ALOS			
	Data Requirements and Criteria to Measure Asset Condition[4]			
	Data Requirements and Criteria to Measure Asset Performance[4]			
	Asset Criticality/Risk Rating			
Financial	Construction Unit Costs			
	Design, Engineering, Contingency & other Overhead Costs and Allowances			
	Total Replacement Costs			
	Annual Maintenance Costs			
	Annual Operating Costs			

See next slide for examples

AMONTario ASSET MANAGEMENT ONTARIO

Examples of Data Inputs to Measure the State of the Assets

Infrastructure Type	Condition Data/Sources	Peformance Data/Sources
Roads	Pavement Condition Index (PCI), Bridge Condition Index (BCI), visual assessments & ratings	Geometrics, site lines, platform widths, cross-section environment, adequate drainage & flood protection
Water	# pipe breaks, hrs service interruption, leakage rates, visual assessments & ratings, vibration analyses	Flow & pressure monitoring, back-up/emergency power, building/electrical code compliance, water quality monitoring, hydraulic modelling, site security
Wastewater	Pipeline Assessment Certification Program (PACP) ratings, infiltration rates, # pipe breaks, visual assessments & ratings,	Flow monitoring/flow capacity, inflow rates, back-up/emergency power, building/electrical code compliance, # overflows (basements & environmental), draw-down tests, hydraulic modelling, site security
Storm Water	Pipeline Assessment Certification Program (PACP) ratings, # pipe breaks, infiltration rates	Flow capacity, excessive overland flooding incidences, hydraulic modelling

Questions

AMONTario
ASSET MANAGEMENT ONTARIO

County of Huron's

Asset Management Journey

Michael Blumhagen, CPA, CMA
Treasurer and Director of Corporate Services
mblumhagen@huroncounty.ca

Huron County's Asset Management Journey

Background

- Huron County with a population of 60,000 located along shores of Lake Huron
- Vibrant rural community leader in agricultural technology and innovation
- Fall 2020: County staff started participating in FCM's asset management technical assistance project to strengthen and advance the County's asset management program
- Completed six training modules delivered by practitioners from AMONTario
- Staff focus was on County Roads, Bridges and Large Culverts

Huron County's Asset Management Journey

Asset Hierarchy and Data Gap Analysis

- What worked well?
- What were the challenge areas?
- What were the outcomes?

Huron County's Asset Management Journey

What Worked Well

- Defining early in the process – "What Matters Most"
- Defining what data is needed to support the asset managers with their asset management program
- Setting up the structure of Asset Hierarchy and data requirements to establish long term success with the process while understanding our limitations
- Having invested considerable resources over the past few years to build out the some of the baseline core infrastructure asset data in our software tool

Huron County's Asset Management Journey

Challenges

- System limitations – Current asset management software
- Missing data pieces required for legislative requirements identified through this training process. Did not have any data to support performance levels of service
- Shortage of staff resources and the fiscal realities of municipal government, current and future
- One time set up versus ongoing annual maintenance of the data

Huron County's Asset Management Journey

Outcomes

- Defined asset hierarchy will support long-term success of the asset management program
- Identification of data gaps and a development of a data capture plan to be able to finalize the required models
- Framework to establish levels of service, risk assessments and life cycle costing strategies
- Ability to leverage these frameworks for our other assets classes

Questions?

Troy Mander, Director, Asset Management
Asset Management Ontario (AMONTario)
E: troymander@amontario.ca

Chris Chen, Executive Director
Asset Management Ontario (AMONTario)
E: chrischen@amontario.ca

Michael Blumhagen, Treasurer & Director of Corporate Services
County of Huron
E: mblumhagen@huroncounty.ca

Chris VanDooren, Program Manager, Canada Community-Building Fund
Association of Municipalities of Ontario
E: ccbf@amo.on.ca

All presentations, templates and recordings can be accessed here

AMO Association of Municipalities Ontario

ccbf@amo.on.ca
416-971-9856

www.buildingcommunities.ca/asset-management
@CCBFinOntario

AMO Association of Municipalities Ontario