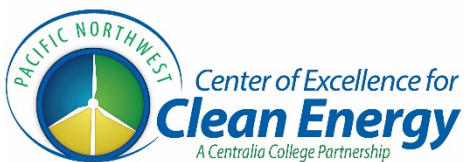




Skill Profile for Utility Foremen in the Pacific Northwest



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Prepared by

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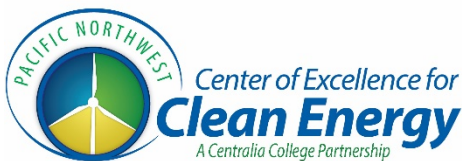
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Washington State University Energy Program

for the

Pacific Northwest Center of Excellence for Clean Energy, Centralia College

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About the Pacific Northwest Center of Excellence for Clean Energy (Centralia College)

The Pacific Northwest Center of Excellence for Clean Energy (PNCECE) is a nationally recognized model that provides strategic coordination for the energy industry's skilled workforce. The Center is a statewide resource that represents the interests of the energy industry, and our labor partners, within the Washington State Community and Technical College system. The Center exists to narrow the gap between employers' demands for a highly skilled workforce and the colleges' ability to supply work-ready graduates. The Center convenes industry and labor to help drive workforce development initiatives — and coordinate community college resources after industry and labor set the direction.

About the WSU Energy Program

The Washington State University (WSU) Energy Program is a recognized leader in energy research, development and technology transfer. The WSU Energy Program works with government agencies, power marketers, utility consortiums, educational institutions, private businesses and industries on projects that promote energy conservation, research, development of renewable energy sources, educational programming, economic and workforce development.

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Introduction

This project sought to understand and document the primary work functions, knowledge and skills required of utility sector foremen. Defining a set of foundational work functions and skills for front-line utility foremen is a critical first step to identifying and developing effective education and training to help experienced craft workers make an effective transition into leadership roles as foremen. New technology, organizational changes, labor shortages and utility markets have all caused shifts in the skill requirements and priorities for foremen.

This project is also viewed as important to education and training institutions and apprenticeship, which are responsible for providing programs that help prepare the next generation of utility craft workers and front-line leadership. Innovations in technology will continue to be incorporated into existing energy infrastructures, raising the levels of knowledge and skill required of the workforce. At the same time, the demand for qualified employees continues to outpace labor supply, and the energy industry is expected to see increased turnover among experienced energy workers and foremen due to retirement trends, demographic shifts, and growing competition from other industry sectors for skilled workers.

Identifying and documenting the current work functions, responsibilities and skills of utility foremen provides a foundation that will help utility organizations, leaders and employees adapt to these changes and plan for the future.

This project was designed to identify and define the workforce attributes of effective utility foremen using a systematic process. The project leveraged prior research findings and incorporated up-to-date data and information received directly from experienced utility foremen. Additional input was collected from other industry experts, and the draft results were subsequently verified by the foremen focus group participants. The goal of this work was to provide a common, industry-defined skills profile for utility foremen that can be used by utilities, labor, trainers and educators to design and improve leadership and related core training programs and professional development opportunities.

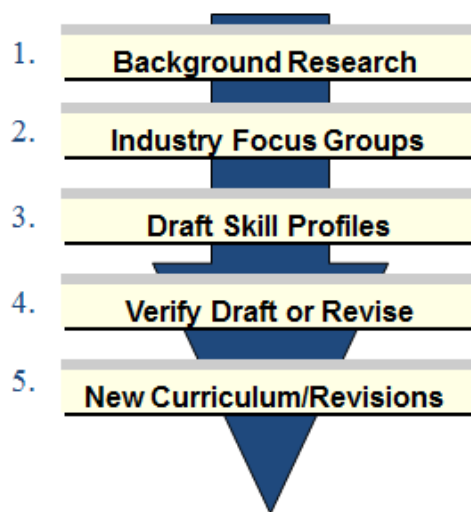


Figure 1. Building and Using Skill Profiles

The Context for Skill Profiles

The energy industry is undergoing significant technological, social, and organizational changes, and these changes pose challenges to the industry's ability to attract, develop, and retain a qualified workforce. Current and future investments in updating the electrical grid, equipping consumers with the ability to monitor and control their own energy use, and a growing interest in integrating renewables and boosting energy efficiency all have implications for the workforce expectations of utilities, energy service companies, and suppliers. Skill profiles provide a systematic approach to help employers and educators identify the nature of those shifting expectations and the associated skill requirements needed by employees now and into the future. In short, skill profiles offer a method to help companies, employees, and education and training institutions understand and adapt to a changing workplace.

Washington state was an early national and regional leader in the development and use of formal methods for identifying the knowledge, skills, and abilities required of employees in certain occupations through the development of industry-defined skill standards, and through efforts to convert that information into enhanced curriculum and training opportunities through processes such as DACUM (Develop a Curriculum) models.¹

Skill profiles – a derivative of these earlier proven models – are an innovation that emerged in response to an interest by researchers, industry and education partners to develop new analytic models. While skill profiles are similar to skill standards and DACUM models, they include new features that afford enhanced user flexibility and novel curriculum and training development inputs for use in program development. These features, described below, are intended to offer an alternative method for improving the ability of the energy industry, employers, and educators to identify and provide high-quality education and training that will ensure that current and future energy employees are well-equipped to succeed in the modern energy workplace.

What Are Skill Profiles?

Skill profiles are the industry-identified, occupation-specific knowledge, skills, and abilities that an individual needs to succeed in the workplace. These skill profiles are critical to improving workforce skills, keeping pace with technological and market changes, enhancing the competitiveness of energy employers, and supporting employee career development. To be

¹ Skill Standards created in Washington state for the energy industry can be found at: <http://cleanenergyexcellence.org/skill-panel/> and www.energy.wsu.edu/ResearchEvaluation/WorkforceDevelopment.aspx

effective, skill profiles must be derived from research and direct input from experienced employees and subject-matter experts (SMEs) who have deep knowledge of the work.

Skill profiles answer two critical questions:

- What do workers need to know and be able to do to succeed in today's workplace?
- What are the highest-priority skills and qualifications needed for success?

With this fundamental information:

- Employers know whom to hire or where to focus their limited training dollars.
- Employees and new entrants to the workforce know how best to improve their own performance.
- Educators know what content students and incumbent workers must master to gain employment and to enhance their careers.

Why Are Skill Profiles Important?

In today's energy workplace, jobs that once were relatively static and narrowly defined have become broader and now require the ability to apply high-performance work processes, an expanded knowledge base, and the ability to rapidly acquire and apply enhanced skills on the job. Because skill profiles reflect changing workplace realities, they are a tool that can be used by applicants and employees to adapt to shifting work requirements and incorporate new learning that will help maximize employee productivity, retention, and career options.

Updating skills and knowledge is now a lifelong endeavor, causing many employers and employees to spend more effort, time, and money on education and training. Skill profiles provide benchmarks for making education and training decisions; shaping curricula; and directing funds toward high-priority, high-impact education and training investments.

Looking across the energy industry, the systematic approach used to develop skill profiles provides a standardized method to identify core skills for specific occupations that can be applied across many organizations. As an industry-wide benchmark, skill profiles provide a tool that ensures greater portability of knowledge and skills across geographic areas, companies, and careers.

Benefits and Uses of Skill Profiles

Skill profiles benefit all stakeholders – business, educators, labor, individuals, and the government. The success of a skill profiles development project and its usefulness to the community depends on the full participation and commitment of all stakeholders. That means a

shared commitment to designing, confirming, and implementing the results of skill profile projects within and across partner organizations, and evaluating the effectiveness of these collaborative efforts.

Benefits for Employers

Employers can use skill profiles to establish personnel qualification requirements and job descriptions. Interviews, performance reviews, and productivity can be evaluated and assessed to a higher degree of accuracy and efficacy.² Employers are also able to identify core competencies and their expectations about workers' skills and abilities. By matching skills and competencies to critical work functions and key activities, employers can work in partnership with employees to enhance their skills and pursue greater organizational efficiencies and productivity. In addition, employers use skill profiles to:

- Align personnel qualification requirements with nationally recognized certifications.
- Design or modify employee training.
- Generate and update job descriptions
- Simplify measurement of employee training effectiveness.
- Assess employee skill levels based on industry-defined work elements and priorities.
- Match employee skills to the work that is required.
- More easily document employee skills, training needs, and performance criteria.
- Improve employee satisfaction, morale, and retention by clarifying expectations.
- Improve work quality, productivity, and competitiveness.
- Initiate or enrich partnerships with key labor, education, government, and community stakeholders who can support workforce development at an organization.

Benefits for Educators

Because the competencies, skills, and assessments were identified as being important for job performance and career success by professionals in the field, educators can confidently integrate these elements into their curricula. This use of profile data for curriculum and assessment development is part of a broader process to establish a collaborative working relationship among educators and employers. Important discussions about new program

² *Note: To ensure that the use of skill profiles, standards and related assessments and certifications do not contradict U.S. employment law, employers may need to conduct an internal validation before using the skill profile information to make hiring and promotion decisions. See: http://www.eeoc.gov/policy/docs/factemployment_procedures.html*

content and delivery, and upgrading existing courses to maximize the benefits and effectiveness for educators and stakeholders, are among the anticipated long-term outcomes.

Educators can use skill profiles to:

- Provide effective, targeted instruction.
- Develop benchmarks for certificates of competence earned by students.
- Communicate to students and other faculty what companies expect of employees.
- Develop and evaluate existing curriculum and programs based on industry needs.
- Develop assessments to evaluate skills, knowledge, and abilities in classrooms and internships.
- Develop a common language on workforce preparation with business and labor.
- Improve relationships with local businesses, labor unions, other educators, and agencies.
- Provide students with current, specific, and highly relevant career education and counseling.

Benefits for Labor Unions

Labor unions can use skill profiles to gain support for company-sponsored worker training programs for their members, and to identify or enhance career pathways for workers within companies and industries. Unions can provide this information to union members and develop strategies to improve employment stability, career mobility, and wage progression.

Skill profiles help unions to:

- Improve member value to the company.
- Provide a greater worker voice in defining occupations and performance goals.
- Link skill profiles to increased training and upward career mobility for union members.
- Assist employers to match employee skills to the work that is required, and enhance these skills as needed.
- Develop skills-based training and certification initiatives that complement or upgrade existing apprenticeship programs.
- Communicate effectively with employers about worker training and retraining needs.
- Collaborate with education and industry in developing joint programs and initiatives that provide mutual benefits to union members, companies, and workforce development partners.

Benefits for Students and Workers

Skill profiles can be used to assist students in making career choices by providing current, occupation-specific data on industry expectations for success in the workplace. Profiles-based curricula and assessments can be used to provide students with credentials that certify work-readiness, which can help them to negotiate hiring-in at higher rates of pay and achieve faster advancement in their chosen fields.

Workers can use skill profile data to:

- Accurately assess their skills against those required for career advancement,
- Plan for career growth and wage progression, and
- Determine the continuous learning and training they will need to upgrade their skills.

In addition, students and workers can use skill profiles to:

- Achieve greater clarity regarding employer expectations, including what they are expected to know, and how to prepare for work.
- Enter and re-enter the workforce with better control over their options and ability to secure high-skill, high-wage jobs with future career mobility.
- Accurately assess business expectations about the basic workplace competencies and the technical skills and abilities needed to succeed in specific positions and to ensure career advancement.
- Improve mobility and portability of their skills and credentials.
- Document and achieve certification of competence of the skills they gain through experience, school, training, or self-study.
- Enhance their performance and achievement by self-evaluation against known standards.
- Be active contributors to improving work practices, behaviors, and related activities that help make their organizations successful.

Benefits for Government

By helping to provide information that will ensure a better skill match between workers and employers, governments are investing in economic development at regional and state-wide levels. Skill profiles enable state agencies, educational institutions, and workforce development organizations to provide relevant, effective employment and career options that:

- Promote continuous learning and job mobility, and
- Ensure the development of a highly skilled and competitive workforce.

In addition, government can use skill profiles to:

- Target and evaluate the effectiveness of publicly funded education and training.
- Increase opportunities for under-represented populations by publicizing information that defines the skills required for success and facilitating the adoption of those definitions by industry, labor, education, and training providers.
- Support the creation of high-performance work organizations and practices that contribute to high-skill, high-wage employment and improved living standards for citizens.
- Facilitate collaboration, commitment, and strategic investments in workforce development among educators, labor, and industry.
- Communicate the need and basis for education reform to business, education, labor, and the community-at-large.

Skill Profiles to Curriculum: A Continuous Development Process

The skill profile generated through this project is designed to be used by:

- **Participating education partners** to develop or modify energy management-related curriculum at the high school and community college levels, and
- **Companies** that wish to upgrade internal hiring and qualifications priorities, training programs and assessments, and overall workforce development goals.

By providing the necessary input from industry, this skill profile document is a first step in the curriculum development process for the utility foreman occupation, and a model for curriculum development for the energy industry as a whole.

To keep current with a rapidly changing workplace, skill profiles need to be re-evaluated and updated regularly, with full partner participation at each step. New technological developments impact the ways that workers organize and apply their skills, including time management, teamwork, and interpersonal relationships. Increased technological complexity may reduce or simplify some job tasks but make others more intricate.

Today's successful energy employees and leaders are challenged to acquire a broader range of analytical, decision-making, and customer service skills, and to stay current with emerging technologies. Ongoing changes like these must be reflected in curriculum in order to meet the needs of industry and to support employment and career development of energy professionals.

Creating and Using Skill Profiles

The following steps were used to create and implement the foreman skill profile. A review of existing skills identification research and standards ensures that prior work is recognized, leveraged, and not duplicated. The day-long focus group process deliberately included industry participants who have extensive, current experience and/or knowledge of the work.

An innovation developed and implemented during this research extended the focus group approach previously used in other applications (DACUMs, skills panels, skill standards, etc.) to include rank ordering of the identified skills and competencies in terms of importance. The importance rankings for the skills and workforce competencies were collected for each focus group participant. The survey of basic work competencies identified the importance of a range of fundamental workplace knowledge and skill, from computer skills to math, time management, problem solving, and teamwork. The skill profile was verified through a review process that incorporated input from other industry experts; the final profile was reviewed and verified by the original focus group participants.

Step 1: Identify Skill Profile Content

- Compile and research existing requirements, standards, training materials, and competencies in the same and related jobs and careers.
- Conduct a focus group comprising experienced utility foremen to identify critical work functions of the target occupation, including the key activities required to support each critical work function.
- Identify, describe, and prioritize the key skills needed to support each critical work function during the focus group process.
- Conduct a survey of focus group participants to determine the level of basic work competencies (referred to as SCANS, short for the Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor) required for each job.³
- Verify the data gathered from focus groups through a review and input by industry experts, with final approval of the profile by focus group participants.
- Disseminate skill profiles information to involved parties from industry, education, and labor for their review, input, and use.

³ SCANS were originally defined by the U.S. Secretary of Labor's Commission of Achieving Necessary Skills. See: <http://wdr.doleta.gov/SCANS/whatwork/>

Step 2: Rank Skills and Competencies

The Pyramid of Competencies was used to help classify and rank the skills and competencies identified in the skill profiles. The knowledge, skills, and abilities depicted in this pyramid are organized into three broad tiers.

- **Tier I** represents the broadest level of competencies, and is the set of 16 employability (SCANS) skills, knowledge, abilities, and personal qualities required of all workers to be successful in today's workplace. These are the universal skills that are needed to apply technical knowledge and tools effectively. For example, utility foremen need to be able to communicate clearly both orally and in writing, and have a basic competence in math.
- **Tier II** represents technical skills, knowledge, and abilities common to a cluster of jobs an industry or industry sector. For foremen, for example, knowledge of applicable federal, state, and local laws, standards, and codes would be applicable across all sectors.
- **Tier III** represents industry-specific technical skills, knowledge, and abilities that are unique to individual jobs or clusters and are the most prone to rapid change. For example, utility foremen are typically promoted through the ranks from craft occupations, where they have developed extensive technical knowledge and experience in a particular occupation. This deep technical knowledge enables a foreman to understand energy work in practice, to perform technical work as needed (most foremen perform work as well as direct the work of others), and also lends credibility and support to a foreman's essential role as a leader.

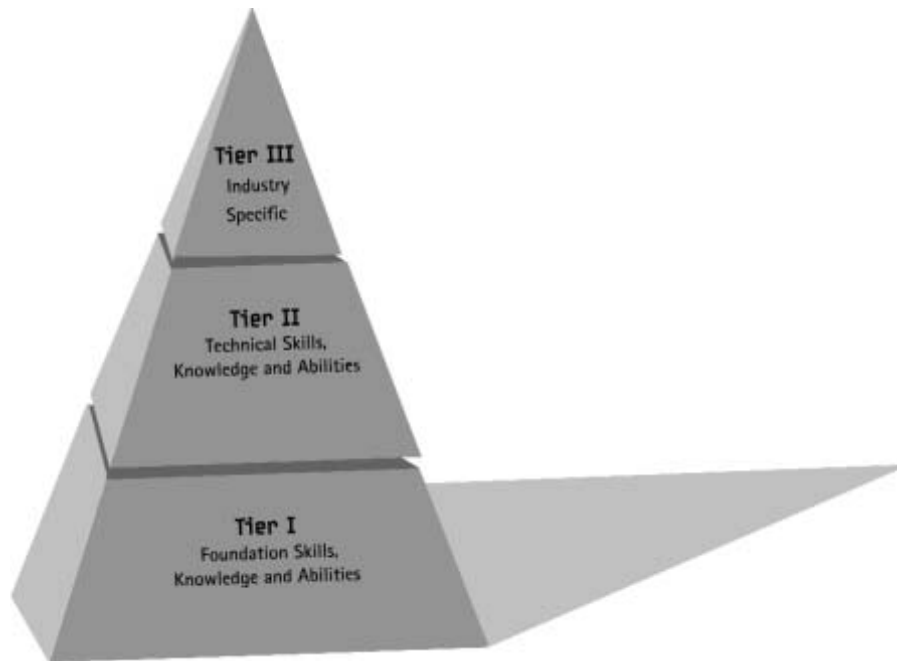


Figure 2. Pyramid of Competencies

Step 3: Developing Curricula and Assessments

The skill profile data provide a useful foundation for curriculum and assessment development by college faculty and industry trainers. In addition to identifying the critical work functions and key activities of these professions, the ranking of the skills and competencies by importance can be used to determine which skills and competencies to include or emphasize in curriculum development and assessment efforts.

Because the skills importance rankings are collected from each participant, the statistical variance for each ranking provides a measure of agreement across different industry representatives and companies. Both pieces of information are available for all skills and competencies (see Appendix A), and are important considerations when designing new courses or modifying existing curriculum.

Study Methodology

The WSU Energy Program was retained to help design and implement the project design in partnership with the project sponsor. WSU has extensive experience conducting industry and occupational analyses, and leading research initiatives in the energy sector, including the specific research model and processes implemented for this project.⁴ Study methods included a combination of qualitative and quantitative data collection strategies and analyses, organized into three primary phases:

1. **Research and Industry Trends:** An extensive background review of existing reports, industry research, training and other technical documents was conducted to identify utility industry trends, resources, and related workforce development and training resources in industry and education. These materials provided the background and context for the study, and helped guide the overall project design, data collection instruments, draft versions for review, and report content.
2. **Stakeholder Discussions:** The author consulted with project sponsors, utility managers, labor representatives and other knowledgeable subject matter experts for input on the project design and content. A presentation and discussion with the full PNCECE advisory board was held to receive additional input and to confirm the project design and final report. Feedback from the advisory board was incorporated into the final report.
3. **Utility Foreman Focus Group and Data Collection:** On May 10, 2018, a day-long focus group comprising 12 utility foremen from nine different organizations was convened to collect data about trends in the utility sector and to better understand the role of a utility foremen. The organizations that agreed to participate had each expressed interest in the project, and they agreed to invite volunteers from among their foreman ranks to attend.

The diversity of company types, geographic locations, size, public-private ownership, and sectors helped to ensure that a range of utility organizations were included. Participants were employed across all major utility sectors: Generation, transmission and distribution. Eight of the 12 participants were current members of an organized labor union (IBEW Local 43, 77, 125, and 659). All participants were men. The focus group representatives were employed at the following organizations:

⁴ Detailed information on the research process and related reports can be found at:
<http://cleanenergyexcellence.org/> Also:
<http://www.energy.wsu.edu/ResearchEvaluation/WorkforceDevelopment.aspx>

- Avista Corporation
- Bonneville Power Administration
- Centralia City Light
- Chelan Public Utility District
- Clark Public Utilities
- Energy Northwest
- Tacoma Power
- Puget Sound Energy
- Seattle City Light

Focus Group Process

Each focus group participant was regarded as a subject matter expert (SME) in their field by virtue of their extensive experience as a utility craft worker and foreman; each individual had at least seven years of utility experience, and at least three years of experience as a utility foreman. The focus group was facilitated by the author, who provided a general introduction to the project goals and focus group data collection process (described in detail in the next section). The focus group meeting lasted eight hours. The data collection approach was based upon a modified version of the systematic data collection process used for many previous energy-related skill standards projects directed by WSU researchers.¹

The introduction and discussion topics covered during the focus group event incorporated several dimensions:

- The rationale and need for development of a skill profile for utility foremen, including:
 - The position represents a key leadership role; a foreman is a high-value catalyst
 - Most foremen both direct and perform technical work; their credibility is rooted in their craft knowledge and experience
 - Team-based work requires group cohesion
 - Adapting to new technologies and processes requires support and re-training
 - Knowledge and skill expectations of foremen are changing, and generally rising
 - Finding, preparing and retaining qualified foremen is a common challenge for utilities, due in part to increased retirements, turnover, and ongoing skill gaps
 - Foremen leadership skills are learned and earned
- Trends in the utility industry, including past and current changes that impact the responsibilities and requirements of foremen.

- The primary roles that a foreman plays within a utility organization.
- The specific work functions, activities, occupational skills and basic workplace competencies required of experienced utility foremen.

Data Collection Process

Industry and Occupational Trends

The first step was for the group to discuss the impact of recent changes and other trends in the utility industry that the group has impacted their role, or may in the future. The group was encouraged to identify factors that represented the perspective of foremen in the workplace, based on their personal observations and experiences.

Critical Work Functions and Key Activities

The next step in the focus group process was to identify the primary functions and key activities that constitute the work of a competent utility foreman. The targeted level of experience was set at between three and five years of experience, which focus group participants and other industry experts identified as the desired target level for professionals in this occupation.

To leverage existing research and avoid duplication, the author generated a draft set of sample critical work functions and key activities for the focus group meeting. The draft was derived from an analysis of background research, existing skill standards from related industry and occupational sectors, and input from industry experts. The focus group used this draft document as the basis for its initial discussion and review of the work functions and activities of utility foremen. Throughout the course of the meeting, participants jointly re-visited, revised and adapted the draft functions and activities to reflect the requirements of a competent utility foreman. Participants freely made changes and recommendations, and agreed as a group on the final content.

Occupational Skills and Ranking

Next was to identify the key occupational skills associated with each of the critical work functions defined by the group. These skills were deemed important to the job performance of a competent utility foreman. Once identified and confirmed, each participant was asked to rank-order each skill by the level of importance needed to perform the associated critical work function. Individuals reported their scores, which were recorded, analyzed and summarized for the report (see Table 1 and Appendix B).

Workplace Competencies

A survey of workplace competencies was administered to focus group members to measure the basic competencies required of workers in any workplace setting. This survey has been used to

establish basic competencies for utilities and other industry-defined skill profiles and occupational skill standards.⁵ The survey results are displayed in the next section of this report.

Review and Verification

A draft of the critical work function and key activity data charts and tables generated by the focus group was circulated for review by all focus group participants and other utility industry experts. Modifications were made to correct factual errors or omissions identified by participants, and new information suggested or provided by reviewers was added to the report where appropriate.

⁵ See: <http://www.energy.wsu.edu/ResearchEvaluation/WorkforceDevelopment.aspx>. Also: <http://cleanenergyexcellence.org/>

Results

Industry Trends Summary

This short (30 minute) facilitated discussion served to stimulate individual and group participation, provide context for the conditions and changes in the workplace, and to preview the broader discussion about job functions, activities, knowledge and skills that followed. The dominant themes identified by the group included:

1. Regulation-Related Workload:

- North American Electric Reliability Corporation (NERC) and Federal Energy Regulatory Commission standards, regulations and controls have become more complex and time consuming to address.
- Cyber security issues and requirements are also more numerous and require additional time and effort to meet and maintain.
- Safety regulations, including federal and state-level requirements (Occupational Safety and Health Administration, Washington Industrial Safety and Health Act, etc.) are also more numerous and demand more effort from foremen than in the past.
- Overall, while the group generally agreed that the various standards, regulations and policies described above are important, foremen now face a more complicated compliance and administrative burden that requires additional time devoted to record keeping and reporting.
- Several foremen reported that they have absorbed the added workload, without additional staff, but this has had a negative impact on their ability to manage multiple jobs and meet project timelines. Administrative requirements can be a distraction to getting the technical work done. As one foreman put it: “There’s endless paperwork. The guys just want to go to work – but we have to do the paperwork first.”

2. Knowledge and Skills Diversification:

- New technologies and systems integration is driving greater focus on interdisciplinary knowledge and skill, including understanding how technical systems, components, and work crews interact.
- While foremen need to know and understand the technical aspects of the job and team skills, the position has evolved and requires a higher priority on broad knowledge rather than being a specialist: “Every guy has to know a little bit about everything to make things work. We are jacks of all trades, not specialists.”

3. Age and Generational Issues:

- Several participants reported that the career priorities of newer, younger workers (participants commented in particular about the Millennial generation) are often very different than those of older, existing employees.⁶ Some said that the work ethic and level of individual commitment to the utility and job seems lower overall, which can make the job of managing individuals and crew dynamics challenging.
- Some observed that many younger-aged workers seem uninterested in moving into positions that require leadership, supervision and management work. Where younger employees have pursued management jobs, they sometimes lack utility knowledge and technical experience, and as a result experienced foremen may not get the management support they need, or they must sometimes help train the new supervisor to help them bridge knowledge and skill gaps.
- On a positive note, the group indicated that the ‘younger generation’ does tend to pick up on communications and information technology quicker than their older counterparts, which is an advantage in light of the growing use of advanced technologies and automated systems in the utility workplace. They show foremen how to use tablets etc.
- Younger workers are more apt to ask “why?” to work requests or procedures, or suggest working in new ways, which presents both opportunities and challenges for foremen. One opportunity is to leverage an employees’ curiosity and drive to find ways to improve their work and the system. An associated challenge for foremen is to be mindful of not repeating past mistakes or misguided enthusiasm that might jeopardize safety or required performance; this can be a difficult balance to strike.
- In general, knowing when and how to lead, delegate, train and support the younger generation of employees can be challenging but is key to developing the future workforce and leveraging the unique knowledge, skills and curiosity that new, younger workers often bring to the job.

⁶ There are no precise dates for when this cohort starts or ends, however demographers and researchers typically use the early 1980s as starting birth years and the mid-1990s to early 2000s as ending birth years (now ages 22-40). See: <http://www.pewresearch.org/topics/millennials/>

Skill Profile

This section presents the results of the foremen focus group facilitation, data collection and analyses. Data summaries depicting critical work functions and key activities are provided in Table 1. A list of occupational skills identified for each critical work function and prioritized by Subject Matter Experts (SMEs) is provided in Table 2.

The following tables represent a consensus viewpoint of SMEs who participated in the initial focus group meeting. This information was subsequently modified, and then verified by the focus group participants and other energy industry SMEs. It is important to note that neither the critical work functions (CWF) nor the key activities (KA) are organized in a specific sequence. This is because each company may organize and manage the work of foremen differently.

Each chart in the following skill profile templates contains the components defined here:

Critical Work Functions

Critical work functions represent the general tasks that a fully competent utility foreman with approximately three to five years of experience would perform.

Key Activities

Key activities are the tasks related to the critical work functions, composed of work activities that are measurable and observable and that result in a decision, product, or service.

Occupational Skills

Occupational skills include technical and non-technical skills required for competent job performance by an experienced employee. The skills identified for each critical work function are presented in order of importance (with a '1' being highest), as identified by the average scores assigned by focus group participants.

Workplace Competencies (Employability Skills)

Workplace competencies are basic academic and personal skills that are needed to build more advanced work-related skills and competencies. They are required by all workers to obtain meaningful work and to participate in the modern workplace.

Table 1. Skill Profile for Utility Foreman

Note: Critical Work Functions and Key Activities are not listed in order of priority or work flow sequence

Critical Work Functions	Key Activities								
A. Lead and Direct Employees	A1 Identify skill sets	A2 Provide skill gap training and ensure mandatory training	A3 Assign and oversee personnel	A4 Enforce industry standard compliance	A5 Review direct reports' performance, and conduct and identify recognition and/or corrective actions and note performance issues	A6 Develop and support career enhancement of direct reports	A7 Lead by example		
B. Communicate	B1 Communicate with management and direct reports	B2 Communicate with internal and external customers	B3 Communicate with vendors and contractors						
C. Construct/Install, Maintain and Repair Systems and Components	C1 Perform preventive maintenance programs	C2 Construct/Install and maintain systems and components	C3 Respond to troubleshooting and system emergencies	C4 Perform system and component repairs	C5 Document equipment maintenance and repairs	C6 Perform inspections			
D. Coordinate Work	D1 Manage materials, tools, equipment and emergency (EMS) stock levels	D2 Ensure availability of materials, tools, equipment, prints and personnel	D3 Order special needs equipment as required	D4 Inspect tools and equipment	D5 Reserve equipment as required	D6 Coordinate work activity of crafts and crews			
E. Perform Planning and Scheduling	E1 Perform long range planning	E2 Perform short range planning and scheduling	E3 Coordinate work projects with timelines	E4 Respond to emergencies and schedule changes					

F. Ensure a Safe Work Environment	F1 Coordinate safety training and participate in or chair safety meetings	F2 Monitor safety conditions	F3 Document inspection results and regulatory compliance	F4 Ensure compliance with safety and environmental regulations	F5 Identify and report unsafe conditions and take corrective action	F6 Conduct and document job briefing meetings "tailboard"	F7 Maintain and inspect safety related tools and equipment		
G. Perform Administrative Duties	G1 Maintain records and reports	G2 Oversee contractors	G3 Be aware of budget	G4 Conduct and maintain personal and agency property inventory					
H. Maintain Quality Control and Quality Assurance	H1 Oversee and confirm installation and replacement of equipment and facilities to industry standards	H2 Oversee and confirm maintenance of equipment and facilities to industry standards	H3 Oversee and confirm repair of equipment and facilities to industry standards						
I. Customer Service	I1 Communicate the scope of the job	I2 Understand internal customer needs	I3 Understand external customer needs	I4 Resolve conflicts	I5 Educate the customer				

Table 2. Summary of Occupational Skills and Priorities by Critical Work Function

Note: Occupational Skills are listed in order of priority, based on the average scores of ratings given by SMEs.

Critical Work Functions and Associated Occupational Skills	
<i>Critical Work Function A: Direct Employees</i>	
1.	Ability to Provide Clear Expectations
2.	Communication Skills
3.	Technical Competence
4.	Organizational Skills
5.	Listening Skills
6.	Team Coordination Skills
7.	Initiation/Self-Motivation Skills
8.	Ability to Delegate
9.	Time Management Skills
10.	Strategic Planning Skills
11.	Ability to Identify Skill Gaps
<i>Critical Work Function B: Communicate</i>	
1.	Ability to Provide Clear Expectations
2.	Provide Clear and Concise Direction
3.	Listening Skills
4.	Ability to Build and Foster Relationships
5.	Ability to Confirm Message is Received/Understood
6.	Ability to Understand/Target Audience
7.	Ability to Communicate in All Forms (Written, Verbal, Non-Verbal, Digital)
8.	Conflict Resolution Skills
9.	Ability to Interpret Relay Information
10.	Negotiation Skills
11.	Presentation Skills
12.	Email/Technical Writing Abilities
<i>Critical Work Function C: Construction/Install, Maintain and Repair Systems and Components</i>	
1.	Technical Knowledge and Skill
2.	Knowledge of Work Standards
3.	Knowledge of Technical Specifications
4.	Strategic Thinking Skills
5.	Organization Skills
6.	Mechanical Aptitude and Competence
7.	Ability to Communication in All Forms
8.	Project Management Skills
9.	Ability to Teach and Train
10.	Physically Able to Meet Job Requirements

<i>Critical Work Function D: Coordinate Work</i>	
1.	Ability to Plan and Form a Strategy
2.	Organizational Skills
3.	Knowledge of Employee/Crew Abilities
4.	Know/Understand Customer Needs and Concerns
5.	Ability to Schedule Key Job Elements
6.	Ability to Communication in All Forms
7.	Time Management Skills
8.	Know/Understand Third Party Roles and Capacities
<i>Critical Work Function E: Perform and Scheduling Critical Work Functions</i>	
1.	Ability to Plan and Schedule with Systems Operation/Control Center
2.	Ability to Schedule Personnel
3.	Knowledge of Federal and State Rules and Regulations
4.	Knowledge of Customer (Internal/External) Outage Coordination Procedures
5.	Knowledge and Ability to Coordinate Between Departments
6.	Ability to Reserve and Schedule Specialty Equipment
7.	Knowledge to Get and Use Proper Personal Protective Equipment (PPE)
8.	Ability to Plan and Schedule Materials
9.	Knowledge of Equipment and Personnel Certifications
10.	Traffic Control Planning Skills
<i>Critical Work Function F: Ensure a Safe Work Environment</i>	
1.	Knowledge of Federal, State and Company Safety Regulations
2.	Ability to Develop and Model a Culture of Safety
3.	Ability and Skills to Identify Hazards
4.	Ability to Identify Best Work Practices
5.	Knowledge of Industrial Safety Requirements and Regulations
6.	Ability to Enforce Proper PPE Usage
7.	Ability and Skills to Conduct Job Briefing Meetings
8.	Knowledge of Employee Qualifications and Certifications
9.	Ability and Skills to Inspect Hot Sticks and Rubber Goods
10.	Knowledge of Traffic Control
<i>Critical Work Function G: Perform Administrative Duties</i>	
1.	Ability to Record and Account for Time
2.	Ability to Develop a Switching Plan
3.	Ability to Document Job Meetings/Briefings
4.	Ability to Understand and Confirm As-Builts
5.	Ability to Write and Maintain Daily Logs
6.	Ability to Write and Maintain Employee Performance Reports
7.	Ability to Order or Reconcile Materials

Critical Work Functions and Associated Occupational Skills (continued)	
8.	Ability to Write and Maintain Damage Reports
9.	Ability to Write and Submit Concrete/Asphalt Requests
<i>Critical Work Function H: Maintain Quality Control and Quality Assurance</i>	
1.	Knowledge of Construction and Quality Standards
2.	Technical Knowledge of Trade or Discipline
3.	Ability to Analyze Data
4.	Ability to Communicate Technical Terms
5.	Ability to Develop Reports
6.	Ability to Execute and Confirm Follow-up Work When Needed
7.	Specialized Software Skills
8.	Basic Computer Skills
<i>Critical Work Function I: Customer Service</i>	
1.	Ability to Communication in All Forms
2.	Listening Skills
3.	Knowledge of Customer Issues and Needs
4.	Negotiation and Problem Solving Skills
5.	Conflict Resolution Skills
6.	Ability to Maintain Composure in Conflict
7.	Ability to Respect Customers and Their Rights
8.	Ability to Foster Positive Relationships
9.	Awareness of Company Policies
10.	Knowledge of Ethical Behavior

Workplace Competencies – SCANS

Workplace competencies are basic academic and foundation skills needed to enter and advance in the work world. These competencies were derived through input from a large national survey of employers across several broad workplace categories, which culminated in a report known as SCANS (*Secretary's Commission on Achieving Necessary Skills*, U.S. Department of Labor). The SCANS report findings stimulated many efforts aimed at educational reform and was the driver for additional measurement instruments and assessments of workplace competency that are still in use. The original report identifies 37 foundation and workplace competencies required for work readiness that have been used widely for workforce policy and program development in industry and education.

The competencies are comprised of a three-part foundation of skills and personal qualities, and five workplace competencies needed for successful job performance in today's workforce (as listed in Table 3).

Table 3. SCANS Skills

Basic Skills	Thinking Skills	Personal Qualities	Worksite Competencies
Reading	Creative Thinking	Responsibility	Utilizing Resources
Writing	Decision Making	Self-worth	Interpersonal Skills
Arithmetic	Problem Solving	Sociability	Utilizing Information
Listening	Visualization	Self-management	Using Systems
Speaking	Knows/Learns	Integrity/Honesty	Using Technology
	Reasoning		

For this project, focus group participants were asked to identify the level of competency for each of the 37 SCANS skills most often required for successful workplace performance. The *ADVANCE™ Workplace Standards Skill Inventory* was used to capture industry views on foundation skills for utility foremen. Sample survey questions are provided in Figure 1.

The information provided in Table 4 was compiled by taking a weighted average of all responses. This summary information provides a general measure of the basic workplace competencies required of energy efficiency managers and serves as a supplement to the technical skills identified in the energy efficiency manager skill profile.

Workplace Competencies Survey Results

Exhibiting Leadership		Negotiating	
1 <input type="checkbox"/>	Understands standards Adheres to standards	1 <input type="checkbox"/>	Understands negotiations process Recalls basic rules/principles Identifies conflicts
2 <input type="checkbox"/>	Encourages others to adopt new concepts Demonstrates commitment to excellence Leads by example Interprets positions on issues	2 <input type="checkbox"/>	Moderates discussion Demonstrates composure Interprets complaints/concerns
3 <input type="checkbox"/>	Motivates others to extend their capabilities Displays enthusiasm/positive attitudes Develops minority/majority views	3 <input type="checkbox"/>	Analyzes group dynamics Distinguishes between facts and inferences Detects underlying issues
4 <input type="checkbox"/>	Persuades others to reverse negative attitudes/behaviors Maximizes strengths/minimizes limitations Consolidates varied viewpoints/positions	4 <input type="checkbox"/>	Summarizes/paraphrases both sides of issues Analyzes underlying issues Resolves technical issues
5 <input type="checkbox"/>	Empowers individuals/teams to achieve excellence Judges leadership styles Justifies positions/policies	5 <input type="checkbox"/>	Appraises negotiated outcomes Resolves critical and emotionally charged issues

Figure 3. Sample Survey Questions from the ADVANCE™ Workplace Standards Skill Inventory

Table 4. SCANS Survey Results: Utility Foremen

Foundation Skills and Personal Qualities	Key: 1 = Basic Competency Level, 5 = Advanced Competency Level										Critical Competencies
	1	2	3	4	5						
Basic Skills											
Demonstrates Effective Reading Strategies											Identifies relevant details, facts, specifications, follows set of instructions, probes to gain knowledge/information, qualifies/analyzes and summarizes information.
Demonstrates Effective Writing Strategies											Records information accurately, writes simple and original documents and summarizes, paraphrases and synthesizes information.
Applies Arithmetic Processes											Performs basic computations, records and interprets numerical data, predicts arithmetic results.
Applies Mathematics Processes											Utilizes mathematical formulas and processes, summarizes and translates mathematical data.
Demonstrates Effective Listening Skills											Listens attentively, confirms information, compares multiple viewpoints, and interprets, clarifies and influences communication.
Demonstrates Effective Speaking Skills											Communicates appropriate messages, participates in discussions, presents complex ideas/information, poses critical questions.

Table 4. SCANS Survey Results: (cont'd)

Foundation Skills and Personal Qualities	Key: 1 = Basic Competency Level, 5 = Advanced Competency Level										Critical Competencies			
	1	2	3	4	5									
Thinking Skills														
Applies Creative Thinking, Generates Ideas														Paraphrases/summarizes existing ideas, demonstrates creative thinking while problem solving, develops creative solutions and new approaches.
Applies Decision-Making Strategies														Applies rules and principles to the situation, gathers information and analyzes the situation and information.
Recognizes and Solves Problems														Understands and appropriately refers the complaint or discrepancy, examines information, analyzes possible causes, solutions, and recommends action plan.
Demonstrates Visualization														Applies appropriate principles to situation, analyzes relationships and processes, uses previous training and experience to predict outcomes.
Knows How to Learn														Draws upon experiences and prior knowledge, interprets and applies new knowledge and experience.
Applies Reasoning Skills														Identifies facts, principles, and problems, applies rules/principles to procedure, uses logic to draw conclusions.

Table 4. SCANS Survey Results: (cont'd)

Foundation Skills and Personal Qualities	Key: 1 = Basic Competency Level, 5 = Advanced Competency Level												Critical Competencies
	1	2	3	4	5								
Personal Qualities													
Demonstrates Responsibility													Performs assigned tasks, pays attention to details, works with minimal supervision, demonstrates enthusiasm, optimism and initiative.
Demonstrates Belief in Self Worth													Responds assertively, defends own beliefs and viewpoints, accepts constructive criticism and responsibility for own behavior and understands own impact on others.
Demonstrates Sociability in Groups													Responds appropriately to others, establishes rapport with co-workers and customers, modifies behavior to environment, shows understanding/empathy for others.
Demonstrates Self-Management													Maintains self-control, demonstrates commitment to self-improvement, applies self-management skills, analyzes and adjusts goals.
Demonstrates Integrity/Honesty													Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, demonstrates commitment to personal improvement and recommends ethical course of action.

Table 4. SCANS Survey Results: (cont'd)

Foundation Skills and Personal Qualities	Key: 1 = Basic Competency Level, 5 = Advanced Competency Level										Critical Competencies
	1	2	3	4	5						
Management of Resources											
Manages Time											Starts on time, prioritizes and performs a given set of tasks, efficiently manages time and adjusts schedule as required.
Manages Money											Maintains and reconciles accounts and costs, performs routine recordkeeping.
Manages Materials/ Facilities											Acquires and maintains job-specific supplies and equipment, monitors safe and efficient equipment use.
Manages Human Resources											Recognizes job tasks, distributes work assignments, makes adjustments, monitors performance.
Management / Use of Information											
Acquires and Evaluates Information											Selects and obtains information relevant to the task, analyzes data and predicts outcomes.
Organizes and Maintains Information											Interprets information and applies processes to new information, transfers information between formats.
Interprets and Communicates Information											Recognizes accuracy of information, interprets information, and prepares basic summaries and charts.
Uses Computers to Process Information											Performs basic data entry, utilizes integrated/multiple software tools, locates and retrieves information, interprets data.

Table 4. SCANS Survey Results: (cont'd)

Foundation Skills and Personal Qualities	Key: 1 = Basic Competency Level, 5 = Advanced Competency Level										Critical Competencies			
	1	2	3	4	5									
Interpersonal Skills														
Participates as Team Member														Actively participates in team activities and assists team members, demonstrates commitment and works to improve team skills.
Helps Others Learn														Models proper performance and attitudes, identifies training needs, conducts task-specific training, provides constructive feedback and learner encouragement.
Serves Customers														Demonstrates sensitivity to customer complaints, analyzes customer needs and demonstrates commitment, relates to customer fears and concerns, resolves conflicts.
Exhibits Leadership														Adheres to standards, demonstrates commitment to excellence, leads by example, motivates and persuades others to support positive attitudes.
Negotiates Agreements														Understands negotiations process, identifies conflicts and demonstrates composure, interprets complaints and concerns, detects underlying issues.
Works with Diversity														Understands the legal aspects of discrimination, respects the rights of others and demonstrates awareness and value of diversity.

Table 4. SCANS Survey Results: (cont'd)

Foundation Skills and Personal Qualities	Key: 1 = Basic Competency Level, 5 = Advanced Competency Level										Critical Competencies
	1	2	3	4	5						
Understanding/Management of Systems											
Understands System											Understands the organization and system hierarchy, follows procedures, and recognizes system strengths and limitations.
Monitors/Corrects System Performance											Monitors system performance, analyzes and troubleshoots system operation, and distinguishes trends in performance.
Improves System Performance											Identifies and suggests system modifications, determines improvements targets, goals and constraints.
Use of Technology											
Selects Appropriate Technology											Knows available technology, understands task requirements and desired results, proposes solutions.
Applies Technology to Task											Understands technology applications, follows proper procedures, understands the operation/interaction, analyzes technology output.
Maintains/Troubleshoots Technology											Follows procedures, identifies symptoms, troubleshoots and corrects failures, and evaluates performance.

Verification Survey Results

Figure 4 shows the average importance and standard deviation (variation) among each critical work function, rated on a scale from 1 (not important) to 5 (critical). These results generally verify that the critical work functions included in this Skill Profile document are relevant to the industry at large. The results show that critical work function F, *Ensure a Safe Work Environment* (4.71) and critical work function B, *Communicate* (4.54) had the highest average scores among all critical work functions. The lowest-rated critical work functions were G, *Perform Administrative Duties* (3.64) and H, *Maintain Quality Control and Quality Assurance* (3.71). The standard deviation scores for all items show a modest amount of variation among respondents (<1.00). It should be noted that no critical work function had an average value of less than 3.50, which generally confirms that respondents view all nine of the critical work functions as important to the work of utility foremen.

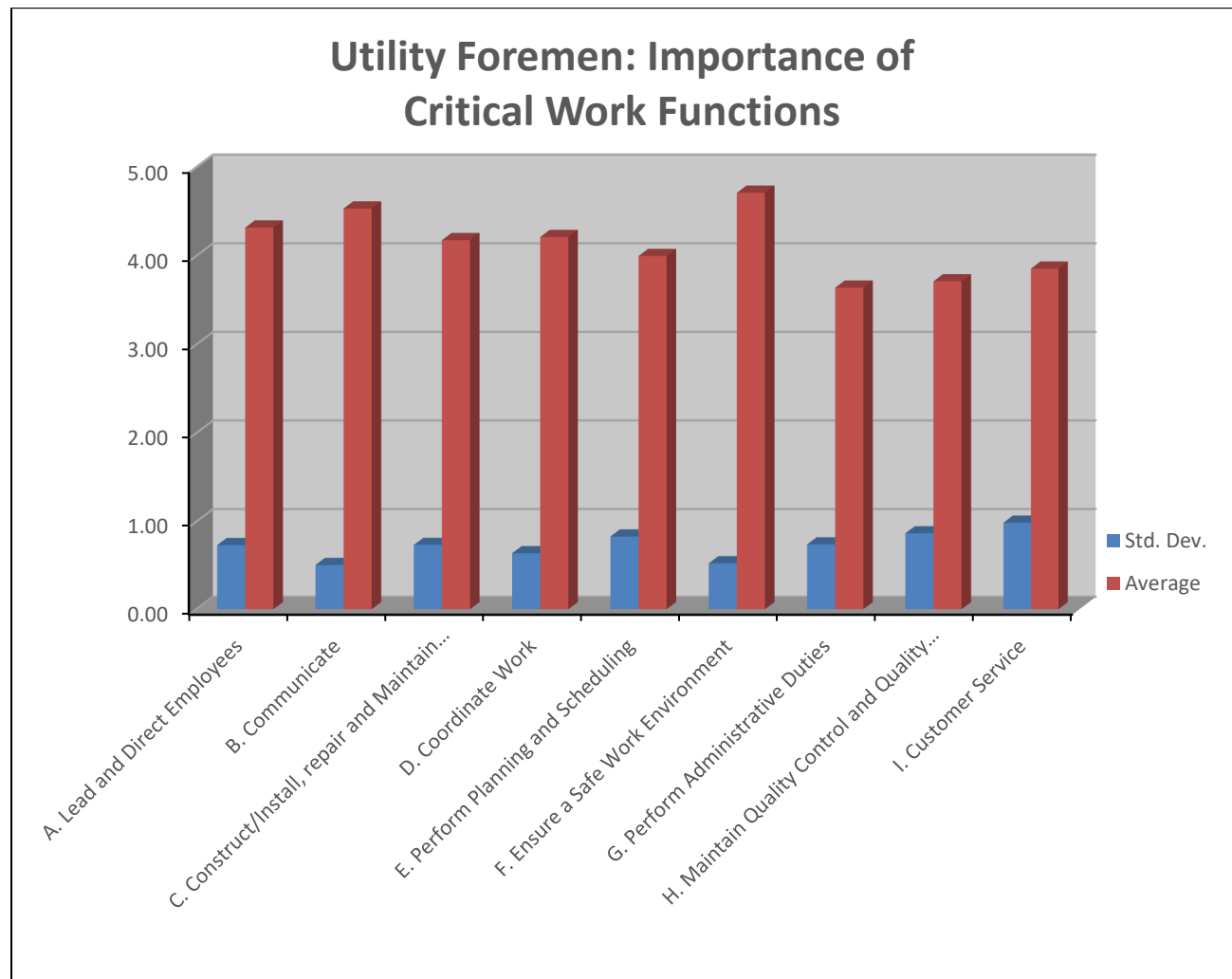


Figure 4. Summary of Verification Survey Results

Conclusions and Next Steps

This project was designed to identify and define the workforce requirements and attributes of effective utility foremen using a systematic research-based process. The project leveraged prior research findings and incorporated up-to-date data and information received directly from experienced utility foremen with input from other industry experts. The goal of this work was to provide a common, industry-defined skills profile for utility foremen that can be used by utilities, industry trainers and educators to design and improve leadership and related core training and professional development opportunities.

During the course of this project several themes and findings emerged that add to our understanding about the conditions, context and requirements for utility foremen that may prove valuable in the development of future education and training programs. Those findings are summarized below.

Building a Resilient Workforce

A driving force for this project was industry, and specifically utility managers, who expressed concerns about ways to improve transition and success of journey-level trade workers into foremen positions. These concerns were widespread and cut across departments as well as functional and technical areas.

The focus on foremen transitions is longstanding, but the attention on this key occupation has amplified in recent years, in part due to the culmination of some important workforce trends occurring within and outside of the utility industry: An ongoing challenge of recruiting, training and retaining qualified foremen, which has become more difficult due to an increase in retirements; the introduction of new technologies that are requiring a greater emphasis on interdisciplinary knowledge, systems integration, and related skills; and the challenges and opportunities associated with recruiting, developing and retaining a future workforce, notably millennials, who bring unique talents, values, personal qualities and career expectations that may differ from the existing employees they will replace.

Utility organizations may also have to adapt their hiring, career pathways and workplace expectations to attract and retain the best qualified new workers for foreman positions in the future. The labor market for technically competent new talent is likely to be competitive within the utility industry, and also between most major industry sectors, because many of the foundational skills required of utility foreman are transferrable to other industries, companies and positions.

It is also notable that the pathway into a foreman position typically takes many years, as the requisite technical knowledge and experience of most foremen is gained through a lengthy training period as an apprentice through journeyman in a skilled trade. The foreman

occupation has deep roots in applied technical work, gained through experiential learning while on the job, and this knowledge and experience cannot be quickly or easily acquired or replaced. This can present a formidable challenge to utility organizations, who are simultaneously working to implement new technologies and integrated systems that cut across departments and require new levels of knowledge and skill.

During the transition from journey-level employee to crew leader, foreman must also “learn and earn” the leadership, management and organizational skills required of the position, and which are necessary to effectively direct and support individual subordinates and the collective work of their crews.

All of these factors impact the ability of technically-skilled employees to transition successfully into leadership roles such as utility foremen. The skill profile identified in this report is a first step toward clarifying the conditions facing utility organizations and employees as they work to provide education, training and other support that will facilitate the development of highly-qualified utility foremen across the industry.

Next Steps

Defining a set of foundational work functions and skills for front-line utility foremen is a critical first step to identifying and developing effective education and training to help experienced craft workers make an effective transition into leadership roles as foremen. Organizational changes, ongoing labor shortages and utility markets have all caused shifts in the demand, skill requirements, and priorities for foremen. Innovations in technology and the continued shift toward a clean energy future will continue to alter the makeup of the energy infrastructure, which is likely to raise the levels of knowledge and skill required of utility foremen.

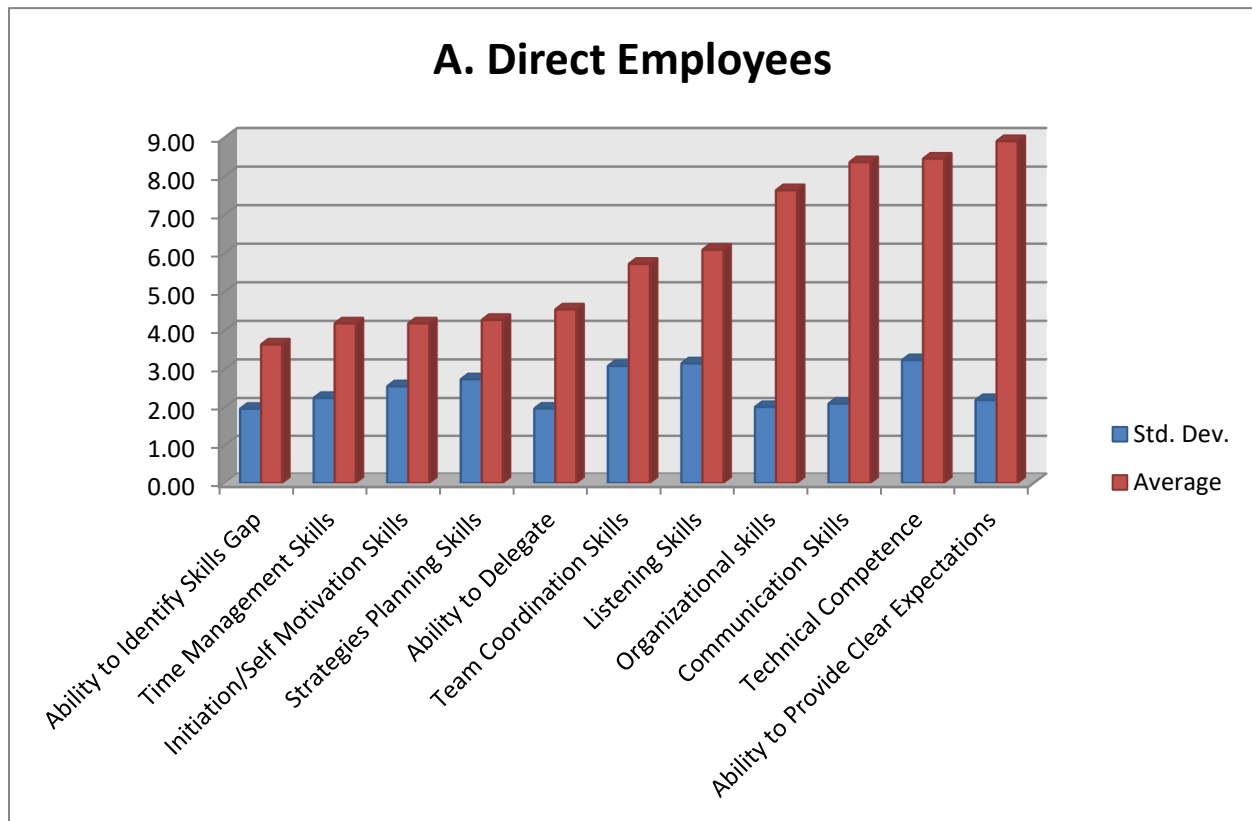
The foreman skill profile generated through this project provides an important foundation for the development and improvement of education and training, but this ongoing work will require many additional steps:

1. Ongoing Review: Further verification and discussion with utility employers, labor and stakeholders to ensure that the core content accurately reflects the conditions, work requirements and competencies for utility foremen. Further discussion and data collection will help to illuminate additional topic areas that should be addressed, to identify changes to the skill profile so it remains current, and to adapt the profile foundation for individual utility organizations, departments and training functions. Additional verification and review will also help ensure that education and training programs sponsored by postsecondary institutions and apprenticeship remain responsive to changing conditions and industry requirements.

2. Assessment and Certification: Development, adaptation and use of related assessments and certifications will make it possible to ensure that new applicants and journey-level employees are able to demonstrate that they can meet the requirements of the foreman position, and to identify areas in which additional education and training is needed.⁷ The skill profile generated by this project can be used to help confirm that the content used as the basis for existing assessments and tools remain relevant to industry needs. The profile information can also help ensure that the strategies used to demonstrate competency are valid, current, authentic and sufficient to demonstrate actual workplace performance and the underpinning knowledge, skills and abilities to attest to individual competence and as the basis for certification.

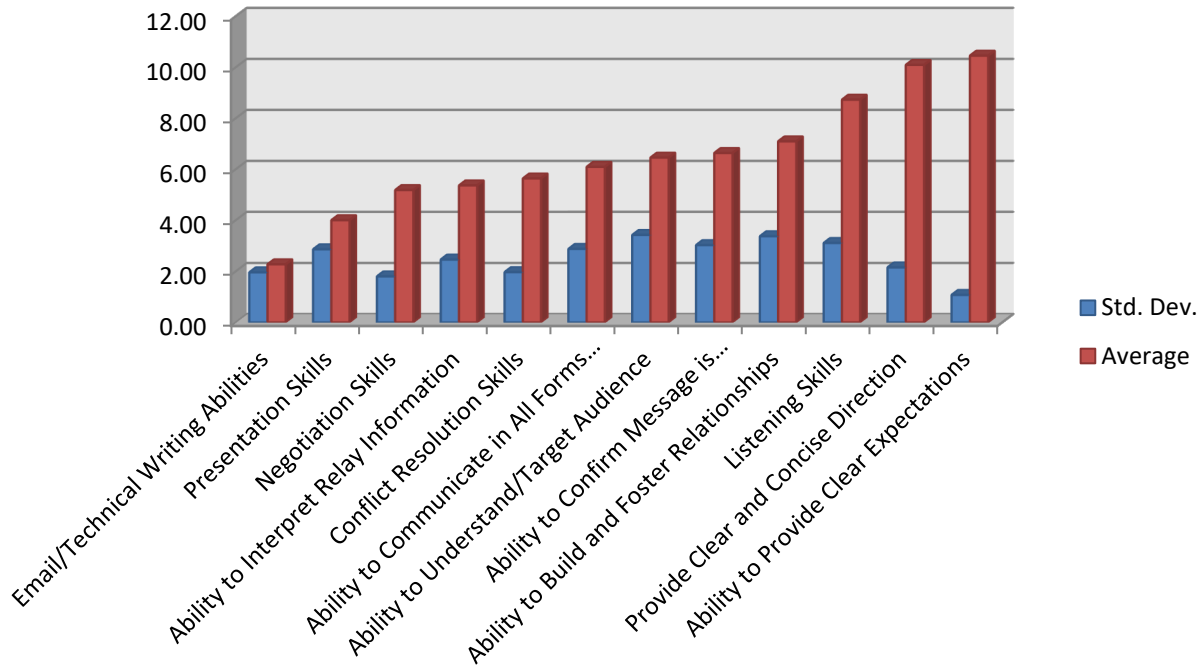
⁷ *Note: To ensure that the use of skill profiles, standards and related assessments and certifications do not contradict U.S. employment law, employers may need to conduct an internal validation before using the skill profile information to make hiring and promotion decisions. See: http://www.eeoc.gov/policy/docs/factemployment_procedures.html*

Appendix A: Utility Foremen Skill Charts by Critical Work Function⁸

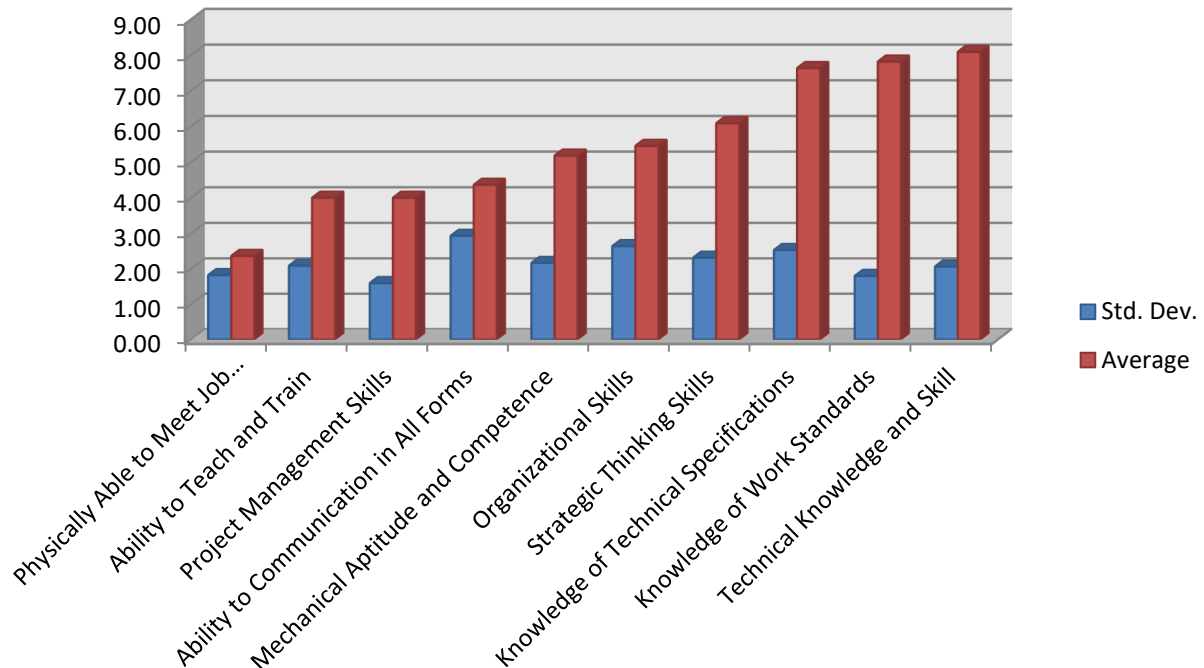


⁸ Note: The scale on the vertical axis represent the possible average scores and variation (standard deviation) values among all rank-ordered scores. In each graph, the higher the average value, the higher the priority assigned by focus group participants, based upon the average of all skill scores. The lower the standard deviation score, the less variation there was by participants on individual skill scores.

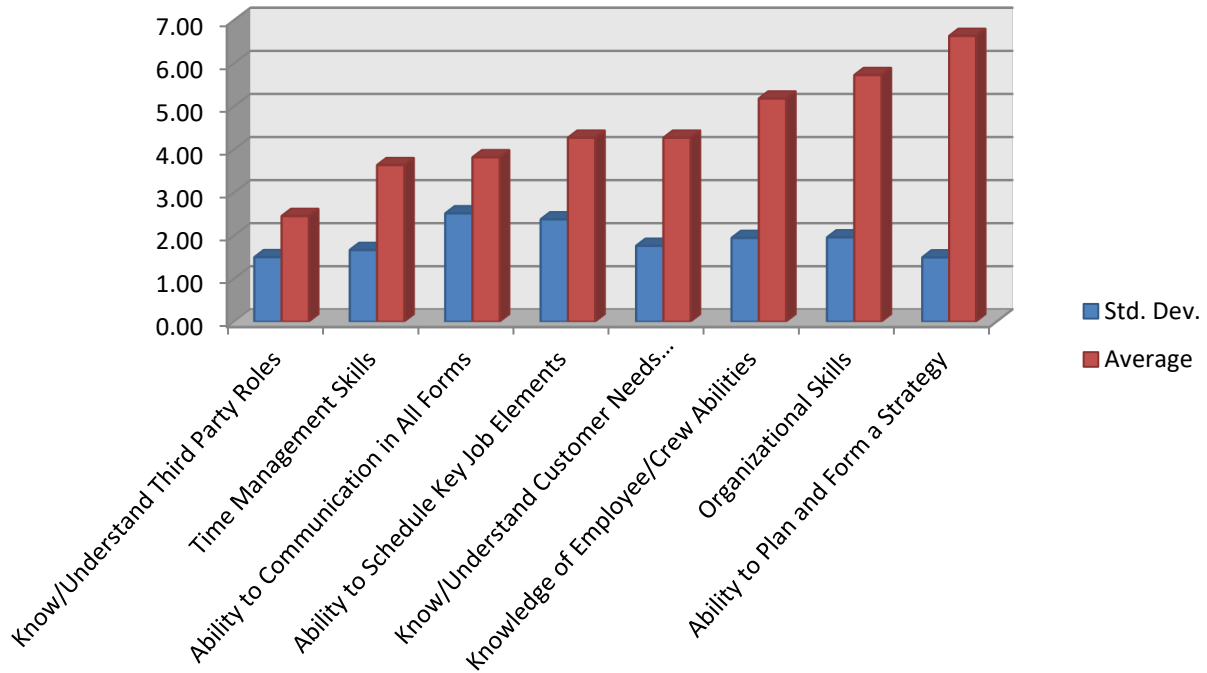
B. Communicate



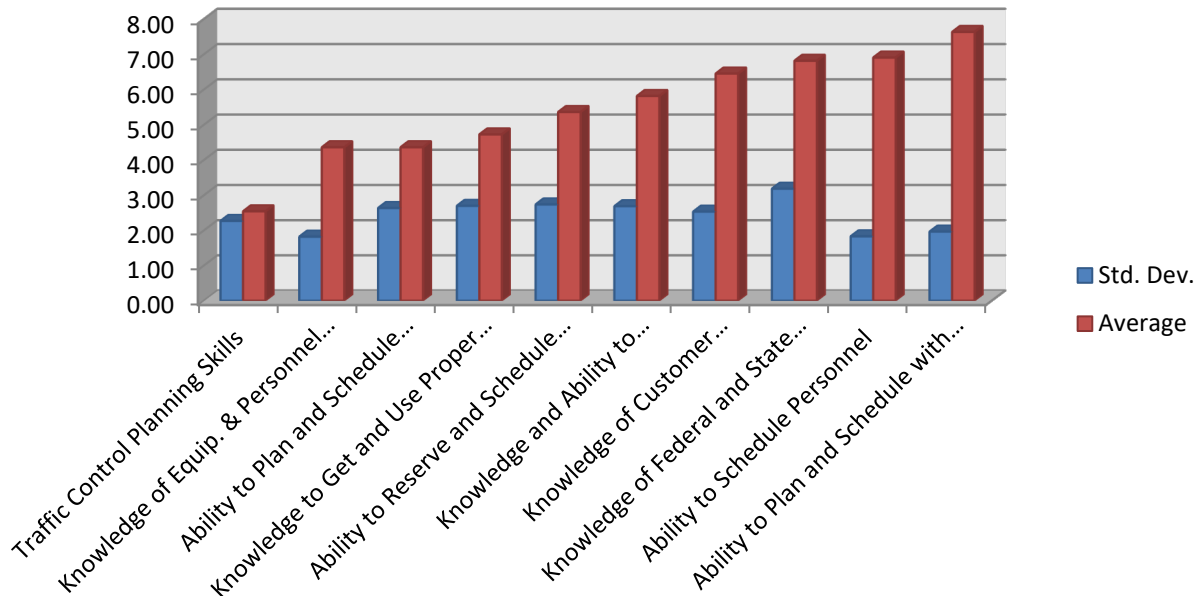
C. Construct/Install, Maintain and Repair Systems and Components



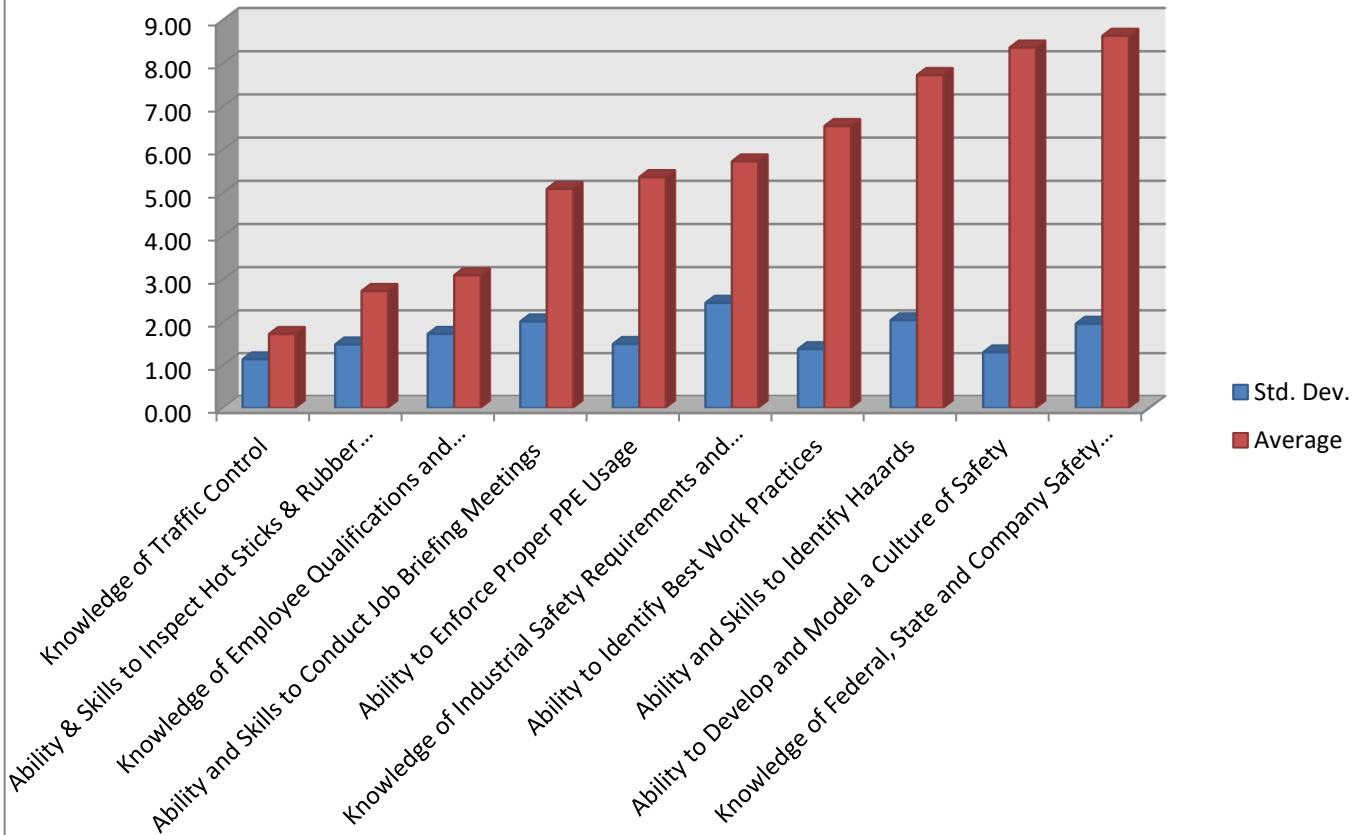
D. Coordinate Work



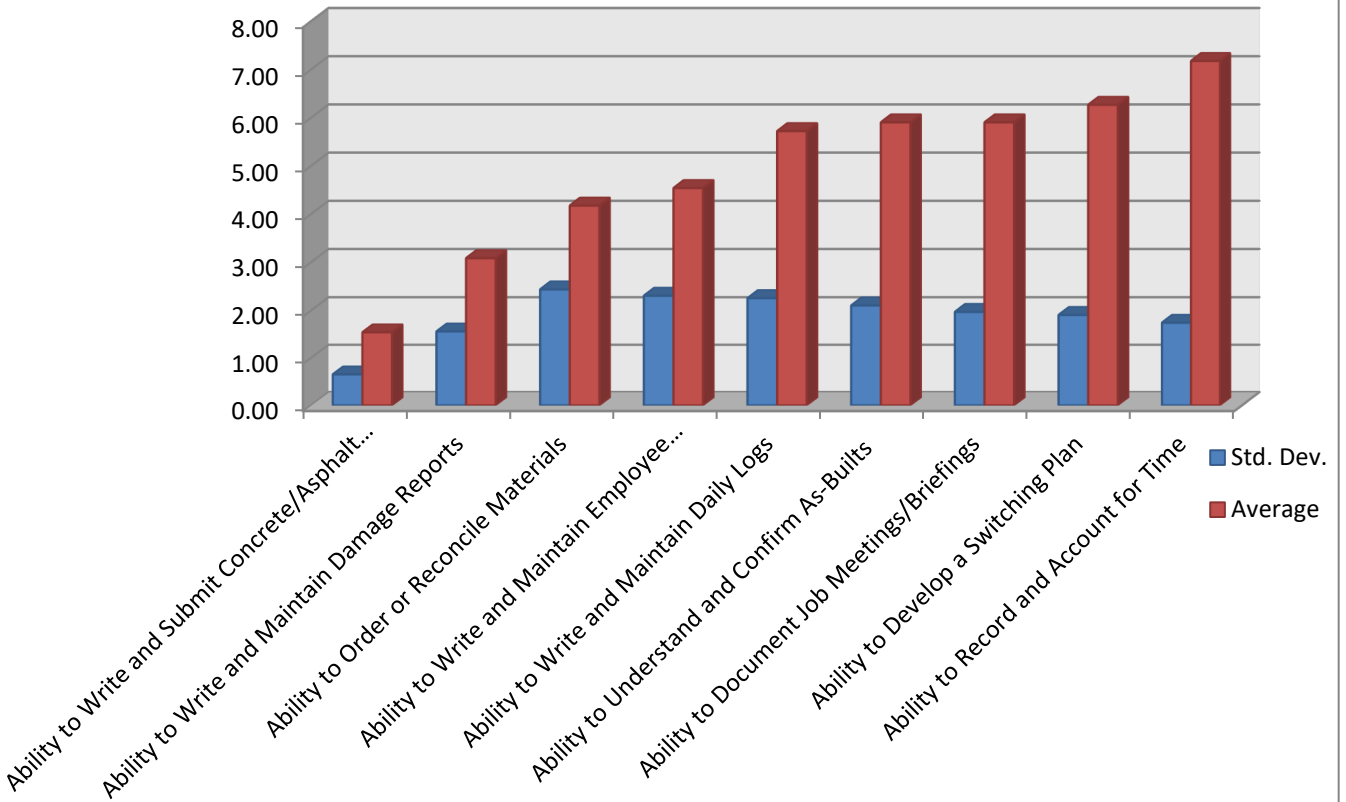
E. Perform Planning and Scheduling Critical Work Functions



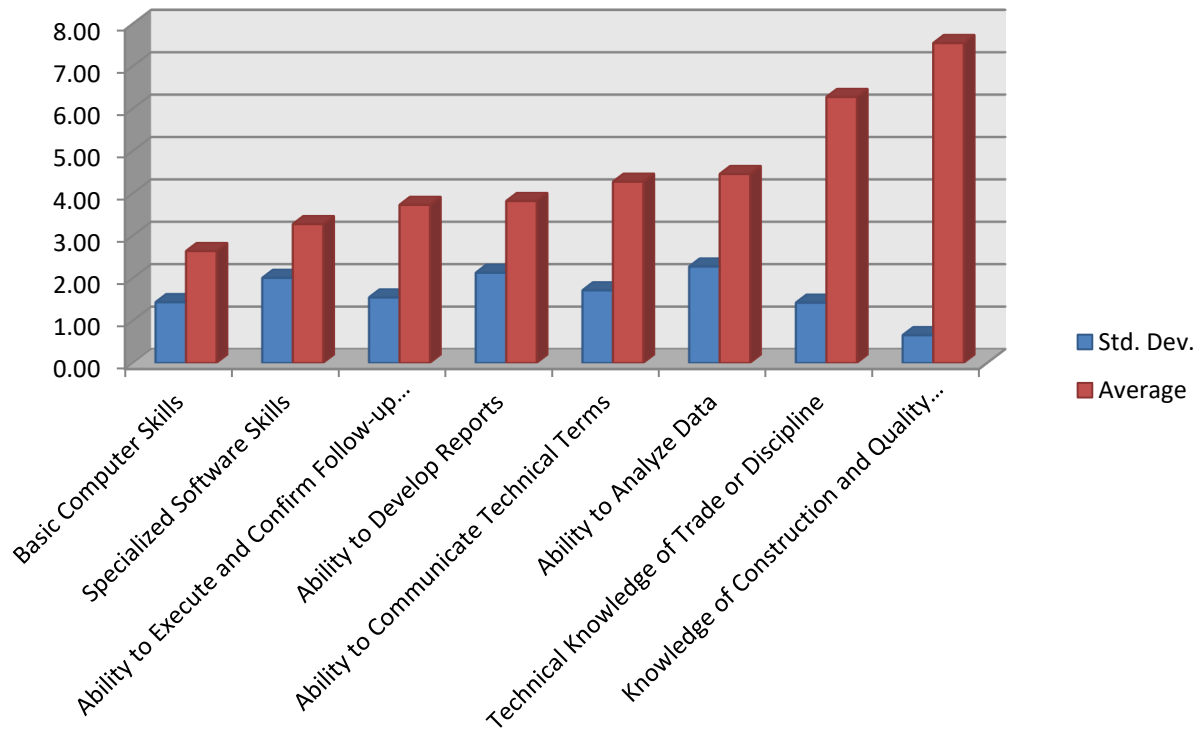
F. Ensure a Safe Work Environment



G. Perform Administrative Duties



H. Maintain Quality Control and Quality



I. Customer Service

