National Operations Center of Excellence

NOCoE Best Practices: TSMO Workforce Hiring and Training

Report #3

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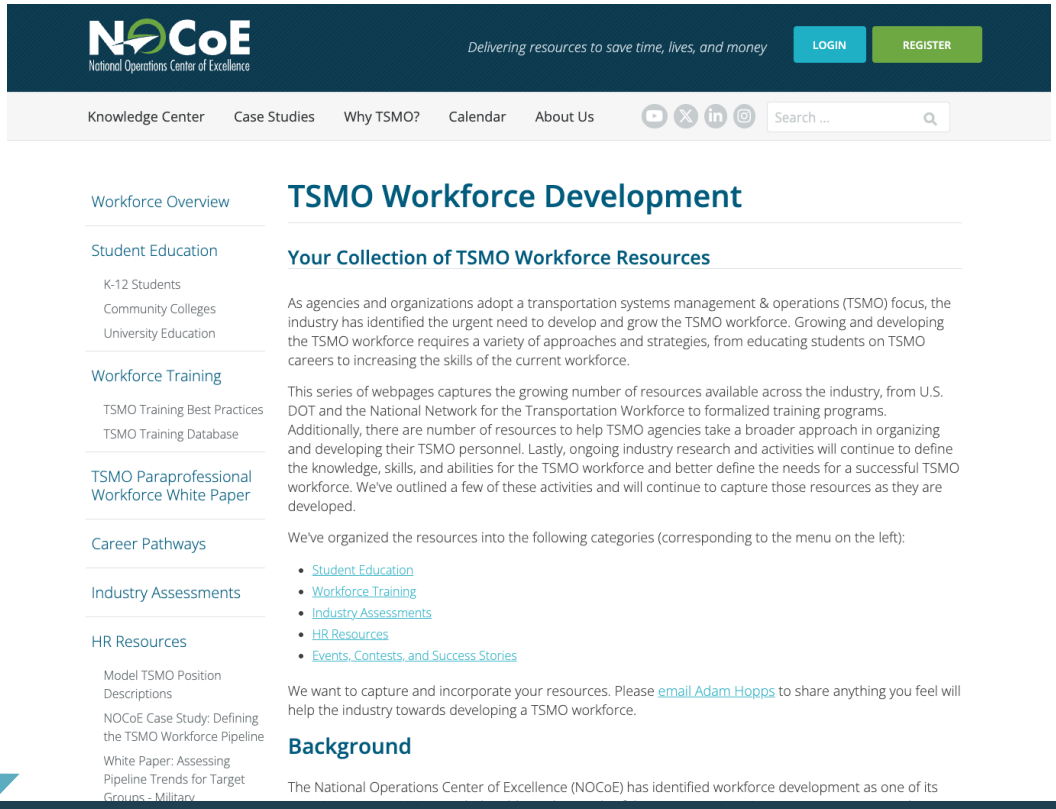
TSMO Workforce Hiring and Training Practice

This report shares best practices in the hiring and training practices of TSMO organizations. With the growing number of resources available, including by the National Operations Center of Excellence (NOCoE), this report focuses on four topics for agencies seeking to expand and improve their workforce's knowledge, skills, and abilities.



A starting point for all TSMO workforce resources is the NOCoE TSMO Workforce Portal, which includes guidance on training, career development, model position descriptions and a database of TSMO trainings.

ACCESS THE PORTAL

Approaches

The two approaches covered below are not inclusive of workforce development practices but represent rather the key practices the TSMO community has focused on.

PIPELINE DEVELOPMENT

A key challenge in building a robust TSMO workforce is the lack of a clearly defined pipeline for recruiting workers. Potential candidates for TSMO jobs must be recruited from academic programs (at the technical, community college and university levels) and from incumbent workers in other fields.

The TSMO workforce requires a wide range of personnel including engineers and planners, computer specialists and signal technicians, as well as TMC operators and traffic incident management staff. These workers must possess varied, but largely technical, knowledge and skills. And the fast-paced and often high-stress nature of TSMO roles means that communication, problem-solving, and decision-making are also critical competencies.

Dr. Stephanie Ivey of the University of Memphis identified many best practices for developing pipelines, in her report, *Defining the TSMO Workforce Pipeline*. Some practices for building the TSMO pipeline include:

START THE PIPELINE EARLY

TSMO-related training can be designed for high school students and delivered through career and technical education (CTE) programs. Transportation-focused STEM academies, such as the T-STEM Academy at East High School in Memphis, Tennessee, provide an excellent opportunity for DOTs to build pipeline partnerships and to highlight some of the technologies, innovations, and impact of TSMO that can attract students to transportation careers.

PROVIDE EXCEPTIONAL LEARNING EXPERIENCES

Programs like the Transportation Technology Tournament that pair DOT and industry mentors with college students to work on a real-world challenge gives students an opportunity to engage in hands-on, problem-based learning. These types of experiences can be very effective in attracting students to TSMO.

Approaches

Pat Noyes, in her white paper on *TSMO Workforce Pipeline – Expanding Opportunities*, identifies technical colleges, Job Corps, and emergency responders as potential pipelines for TSMO practitioners. The value of technical colleges is the hands-on experience focused on specific skills required by TSMO practitioners, including data analytics and electrical technician skills.

The US Chamber of Commerce published a guide for recruiting from trade schools, including connecting with student organizations and apprenticeships.

GET THE GUIDE

Job Corps, a nationwide residential career training program for people ages 16 to 24 has program areas that include information technology, construction, and transportation.

Emergency responders offer another pipeline for TSMO organizations. In addition to the interests, and experiences translating to TSMO needs, key skills possessed by emergency responders include: critical thinking, situational awareness, conflict resolution, adaptability, working with the public and dedication to public service.

Similarly, the military offers a great pipeline into TSMO programs. With nearly 200,000 military personnel transitioning to civilian lives each year, TSMO organizations have an opportunity to add extensive experience in high pressure environments that require teamwork and attention to safety.

Approaches

Dr. Ivey identifies a few special considerations for military pipelines in her white paper on *Assessing Pipeline Trends for Target Groups*. These include:

TERMINOLOGY MISMATCH

Differences in terminology, especially for job descriptions, can cause significant confusion for military candidates considering civilian careers. This can result in candidates assuming they are not qualified or misunderstanding the attributes of the role they are considering. This in turn can lead to frustration and high turnover as veterans enter occupations or roles that do not meet their expectations. In fact, veterans tend to have lower retention rates in the first year of civilian employment than non-veterans do. Once a veteran is matched with the right 'fit' in terms of employment, this trend is reversed, and veterans overall are retained at higher rates and stay in jobs more than 8% longer than non-veteran counterparts.

CULTURAL DIFFERENCES

Culture and values are an important part of military experience, and transitions to companies where the culture and values are not clearly articulated and well understood across the organization can contribute to job dissatisfaction for veterans. It is also important that companies understand and value military service and recognize the contributions that veterans bring to the workforce. Organizations where this is not effectively communicated are less likely to retain veteran employees. Additionally, many organizations do not have a culture that is inclusive of veterans, where transition challenges are specifically identified and addressed.

TRAINING AND EDUCATION EXPECTATIONS

One of the most significant challenges for veterans is understanding how their military training and educational experiences translate to the civilian workforce . Civilian job postings frequently cite requirements for specific certifications, training, or education that can limit veteran applications because the analogous military training may not be readily apparent. When Human Resources personnel are not familiar with military occupations and related training, this further complicates the issue.

Approaches

UNIVERSITY COLLABORATION

University Collaboration is another valuable practice to expanding TSMO organization workforce skills. Iowa DOT and Iowa State University's Institute for Transportation work together to establish TSMO solutions on an almost daily basis. As an example, InTrans developed a motorcycle crash tool for Traffic and Safety to interactively explore crashes with unlimited searches and spatial map display. The tool was presented to Motor Vehicle Enforcement (MVE) who were challenged to consider how such a tool might help their daily efforts. This quickly evolved into a Heavy Truck Crash Tool with similar functionality yet custom filters for MVE and Iowa State Patrol district boundaries. These data are updated monthly with the goal being daily. A similar effort is on-going in winter maintenance where InTrans is developing real-time tools based on AVL data feeds integrated with other roadway, operations, and infrastructure data.

IOWA STATE UNIVERSITY

THE UNIVERSITY OF ALABAMA

In Huntsville, Alabama university students operate the regional transportation management center (TMC). Alabama DOT's Huntsville TMC hires student interns as part-time employees and offers a minimum 20-hour workweek. In addition to learning the technical skills required to operate the TMC, students are exposed to the problem solving and teamwork skills required of all TSMO professionals but often irreplicable in a university setting.

Additionally, TMC staff engage student interns in all aspects of real-world projects to help develop their technical skills. For example, when ALDOT asked the TMC to identify a way to reduce 14-mile queues occurring due to a local bridge inspection and repair project in Limestone County AL, TMC staff engaged interns during the review of data and when discussing solutions. Student interns suggested changing the project lane closure schedule to limit queuing, and their solution was partially implemented.

Practices by TSMO Strategies or Roles

The following sections cover workforce development practices for two specific TSMO strategies.

TRAFFIC MANAGEMENT SYSTEMS

Estimating current and future staffing and resource needs is essential to ensure TMSs sustain or meet their operational needs and performance expectations. During a December 2024 NOCoE webinar, organized by FHWA, speakers discussed current practices to estimate staffing needs. These include:

- Demand analyses in Florida to estimate staffing needs in terms of annual hours per position.
- Workload analyses at Washington State DOT that estimates expected activity levels based on earlier traffic operations experience, based on impacts to safety.
- Staffing analyses by Texas DOT that incorporates qualitative data that includes job functions, new technologies added to the TMS, upcoming roadway projects, and the current labor market.

ROAD WEATHER

FHWA's Road Weather Management program has organized several webinars, hosted by NOCoE focused on hiring and training for road weather management as part of the Road Weather Spotlight series. Winter maintenance training programs from Colorado DOT including the CDOT Maintenance Training Academy, established in 1999. The blended training model includes both virtual and hands on experience, with simulation training added in 2022. The program also aligns with Front Range Community College's associate degree in highway maintenance management, who help support the academy.

APWA also has a winter maintenance supervisor certificate for local chapters to provide via an all-day workshop. A winter maintenance operator certificate is also offered via a four-hour workshop with a focus on snow and ice control behind the wheel.

Practices by TSMO Strategies or Roles

ROAD WEATHER

Additionally, four key training courses have been identified to expand workforce knowledge, skills, and abilities for road weather strategies:

1

PRINCIPLES AND TOOLS FOR ROAD WEATHER MANAGEMENT

This course provides transportation professionals in highway maintenance and/or highway operations with training to develop tools and strategies for addressing road weather problems. Participants are exposed to various strategies for addressing road weather problems, including Road Weather Information Systems (RWIS) and the development of crosscutting decision support systems to respond effectively to weather situations.

LEARN MORE

2

RWIS EQUIPMENT AND OPERATIONS

This course discusses RWIS initiatives and considerations, as well as explores individual state and local deployment challenges through workshops, exercises, and self-assessments, which provides participants with an action plan tailored for their specific needs.

LEARN MORE

Practices by TSMO Strategies or Roles

3

WEATHER-RESPONSIVE TRAFFIC MANAGEMENT (WRTM)

This course provides information and guidance to transportation system managers and operators to help them effectively manage traffic flow and operations during adverse weather conditions. Specific guidance is provided on how to choose, design, and implement WRTM strategies that are appropriate for different roadway, traffic and weather conditions.

LEARN MORE

4

PRINCIPLES AND TOOLS FOR ROAD WEATHER MANAGEMENT

Capability Maturity Frameworks are concepts with roots from the software development industry. Modeled after the AASHTO Systems Operations and Maintenance guidance, this tool assesses road weather management capability in the same six dimensions: Business Processes, Systems and Technology, Culture, Organization and Workforce, Performance Measurement, and Collaboration. However, in this tool, road weather management is viewed as a subset of the larger Transportation Systems Management and Operations (TSMO) program. The capability levels and the actions are more focused and defined from a traffic manager's perspective. When the current capabilities are determined, the tool provides a list of concrete actions for agencies to raise their capabilities to the desired levels.

LEARN MORE

Resources

- NOCoE Workforce Development Peer Exchange
- NOCoE 2nd Workforce Summit Proceedings Report
- Defining the TSMO Workforce Pipeline
- Transportation Systems Management and Operations (TSMO) Workforce Pipeline - Expanding Opportunities
- Assessing Pipeline Trends for Target Groups - Military
- A Working TSMO Partnership Between Iowa DOT and Iowa State University's Institute for Transportation - Celebrating Six Years of Successful Collaboration
- Best Practices in Workforce Development from Similar Industries
- A Workforce Shift Toward TSMO
- Attracting and Retaining Younger Workers in Transportation Systems Management and Operations (TSMO)
- Attracting Non-Traditional Workers Into the TSMO Workforce
- Statewide Operations Center Reconstruction: Resiliency & Continuity of Operations
- The Benefits of Regional Collaboration: Workforce Development, Construction Management, and RTSMO
- TSMO Implementations on I-25 and I-70 Work Zones
- Methods and Tools to Estimate Staffing Needs
- Road Weather Spotlight: Workforce Planning
- Coordinated Highway Assistance and Maintenance Program
- TSMO Training Best Practices