Function-Based Workforce Development: A Case Study in Innovation

J.D. Solomon, PE, CMRP, CRE - CH2M

I. Summary

Many workforce planning and development programs are driven solely from a human resources department perspective. The approaches utilized for this case study successfully were driven from the integrated perspective of organization functions, similar to a reliability approaches, while meeting the primary objectives of the human resources departments. The authors maintain that the most effective approach for workforce planning and development is to focus on key (and evolving) functions rather than filling organization structures. For Reliability and Maintainability (R&M) professionals, this approach is similar to the manner that reliability centered maintenance focuses on maintaining functions rather than maintaining the form and structure of physical assets.

II. Background

An overview of the development of workforce planning and development is provided in this section.

Organizational Performance

Modern organizational performance, in theory and in practice, is credited to Frederick Taylor. R&M professionals are probably most familiar with Total Quality Management (TQM), whose development by Shewart and Deming was based on the foundation laid by Taylor's seminal work in 1916, *Scientific Management*. Taylor's contributions to workforce planning and development are many: the focus on work specialization in industrial production rather than "gang labor"; separation of planning and management from routine production to allow specialists to focus on efficiency and quality; time and motion studies to determine the best way to perform a task; performance measurement; and cultural change within high performing organizations.

Although over 100 years old, Taylor's advice has proven to be timeless. "It is also clear that in most cases one type of man is needed to plan and an entirely different type to execute the work," states Taylor. "The work of every workman is fully planned out by the management at least one day in advance, and each man receives in most cases complete written instructions, describing in detail the task which he is to accomplish, as well as the means to be used in doing the work (Taylor, 1903)."

In the aftermath of Taylor, much of the advances in workforce planning and development in the first half of the twentieth and until World War II focused on the role of the individual worker in industrial organizations. Worker motivation and improved working conditions were dominant focuses of investigation since organization structures were now driven by divisions of labor, repetitive work, and specialization.

Another consequence of Taylorism was the birth of careers focused solely on the administration of work, or maybe less affectionately known as bureaucracy. Max Weber is credited with the Weberian Model of administration in the 1940s and 1950s. It advocates that a strong chain-of-command structure is needed (and at the time was prevalent in Western organizations) as being the most effective approach for solving collective problems and handling large, complex tasks. Strong arguments for this model persists. Its primary argument is that it allows a few, highly qualified leaders to take on large tasks more efficiently by breaking them down into smaller components that can be tackled by individuals with less knowledge or skill in larger decision making. Essentially, the organization takes the form of a well-oiled machine.

Other organizational models argue that the strict discipline and precisely defined roles and responsibilities required by a top down, command-and-control approach is not effective for dealing in fast changing environments or environments that have a large number of highly skilled technicians and professionals. These models place a focus on flexibility and creativity to effectively deal with dynamic environments and complex problem solving (Fried, 1976). In these organization models, workers are expected to demonstrate creative thought and independent decision making.

In the post-world War II era, Herbert Simon and James March are credited with leading the modern academic traditions related to group decision making in large organizations and bureaucracies. Simon argues that organizations operate in a hybrid form. Decisions are made and work gets done more informally in most organizations. Effective organizations have natural communication and coordination patterns that freely flow "upward", "downward", and "sideways". The lines of authority associated with organization charts are in many ways overblown in terms of day-to-day importance. However, the lines of authority have special importance when it is necessary to terminate debate when consensus in decision making cannot be reached and in matters concerning disciplining and dismissing personnel (Simon, 1997).

Informal authority is commonly used by effective organizations in the day-to-day execution of work while formal authority is reserved for the settlement of disputes. Social scientists describe this type of organizational approach, and even use the term bureaucracy" in a positive way, as a form of rational (goal-directed), social (cooperative) action is which behavior patterns are designed to achieve the highest-level goals. Of course, in less effective organizations the lines of formal authority over-dominate the efficiencies and effectiveness of producing high quality work. In less effective organizations, the organization structure is more commonly referenced as "top heavy", "bad administration", or "bureaucratic", all implying various forms of sloppiness, red tape, inaction, indifference, irresponsible, and inflexibility (Fried, 1976).

The lines of authority in an organizational structure also have less importance if consensus in decision making can be reached. Consensus in decision making normally requires effective communication, cross-functional (sideways) cooperation, and clarity regarding values, goals, and tradeoffs. This is a primary reason that the focus of organization structure, in both the private and public sectors, has shifted toward a greater focus on organization performance associated with performance measures aligned with organization goals (Talbot, 2010).

According to Simon, "Organizations are formed with the intention and design of accomplishing goals; and the people who work in organizations believe, at least part of the time, that they are striving toward these same goals. We must not lose sight of the fact that however far organizations may depart from the traditional description…nevertheless most behavior in organizations is intendedly rational behavior. By "rational behavior" I mean the kind of adjustment of behavior to goals of which humans are capable – a very incomplete and imperfect adjustment, to be sure, but one which nevertheless does accomplish purposes and does carry out programs (Simon, 1997)."

From an organizational performance perspective, organization design comes down to three primary things:

1. How decisions are made with respect to organizational goals and where in the organization they are made

2. Performance measures built around the task of informing and influencing operating decisions

3. Bringing about changes in the patterns of who talks to whom, how often, and about what – rather than by changes in organization charts.

A natural question arises concerning the continual emphasis on organization charts when trying to improve organizational performance. The authors believe that there are two primary reasons, one associated with human resource departments and the other with respect to the managers themselves. From a human resources perspective, the dominate focus on filling the current organization chart is rooted in the chain-of-command management approach and the associated need of disciplining and dismissing employees. We live in a litigious society, and much of the focus of our human resources departments have eroded into legalistic perspectives.

Line management also has accountability for falling into the easy trap of simply populating the current organization chart. Some relevant aspects of Cyert and March's behavioral theory of the firm are "uncertainty avoidance" and "environmental negotiation." Both reflect managers' limited ability to deal with uncertainty and complexity. Uncertainty avoidance manifests itself through sub-optimization, the use of slack (to decouple interrelated systems such as production and inventory), reliance on routines (e.g. always using the same supplier), and not sticking out one's neck (Cyert and March, 1992). There is simply ease and less risk in maintaining the status quo.

Workforce Planning & Development

Workforce planning is a continual process used to align the needs and priorities of the organization with those of its workforce to ensure it can meet its legislative, regulatory, service and production requirements and organizational objectives (Wikipedia, 2017). Perhaps the simple and most commonly used definition describes workforce planning as getting the right number of people with the right competencies in the right jobs at the right time. A more comprehensive definition, which highlights some of the procedural issues involved, defines it as "a process in which an organization attempts to estimate the demand for labor and evaluate the size, nature and sources of supply which will be required to meet that demand" (Reilly, 1996).

Historically workforce planning grew during the 1960s and early 1970s in a period of relative economic stability when unemployment was low and organizations were faced with supply shortages and the need to improve labor utilization. The term workforce planning is a relatively new one which is used interchangeably with older terms such as 'human resource planning', 'succession planning' and 'building bench strength'. In the past, workforce planning was predominantly known as 'manpower planning'. Although still used occasionally, there has been a move away from this latter term due to its gender-unequal connotation and because it suggests a mechanistic quantitative approach to thinking about the workforce (Reilly, 1996). In summary, workforce planning is a strategic, long-term approach that is organization wide and integrated with business needs (HR Society, 2013)

The benefits of conducting workforce planning are many and varied. Essentially it helps organizations to 'get the right people in the right job at the right time'. It allows for a more effective and efficient use of workers and for organizations to prepare for restructuring, reducing or expanding their workforces In addition to the practical benefits, the process of workforce planning aids organizations by providing overarching objectives which integrate the various units and allow employees space and time to think about common goals for the future.

Some examples of possible substantive reasons to adopt workforce planning are:

1. to determine staff numbers required at a new location

2. to deal with the problems of retaining a highly skilled staff

3. to manage an effective downsizing program

4. to look to see where the next generation of managers will come from

Many HR professionals believe that the majority of workforce planning fails. There are a handful of key pitfalls that should be avoided (Sinclair, 2011).

- Workforce planning should not be viewed as being able to predict the future. It should be used to frame intermediate- and long-term business issues and serve as a decision filter.

- HR professionals may lack an understanding of many key business issues that help create the plans and sell them to the organization. Human Resources departments are often resources challenged and ironically workforce planning does not fit into many traditional HR roles.

- Workforce planning efforts often errantly target covering the entire organization to be reached over a fixed time-period, sometimes spanning several years. To be effective, workforce planning needs to be flexible and usually occurs most effectively in step changes rather than continuously. Effective workforce planning is both structured and opportunistic.

- Peaks and troughs in business cannot be eliminated. However, developing a clear understanding of the present situation, considering key future issues, and managing the interaction between the current and future states provides both efficiency and effectiveness over the status quo.

Several models and tools are available to help organizations conduct workforce planning. Despite variations in terminology and the order of processes, most models are very much alike. Essentially, workforce planning involves an analysis of the present workforce competencies, identification of the competencies needed in the future, a comparison of the present workforce to future needs to identify competency gaps and surpluses, and the preparation of plans for building the required workforce.

Some models have been designed specifically for use contexts. Many organizations have developed their own models. For example, at one point Duke Power Company developing its own model based on the idea of 'pivotal roles' and Shell Oil Company aligned its model around its industry-leading application of scenario planning (Sinclair, 2011).

The HR Society endorses a simple model with four key steps:

1. Strategic analysis leading to a Business Plan over typically 3 to 5 years

2. Workforce Demand planning – this is the sum of the demand derived from the business plan, plus the results of changes in organization structure and productivity, plus those that derive from on-going movements such as labor turnover

3. Estimating the Supply availability to match the demand – from both internal and external sources

4. Managing the Gaps that may arise between Demand and Supply

The State of Texas uses a 4-phase model:

1. Determine Agency Strategic Direction

2. Conduct Workforce Analysis

3. Implement Workforce Plan

4. Monitor, Evaluate, & Revise

The US Office of Personnel Management (OPM) has issued a Federal Workforce Planning Model that can be found at www.opm.gov (USOPA, 2011). The following table and discussion incorporates steps from the OPM model and best practice research:

1. Analyze Mission, Vision, Strategic Plans, Budgets and Resource Allocation

2. Analyze Demand

3. Analyze Supply

4. Conduct Gap Analysis

5. Create Workforce Strategy and Plans

6. Implement Plans

7. Evaluate Plans

Figure 1: Simplified OPM Workforce Planning Model (Steps 6 & 7 combined)
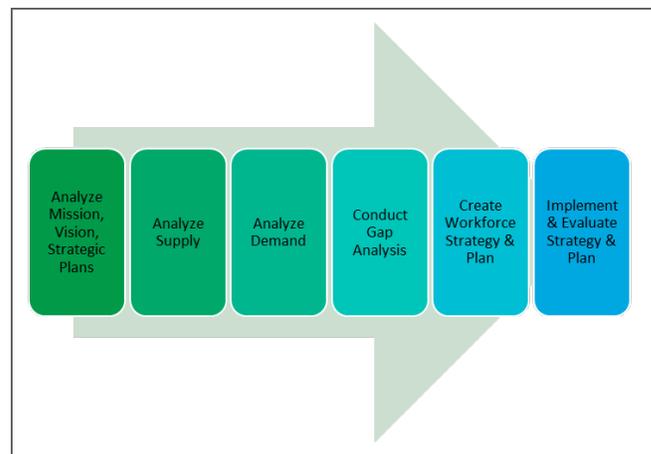
In the case application cited in this paper, Mount Pleasant Waterworks used a *workforce planning model* like the one

used by the State of Texas, which is a slight simplification of the OPM model.

Workforce development is a holistic concept that integrates workforce planning, human resources management and capability development. It covers a wide range of key activities related to individuals, groups as well as the systems (including processes and policies). Workforce development also includes broader industry considerations as well as those associated with communities and stakeholders. As such, many industries have specific workforce development guidelines in addition to the many general workforce development models that have been developed.

One model for public health organizations includes six strategic elements that work in a circular manner:

- Monitor Workforce Composition
- Identify Competencies and develop curriculum
- Design integrated learning system
- Use incentives to assure competency
- Conduct evaluation and research
- Assure financial support

Figure 2: The standard water sector competency model is too complex for most organizations

Source: US Department of Labor, et al, 2016
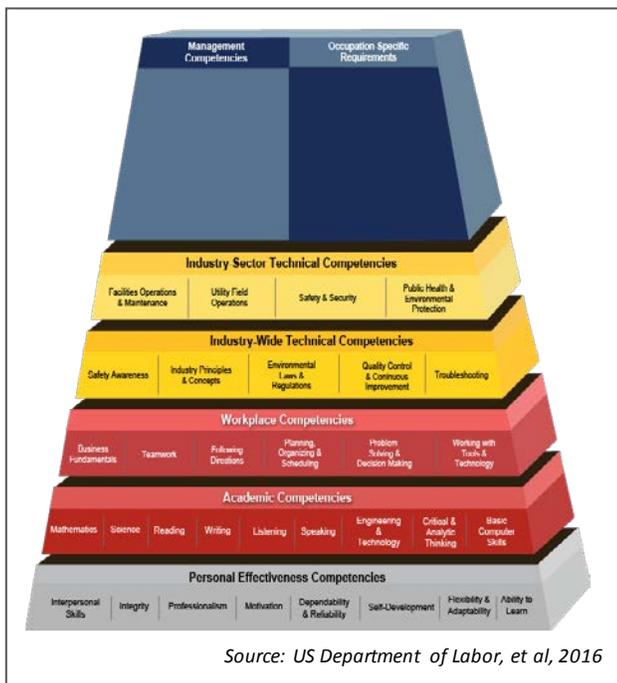
The case application of this paper, Mount Pleasant Waterworks, is a medium-sized, water & wastewater utility which uses key aspects on its industry *workforce development model*. However, the usefulness of the model in confounded by staff number (on the low side of medium-sized utilities) and the large number of key functions (on the high side of medium-sized utilities). One driver for the workforce planning and development

program was to determine a more concise workforce development approach that was applicable to the context of the organization. A function-based approach was chosen.

Systems Engineering and Function-Based Approaches

Practitioners and academics have compared organizations and organization structures to systems for more than one hundred years. To some, the organization has taken more of the form of a linear, mechanical system while others have viewed the organization as more similar to a non-linear, ever-adapting biological system. The application of a systems-based approach, including functions, is especially powerful for technically oriented sectors such as those that include R&M professionals.

There are a number of definitions of a system. One common definition by Ackoff describes a system as a set of interrelated elements. Thus, a system is an entity which is composed of at least two elements and a relation that holds between each of its elements plus at least one other element in the set. Each of a system's elements is connected to every other element, directly or indirectly. Furthermore, no subset of elements is unrelated to any other subset.as producing outcomes which contribute to goals or objectives. To have a function, a system must be able to provide the outcome through two or more different combinations of elemental behavior (Ackoff, 1971).

One systems engineering organization more simply defines a system as a broad work area encompassing multiple related disciplines (SEBoK, 2017). ISO 9000, the international quality management standard, defines a system as set of interrelated or interacting elements (ISO 9000:2016).

Regardless of specific definition, systems typically can be thought of as having the same common elements. The common elements related equally to both physical systems and organizational systems. These include inputs, outputs (that are aimed at outcomes associated with goals), a function (with defined performance that transforms inputs to outputs), a series of controls (processes and procedures), and a system of measurement and data collection that provides an important feedback loop.

Viewing the organization as a system, with functions that fulfill organization goals, is a meaningful way to effectively evaluate workforce planning and development. A focus on the most important functions of the organization, or a function-based approach, provides additional clarity.

First, functions can be viewed as primary and secondary. For example, a pumping system's primary function is to pump water at a certain rate. The way the pump looks and sounds are usually secondary functions, and only important if the primary function is fulfilled. An organization viewed as a system is the same way – its owner has certain primary functions that are desired and which should take priority.

Second, functions help define failure. Systems can fail in several ways including catastrophically, partially in terms of either primary or secondary function, in a fail-safe manner that is hardly noticeable, or in a fault tolerant manner if redundancy is present. Organizations viewed as systems can be considered in the same way. In fact, both physical systems and organizational systems often fail partially before they fail completely. Establishing performance measures against system goals helps management to be proactive. And properly evaluating all forms of failure is a critical element of continual improvement.

Third, the concept of functions can be associated with RCM, which provides another common basis of understanding for R&M professionals. An RCM approach for physical systems focuses on maintaining system functions and not the physical forms. A similar approach applied to organization systems is helpful because it focuses management on addressing the primary functions of the organization and not simply its organizational chart, or form.

Fourth, function-based approaches, through their alignment with systems engineering, provides a powerful basis for workforce development. Systems engineering requires understanding integrated competencies, roles, and tasks plus knowledge, skills, abilities (KSAs). In systems engineering, as well as organizations viewed as systems, responsibilities can be allocated to individuals through the definition of roles associated with the desired functions. Competencies associated with the roles reflect the KSAs needed through education, training, and on-the-job experience associated with functions.

Competencies have been defined in many ways. However, a common practical definition is competency is a measure of the ability to use the appropriate KSAs to successfully complete specific tasks. KSAs are applied to tasks to fulfill a desired function. However, KSAs belong to the individual. In the process of filling a role associated with a function, organizations should develop a specific set of competencies associated with tasks that are directly related to the function.

There are several different taxonomies associated with KSAs. Bloom's Taxonomy is one of the oldest and remains one of the most practical. as learning objectives for competency development. Bloom's Taxonomy, which includes both cognitive (reasoning) and affective (emotional) domains, provides structure for associating learning objectives with desired competencies. The cognitive domain is described by six levels: Remember, Understand, Apply, Analyze, Evaluate, and Create. The affective domain is described in five levels: Affective Domain, Receive, Respond, Value, Organize, Characterize.

In the case application for this paper, Mount Pleasant Waterworks sought a proven approach to workforce planning and development while at the same time making the effort easily understandable for staff and at the same time not unnecessarily burdening existing resources. Approximately 70 percent of the staff are directly involved in industrial process delivery. Furthermore, the

organization has completed an initial deployment of RCM. A function-based approach appeared to be a best fit and was deployed.

III. Case Application: Mount Pleasant Waterworks

Mount Pleasant Waterworks (MPW) is a progressive water and wastewater utility located north of Charleston, SC. In 2003, MPW and CH2M worked together to develop the utility's first asset management program and related implementation from 2004 to 2007. MPW's strategic plan was updated and a new organizational structure was implemented as part of that program. The Strategic Plan most recently had a major revision in 2012. However, a major organization structure change has not been implemented plan since the 2004 to 2007 era.

By 2015, MPW was facing potential key staff changes over the next 5 years as its aging workforce began to retire. This included the General Manager, Chief Operations Officer, Emergency Response Coordinator, and several other managers with more than 20 years of experience.

The project to date has included three phases:

Phase 1 included an organization structure assessment and strategic plan validation

Phase 2 included workforce evaluation and planning.

Phase 3 included implementation for the new Technical Services Division

Phase 1: Organization Structure Assessment and Strategic Plan Validation

In the assessment task, the General Manager chose a very direct but high-risk, high reward approach for the evaluation. This high-risk, high-reward approach involved bypassing the top two levels of management and focusing the assessment process on the "third-tier" leadership, involving nearly 25 percent of the workforce. This approach enabled very direct interaction and open feedback from the general workforce; however, it primary drawback was the risk of the process spinning out of the control of senior management if the facilitation was not done well and staff expectations were not met.

The approach was well executed. The end results exceeded those of senior management as well as staff. Furthermore, the openness and trust conveyed by this approach created cohesion and momentum for subsequent phases.

A Leadership and Organizational Planning workshop was conducted in June 2015. In total, 29 staff participated in the workshop. The primary objective of the workshop was specifically focused on gathering staff feedback on MPW's current organizational structure to determine the potential need to transition to a new structure over the next 5 to 10 years. The secondary objective was to identify the emerging leaders within the organization

based on what the participants saw as the strategic direction of the utility.

The format of the workshop was interactive with a variety of different exercises and group feedback techniques employed, including an audience response system (ARS). The small breakout groups and ARS are normative techniques that are utilized to assure full group participation, minimize groupthink or domination of the discussions by a small number of staff, and to capture a full range of perspectives from the cross-functional team of participants. The small groups reported out on their discussions for the benefit of the full group at the end of each small group exercise.

The small groups were led by five MPW staff. A facilitation training session was conducted by CH2M on the day before the workshop to provide the small group leaders an overview of the objectives for the small groups and tool/techniques to facilitate their group discussions.

In addition, after the workshop an email was sent out to all participants to elicit additional feedback after having sat through the workshop or if there was information or a perspective an individual did not feel comfortable sharing during the workshop.

Organizational Effectiveness

The small groups developed a list of strengths of the organization and areas for potential improvement. As part of the discussions related to the outcomes from the small group exercise, workshop participants were told to think about organizational structure changes such that the strengths of the organization could be maintained and any changes identified address the areas for potential improvement, where appropriate.

Table 1: Organizational Effectiveness Small Group Exercise Summary

Strengths of the Organization	Areas for Potential Improvement
Teamwork	Individual accountability/ownership
Strong customer service focus	Inconsistency in policies (specifically related to O&M staff time charging)
Efficiency with available resources	Technology (integration across departments, right size implementation and review effect of technology on staff needs)
Family –oriented organization	Top heavy organizational chart
Experienced leadership	Decision making (engagement of staff, respect for lower level staff recommendations)
Employee retention	Employee training

Table 1: Organizational Effectiveness Small Group Exercise Summary

Strengths of the Organization	Areas for Potential Improvement
External communications	Internal communications
Benefits/compensation	Departments are too lean
Safety culture	Facility safety and security
Water and wastewater operations separate	Duplication of duties and processes between departments

From the discussions, the organizational strengths greatly outweighed the areas for improvement; the amount of feedback on the strengths was greater than the areas for improvement. The strengths revolved around the strong culture of MPW; family orientation, safety, customer focus, and employee value, experienced leadership and the staff's ability to be efficient with available resources. Many of the potential improvements identified are fairly common to those identified by other organizations in the industry. Some of the identified areas of potential improvement could be connected to the current organizational structure which was put in place with several manager/director positions to develop leaders from within MPW.

External Forces

The ARS was used by the large group to assess the workshop participant's perspective on the relative importance (on a scale of 1 to 10) of 10 future trends, identified in MPW's Strategic Business Plan, and the Special Programs to MPW over the next 10 years. The group was also asked if there was any other factors that should be added to the list for review, after much discussion on a number of items no specific additional forces were added to the list.

The majority of the identified external forces were all generally ranked as important to the organization by the group, with not a significant amount of variability in the majority of individual participant's scores. The scoring results that exhibited the greatest range were discussed by the group, and the primary factor creating the spread in scoring results was based on where in the organization a person was housed. For example, IT staff and Operations staff had a much different perspective on the importance of the Regulations/Affordability and Energy external forces simply based on their familiarity with these factors and their potential effect on MPW. IT staff being less familiar and consequently giving these two factors a lower score than Operations staff.

Table 2 presents the future trends ranked in order of importance by the average score of the group. Attachment B provides a definition of each of the external forces and a histogram of the scoring results for the entire group for each of the assessed forces.

Table 2: External Forces: Importance Ranking Results

External Force	Average Score by Workshop Participants (Maximum score of 10)
Population	9
Workforce Issues	8
Total Water Management	8
Technology	7
Customer Expectations	7
Political Environment	7
Utility Financial Constraints	7
Regulations/Affordability	7
Energy	7
Special Programs	7
Risk	6

Organizational Chart Review

The small groups reviewed the current organizational chart and the information developed in the two preceding exercises to determine if alterations to the current organizational chart would be required, focusing on the two levels of the organization under the General Manager. Focus was placed on the key, current functions that the organization was required to fulfill. The current personnel's knowledge, skills, abilities, and tenure were deemphasized.

The following summary is provided:

- One group maintained the existing organizational chart as of May 1, 2015, but noted the need for more consistency in titles and levels across the organizational chart to reduce confusion (i.e. an operations supervisor and department head are shown at the same level when they are not).

- Three groups created new organizational charts that reduce the number of direct reports to the General Manager; creating three executive leadership positions with oversight over the operations, financial, and administrative functions. The group notes on the benefits of the updated organizational chart included:

   o Allow for more consistent implementation of policies

   o Better feedback (negative of positive) through the organization

   o More efficient reporting to the General Manager

   o Greater reliance/utilization of the expertise in lower bracket positions

- One group modified the current organizational chart adding:

   o An Environmental Resources Department that consolidates the water and wastewater treatment operations and laboratory functions into one department.

   o A Water Maintenance and Wastewater Maintenance Department focusing primarily on distribution and collection system maintenance.

   o An Asset Management leadership position within the Engineering Department.

After the small group report out, all workshop participants were given three dot stickers to place on the five organizational charts developed by each small group to represent their preference (vote) for the developed organizational charts. The existing organizational chart received 3 votes, the organizational charts that reduced the number of direct reports to the General Manager received 57 votes cumulatively and the organizational chart that represented a moderate modification of the current chart received 19 votes.

It was noted by several workshop participants that 45 minutes allocated for this exercise was insufficient for all the conversations needed on organizational structures and realignment, but recognized that this was a first step in the process.

Emerging Leaders

Workshop participants were asked to provide up to five emerging leaders within MPW they view as those that could fall into a leadership role in the next 5 to 10 years. The emerging leaders could be any one in the organization that could fill a leadership position within the organization. All feedback was provided anonymously on individual note cards submitted to CH2M. Like the organization chart review, this exercise focused on emerging leaders who would most effectively meet the future key functions of the organization.

A total of 36 MPW staff were identified as emerging leaders, 30 percent of the current number of MPW staff, ranging in number of votes from 1 to 20. This is a positive indication for MPW in that a large majority of the workshop participants identified the potential for future leadership positions to be filled by internal candidates.

As part of the discussions during the small group exercises and feedback after the workshop, a number of staff indicated that the organizational structure has evolved in part by positions being created for specific individuals and that if certain individuals are placed in key leadership positions turnover could potentially increase.

Workshop Closeout

The full group was asked three questions to gage the group's perspective on their engagement in the workshop, contribution to workshop discussions and the overall importance of the workshop to the future of the organization. The group was asked to provide feedback using the ARS (scoring scale of 1 to 10). Table 3 provides the questions asked and the group's feedback. Attachment B provides a histogram of the scoring results for the entire group for each of the workshop close out questions.

The overall feedback from the group indicates that they all felt they were engaged and contributed to the discussions of the day. In addition most felt the workshop was important for the organization, but not all participants viewed it as critical to MPW's near-term future.

Table 3: Workshop Closeout Questions

Questions	Percent of Votes by Workshop Participants		
	Score: 1-3	Score: 4-7	Score: 8-10
Did you feel part of the process today? [a]	0%	17%	83%
Do you feel like you contributed today? [a]	0%	12%	88%
How important do you think today is for the future of the organization? [b]	4%	48%	48%

[a] Scoring scale reference points: 1 = not engaged and no contribution, 5 = moderately engaged and some contribution during the workshop, 10 = highly engaged and significant level of contribution.

[b] Scoring scale reference points: 1 = little importance, 5 = important, but not critical, 10 = critical to MPW's future.

Phase 2: Workforce Evaluation and Planning

Phase 2 included workforce evaluation and planning. The primary outcome was to provide MPW with a model that can be used assess its capability to meet current and future workload demands, understand where competency gaps lie, and respond comprehensively. It was desired that any model be both flexible and opportunistic based on MPW's size and need for accommodate specialized functions

Similar to the approach in Phase 1 of building the organization structure around primary organization functions, Phase 2 focused on workforce planning and development based on primary organization functions rather than around job descriptions that were not aligned with the changing organization. Ultimately, workforce planning results is a practical framework for attaining, developing, and maintaining a workforce in a manner that ensures staff is able to meet strategic goals, and functions. Aspects included key function review, workload analysis, informal benchmarking, technology analysis, and staff analysis.

Figure 3: MPW Workforce Assessment and Competency Model
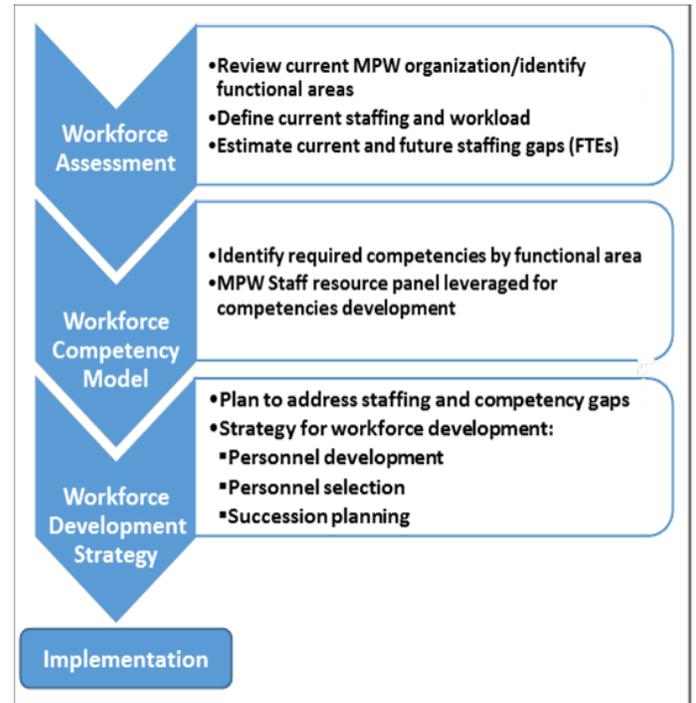
Staff helped to identify primary functional areas through individual and small group interviews. Approximately two-thirds of the MPW staff was interviewed in this Phase 2 (up from 25% in Phase 1). Data analysis and informal business process mapping was performed by CH2M to confirm primary functions and performance requirements. Comparative analysis with other CH2M clients of similar size and scope was also performed.

MPW was identified as having 28 of 35 water & wastewater utility sector functional areas. Specific functions were identified within each functional area. Functions were not specifically related to jobs or tasks; functions were defined as activities that convert inputs to outputs at desired performance levels with the MPW organizational system.

Table 4: Typical Water & Wastewater Utility Functional Areas

Functional Area	Classification
Health & Safety	Administration
Customer Communication	Administration
Compliance	Administration
Regulatory Affairs	Administration
Security and Emergency Response	Administration
Capital Program Administration	Engineering
Project Management	Engineering
Development Services	Engineering
Engineering & Technical Services	Engineering
GIS	Engineering
Records Management	Financial
Account Management	Financial
Customer Billing	Financial
Customer Service	Financial
Meter Reading	Financial
Accounting	Financial
Budget & Procurements	Financial
Human Resources	HR
IT/IS	IT
CMMS	O&M
Facility/Building Maintenance	O&M
Laboratory	O&M
Water Treatment Plant (WTP) Operations	O&M
WTP Maintenance	O&M
Wastewater Treatment Plant (WWTP) Operations	O&M
WWTP Maintenance	O&M
Site Restoration	O&M
Distribution System Maintenance	O&M
Distribution System Operations (Water Quality & Flushing)	O&M
Process Control	O&M
Pump Maintenance	O&M
Collection System Maintenance	O&M
Inflow & Infiltration Abatement	O&M
Dispatch	O&M
Fleet Management	O&M
Leak Detection	O&M

Additional insights were further gained from the interview and performance analysis:

1. Organization and Responsibilities

   a. Staff shows a great deal of loyalty, pride of work, and commitment to MPW as an organization

   b. Long tenures have contributed to an organizational structure/job descriptions that are based on attributes and capability of individual staff members

   c. Communication and cross-departmental coordination/planning are primarily limited to functional areas; sharing-of-work is staying within work divisions

   d. Career pathing and development opportunities were persistent, common requests

2. Workload Shifts

   a. Multiple factors are causing a backlog in some functional areas, including: staffing levels, staff out due to injury, increasing community growth, and new initiatives

   b. Measures created to increase revenues and keep people busy during the recession are now creating increased workload as they mature

   c. Workload issues are exacerbated by reactive activities and is escalating because of community growth

3. Technology

   a. The science of utility management is becoming more complex, creating the need to adopt, fully deploy, and effectively use existing and new technology

The performance analysis indicated several interesting findings relative the actual performance versus the desired level of performance for each function. One helpful way that this was communicated to senior management and the Board of Directors was by a summary graph of employee count versus physical infrastructure growth (Figure 2). This figure shows the reduction of force and intentional staff attrition following the Great Recession of 2008-2009. A trend of limited infrastructure growth can be seen through the flat slope of each infrastructure type. However, infrastructure growth began again in the 2010-2011 timeframe while employee growth remained relatively flat during the same period.

The slow growth of new full-time employees is not necessarily bad during this period of challenged financial performance and the amount of uncertainty related to the long-term recovery of the economy. It does help to explain stressed staff, amount of above 40-hour work weeks, and in some cases, less than desired performance

(although MPW was continuing to meet all regulatory standards and maintained high customer satisfaction). It was also relatively easy to conclude that this situation was unstainable, both from growth and increased technology requirements, if MPW was to maintain desired system performance.

Figure 4: Employee Count versus Physical Infrastructure Growth
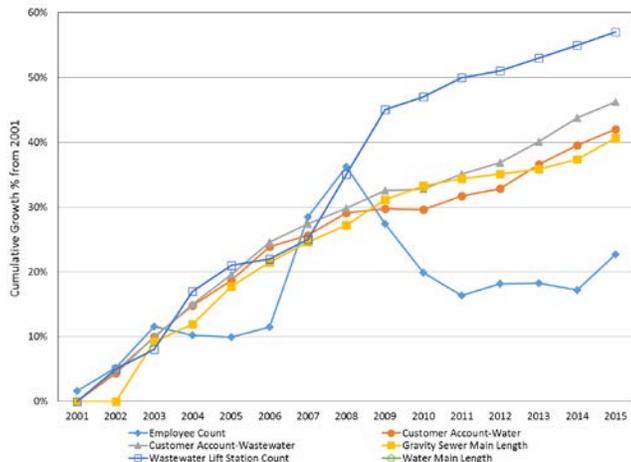
Some of the key findings associated with this phase were:

1. Retirements will mostly impact leadership positions, where there is the most opportunity to realign responsibilities
   a. Industry comparisons suggest MPW General Manager has a lot of direct reports
   b. Presents opportunity to restructure to emphasize strategic objectives and primary functions
2. Performance has not yet been severely impacted by increasing workload because staff are very experienced
   a. Presents opportunity to restructure to emphasize strategic objectives and primary functions
3. Immediate performance impacts are only being seen in certain operational areas
   a. Collections, HR, Engineering, Finance, Metering are critical hire areas
4. There exist numerous opportunities for process and technology improvements that can improve efficiency and eliminate non-value-add work without adding staff resources
   a. Advanced meter Infrastructure (AMI), billing automation, CMMS (Maximo), SCADA
   b. Preventative Planning & Maintenance
   c. Predictive Planning & Maintenance
5. Reconstituting the organization's structure to allow for resource-sharing across functions will enable MPW to meet fluctuating levels of work
6. Cross-training water and wastewater functional areas
7. Realigning staff and business processes by current functional areas

Phase 3: Focused Implementation

The Board of Directors approved 5 new positions in the upcoming budget based on the findings of Phase 2. Additionally, situational opportunities created by a former manager moving back into the area and another local management candidate expressing interest in joining MPW permitted some of the recommended organization changes to occur sooner than expected. This was made possible by a workforce planning model that was both flexible and opportunistic, and one that had been effectively communicated to the Board of Directors. A new Technical Services Division was formed.

The new Technical Services Department (TSD) was targeted for the first division of workforce development implementation. Its primary function was to provide data management associated with physical asset management, risk, and operational resiliency.

CH2M worked with MPW staff to conduct a facilitated workshop with eighteen MPW staff. This included key personnel within TSD as well as other division managers and the General Manager. Two days of interactive workshops were conducted and included:

- An initial pre-visit staff survey to gather early input on roles, responsibilities and priorities.

- A large group informational workshop and discussion of physical asset management (AM) program, data, decision making, and industry best practices.

- Small facilitated group discussions to discover the current roles and responsibilities related to current and future activities, or initiatives, for the program.

- An assessment of key competencies, including knowledge, skills, and abilities of the current staff.

Three-year Roadmap of Program Initiatives

One important outcome for the project is a three-year roadmap defining initiatives for the Technical Services Department specific identification of schedule, roles and responsibilities for each initiative. This roadmap will provide a basis for mapping personnel numbers and personnel competencies to meet the primary functions of this business units and enable the MPW system as a whole to meet the objectives of the Strategic Business Plan.

Overall, twenty-four (24) initiatives were identified for the next three years. The initiatives were place in priority order based on primary and dependent tasks, early win/priority activities and staff capacity needed to complete initiatives. The top near-term initiatives include:

- Defining physical asset criticality,
- Developing a standard approach for condition assessments,
- Identifying and defining performance measures,
- Conducting a new planning and scheduling pilot program,
- Completing a work order business process analysis and
- Developing an AM program communication plan.

These initiatives are identified to start, and some will be completed, in Year 1 of the roadmap followed with the remaining initiatives to be implemented by the end of Year 3.

During the workshop discussions and development of the roadmap, a number of observations were collected that will be important for the implementation of the AM program initiatives. These observations are as follows:

1. The Technical Services Department IT staff responsible for software applications have significant commitments already.

2. The Technical Services Department now "owns" four information management systems (serve dually as Technical System Lead and Business Lead). This is a change from the previous model of a system support role.

3. Change management will be important for the long-term success of many of the initiatives that will modify current business processes or add new business activities or requirements.

4. Staff described the current state with Maximo as "walking with Maximo." MPW requires several initiatives to get "over the hump" and onto the next phase with Maximo.

5. Business processes (i.e. work orders) and information systems need to be structured to set frontline staff up for success and collect the data needed by the organization.

6. MPW needs to communicate the AM program's progress and value to all levels of staff on a continuous basis. Many staff have expressed an uncertainty related to what is being done as part of the AM program and the value of the program to MPW.

These observations are important considerations for MPW's implementation of the initiatives from a workload and workforce development standpoint. Long-term cultural adoption of new or changed business processes or required accountabilities are also important focus.

Clearly the existing staff does not possess all the key competencies or personnel numbers to achieve the desired TSD initiatives plus meet all its core functions on a normal. The next piece of the workforce development program, focusing on optimizing functions, revising competency frameworks, and developing individual competency/training plans was underway at the time of the writing of this paper.

IV. Summary of Approach

A function-based workforce planning and development approach incorporates historical organization management theory that businesses perform as a system. Systems include inputs, outputs, functions controls, and a system of measurement. Approaching workforce development in this manner provides clarity, particularly with technical staff like R&M professionals, who deal with physical systems and complex problems on a routine basis.

A function-based approach is particularly helpful is particularly helpful in organizations where there are relatively high numbers of specialized functions but which have limited resources to successfully accomplish the work. The case application from Mount Pleasant Waterworks demonstrates the efficiencies and effectiveness gained by focusing on the functions and related organization outcomes rather than defaulting to filling the current organization chart. While not necessary to successfully implement a function-based workforce planning and development program, the familiarity of some of the key MPW staff with Reliability Centered Maintenance (RCM) concepts provided an additional benefit.

A function-based approach follows best practices associated with traditional workforce planning and development approaches from the human resources sector. The traditional approaches include four to seven primary steps that begin with alignment to the strategic plan and concluding with continual improvement following implementation. In the case example, a simplified four-step process was used: verification of strategic direction, including evaluation of current organization structure; workforce planning; implementation, including development of required workforce competencies; and evaluation and continual improvement. The details of the first three steps are provided in this paper. At the time of the writing of this paper, the fourth step was in progress.

The case application also demonstrates that workforce planning and development, particularly in technical organizations that operate in complex environments, is best done *in conjunction* with the human resources department but *not led* by the human resources department. This is a subtly that can be found in the literature and one that is usually lost in practice.

V. Conclusions

Function-based workforce planning and development is an effective approach, especially in organizations with a largely technical or specialized workforce, a wide range of functions, and limited resources. The authors maintain that the most effective approach for workforce planning and development is to focus on key (and evolving) functions rather than filling organization structures. For Reliability and Maintainability (R&M) professionals, this approach is similar to the manner that reliability centered maintenance focuses on maintaining functions rather than maintaining the form and structure of physical assets.

In organizations with largely technical or specialized workforces, function-based workforce planning and development should be performed in conjunction with the human resources department but not led by it. In many organizations, the human resources department is extremely limited in its numbers and lacks the technical knowledge of the functions and systems of the organizations. An integrated approach that actively included frontline staff is especially important.

There are many workforce planning and development approaches. No one approach fits all, and best practice encourages some situational customization. The authors are, however, reminded of a quote from Frederick Taylor in *Shop Management* that is equally relevant today as it was over one hundred years ago, "It is not at all generally realized that whatever system may be used, --providing a business is complex in its nature--the building up of an efficient organization is necessarily slow and sometimes very expensive." Function-based workforce planning and development is a key approach for making the process a little more understandable, a little faster, and a little less expensive.

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VII Key Words

Workforce Planning, Workforce Development, Performance Improvement, Organization Structure, Succession Planning, Aging Workforce, Employee, Best Practices, Change Management