

## **QUALITY TRAFFIC INFORMATION**

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## **ABSTRACT**

The Florida Department of Transportation (FDOT) provides real time traffic information through an Advanced Traffic Information System (ATIS), commonly referred to as 511. Real time traffic information is disseminated to the public through the internet and a phone based Interactive Voice Recognition System (IVR). In the past, information was disseminated through several regional ATIS within the state. Then, on June 17, 2009 the FDOT substituted all regional ATIS to one statewide ATIS, which is now referred to as Florida ATIS (FLATIS). Moving from the regional 511 systems that had manual quality control processes to an automated statewide system, added potential for lack of quality in the information. This issue arises since the information is being disseminated instantly from the state's incident management software (SunGuide® Software) to the FLATIS system.

This automation created the need to develop new quality control procedures to verify the accuracy of the information being disseminated. The approach taken by FDOT District Six (D6) Transportation Management Center (TMC) to meet and exceed the quality guidelines set by FDOT Central Office (CO) involved the development of the first FLATIS verification software tool, called "511 Watcher".

The 511 Watcher alerts and guides TMC Operators in the task of verifying the accurate posting, updating, and removal of traffic information published to FLATIS, such as lane blocking events, congestion events, DMS messages, travel time, and CCTV images. Also, the 511 Watcher alerts TMC Operators in real time about 511 user's traffic feedback. Inputs from the Operators are processed by the software to produce several reports that document the quality control task as well as the Operators response time.

This paper will provide an overview of the FLATIS system, the quality control guidelines established by CO for the new statewide 511 system, the approach on how FDOT D6 met and exceeded the CO guidelines, as well as the lessons learned through the process.

**Key words: Florida Advanced Traveler Information System, FLATIS, 511, Southeast Florida regional 511 system, 511 Watcher software, ATIS, quality control, real time traffic information dissemination**

## **GENERAL OVERVIEW**

With the increasing number of vehicles out in the streets, traffic information dissemination is one of the most important tools to allow motorists to plan their route ahead of time and for motorists already on the road to evade congested segments or safely pass an incident scene. A reliable and valuable traffic information dissemination system is that which can broadcast accurate real time information. Intelligent Transportation Systems (ITS) allow transportation agencies to effectively get real time traffic data; but delivering this data in the way of traffic information to the motoring public requires the interaction of various systems and actors. Such interaction is an open window for lack of quality, thus, requiring a quality assurance system that works in real-time to be consistent with the timeliness of the information provided.

The statewide Florida Advanced Traveler Information System (FLATIS), commonly referred to as 511, is a traffic information dissemination tool of the Florida Department of Transportation (FDOT). The FLATIS system compiles real-time traffic information from the majority of Florida's interstate highways, Florida's Turnpike, and major roadways in the state's metropolitan areas. Then, the system disseminates this information to the public for free via an interactive phone service and the internet. Both the website and phone service are fully bilingual in both English and Spanish.

The statewide 511 system provides incident information, camera images, and travel times. The volume of information provided by FLATIS, as well as the speed at which this information is updated, requires not only fit quality control guidelines but a system that can keep up with FLATIS capabilities.

## **REGIONAL 511 SYSTEMS**

Traffic Information via 511 started in Florida when FDOT received a Federal Highway Administration (FHWA) 511 deployment grant, which initiated a statewide 511 implementation plan. The plan began with the deployment of regional 511 telephone-based traveler information services in Central and Southeast Florida regions. Then, the Tampa Bay, Jacksonville, and Southwest regional services were later added into the State's 511 network.

In 2000, FDOT Districts 4 and 6, and the Florida Turnpike Enterprise, initiated a program to design, build, operate, and maintain a multi-modal traveler information service. The service for Southeast Florida launched on July 16, 2002. With this regional system, Southeast Florida had information available on all major interstates and many state highways throughout Miami-Dade, Broward, and Palm Beach Counties. Callers from within these counties, as well as Monroe County through the Florida Keys, had access to the service through the 511 system. The Southeast Florida phone service was touchtone-activated and provided information in both English and Spanish at the time. The service also provided traffic information through the [www.511southflorida.com](http://www.511southflorida.com) website.

## **Quality Control on Southeast Florida Regional 511 System**

The Southeast Regions early approach for traveler information dissemination was a process which required FDOT's operators to verify and enter information into an incident management software prior to supplying the information to the 511 service provider. The 511 service provider will then manually input this information into the 511 software, in order to deliver it to the public.

In summary, the previous methods for disseminating traveler information through 511 were complex. A process that involved two operators entering identical information, manually, into two separate software systems, within a time frame of just a couple of minutes, showed to have a potential for lack of quality and delay in the dissemination of traveler information.

Given the inefficiencies at the time, the Southeast Florida regional system partners created manual quality control procedures, to verify the information provided to the 511 service contractor was being disseminated accurately and timely. However, this process was not a real-time and complete quality control process, because it would only verify a couple of weeks of data from the previous month. The quality control process implemented at the time was more of an effort which would create lessons learned exercises and identify areas of improvements, which could not be corrected on the spot.

## **THE NEW STATEWIDE 511 SYSTEM**

In December 2003, a statewide FDOT 511 Working Group was formed to facilitate coordination between the Districts in deploying and operating 511 services. The Working Group developed strategies to converge all regional 511 services towards a single statewide 511 service by the end of the decade. The single statewide 511 service is what FDOT now commonly refers to as FLATIS.

Through lessons learned from the many regional systems, FDOT Central Office (CO) and the Districts jointly developed a statewide 511, which improved the dissemination efficiency by removing the duplication efforts of having to enter identical information in two separate software platforms for two separate, but similar traveler information functions: Dynamic Message Signs (DMS) and 511.

FLATIS was launched in June 2009, serving the motoring public statewide with traffic information, travel times (TvT), reproduction of posted DMS messages, and Closed Circuit Television camera (CCTV) still images. The public can access FLATIS by dialing 511 to get to the phone based Interactive Voice Recognition System (IVR) or through the internet on the 511 Website (<http://www.fl511.com>). For obvious reasons, the DMS and CCTV services mentioned previously are only provided through the FLATIS website.

FLATIS also provides other services such as phone or website link connections to agencies that may be of interest to the traveling public, such as emergency management offices, transit and transportation agencies, airports, seaports, trains, etc.

Also, phone callers interact with the IVR system to select the information that fits their route and/or location. Additionally, FLATIS users can configure personalized accounts and have traffic information on selected routes and times sent automatically to their phones or to their personal email accounts.

511 is a two-way system which not only delivers traffic information to users but a tool through which users can report traffic events. Motorists on the roadways are a valuable source for incident detection. Therefore, motorists can contribute to improve traffic conditions by alerting Regional Transportation Management Centers (RTMCs) on traffic events not already detected by RTMC resources. Because of the previous reasons, 511 users are encouraged to provide traffic reports on incidents which they find not posted in the IVR. Once the user finishes his/her report, the IVR system sends the recorded message to RTMCs' email accounts, where RTMC Operators can verify the event.

This new 511 system reduced some of the quality control concerns from the previous regional systems by automating the process of transferring traffic data from the state incident management software, called SunGuide® Software, to FLATIS.

### **SunGuide® Software and Information Dissemination through FLATIS**

SunGuide® Software is the nerve system that supports FDOT's RTMCs with control of ITS roadway devices, traffic and incident management, data collection, traveler information dissemination, as well as information exchange across a variety of transportation agencies. The goal of SunGuide® Software is to have a common software platform that can be deployed across the state of Florida.

Traffic incidents information, DMS messages, and travel times, are published to FLATIS via SunGuide® Software. Among other capabilities, SunGuide® Software provides standardized messages to be posted on DMSs and event descriptions to be disseminated through FLATIS. RTMC Operators input event information into SunGuide® from all roadway events or traffic conditions that may impact motorists' mobility and/or safety, such as crashes, roadway construction, debris, disabled and abandoned vehicles, as well as any other lane blocking event, congestion, weather event, and special event. Based on the input data, the software provides a response plan to disseminate event information to the public via DMS and FLATIS. Regarding travel times, they are collected by SunGuide® from vehicle detectors deployed on RTMCs managed roadways and sent automatically to FLATIS. These, along with CCTV images, are published to FLATIS using one of SunGuide® subsystems called Center to Center (C2C).

### **FDOT Central Office Quality Control Requirements for the Statewide 511 System**

With the 511 system improvements, the need to develop new quality control procedures to verify the accuracy of the information being disseminated was evident. FDOT Central Office (CO) distributed to all the 511 partnering Districts and agencies a copy of the minimum content quality guidelines allowable. These quality guidelines are summarized below

- Incidents Event Data:

RTMCs are required to verify incidents being added or removed on both the Website and the IVR. This verification shall be done within 5 minutes after the event is sent to FLATIS. If the number of events being entered in the system prevents the RTMC Operator from checking after entering each event, the Operator should, within 30 minutes of the first entry, perform a sampling to verify the entered incidents.

- Message Boards (a reproduction on the web of DMS messages):

On at least a weekly basis, RTMC Operators shall verify through sampling that the information being displayed on the website DMSs is correct.

- Camera Images:

On a daily basis RTMC Operators shall verify by sampling that CCTV images are being disseminated. Verify all camera images on a weekly basis.

- Travel Times:

On a daily basis RTMC Operators shall verify that travel times are indeed available for all disseminated travel time links.

From these minimum content quality guidelines, FDOT District Six (D6) Transportation Management Center (TMC) began to design a system which would track all the different performance measures required by CO with respect to FLATIS services.

### **FDOT D6 TMC Approach to Central Office Statewide 511 Quality Control Requirements**

As previously discussed, moving from the regional 511 systems to an automated statewide system, reduced some of the risks for lack of quality in the information, but the new system brought other quality challenges as well. This issue arises since the information is being disseminated instantly from SunGuide® Software to the FLATIS system.

Many factors can make information dissemination inaccurate, and chances of having these inaccuracies increase when the speed and volume of information dissemination is incremented by the interaction of two systems: SunGuide® and FLATIS. This automation created the need to develop new quality control procedures to verify the accuracy of the information being disseminated. For that reason, FDOT D6 wanted to develop a more robust FLATIS quality control system that would meet FDOT Central Office and D6 requirements.

But meeting these requirements was not an easy task, since TvT, CCTV images, and DMS messages are sent continuously from SunGuide® to FLATIS. Therefore, keeping up with the pace at which data is sent to 511 would be very demanding.

The approach taken by D6 TMC to meet and exceed the quality guidelines set by FDOT CO involved the development of the first FLATIS verification software tool. This software would perform an automatic comparison between the D6 information sent via SunGuide® and what was

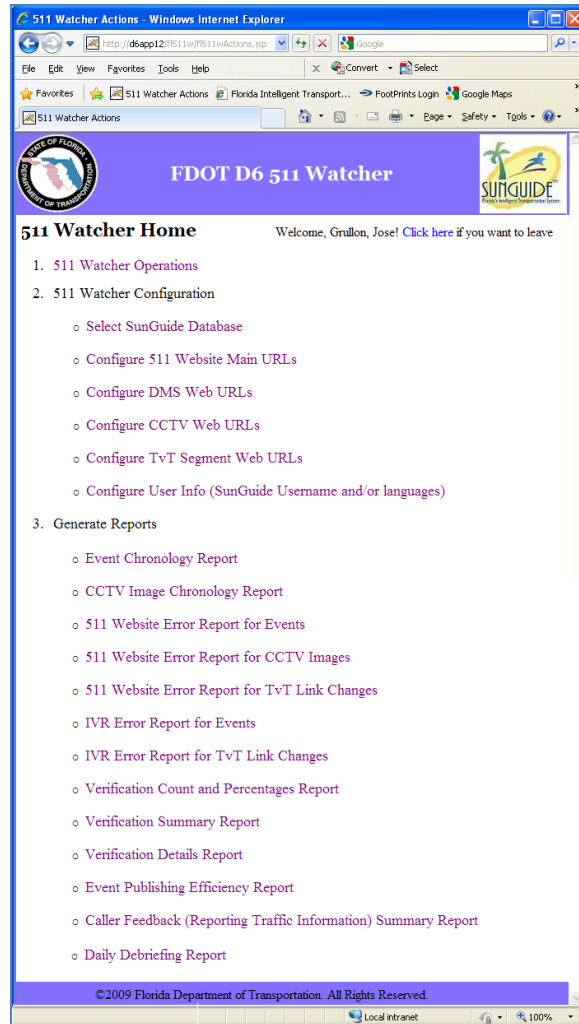
published on FLATIS. Therefore, most of the quality control tasks would be performed by the software, while D6 TMC Operators would then be in charge of the quality assurance. District Six built this software and called it “511 Watcher”.

### **D6 TMC’s 511 Watcher Software and Quality Control over FLATIS**

The 511 Watcher was created to help the 511 Operator in the task of verifying the accurate posting or removal of traffic information to FLATIS. The 511 Watcher software alerts users when District Six TMC traffic information is being published or removed through SunGuide® Software to FLATIS, and when TvT segments, DMSs, and CCTVs are blocked or unblocked from being displayed. Also, every 10 minutes the software verifies and compares the information in SunGuide® against the information displayed in FLATIS for District Six’s DMSs, CCTVs, and TvT segments. Thus, if discrepancies are found between the compared sources or if the information is not being published at all, the 511 Watcher would alert D6 TMC Operators about the issue.

Also, the 511 Watcher alerts D6 Operators when an email is received from the IVR reporting a 511 user left a traffic report on the system. As previously mentioned, FLATIS users are presented with the option of leaving traffic reports on the IVR. When a 511 user leaves a report, the IVR system saves the audio file and sends it to the districts via email. The 511 Watcher notifies operators when these traffic reports are received via email. Therefore, the verification and documentation of such reports are performed using the 511 Watcher.

The 511 Watcher is arranged by action types: Operations, software configuration, and reports. A screenshot of the 511 Watcher Actions window is presented in Figure 1 below



***Figure 1. 511 Watcher Actions Window***

### ***1. 511 Watcher Operations***

QA/QC operations are performed in this section. Here the 511 Watcher provides alerts and guides Operator through the verification and documentation of data sent by D6 to FLATIS.

When logged in this section Operators are provided by the software with alerts for published/unpublished events, alerts for actions performed on CCTVs, TvT, and DMSs, as well as alerts for discrepancies between the data displayed for these devices in FLATIS vs. the same data in SunGuide®. Records of alerts pending notification and alerts already notified to Operators are also displayed in this window.

### ***2. 511 Watcher Configuration***



511 website URLs are configured here. These are the URLs the 511 Watcher will be looking at when comparing what is displayed in the 511 website versus data in SunGuide®. Also, this section is where the 511 Watcher users' information is configured.

### *3. Generate Reports*

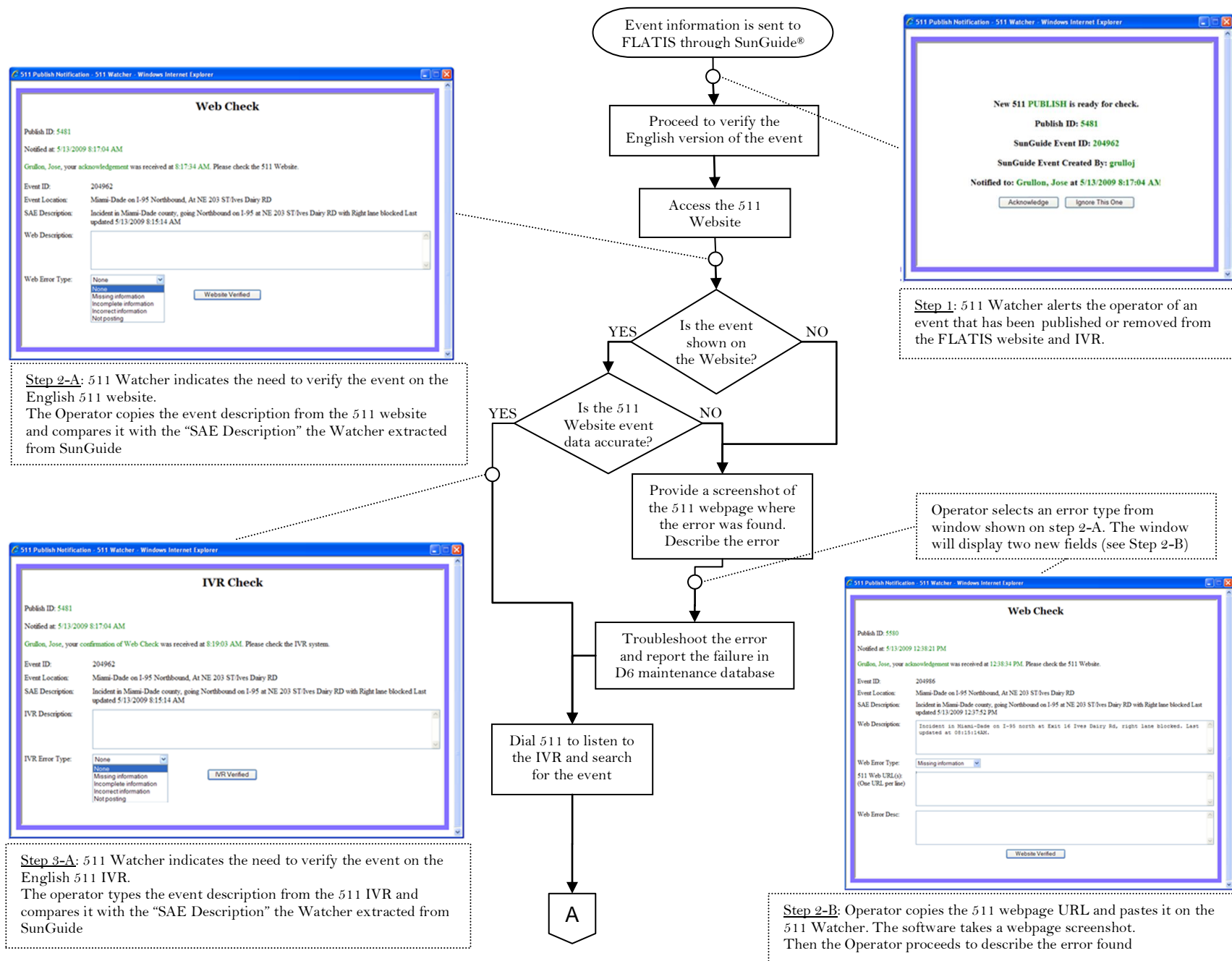
Once Operator's enter information into the 511 Watcher, response times are saved and processed by the software. This information entered can later be accessed from the reports section of the 511 Watcher. These reports assist D6 in evaluating their performance measures goals.

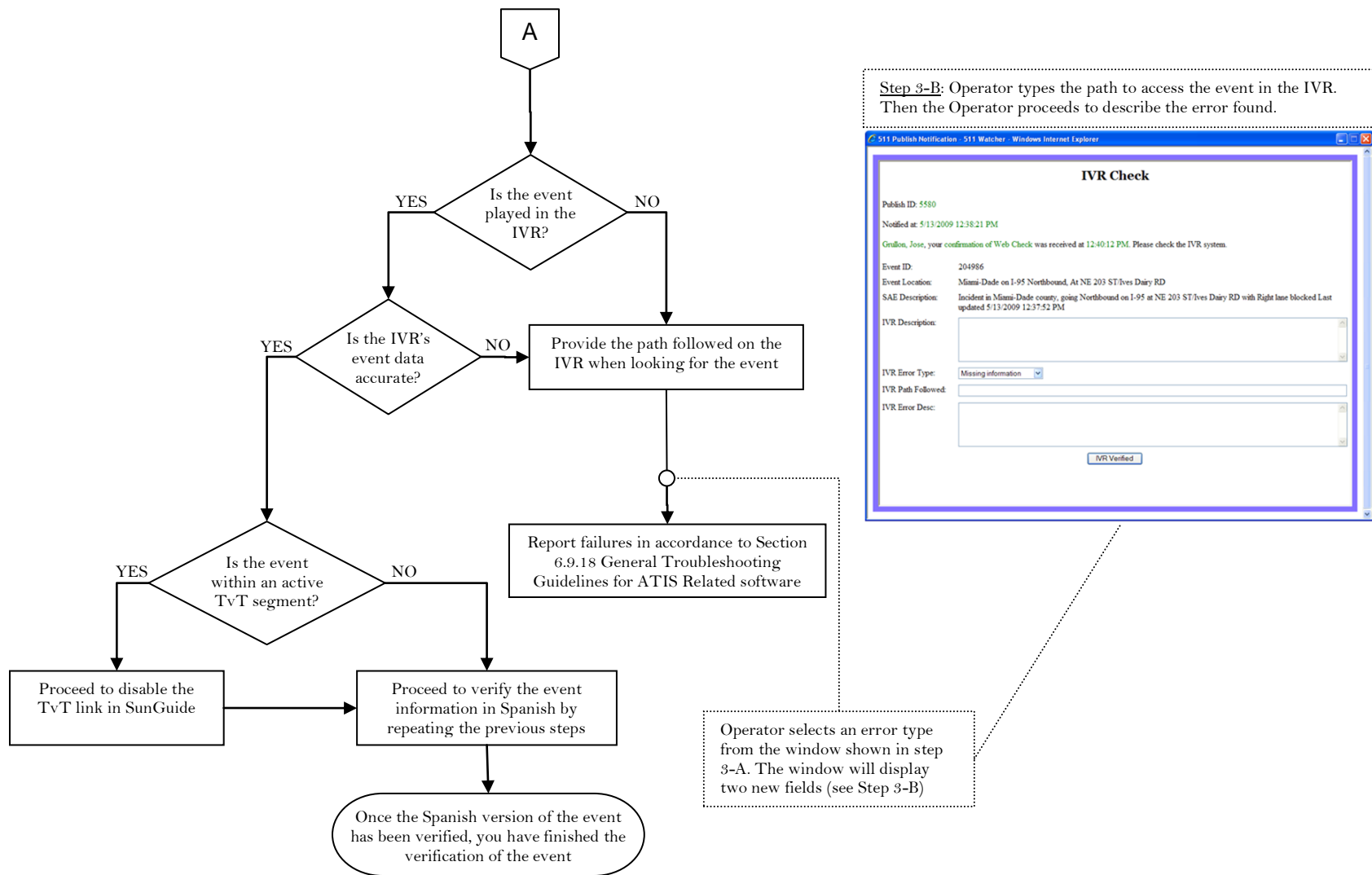
D6 TMC established Operator procedures that follow traffic event information from when it is published or removed by D6 from FLATIS or when issues are found with TvT, DMS, or CCTV. These procedures have the intention of both verifying the validity of issues reported by the 511 Watcher and documenting the QA/QC process. The 511 Watcher will not only alert TMC Operators when a failure or inaccuracy is detected but will also guide Operators throughout D6 procedures, allowing TMC Operators to document on the 511 Watcher their QA/QC tasks.

The next section presents an example of the QA/QC procedures D6 Operators shall follow and how the 511 Watcher guides Operators on accomplishing these procedures. Although the example shown is for the QA/QC procedures on lane blocking and congestion incidents, the alerts and steps followed by the 511 Watcher are similar for other verification tasks.

#### **Example of the 511 Watcher guidance for QA/QC procedures on Lane Blocking and Congestion Events**

Once the information of a lane blocking incident or congestion event is sent to FLATIS through SunGuide® Software, the TMC Operator shall proceed to verify the English and Spanish information dissemination success and accuracy on both the FLATIS website and IVR. To do so, D6 TMC Operators shall follow the steps on the flow chart shown below:





**Figure 2.-Lane Blocking /Congestion Event Verification Flow Chart**

### **D6 FLATIS Expected Performance Measures**

The creation of the FLATIS verification software, 511 Watcher, allowed District Six TMC to meet and build off of FDOT Central Office performance measures. D6 expected performance measures are shown in the table below.

***Table 1. FDOT District Six TMC's FLATIS Expected Performance Measures***

<b>1. Verification Percentage (Average Monthly)</b>	
<i>Information is gathered from the "Unverified Publish Reports" in the 511 Watcher</i>	
<b>Publish Type</b>	<b>Performance Measure Verification Percentage</b>
Event Publish/Unpublish	99.00%
Floodgate and Banner Publish/Unpublish	100.0%
CCTV Configuration Changes	99.00%
TvT Link Changes	99.00%
DMS Configuration Changes	99.00%
CCTV Hourly Check	99.50%
<b>2. Timeliness for Verification of Published Events (Average Monthly)</b>	
<i>Information is gathered from the "Verification Summary Reports" in the 511 Watcher</i>	
<b>Verification Action</b>	<b>Max. verification time</b>
Lane Blocking & Congestion Event Verification (Web: English & Spanish; IVR: English & Spanish)	6 minutes
Floodgate and Banner messages verification (Web: English & Spanish; IVR: English & Spanish)	6 minutes
CCTV video/ feed blocking or flag action verification (Web: English & Spanish)	5 minutes
DMS flag action verification (Web: English & Spanish)	5 minutes
TvT disabling or Flag action verification (Web: English & Spanish; IVR: English & Spanish)	5 minutes
DMS Message discrepancy verification (Web: English & Spanish)	6 minutes
TvT discrepancy verification (Web: English & Spanish; IVR: English & Spanish)	6 minutes
CCTV image hourly verification (Web: English & Spanish)	6 minutes

A summary of D6 FLATIS operations performance measures for March 2010 is shown on the next page.



**FDOT DISTRICT SIX – SUNGUIDE TMC**  
**MARCH 2010**  
**FLATIS Operations Summary Report**



**FLATIS Verification Summary**

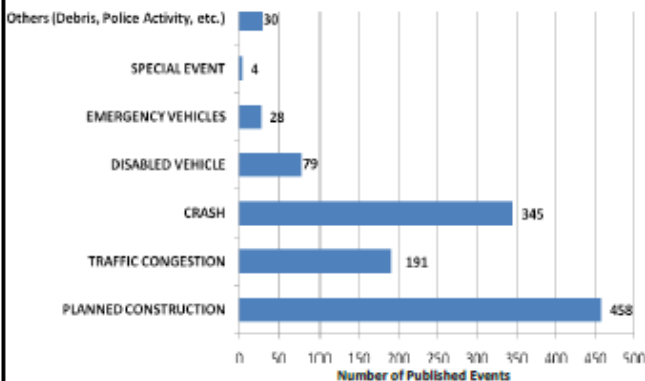
Verification Type	March 2010		Verification Percentage		Average Verification Time*	
	Total Count	Verification Count	Month	Target	Month	Target
Event Publish/Unpublish	2063	2063	100%	≥99.0%	00:05:45	≤00:06:00
Event Publishing Efficiency**	1305	1303	99.8%	≥99.5%	N/A	N/A
Floodgate and Banner Publish/Unpublish	89	89	100%	100%	00:03:18	≤00:06:00
CCTV Blocking and Flag Actions	286	286	100%	≥99.00%	00:02:03	≤00:05:00
CCTV Image Update Hourly Check	743	743	100%	≥99.5%	00:03:56	≤00:06:00
DMS Message Discrepancy	1245	1231	98.9%	N/A	00:03:29	≤00:06:00
DMS Flag Actions	0	0	N/A	≥99.0%	N/A	≤00:05:00
Travel Time Discrepancy	1161	1157	99.7%	N/A	00:02:58	≤00:06:00
Travel Time Disabling and Flag Actions	0	0	N/A	≥99.0%	N/A	≤00:05:00
Statewide Traffic Report from Motorists	1937	1934	99.9%	N/A	00:04:02	N/A

\*Verification time for both 511 Website and IVR, in English and Spanish, where applicable.

\*\*Only includes publishing and unpublishing of lane blocking events. Also, only includes event updates due to lane blockage changes.

**Published Events by Type\***

(Total number of published events = 1,135)



\*Publish actions only, including published event updates.

**Published Events by Roadway\***

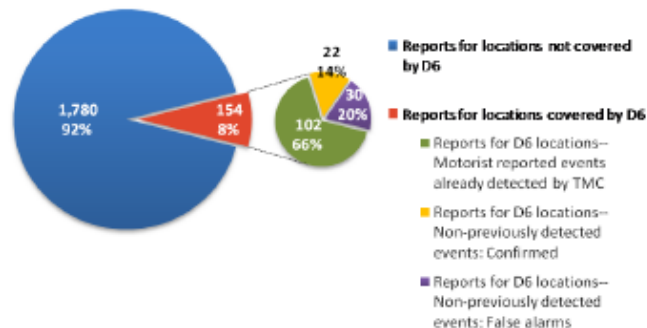
Roadway	Published Events	Percentage
I-95 Mainline	440	38.8%
NB 95 Express	116	10.2%
SB 95 Express	43	3.8%
SR-826	319	28.1%
I-195	66	5.8%
I-395/MacArthur Cswy	78	6.9%
I-75	30	2.6%
SR-886/Port Blvd	0	0%
US-1 (Miami-Dade)	15	1.3%
US-1 (Monroe)	28	2.5%
Card Sound Rd	0	0%
<b>Total</b>	<b>1,135</b>	<b>100%</b>

**Calls to Statewide 511 from Southeast Florida Area Codes**

Area Code	Number of Calls
305	32,213
786	13,159
772	4,886
754	1,597
954	36,008
561	26,652
<b>Total</b>	<b>114,515</b>

**Statewide Traffic Reports from Motorists**

(Total number of reports = 1,934)



File Code 501.2.3.6

www.sunguide.org

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**Figure 3. FDOT D6 TMC's FLATIS Operations Summary Report for March 2010**

## **LESSONS LEARNED**

The success of any public information dissemination system can be measured by its number of users. Also, the credibility of the system plays an important role in its success. Users of 511 systems would evaluate the system by the usefulness of the information, thus, credibility is directly tied to accuracy and timeliness of the information.

For the previous reasons, quality control mechanisms are vital to ensure system effectiveness. Performance measures should guarantee the accuracy and timelines of information provided to the public.

Traffic information dissemination systems may require some level of automation in their QA/ QC process, and should also involve consistent human double checks. Traffic conditions change in seconds, thus the information must be served with minimum delay. Timeliness and accuracy of the information may assist in alleviating aggravated traffic conditions, therefore saving time motorists would spend in congestion, and saving lives as well.

In the regional Southeast Florida 511 system, QA/ QC happened as an aftermath due to limited resources. Given the high frequency at which traffic information updates, regardless of the system, makes it imperative to have a structuralized real time QA/ QC process that can constantly adjust to provide credible information to the public.

With the experience that FDOT D6 has developed in performing real time QA/ QC with the 511 Watcher, it has noticed that the state and the District may benefit from having the 511 watcher combined into SunGuide Software because it will allow for the rest of the state to assure credible information to the motoring public.

## **References**

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- (3) Florida Department of Transportation, Traffic Engineering and Operations Office, Intelligent Transportation Systems Section, “ATIS Content Guidelines, Draft-Version 2.6”, March 2009.
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