



Effective Utility Management for Wastewater Systems

Thursday September 24, 2026 (1:00 to 2:00 pm EST)

Instructor: Greg Pearson, Great Lakes Environmental Infrastructure Center, MTU



What we will cover

- Challenges in the Wastewater Industry
- How Effective Utility Management works
- Understanding the EUM attributes
- Strategic planning using EUM



Goals of a Wastewater Utility

PROTECT PUBLIC
HEALTH AND THE
ENVIRONMENT

SUPPORT
RESIDENTIAL AND
BUSINESS
DEVELOPMENT

EFFICIENT USE OF
RESOURCES, COST-
EFFECTIVE SERVICE

RESPOND TO, AND
RECOVER FROM
EMERGENCIES

PROVIDE
CUSTOMER SERVICE
AND TRANSPARENT
COMMUNICATION



2025 Report Card for Wastewater Infrastructure

- Renewal and replacement rates decreased from 3% to 2%
- Collection system failures increased from 2 to 3.3 per 100 miles of pipe
- Only 30% of infrastructure capital needs are being met
- At current investment levels, a gap of \$680 billion is predicted by 2044

The Nation's Sewers are worth \$1 trillion and include 17,500 WWTPs

A Comprehensive Assessment of America's Infrastructure – American Society of Civil Engineers (ASCE, 2025)

<https://infrastructurereportcard.org/wp-content/uploads/2025/03/Full-Report-2025-Natl-IRC-WEB.pdf>

Challenges in the Wastewater Industry

Aging infrastructure

- Breaks and sanitary sewer overflows
- Inflow and Infiltration (excessive flows)

Questions:

1. How can we create a plan to address priority repairs and replacements? and
2. How can we measure progress toward these goals?

- *Condition assessment strategies such as CCTV and corrosion surveys, followed by risk analysis, can help identify priority needs.*
- *KPIs include a) percent replacement per year, b) SSOs per 100 miles, and c) GPD per inch-mile of collections main.*



Challenges in the Wastewater Industry

Socio-economic

- Retirement of the aging workforce (loss of knowledge)
- Need to raise rates vs affordability metrics ($\leq 2.0\%$)

Questions:

1. How can we capture organizational knowledge and recruit and train a sufficient workforce?
2. How can we ensure sufficient revenue while keeping rates affordable?

*If the wastewater bill exceeds **2.0% of the MHI**, it can place a "high financial burden" on households.*



*The U.S. Bureau of Labor Statistics (BLS) projects that the industry will need to fill roughly **10,000 openings for water and wastewater treatment plant operators each year** through 2034*

Challenges in the Wastewater Industry

Regulatory

- More stringent nutrient regulations and demand for reuse
- PFAS testing and regulatory uncertainty
- Microcontaminants of emerging concern

Questions:

1. How can treatment processes be optimized to remove nutrients?
2. How can WWTPs be redesigned to remove PFAS chemicals and microcontaminants?



Microcontaminants such as pharmaceuticals, synthetic hormones, and PFAS have highly stable structures and are found at ppt levels. WWTPs were not originally designed to remove them.

Poll 1

Which of the following do you think is the most serious challenge facing the wastewater industry today?

- a) Potential for PFAS removal regulations on the horizon
- b) Aging infrastructure leading to I&I and SSOs
- c) Balancing rate increases with affordability
- d) Mass retirement of experienced operators
- e) Something different (share in the chat)



Effective Utility Management (EUM)

The EUM Process

- Conduct a self-assessment
- Rank attributes and Graph Results
- Create an improvement strategy
- Use metrics to measure progress



The 10 Attributes

1. Stakeholder Understanding and Support (SU)
2. Regulatory and Reliability Performance (RR)
3. Customer Experience and Satisfaction (CE)
4. Infrastructure Strategy and Performance (IS)
5. Water Resource Sustainability (WR)
6. Community Sustainability (CS)
7. Operational Optimization (OO)
8. Workforce Development (WD)
9. Enterprise Resiliency (ER)
10. Financial Viability (FV)



The 5 keys to management success

1. Strategic Business Planning and Management
2. Continual Improvement Management
3. Knowledge Management
4. Measurement
5. Leadership



Strategic Planning

- Strategic objectives are developed in alignment with the utility's mission, future vision, and values. Action steps implement strategic objectives

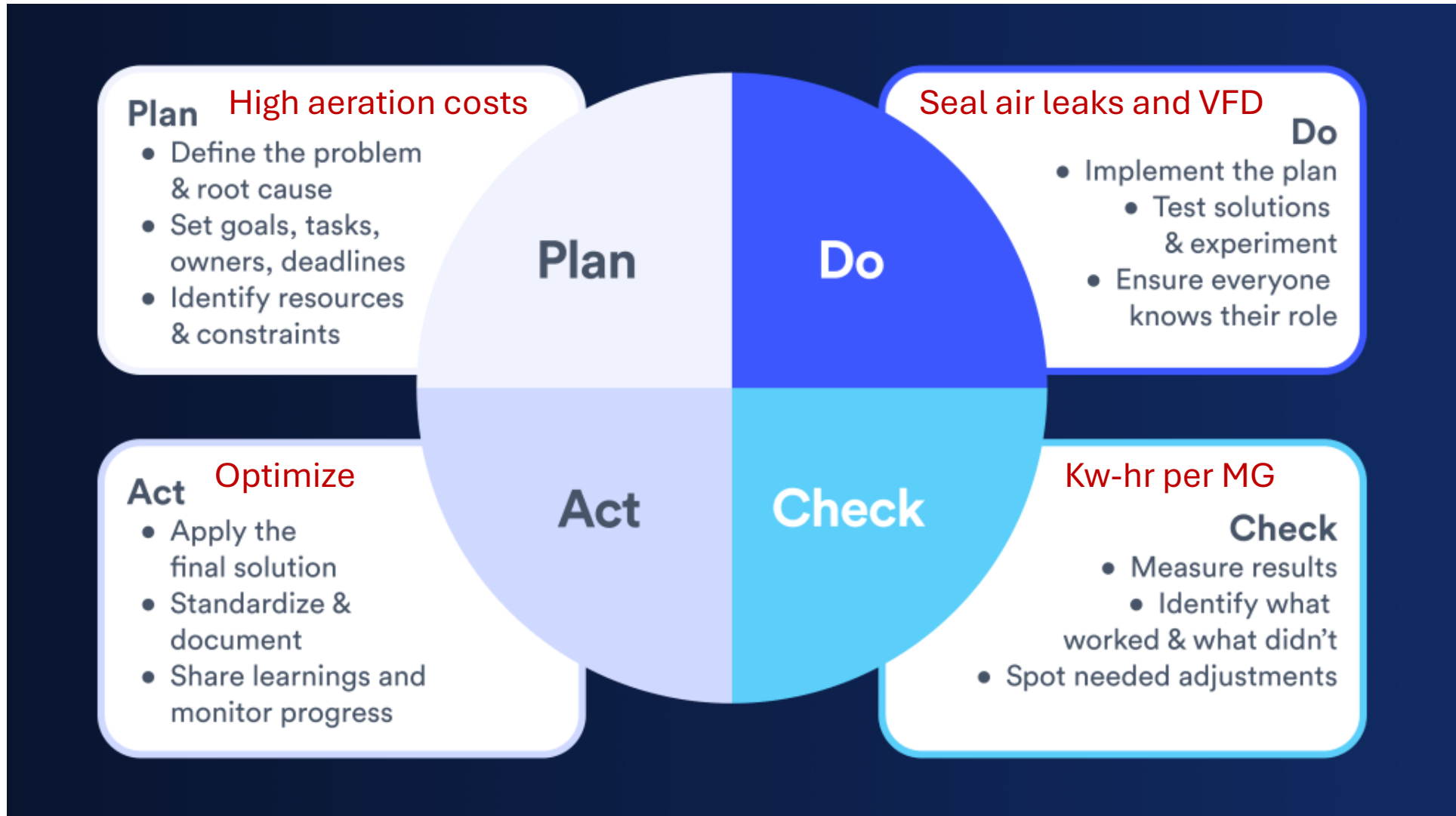
Strategic planning is a different approach from reacting to problems as they occur

Strategic objective: Improve BOD removal in the lagoon treatment plant from 85% to 95% by 2028

Action Steps:

- 1) Study BOD removal at the effluent of cells 1, 2, and 3
- 2) Monitor dissolved oxygen levels throughout the lagoon
- 3) Install additional aerators and add baffles





“I can manage any company because I can run PDCA.” Hiroshi Okuda, former Toyota CEO

Knowledge Management

- Capture valuable knowledge of experienced operators for critical tasks in operations manuals and SOPs.
- Convert operations manuals into onboarding training guides for new operators
- Use digital tools to capture knowledge about assets (GIS, databases)



Measurement

Measurement lets you know if your strategy is working

KPIs = Key Performance Indicators



Example: The operating ratio compares the annual revenue to the annual expenses. It should be greater than 1.0 to cover emergency and operating reserves. A typical OR target is 1.4. Consider a system with a revenue of \$450,000 and expenses of \$420,000.

$$\text{OR} = \frac{\text{Revenue}}{\text{Expense}} = \frac{450,000}{420,000} = 1.07$$

This system may decide to increase rates over a 3-year period and monitor progress using the Operating Ratio as a KPI, working to increase it from 1.07 to 1.4 in year 3. Each year, the utility could check this KPI, using PDCA to see if the strategy is working.

Leadership (what is it?)

- Establishing a shared vision
- Advocating for the utility as a public health steward
- Making decisions in the best interest of the organization

Leadership is the ability to influence, inspire, and guide others toward achieving a common goal. You don't need a title to be a leader – you can lead by example through your actions.



EUM Primer

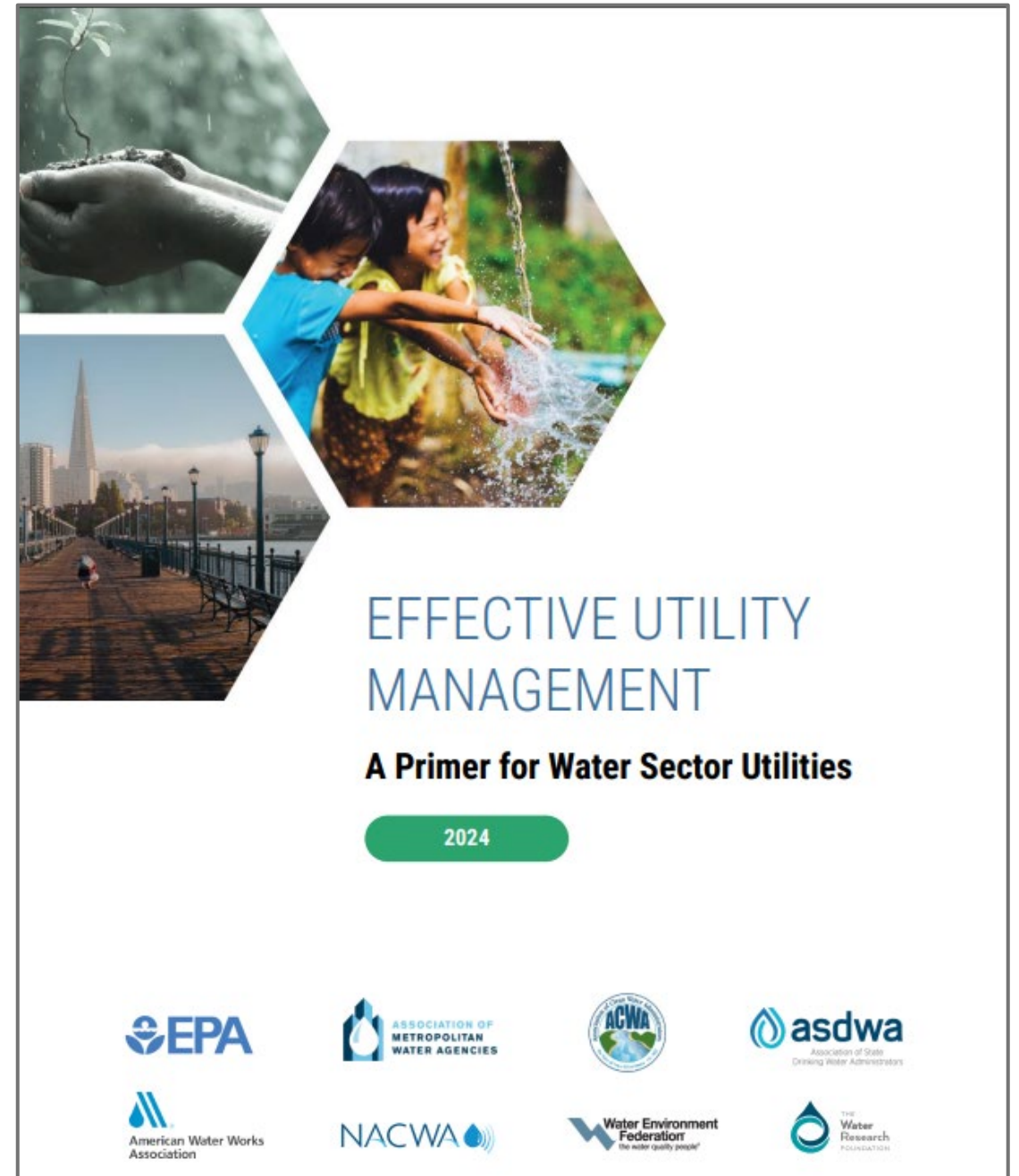
Provides instructions and resources to utilize the EUM process

Most recent edition (2024)

Link to download:

Effective Utility Management: A Primer for Water Sector Utilities (USEPA, 2024)

<https://www.epa.gov/system/files/documents/2024-08/eum-primer.pdf>



Important information in the EUM Primer

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Section 2 describes the 10 attributes

Sections 5 and 6 explain how to use the EUM tools

Appendix B has a self-assessment table

Appendix C provides Measurement Metrics

Step 1: Assess the Current Level of Achievement

Rating	Description
1.	Effective, systematic approach and implementation; consistently achieve goals.
2.	Workable systems in place; mostly achieve goals.
3.	Partial systems in place with moderate achievement but could improve.
4.	Occasionally address this when specific need arises.
5.	No system for addressing this.

- *In the self-assessment, you compare your utility's current performance against each attribute using a 1 to 5 scale.*

Example: A wastewater system has a complete asset inventory but lacks sufficient condition assessment data to analyze risk and to prioritize repairs and replacements across all assets.

A community scenario

A small wastewater system has 5,500 connections. The treatment plant meets NPDES permit requirements 99% of the time. The utility currently provides adequate service with only occasional outages and has an excellent relationship with ratepayers, partly due to customer service and partly because rates are so low.

The manager is concerned that aging infrastructure will lead to increased infiltration and Sanitary Sewer Overflows (SSOs). Recently, a sewer main collapsed, and two SSO events occurred during heavy rains. The main challenges of this system are:

- Aging infrastructure without an adequate asset management program
- Both operators are near retirement
- Low revenue to expense ratio



Step 2: Rank the attributes by importance

The attributes are ranked 1 through 10 by importance to your utility



Attribute	Rating	Rank
Infrastructure Strategy & Performance(IS)	4	1
Workforce Development (WD)	5	2
Financial Viability (FV)	4	3
Customer Experience & Satisfaction (CS)	1	4
Regulatory & Reliability Performance (RR)	3	5
Water Resource Sustainability (WS)	2	6
Stakeholder Understanding & Support (SS)	4	7
Enterprise Resiliency (ER)	2	8
Operational Optimization (OO)	1	9
Community Sustainability (SU)	4	10

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Community Sustainability (SU)	- Actively leads in promoting and organizing community sustainability improvements through collaboration with local partners. - Uses operations to enhance natural environment. - Efficiently uses water and energy resources, promotes economic vitality, and engenders overall community improvement. - Maintains and enhances ecological and community sustainability including pollution prevention, watershed and source water protection. - Identifies and implements programs such as community benefits and workforce development initiatives to increase investments in people and the community for improved economic inclusion.	4	10
Customer Experience and Satisfaction (CS)	- Provides reliable and responsive services. - Receives timely customer feedback. - Encourages all utility personnel to be aware of and responsive to customer needs and emergencies. - Provides tailored customer service and outreach to a range of customer groups (e.g., residential, commercial, industrial, and newly emerging groups such as high-strength waste producers or power companies).	1	4

Step 2: Rank the attributes by importance

The attributes are ranked 1 through 10 by long-term importance to your utility.

Attribute	Rating	Rank
Infrastructure Strategy & Performance(IS)	4	1
Workforce Development (WD)	5	2
Financial Viability (FV)	4	3
Customer Experience & Satisfaction (CS)	1	4
Regulatory & Reliability Performance (RR)	3	5
Water Resource Sustainability (WS)	2	6
Stakeholder Understanding & Support (SS)	4	7
Enterprise Resiliency (ER)	2	8
Operational Optimization (OO)	1	9
Community Sustainability (SU)	4	10

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Financial Viability (FV)	- Establishes predictable and equitable rates consistent with community expectations that consider full life-cycle cost of utility operations and value of water resources. - Effectively balances long-term debt, capital, operations and maintenance expenditures with revenues and asset values. - Adequately recovers costs, provide reserves, invest for future needs, maintain optimal bond ratings, and address cost of service and the needs of disadvantaged households. - Understands opportunities for diversifying revenue and raising capital through adoption of new and innovative business and financing models.	4	3
Infrastructure Strategy and Performance (IS)	- Understands the condition of and costs associated with critical infrastructure assets. - Maintains and enhances assets over the long-term at the lowest possible life-cycle cost and acceptable risk. - Coordinates repair efforts within the community to minimize disruptions. - Plans infrastructure investments consistent with community needs, anticipated growth, system reliability goals, and with a robust set of adaptation strategies. - Integrates service equity and environmental justice in the capital project planning process.	4	1

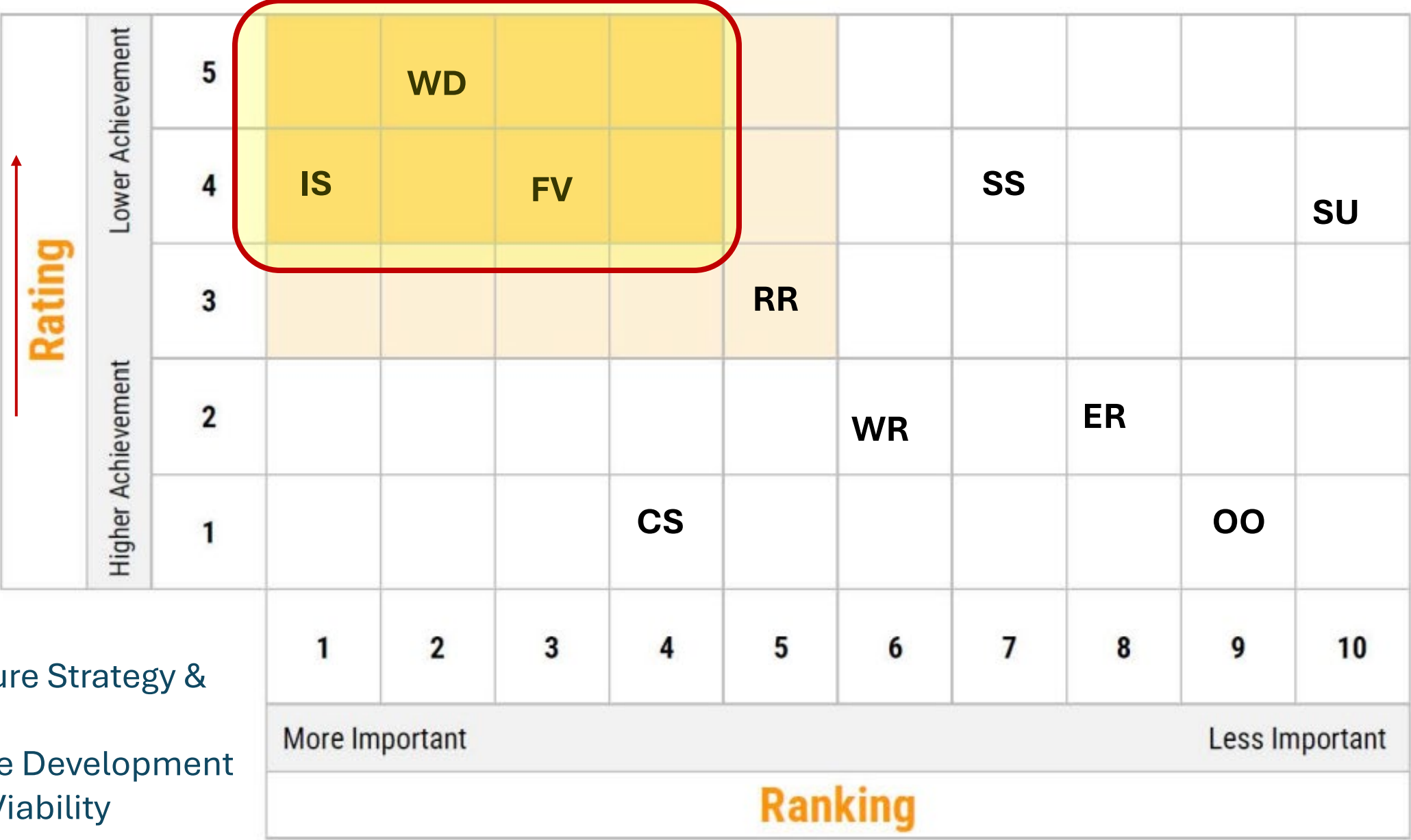
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Operational Optimization (OO)	1	9
Community Sustainability (SU)	4	10

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Water Resource Sustainability (WS)	- Understands the utility's role in the complete water cycle including fit for purpose water reuse options, ensuring attainment of designated uses and maintenance of surface water quality, and integrating utility objectives and activities with other watershed managers and partners. - Manages operations to provide for long-term aquifer and surface water sustainability and replenishment. - Understands and plans for future water resource variability (e.g., changing weather patterns, including extreme events, such as drought and flooding). - Undertakes long-term integrated water resource planning, striving to equitably meet customer, community, and ecological water-related needs.	2	6
Workforce Development (WD)	- Recruits, develops, retains, and inspires a workforce that is inclusive, competent, motivated, adaptive, and reflective of the community they serve. - Maintains a participatory, collaborative organization dedicated to continual learning, technical proficiency, safety, and innovation where employees recognize themselves as valuable team members that belong and actively contribute to achieving utility goals. - Implements procedures for institutional knowledge retention, workplace safety, and continual learning (e.g., standard operating	5	2

Chart each Attribute based on your ratings and rankings.



A large concrete pipe is shown in a trench, with the pipe extending into the distance. The trench is dug into reddish-brown soil, and the pipe is supported by wooden planks at the bottom. In the background, there are some trees and utility poles under a clear sky.

Infrastructure Strategy and Performance (IS)

- Understands the condition of and costs associated with critical infrastructure assets.
- Maintains assets at the lowest possible life-cycle cost
- Coordinates repair efforts within the community to minimize disruptions.
- Plans infrastructure investments consistent with asset management planning and community needs

SSO Rate = $\frac{\text{SSO events in a year}}{\text{Miles of collection Pipe}} \times 100 \text{ miles} = \text{SSOs}/100 \text{ mi}$

Renewal Rate = $\frac{\text{number of assets replaced per year}}{\text{total number of assets}} \times 100\%$



Workforce Development

- Recruits, develops, retains, and inspires a workforce that is competent, motivated, and reflective of the community they serve.
- Dedicated to continual learning, technical proficiency & safety
- Employees recognize themselves as valuable team members who belong and actively contribute to achieving utility goals.
- Implements procedures for institutional knowledge retention

Measurement:

Employee turnover rate: $\frac{\text{number of employee departures/yr}}{\text{total number of positions}} \times 100\%$

Knowledge Capture = $\frac{\text{number of critical tasks documented}}{\text{total number of critical tasks}} \times 100\%$



Financial Viability

- Establishes sufficient rates to cover operation, maintenance, and replacement costs but do not overburden households.
- Effectively balances long-term debt and capital investments, with revenues and asset values.
- Maintains an adequate bond rating.

Measurements:

$$\text{Operating Ratio} = \frac{\text{Revenue}}{\text{Expense}}$$

$$\text{Affordability} = \frac{\text{Average annual Cost of Bill}}{\text{Median Household Income}} \times 100\%$$

Poll 2

A small system serving 1,000 connections is in a community expected to quadruple in size due to a major warehouse and a data center coming to the area. This growth will require upgrading the wastewater treatment plant and the interceptor sewer.

Which of these should the utility establish or strengthen FIRST to prepare?

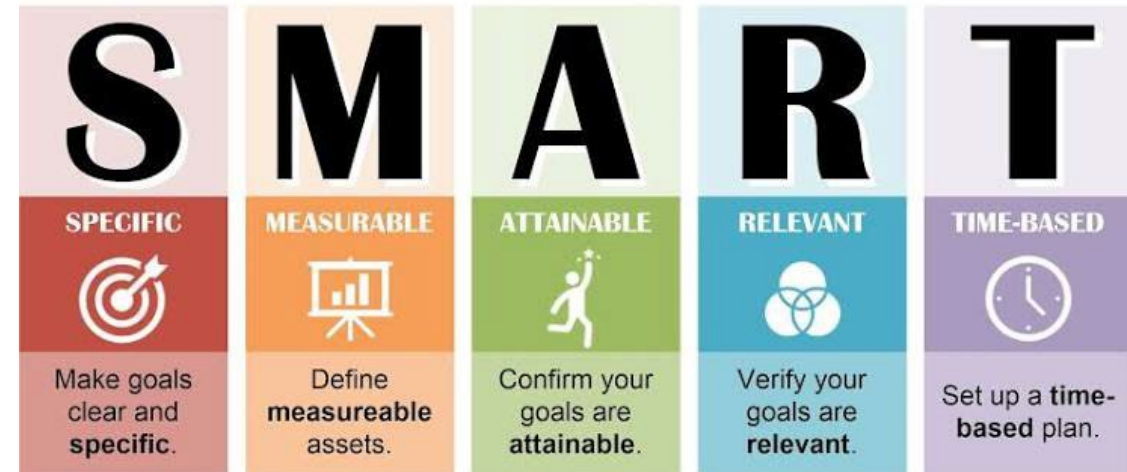
- a. An operating ratio target, so revenue can cover the higher O&M costs
- b. A capacity and condition assessment of the current plant and interceptor sewer
- c. A training plan for critical operator positions, so there's certified staff capacity
- d. A capital financing plan (rate study and low-interest loans) to fund the upgrades.



Share your thoughts and experiences in the chat

SMART Goals for Strategic Objectives

- **Specific:** Your goal must be clear and well-defined. Answer *what* you want to do and *who* is involved.
- **Measurable:** Include exact numbers or data to track your progress. This lets you know when you reach success.
- **Achievable:** Make sure the goal is realistic. You need the right skills, tools, and time to do it.
- **Relevant:** The goal must matter to you. It should fit your broader plans or values.
- **Time-bound:** Set a clear deadline. A final date creates urgency and focus



Examples of Improvement Goals (SMART goals)



Infrastructure Strategy & Performance (IS)

Reduce SSOs to fewer than 1 per 100 miles of pipe by 2030

Conduct CCTV inspections on 5% of the collection system each year.



Workforce Development (WD)

Knowledge capture of employees by 2028, achieving a KCI of 100%

Provide an apprenticeship opportunity to a new operator by 2027

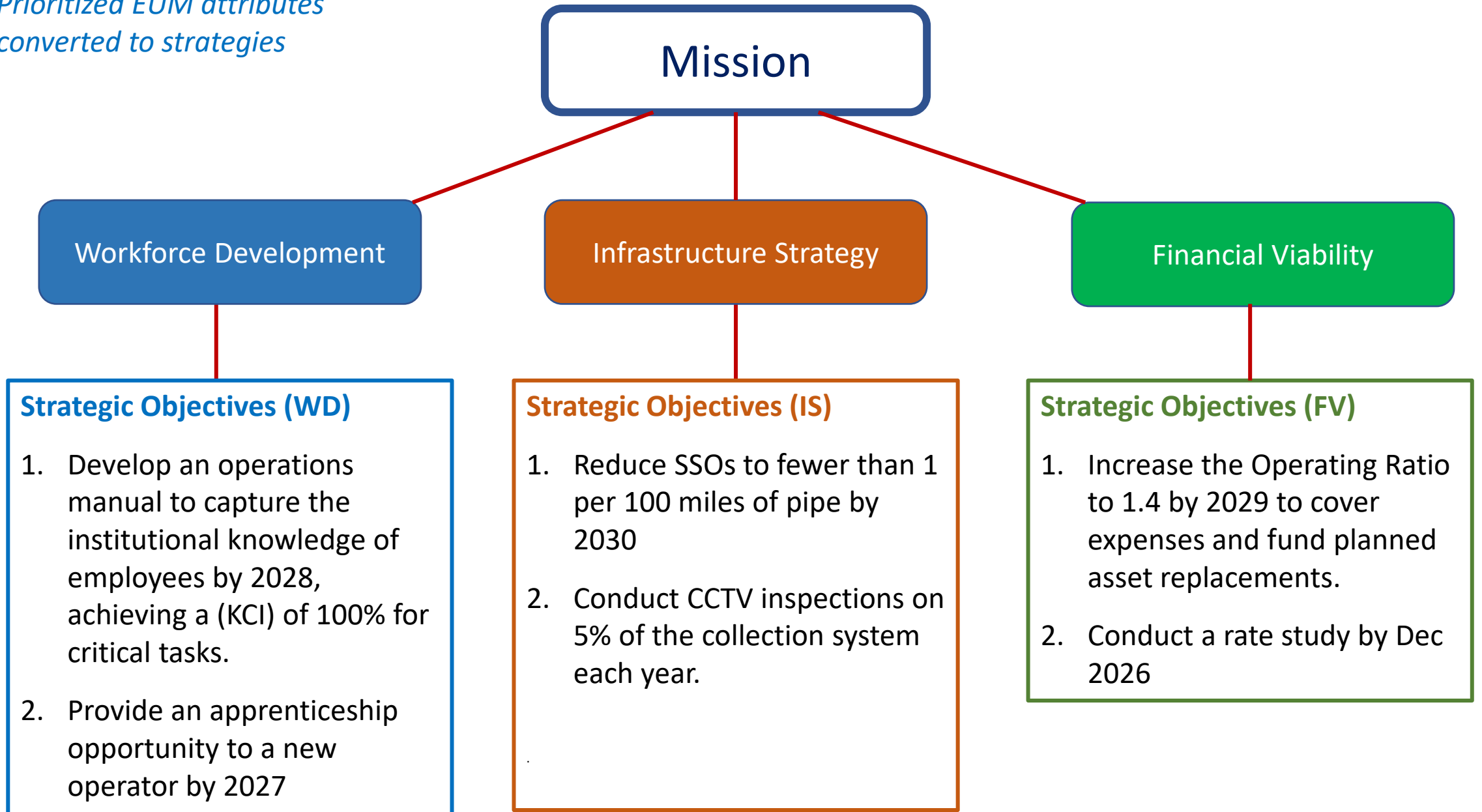


Financial Viability (FV)

Increase the Operating Ratio to 1.4 by 2029.

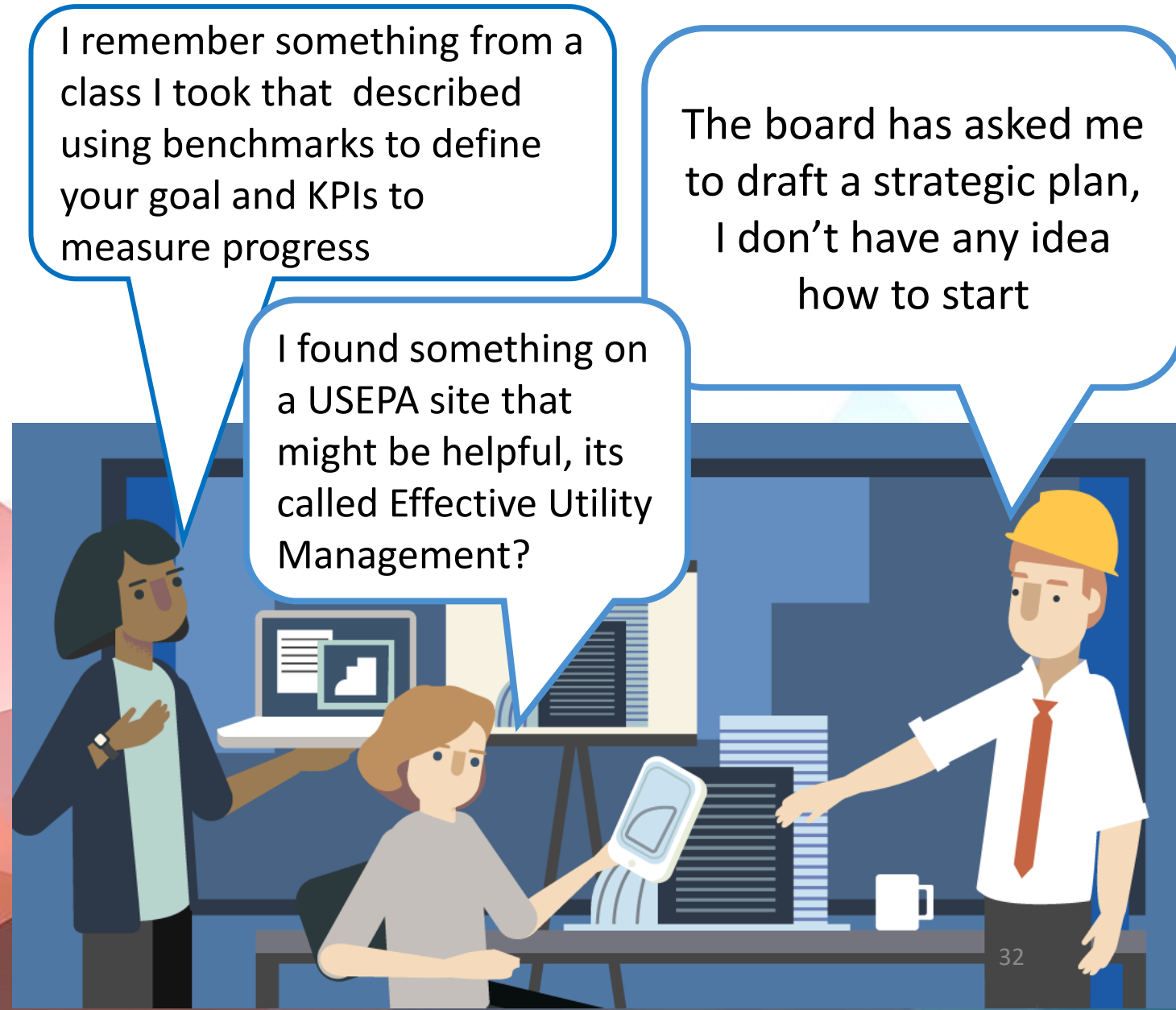
Conduct a rate study for the water utility by Dec. 2026.

*Prioritized EUM attributes
converted to strategies*

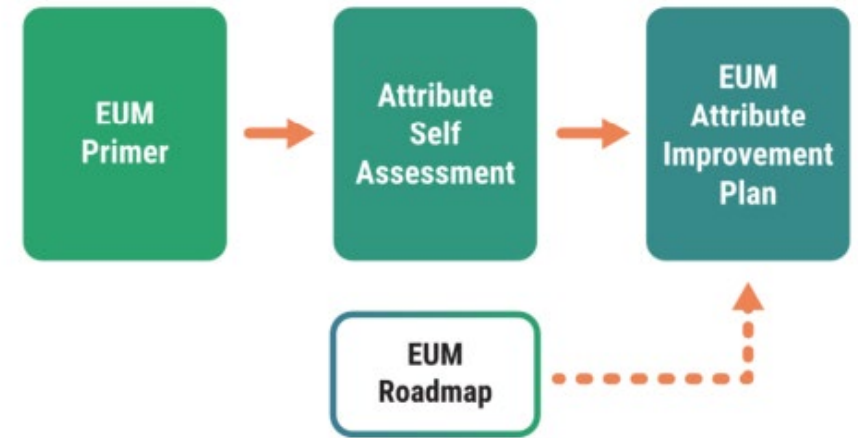


EUM

The 10 Attributes function like benchmarks. They show you what an effectively managed utility looks like through 10 different lenses.



Review and Next Steps



1. **Download and read the EUM Primer**
2. **Conduct a self-assessment** using the descriptions of what each attribute represents. **Rate** the performance of your utility for each attribute (1 – 5) and **rank** the attributes (1 through 10) by importance to your utility
3. **Graph the results and choose 1 to 3 attributes to work on** over a planning cycle. Focus on high-importance, low-performance attributes.
4. **Create strategic objectives**, writing them as SMART goals, and choose how you will measure progress.
5. **Uses PDCA to track and revise** your strategy as needed and inspire your team to embrace the vision for utility improvement.



Thank you for participating

Please share one thing you enjoyed learning about today in the chat.

