Research in Progress:
Outsourcing Traffic Monitoring Data: Are TMC's ready?

James Wong — jcwong@gatech.edu
Dr. Kari Watkins — kari.watkins@ce.gatech.edu
Dr. Hans Klein — hans@gatech.edu

Georgia Tech | Civil and Environmental Engineering
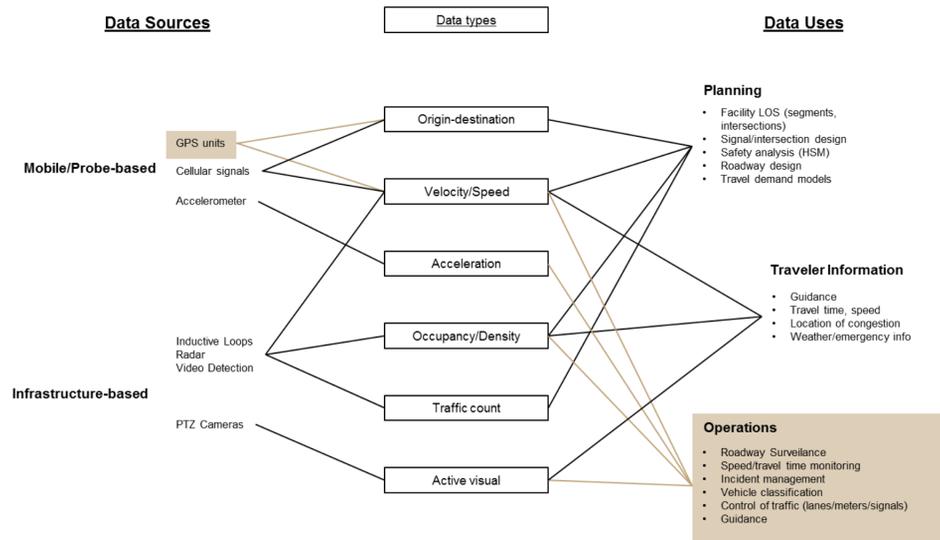Georgia Tech | Public Policy

Introduction & Background

Traffic surveillance is a key function for traffic management centers (TMCs), which are generally responsible for high-order facilities such as freeways and limited access facilities. The cost of existing surveillance technology is extremely high because of the extensive infrastructure needs involved. These devices are effective when they are operational, but studies suggest high rates of failing sensors for large state-wide networks. Additionally, the geographic coverage of these systems is limited to those infrasturcture requirements. A new wave of probe-based technologies have been shown to be effective in identifying travel speed and, in some cases, origin-destination pairs. No traffic volume or density parameters have been observed in the existing literature for probe-based surveilance systems. In addition, state departments of transportation are unlikely to have the in-house staff or leverage over major mobile-device providers to build these projects in house. As equipment ages and necessitates replacement or overhauls, TMCs are faced with the option of purchasing this broad-coverage speed data from third-party vendors. This research project attempts to identify what technological or organizational barriers exist in the deployment of these systems.

Traffic Data Sources and Uses

Research Questions

Does GPS-based traffic monitoring technology work?

While the use of GPS technology has grown extensively over the past decade, its use in monitoring traffic remains limited. A literature review of the latest practice in GPS-based traffic monitoring will provide researchers an update on its technical capabilities and limitations.

Will it provide TMCs with the insights they want?

Probe-based traffic monitoring generates incoming data from a sample of the total traffic on a facility. A known limitation is the inability to accurately identify traffic volume or flow, two key elements in the fundamental equation. An understanding of TMC functions and data needs will assist in evaluating the potential for GPS-based data to replace existing infrastructure.

Is it less expensive or more efficient than existing technology?

New technology should not be adopted for its own sake. TMC operators may face specific challenges that new GPS-based third-party systems can overcome. Part of this research is to identify those benefits. Additionally, the newness of GPS-based traffic data means that there is no common market or regularly set prices for the data.

Will it expose the TMC to new risks?

Identifying risk and uncertainty is critical to the understanding of this technology's potential to succeed in traffic monitoring. A key element is that not only is the technology changing, but the control of the monitoring function is also taken out of the TMC. To what extent does this affect the validity and trust of that data?

Do the potential benefits outweigh the risks?

This qualitative research task will gauge the attitudes and perspectives of TMC operators and will attempt to identify private GPS-based traffic data's potential for success in the public sector.

Preliminary Results

- Initial findings suggest that TMC operators are currently reluctant to trust third-parties with the responsibility of providing traffic monitoring data, largely because of the non-transparent nature of the data. The use of historic data to fill in where live data is unavailable is potentially useful for drivers but TMC operators find this practice misleading and un-useful for their purposes.

- There are many sources of uncertainty and risk that will affect TMC operators' likelihood to endorse a third-party GPS-based system including: lack of documentation, lesser understanding of technology, third-party operation and others that will emerge from ongoing study.

- TMC operators may be willing to accept technologies that produce speed measurements, but not traffic flow or volume data. The need for volume and flow information is largely related to performance measurement such as the Highway Performance Monitoring System. This is an important task but is not central to the function of TMCs, which focus on operations.

- TMC operators recognize the trade-off between accuracy and the cost of a system; they may be willing to accept a decrease in accuracy if the system costs are substantially less than the cost for maintaining or rehabilitating existing systems. This will be most apparent when a low sample of vehicles is available for speed calculation, decreasing confidence in the values.

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Proposed Methodology

Literature Review: GPS-based traffic monitoring began to show up regularly in literature within the past decade; this will be used to identify the technical capabilities and limitations of modern devices and systems.

Semi Structured Interviews and Survey Development: A survey of TMC operators will be the primary data collection instrument for this study. To ensure a broad understanding of survey questions and format, a series of extended semi-structured interviews with 3-5 TMC operators will assist in the development of the survey.

Survey Deployment: The TMC Pooled-Fund Study, organized through the US Department of Transportation, is a group of active TMC operators that collaborate on research tasks. The survey will be distributed to this group of approximately 40 operators.

Analysis: The results from this survey and the literature review will be compiled and analyzed in the context of the original research questions.

Abstract

Traffic management centers (TMCs) have been at the center of development for intelligent transportation systems (ITS) since the early 1990s; their primary role has been to monitor real-time traffic conditions and manage freeway operations using infrastructure based ITS (such as inductive loop or video detection, changeable message signs and ramp metering). The rising cost to implement and maintain these infrastructure systems, however, has led some agencies to explore the use non-traditional data collection to monitor traffic. The objective of this research is to identify the major obstacles that TMCs face in adopting new technologies and whether or not third-party GPS data is a viable alternative to the infrastructure-based systems currently in place. Researchers will survey TMC managers in the United States and conduct case-study interviews with a subset of those individuals for in-depth understanding of certain representative TMCs. Those transportation professionals involved in traffic data, traffic monitoring and TMC operations or planning will find the results of this survey to be of particular interest. Researchers expect that the findings will contribute to a broader understanding of the industry's willingness to adopt new technology in light of the risks involved.