Nextgen Transportation System Workers: Building the Education, Training and Career Path Infrastructure

Presentation to the U.S. Conference of Mayors, Workforce Development Board.
January 24, 2019

Glenn McRae, Director
Northeast Transportation Workforce Center
at the University of Vermont
Overview

• Transportation as a field representing millions of diverse jobs & careers across many disciplines, at all skill levels, and dispersed across every community in the country. (13 million workers)

• New Mobility is changing transportation at every level.

• The changes and the growth of new jobs and development of emerging fields is happening at and being driven at the community level.

• How are these changes being identified and made actionable in preparing the necessary workforce?

• What resources can local workforce initiative draw on?
Cities and regions are at the forefront of the new mobility – **US DOT Smart City Challenge**

*Many of you are represented here today.*

**Winner:** Columbus, OH  
**Finalists:** Austin, TX; Denver, CO; Kansas City, MO; Pittsburgh, PA; Portland, OR; San Francisco, CA

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https://www.transportation.gov/smartcity
Reshaping how cities and regions address mobility & build the workforce to support it

Mobility is a crucial factor in determining how well a city can meet its challenges in housing, jobs, and healthcare.

Pittsburgh’s reinvention of how to organize to meet mobility challenges:

- **Creation of a new** Department of Mobility and Infrastructure, building on a study by Harvard’s Kennedy School of Governance
- **Hiring of new leadership** to advance a human-scale community building agenda, where equity and inclusion are embedded
- **Partnering with local education institutions**, Carnegie Mellon University serving “as the research arm of the city”
- **Building a city-to-city community of Practice**
- **Identifying new skills and competencies** for the future mobility workforce

http://www.govtech.com/fs/transportation/Mobility-Emerges-as-a-Top-Priority-for-Forward-Thinking-Cities.html
Reshaping how cities and regions address mobility and build the workforce to support it

A smart region as a service approach represents the best recipe for digital inclusion and the scaling of relevant innovations for all communities, large and small.

**Greater Phoenix region** – Creating a ‘Smart’ Region addressing mobility, and workforce

- Rapid education for current public sector employees
- Building an educational infrastructure for workforce
- Engage university research capacity
- Build national support network with other cities/regions

https://www.azidp.com/the-smart-region/
Reshaping how cities and regions address mobility and build the workforce to support it

Through Smart City implementation, we will focus on an advanced, integrated infrastructure approach to transportation that will support the same level of transformative changes throughout the city... and... foster innovation beyond our ability to imagine today.

**Chattanooga— the ‘gig’ City**

- University of Tennessee graduate education programs & research in direct partnership with city programs
- Creation of innovation hub to attract entrepreneurs & start-ups to build on ‘smart’ city backbone
- County-wide educational partnership, K-12 & post-secondary, to develop local talent pipeline

[https://www.pcmag.com/feature/360564/gig-city-how-chattanooga-became-a-tech-hub/](https://www.pcmag.com/feature/360564/gig-city-how-chattanooga-became-a-tech-hub/)
Reshaping how cities and regions address mobility and build the workforce to support it

Common Strategies
• Integration of approaches to housing, jobs, economic development, and mobility
• Partnership for education and research with post-secondary institutions
• Strong networking with peer cities and regions for shared lessons and benchmarking
• Attention to the needs of the current workforce for upskilling, from technicians to leaders

What is holding it back?
• Workforce development boards are often not at the table; workforce considerations are secondary
• Talent pool needs to be widened (engage future workers from groups not currently represented)
• Talent pool needs to be deepened (K-12 initiatives are critical; both CTE and STEM tracks need to be engaged)
• Existing resources need to be consolidated and integrated
• Deep involvement by employers in educational opportunity
The evolving transportation workforce

• What do we know?
• Where are the growth sectors?
• What are the resources to support new needs & build a talent pipeline?
  • FHWA & NNTW National Transportation Career Pathways Initiative
  • USDOT Intelligent Transportation Systems Professional Capacity Building Program
• Partnerships for the future
The evolving transportation workforce

- NNTW – FHWA approach to documenting and developing new strategies for growing and sustaining a resilient transportation workforce to address transformative trends in mobility & technology.
Who are Environmental Workers?

- The environmental workforce in transportation emerges from highly interdisciplinary knowledge sets and skills with a wide range of responsibilities and functions.
- Twenty plus subfields, with little overlap, providing highly specialized knowledge for transportation projects and initiatives; prepared in academically distinct fields with little or no preparation for, or knowledge of, transportation specific applications.
- Few entry positions for less than 4-year degree prep; College grads lack workplace experience.
- Lack of coherent field definition in emerging fields
- Opportunity to align with Smart Cities, ITS, and Shared Use Mobility (the “new” mobility fields) as environmental disciplines in transportation.
## Priority Occupations

Characterizing the Workforce-aligning new occupations with relative BLS categories

<table>
<thead>
<tr>
<th>SOC Code</th>
<th>Occupation</th>
<th>Current # Employees, 2016</th>
<th>Projected # Employees, 2026</th>
<th>Percent Change</th>
<th>Median Salary 2017</th>
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<td>n/a</td>
<td>Smart City Coordinator / Transportation Engineering Bureau Chief</td>
<td>n/a</td>
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<td>Computer an Information Systems Managers</td>
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<td>n/a</td>
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<td>n/a</td>
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<td>329,900</td>
<td>12%</td>
<td>$84,770</td>
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<tr>
<td>n/a</td>
<td>ITS Systems Engineer</td>
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<td>15-1199.02</td>
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<td>17-2071</td>
<td>Electrical Engineer</td>
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<td>n/a</td>
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<td>17-3023.03</td>
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<td>47-2111</td>
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<td>Civil Engineering Technician</td>
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<td>53-6041</td>
<td>Traffic Technician</td>
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Characterizing the Workforce

The number one competency cited was:
• Communication Skills. This connects to many of the other competencies but demonstrates the importance that employers are placing on this attribute above all others, including technical competences.

The next competencies could also be identified in any number of rapidly evolving fields:
• Ability to deal effectively with the public
• Ability to work on a team
• Ability to work independently
• Analytical skills
• Project management practices

And the final five are more technical competencies directed at the field
• ITS Master Planning studies
• ITS communications technologies & implementation
• Transportation/Traffic engineering operations
• Ability to read/interpret diagrams, schematics, blueprints
• Ability to collect enter and analyze data
Gaps in Workforce Preparation

Transportation Environmental Practice

Workforce Readiness Challenges

- Advanced technologies are being incorporated into work responsibilities and outcomes among older workers, without clear pathways to increase professional competencies, or actual resistance to new learning or responsibility;

- Bachelors or masters degree required for many employment opportunities, but virtually no direct community college feeder programs;

- Skill sets and competencies are in high demand in other fields; difficult to define transportation as a field of focus, or a career path of choice;

- Academic programs remain in silos, while emerging fields and competencies require cross-disciplinary instruction and skills.

- New disciplines emerging in transportation, with new occupations and pathway still in formative stage.
Transportation Environmental Practice

ITS & Smart Communities Career Pathway Design

- Academic ladder needs development and growth in interdisciplinary options.
- Career ladder connects to jobs specifications.
- Student academic plan is not prescriptive; new programs and departments are emerging.
- Experiential learning programs and innovative learning strategies are outlined, but need further development.
- Opportunity to incorporate multiple non-academic programs and resources.
Transportation Planning

Characterizing the Workforce

• “Planners are responsible for designing, evaluating and planning the implementation of state, city or community transportation mediums ...” (Chron)

• Defined by a highly-vertical academic program and industry career specializations.

• Planners are mobile across those specializations.

• Expanding job responsibilities and advances in technology demand new and cross-disciplinary skill sets (policy, enviro, data viz, project mgmt, etc.)

• College grads lack workplace experience.
Transportation Planning

Characterizing the Workforce

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<th>PERCENT CHANGE</th>
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<td>Urban &amp; Regional Planner</td>
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<td>40,600</td>
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<td>12.8%</td>
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<td>Land Use Planner</td>
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<td>40,600</td>
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<td>Environmental Planner</td>
<td>36,000</td>
<td>40,600</td>
<td>12.8%</td>
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<tr>
<td>17-1021</td>
<td>Cartographers &amp; Photogrammetrists</td>
<td>12,600</td>
<td>15,000</td>
<td>19.4%</td>
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<tr>
<td>17-1021*</td>
<td>GIS Analyst/Technician</td>
<td>12,600</td>
<td>15,000</td>
<td>19.4%</td>
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<td>17-3031</td>
<td>Surveying and Mapping Technician</td>
<td>60,200</td>
<td>66,600</td>
<td>10.6%</td>
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* Titles not uniquely identified within the BLS database share common SOC labor market data.

Workforce Readiness Challenges
- Bachelors or masters degree required for employment, but virtually no community college feeder programs.
- Despite growing responsibilities and advancing technologies, academic programs provide little cross-disciplinary instruction.
- Experiential learning opportunities rare in college programs.
- Little-to-no pre-employment training provided by employers.
- No targeted professional development opportunities.

Top Industry Surveyed Critical Job Competences
- Critical Thinking
- Problem Solving
- Public Outreach
- Relationship Building
- Teamwork Skills
- Report Writing
- Presentation & Public Speaking
- Research & Analysis Methods
- Project Management
- Data Collection & Analysis
- Leadership Skills
- Regulatory Compliance
- GIS & Data Visualization
Transportation Workforce Growth

Barriers to Deployment

Career Pathway Implementation

- Strict adherence to LMI obscures broader needs in transportation fields and rapidly transforming competencies and skills; leads to academic programs that don’t fully capture needs of industry.
- Well-established academic programs are resistant to innovative change.
- Curriculum is slow to keep pace with industry, lacks cross-disciplinary focus.
- Few mandates on professional development stifles classroom innovation.
- Limited employer internships keep graduates inexperienced.
- Limited funding options restrict academic/workforce program growth.
- Limited involvement of Workforce Development Boards and resources in rapidly transforming transportation fields & workforce needs.
Transportation Workforce Growth

Career Pathway Implementation

The Implementation Plans

**FHWA has tasked the NNTW to develop place-based pilot programs in each discipline to test and showcase approaches to expand and prepare the next generation workforce, addressing the specific barrier identified.**

- Assessment of specific employer needs; Tie to municipal/state transportation goals.
- Evaluation of previous training efforts set up by employers and partners.
- Pilot to test specific intervention to meet an urgent certification need.
- Coordinate action across the post-secondary educational continuum.
- Host pathway information and tools on the emerging fields at educational institutions and engage public and private employers to engage with students, advise on curriculum, and help build experiential learning opportunities.
Transportation Workforce Growth

NNTW
National Network for the Transportation Workforce

http://nntw.org/

Resources
Transportation Workforce Growth

Welcome to the ITS ePrimer!

United States Department of Transportation
Intelligent Transportation Systems Joint Program Office
ITS Professional Capacity Building Program

Supporting University and Community College curriculum and program building efforts
Upskilling transportation professionals
Brings emerging results from the ITS Test Beds, the Integrated Corridor Management, and Active Transportation Demand Management research programs to the wider transportation community through partnerships.

Using Connected Vehicle Technologies to Solve Real-World Operational Problems

Connected vehicles are poised to transform our streets, communities, and personal lives. But before these technologies can be deployed broadly, there are a number of technical, institutional, and financial challenges -- challenges that can only be understood and overcome by putting these emerging technologies to work in real-world situations, solving real problems.

WORKFORCE IMPLICATIONS

- Building and Maintaining the Infrastructure
- Designing and Operating the Systems
- Collecting and Using the Data

Transportation Workforce Growth

On-the-Job Training and On-the-Job Training Supportive Services Program

https://www.fhwa.dot.gov/innovativeprograms/centers/workforce_dev/
How do we organize to best meet the needs of the transportation workforce in the face of the new mobility future, addressing identified barriers?

Transportation is about getting people to work, to educational and training opportunities, to essential services, and to where they want to go for leisure and sociability.

Transportation is also a system that employs millions of skilled workers in every corner of every state.

COLLABORATE

- Build better information on Transportation Careers to enrich resources with American Job Centers.
- Engage Public Employers as well as Private Employers in transportation.
- Craft new experiential, OJT and registered Apprenticeship programs in transportation fields, especially emerging fields that are growing but do not have well-defined pathways.