A strong transport system for a liveable city

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Introduction

The city of Helsinki in southern Finland is the country's capital and has a population of 603,000 residents, with the metropolitan area home to 1.4 million people. Like many large cities, Helsinki relies on a strong public transport system to help residents and tourists get to where they need to go. Every day 72% of city commuters use public transport, and Helsinki has Europe's highest resident approval rating for public transport.

Motivation

The city's bus lines are a key element of public transport in Helsinki, and they are managed by several different companies that compete for contracts by placing public bids based on cost and quality. One third of the routes are run by Helsingin Bussiliikenne Oy (HelB), which carries 60 million passengers annually. Even though HelB is owned by the city, it competes with private companies for contracts. In order to be competitive, the company constantly looks for ways to reduce costs and improve service.

In 2008, HelB worked with long-time Microsoft CityNext technology partner CGI to deploy a data warehouse system for financial and resource planning. The system is built on Microsoft SQL Server 2008 database software and utilises Microsoft SharePoint Server 2010 for reporting.

HelB wanted to extend the functionality of the data warehouse to include logistical planning for company operations and, in 2010, it embarked on a pilot project. The expanded data warehouse uses sensors installed in each bus. The sensors monitor and analyse fuel usage and other data for each driver, route, and vehicle. Although there are existing fleet management products that can manage data on a per-vehicle basis, HelB wanted a comprehensive system that would combine data across all its 400 buses.

Development

The HelB vehicle and driver monitoring system went into production in late 2011. The system gathers time-stamped data from sensors installed in the buses that measure acceleration, speed, engine temperature, fuel consumption, brake performance, and GPS location for every driver and bus. Every day, the buses generate 4 million lines of information that is fed into the data warehouse for analysis.

In addition to providing detailed statistics on fuel usage, the system has other benefits. By monitoring the engine condition and fuel usage of each bus, HelB can tell when a bus is starting to have mechanical problems and perform necessary predictive maintenance. HelB has also used the system when evaluating potential new vehicle purchases to ensure that it is buying only the most fuel-efficient buses. This not only cuts costs, but also reduces the city's carbon footprint, and is an important part of Helsinki's efforts to be an environmentally-conscious city.

The sensor data has also given HelB useful insight into individual bus driver performance, including driving speed, idling times, and the number of 'red brake' incidents, when a driver brings the bus to an abrupt stop. This information is shared with the drivers to help them improve their driving performance and provide a safer and more comfortable trip for passengers. Mapping software is used to identify which parts of its bus routes have the highest emergency braking frequency. If a HelB bus is involved in an accident, the sensor data can help the company better understand exactly what happened so that it can take steps to prevent similar problems in the future.

Results

Overall, HelB was very satisfied by the results of its data warehouse expansion, which has led to a reduction in fuel consumption of 5%, and an improvement in drivers' performance.

According to surveys carried out by the city, passenger satisfaction has increased by 7%. HelB have been contacted by other cities interested in duplicating its results.

Next steps

Public transport in Helsinki, Finland is a highly competitive sector. Calls for tenders for transportation services are organised up to twice a year, with the decisive factors being pricing and equipment. Pricing is mostly determined by fuel costs. Equipment evaluations also include driving habits.

Since margins are small, cost-efficient operations are crucial. HelB plan to seek new ways to improve efficiency and save costs. During 2016, HelB is planning to switch to environmentally-friendly Finnish biogas, made from biodegradable waste, to fuel its gas buses operating in the Helsinki Metropolitan Area.