

# RESEARCH SPOTLIGHT

## Project Information

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## MDOT prepares its workforce for emerging transportation technologies

New technologies have emerged quickly throughout the transportation sector in the last decade. Intelligent transportation systems, big data analytics and connected and automated vehicles are a few of the advancements that have the capacity to revolutionize how the Michigan Department of Transportation (MDOT) manages the state's transportation system. This research study investigated the technologies on the horizon, recommended methods to identify expertise gaps in MDOT's current staff and provided recruitment and training strategies to help MDOT build a highly skilled and specialized workforce to meet future needs.

### PROBLEM

The emergence and implementation of many new technologies over the last 10 years have brought positive changes for MDOT and present the potential for further progress. Innovations in areas such as wireless communications, data technologies, advanced traffic management systems, and civil integrated management have profoundly impacted the agency's work. With these technological advances comes the need for an agency staff that can understand, navigate and implement the necessary tools to maximize transportation opportunities and manage challenges across the state.

To ensure it will have a technologically sophisticated workforce in place to meet demands in the coming years, MDOT sought to identify which emerging technologies will have the greatest impact on the agency's



Drones, mobile robots and traffic operations centers allow agencies to be more effective, but their use depends on trained and experienced operators.

work as well as the skills staff will need to use it. With that knowledge, MDOT could then begin to recruit new specialists and help current workers update and expand their skills.

### RESEARCH

Researchers began by identifying the key technologies that will likely affect transportation operations and management

*“A strategic and nimble workforce, able to manage the changes inherent in transformational technologies, will ensure MDOT meets the public’s needs in the most effective and conscientious ways.”*

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into the future. Working closely with MDOT, the team narrowed its focus to five areas of technology: mobile robotics, advanced traffic management systems, data analytics, mechanistic-empirical design and engineering, and complete streets design with context-sensitive solutions.

Next, to learn what skills MDOT will need to incorporate into its current workforce, the researchers examined MDOT’s existing strategic plans, organizational structure and current practices, as well as national transportation employment statistics and the best practices of several other state DOTs. The team also reviewed the relevant academic and training programs that have already been established in Michigan to support the evolving needs of the transportation industry. These efforts led researchers to understand how other transportation organizations are managing the rapidly changing technological landscape, the resources available and the context within which MDOT’s workforce strategies need to be implemented.

Finally, the team set out to develop recommendations that would guide MDOT in its workforce preparation strategies.

## RESULTS

The researchers produced a comprehensive analysis of the future workforce needs at MDOT. While the team found that MDOT is

among the leading state DOTs for developing a workforce geared toward emerging technologies, they offered several recommendations to strengthen the agency’s workforce in the following five areas:

- **Ideal core competencies.** Seek workers with both technical skills, such as data analytics, artificial intelligence, neural networks, and cybersecurity needs, and soft skills like a growth mindset, communication and emotional intelligence.
- **Organizational structure.** Model MDOT’s program after the U.S. Chamber of Commerce’s Talent Pipeline Management, which uses a supply chain management methodology, to ensure a steady pool of qualified candidates. Conduct skills mapping for positions across MDOT to help workers identify career pathways.
- **Recruitment.** Increase workforce diversity, engage with academia, embrace social media to reach younger workers, and quantify benefits to be competitive with the private sector.
- **Training and development.** Invest in diversified training programs and education assistance, establish a succession planning committee and understand workforce generational differences.
- **Retention.** Create employee support programs, implement a transparent system for promotions and incentives and provide leadership training.

Researchers also analyzed postsecondary education and training programs to support emerging technology and occupational trends in the transportation industry. Compiling insights and forecasts, educational resources and desired skills and wage analyses, the team developed recommendations for recruiting professionals to five high-demand occupations critical to MDOT’s future success: civil engineers, civil engineering technicians and technologists, electricians, surveyors, and highway maintenance workers. Through customized pathways, such as internships, apprentice-

ships and other special programs, MDOT can develop a pipeline over time to replenish these hard-to-fill roles.

## IMPLEMENTATION

With a better understanding of the technologies to come and its future staffing needs, MDOT can use the training and recruitment strategies outlined in this project to cut a path toward strengthening MDOT’s workforce over time. The results will serve as a roadmap going forward, ensuring Michigan has the high-tech workforce it needs to support its evolving transportation management practices across the state.

## Research Administration

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### This final report is available online at

[www.Michigan.gov/documents/mdot/SPR-1699-Report\\_743863\\_7.pdf](http://www.Michigan.gov/documents/mdot/SPR-1699-Report_743863_7.pdf).

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