Beware of costs, utility, reliability, and maintenance issues in deploying a statewide transportation network monitoring system.

Statewide systems implementation experience from iFlorida Model Deployment

---

January 2009
Florida, USA

Background (Hide)

The iFlorida Model Deployment, which was started in May 2003, called for the Florida Department of Transportation (FDOT) District 5 (D5) to complete the design, build, and integration of the infrastructure required to support operations in 2 years. The required infrastructure was extensive, spanned numerous stakeholders, and included many technologies that were new to FDOT D5, such as sophisticated traffic management center (TMC) operations software, a wireless network deployed along I-4, an interface to Florida Highway Patrol Computer Aided Dispatch (FHP CAD) data, statewide traffic monitoring, and many others. The iFlorida plans also called for deployment of these technologies in ways that required coordination among more than 20 stakeholders. It was an ambitious plan that would result in dramatically different traffic management operations for FDOT D5 and other transportation stakeholders in the Orlando area.

In implementing the iFlorida plan, FDOT faced many challenges ranging from higher failure rates than expected for some field hardware to difficulties with the Condition Reporting System (CRS) and Central Florida Data Warehouse (CFDW) software. "Despite these challenges, it can be readily claimed that the overall iFlorida Model Deployment was successful," according to the final evaluation report for the iFlorida Model Deployment, published in January 2009.

The difficulties associated with the iFlorida Model Deployment provided many opportunities to identify lessons learned from the experiences they had. The most important of these are presented below in a series of lessons learned articles.

Lesson Learned (Hide)

Before iFlorida Model Deployment, statewide traffic management activities were mostly limited to support for hurricane evacuations. During a hurricane, the Florida Department of Transportation (FDOT) Transportation Statistics Office would activate real-time data collection for its Telemetered Traffic Monitoring Site (TTMS) network, which would provide volume and speed information from a subset of 54 stations scattered across the state. Most other traffic management activities were handled regionally by the seven FDOT districts and by FDOT staff stationed at the State Emergency Operations Center (SEOC).
The main objective of iFlorida statewide operations was to establish statewide traffic management by deploying new traffic monitoring devices and consolidating those devices with existing sources of statewide traffic data, then disseminating this data to the public as traveler information and to decision makers in need of statewide traffic information-primarily those involved in hurricane evacuation decision making. A key component of the statewide operations monitoring was the deployment and maintenance of a statewide traffic monitoring system.

- **Beware that travel costs can make the costs of maintaining a statewide traffic monitoring system high.** Twenty-five traffic monitoring stations, including radar for traffic detection and video, were deployed at existing microwave communication towers. These stations used available bandwidth in the microwave network to transmit these data back to the District 5 Regional Traffic Management Center (D5 RTMC). One challenge faced by designers of the Statewide Monitoring System was related to the maintenance of field devices distributed across the state-some of the stations were located more than 400 miles from the FDOT D5 offices in Deland, Florida. The cost of traveling to each site from Orlando made maintenance visits expensive. FDOT took this into consideration in the system design, deploying network-addressable Uninterruptible Power Supply (UPS) at each station so that equipment could be rebooted remotely. It was hoped that being able to reboot equipment remotely would reduce the need for expensive onsite maintenance.
- **Work cooperatively with the potential users to ensure that the statewide monitoring system satisfies users' data needs.** After the statewide traffic monitoring system was deployed, the system did not develop a regular set of users. FDOT had anticipated that the data from this system would be useful for traveler information and to support hurricane evacuation decision making. RTMC operators found that the stations were too widely spaced to consistently provide statewide traveler information. While the SEOC was very interested in using video from the Statewide Monitoring System during hurricane evacuations, SEOC's actual use of the video was irregular, only occurring during hurricane evacuations. The combination of high maintenance costs and no regular users meant that FDOT D5 placed a lower priority on maintaining this field equipment than the equipment that was less costly to maintain and used more frequently. The result was low availability of the Statewide Monitoring System, as reflected in FDOT's maintenance logs. The average length of time a device was inoperable was almost 50 days, much longer than for devices FDOT D5 maintained within its district.
- **Identify and rectify equipment maintenance problems to make the system reliable to users.** FDOT believed that one cause of maintenance problems was the power supplies, noting that the power transformer was deployed in the equipment room and a 25 V line made a long run to the field equipment. FDOT also noted that the software it used to interface with the Statewide Monitoring System field equipment caused some of the problems it observed. At times, FDOT personnel could view video if they accessed the video controller directly, but could not view the video through the software the agency used to manage the video at the RMTC.
- **Involve all DOT districts in the design of a statewide monitoring system to make it easier to distribute maintenance responsibility for the monitoting stations across the districts.** FDOT D5 also anticipated that the districts in which the Statewide Monitoring System equipment was located would take over responsibility for maintaining the equipment (each district was already responsible for maintaining the microwave tower equipment in its boundary). This did not occur during the iFlorida operational period. This may have been caused, in part, by the fact that the other FDOT districts were not involved in the design of the Statewide Monitoring System. FDOT D5 received push-back from some districts when deploying the Statewide Monitoring System equipment because the districts had not been given the opportunity to verify that the new equipment was compatible with existing equipment. Initially, monitoring equipment was under warranty for maintenance performed by the vendor, which was contracted to deploy the equipment. In August 2007, FDOT D5 took over maintenance responsibility for the Statewide Monitoring System. At that time, FDOT D5 requested that the other FDOT districts take over

maintenance of the equipment in their district. Districts that had an active ITS program were willing to take over this responsibility. Some districts had little or no ITS equipment deployed and no staff or maintenance contracts for maintaining ITS equipment. These districts were not interested in maintaining this equipment.

A statewide traffic monitoring system is meant to improve efficiency and mobility in a state's roadway network. However, implementers must design the system to satisfy potential users' data needs and to ensure reliability and maintainability of the system.

Comments

No comments posted to date

Other Lessons From This Source

Assess security risks, threats, vulnerabilities, and identify countermeasures for the transportation management centers.

Beware of the limitations of using toll tags in order to calculate travel time on limited access roadways and arterials.

Beware that software development for ITS projects can be utterly complex, which demands avoiding pitfalls by following a rigorous systems engineering process.

Define a vision for software operations upfront and follow sound systems engineering practices for successfully deploying a complex software system.

Deploy a variable speed limit system only after the software systems required to support it are mature and reliable.

Develop an accurate, map-based fiber network inventory and engage ITS team in the construction approval process.

Develop an effective evacuation plan for special event that gathers a large audience and consider co-locating the responding agencies in a joint command center.

Ensure compatibility of data format of the field-weather monitoring sensors with the central software in the transportation management center.

Ensure that experienced staff oversee the development of a complex software system and thoroughly follow systems engineering process.

Ensure that Highway Patrol's CAD system operators enter key information needed by the transportation management center operators.

Establish a well defined process for monitoring and maintenance before expanding the base of field equipment.

Estimate life-cycle cost of ITS technologies as part of procurement estimates in order to assess the range of yearly maintenance costs.

In developing software for automated posting of messages on dynamic message signs, focus on the types of messages that are used often and changed frequently, and also include manual methods for posting.

Incorporate diagnostic tools to identify and verify problems in the transmission of video in a transit bus security system.

Perform adequate analyses and tests to design, calibrate and validate the capabilities of a bridge security monitoring system in order to reduce false alarms.

Use simple menu choices for 511 traveler information and realize the majority of callers are seeking en route information while already encountering congestion.

Source

iFlorida Model Deployment Final Evaluation Report

Author: Robert Haas (SAC); Mark Carter (SAIC); Eric Perry (SAIC); Jeff Trombly (SAIC); Elisabeth Bedsole (SAIC): Rich Margiotta (Cambridge Systematics)

Published By: United States Department of Transportation Federal Highway Administration 1200 New Jersey Avenue, SE Washington, DC 20590
(USA)

Source Date: 01/30/2009

URL: http://www.ops.fhwa.dot.gov/publications/fhwahop08050/index.htm

Other Lesson Titles From This Source:

Assess security risks, threats, vulnerabilities, and identify countermeasures for the transportation management centers.
Experience from iFlorida Model Deployment

Beware of the limitations of using toll tags in order to calculate travel time on limited access roadways and arterials.
Experience from iFlorida Model Deployment

Beware that software development for ITS projects can be utterly complex, which demands avoiding pitfalls by following a rigorous systems engineering process.
Experience from iFlorida Model Deployment

Define a vision for software operations upfront and follow sound systems engineering practices for successfully deploying a complex software system.
Experience from iFlorida Model Deployment

Deploy a variable speed limit system only after the software systems required to support it are mature and reliable.
Experience from iFlorida Model Deployment

Develop an accurate, map-based fiber network inventory and engage ITS team in the construction approval process.
Experience from iFlorida Model Deployment

Develop an effective evacuation plan for special event that gathers a large audience and consider co-locating the responding agencies in a joint command center.
Experience from iFlorida Model Deployment

Ensure compatibility of data format of the field-weather monitoring sensors with the central software in the transportation management center.
Statewide systems implementation experience from iFlorida Model Deployment

Ensure that experienced staff oversee the development of a complex software system and thoroughly follow systems engineering process.
Experience from iFlorida Model Deployment

Ensure that Highway Patrol's CAD system operators enter key information needed by the transportation management center operators.
Experience from iFlorida Model Deployment

Establish a well defined process for monitoring and maintenance before expanding the base of field equipment.
Experience from iFlorida Model Deployment

Estimate life-cycle cost of ITS technologies as part of procurement estimates in order to assess the range of yearly maintenance costs.
Experience from iFlorida Model Deployment

In developing software for automated posting of messages on dynamic message signs, focus on the types of messages that are used often and changed frequently, and also include manual methods for posting.
Experience from iFlorida Model Deployment

Incorporate diagnostic tools to identify and verify problems in the transmission of video in a transit bus security system.
Experience from iFlorida Model Deployment

Perform adequate analyses and tests to design, calibrate and validate the capabilities of a bridge security monitoring system in order to reduce false alarms.
Experience from iFlorida Model Deployment

Use simple menu choices for 511 traveler information and realize the majority of callers are seeking en route information while already encountering congestion.
Experience from iFlorida Model Deployment

Contacts

Lesson Analyst:

Firoz Kabir
Noblis
202-863-2987
firoz.kabir@noblis.org

Classifications

Lesson Categories

Management & Operations > Operations

Management & Operations > Operations

Application Areas

Intelligent Infrastructure > Arterial Management > Surveillance > Traffic

Intelligent Infrastructure > Freeway Management > Surveillance > Traffic

States

Florida

Countries

USA

Systems Engineering

None defined

Focus Areas

Major Initiatives > Cooperative Intersection Collision Avoidance Systems

Major Initiatives > Integrated Corridor Management

Goal Areas

Mobility
Efficiency

Keywords

CCTV, closed circuit television cameras

Systems

Other Program Activities > Rural ITS Deployment

Lesson ID: 2010-00537