National Operations Center of Excellence

ACADEMIC FORUM PROCEEDINGS

April 24, 2018

EXECUTIVE SUMMARY

The National Operations Center of Excellence (NOCoE) is conducting an active collaborative program with key agency, industry, and educational partners to improve and enhance the Transportation Systems Management and Operations (TSMO) workforce. Efforts are being applied across the educational, public agency, and industry environments and activities include: raising TSMO awareness, professional capacity building, and addressing related management and administration issues.

A key target area for increasing the knowledge, skills, and abilities of the TSMO workforce is the current academic environment, including facilitating a career orientation towards TSMO via the resources available to current university, community college, and adult learning institutions. To better understand the current academic environment's needs, gaps, and possibilities, NOCoE convened an Academic Forum in November 2017 with representation from seven universities and community colleges with an interest in TSMO. The Forum provided key insights and possible actions that NOCoE and the TSMO industry can undertake to enhance current academic curriculums and programs, while also raising the awareness and understanding of TSMO to all students in TSMO related fields. After the Forum, a list of actions was compiled and presented to the NOCoE Board of Directors and Technical Advisory Committee who reached consensus on the priority list of actions presented below:

1. Identify DOT/university TSMO collaboration models and create best practice document
2. Create Community College TSMO technical training programs in conjunction with industry certification
3. Encourage a role for outside classroom learning through a NOCoE, web-based " hub" providing accessible classroom material for educational faculty, students, and industry collaborators
4. Outreach to non-civil engineering academic disciplines and propose guest TSMO experts to promote TSMO as a discipline
5. Create a NOCoE student fellowship opportunity to gain broad industry knowledge of TSMO
6. Contribute to TSMO curriculum development from practitioner/employer points-of-view and champion its utilization
7. Analyze issues regarding lack of TSMO (and related technologies) in course content

NOCoE will engage with academic partners through these actions and seek to continually improve of its service and product offerings to support TSMO workforce development.

BACKGROUND

In September 2016, NOCoE held a two-day TSMO Workforce Development Summit as the centerpiece of NOCoE's first Strategic Work Program. Participants included a diverse group of practitioners, agency managers, human resource specialists (HR), professional education and training specialists, representatives of state, regional and local transportation agencies, and professional service providers.

Using an agenda supplemented by background white papers, a Summit consensus was reached on a set of initial priority actions in six key areas:

1. Stakeholder briefing
2. Pre-employment education and training
3. Needed KSAs and position descriptions
4. Post-employment education and training
5. Recruitment, retention and career development
6. TSMO visibility

During 2017, after reviewing Summit Action recommendations, the Board determined to convene an "Academic Forum" of key educators and practitioners to explore pre-employment education/training needs and opportunities as a priority action item.

ACADEMIC FORUM

The Academic Forum was held on November 9, 2017. The target of the Forum was pre-employment education aimed at producing both TSMO generalists and specialists with key support capabilities. Forum participants included a range of educators (both community college and universities), NOCoE Board members, staff, and consultants. (See Appendix A)

It was recognized that a key objective of the Forum was to enhance mutual understanding between educators and practitioners regarding the state-of-the-practice and the challenges faced in improving TSMO education and training.

The Forum opened with a presentation of the main issues developed during the Workforce Development Summit, with respect to the lack of adequate pre-and post-employment training, as well as related materials focused on TSMO, including the need to support further mainstreaming of TSMO within transportation agencies and in education.

Initial discussion focused on the state-of-play, including where TSMO is, or is not, included in current community college and university curricula, as well as the key constraints facing educators in offering TSMO related material, such as crowded curricula, absence of easily available educational materials, and lack of student awareness and demand.

Presentations were made by educator-participants regarding their current education and training initiative, including:

- Virginia Tech – operates a cooperative university-industry (supported) applied project-based undergraduate internship hub
- University of Maryland -- has existing graduate level ITS applications course within the civil engineering disciplinary context, but without a broad TSMO focus
- Florida International University – offers graduate course in ITS with outside guest speakers and a summer program
- University of Memphis – starting up introduction to TSMO course in 2018 – based on FHWA Program Plan outline

- UC Berkeley – addressed the need for a broad range of interdisciplinary KSAs to support TSMO
- University of South Florida – developing a model curriculum for TSMO at different scales
- Washtenaw Community College – offers a pre-professional mobility analyst training program
- Oregon State (could not attend, but contributed via subsequent conference call)

Following the presentation, a range of issues were addressed regarding pre-employment training and education. Key issues that emerged include:

- TSMO is not a discipline, it is multidisciplinary and fuzzily defined, and therefore has not attracted university academic department support. In addition, civil engineering curricula are already very crowded and other discipline curricula rarely include a TSMO focus.
- There are no existing convenient curriculum materials. Few academics have the level of TSMO practice involvement to support a broad TSMO focus. However, there are several current initiatives to develop curricula, both in universities and at FHWA.
- There is no convenient channel through which key non-university/college stakeholders can communicate with TSMO practitioners and service providers regarding TSMO workforce development needs.
- TSMO represents a new, not fully mainstreamed, transportation agency program with a modest rate of recruitment nationally. Therefore, students are not aware of TSMO and there is a resulting lack of student demand for courses. There is the need to develop awareness of career opportunities starting back in K-12 and at the college level.
- A substantial portion of civil engineering graduate students are from overseas, where TSMO related practice is not institutionalized, and the institutional configurations are very different from the US.
- There are successful, existing examples of creating educational opportunities based on university research and support relationships with agencies of industry
- Among FHWA's Regional Workforce Development program, only the Southwest center has a TSMO focus and is developing a TSMO course.
- Pre-professional training for transportation at the community college level is oriented more generally to highway development. However one community college offers a "mobility analyst" course as a general preparation for operations support roles.
- TSMO related KSAs and position descriptions are under development in several states and an NHCRP study is currently underway. There may be an opportunity to develop a certification program based on these activities.
- There is a need for establishment of a resource of background material and case studies available to all educators, a role that NOCoE can fill.
- There are several workforce development initiatives underway in USDOT, academia, and among associations, but there is limited regular communication/coordination among them.

In the course of the day-long discussion, over 70 actions were identified in 5 categories:

1. Outreach/Promotion of TSMO to students from K-12
2. Curriculum support for academic institutions
3. Non-curriculum support for academic institutions
4. Engagement with organizations that require TSMO services to understand needs
5. Advocacy with stakeholders to enhance their understanding and inclusion of TSMO

The Forum closed with a commitment from the NOCoE Managing Director to continue working with the academic participants on the potential action items.

NOCoE Stakeholder Input

After the conclusion of the Academic forum suggested actions were categorized, characterized, refined, and prioritized according to the category, audience, collaborator, product(s), level of effort, and payoff time (see Appendix B). Several refinement rounds were conducted by staff and consultants resulting in 13 priority actions in two basic categories: collaborative follow up to Academic Forum and NOCoE internal actions.

The priority actions include:

Academic Forum follow-up (7)

- Outreach Promotion
  - Explore, encourage role of real-world" outside classroom" learning"
  - Create mechanism for an NOCoE student program/fellowship
- Curriculum Support
  - Identify and outreach to non-civil engineering disciplines
  - Analyze issues behind absence Of TSMO in university course content
  - Contribute to TSMO curriculum development
- Non-Curriculum Support
  - Create community college TSMO technical training programs
  - Identify DOT (state and local)-university collaboration models appropriate to TSMO

NOCOE internal follow up (6)

- Engagement
  - Develop regular/formal communications with national-level stakeholders
  - Refine workforce development focus in terms of "operationalizing" KSAs
  - Create a NOCoE webpage for TSMO educational and classroom materials
  - Create materials and outreach TSMO to the K-12 audience
- Advocacy
  - Enhance TSMO professional certification programs;
  - Leverage the Operations Academy regarding occurrence, audience, materials, graduates, etc.

The Academic Forum follow-up list was further refined by asking the NOCoE Board of Directors and Technical Advisory Committee members to identify the highest priority action items to be addressed as resources become available. The priority list is presented below:

1. **(Non-Curriculum Support)** Identify state and local DOT/university collaboration models related to TSMO and create a best practice document, including case studies. Outreach to universities and DOTs on the collaboration model examples.

2. **(Non-Curriculum Support)** Create Community College TSMO technical training programs modeled after the Mobility Analyst Training Program for community colleges. Develop partnership with community colleges to incorporate training for TSMO technicians and operators in conjunction with industry certification providers.

3. **(Outreach Promotion)** Explore and encourage the role of real-world, "outside classroom learning" for TSMO through an integrated hub at the university for professors, students, and industry to collaborate as a part of internships.

4. **(Curriculum Support)** Identify and reach out to non-civil engineering disciplines (computer, science, planning, public policy, IT, etc.) and propose guest lectures relating given discipline to TSMO as a career option.

5. **(Outreach Promotion)** Create a NOCoE student fellowship that will allow a recent graduate to work with NOCoE and partners for a set period (assume 1 year) to gain broad TSMO industry background.

6. **(Curriculum Support)** Contribute to TSMO curriculum development from practitioner/employer point-of-view and champion utilization.

7. **(Curriculum Support)** Analyze issues behind lack of university course TSMO (and related new technology) content.

NEXT STEPS

Utilizing the action items above, NOCoE will develop brief action plans for each item and identify partners to advance them. It is understood that some of the action items can be accomplished simultaneously and the level of effort needed from NOCoE will depend on the action item and involvement from various partners.

This effort will be conducted to include activities that keep the partners informed and engaged at all times with TSMO workforce development. For that reason, a primary product will be "home page" on the NOCoE website for TSMO workforce development efforts, acting as a central repository of information with regular updates further greater collaboration opportunities and advancing the TSMO workforce development efforts.

APPENDIX A

NOCoE Academic Forum Attendees
November 9, 2017

- Mohammed Hadi, Ph.D., P.E., Professor of Transportation Engineering, Lehman Center for Transportation Research, Florida International University
- Joe Butler – Engineering Manager, UC Berkeley PATH (Partners for Advanced Transportation Technology)
- David Hurwitz, Associate Professor of Transportation Engineering, Oregon State University
- Stephanie S. Ivey, PhD, Director, Southeast Transportation Workforce Center, Professor, Department of Civil Engineering, The University of Memphis
- Lei Zhang, Ph.D., Herbert Rabin Distinguished Professor, Director, National Transportation Center, Department of Civil and Environmental Engineering, University of Maryland
- Robert L. Bertini, University of South Florida
- Dr. Michelle K. Mueller, Vice President of Economic, Community & College Development, Washtenaw Community College
- Neil Gudsen, Program Development Manager, Economic and Community Development Division, Washtenaw Community College
- Zac Doerzaph | Director, Center for Advanced Automotive Research, Virginia Tech Transportation Institute
- Tom West, Director California PATH (Partners for Advanced Transportation Technology)
- Clark Martin, Program Manager, Center for Transportation Workforce Development, Office of Innovative Program Delivery, Federal Highway Administration
- Tony Kratofil--Metro Region Engineer, Michigan Department of Transportation
- Tracy Scriba, FHWA SHRP2 Reliability Program Manager, Federal Highway Administration
- Patrick Son, NOCoE
- Steve Lavrenz, ITE
- John Conrad
- Tom Kern
- Paula J. Hammond, WSP
- Stephen Lockwood

APPENDIX B – REFINED WORKFORCE DEVELOPMENT ACTION ITEMS

Idea	Audience	Collaborators	Suggested Products
Outreach & Promotion			
1. Explore, encourage role of real-world" outside classroom" learning" for TSMO (VTTC "Hub" model)	Educators and industry (employers of graduates), TSMO interested academic faculty AASHTO, ITE, ITS America, student groups	Industry and universities involved in NOCoE's WFD initiative, CITE members	• Review VTTC experience • Establish industry contacts and conduct discussion forum • Develop Memo re potential pilot • Pursue with promising pilot employer(s)
2. Create mechanism for an NOCoE student program/ fellowship	Undergrad and grad students	Universities involved in NOCoE's WFD initiative and CITE members ENO Fellow program TRBG's e-portfolio winners as advisory group Consultants and SDOTs for cases	• Convene TRB e-portfolio winners in webinar to obtain advice • Review Eisenhower fellowship experience • Develop memo on fellowship guidelines re budget, management; outreach and recruitment strategy • Commit budget • Conduct pilot

Idea	Audience	Collaborators	Suggested Products
Curriculum Support			
3. Identify and outreach to non-civil engineering disciplines (computer, science, planning, public policy, IT, etc.) within an academic setting and propose guest lecture relating given discipline to TSMO as career	University departments in key TSMO-related disciplines	Universities involved in NOCoE's WFD initiative and CITE members	• Develop business case memo tailored to disciplines • Identify supporting universities, establish contact and conduct forum for discussion • Determine nature of module and delivery approach • Develop test module for application with supportive academics
4. Analyze issues behind university course content lack of TSMO (and related new technology)	University and community colleges transportation and related faculty and Dept. chairs; State DOTs and FHWA as leverage	Consortia of universities involved in NOCoE's WFD initiative, CITE members, FHWA CTWD, ITE Education Council, ITS-JPO University Partners	• Develop memo on business case for adding TSMO to transportation-related graduate and undergraduate course and/or syllabuses • Survey universities (NOCoE Forum and CITE, ITE Education Council, NCCPT Partners) to gain greater insight regarding issues related to scale of industry/agency demand, student interest, university department and faculty incentives, faculty knowledge, curriculum approval, etc. • Develop White paper refining issues and options – relating issues to curricula under development • Consider National forum (thru FHWA WFD

Idea	Audience	Collaborators	Suggested Products
5. Contribute to TSMO curriculum development from practitioner/ employer POV, champion utilization	DOTs, Universities, Consultants	FHWA Office of Operation and CTWD and its participating partners	• Engage small practitioner group to review product of FHWA academic TSMO course curriculum and the National Transportation Career Pathways Initiative (National Network for Transportation Workforce) to consider gaps/issues from employer (DOT) POV • Develop memo regarding options – including sample module, focused on • Options beyond full courses including modules, electives, capstone, webinars, use of adjuncts • Develop 1-2-day module for trial run -- from existing material for insertion in existing courses – including case studies – for CE and non-CE • Consider full course, • Engage with university professor for trial

Idea	Audience	Collaborators	Suggested Products
Non-Curriculum Support			
6. Create Community TSMO technical training programs modeled after the *Mobility Analyst Training Program* for community colleges; develop partnership with CCs to incorporate training (and certification) for TSMO technicians, operators	Community colleges	Select community colleges; IMSA – or similar training/ certification entity	Review existing models and develop business case Create working group from industry and community colleges Investigate Certification models (ITE, IMSA) Develop memo re model program regarding demand, curriculum and approach to industry-acceptable certification; and identify next steps
7. Identify DOT-(state and local) -university collaboration models related to TSMO – and options re technical support, funded research, workshops, internships, tuition waivers	Universities and community colleges (CITE group, ITE); together with AASHTO, ITE, NACTO	Universities with current strong DOT (state, local) collaboration, (National Network for Transportation Workforce)	Survey CITE and universities for current experience Develop memo articulating business case for TSMO focus in collaboration activities, including review and identification of agency/academic collaboration models, activities; and specific TSMO activities Identify next steps