Smooth operations: Smarter transportation systems

Introduction: Transportation today

A population explosion, urbanization and globalization are significantly stressing our transportation networks. The population of the world is almost 6.8 billion people and is likely to reach 7 billion by 2012. In 1950, there were 83 urban areas with populations over 1 million. Today there are 476, an increase of 573 percent. Increases in global trade, supply chains and exchange of resources, knowledge and labor have made the world flatter.

Goodbye "smart." hello "smarter."

These factors have created an increase in transportation demand that is outstripping current capacity:

- In Europe, traffic congestion costs the European Union 1 percent of its gross domestic product each year.
- By 2020 there will be global demand for 7 billion air passenger trips, yet airline and airport capacity will only be able to handle 6 billion passenger trips.
- Global demand for rail services is outpacing available capacity, and aging systems limit solutions for growth.
- In the U.S. alone, people lose 4.2 billion hours sitting in traffic every year, and 2.8 billion gallons of fuel burn needlessly at a cost of $87.2 billion per year to the economy.

Quite simply, the world's transportation infrastructure can't handle the world's transportation needs. What is needed is a smarter transportation system—one that integrates digital information into the fabric of the different types of physical transportation networks.

A smarter transportation system

A smarter transportation system integrates information, processes and technology. It builds digital awareness and intelligence into vehicles and transportation infrastructure and uses advanced analytics to generate insights based on data from digital video, sensors and wireless devices. These instrumented devices have created a system that needs to be interconnected with the systems belonging to transportation operators, government authorities, freight providers, commuters, travelers and many others.

These instrumented, interconnected systems and devices also generate volumes of new data. Advanced analytics can turn that data into intelligence—insight that transportation agencies, authorities and companies can use to make better transportation management decisions, often in real time. In turn, the whole system becomes an efficient, reliable and adaptive system that features:

- Comprehensive, intelligent transportation strategies that are long term, flexible and integrated with your transportation vision
- Customer-centered approaches that improve services and influence customer behavior patterns
- Service delivery based on integrated transportation modes
- Innovative business models
- Effective systems management and control that addresses the complexity of intelligent transportation

A smarter transportation system in action: U.S. Postal Service

Because of rising fuel costs and the need to reduce CO2 emissions, the U.S. Postal Service (USPS) turned to IBM to develop an efficient network modeling tool to optimize routes. Since its implementation, the tool has brought annual savings of 10 percent and 20 percent of the trips eligible for elimination. IBM Global Business Services and IBM Business Partner Allsys worked with the USPS to build a better transportation optimization, planning and scheduling system that moves mail between its processing and distribution centers more efficiently. Reductions in highway transportation have reduced the USPS carbon footprint.

Meeting today's transportation challenges with solutions from IBM

Today, clients from the public and private sectors are turning to IBM to help them manage traffic congestion, improve urban environmental conditions and increase economic competitiveness. Using digital technology, intelligent sensors and analytic tools, IBM helps our clients create smart transportation ecosystems. These ecosystems can manage multiple forms of transportation as integrated systems that work more efficiently and effectively. A main solution component for a smarter transportation system is transportation information management, which can benefit airports, railroads, sea authorities and private transportation companies alike. Examples of solution components that are more specific to land travel include integrated fare management and road user charging.

Whether our clients are cities, public transit authorities, airport operators, railroads or shipping companies, they share some similar imperatives:

- Predict demand and optimize transportation infrastructure and assets.
- Improve traveler and customer experiences.
- Improve operational efficiencies while reducing carbon emissions.
- Assure and sustain safety and security.

IBM transportation solutions can help them address these issues.

Predict demand and optimize transportation infrastructure and assets

IBM transportation solutions include strong analytical tools tailored for analyzing and modeling transportation demand and asset utilization. These solutions can help you optimize and understand the capabilities and demand for your transportation network. Using these solutions, you can develop different scenarios and plan routes, schedules and maintenance better while optimizing your transportation assets, infrastructure and capacity. You can create dynamic, multimodal plans and models and make operations decisions based on real-time data. The result? You gain deeper insights into the utilization of your transportation assets and infrastructure.

Optimizing assets and understand demand with IBM solutions

Netherlands Railways uses IBM optimization software to weigh 56,000 variables, including passenger demand and available assets. They use this information to assemble and schedule more than 5,000 trains per day, realizing a 6 percent improvement in operating efficiency and saving $28.5 million per year. They also improved on-time performance by 2 percent, capturing an additional $57 million in fares.

Aeroports De Paris uses IBM software to coordinate equipment and facilities. As a result, they now have fewer flight delays, passengers move through the airport faster and their operating costs are lower. Creating a plan for aircraft parking stands and ground equipment takes three minutes (it used to take more than four hours), which means the staff can react quickly to unexpected events or delays.

Atlas Air Worldwide Holdings uses IBM solutions to improve the coordination of complex crew, aircraft and cargo movement, increasing operational efficiency. As a result, the have reduced the cost of integrating operations with strategic delivery partners by 80 percent.

Improve traveler and customer experiences

IBM transportation solutions include technology and business consulting services for improving travel experience, which can help you increase revenue by developing more loyal customers who then become advocates for your brand. Using our analytical tools that support differentiated experiences based on individual customer preferences, you can better serve your customers by anticipating and catering to their needs. Our proven technologies can help you aggregate, analyze and act upon information from embedded technologies such as sensors, cameras and biometrics and our routing and scheduling tools can help you optimize capacity to meet demand, reduce delays and control or reduce costs.

Increasing customer, passenger and traveler satisfaction with IBM

IBM solutions have helped the Singapore Land Transport Authority provide a unified payment system. This system uses smart cards for all public transit, tolls and parking, which improves the commuter experience and increases the use of public transit. Planners use data from the system to develop optimal routes, schedules and fares, reducing congestion and increasing the appeal of public transit. The system has reduced uncollected fares by 80 percent and the cost of fare processing by 2 percent.

A leading global logistics firm uses IBM software to route and consolidate shipments for their customers, lowering supply chain transportation costs by up to 25 percent.

For Air Canada, IBM developed an application for the Apple iPhone, iPod Touch and Blackberry that passengers can use to book flights, download electronic boarding passes, check-in, get flight status updates and book rental cars and other services. There were over 30,000 downloads of the application from 47 countries in the first 6 days and a 13.5 percent increase in mobile check-ins. Ninety-three percent of Air Canada passengers say multi-channel self service has improved their travel experience.

Improve operational efficiencies while reducing carbon emissions

IBM has tools, dashboards and consulting that can help you increase your extended transportation network capacity and collaborate with other service and infrastructure providers, all while using your current infrastructure and assets and without increasing your expenditures. Our asset tracking and optimization tools provide information about the location, status and availability of your assets to help you determine how to reduce the amount of resources you use, along with your carbon footprint. Using IBM analytics and modeling tools, you can model the financial impact of decisions, streamline planning and monitor performance to maximize revenue, margins and cash flow while predicting and avoiding disruptions. In addition, with our industry expertise and tools you can manage irregular operations over your network and even over multiple transportation modes.

Efficient operations and smaller carbon footprint with IBM

Taiwan High Speed Rail Corporation chose IBM for their advanced maintenance management solution. Using condition-based monitoring, they can predict and act on maintenance requirements while managing over 320,000 asset elements. They have improved asset life and availability and their on-time train performance is now over 99 percent.

A U.S.-based airline uses an IBM enterprise asset management and MRO solution to increase reliability and availability while reducing maintenance and materials cost. Streamlined maintenance processes have reduced delays and decreased material and maintenance costs.

COSCO, a global shipping firm, engaged IBM to help optimize their supply chain. As a result of the engagement, COSCO consolidated from 100 to 40 distribution centers, lowered logistics costs by 23 percent and reduced CO2 emissions by 15 percent.

Assure and sustain safety and security

IBM transportation solutions can help you address safety and security issues, no matter what type of transportation you provide or support. Our analytical and reporting tools can help you predict and avoid vehicle or aircraft failure by aggregating large volumes of data generated by condition-based monitoring and providing scenarios that can help you take action. Other IBM software and technology can help you use digital video surveillance and sensors to identify hazards in the right of way or in terminals and manage security uniformly in your transportation network while protecting the privacy of individuals. Using our industry knowledge, expertise and technology, you can balance traffic over routes or for different transportation modes and potentially reduce accidents and congestion.

Safety and security with IBM

IBM Research and a U.S. freight railroad have piloted a remote-based wireless sensor network that provides periodic reports and real-time alerts about the mechanical condition of trains and fixed infrastructure. IBM Research is also developing a rail project to aggregate and analyze data from many sources, including sensors, RFID and digital video surveillance used to monitor the safety and security of rolling stock and rail infrastructure, providing immediate alerts based on analysis of real-time conditions.

An Italian parcel delivery service reduced their security staff and increased the level of security for their 10 hub facilities using an IBM solution that centrally monitors intrusion, access control readers, digital video and smoke detection.

With IBM, A U.S. hub airport implemented a digital video surveillance solution and a security command and control center. The system also uses information from biometric handprints and badge readers. The system is more effective at recognizing risks and alerting the command center. The effective labor cost savings is $2.2 million per year.

Conclusion

It is clear that the way the world builds and expands transportation infrastructure and capacity is changing. Governments and private sector businesses need to use instrumented, interconnected and intelligent technology, devices and vehicles to create smarter transportation systems that can accommodate rising demand.

IBM has the experience to help governments and the private sector address their transportation challenges as they navigate the complexities of an increasingly integrated world. Our researchers and consultants have helped optimize transportation systems in China, Sweden, Singapore, Taiwan, Stockholm, Dublin, London and other regions around the world—and the list is growing. We can show you how to implement and use systems and analytics to predict demand better, optimize assets and infrastructure and enhance the end-to-end customer experience. In addition, IBM transportation solutions help reduce environmental impact while assuring safety and security.

For more information

To learn more about IBM solutions for smarter transportation, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web site:

ibm.com/travel

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