



# Traffic Safety Center

Setting New Directions in Traffic Safety

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## A Look at the Haddon Matrix

### Showing the need for depth and breadth

More than 35 years ago **Dr. William Haddon Jr.**, the first head of what is now the **National Highway Traffic Safety Administration**, developed the Haddon Matrix, a conceptual model that applies basic principles of public health to the problem of traffic safety.

It remains an extremely useful and effective tool for revealing **where** and **when** to best conduct **traffic safety interventions** and for fostering cooperation among different agencies. The matrix illuminates injuries in terms of causal and contributing factors, as well as in terms of a time sequence consisting of pre-event, event, and post-event phases. The Haddon Matrix consists of four (or three) **columns** representing the causal agents in the crash: the driver, the vehicle, and the physical and socio-economic environment (the last of which can be combined to make it a nine-cell matrix), and three **rows** representing time phases: pre-crash (before a potential vehicle collision), crash (the actual event), and post-crash (the immediate aftermath).

	Human	Vehicle/Equipment	Physical Environment	Social/Economic
Pre-Crash	Poor vision or reaction time, alcohol, speeding, risk taking	Failed brakes, missing lights, lack of warning systems	Narrow shoulders, ill-timed signals	Cultural norms permitting speeding, red light running, DUI
Crash	Failure to wear seat belt	Malfunctioning seat belts, poorly engineered air bags	Poorly designed guardrails	Lack of vehicle design regulation
Post-Crash	High susceptibility, alcohol	Poorly designed fuel tanks	Poor emergency communication systems	Lack of support for EMS and trauma systems



The value of the matrix is that each cell illustrates a different area in which interventions can be undertaken to improve traffic safety. For example, the top-left cell, representing the driver in the pre-crash period, identifies the area where modifications to driver behavior can reduce vehicle collision rates. In this example, it is poor vision or reaction time, alcohol consumption, speeding, and risk taking.

Although the three rows of time periods refer to events that occur in the pre-crash, crash, and post-crash phases, interventions naturally need to be planned well in advance of a crash. Those that apply to the pre-crash phase are designed to reduce the number of collisions. Interventions that apply to the crash phase don't stop the crash, but reduce the number or severity of injuries that can occur as a result. Interventions that apply to the post-crash phase don't stop the crash or injuries from occurring, but optimize the outcome for people with injuries, and prevent secondary events from happening.

Effective efforts at improving traffic safety require that attention be paid to safety improvements in all 12 (or nine) cells of the Haddon Matrix. Similarly, different agencies and organizations whose policies target the same cell (such as the multitude of those that focus on affecting driver behaviors in the pre-crash period) should establish ways to work collaboratively to maximize their impact. This need for both breadth and collaboration means that all agencies with a stake in traffic safety need to be "at the table" together to direct a truly comprehensive and effective traffic safety effort.

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