Water Intrapreneurs for Successful Enterprises (WISE):
A Vision for Water Utilities

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Contents

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1.0 EXECUTIVE SUMMARY

Key messages:

- Managing a utility is a complex challenge that benefits from a methodology based on systems thinking.
- The WISE approach is based on value and considers how people execute business process that may be enabled by technology.
- WISE methodology starts with assessments based on maturity models and includes specific steps for improvement that include change management and learning.
- WISE includes active engagement, collaboration, and sharing by the participating utilities.
- WISE is applied research; the priorities are determined by the participating utilities and evolve based on their needs.

This document starts by summarizing the findings of a research project to develop and apply a standard methodology for improving performance of water sector utilities. It then shifts focus to a new Water Intrapreneurs for Successful Enterprises (WISE) vision that will continue the collaborative efforts for improving management of utilities under the sponsorship of the Water Environment Federation (WEF).

The research project Utility Analysis and Improvement Methodology (UAIM) was initiated in 2017 by the Water Environment and Reuse Foundation (WE&RF) and has continued to be implemented by the Water Research Foundation (WRF) with a scheduled completion date of May 2021.

The defining characteristics of the UAIM project are as follows:

1. Use of funding provided entirely by participating water sector utilities (utility partners) who have given direct cash contributions and a significant level of in-kind support by their staff and management
2. Application of system thinking to address management issues, including the development of models (e.g., for business processes)
3. Development of an analytical framework based on creation of value
4. Development of a collaborative peer-to-peer network from utility partners
5. Development and curation of a Water Sector Value Model, which includes business process models developed and posted by utility partners using common and standard notation
6. Development of a knowledge base where participating utilities can share their documents, methods, and case studies
7. Development of a common understanding of UAIM as applied research focused on enabling participating utilities to improve their performance

WISE expands on all the UAIM characteristics and adds two new ones.

1. The scope of the UAIM framework was focused on the creation of value within a utility with a primary initial focus on business processes. The framework for WISE has a broader scope that includes workforce, organizational culture, change management and learning, effect on external entities, and more in-depth considerations of technology.
2. The methodology for UAIM initially focused on business process improvement. WISE methodology is more holistic and includes additional concepts of monitoring performance and continuing improvement.

As we were planning for the transition from UAIM to WISE, we realized that this is an opportunity to make the WISE effort more inclusive and more complete. We started by making the framework "more real" to better represent the reality of water sector utility management.

It is great when technology can enable utilities to be smarter; indeed, technology can greatly enhance some of our capabilities. However, although technology has made significant advances, many tasks in utilities are still done by people. Gaining insight to issues related to the behaviors of individuals and organizations is, therefore, especially important. Furthermore, if people do not see that technology brings value to their work, or if they feel threatened by it, there is a great risk that the potential benefits of technology will not be realized.

This expanded concept of a "WISE organization" would include a broader set of capabilities that address the full scope of decision-making that includes humans. A WISE organization would have the capability to

- **define** its purpose and values, adaptable to a changing society or environment requirements;
- **discern** how value is created and how it affects external entities;
- **decide** based on knowledge acquisition and continuous information collection and analysis; and
- **deploy** methods for effective learning and change that consider all aspects of utility management, including the value system.

Methods aligned with these four capability principles will be defined and applied to assess different aspects of utility performance and the effect a utility has on the external stakeholders.

There are many potential benefits for a utility that becomes "smart" by implementing new technologies. Our message is not that being smart is an unworthy goal for a utility; quite on the contrary—it is very desirable. We see the concept of a WISE utility as a more inclusive and integrated approach that facilitates different types of improvements, including a utility becoming "smart." Individuals and organizations must make their own determination if "smart" is sufficient for them.

The revised framework and methodology for WISE are shown below.
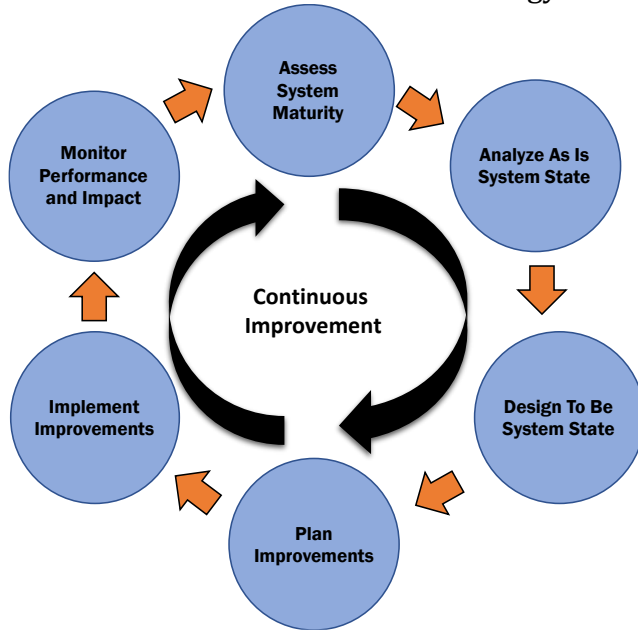
The WISE methodology expands on the UAIM to explicitly include maturity assessment and to add performance monitoring and continuous improvement. The methodology includes steps to analyze the current ("as is") maturity, design improvements ("to be"), implement changes, and monitor performance. Although the specific models and methods may be different for various components (e.g., improving processes, workforce engagement, or technology components), the overall methodology for improvement is consistent.

The UAIM model (for value creation) is included here. Please note that the maturity models are included and represented by the five levels of maturity for each of the components: They are indicated with a scale from 1 to 5, and the colors range from red to deep green.
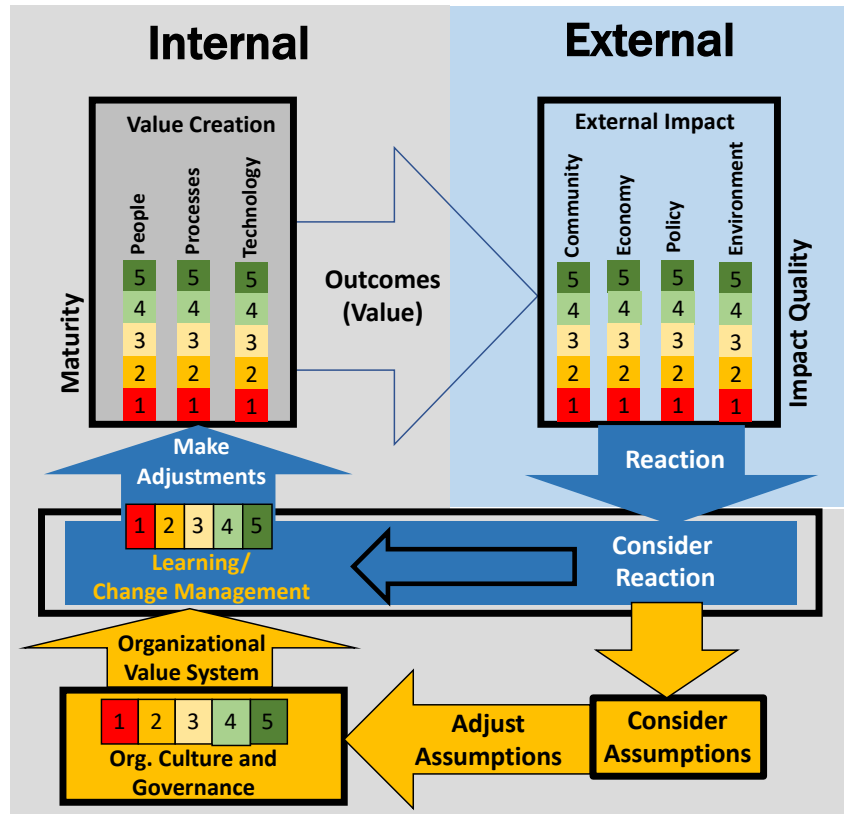
The active engagement and close collaboration by the utility partners ensure that the focus of all efforts remains on the issues that are a priority for their organizations and that the work is grounded in the real needs of water sector utilities.

This document includes examples ("user stories") that show how staff and management in a WISE utility partner organization may benefit from participation in WISE efforts. The user stories are located at the end of the document; however, for readers who want to get a quick and practical sense of the benefits of participating in WISE and who want to learn the ways in which WISE can help their utilities, it may be better to first read Section 4.0 "How Can Wise Help Utilities" and then return to the main body of the document to see how we would accomplish those usability end goals.

The current scope of the UAIM project does not include analysis and improvement methods for all the components; for example, external impact is out of UAIM project scope and will be addressed by WISE in the future.

The methodology based on systems thinking helps us break down the overall complexity of managing a utility into components and enables us to address these components using an approach that is scalable. The framework helps us maintain an overall holistic view so we can focus on specific pieces while still maintaining the awareness of all aspects involved in managing or improving utility performance.

2.0   INTRODUCTION TO THE WISE SYSTEMS APPROACH

The goal of WISE is to leverage a systemic approach to improve different aspects of managing a water sector utility. The WISE mission is to apply system thinking and provide a methodology for utilities to improve their capabilities and enable management practices focused on value and overall performance.

WISE starts with an analytical framework that describes how an organization creates value:

	People	Process	Technology
Strategic			
Tactical			
Operational			
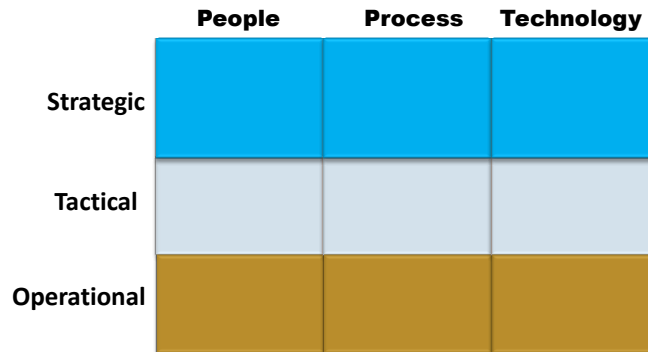
Establishing a framework provides a foundation for a systemic approach because it

- defines the boundaries of a system,
- defines the components of the system,
- defines the interactions between components, and
- provides an analytical "map" to examine the system behavior and performance.

This framework adopts the widely accepted components of value creation (people, process, technology) and combines them with the idea that value is created on different time scales (from long term—for strategic—to real-time—for operational level).

The purpose of this framework is to facilitate the development and implementation of tangible, practical improvements to the management of water utilities. The framework provides us with a map based on "system thinking;" however, this is not sufficient for improvement. There is also a need to define:

- where are we now (current condition or state of the system),
- where we want to go (additional capabilities and behaviors we want to achieve), and
- how to get there.

The methodology for improvement includes five steps, as shown below.
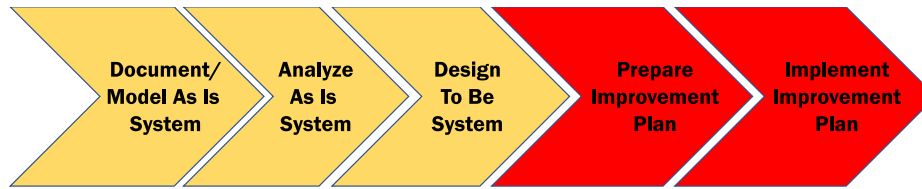
The first three steps indicate that the methodology is based on system modeling. The "system" is the focus of interest; that is, the people, processes, or technology aspects a utility can leverage to create value.

The original focus of this project was business processes. For this area of focus, the word "system" meant "processes," and the "system models" were "business process models." All the participating utilities adopted the same standard modeling notation (Business Process Model and Notation [BPMN] 2.0) so the models that they developed could be easily shared and understood by all.

Business process documentation is lacking in many utilities. Producing such documentation in the form of a business process model that follows a standard notation allows for defined details of "system" characteristics and behaviors such as

- who (e.g., people, business units) is involved in the business process,
- what is the workflow (sequence and paths of activities),
- what decisions need to be made (and by whom),
- which resources (e.g., time, staff, equipment) are needed for this process,
- which metrics are affected by the process,
- what data is required to execute the process (and make decisions), and
- what system will be required to provide the data (and possibly analytics).

System modeling produces much more than a flow chart. A business process model helps clarify the details of the "as is" state and, if configured properly, can also be used to simulate different "to be" alternatives and their effects on parameters such as costs, resources, and schedules.

A system model shows how a specific system works, while a maturity model indicates how well a system *could* work by providing a maturity scale that defines a range of capabilities. A maturity model that describes different levels of capabilities related to business processes is shown below.
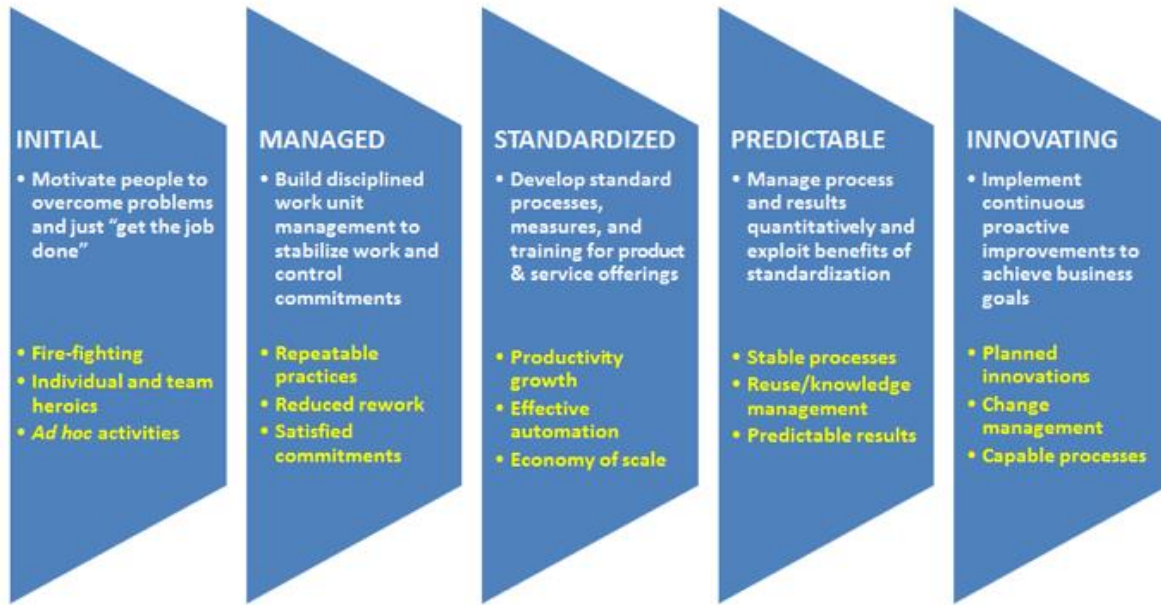
The levels in the business process maturity model show that the difference in maturity levels for processes is related to "where the knowledge resides," as shown in the table below.

Level	How are processes managed?	What is helpful?
1	Individual employees maintain their own knowledge	Training individuals
2	Knowledge is shared by individuals in a business unit	Team training, collaboration
3	According to documented processes and procedures	System model
4	Quantitatively (based on metrics)	Monitoring and feedback
5	Through effective learning and changes made to management practices	Continuous learning

The maturity model for processes requires proper documentation and standardization to advance to level 3 on the maturity scale. Execution of the first step of the UAIM methodology (modeling the "as is" state) by itself leads to increased maturity (i.e., the benefits of developing a system model is reflected in the maturity model).

The second step of the methodology includes an analysis of the "as is" system based on the detailed documentation in the form of system (process) models. System models allow understanding and analysis of the "system," including its strengths, weaknesses, and vulnerabilities. Facilitated sessions can be an effective way to examine the existing business processes. It is important to include all the stakeholders and actors in the process that is being examined.

The third step of the methodology includes the design of improved ("to be") business processes. Examples of possible improvements may include streamlining the workflows, eliminating activities that do not add value, providing better information to support decision-making, automating certain processes, and incorporating the learnings that increase the value of the business process.

If metrics for a specific process are identified within the business process model, and the design (model) of improved business processes considers the effects of modifications to the process on the metrics, improvements can raise the maturity level of the processes in question to level 4.

Utilities participating in WISE have developed and shared business process models for a number of different procedures, including

- developing asset management plans,
- managing enterprise risk,
- conducting business case evaluations for the capital improvement program (CIP)
- delivering the CIP,
- reporting across electronic media,
- renewing and replacing pumping stations,
- inspecting construction, and
- assessing collection conditions.

They have also shared a number of artefacts that were produced or used by these processes, including risk matrices and asset management plans.

The need to consider the "people issues" related to workforce engagement, governance, and organizational culture was underscored by the results from the workshop that was held in September 2019. During this workshop, roughly three dozen representatives from different utilities discussed four topics that have been selected for modeling, analysis, and improvement:

- delivering CIP
- developing asset management plans
- managing enterprise risk
- evaluating and prioritizing business cases (for the CIP)

As part of the workshop, four groups of participants identified the key challenges related to each of these topics. After the challenges were identified, each was categorized based on the 3 × 3 UAIM framework matrix shown below. For example, if a challenge were deemed to be mostly related to technology on the operational (real-time) level, it would be placed in the lower right corner of the matrix.

	People	Process	Technology
Strategic	33	34	5
Tactical	14	14	3
Operational	13	8	6
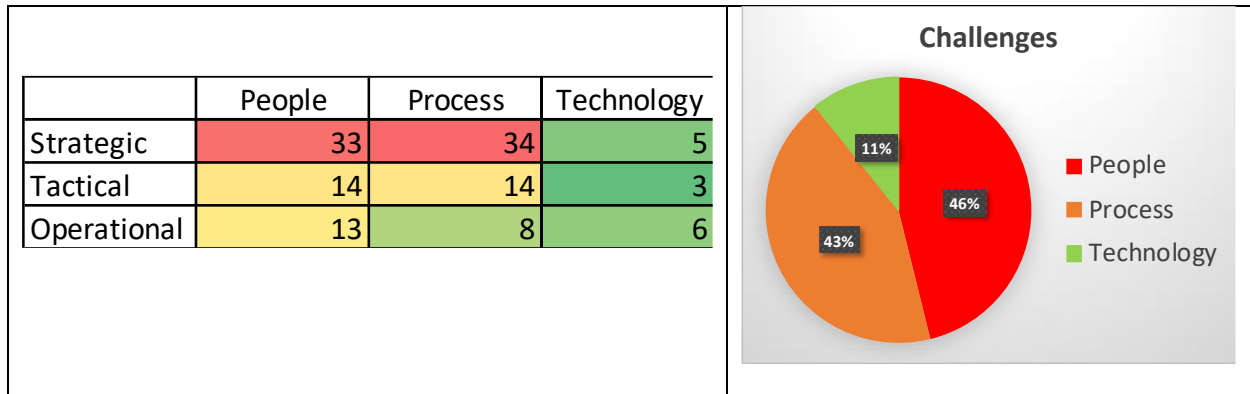
Challenges identified during the September 2019 Workshop.

The results confirmed the need to carefully consider the "people side" of water sector utilities.

This led to expanding the use of the five-step approach to the "people" column issues that include:

- organizational culture and governance
- change management (and learning)
- workforce (individuals)

There are many reasons why the "people" column is quite challenging, including the following:

- It is very common for staff and management in water sector utilities to have technical backgrounds, such as in science or engineering. A typical educational path for a scientist or an engineer has a strong focus on processes and technologies, with less attention to issues that belong in the "people" column. The lessons in these areas are often learned the hard way through time on the job.
- Dealing with humans is more complex than dealing with processes and technologies.
- The complexity and breadth of scope in the "people" column present challenges and are magnified because of many interactions and relationships between the organizational culture, governance, and individuals.

The goal of further research in these areas is to complement the work done on business processes. Insight into these issues will be helpful as utilities move from the design of the "to be" processes to implementation because "people issues" will play a significant role.

Technology has been considered only within the context of business process modeling where technology components and the ways in which they support processes are identified.

## 3.0 EXPANSION OF VALUE CREATION AND IMPACT FRAMEWORK

In addition to the components of value creation within a utility (people, process, technology), a framework that would encapsulate the broader, more complete, and aspirational ideas of a WISE utility would also need to include

- interaction between the utility and the external entities (e.g., the effect on the community, the customers and rate payers, and the environment);
- the capability to learn and adjust internal components (i.e., management of people, processes, and technology) in response to changing conditions and internal or external feedback;
- a more detailed and complete understanding of the "people" column, including issues related to workforce, organizational behaviors and culture, and change management; and
- a more detailed examination of the different aspects within the "technology" column.

The new framework should reflect the four key capabilities of a WISE utility as listed above.

Capability	How the new framework should address it
Define its purpose and values (adaptable to changing society or environment requirements).	Include organizational values that drive the behaviors and determine how successfully an organization can improve internally and adapt to external challenges.
Discern how value is created and how it affects external entities.	Adopt system and maturity models to describe the people and technology aspects.
Decide based on continuous acquisition and use of knowledge	Apply "systems thinking" to all aspects (expand from just business processes).
Deploy methods for effective learning and change and assessment of the value system.	Consider the key drivers and obstacles for learning.

The first step in creating a new and more complete Value Creation and Impacts (VCI) framework is to add the elements of external impact and the internal learning and change management.
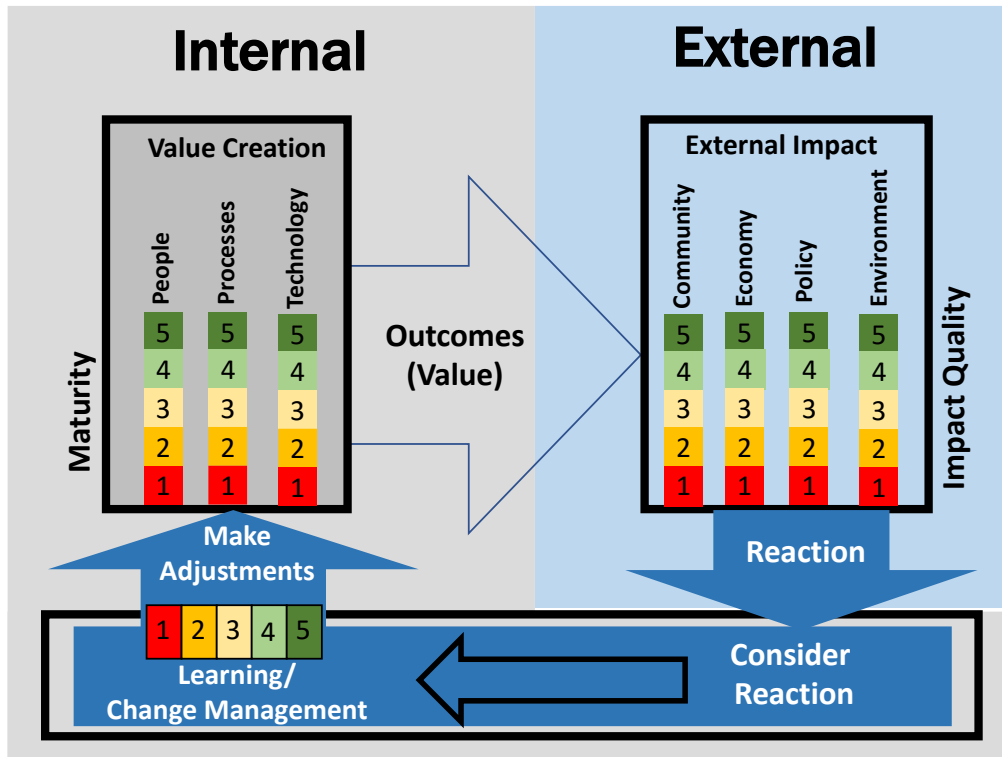
Please note that the gray background indicates what happens within a utility (internal), and the blue background indicates the interaction with the outside entities (external). The reaction from the external entities comes back to the utility via the feedback loop indicated with blue arrows. A utility produces outcomes that may affect external parties in different ways. The outside world reacts—perhaps they endorse the utility in raising their rates or making certain capital investments—and the feedback is considered by the utility. The utility considers the external reaction and adjusts (e.g., by using learning or change management) to the elements of value creation: people, processes, or technology.

An organization's ability to learn and change will be strongly influenced by its governance and organizational culture which are not included in the figure above. The governance and organizational culture provide the fundamental assumptions that drive behaviors and affect an organization's ability to learn and change, as illustrated by the double loop learning. When following this more complete model of learning, we are willing to examine and possibly challenge the organization's culture and the underlying system of values that drive the organization's behavior.
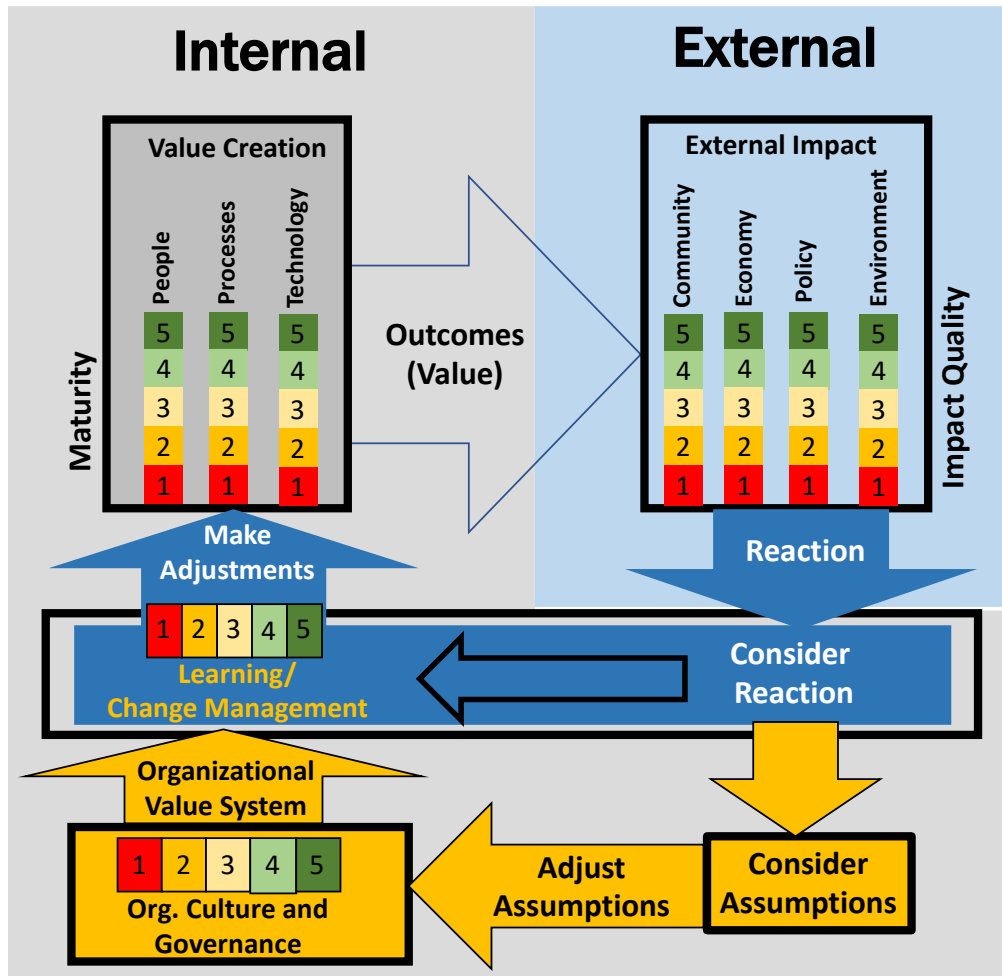
This revised VCI framework for WISE includes all four attributes of a "WISE utility," and it allows us to examine the capabilities of a utility in a holistic way without ignoring issues that often cause the most difficulties. This framework identifies the key components of WEF WISE and also illustrates the interactions between these components.

4.0 IMPROVEMENT METHOD

The WISE framework may appear complex at first glance. To make a framework truly useful for addressing specific business or performance challenges, it needs to be combined with a methodology that enables use of that framework to solve "real-world" problems and make improvements. This methodology should assist managers in dealing with a number of different practical challenges.

A diagram illustrating the improvement methodology that is aligned with the VCI framework and incorporates the characteristics of a WISE utility is shown below.
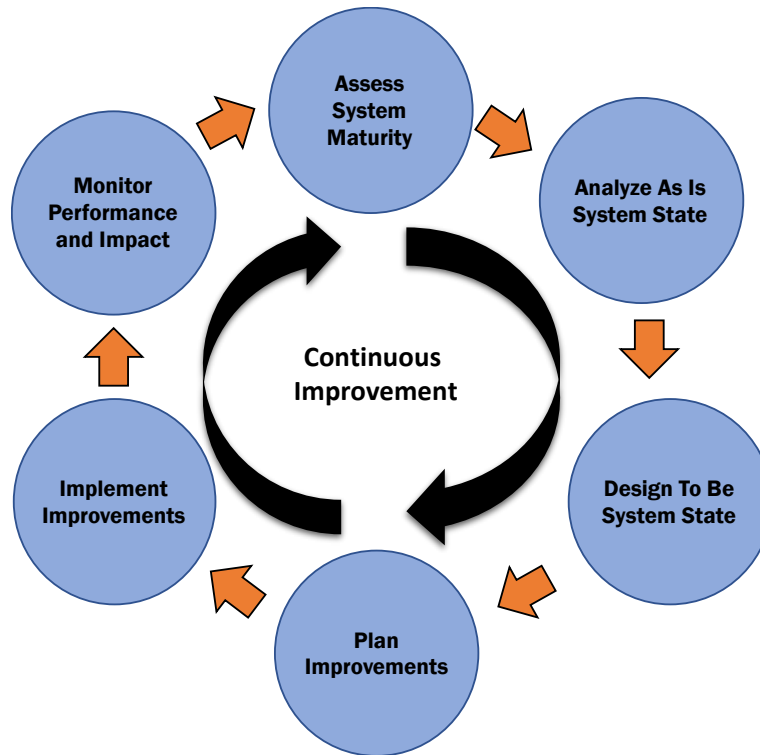
The word "system" in the graphic above defines the scope and focus of our improvement efforts. The same methodology steps could be applied to processes, technology, and even the elements of the "people" column.

A few of the similarities and differences between the original and current methodologies are summarized in the table below.

Original	Current
Includes maturity models to establish a range of capabilities, mainly focused on business processes	Includes additional maturity models to establish a wider range of capabilities, including those in the "people" and "technology" columns
Includes system models that focus on business processes	Includes additional system models to document system behavior (people, technology)
Does not include monitoring of performance and effect; same for feedback and learning	Includes monitoring of performance and effect, feedback, continuous learning, and change management
Includes maturity models and assessment only implicitly as the first step	Explicitly includes maturity models and assessment as the first step

5.0 HOW WISE CAN HELP UTILITIES

Managing a utility is not simple. Utility managers at all levels of the organizations are regularly faced with numerous "urgent issues" that demand their immediate attention. Resources are often limited, and governance of the organization can be complex (e.g., large or diverse boards providing oversight of independent water or wastewater districts or a utility as a department within a larger city or county government). Utility managers must maintain 24/7/365 reliable operation of their facilities, deliver high quality products and services, and deal with the concerns of the community, including groups with diverse interests and agendas.

Dealing with urgent issues is difficult, and sometimes it interferes with our ability to consider the important issues because they seem complex and daunting. It is tempting to put aside those issues and postpone them for "when there is time to deal with this." WISE is an attempt to tackle issues that are important, and we will try to make a compelling case for the ways in which WISE is well positioned to help utilities deal with both the urgent and important challenges.

1. *Achieving tangible benefits in the relatively near term.* The WISE approach is scalable: It can be applied on a smaller scale and started with one or more targeted challenges—perhaps a single business process like procurement or managing a customer call center. It would not take long for participants in this effort to demonstrate to their organization that participation in the WISE effort has contributed something of value that is applicable and useful to their own utility.

2. *Engaging in a peer-to-peer network of professionals in water utilities.* WISE is a platform for interaction between peers from different utility organizations; we will continue the practice established with the UAIM effort for participating utilities to share their artefacts such as asset management plans, risk registers, risk matrices, business process models, and improvement case studies. The UAIM/WISE knowledge repository already contains a number of such valuable items, and the shared content will continue to increase in volume, quality, and value.

3. *Collaborating closely on solving problems.* Utilities taking part in UAIM are accepting leading roles in different areas of research and utility improvement; this will continue with WISE. They are jointly producing key deliverables. WISE aims to leverage, in a crowd-sourcing way, the immense talent pool of dedicated and diverse professionals who work through shared learnings in the participating utilities. Contributions from each participant add value to all participants.

4. *Utilizing value-based methodology grounded in "systems thinking," realistic and pragmatic holistic framework, and common standards.* WISE provides an approach to different types of problems. The key is consistency among the framework, maturity models, system models, and methods for assessment and improvement. It is the connection and consistency with these different components that provide the real value: We may run across illustrations of different "frameworks" that look interesting; however, it is difficult to act and make improvements unless a

framework is consistent and "matched" with the maturity models, system models, and the methods for assessment and improvement.

6.0 USE CASES: JACK AND JILL

The vision will be presented in the format of two "use cases" that will describe how users might benefit from the WISE effort in October 2021.
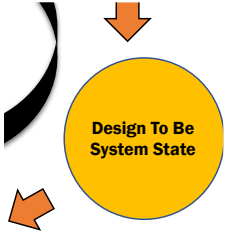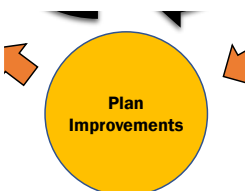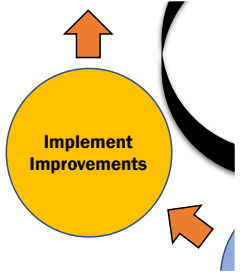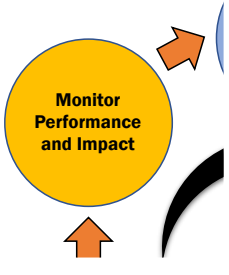
User A: Jack, a team manager from a small to medium utility who has just joined WISE. Jack is in charge of a team that manages a warehouse for spare parts.

User B: Jill, a manager at a large utility who has been participating in the UAIM and WISE efforts for the past three years. Jill was promoted to be in charge of the CIP.

6.1 JACK'S USE CASE (STORY)

Jack is managing a warehouse and is interested in exploring what improvements can be made.

	His first step will be to look at how the warehouse is managed now; for example, how mature are his processes? Jack will examine the Business Process Capability Maturity Model to find out where his processes stand on the maturity level; for example, are they documented? Are the metrics well defined? Are metrics used to manage the warehouse? Assume that Jack determines he is currently on level 2 on the Maturity Model scale: His team includes people who know what they are doing, and he has done some cross training. However, his business processes are not well documented.
	Jack does not have much experience with business process modeling; He browses the WISE repository and finds out that Alex from a utility in a different state has developed a business process model for operating his own warehouse. Simply expressed, the model presents a systematic procedure to handle the warehouse operations. Jack is not familiar with the process modeling notation, but the repository also includes guidelines that explain the details. He downloads Alex's model and starts from there. Jack's situation is different from Alex's, so he modifies the model to fit his own specific needs. He contacts Alex and finds him to be helpful. To develop the model, he has to talk to many different stakeholders to discuss their views.

Design To Be System State	Armed with a model that describes how they currently manage the warehouse, Jack organizes meetings with people who are engaged in processes related to managing the warehouse—not just his own warehouse staff but also maintenance technicians, staff from the purchasing department downtown, and even the operators who are concerned about reliability. During the discussions, Jack finds out that this is the first time these different people are talking about a process each of them touches. They identify improvements and describe them in the "to be" model of the system. Furthermore, the model discussion encourages people to talk with each other and reach a common understanding of the issues.
Plan Improvements	The team now defined what they want ("to be") and need to create a plan for getting from "as is" to "to be." This may require bringing in new people—perhaps someone from engineering, in their project management team, or information technology (IT) staff. They create an improvement plan to define the scope, budget, and schedule for the effort, and, to help coordinate things, they develop a responsibility matrix to identify who will be doing what. People from different business units will be involved, and they also assign someone to coordinate and manage the whole effort; Jack is too busy with his primary duties.
Implement Improvements	Transitioning from "as is" to the desired "to be" state may require some changes to the process—introducing changes to how people do their jobs. It may also require people to be trained to learn new skills and new technologies. Jack is finding out that in addition to managing the warehouse, he is also managing different changes. Jack browses the WISE knowledge repository again and finds that other utilities have developed guidance documents for workforce and change management. He downloads the guidance documents and the case studies that provide examples contributed by his WISE peer-to-peer network.
Monitor Performance and Impact	The project has been completed, and Jack wants to make sure the effort and money spent on improvements are paying off. He sets up reports to inform him about the effectiveness of the new systems and to track their performance. He may also assess how people have accepted the new way of thinking and working. The performance reports might give him clues on additional improvements that could be made. There also may be new challenges that emerged in the past year—perhaps two of his key employees are retiring, and he can only fill one full-time position, or perhaps the utility implemented a large automation that significantly changed the stock and required technology in

| | his warehouse. Jack considers whether it is time to repeat the improvement cycle with this new information in mind. |

More detail about Jack's use case is included in the appendix.

In addition to successfully completing the improvements, Jack has also enjoyed working with peers in different utilities. Jack felt pretty good when Henry from a utility in another state called him about the models and the case study that Jack posted to the WISE knowledge base. They decided to form a group within WISE that would focus on warehouse management; Henry's friend Alex might like the idea as well. In addition to making a difference in his own utility, Jack feels that he is making a difference on a larger scale and helping to build a community of colleagues and peers from different organizations. When Jack has an opportunity to bid for a job in maintenance, he is confident that he can take the lessons learned on the warehouse improvement effort and apply the same methodology to a different area in his utility.

6.2 JILL'S USE CASE (STORY)

During the past few years of participating in UAIM and later in WISE efforts, Jill has become quite familiar with the different components of these programs, including the framework, methodology, maturity models, use of system models, and collaboration with industry peers. She has personally led the development of system models and the implementation of improvements. However, she has been promoted to a position where she oversees a function that includes a number of different business processes executed by different business units using different technologies. Jill has a good understanding of the methodology for improvements that target specific processes; however, a nagging question continues to keep Jill awake at night: "How can I manage a CIP that includes so many moving parts that must be coordinated?" Jill has learned how to play several instruments, but now she is a conductor and needs to have a very sharp ear to detect which parts of the symphony orchestra need more attention.

Jill's focus and needs have therefore transitioned from improving specific functions to integrating different functions into a coherent and effective holistic performance. Like any conductor, she needs to recognize each instrument even if she is not an accomplished player of it.

For a high-level manager, the reporting system is one of the key mechanisms used to hear the music played by their organization. The VCI framework provides a structure that helps us envision how the WISE program can provide support to Jill and assist her in making decisions.

We have introduced several concepts that are not yet well entrenched in water sector utilities, including holistic analytical frameworks, maturity models, and system modeling applied to business processes. It is important for these concepts to be consistent and "in harmony" with each other; for example, it is imperative that the VCI framework is consistent with the maturity models, assessment methods, system models, and

mechanisms that may be used for reporting. To clarify these thoughts, in the next few pages we will consider how Jill could use WISE to help her in her new role; we will start by looking at a reporting system that might help Jill oversee her CIP.

6.2.1 Jill's Dashboard: Configuration and Useability

In her new role, Jill needs to monitor all the activities related to the CIP. She wants to know what is going well and also see where the vulnerabilities are that need to be addressed. She would like to have a dashboard that will give her a sense of the areas in which she needs to focus her energy, where the risks are, and what is going well.

Jill also wants the dashboard to be

- targeted to her own area of interest and
- scalable so her staff can use the same format of the dashboard to monitor and report the different functions and business processes they are managing.

Value Creation			Jill's CIP dashboard is focused on value creation within the utility. With their previous involvement in UAIM, Jill and her team identified a few of the business processes that are included in the planning and execution of the CIP; they also documented their use of business process modeling. However, a number of their CIP processes have not been well documented. Ultimately, Jill understands that investment in infrastructure will need to be informed by good asset information and reporting of service levels to customers—a huge undertaking—and that she will need to focus on some short-term gains, taking bites of the apple rather than consuming it all at once. Trained as an engineer with experience in project management, Jill naturally gravitates toward processes and technologies.
People	Processes	Technology	
5	5	5	
4	4	4	
3	3	3	
2	2	2	
1	1	1	

Jill starts by examining the WISE process model repository to identify the business processes and artefacts that are included in the management of a CIP.
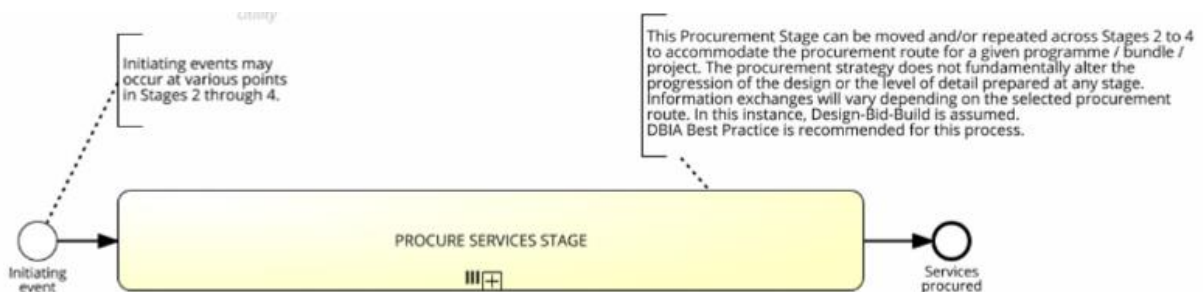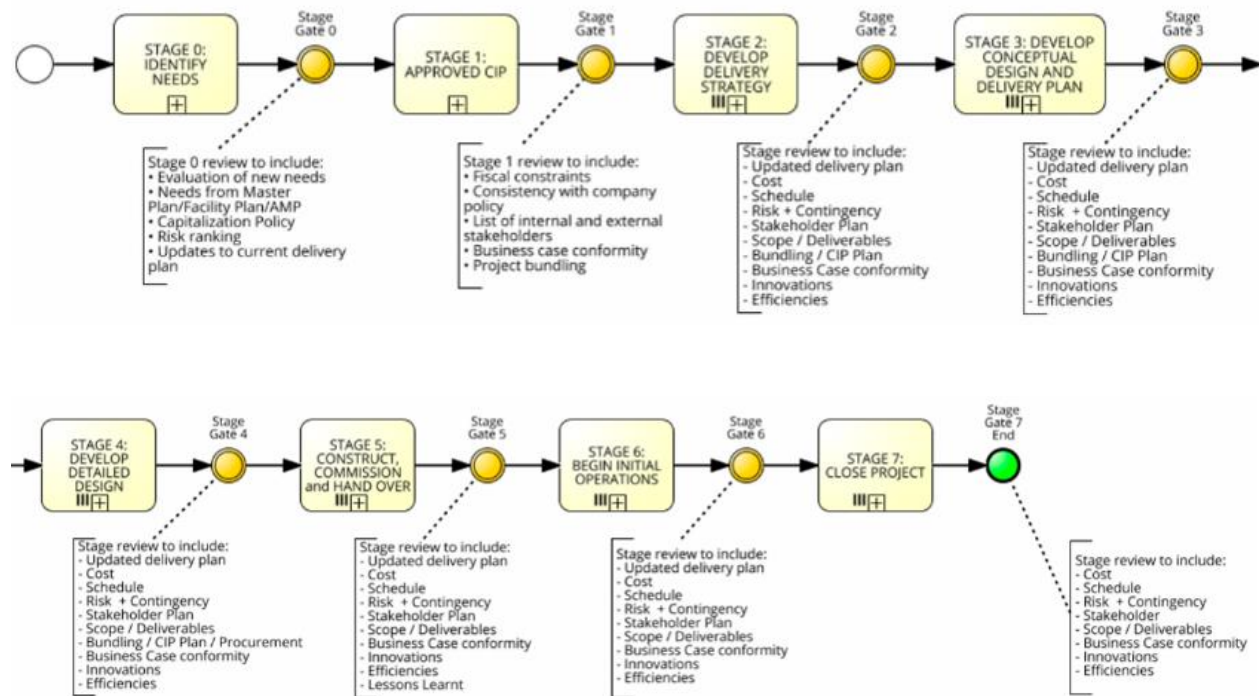
In the WISE repository of business process models, Jill finds that utilities had collaboratively developed a range of business process models for the CIP procedures. She decides to configure her dashboard according to these high-level CIP processes that represent a "stage approach" to the CIP. Jill's dashboard design is shown below.

Jill understands that each of the business processes, and even the underlying subprocesses, will require support from many technologies, include involvement from different people

and business units, and will need data from various sources to make decisions and produce artefacts. She also understands that she may not yet have all the pieces required to fully populate this dashboard; however, this version of the dashboard is what she ultimately wants, and some of the items may be placeholders to begin with and will be populated later.

Looking at this dashboard, Jill can see the level of maturity for different business processes and identify the vulnerabilities. Going from right to left for each business function (process), Jill first looks at the current capabilities of the technology components to support the business function.

Several frameworks have been offered for the "Technology" column: the one shown in this dashboard is under development under a separate WRF project - WRF 5039, Smart Utilities and Intelligent Water Systems (2021).

Technology	Technology is broken down into four layers representing the following capabilities:
Decision Support / Insights / Collect & Structure / Sense/Observe 2 3 3 2 4 4 5 5 2 3 3 4 3 4 4 5 2 2 2 2 2 2 2 2	1. Sense and observe. This capability could be provided by physical sensors (e.g., flow meters) and operator observations but also via questionnaires, surveys phone calls, or social media. 2. Collect and structure. After being received via the sensing layer, data need to be collected, checked and screened, organized, and structured. An example of this is asset registry. 3. Insight. Technology also offers analytical and statistical tools that can process data and provide insights—that is, produce useful information from loads of data. 4. Decision Support. Data and timely and reliable information can be used to improve decision-making. We can use different assessment methods and maturity models for each of these layers or capabilities. For example, we may have deployed sophisticated instruments for a certain process, but the data received from these instruments is not properly organized, or technology may provide effective decision support on the local level (e.g., maintenance unit), but the information is not available for business processes outside that specific system or business unit.

Please note that the maturity levels for technology are a "stack" in which each layer relies on the lower levels to function properly; for example, if our sensing capabilities are at a maturity level 2, we cannot realistically expect to have insight (analytics) on a level 5 (this would be equivalent to a great opera critic who cannot see or hear).

The "People" column, similar to the "Technology" column, includes different aspects that impact the effectiveness of business processes, including organizational culture, workforce, and change management. Business process models will identify which business units are engaged in a specific process so the maturity can be assessed on a smaller scale (i.e., not the "maturity" of the entire workforce or utility-wide capability but those units that are engaged in that specific business process).

<table>
<tr><td>

People

Organizational Culture	Workforce	Change Management
3	3	2
3	3	2
3	3	3
3	4	4
2	2	2
2	2	2

</td><td>

The three components of the "People" column are by far the most complex because they involve understanding and influencing human behavior. The UAIM project includes collaborative research into these three topics that started in August 2020 and is scheduled to be completed in May 2021. The scope of this research includes identifying maturity models that define a range of capabilities and selecting assessment methods to assign the maturity level to a specific business unit or the overall organization. Both maturity models and assessment methods already exist for these three areas, and the goal is to select or cocreate new ones that are applicable to water sector utilities.

</td></tr>
</table>

To assess the maturity of particular business processes, Jill can use the maturity model that is specific for processes—the same one Jack used, as described in the appendix.

We can see that this type of reporting is targeted because Jill has selected those specific processes that she is most interested in; a manager in procurement or human resources, for example, would select different processes but could use the same format.

The approach is also scalable because Jill does not need to fully complete this dashboard for all of the listed processes simultaneously; she can take them on one by one and build her reporting system (dashboard) incrementally.
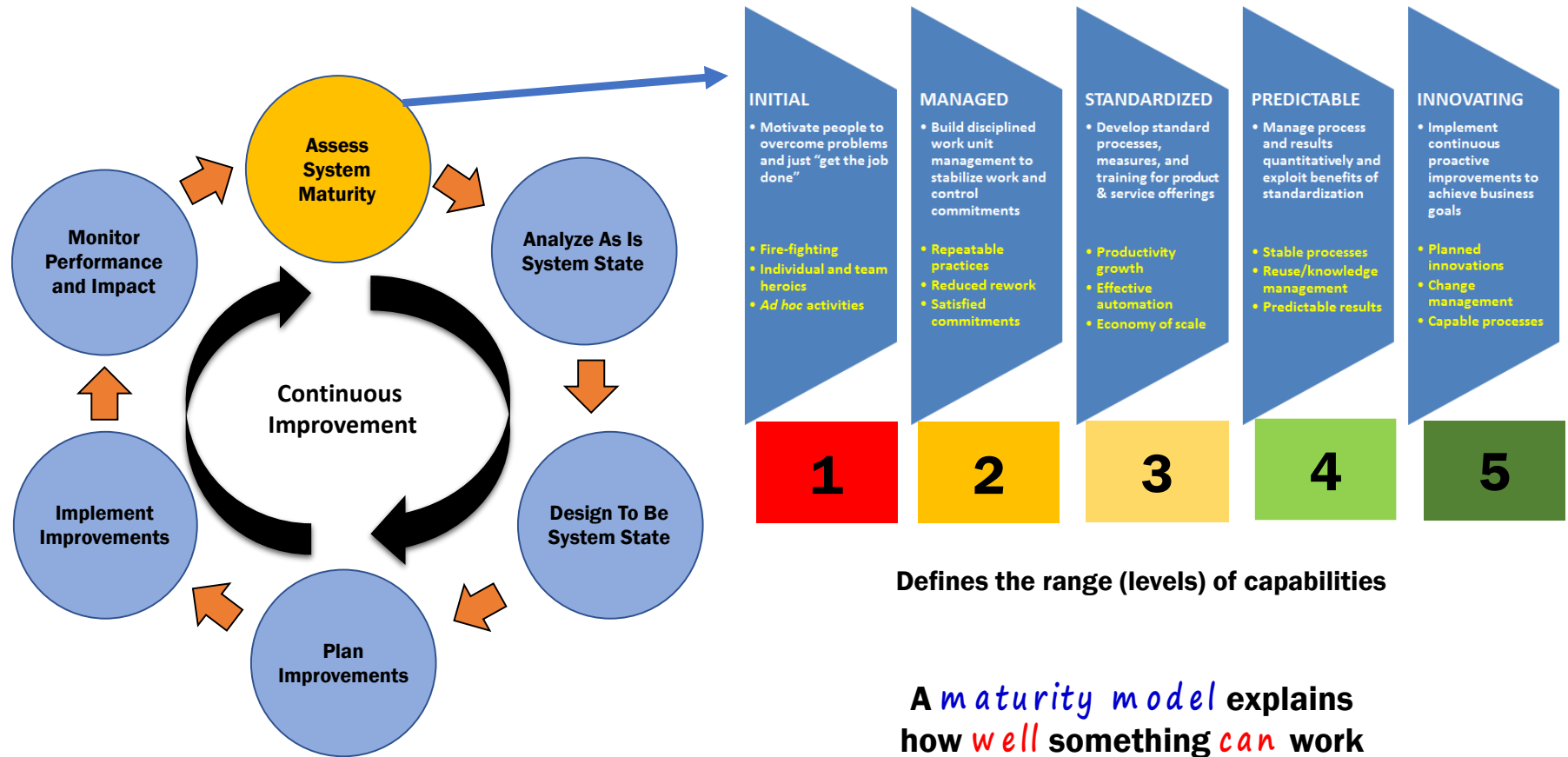

7.0 BUILDING A WISE FUTURE

The examples that describe how Jack would improve the management of the warehouse and how Jill could build a reporting system to monitor the state of the CIP identify several components that both Jack and Jill would need:

1. Maturity models that define a range of different possible capabilities

2. Assessment methods that allow us to determine where we (in a utility) actually are on the capability maturity scale for a specific process, technology, or people aspect

3. System models (e.g., business process models) that support the assessment methods by capturing and documenting our practices (both "as is" and "to be")

4. Metrics that are affected by different business processes and connected to higher-level and strategic performance measurements, such as the Key Performance Indicators (KPIs)

5. Improvement methodology to close the gap from "as is" to "to be"

6. Training and communication protocols to help assure employee knowledge and engagement

7. A framework for monitoring progress and identifying new improvement needs and opportunities

WISE is a movement based on active engagement and collaboration between water sector utilities. It has to be a movement because, unlike a project, it is a continuous effort that does not have a defined end date. Do we need a date to inform us when we can stop learning? We think not. And at the utility level, this WISE approach can become an ongoing way of operating and scaling up across the organization.

The collaboration and sharing among the participating water sector utilities are key aspects of WISE; their importance cannot be overstated. This movement is powered and sustained by the energy and talents of many people who have dedicated their professional careers to providing and protecting a precious, life-sustaining resource. Utilities have significant responsibilities to their communities to provide high-quality services that are also affordable, and the goal of WISE is to assist in that noble mission.

8.0 APPENDIX: JACK'S JOURNEY: WISE METHODOLOGY FOR PROCESSES

Continuous Improvement cycle:
- Assess System Maturity
- Analyze As Is System State
- Design To Be System State
- Plan Improvements
- Implement Improvements
- Monitor Performance and Impact

INITIAL
- Motivate people to overcome problems and just "get the job done"
- Fire-fighting
- Individual and team heroics
- *Ad hoc* activities

MANAGED
- Build disciplined work unit management to stabilize work and control commitments
- Repeatable practices
- Reduced rework
- Satisfied commitments

STANDARDIZED
- Develop standard processes, measures, and training for product & service offerings
- Productivity growth
- Effective automation
- Economy of scale

PREDICTABLE
- Manage process and results quantitatively and exploit benefits of standardization
- Stable processes
- Reuse/knowledge management
- Predictable results

INNOVATING
- Implement continuous proactive improvements to achieve business goals
- Planned innovations
- Change management
- Capable processes

1 2 3 4 5

Defines the range (levels) of capabilities

A *maturity model* explains how *well* something *can* work

Step 1: Assessing the maturity of the process
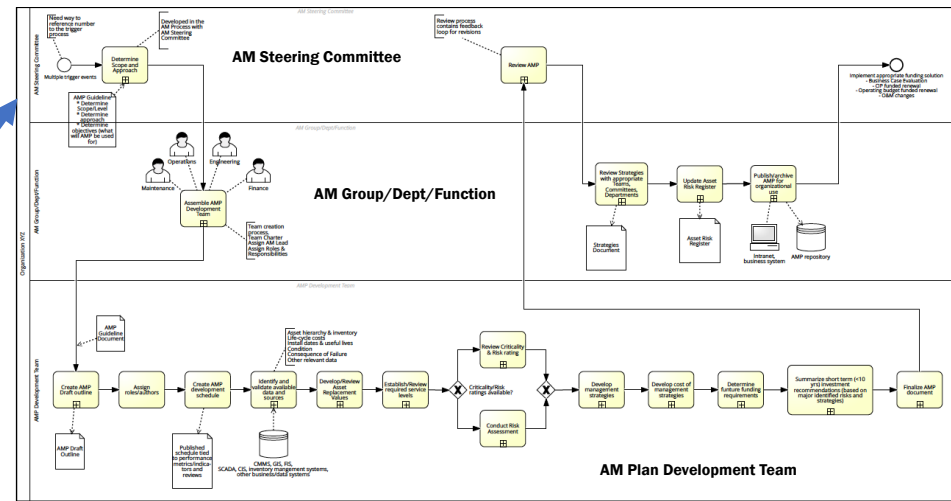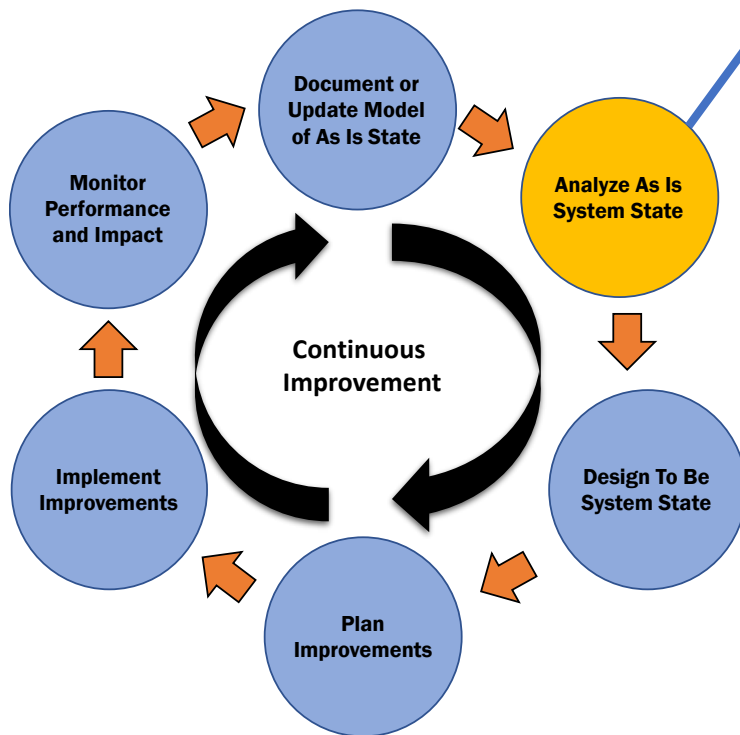
A *system model* explains
how something **actually** works; example
here is for business process modeling.
System models for other components
(e.g. technology, people components)
would have different form & notation

Business process models will tell Jack

- who is responsible for and who participates in the process,
- what metrics are used to assess performance of the process,
- which activities must happen in sequence, and which can be done simultaneously,
- what technologies (including IT systems) are supporting the process,
- what decisions drive the process, and who makes them,
- what data is required to support decision-making and how that data can be accessed, and
- What artefacts (e.g., documents, data, information, drawings) are used within or generated by the process.
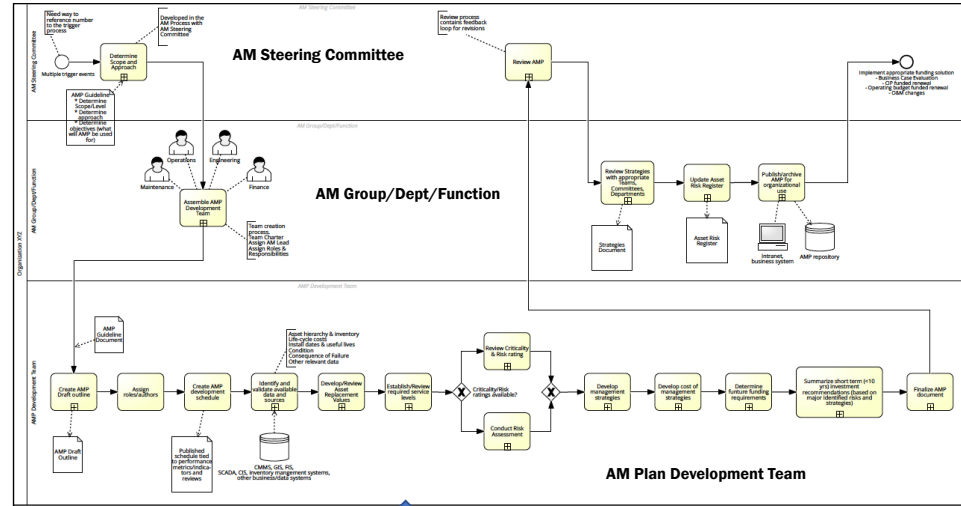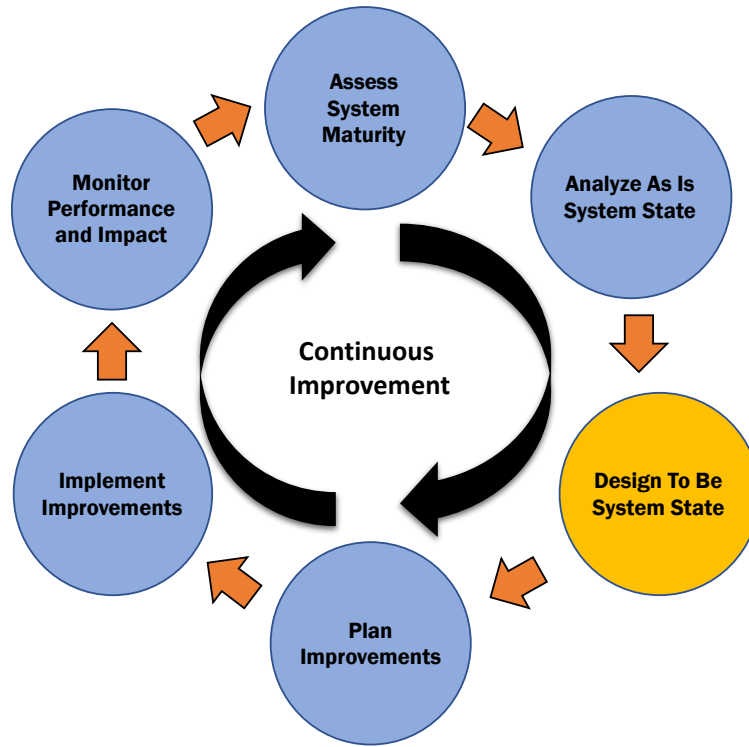
Adjust the As Is system model to address challenges and inefficiencies,

produce model of desired (To Be) system

(in this case improved process)

Continuous Improvement Cycle

- Assess System Maturity
- Analyze As Is System State
- Design To Be System State
- Plan Improvements
- Implement Improvements
- Monitor Performance and Impact

Continuous Improvement

Produce Project Management Plan
Including scope, schedule, budget, resources

UAIM Year 2 Schedule (May 1, 2020 to May 1, 2021)

Calendar is in Weeks: Year 2 starts at week 1

Legend: Plan Duration | Actual Start | % Complete | Actual (beyond plan) | % Complete (beyond plan)

	ACTIVITY	PLANNED START	PLANNED DURATION
	Finalize Work Plan for Year 2	1	6
1	Define Improvement Initiatives (II)	7	4
2	Organize/Start Improvement Initiatives	11	4
3	Develop As Is Detailed BP Models	15	6
4	Analyze As Is, Design To Be detailed models	21	4
5	Prepare Implementation Plan	25	2
6	Execute Improvement Plan	27	16
7	Prepare Case Study Report	43	2
	Workshop on Improvement Initiatives		
	Workshop on Improvement Initiatives (Online)		
	Workshop on Improvement Initiatives (Online)		
	Year 2 Wrap-Up Workshop (Online)		
	Complete Case Study Report for Improvement Initiavites		
	Complete Final Project Report		

Implementing change management will require Jack to consider the components related to the "People" column of the framework, including workforce, organizational culture, and learning and change management.

At this step of the methodology, Jack is focused on the highlighter part of the WISE mission: to develop and apply a holistic analysis framework and a methodology based on system modeling to help utilities improve maturity of their capabilities and implement change management focused on value and overall performance.
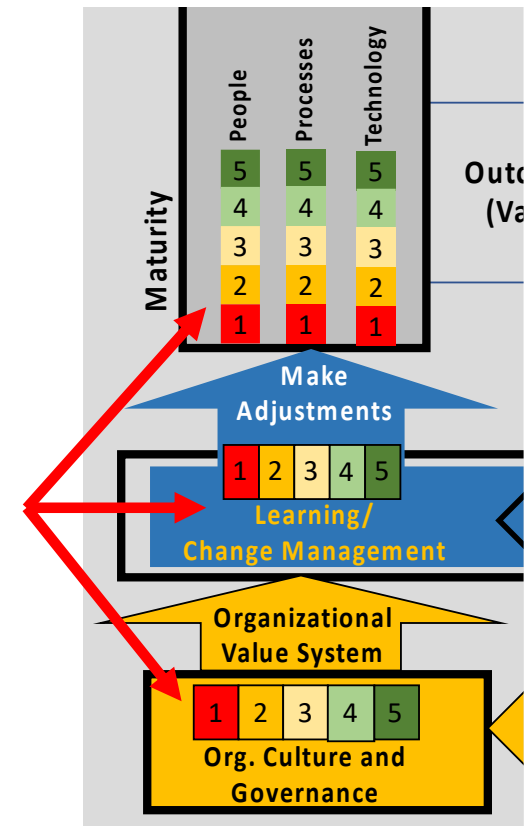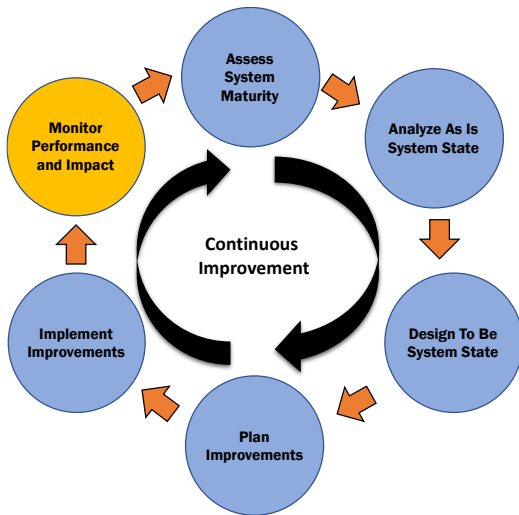
The information gained from different steps of the methodology system (e.g., business process) models; maturity assessments for different components of the framework, including people and technology; and analysis of "as is" and the design of "to be" system states will all help Jack design and construct a dashboard that targets his specific concerns and interests. An example of such a dashboard is shown in the example below.

Please note that the processes listed in the example to the right are standard procedures involved in warehouse management as defined in that part of the supply chain model; for a warehouse in a water sector utility, these standard processes may need to be adjusted or modified to reflect the specific role of a warehouse in such an organization.

People			Process	Processes	Technology			
Organizational Culture	Workforce	Change Management		Business Processes	Decision Support	Insights	Collect & Structure	Sense/Observe
3	3	2	Receiving	2	2	3	3	2
3	3	2	Put-away	4	4	4	5	5
3	3	3	Storage	3	2	3	3	4
3	4	4	Picking	3	3	4	4	5
2	2	2	Packing	2	2	2	2	2
2	2	2	Shipping	2	2	2	2	2