Career Ladders for Maintenance Professionals
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ABSTRACT

Lack of a formal program for career advancement for maintenance professionals at Upper Occoquan Service Authority (UOSA) has had a negative impact on retaining staff in the Operations and Maintenance (O&M) Division.

To solve this issue an O&M Career Ladder was developed during 2007 and 2008. The Career Ladder enables personal development for the majority of the O&M staff and advancement to higher pay-grades and more responsibility. To move up the Career Ladder the employee must learn certain predetermined skills and be able to show his/her manager that they possess those skills by passing tests.

The O&M Career Ladder provides an opportunity for maintenance staff to be recognized and rewarded for their skills. It encourages development of a well-rounded skill set with emphasis on more training and personal development. A well trained staff should be able to perform tasks more efficiently, which is essential during our current financial hardships.

KEYWORDS: career ladder, career path, career advancement, promotions, maintenance staff, proficiencies, skills, retaining staff

INTRODUCTION

An aging wastewater infrastructure and limited budgets mean increased demands on maintenance professionals. They are usually asked to do more tasks for less money. However, it is not only the infrastructure that is aging, but the maintenance staff as well, which means that one of the industry’s major challenges today is to build and retain institutional knowledge. To keep, engage and train maintenance professionals has become an increasingly essential task for governments and utilities. It has also become more difficult to hire skilled maintenance professionals. One way to attract top candidates is to show them a detailed career structure that includes opportunities for personal development and advancement (Andersen and Greene, 2009).

Upper Occoquan Service Authority

Upper Occoquan Service Authority (UOSA) is a public entity organized under the Virginia Water Authorities Act. UOSA was created in 1971 to replace 11 smaller secondary wastewater treatment plants with a larger Regional Water Reclamation Plant providing advanced wastewater treatment. Currently the plant has a capacity of 54 mgd with the capability to handle peak flows
of 128 mgd. UOSA also owns, maintains and operates a regional system of interceptor sewer lines, pump stations and force mains that deliver sewage to the treatment plant. The plant is located in Centreville in Fairfax County in northern Virginia with the collection system stretching out into neighboring counties and municipalities, as seen in Figure 1.

![Figure 1: UOSA Service Area](image)

UOSA currently has 183 full-time positions, 54 of them in the Operations and Maintenance (O&M) Division. The main task for the O&M Division is to perform and oversee smaller installations and perform preventive, predictive and corrective maintenance. The division is also responsible for operating the remote pump station and the interceptor sewer lines. O&M Division includes six sections: Delivery Systems (responsible for maintaining and operating the remote pump stations and sewer lines), Electrical Systems (responsible for maintenance and overseeing work on electrical equipment), Facilities Maintenance (responsible for maintaining and overseeing work on buildings and grounds), Industrial Controls (responsible for maintaining and overseeing work on instruments and controls and HVAC equipment), Mechanical Systems (responsible for maintenance and overseeing work on mechanical equipment) and Support Systems (responsible for planning, record keeping, PM scheduling and fleet vehicles).

During the last few years it has become harder to retain maintenance staff, not only because of retirement (the Water Reclamation Plant recently celebrated its 30th anniversary and many of the original staff have started to retire), but also since several skilled maintenance employees have left the O&M Division to become operators instead. Their main reason for leaving was that the new position had opportunities for career advancement and more pay. To overcome these issues UOSA decided to create a Career Ladder for O&M staff.

**DEVELOPMENT OF THE O&M CAREER LADDER**
During 2007 and 2008 UOSA developed an O&M Career Ladder for four of its six sections: Electrical Systems, Facilities Maintenance, Industrial Controls and Mechanical Systems. Delivery Systems already had a Career Ladder in place that is based on the Sacramento Operation and Maintenance Waste Water Collection System Certification I & II and on passing in-house tests. Delivery Systems’ Career Ladder was reviewed and partly adjusted so that all O&M Career Ladders in general follow the same format which is described herein. A Career Ladder is not yet developed for Support Systems Section.

The four sections are very diversified, consisting of electricians, facilities specialists, I&C technicians and mechanics. Due to this difference in tasks each section needed their own career path, but the same approach could be used for all of them.

**Skill assessment**

The basic idea of UOSA’s O&M Career Ladder is that the employees should be able to advance to higher positions without somebody from that position being required to leave. A higher position requires that the employee have more knowledge of the trade-specific tasks as well as more knowledge about safety, processes and required coordination with other trades and divisions. An effective training program is an inherent part of the Career Ladder.

Ideally an effective training program would only provide information that is fully relevant to both the job and the participant (WEF, 2007). Accordingly, the first step of developing an O&M Career ladder was to define the type of skills that were required for each position. Each position at UOSA has a written position description. Using this description as a base and with the contribution of the trade managers, UOSA’s Maintenance Engineer created a “Skills Matrix” for each of the four sections. Part of the “Skills Matrix” for Electrical Systems is shown in Figure 2.

On the left side of the “Skills Matrix” are different types of proficiencies or skills that pertain to the trade. These skills are not only the typical abilities associated with the trade, but also “soft skills” such as computer literacy, knowledge of codes and standards, administration, etc. Knowledge of safety procedures and regulations, both general and trade specific, are also considered an important part of the basic knowledge. By its nature a “Skills Matrix” will not be static, but has to constantly evolve to adapt to new processes, equipment, tools and regulations that apply to UOSA.

Each skill is divided into three categories: basic, intermediate and advanced. For each skill and category there is a description that defines the required knowledge for that skill and category.

The basic category is what UOSA expects technicians at the lower positions (Technician III) to know. The advanced level identifies specialized (expert) knowledge. UOSA does not expect the technicians at the highest pay-grade to know all the advanced skills in the “Skills Matrix”, but they should know all the intermediate as well as the basic and have specialist knowledge in some advanced areas.
To assist the managers in their evaluation of their employees, each category of the “Skills Matrix” identifies the required training, usually in on-the-job (OJT) training hours, for each skill and category. The majority of the training is OJT, but the staff is also encouraged to take classes outside of UOSA (for example leadership classes, computer literacy classes and equipment training). Taking training off-site can successfully be combined with OJT if it is done in a coordinated effort to fill the skills gap (Gary Johnson 2003). Scheduled training does not always need to be off-site though. Suppliers of equipment and parts are usually happy to come and instruct the staff on proper installation, operation and maintenance, and their training quality is usually quite high. The O&M Division had an annual travel and training budget of $25,000 for a
staff of 54 in fiscal year 2009 (FY09), which mainly pays for the training outside of UOSA. Some of the O&M Division’s managers use the “Skills Matrix” to assess each employee’s training needs and to help set up goals during the annual evaluation process.

During OJT the employee gradually gets exposed to using certain skills under supervision of more experienced staff, lead technician or a manger. With a gradually increased level of responsibility the employee gets to improve his/her proficiency in performing the task.

The O&M Division at UOSA has also started building up a training database with self-paced training classes on CD-ROM that the employees are encouraged to take when they have some spare time during a normal work day. These classes are hi-tech and interactive and include several self checks and tests. The managers are able to print out reports for their employees to see how they are progressing with their training and if they have passed their tests.

The initial introduction to UOSA procedures and practices that all new employees receive, regardless of their duties, is called baseline training (WEF, 2007). All new hires at UOSA undergo overview, safety, and familiarization training coordinated by their manager. This type of training is not part of the O&M Career Ladder at UOSA, since it is mandatory training for all UOSA staff.

**UOSA’S O&M CAREER LADDER**

The Career Ladder is based on the “Skills Matrix” for each trade. Each manager uses the “Skills Matrix” to evaluate if an employee is ready to take a practical or written test. The employee has to pass the practical test to receive a pay increase and be allowed to take the written test.

A requirement in the Career Ladder is that an employee has to have a certain score at their last annual evaluation. All employees at UOSA are evaluated annually and receive a score from unacceptable (a score of 0) to outstanding (a score of 5.1). An employee who receives a score of 3.7 is exceeding the requirements and an employee with an annual evaluation score of 4.1 is considered highly competent.

An experience period is also required at every step of the Career Ladder. In special cases there might be an exception to this rule (for example return of an experienced technician) as authorized by the O&M Division Director.

UOSA’s Career Ladder for maintenance professionals has different paths for each section, but the framework is the same. The format of UOSA’s O&M Career Ladder is shown in Figure 3.

New hires that have no or little relevant experience may be hired as a Trainee. The section manager will evaluate when the Trainee is ready to take the Technician III test. Usually this is done in conjunction with the 6-month evaluation that all new UOSA employees undergo approximately six months after they are hired. A new hire must pass this practical hands-on test within one year of employment for continuing employment. Upon successful completion of this
test, the Trainee will be promoted to a Technician III and will receive an eight percent salary increase.

Figure 3: Basic format of the Career Ladder

A Technician III can complete two tests to show their abilities, one practical hands-on test and one written test. Before the Technician III can take the practical test he/she has to fulfill the basic training requirements. The manager and/or lead technician will evaluate when the
A technician is ready to take the practical test based on the completed training and mastering of the required skills. The successful completion of the practical test will yield a four percent salary increase.

Once the technician has passed the practical test the manager will decide when the technician is ready to take the written test. The technician has to have been working a minimum of two years as a Technician III, it should be at least six months since he/she passed the practical test, and he/she should have received a minimum score of 3.7 at his/her latest evaluation to be eligible to take the written test. Upon successful completion of the written test the Technician III will be promoted to a Technician II and will receive a five percent salary increase.

A Technician II can complete two tests to show their proficiencies, one practical hands-on test and one written test. Before the Technician II can take the practical test he/she has to fulfill the basic and intermediate and one third of the advanced training requirements. The manager and/or lead technician will evaluate when the employee is ready to take the practical test based on the completed required training and mastering of the required skills. The successful completion of the practical test will yield a four percent salary increase.

Once the technician has passed the practical test the manager will decide when the technician is ready to take the written test. The technician has to have been working a minimum of two years as a Technician II, it should be at least six months since he/she passed the practical test, and he/she should and have received a minimum score of 4.1 at his/her latest evaluation to be eligible to take the written test. Upon successful completion of the written test the Technician II will be promoted to a Technician I and will receive a five percent salary increase.

It’s important to note that not all positions in the Career Ladder have to be permanently filled at all times. For example most of the O&M sections do not currently have anybody in the Trainee Position.

Testing
At UOSA we decided to develop in-house tests since we were unable to find maintenance certifications or other types of tests that address all the necessary skills for each trade. There are both practical “hands-on” tests and written tests. During a practical test an employee is asked to perform four predetermined tasks to prove their knowledge and skills. The employee must be able to perform all four tasks in order to pass the test. The written tests consists of approximately 200 multiple choice questions relating to safety, maintenance practices, technical proficiency, theoretical knowledge and knowledge of processes at UOSA. The passing score for the written test is 80 percent.

DISCUSSION
The Career Ladder is not an automatic way to get promoted. Each employee is the owner of their own career development and there are no guarantees of testing and training schedules. Each section manager and his/her lead technicians are responsible for evaluating the employee’s
progress and abilities and should take all reasonable steps to allow the staff the opportunity to advance when ready.

The O&M Career Ladder provides a mechanism for O&M staff to be compensated fairly as their level of knowledge and responsibility grows. It also helps create a culture where employees have the opportunity to develop and learn new skills.

**Benefits**

The O&M Career Ladder provides an opportunity for maintenance staff to be recognized and rewarded for their abilities within their chosen field. Employees will be compensated and the personal satisfaction received will be in proportion to the employee’s creative and productive abilities. It encourages development of a well-rounded skill set with emphasis on more training. A well trained staff should be able to perform tasks more efficiently and complete more tasks for less money. Experience also shows that hands-on training provides a measurable improvement in employees’ technical knowledge, leading to measurable reductions in downtime and accidents (Gary Johnson 2003).

Much of the knowledge about existing systems is in the heads of the employees who will retire in the near future. (Andersen and Greene, 2009). An important part of the O&M Career Ladder is OJT (on-the-job training), which is a great opportunity for experienced staff to pass on their knowledge. The Career Ladder will thereby also help to retain experience gained over the years and will reduce the impact of the imminent wave of retirements.

Another benefit is that it will make the employees responsible for their own career development instead of just waiting for somebody to retire from a higher position. It should also be easier to attract new hires since there is a clear opportunity for personal development and advancement and no “dead-end” jobs. The emerging workforce expects to learn and build skills and gain knowledge in order to have an edge in the job market and build their careers (AMWA and AMSA, 2004). Traditionally, we have expected the educational system to produce people with the skills that are needed in the workplace (Gary Johnson 2003). However, there is currently a scarcity of qualified entry level craftspeople in the United States. With the implementation of the O&M Career Ladder UOSA now has a better opportunity to hire an individual with no or little relevant experience but who shows great aptitude for the job (for example individuals that just finished high school). Such an individual can be hired at a lower level (with less pay), but will have the opportunity to advance and make a career within their field without leaving UOSA.

Having written and practical tests also helps morale since employees can certify to upper management that they have the necessary skills and the ability to do the job. Another positive effect is that it might be easier for the employees to get training support from managers since the managers are involved in the evaluation process and have a clearer picture of what type of training the employee requires in order to succeed in their career development.

Also, since there is a possibility of being promoted based on your skills and commitment to the job, the O&M Career Ladder should encourage employees to take a more active part in learning
and help foster an attitude of sincere enthusiasm and passion for their trade. It should motivate employees to improve their technical skills and take charge of their professional development.

**Potential pitfalls and how they were avoided**

Before the O&M Career Ladder was implemented some managers expressed concern that staff would be promoted just because they were good at taking tests, even though they had poor attendance, poor attitude towards UOSA, poor teamwork and cooperation skills and often showed poor judgment. The managers were concerned about what type of message that would send to other employees. To overcome this issue a required minimum annual evaluation score of 3.7 for a Technician III and 4.1 for a Technician II was built into the Career Ladder before an employee is allowed to take a written test. All employees at UOSA are evaluated by their supervisor annually and attendance, attitude, teamwork, judgment, etc. are a part of the evaluation. An evaluation score of 3.7 means that the employee’s performance was consistently beyond normal expectations. An evaluation score of 4.1 means that the performance and job knowledge was very high and consistent, and that the employee routinely brought added value to UOSA.

Another concern brought up during the development of the O&M Career Ladder was that most maintenance tasks are very practical (hands-on) and that there are several employees who are not very good testers and would probably do poorly on written tests, even though they are very intelligent, accountable, hard-working and good with their hands. To deal with this issue, practical tests were included in the Career Ladder. If an employee passes a practical test he/she will receive a salary increase. In order to ensure that promotions are not subjective and solely in the hands of their manager, the employee has to pass a written test to get promoted. However, no time frames were set on taking the written tests, so that the test candidate would not make mistakes due to lack of time.

To reduce doubts and questions by other employees it is important to adequately document the basis for promotions. Administrative forms requiring signatures of both the manager and Division director are an important part of the Career Ladder. These forms also properly document test scores and that the employee was eligible to take the test.

**CONCLUSIONS**

The maintenance field in general is very diversified and at UOSA each section has their own expertise (electrical, mechanical, etc.). Due to this diversity an O&M Career Ladder requires different paths for different maintenance trades. However, the framework of each of these career paths is the same for all sections.

Each career path is focused on the skills that are necessary for that particular trade. Employees need to build their skills by training in the particular areas that pertain to their trade. The skills are all defined in a “Skills Matrix” that is unique for each section. When a manager believes that an employee is ready for promotion to a higher position the employee has to complete in-house tests to certify that he/she has the required skills for the higher position.
According to Association of Metropolitan Water Agencies and Association of Metropolitan Sewerage Agencies (2004) an organization should develop a learning environment that encourage employees to seek life-long training and career paths that are mutually beneficial to the employee and the organization. UOSA’s O&M Career Ladder aim at creating such a learning environment.

The O&M Career Ladder provides an opportunity for UOSA’s maintenance staff to be recognized and rewarded for their skills, instead of waiting for someone at a higher position to retire or leave UOSA. The benefits of the Career Ladder have already been seen by some of the maintenance managers, and employees feel encouraged to get further training.

The Career Ladder encourages development of a well-rounded skill set with emphasis on OJT (on-the-job training) which is a great opportunity for experienced staff to pass on their knowledge to less experienced staff.

The O&M Career Ladder is not static but will continue to develop. The next step is to incorporate different types of maintenance related certifications into the Career Ladder to encourage life-long training for all employees. A certification by an independent authority will also confirm to upper management and to UOSA’s customers that the employees are very well qualified to do their job.

The objective of this paper was to share significant features UOSA’s Career Ladder for maintenance professionals with other utilities facing similar concerns of retaining their maintenance staff and hardships in hiring new employees. It’s our belief that encouraging continued professional growth benefits not only our employees but also residents and communities who will be able to see their highly skilled maintenance professionals do more work for less money. We hope that we can inspire others to start on their path to develop Career Ladders for maintenance professionals so that we can all have a highly skilled and knowledgeable workforce to meet 21st century needs.

REFERENCES


