NOCoE 2016 Workforce Summit Proceedings and Implementation Plan

June 22–23, 2016

EXECUTIVE SUMMARY

The National Operations Center of Excellence's (NOCoE) identified workforce development as one of the focus areas that would provide value to the Transportation Systems Management and Operations (TSMO) community and hosted a two-day summit on TSMO workforce development on June 22–23, 2016. The proceedings and findings from its two-day workforce development summit are presented in this document for the TSMO community, participants and partners. The goal of the summit was to identify viable actions that NOCoE can either influence and encourage the development of additional resources for TSMO workforce development.

In preparation for the summit, NOCoE produced three white papers focused on the current workforce environment for the TSMO community prepared in advance of the summit. The white papers provided context and discussion starting points by focusing on the following key issues: *institutional context for TSMO in transportation agencies, professional capacity building needs vs. available resources, recruitment, retention, and career development.*

The first day of the summit focused on discussion and review of the white papers and their suggested focus for TSMO workforce development. Discussions were held within breakout groups where participants developed responses and suggestions to pre-identified actions identified in the white papers followed by a discussion of the findings of each breakout.

The second day of the summit focused on the prioritization of the proposed actions by voting on the proposed actions and taking into consideration the importance, ability to leverage, urgency, and practicality. The prioritization of the actions allowed for additional discussion to produce a refined list of issues, actions, and next steps which would allow NOCoE to identify, allocate and collaborate on after the summit.

The eight priority actions that were identified are:

1. Convene a forum of DOTs, private sector and educators to discuss pre-employment education needs/solutions
2. Create a repository of existing TSMO-related course materials across all educational institutions—universities and community colleges
3. Conduct an updated systematic exploration of knowledge, skills and abilities (KSA) needs vs. training materials gaps for TSMO entity-related functions and positions

4. Develop a repository of existing position descriptions (PD) for similar positions/functions, and create model position descriptions
5. Develop model TSMO training program for new hires, promotions, and transfers—including a review of current best practice for organization policies, practices, and content
6. Develop a strategy to elevate TSMO visibility as a core transportation function
7. Document current best recruitment practice in public and private entities, including targeting of non-traditional disciplines and recruitment sources, and the use of recruitment "sweeteners"
8. Document current best practices in mentoring, succession planning, cross training, special assignments and individual career planning for public and private entities

The 2nd part of this report is the implementation plan that NOCoE staff have put together as a result of the workforce development summit. The implementation plan presents to the TSMO community concise ways to develop professional capacity building, recruitment, retention, and career development for prospective and current TSMO professionals. The implementation plan is meant for the TSMO community to work together and collaborate on all of the action items as the NOCoE will play its essential role of being the hub for the development of these resources and completion of the action items.

OVERVIEW

In September, 2015, the National Operations Center of Excellence (NOCoE) identified workforce development as one of the main focus areas for the Transportation Systems Management and Operations (TSMO) community and decided to host a summit of key players to support the development of the TSMO workforce. Three background white papers were prepared to structure the summit agenda and provide background/context for the discussions. The two-day summit was held on June 22–23 at the Maritime Institute in Linthicum, Maryland. The participants included a diverse group of practitioners, agency managers, human resource specialists (HR), professional education and training specialists, and representatives of state, regional and local transportation agencies and professional service providers (see appendix).

TSMO WORKFORCE BACKGROUND

Three White Papers prepared in advance of the Summit addressing the following areas.

Institutional context for TSMO in transportation agencies—TSMO is currently not fully integrated into agency policy nor a formal program structure because it is still somewhat outside the legacy civil engineering project development culture. TSMO is integrated into agencies typically as an afterthought set of activities dependent on mid-level staff champions who are often two to three levels down from executive management who have shifted to an operations focused approach from other disciplines within the agencies. There are no organized staff development programs (training, internships, etc.) and existing Professional Capacity Building (PCB) resources are accessed by individual professionals based largely on their own initiative. Finding and retaining staff with the needed multi-disciplinary qualifications is difficult given the lack of pre-employment education—and competition with the private sector. As a result, much of the more technical activities in agencies are outsourced to the private sector—which itself has limited experienced staff resources.

Professional Capacity Building Needs vs. Available Resources—The previous white papers identified competencies for function and position combinations which included additions to KSAs that detail technical knowledge, cross cutting skills and abilities. The KSAs were compared with the easily accessible education and training materials available—both at the pre-employment level in university graduate programs and for post-hiring training from transportation entities (FHWA and the National Highway Institute, the USDOT ITS Joint Program Office, the Consortium for ITS Training and Education (CITE) at the University of Maryland, and professional associations such as AASHTO, ITE and ITS America. [Post-hiring training refers to the training that occurs during employment after someone is hired] It was found that there are a limited number of TSMO related graduate courses and that these are not necessarily closely related to TSMO practice. Concurrently, there are a wide range of post-hiring training materials focused primarily on specific TSMO applications and state of the practice knowledge. While the post-hiring training materials are beneficial, there still exists significant gaps in areas related to TSMO program

planning, development, management and leadership and do not address the cross-cutting skills and abilities needed within TMSO.

Recruitment, Retention and Career Development—Given the range of education and training resources available today, the challenge to TSMO workforce development may not lie principally in education and training gaps as the identity of the TSMO workforce is still developing. The TSMO-specific recruiting, training, retention and career development practices or sometimes lack thereof would contribute to the use and development of the existing training material in combination with on-the-job training and mentoring. One important aspect of the problem is the limited recruitment experience for agency HR and TSMO managers. TSMO managers lack the internal leverage to achieve the needed changes in legacy, civil engineering oriented recruiting, retention and career development practices. Key recruiting challenges are difficult because of the absence of position descriptions, a burdensome recruitment process, inappropriate legacy qualification requirements and limited talent pool contacts. Despite the small number of staff positions and relative novelty of TSMO as an agency focus, there appears to have been less attention to the retention challenges of which succession planning is one of the key considerations that is contributing to TSMO being seen as an after-thought process. TSMO retention often times do not have a defined performance and review process that supports advancement within and across the transportation agencies.

Career Development—While the larger transportation agencies provide specific career development opportunities for civil engineers and managers as part of an organized program, TSMO lacks an equivalent program focus within transportation agencies and lacks a clear advancement track. Key missing elements include pay and rewards related to defined performance and encouragement for national exposure to advance the state of the industry. As with other disciplines, competing opportunities often attract senior TSMO staff from state DOTs to some better compensated opportunities mostly in the private sector.

KEY ISSUES FOR THE SUMMIT TO ADDRESS

The White Paper findings were used as the basis for identifying eight key issue areas.

Under the heading *Competencies, Education and Training*, four issues were identified:

1. Pre-employment education aimed at producing TSMO generalists
2. Pre-employment education aimed at producing key TSMO-related technical specialists
3. Position and qualifications specifications (KSAs)
4. Employment training programs

Under the heading Recruitment, Retention, and Career Development, an additional four issues were framed:

5. Keeping pace with emerging trends in technology/skills
6. Recruitment
7. Career development
8. Retaining top performers

THE WORKFORCE DEVELOPMENT SUMMIT

The three white papers provided a set of 33 potential implementation actions for consideration under each issue area for discussion and prioritization. With the intent to provide a platform for effective discussion and prioritization of action items, the diversity and composition of the summit participants was equally important to the work in preparing for the summit. The participants included a diverse group of practitioners, agency managers, human resource specialists (HR), professional education and training specialists, and representatives of state, regional and local transportation agencies, and professional service providers. The mix included:

- 4 US DOT officials
- 11 State DOT officials
- 2 local officials
- 6 academics
- 4 professional service providers
- 4 non-profit association representatives

Additionally, Summit organizers consulted with another 15-20 stakeholders to ensure their perspective was represented in the shape of the Summit's agenda and the perspectives that were important to be mindful of. The list of attendees can be found in the Appendix.

Finally, the make-up of the white papers themselves were deliberatively drawn from extensive research, prior attendance at a range of meetings addressing workforce matters, and a survey of the TSMO community to strengthen the validity of the findings brought to the summit for review and discussion.

Day One: Discussion and Review

The first day of the summit process involved issue focused breakout sessions followed by a plenary discussion. The breakout sessions were used as the basis to refine and supplement the pre-identified actions and to consider strategic "next steps" to implement each action. The breakout sessions produced a collective decision to combine Issues 1 and 2 and Issues 4 and 5 because of their similarity in focus and allowing for a management six issue areas. The results of day one provided a refined list of issues with actions and potential next steps for each action.

Day Two: Prioritization of Actions

The second day focused on developing a consensus regarding the highest priority actions in terms of importance, leverage, urgency, and practicality. To organize a list of action items and identify the highest priority action items, votes were cast amongst the summit participants that resulted in eight priority actions with a significantly high number of votes. The eight priority actions received an approximate equal distribution of votes related to Competencies/Education/Training and Recruitment/Retention/Career Development. Following the voting, there was considerable discussion of potential next steps that can be identified as a starting point to implement each priority action. In several cases, actions not identified as a high priority on their own were included as next steps within the remaining a priority action.

The eight priority actions and suggested tasks identified are:

Action	Action from Summit

Priority Action 1: Convene forum of DOTs, private sector, and educators to discuss pre-employment education needs/solutions

#1	Clarify key constraints facing educators in offering TSMO related material including crowded curricula, size of demand, need for special materials.
#2	Improve communications between TSMO practice and educators by engaging in the current national dialogue on general transportation workforce development (Urban Transportation Centers, Regional Workforce Centers, FHWA Center of Excellence for Workforce Development, State DOT innovation officers).
#3	Identify key opportunities for community college, undergraduate, and graduate professional education for both TSMO generalists (interdisciplinary) and TSMO-related content for specialist disciplines (systems engineering, Information Technology (IT), etc.)—including internships, industry-taught classes, mentoring, etc.

Priority Action 2: Create a repository of existing TSMO-related course materials across all educational institutions—universities and community colleges

#4	Inventory material available and create a central searchable repository available to all educators.
#5	Develop model curricula or modules for universities, community colleges, and other training institutions through a task force of practitioners and educators. Include material appropriate for civil engineering, planning, and systems engineering concentrators.

Priority Action 3: Conduct an updated systematic exploration of knowledge, skills, and abilities (KSA) needs vs. training materials gaps for TSMO entity-related functions and positions

#6	Conduct systematic development of KSAs by position and function involving representatives across the widest range of practice applications, capitalizing on past (NCHRP), and current (ITS JPO/FHWA) activities.
#7	Identify the current/future development in technologies and systems that may impact KSAs needed for different positions and functions involving both public and private sector players.
#8	Sponsor discussion among key players in the development of post-hiring education and training materials (NOCoE, ITS JPO, FHWA/NHI, CITE, ITE, ITS-America) to agree on training materials development strategy, coordination, and division of responsibility.
#9	Consider certification program/credentials and CEU requirements—building on existing experience with ITE's Professional Traffic Operations Engineer program and certification programs in other professional disciplines.

Priority Action 4: Develop a repository of existing position descriptions (PD) for similar positions/functions, and create model position descriptions

#10	Compile and review existing PDs from agencies including on-going ITS-America project regarding ITS position descriptions.
#11	In conjunction with KSA framework by function/position (see above), develop modular approach to accommodate employer variations.
#12	Review issues with representation from agency HR and training administrators—regarding implications for recruitment process and overlaps with other agency jurisdiction (e.g., IT).

Priority Action 5: Develop model TSMO training program for new hires, promotions, and transfers—including a review of current best practice for organization policies, practices, and content

#13	Inventory and create repository for all existing training materials by topic and identify key "gaps" for function/position function KSAs (as per existing FHWA/ITS JPO PCB training strategic plan).
#14	Convene agency TSMO program leadership together with HR/training experts to define appropriate training program elements for all KSAs (both hard and soft skills)—building on examples such as existing in EIT programs for civil engineering graduates.
#15	Match training subjects with appropriate knowledge transfer models, recognizing millennial workforce characteristics and settings and include key skills and abilities, recognizing different needs for generalists vs. specialists.
#16	Develop modular "model" training program—scalable to needs of range of entities—addressing key needed position/function capabilities, including knowledge, skills, and abilities.

Priority Action 6: Develop a strategy to elevate TSMO visibility as a core transportation function

#17	Identify and engage potential TSMO program advocates, champions and to support association dialogue regarding measures to further mainstream TSMO as a significant entity program focus.
#18	Conduct awareness survey and develop responsive program to achieve greater branding consistency among agencies.

Priority Action 7: Document current best recruitment practice in public and private entities, including targeting of non-traditional disciplines and recruitment sources, and the use of incentives

#19	Review best recruitment and retention practice used by other technical areas in both the public and private sector regarding compensation, apparent career paths, and incentives. Explore alternative sources for recruits with operational backgrounds (private transportation, aviation, military, and law enforcement).
#20	Identify recruitment approaches responsive to creating (1) a more diverse workforce by considering alternative recruitment targets and venues, and (2) a work environment that accommodates Millennial workforce characteristics.
#21	Develop NOCoE "Job Board" to facilitate improved recruitment.

Priority Action 8: Document current best practices in mentoring, succession planning, cross training, special assignments, and individual career planning for public and private entities

#22	Identify size of anticipated TSMO recruitment problem in public and private sector to scale priorities and methods.
#23	Identify typical visible career path opportunities and/or barriers as evidenced in current practice.
#24	Identify best current practices for rewarding performance (e.g., spot bonuses, gift certificates, pay-for-performance, and recognition).

NEXT STEPS

The Workforce Summit that took place in June 2016 provided a rich offering of views and an initial prioritization of workforce actions for the TSMO community to take on.

It was affirmed at the summit that the NOCoE will propose an implementation plan on workforce development for the NOCoE Board of Directors and Technical Advisory Committee to review. These two groups are comprised of representatives from the TSMO stakeholder community and are well positioned to affirm how best to tackle the challenges transportation systems management and operations officials face when it comes to their 21st century workforce.

The implementation plan will have several key elements that will:

- Affirm the important roles currently played by the US DOT, state and local transportation agencies, academic institutions, the private sector, and non-profit associations.
- Underscore and further promote the significant collaboration currently taking place so that the NOCoE can support further outreach, engagement, coordination, and interaction to achieve the workforce development priorities that are needed.
- Identify and leverage NOCoE resources on its own or in combination with its partners to help fill some of the gaps that exist.

The implementation plan that provides direction and identification of action items related to the priority actions are provided in the next chapter of this report. NOCoE will work to influence and encourage the development of subsequent material with its partners. The implementation plan does not assume NOCoE will be conducting and leading all of the items but will function in its role to facilitate and inform the TSMO community about the activities as they unfold.

NOCoE Workforce Summit Implementation Plan

The NOCoE workforce summit implementation plan is a brief document for all of the workforce summit participants, partners and the larger TSMO community to maintain the momentum of activities within this area of transportation operations. The following plan is considered to be a guiding document and will be used to reference the NOCoE's activities within this space and keep the TSMO community apprised of developments.

1. ASSOCIATION & AGENCY DEBRIEF

Convene a planned and facilitated meeting with appropriate representatives of FHWA, AASHTO, ITE, ITS America and TRB to present the action items from the summit and discuss approaches to more detailed implementation plans for the summit action items that are coordinated with current and planned activities of the associations and agencies represented.

2. PRE-EMPLOYMENT EDUCATION AIMED AT PRODUCING BOTH TSM&O GENERALISTS AND SPECIALISTS WITH KEY SUPPORT CAPABILITIES

As an outcome of the Debrief meeting, schedule a meeting with FHWA and other interested parties to develop, plan and convene a forum of transportation agencies, private sector, and educators. The long term goals of the forum are to:

1. Clarify key constraints facing educators in offering TSM&O related material including crowded curricula, size of demand, need for special materials
2. Improve communications between TSM&O practice and educators by engaging in the current national dialogue on general transportation workforce development (Urban Transportation Centers, Regional Workforce Centers, FHWA Center of Excellence for Workforce Development, State DOT innovation officers)
3. Identify key opportunities for community college, undergraduate, and graduate professional education for both TSM&O generalists (interdisciplinary) and TSM&O-related content for specialist disciplines (systems engineering, Information Technology (IT), etc.)—including internships, industry-taught classes, mentoring, etc.
4. Create task force of practitioners and educators to develop material, Including materials appropriate for civil engineering, planning, and systems engineering concentrations
5. Develop model curricula or modules for universities, community colleges, and other training institutions

3. DEVELOP A REPOSITORY OF EXISTING TRANSPORTATION AGENCY POSITION DESCRIPTIONS AND KSA'S FOR SIMILAR TSMO POSITIONS/FUNCTIONS, AND CREATE MODEL POSITION DESCRIPTIONS (OR KSA'S) BASED ON POSITION/FUNCTION MATRIX ESTABLISHED IN PREVIOUS RESEARCH.

Building on past NCHRP and Summit papers, develop new NCHRP 20-7 scope to refine KSAs and related position descriptions project for approval and submission by STSMO for the November AASHTO meeting in Boston. The scope of the 20-7 project should address the following:

1. Involve HR to refine/develop PDs/KSAs
2. Include technical & non-technical skills in PDs/KSAs
3. Conduct systematic development of KSAs by position and function—involving representatives across the widest range of practice applications, capitalizing on past (NCHRP) and current (ITS JPO/FHWA) activities
4. Identify the current/future development in technologies and systems that may impact KSAs needed for different positions and functions—involving both public and private sector players

4. POST-HIRING EDUCATION AIMED AT PRODUCING TSMO PROFESSIONALS WITH KEY SUPPORT CAPABILITIES

Convene a meeting with FHWA to discuss the development and potential sources for funding of a project aimed at addressing the needs for post-hiring education and training for TSMO professionals. The project should address the following:

1. Review current best practice for organization policies, practices, and content re: TSM&O training for employees (including new hires, promotions, and transfers), and create (model) TSM&O training programs (using full range of available materials, university support, etc.)
2. Inventory and create a repository in the NOCOE EKTS for all existing training materials by topic and identify key gaps in available training for function/position function KSAs (as per existing FHWA/ITS JPO PCB training strategic plan and the NCHRP 20-7 project developing KSA's and position descriptions. This should include current on-going work in a number of transportation agencies such as the Colorado and Utah DOT's, e.g. CDOT University.
3. Define an appropriate training "program" elements for all KSAs (both hard and soft skills)— building on examples such as existing in EIT programs for civil engineering graduates
   i. Strategies:
      a. Include TSM&O element in formal certification programs
      b. Include TSM&O element in staff training for other disciplines
      c. Consider OJT, mentoring, and rotational assignments
      d. Provide opportunities for external in-depth technical training
      e. Identify opportunities to include training as an integral part of system installation contracts

  f. Match training subjects with appropriate knowledge transfer modes, recognizing millennial workforce characteristics and settings and include key skills and abilities—recognizing different needs for generalists vs. specialists

4. Develop a modular "model" training program—scalable to needs of range of entities—addressing key needed position/function capabilities, including knowledge, skills, and abilities

  i. Strategies

   a. Review issues with representation from agency HR and training administrators—regarding implications for recruitment process and overlaps with other agency jurisdiction (e.g., IT)

   b. Develop modular approach to accommodate employer variations

5. TSM&O WORKFORCE RECRUITMENT, RETENTION, AND CAREER DEVELOPMENT

Develop a scope of work and proposal for a NCHRP 20-24 project for approval and submission by STSMO for the November AASHTO meeting in Boston. Unlike the NCHRP 20-7 program which is approved by the Standing Committee on Highways, the NCHRP 20-24 projects are reviewed and approved by the AASHTO Board of Directors. The scope of the 20-24 project should address the following:

A. Recruitment

1. Document the current best recruitment practices in public and private entities for positions with technical skills, including (but not limited to) targeting of non-traditional (non-CE) disciplines, recruitment sources, and the use of recruitment "sweeteners" (e.g., signing bonuses, flex schedules, etc.).

  i. Strategies

   a. Review best recruitment and retention practice used by competitors and in other technical areas—both public and private sector—regarding compensation, apparent career paths, and recruitment sweeteners—and alternative sources for recruits with operational backgrounds (private transportation, aviation, military, law enforcement)

   b. Identify recruitment approaches responsive to creating (1) a more diverse workforce by considering alternative recruitment targets and venues, and (2) a work environment that accommodates Millennial workforce characteristics

   c. Identify size of anticipated TSM&O recruitment problem in public and private sector to scale priorities and methods

B. Career Development

1. Review and document current best practices in mentoring, succession planning, cross training, special assignments, and individual career planning for public and private entities.

C. Retaining Top Performers

1. Review current practices for rewarding performance (e.g., spot bonuses, gift certificates, pay-for-performance, recognition)

6. DEVELOP A STRATEGY TO ELEVATE TSM&O VISIBILITY AS A CORE TRANSPORTATION FUNCTION

The Summit Implementation Team should convene a meeting with AASHTO Communications Director to discuss and agree on strategies such as the conduct awareness survey and subsequent development of a responsive program to achieve greater branding consistency among agencies (ITS vs. TSM&O)— as per within USDOT and among associations—including clarity re "scope" of TSM&O vs. other US DOT initiatives greater branding consistency across industry and consensus regarding terminology ("ITS" vs. "TSM&O").

In 2012, AASHTO STSMO and TRB SHRP2 staff developed and coordinated an AASHTO Board of Directors peer CEO presentation highlighting the components of TSMO and the value of SHRP2 projects in supporting improvements to agency TSMO. The peer to peer CEO discussions were well received and laid the groundwork for the revitalization of the STSMO subcommittee and the creating of the NOCOE. It is timely to develop a similar approach to identify and engage potential TSM&O program advocates, champions and to support association dialogue (ex: AASHTO Board of Directors and Standing Committee on Highways, etc.) regarding measures to further mainstream TSM&O as a significant entity program focus.

APPENDIX: WORKFORCE DEVELOPMENT SUMMIT ATTENDEES

State DOT Leadership

Shailen Bhatt	Executive Director	Colorado DOT

State DOT TSMO Practitioners

Tom Byron	Assistant Secretary, Intermodal Systems Development	Florida DOT
Dean Gustafson	State Operations Engineer	Virginia DOT
Mike Holder	Chief Engineer, Division of Highways	North Carolina DOT
John Nisbet	Director of Traffic Operations	Washington State DOT
David Huft	ITS Coordinator	South Dakota DOT
Brad Freeze	Traffic Operations Division Director	Tennessee DOT
Ryan Rice	Director Division of Operations	Colorado DOT
Sue Mulvihill*	Deputy Commissioner	Minnesota DOT
Doug Tomlinson	ITS Division Manager	PennDOT
Tony Kratofil	Metro Region Engineer	Michigan DOT

Local Agency and MPO TSMO Practitioners

Jennifer Toth*	Director	Maricopa County DOT
Doug Wiersig	Director, Department of Transportation and Public Works	City of Fort Worth
Laurie Matkowski	Senior Transportation Engineer	Delaware Valley Regional Planning Commission

US DOT

Tracy Scriba	SHRP2 Reliability Program Manager	FHWA

Academia

Steve Albert	Director	Montana State University's Western Transportation Initiative
Mohammed Hadi	Associate Professor, Graduate Program Director	FIU
Tim Lomax	TTI Research Fellow	TTI
Dr. Michelle Mueller	VP of Economic, Community & College Development	Washtenaw Community College

Martin Pietrucha	Director	Thomas D. Larson, Pennsylvania Transportation Institute, Penn State University
Tyler Reeb	Director of Research	California State Long Beach

Private Sector		
Rich Schuman	Vice President and General Manager, Public Sector	Inrix
Matt Lee	Manager, ITS Operations	AECOM
Pierre Pretorius		Kimley-Horn
Eric Rensel	Manager TIM Network	Gannet Flemming

Observers		
Phil Caruso	Associate Executive Director for Technical Programs	ITE
Rich Cunard	Engineer of Traffic and Operations	Transportation Research Board
David Jackson	Transportation Industry Analyst	Volpe Center
Clark Martin	Team Leader, Affiliate Programs	FHWA
Gummada Murthy	Associate Director, Operations Program	AASHTO
Anthony Shaw	Transportation Program Specialist	ITS America
Patrick Son*	Vice-President Technical Programs	ITS America
Grant Zammit	Operations Technical Service Team Manager	FHWA

Consultants/NOCoE Staff		
Steve Lockwood	Consultant	Independent Consultant
Gary Euler	Consultant	Independent Consultant
Paula Hammond	Consultant	PB
John Conrad	Consultant	AASHTO
Tom Kern	Managing Director	NOCoE
Steve Lavrenz	Technical Services Manager	NOCoE
Deborah Rouse	Technical Communications Manager	NOCoE
Ashley Ciacco	Intern	NOCoE
Meghan Wozniak	Senior Meeting Planner	AASHTO
Pat Zelinski	Engineering Operations Specialist	AASHTO

*Unable to attend due to last minute considerations.