TCRP Research Report 235: Improving Access and Management of Public Transit ITS Data
(TCRP Project G-18)

Executive Summary

A PROPOSED METHOD FOR TRANSIT ITS DATA STORAGE AND ANALYSIS

With the proliferation of **automated vehicle location (AVL), automated passenger counters (APCs), and automated fare collection (AFC)**, transit agencies are collecting increasingly granular data on vehicle movement, service performance, ridership, customer behavior, and financial recovery.

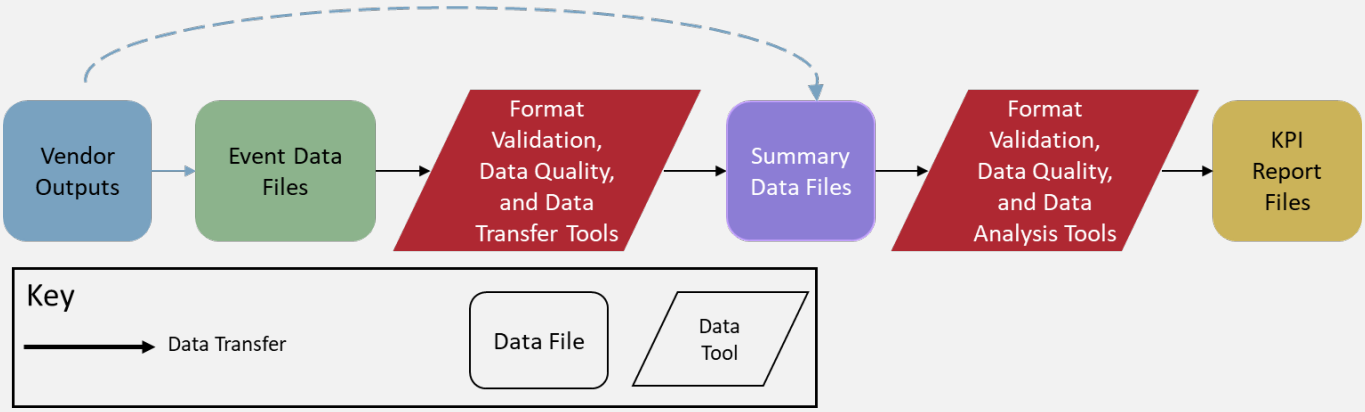
While granular intelligent transportation systems (ITS) data can meaningfully improve transit decision-making, **transit agencies face many challenges in accessing, validating, storing, and analyzing these data sets**. These challenges are made more difficult by the fact that tools for managing and analyzing transit ITS data generally cannot, at this point, be shared across transit agencies because of variations in data collection systems and data formats. There are multiple vendors that provide ITS hardware and software, and data formats vary by vendor. Moreover, agencies may employ a patchwork of ITS that have been acquired and modified over time, leading to further consistency challenges.

Standardization of data structures and tools can help address these challenges. Not only can standardization streamline data transfer, validation, and database structuring, it encourages the development of analysis tools that can be shared across transit agencies, as has been the case with route and schedule data, standardized in the General Transit Feed Specification (GTFS) format.

With input from transit agencies, ITS vendors, and key stakeholders, the research team defined a data structure for storing data from bus and rail ITS, including vehicle locations, passenger counts, and fare collection information. The TCRP Report describes how the data structure can facilitate a process in which transit agencies receive ITS data from vendors, organize and validate it, and use it to calculate key performance indicators (KPIs). To support that data flow, the project developed requirements that transit agencies, researchers, and consultants can use in follow-on work to develop tools to transform, validate, and analyze ITS data using the data structure.

Two Paths for Implementation

The standard supports two paths for implementation: one for transit agencies that receive discrete event data and an alternative for transit agencies that receive only summary data files.



Note: This research developed tool requirements. Tool development is left for follow-up work.

BENEFITS OF A TRANSIT ITS STANDARD

Transit ITS data can significantly improve public transit system performance by providing detailed and up-to-date information about vehicle movement, service performance, ridership, customer behavior, and financial recovery. A standard structure for ITS data will provide value to the transit industry by:

- Promoting open-source tool and third-party tool development
- Enabling transit agencies to share data support protocols and practices
- Encouraging vendors to provide data in consistent formats
- Allowing transit agencies to more easily generate accurate **key performance indicators**

On-time performance
- Stop-, timepoint-, or trip-level with adjustable early/late thresholds

Headway spacing
- Average/median/percentile on a route or at a stop

Speed/Runtime
- Average/median/percentile by route or between timepoints

Boarding/Alightings/Load
- Average/median/percentile by stop/trip/route

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PROJECT PANEL

CATHERINE VANDERWAART
BRENT BOYD
BRENDON HEMILY
KATE KO
JOHN LEVIN
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SANDRA MARTIN-BOEHM
J. DAVID PORTER
LAURA RIEGEL
FRANKLIN SPIELBERG
ARIANNA VALLE

RESEARCH TEAM

CECILIA VIGGIANO
PRINCIPAL INVESTIGATOR

TCRP STAFF

STEPHAN PARKER
LARRY GOLDSTEIN

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