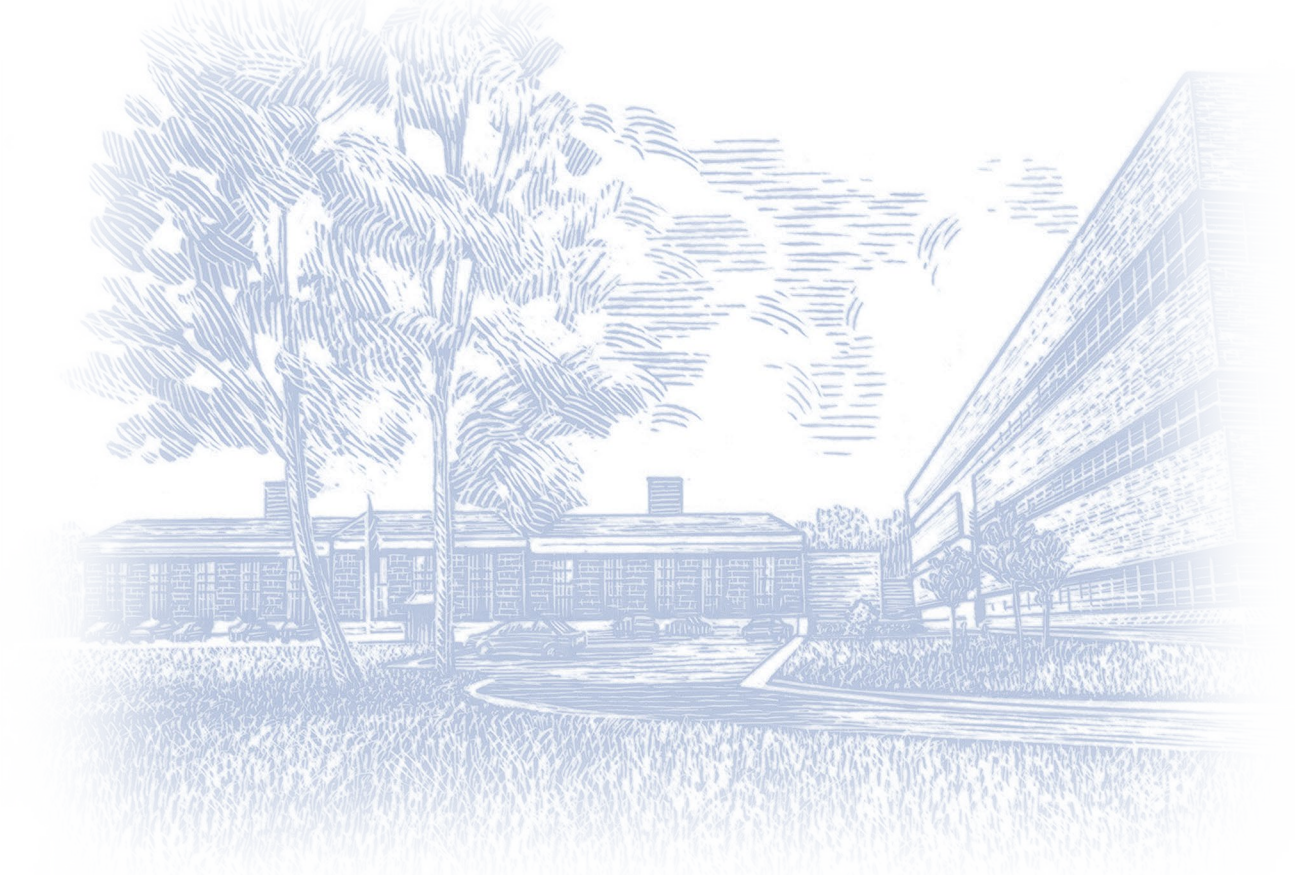


Advanced Traffic Management Simulator To Support Development Of Human Factors Design Guidelines

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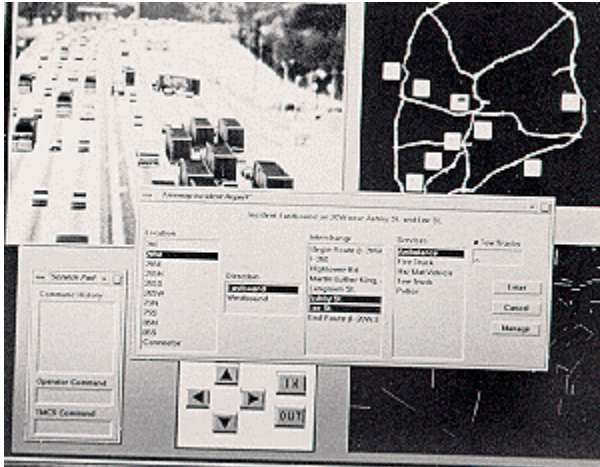


Figure 1. CRT screen

Background

Advanced Traffic Management Systems (ATMS) will be instrumental in minimizing congestion and delays on our roadways. To accomplish this, the Federal Highway Administration (FHWA) ATMS research program is investigating the human factors requirements of Traffic Management Center (TMC) operators using real-time descriptions of roadway status to manage traffic flow.

TMC operators engage in three primary activities during traffic management; each of these activities is expected to have significant support from automation. In the first activity, data relevant to traffic status are transmitted to the TMC from a variety of sources. These sources may include traffic counters, closed-circuit cameras, radio, and telephone. In the second activity, the TMC analyzes the incoming information to determine whether TMC action on traffic conditions is appropriate and which type of action is required. In the third activity, detailed messages designed to implement these actions are then transmitted to the appropriate receiver.

According to current analyses from Georgia Tech Research Institute (GTRI), automation would contribute to several traffic management support systems, including incident detection and location, traffic prediction, incident advisories, information dissemination, and adaptive traffic control. How the operator shares his or her tasks with automation is basic to the development of a successful TMC design. This proposition is supported by research in other uses of automation and advanced technology, such as in aviation and nuclear power plants.

At present, the advantages and limits of automated systems in a traffic management center are not yet well defined. For instance, improper design of these systems could result in too much data for the operator to process. In certain cases, operator mistrust of automation may appear. For instance, the effects on operator performance of a malfunctioning automatic information processor are not clear. There are also questions about when a specific task should be completed automatically, by an operator or by an operator in combination with automation.

Human Factors ATMS Research Simulator



Figure 2. Operator workstation

Operator workstation In order to investigate these and other human factors issues, Georgia Tech is developing a real-time, interactive traffic management simulator. This simulator accurately mimics the traffic management setting and tasks of the TMC operator. The simulator includes: (1) computer-generated views of moving traffic (including emergency vehicles) as would be shown from freeway cameras; (2) the capability of requesting traffic status and performing incident resolution from the TMC computer as shown in figure 1; (3) operator stations with adjustable work surfaces and seating as shown in figure 2; and (4) a large-screen electronic map of the Atlanta roadway network, shown in figure 3.

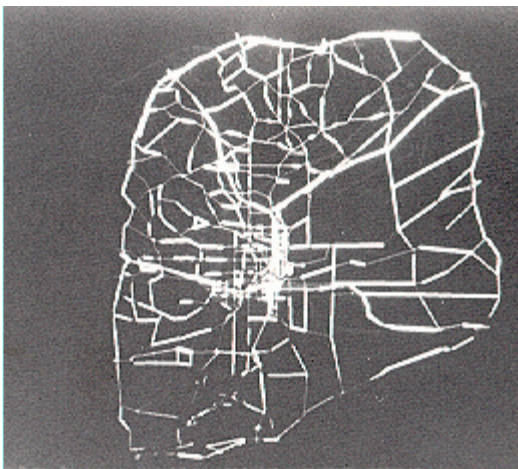


Figure 3. Atlanta freeway map

Atlanta freeway mapGTRI is exploring a variety of human factors issues embedded in TMC operations. A sample of these issues include: (1) which input device is best for a TMC operator working with a traffic computer (e.g., touch screen, joystick, keypad); (2) should mobile telephone reports from the public go directly to the operators; (3) what is an effective method for an operator to navigate and obtain information from a complex map display; (4) should operators be cross-trained to perform the tasks of other operators in addition to their own; (5) is camera selection control best determined by manual, preset, or a combination of both; and (6) what effect will malfunctions in automated support systems have on operator performance?Additional research regarding the requirements of the TMC operator concerns the required level of operator teamwork, especially between different TMCs. The results of these studies will be translated into TMC design guidelines and incorporated into an ATMS TMC human factors engineering design handbook, which is expected around December 1995.

[For More Information](#)

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