



# Highway Safety Manual Case Study 5: HSM Implementation Plans – New Hampshire DOT Experience

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## HSM Reference

The American Association of State Highway and Transportation Officials' (AASHTO) *Highway Safety Manual* (HSM), published in 2010, provides access to the latest science-based knowledge on the proven relationship between crashes and the roadway environment, thus enabling the safety effects of actions or treatments involving the highway and street environment to be quantified.

The HSM provides roadway agencies with access to meaningful quantitative safety measures that can inform project decisions and therefore improve the understanding of tradeoffs involving other aspects, such as environmental concerns, rights-of-way, and stakeholder issues. The application of these quantitative measures can demonstrate and prove over time the direct and meaningful return for investments in safety to the stakeholders and improve confidence that safety funds are being applied most effectively.

The HSM is organized in four parts: Part A – Introduction Human Factors, and Fundamentals of Safety; Part B – Roadway Safety Management Process; Part C – Predictive Methods; and Part D – Crash Modification Factors (CMF). The HSM is a potentially transformative resource for departments of transportation (DOT) and other agencies responsible for planning, design, construction, and operation of highway systems.

## Description

The HSM represents a change in the formalized decision-making process for a DOT. Therefore, it is important that states develop and follow effective implementation plans before attempting to adopt the HSM. An HSM implementation plan should reflect the specific attributes, culture, and capabilities of the user organization. Furthermore, an understanding of the agency's organization and identification of influential decision-makers, potential champions within each office, and what is reasonably achievable over time given the agency's other priorities can all influence the makeup of an implementation plan.

**Vision.** An effective implementation plan should lay out a roadmap that clearly defines the vision for how the HSM, over time, can influence the way in which safety is considered in all decisions and is incorporated into the agency's overall project development process. The roadmap should include a timeline that focuses on where early successes are most likely to be

*“...a good plan addresses specific actions and assigns timeframes. It need not be overly detailed, but should be sufficient to communicate what needs to be done, in what order, and what issues will need addressing in completing each task. A good plan will recognize and respect the make-up of the organization and other known priorities. It will be ambitious but not overly so. Implementation plans should consider basic areas such as training, organizational issues, agency policies, data management, and information technology.”*

- FHWA's [\*HSM Implementation Guide for Managers\*](#)

achieved so that benefits are demonstrated and confidence is gained.

The New Hampshire DOT (NHDOT) developed a roadmap of the State’s current HSM integration status and implementation strategy for a regionwide implementation. The roadmap highlights the activities initiated before the release of the HSM, current efforts, and upcoming activities. NHDOT also developed an implementation plan that was approved by executive leadership. To effectively pursue the implementation plan, they formed an implementation team, comprising representatives from traffic, highway design, planning, and safety bureaus, cities, and Regional Planning Commissions that have partnered with FHWA and the Maine and Vermont DOTs.

**Dissemination of Training.** Implementation plans should address how the agencies will disseminate the HSM and conduct training across their agency and partners. Agencies are encouraged to identify and establish a method for integration of the HSM, including the HSM supporting software if needed. Training needs to be planned strategically; for example, not everyone needs to be trained at once or have the same in-depth knowledge. Customizing different training sessions for key personnel within the agency should be considered, as well as encouraging senior leadership to participate.

The NHDOT HSM implementation included training initiatives both before and after release of the HSM. The first two training phases, prior to the release of the HSM, targeted audiences included executive leadership, bureau administrators, and traffic operations, planning, and highway design managers. Such efforts helped build the path and prepare personnel by providing them with fundamentals of highway safety. For the third training phase, after the release of the manual, the target audience ranged from executive leadership to safety analysts. This phase also included training on IHSDM and *SafetyAnalyst*, as they have adopted AASHTOWare *SafetyAnalyst* software for Network Analysis, and have been using IHSDM on a select number of projects. Results from these tools are being used in the economic decision-making process. The implementation plan includes future training for locals, consultants, and Regional Planning Councils in the New Hampshire, Vermont, and Maine areas. Additionally, employees of the DOT have been taking advantage of the HSM recorded sessions from the HSM web site.

**NHDOT Implementation Plan Components:**

- Marketing/Outreach
- Implementation Team
- Training
- Support Materials
- Policy and Guidance
- Support

**Skills Assessment.** Agencies also will need to assess the availability and quality of skills within their agency to conduct the more-sophisticated analyses provided in the HSM. To obtain the full benefit of the HSM, skills relating to statistical modeling and experimental design are important. Such skills are needed to calibrate the HSM predictive models and/or develop agency-specific Safety Performance Functions (SPF) and perform project evaluations.

While NHDOT Safety staff has a background in Generalized Linear Models (GLM) they have not developed state specific SPFs or CMFs. They are working to improve the overall quality of the state data set before investing time and effort in their development. In the interim the State is using calibrated SPFs and published CMFs.

**Policies.** Revisions to agency policies will require coordination across internal offices to ensure HSM is integrated into the project development process. An implementation plan should

include an evaluation of project development and design manuals containing safety information or processes. Careful consideration must be given to the agency’s decisions and investments in SPF development and/or calibration factors development and Highway Safety Improvement Program (HSIP) activities, including current data and analysis tools.

As part of the HSM implementation, NHDOT is targeting their Strategic Highway Safety Plan, transparency report, corridor studies, and project evaluations, among others, as focus areas for incremental implementation of HSM methods.

**Data.** It is also essential to have a good understanding of the data quality needed to support HSM analyses. The implementation plan should include a data assessment and identify additional data collection efforts to address existing data gaps. These may include missing traffic volume data or roadway inventory data, for example.

With the objective of addressing data gaps and improving its data systems, NHDOT is currently participating in FHWA’s Model Inventory of Roadway Elements Management Information System (MIRE MIS) Lead Agency Program, as well as a CMF Study. After the MIRE MIS program is completed, NHDOT is expecting to have a more robust data system, thereby allowing the agency to develop its own SPFs. In addition, NHDOT has projects and initiatives targeting improvements in safety data, including crashes, horizontal curves, traffic, intersections, ramps, and other roadway elements. They have a video log database of the state system that is updated every two years. This information along with aerial mapping and GIS data is used for data collection.

## Benefits

By developing an implementation plan to guide initial HSM efforts agencies can make better assessments of the needs and resources required to advance safety analysis in all project development processes. An HSM implementation plan can also identify the full potential that HSM can provide to the entire organization.

An HSM implementation plan allows for strategic planning and management of an integration and implementation effort. In addition to planning obvious tasks such as training or database development and management; implementation plans guide agencies as they examine their internal program and project development policies and risk management procedures. Agencies can better anticipate the internal engagement needs of their project delivery staff to achieve the greatest benefits for the agency and its customers.

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*“Our leadership continues to support and encourage the develop and implementation of the HSM as a tool to help meet our commitment of providing the safest roads possible” – Stuart Thompson, NHDOT*