



Connected and Automated Vehicle (CAV) and Highway Automation Workforce Challenges and Opportunities

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Overview

- Perceptions
- Workforce Demand Estimates
- CAV and Highway Automation Workforce at DOTs
- CAV and Highway Automation Positions
- Improving Agency Maturity
- Training Gap Analysis
- Challenges and Opportunities

CAV Workforce Estimates

Boston Consulting Group and Detroit Mobility Lab published report in Jan. 2019

- *"Rise of self-driving and electric cars will create more than 100,000 US mobility industry jobs in the next decade, including 30,000 jobs for engineers with computer science-related degrees"*
- *"Demand could be up to 6 times more than the expected number of graduates"*
- *More than 65,000 jobs for skilled trade workers and thousands more jobs for remote-support staff for automated vehicles and fleet maintenance*

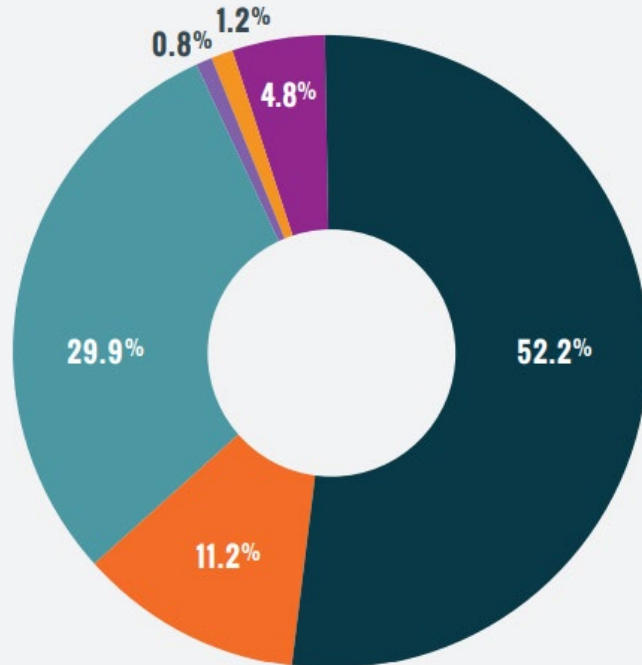
CAV Workforce Estimates

- Challenge to Quantify without BLS CAV Specific Occupation Codes
- Concentrations of Private Sector CAV Workforce
 1. Silicon Valley / San Francisco
 2. Detroit
 3. Washington DC
 4. Boston
 5. Pittsburgh
 6. Phoenix
- Since 2015, 668% increase in searches for the terms “autonomous car,” “autonomous vehicle,” “self-driving car” and “self-driving vehicle” on Indeed

CAV Workforce Estimates

Distribution of CAV Ads by Occupation Group

United States, October 2015 - September 2016



Occupation Group

Number of Ads 2015-2016

● Data Management & Cybersecurity	5,400
● Design & Testing	1,154
● IT Design	3,089
● Quality Control	84
● Vehicle Manufacturing	121
● Intelligent Transportation Systems & Infrastructure	496

Total Job Ads Directly Related to CAV Jobs

10,344

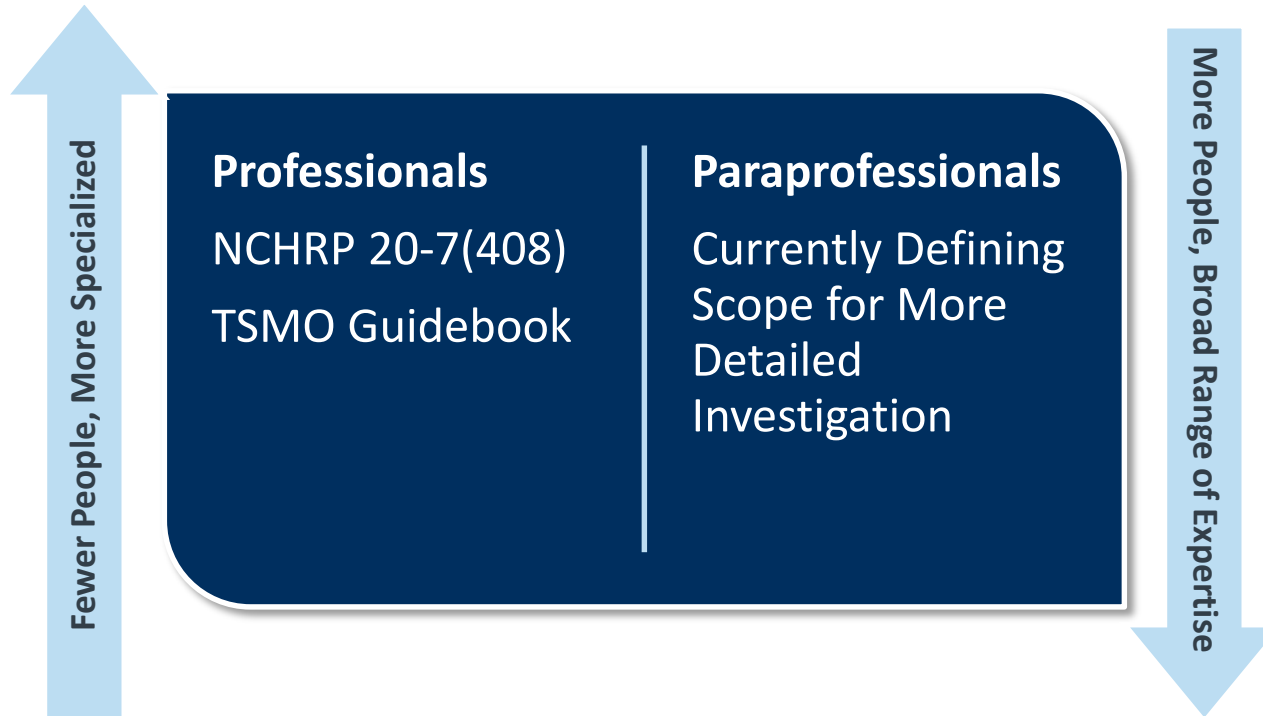
Source: WIN/Atlas: CONNECTED AND AUTOMATED VEHICLES -SKILLS GAP ANALYSIS (2017)

CAV Talent Needs

Advanced Driver Assistance Systems	Electrical Systems and Components
App Development	Information Security
Applied Data Analytics	Mid-Level Engineering Managers
Artificial Intelligence	Programming
Auto Testing/Development	Robotics Engineering
Autonomous Vehicles	Software Development
Business Analytic Tools	Software Engineering
Coding	Statistics Modeling
Connected Vehicle Technologies	System Engineering
Cybersecurity	

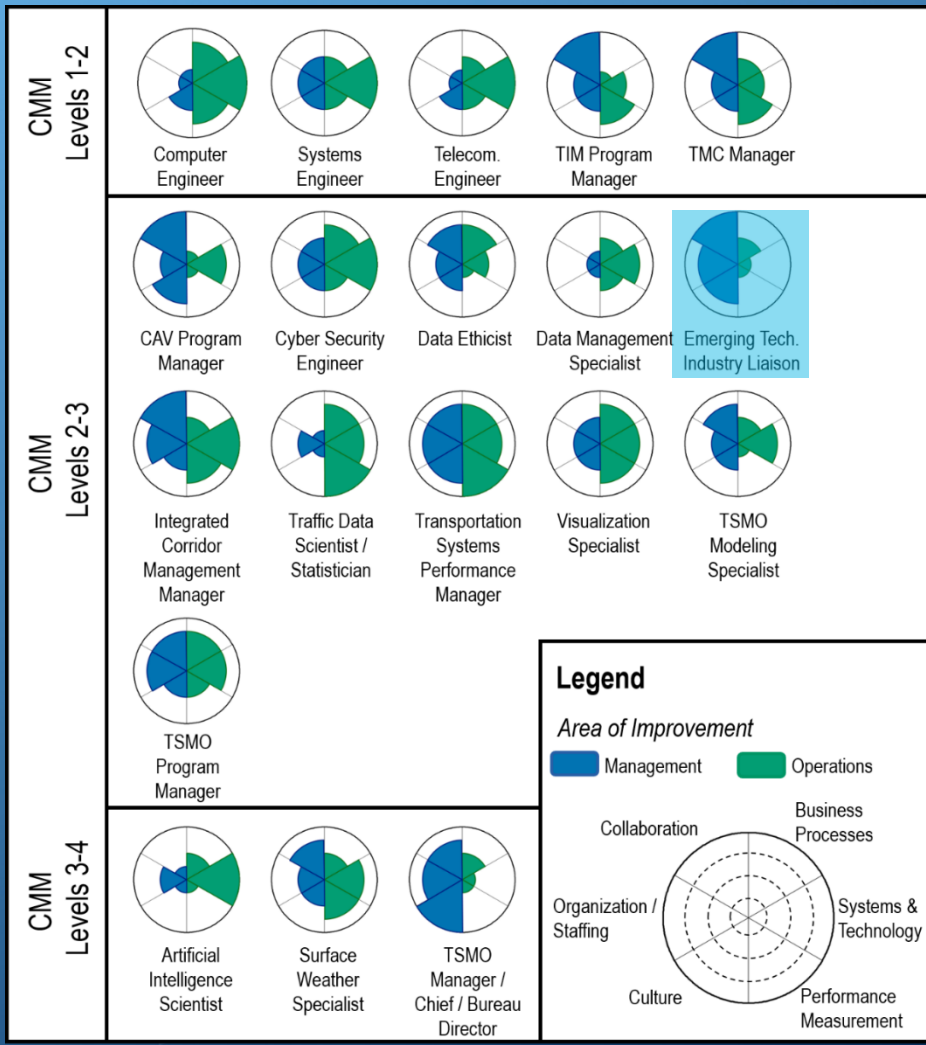
Sources: CAR Research; Oakland County, Michigan Skills Needs Assessment Project; WIN CAV Skills Gap Analysis

CAV Workforce for DOTs and other Transportation Agencies



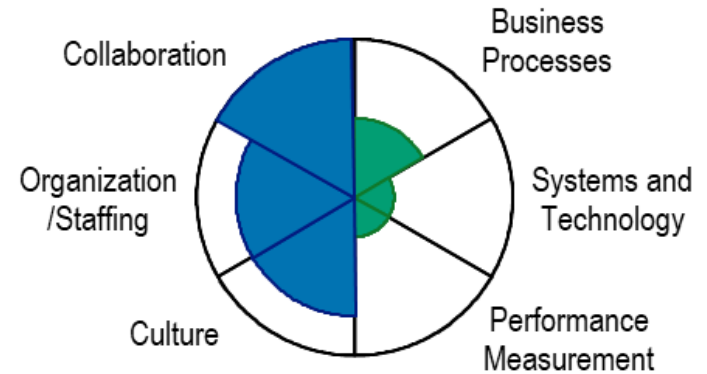
TSMO Guidebook Model Position Descriptions

Traffic Data Scientist/Statistician ✓	Cyber Security Engineer ✓
TSMO Manager/Chief/Bureau Director	Transportation Data Ethicist ✓
TSMO Program Manager	Surface Weather Specialist
Computer Engineer ✓	Systems Engineer ✓
Artificial Intelligence Scientist ✓	TSMO Modeling Specialist
Telecommunications Engineer ✓	Emerging Technologies Industry Liaison ✓
Data Management Specialist ✓	Transportation Systems Performance Manager
Visualization Specialist	Integrated Corridor Management Manager
CAV Program Manager ✓	Transportation Management Center Manager
Traffic Incident Management (TIM) Program Manager	

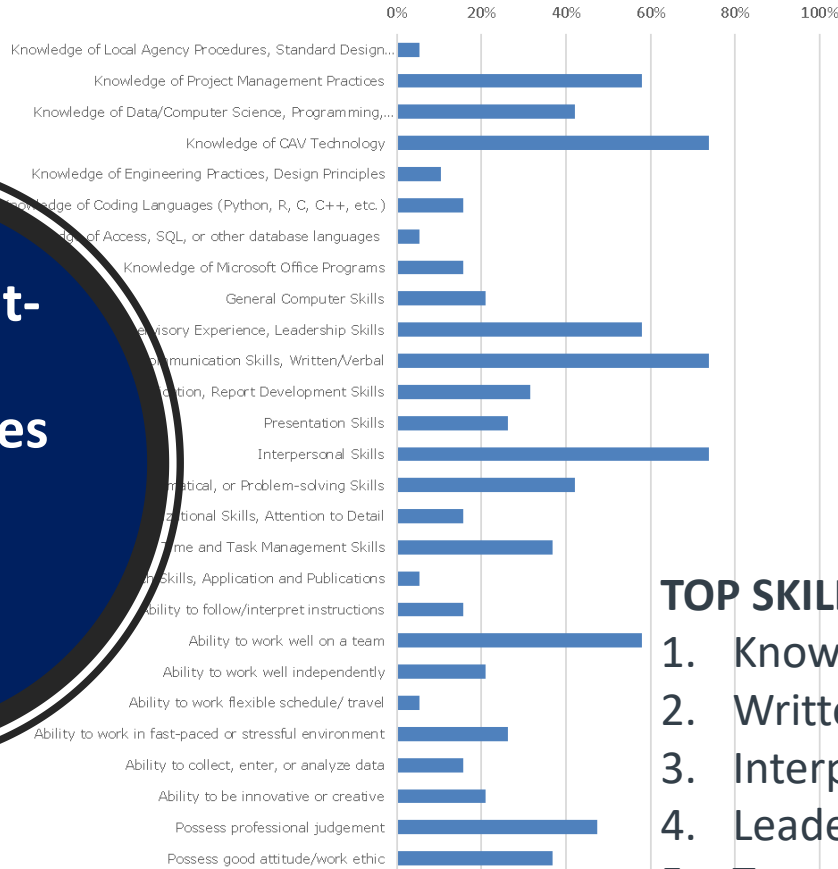


Capability Maturity Model Improvement Potential

Emerging Technologies Industry Liaison



Most Sought-After Competencies for CAV Program Manager



TOP SKILLS

1. Knowledge of CAV Technology
2. Written and Verbal Comm Skills
3. Interpersonal Skills
4. Leadership Skills
5. Teamwork

Example: CAV Program Manager KSAs

Knowledge

- Knowledge of Project Management Practices
- Knowledge of Data/Computer Science, Programming
- Knowledge of CAV Technology
- Knowledge of Local and State Policies and Procedures
- Knowledge of Multi-modal and Intermodal Operations

Skills

- Managerial/Supervisory Experience, Leadership Skills
- Communication Skills, Written/Verbal
- Interpersonal Skills
- Analytical, Mathematical, or Problem-Solving Skills
- Time and Task Management Skills
- Research Skills
- Technical Communication and Report Development
- Entrepreneurial skills to develop non-traditional relationships

Abilities

- Possess Professional Judgment
- Ability to Work Well on a Team
- Ability to Collect, Enter, or Analyze Data

Post-Secondary Training Gap Analysis by Position

TOPIC AREAS								
Architecture	Connected Vehicles	Data Management	Decision Support	Engineering/ Design	Leadership	Legal	Traffic Operations	Performance Management
Planning	Procurement	Safety	Standards	Strategy/ Challenges	System Security	Systems Engineering	Technologies/ Applications	Traffic Maintenance

Introductory

Basic

Advanced

Total: 328 Existing
TSMO Training

Post-Secondary Training Gap Analysis by Position

[illegible]

Setting the Stage – CAV Paraprofessionals

- Defining CAV Jobs of the Future
 - Operational Technology (OT)
Field Staff (Signals/ITS/Comm)
 - CAV Fleet Operators
 - Maintenance Fleet Mechanics
 - IT Support Staff
 - TMC Staff
 - Others
- Working with technical colleges to craft focused curriculum
- Adapting TSMO Guidebook



CAV DOT Workforce Challenges and Opportunities

- Attracting Workforce away from CAV Concentrations
 - University and consulting partners as a stopgap
 - Reevaluate recruiting footprint
 - Rethink Regional Expertise DOTs
- Stronger Connections between DOTs and the Talent System
 - Track Advanced Mobility Curriculum at Wayne State University
 - Leverage Tech Colleges for “Upskilling”
 - DOT Organizational and Salary “Recalibration”
 - Consistent dialogue - public, private, and academic



CAV DOT Workforce Challenges and Opportunities

- Retain your workforce to the maximum extent possible
 - Plan for increased churn
 - Customized professional development
 - Adapt to “Gig Economy” contracting
 - Develop plan to capitalize on “Encore” careers
- Internships and Co-ops are Dated
 - Adapt apprenticeships, Innovation centers, and other new models for bringing people into the CAV/TSMO space

Thanks!

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