

Milwaukee Metropolitan Sewerage District's Asset Management Journey

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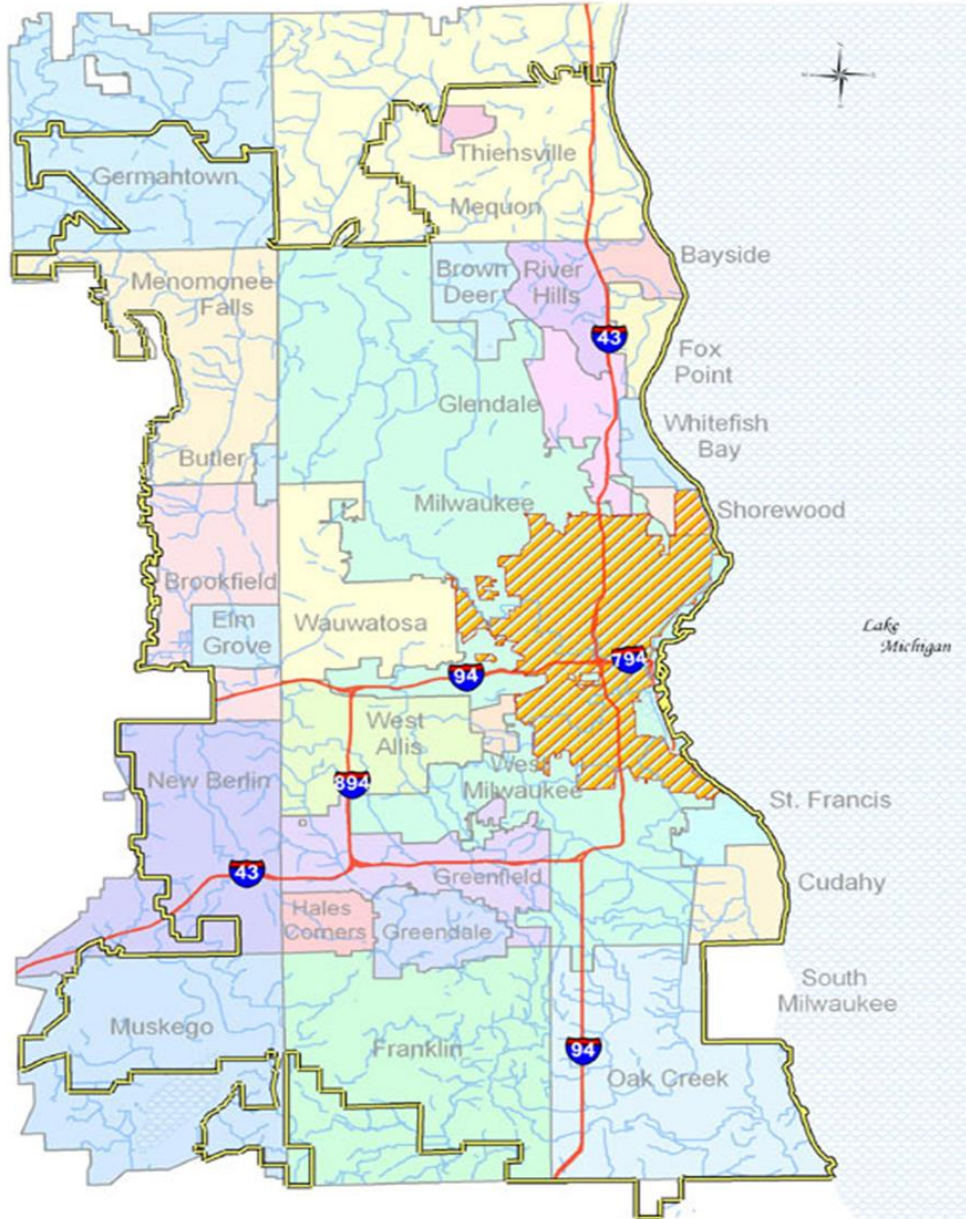
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BLACK & VEATCH



The Milwaukee Metropolitan Sewerage District



- Regional government agency
- Wastewater conveyance, water reclamation and flood management services
- 1.1 million people in 28 communities in the greater Milwaukee area
- 411 square miles in six watersheds
- Governed by 11 commissioners with taxing authority
- \$4.7 Billion in assets (installed costs)

Typical Asset Management (AM) Journey

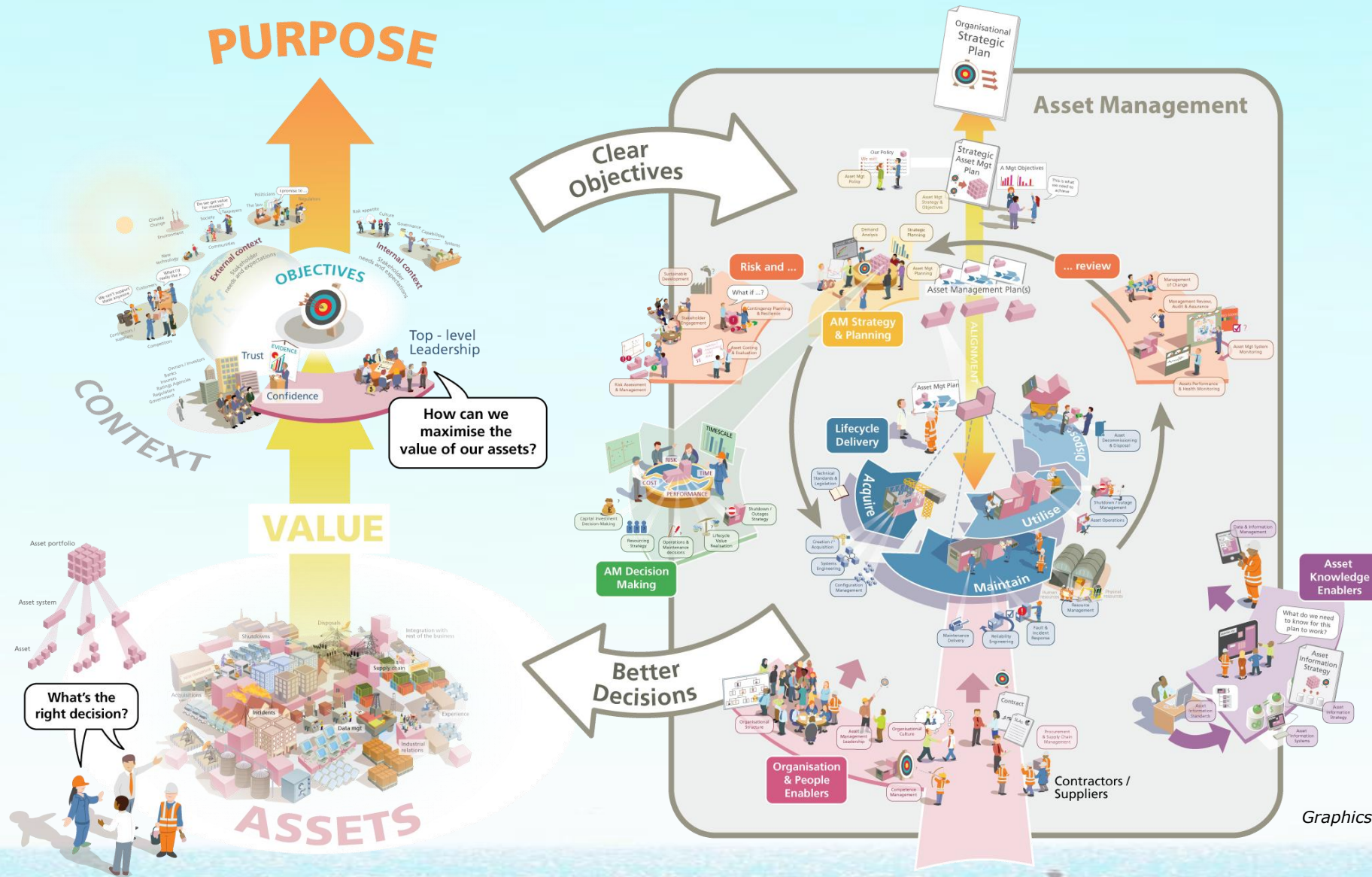


Institute of Asset Management

www.theiam.org

Graphics: Institute of Asset Management

The Elements of Asset Management



Graphics: Institute of Asset Management

Agenda

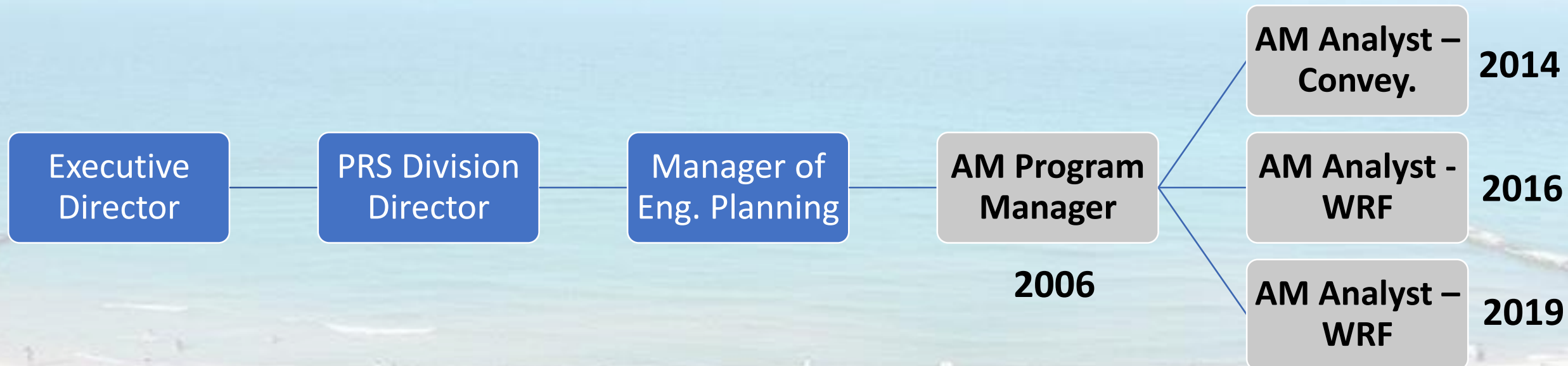
- Organizational AM Structure
- Asset Information and Processes
- Next Steps



Organizational Asset Management Structure



AM Department Hierarchy & Staff



AM Program Structure

Strategic

Exec. Steering
Comm.

2013

Tactical

Improvement
Team

2019

**Operational
(AM Teams)**

Reclamation

2017

Conveyance

2016

Watercourse

Future

Facilities

Future

Green Infra.

Future

Asset Information and Processes



Information – Data Hierarchy

Approx. 120

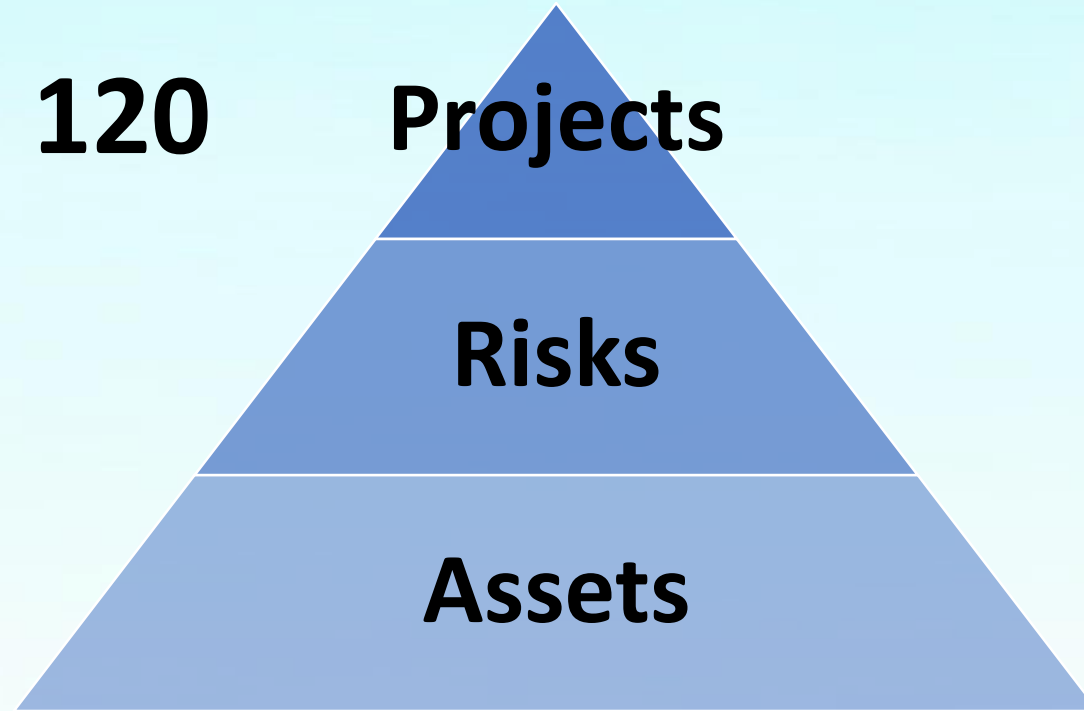
Projects

712

Risks

24,505

Assets



Information – Enterprise AM System

Connected Data

- Assets
- Risks
- Projects

The screenshot displays the 'AssetView' interface. On the left, a tree view shows a hierarchy of assets under '234 - BLDG 234 RAS PUMP STATION'. The 'Assets' column is highlighted, and an orange arrow points from the '234 - BLDG ...' asset to the main table. The main table lists assets with columns for Row, MMSD Asset ID, Asset Description, and Asset Status. An orange arrow points from the first row of this table to a detailed view on the right. This view shows various attributes for the asset 'SWITCHGEAR 480V #2', including its MMSD Asset ID (118472), Type (ASSET), Asset Category (ELECTRICAL), Asset Class (POWER DISTRIBUTION PANEL (B...)), Asset Type (SWITCHGEAR), Fixed Asset Class (185 - MACHINERY & EQUIPMENT), Asset Value (Original Acquisition Cost: \$114,259.00, Current Year Replacement Cost: \$142,111.99), Asset Life (In Service Date: 05/18/2011, Est Useful Life: 25, Governing Rehab Replace Year: 2036), and Project (Project Assets (1)).

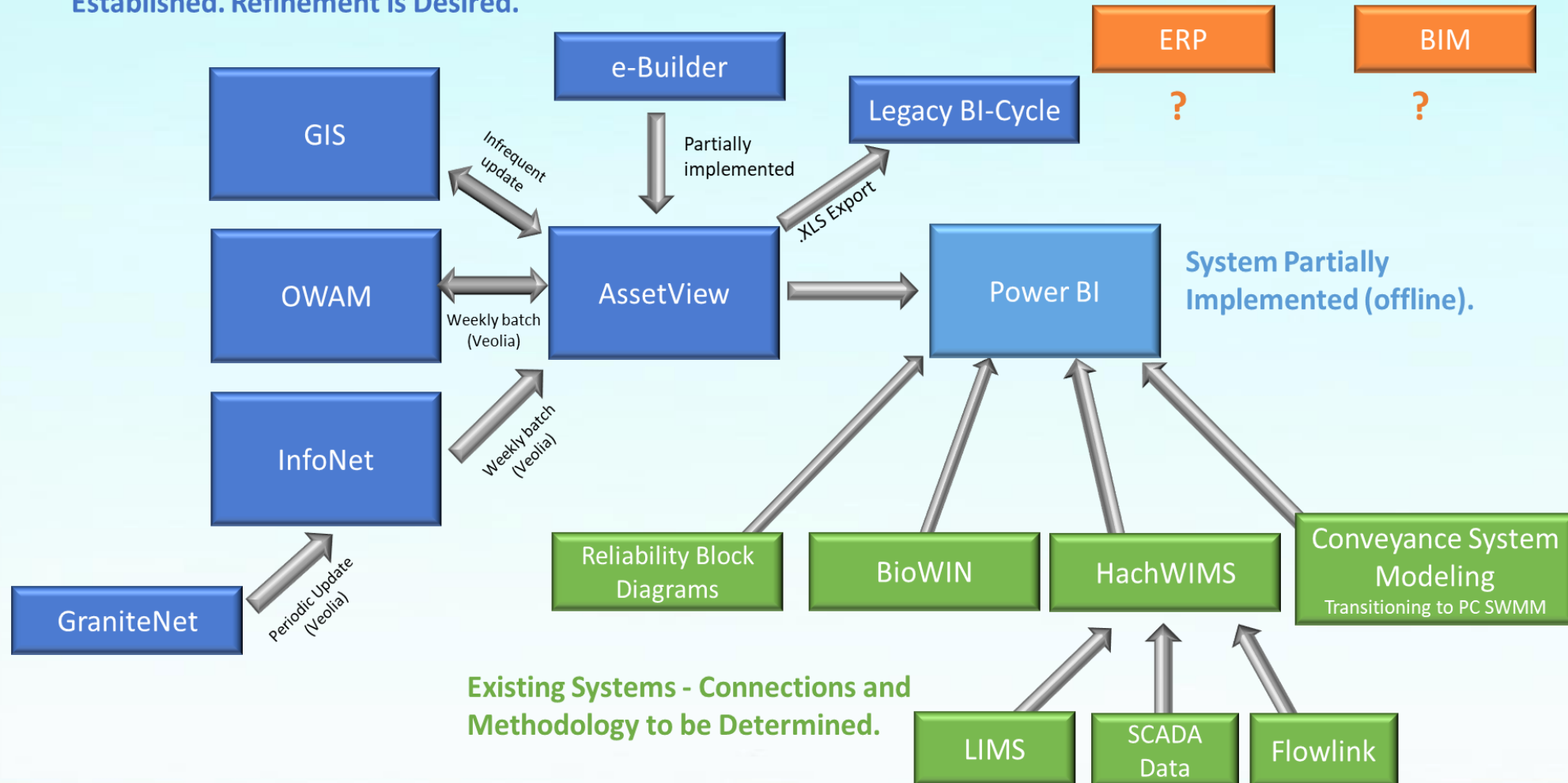
Row	MMSD Asset ID	Asset Description	Asset Status
1	118472	SWITCHGEAR 480V #2	ACTIVE
2	118471	SWITCHGEAR 480V #1	ACTIVE
3	104794	SWITCHGEAR - RAS/WAS	ACTIVE
4	103261	SWITCH, AUTOMATIC TRANSFER #21, 234-BPP-10 T...	ACTIVE
5	117172	SWITCH, AUTOMATIC TRANSFER #2	RETIRED REMOV
6	104800	SWITCH, AUTOMATIC TRANSFER #12, 234-SWGR-1 T...	ACTIVE
7	103260	SWITCH, AUTOMATIC TRANSFER #10, 234-MCC-1 TO...	ACTIVE
8	117171	SWITCH, AUTOMATIC TRANSFER #1	RETIRED REMOV
9	104738	SUBSTATION #2 - (234-SS-2)	ACTIVE
10	104737	SUBSTATION #1 - (234-SS-1)	ACTIVE
11	101531	SPRINKLER SYSTEM	ACTIVE
12	116022	ROOF SYSTEM, BLDG 234 JI RAS PUMP STATION	ACTIVE
13	103251	PUMP, SUMP, ELEVATOR PIT	CMMS ONLY
14	104746	PUMP, SUMP #2, RAS PUMP STATION BASEMENT	CMMS ONLY
15	104745	PUMP, SUMP #1, RAS PUMP STATION BASEMENT	CMMS ONLY
16	104763	PUMP, HOT WATER CIRCULATING, HWCP-4	CMMS ONLY

Row	ID_D81	Asset Id	Asset Description	P&ID or Equipment Tag No.
1	J06057C01	118472	SWITCHGEAR 480V #2	234-SWBD-2

Information – AM Data Strategy

Existing Systems - Connections
Established. Refinement is Desired.


Future Systems - Configuration in Progress



Process – AM Standards Developed

13 AM SOP's developed

- Asset definition
- Asset hierarchy definition
 - Categories, classes, types
- Condition assessment
- Risk methodology
- Asset register maintenance
- etc.

	Risk Identification Process	SOP #	AM - 010
		Revision #	
		Implementation Date	
	Page #	Page 1 of 6	Last Reviewed/Update Date
SOP Owner	AM Department	Approval	

1. Purpose

This procedure describes MMSD's approach to risk identification. It describes roles and responsibilities, process and methodology for identifying risk consistently across the organization.

The Risk Identification process is step two of the Overall Risk and Investment Planning process, shown in Figure 1. This process describes the procedure for identifying, managing, and mitigating risks and ultimately developing the annual Asset Investment Forecast. This SOP should be used in combination with the Risk Identification Process Workflow Diagram that is included as Attachment A. This SOP document provides additional details to describe activities shown on the workflow diagram.

Risks typically falls into three categories related to asset management at MMSD:

- **Asset level risks:** risks that generally apply to a single asset or small group of related assets. These risks are addressed in SOP AM-009 (Asset Level Data Evaluation), where some risks may be identified for possible addition to the risk register.
- **Risk register risks:** risks that pertain to assets, but may occur more broadly to multiple assets or asset systems. Generally speaking, these are risks that can be assigned in the asset hierarchy but are best applied at a level of the hierarchy above the asset.
- **Enterprise/organization risks:** risks that are not necessarily directly applicable to assets or asset systems but pose a potential threat to the MMSD at an organizational level. The MMSD does not currently have a separate system to track such risks, so Enterprise level risks are tracked on the risk register until MMSD identifies an alternate methodology to handle such risks.



Process – Desktop Condition Assessments

- In-person meetings with O&M staff
- Identify assets condition and useful life
- Proactive rehab and replacement
- Engages staff in AM



Process – Risk Methodology

- Definitions for Likelihood and Consequence of Failure
- Risk Scoring Levels defined

Likelihood of Failure

Ranking	Score	Definition
Very High	75	Event will occur within a year.
High	25	Event will occur at least once every 1-5 years.
Medium	5	Event will occur at least once every 6-10 years.
Low	2	Event will occur at least once every 11-20 years.
Very Low	1	Event will occur at least once every 21+ years.
NA	0	NA

Consequence of Failure

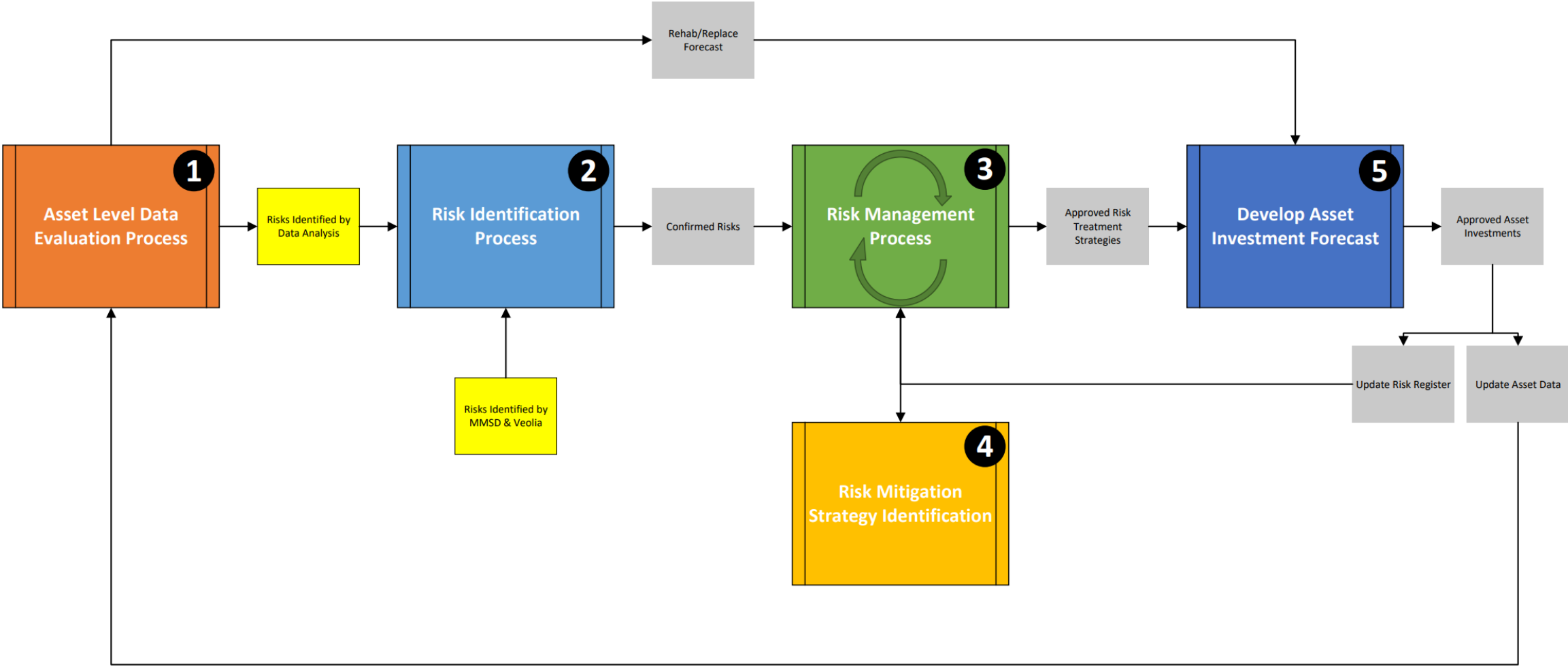
Ranking	Score
Very High	1,000
High	220
Medium	25
Low	6
Very Low	1
NA	0

Likelihood of Failure (1-75) x Consequence of Failure (1-1,000)

Risk Level	Governing Risk Score
High Risk	> 10,001
Moderate Risk	1,001 – 10,000
Low Risk	101 – 1,000
Minimal Risk	0 – 100

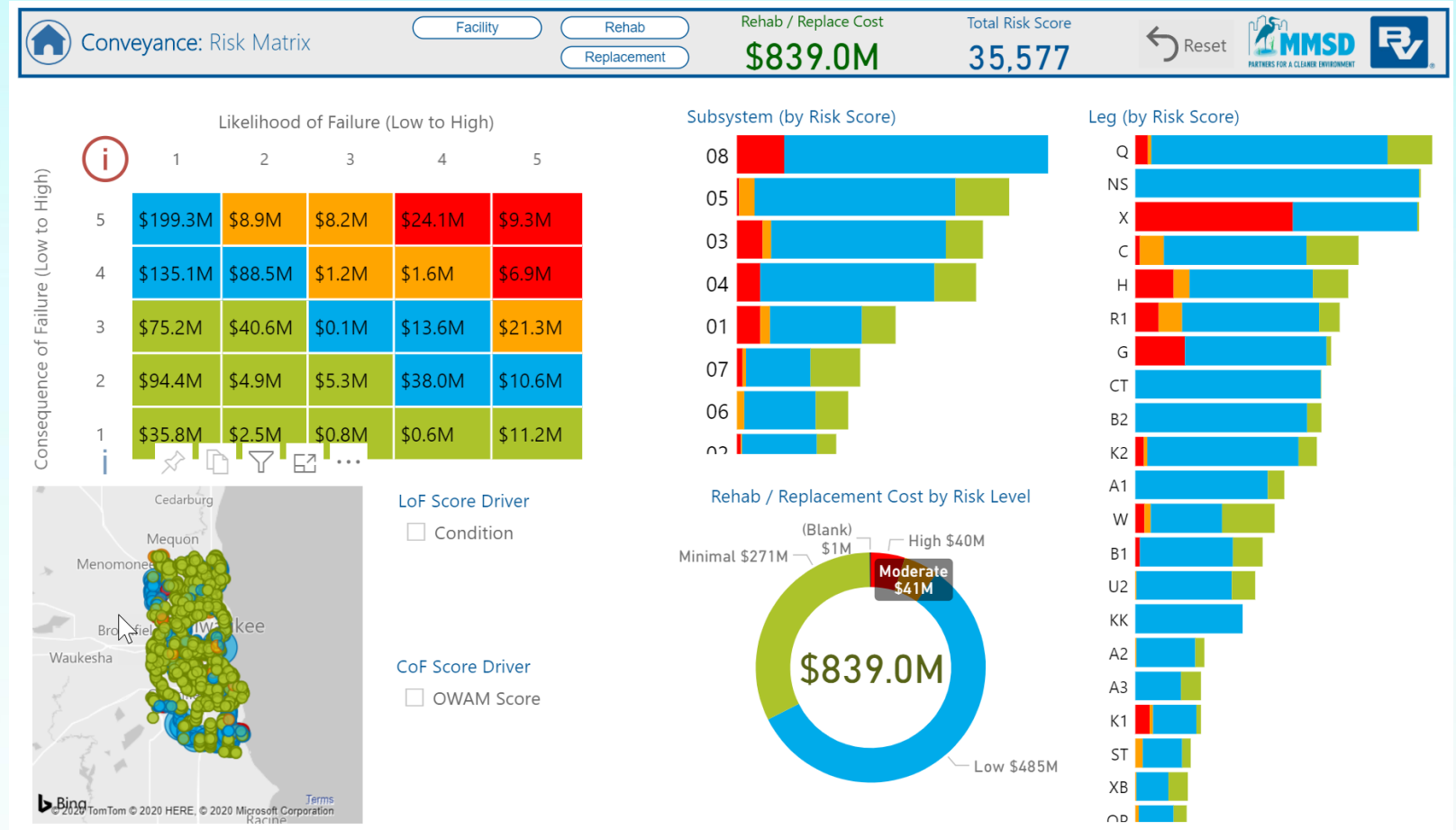


Process – Risk Management Processes



Information – Analysis Tools

- Dashboards developed to analyze and view information
- Power BI is common platform at MMSD
- Connection to multiple data systems



Process – Project Asset Tables

- Proactively identify assets prior to project bid
- Coordination between Stakeholders:
 - Asset Management
 - Project Management
 - Designer
 - Contractor
 - Veolia (operator)

Project									
Project Number	Description	Project Start Date	Project Status	Projec	Project				
J01021	Grit Basin Equipment Replacement				Project Number	Description			
					Project Start Date				

Project Assets									
Contract	Asset Id	Asset Description	P&ID or Equipment Tag No.	Building	Field Location	Action Status	Risk ID	Repl Asset	
J01021C01	146308	PUMP, GRIT #6	203-P-3-6-6	BLDG203	20300000	ADD	#	Y	
J01021C01	146307	PUMP, GRIT #5	203-P-3-6-5	BLDG203	20300000	ADD	#	Y	
J01021C01	146306	PUMP, GRIT #4	203-P-3-6-4	BLDG203	20300000	ADD	#	Y	
J01021C01	146305	PUMP, GRIT #3	203-P-3-6-3	BLDG203	20300000	ADD	#	Y	
J01021C01	146304	PUMP, GRIT #2	203-P-3-6-2	BLDG203	20300000	ADD	#	Y	
J01021C01	146303	PUMP, GRIT #1	203-P-3-6-1	BLDG203	20300000	ADD	#	Y	
J01021C01	146296	MECHANISM, GRIT #6	203-M-3-2-6	BLDG203	20300000	ADD	#	Y	
J01021C01	146295	MECHANISM, GRIT #5	203-M-3-2-5	BLDG203	20300000	ADD	#	Y	
J01021C01	146294	MECHANISM, GRIT #4	203-M-3-2-4	BLDG203	20300000	ADD	#	Y	
J01021C01	146293	MECHANISM, GRIT #3	203-M-3-2-3	BLDG203	20300000	ADD	#	Y	
J01021C01	146292	MECHANISM, GRIT #2	203-M-3-2-2	BLDG203	20300000	ADD	#	Y	
J01021C01	146291	MECHANISM, GRIT #1	203-M-3-2-1	BLDG203	20300000	ADD	#	Y	
J01021C01	145781	MECHANISM, GRIT #2	203-M-3-2-2	BLDG203	20300000	REMV	#	Y	
J01021C01	122154	PIPING AND VALVES GROU		BLDG201	20100000	MOD	#	N	
J01021C01	103941	MCC, BLDG203 #8	203-MCC-8	BLDG203	20300000	MOD	#	N	
J01021C01	103940	MCC, BLDG203 #7	203-MCC-7	BLDG203	20300000	MOD	#	N	
J01021C01	103937	MCC, BLDG203 #4	203-MCC-4	BLDG203	20300000	MOD	#	N	
J01021C01	103936	MCC, BLDG203 #3	203-MCC-3	BLDG203	20300000	MOD	#	N	
J01021C01	103908	MECHANISM, GRIT #6	203-M-3-2-6	BLDG203	20300000	REMV	#	Y	
J01021C01	103907	MECHANISM, GRIT #5	203-M-3-2-5	BLDG203	20300000	REMV	#	Y	
J01021C01	103906	MECHANISM, GRIT #4	203-M-3-2-4	BLDG203	20300000	REMV	#	Y	
J01021C01	103905	MECHANISM, GRIT #3	203-M-3-2-3	BLDG203	20300000	REMV	#	Y	
J01021C01	103903	MECHANISM, GRIT #1	203-M-3-2-1	BLDG203	20300000	REMV	#	Y	
J01021C01	103891	PUMP, GRIT #6	203-P-3-6-6	BLDG203	20300000	REMV	#	Y	
J01021C01	103889	PUMP, GRIT #5	203-P-3-6-5	BLDG203	20300000	REMV	#	Y	
J01021C01	103887	PUMP, GRIT #4	203-P-3-6-4	BLDG203	20300000	REMV	#	Y	
J01021C01	103885	PUMP, GRIT #3	203-P-3-6-3	BLDG203	20300000	REMV	#	Y	
J01021C01	103883	PUMP, GRIT #2	203-P-3-6-2	BLDG203	20300000	REMV	#	Y	
J01021C01	103881	PUMP, GRIT #1	203-P-3-6-1	BLDG203	20300000	REMV	#	Y	

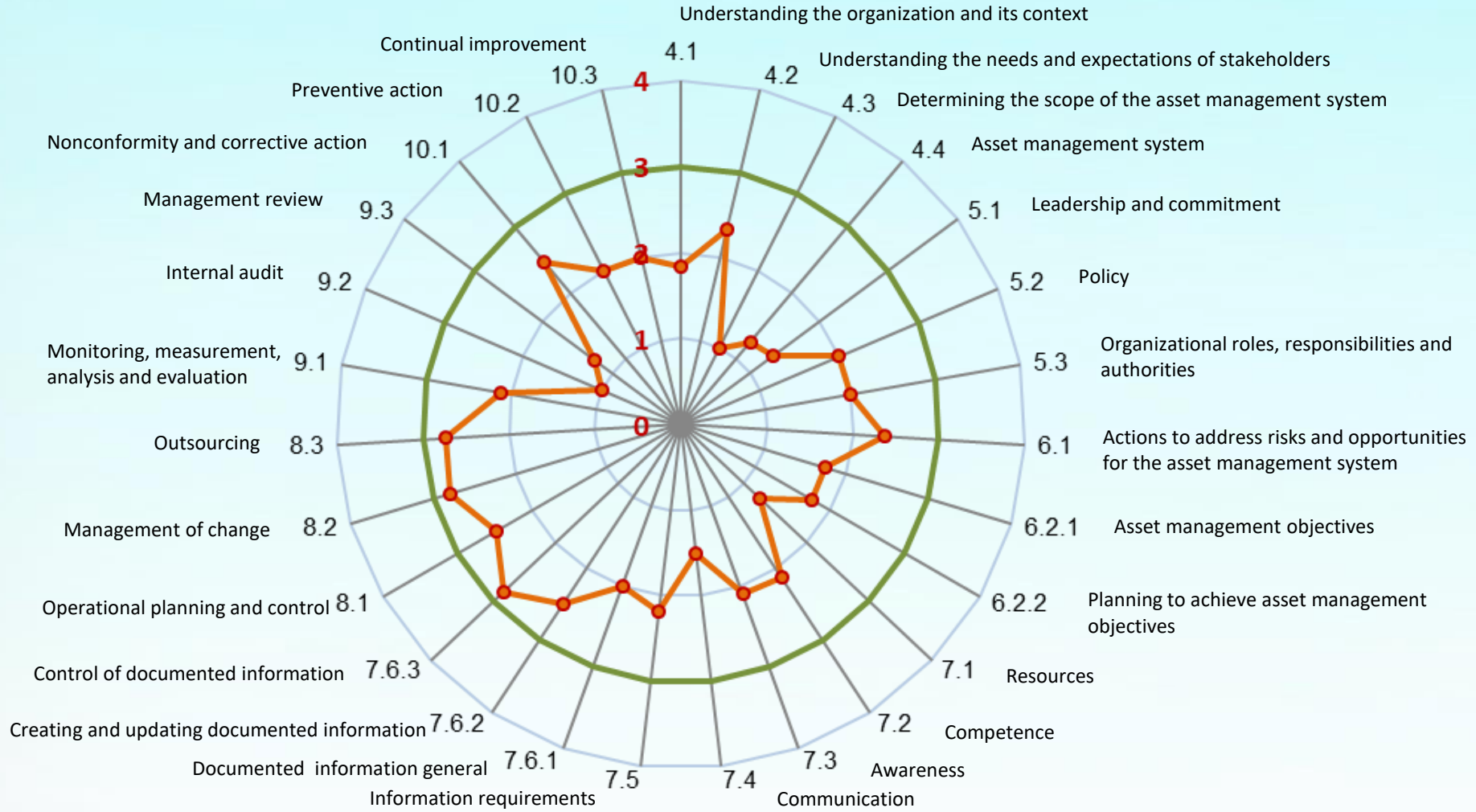
Next Steps



AM Program Gap Assessment – Approach



ISO 55001 Assessment Results



MMSD
 average score
 of 2.0



Components of Improvement Plan

- Summary of all actions (32 actions)
- Schedule
- Resource requirements
- Detailed action summaries

MMSD Asset Management Improvement Plan - Schedule														
Initiative	Action	Lead	Priority	Timescale	Duration	2020				2021				
						Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1 Asset Management System Development	1.1 Develop AM Policy	Greg	High	2021 Q1/2	6 months									
	1.2 Develop AM Strategy and Objectives	Greg	High	2020 Q3/4	9 months									
	1.3 Develop Asset Management System Documentation	Greg	High	2020 Q3/4	1 year 6 months									
2 Management of Change	2.1 Develop AM Roles and Responsibilities	Greg	High	2021 Q1/2	9 months									
	2.2 Develop Resource Plan	Don	Medium	2021 Q3/4	9 months									
	2.3 Develop Succession Plan	Don	Low	2023	6 months									
	2.4 Develop and Implement Management of Change and Communications Plans	Mike	High	2021 Q1/2	1 year									
	2.5 Improve Training	Don	Medium	2021 Q3/4	1 year									
3 Risk Management	3.1 Complete Implementation of Asset Risk Management	Greg	High	2020 Q3/4	2 years									
	3.2 Develop Risk Management Framework	Don	Medium	2022 Q1/2	9 months									
	3.3 Implement Enterprise Risk Management	Pat	Low	2023	9 months									
4 Project Planning and Prioritization	4.1 Implement BCE Process and Project Prioritization	Rick	High	2020 Q3/4	1 year 6 months									
	4.2 Improve Project Planning Process	Micki	High	2021 Q1/2	1 year									

MMSD Asset Management Improvement Plan - Action Summary					
Note: Cells in grey autopopulate when Action ID is selected from dropdown, cells in white require manual updates					
Initiative ID	1	Initiative Name:	Asset Management System Development		
Action ID:	1.2	Action:	Develop AM Strategy and Objectives		
Objective:	1. Establish an Asset Management Framework modeled after the ISO 55000 standard				
Implementation Cost (Not to include MMSD labor costs) \$:	\$0 - \$50,000	Lead:	Greg	Priority:	High
Annual Cost (Not to include MMSD labor costs) \$:	\$0 - \$50,000	Duration:	9 months	Resourcing Level:	Low - Less than 500 hours
ISO 55001 Gap (Need)			Benefits		
4.1, 4.2, 4.3, 4.4, 6.2.1			This initiative provides the baseline and guidance for development of an AM program. It defines the objectives and the strategy to achieve those objectives. It shows executive support for the program through the implementation of a policy that is directed in the context of the objectives. Finally, it provides an overall structure and scope to the program that will provide the basis for a combined understanding and alignment of efforts across the organization.		
Action Description			Required Resources		
<ul style="list-style-type: none"> Develop an asset management strategy that includes: description of internal and external issues, stakeholder needs, approach to asset management, and asset management objectives. Define the scope of the asset management system. 			AM Department, AMIT, AMESC		

Discussion/Questions

