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# Florida

## Crash Data System Mapping - Final Report

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National Highway Traffic Safety Administration



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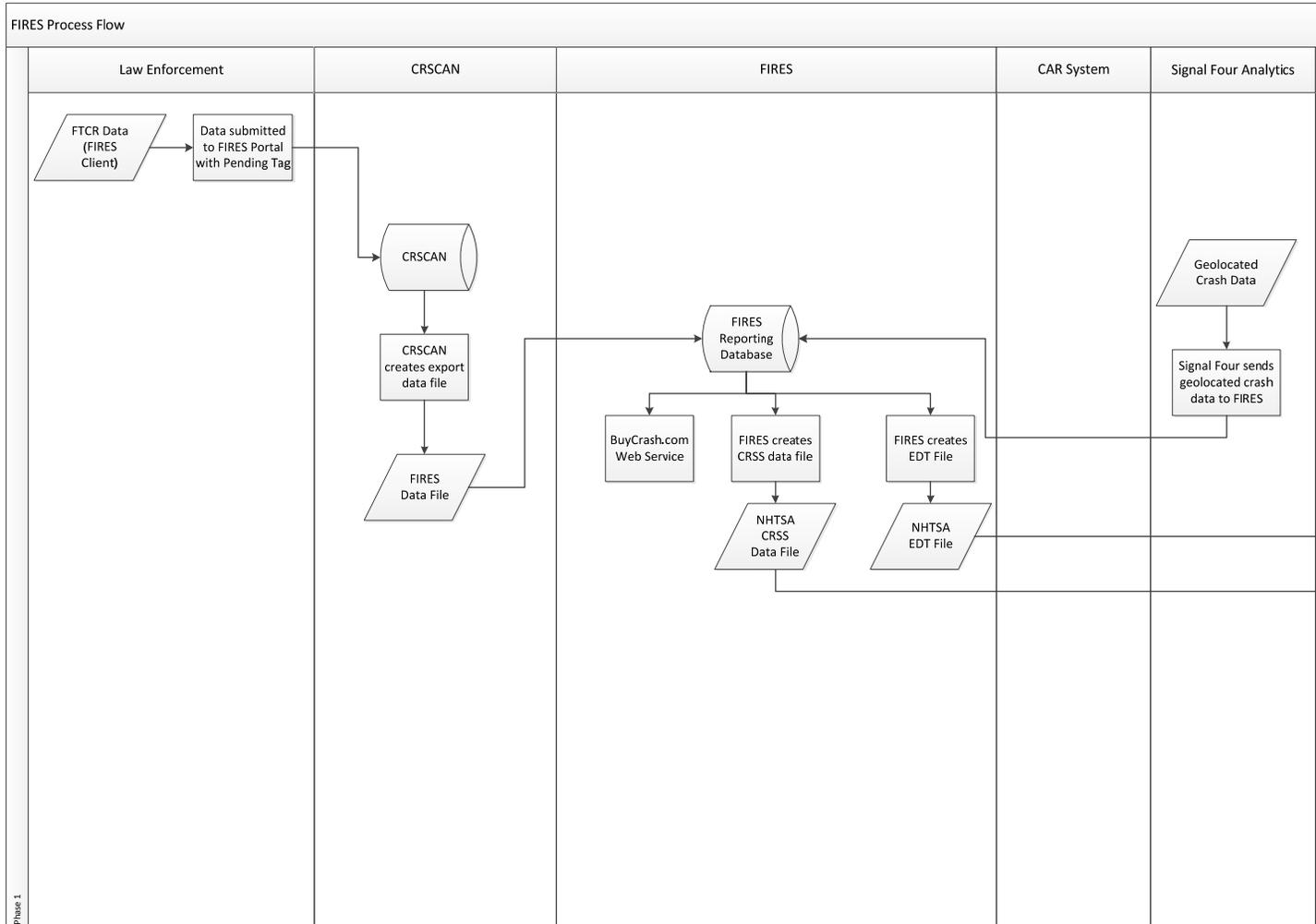


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The team would also like to recognize the sustained support of the National Highway Traffic Safety Administration.

The team expresses appreciation to the members of the Traffic Records Coordinating Committee for assisting the GO Team in obtaining the required materials and for their commitment to improving the State’s traffic records system. That broad and deep commitment will ensure Florida’s Crash Data System will benefit from the use of this report. The following stakeholders participated in this GO Team effort:

| <b>State Participants</b> | <b>Agency Name</b>                                      |
|---------------------------|---------------------------------------------------------|
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# Executive Summary

The Florida Department of Transportation (FDOT) supports the State Traffic Records Coordinating Committee (TRCC). Florida's TRCC partner agencies have been pursuing many crash data initiatives and developing crash data systems. As a joint effort, FDOT and the Florida DHSMV sought to catalog the components of the crash data systems and detail their relationships. This would allow the State to better identify the locations of data, eliminate duplicative efforts, and streamline the processing and distribution of crash data. To accomplish their goals, FDOT and DHSMV requested a GO Team from the National Highway Traffic Safety Administration (NHTSA). NHTSA assigned a GO Team to provide technical assistance in developing a crash data systems document. The GO Team used crash system documentation, interviews with stakeholders, and a facilitated session with key staff from State agencies and their consultant partners.

The focus of this report is to provide the State with a high-level inventory of Florida's crash data systems. This report provides the State with the status of these systems so the State can move forward with decisions to consolidate State efforts for crash data analysis.

Florida's one core crash data system and four supplemental systems store a full or partial instance of the crash repository. The systems are as follows:

Core Crash Data System:

- CRSCAN.

Supplemental Systems:

- Florida Integrated Report Exchange System (FIRES).
- Department of Highway Safety and Motor Vehicles (DHSMV) Analytics Warehouse.
- Crash Analysis Reporting (CAR) System.
- Signal Four Analytics.

All five systems contain a considerable amount of the crash data that the State collects. Each of the supplemental systems contain the data that is available in CRSCAN. In the report, the GO team found there is not a large variance with most of the data collected between systems. However, each system does have nuances in their data set that are specific to their group of users.



## Organization of the Crash Systems Relationship Report

This report is organized into the following three sections:

- Crash Systems Data Inventory
- Crash System Observations
- GO Team Conclusions

The Crash Systems Data Inventory provides the State with the crash systems data relationship map, including the following:

- Crash system maps
- State points of contact
- Key users for each system
- Data inventory for the crash system identified

The Crash System Observations section of the report provides what the GO Team noted when documenting the crash system.

The GO Team Conclusions section closes the report with suggestions for how the State can use this report to improve the crash component of the traffic records system. The State will be able to use this to determine next steps for future data improvement efforts.



## Practices Used for Information Gathering

### Documentation Collection

Table 1 lists the documents that Florida provided to the GO Team. The GO Team used these resources to describe the crash-related data systems and process flows.

**Table 1. List of Crash System Documents Received by GO Team.**

| Agency | Data Source                               | Description                                                                                             |
|--------|-------------------------------------------|---------------------------------------------------------------------------------------------------------|
| DHSMV  | Crash Report                              | Uniform crash form used by all State of Florida law enforcement agencies for reporting vehicle crashes. |
| DHSMV  | Crash Data Dictionary                     | Documents all fields on the crash report.                                                               |
| DHSMV  | Crash Manual                              | The process guide for completing the crash report.                                                      |
| DHSMV  | Crash Facts Definitions Sheet             | Defines the terms used in the annual State Crash Statistics publication.                                |
| DHSMV  | Data Directory (2011)                     | Outlines the data elements contained within the 10 crash data system tables.                            |
| DHSMV  | Crash Data Validation Spreadsheet         | The validation rules for the system.                                                                    |
| DHSMV  | FARS 2015 FL Variable Mapping Document    | Document that maps crash data fields to those in FARS.                                                  |
| DHSMV  | Electronic and Paper Report Flowchart     | Flowchart describing the electronic and paper crash reporting process.                                  |
| FDOT   | 2015 Traffic Records Assessment           | A cumulative document that reports on the State’s Traffic Records System.                               |
| FDOT   | Florida Traffic Crash Report Data Extract | Data dictionary for extract data tables.                                                                |
| FDOT   | Sample Crash Data Files                   | Example files of the data being imported from DHSMV CRSCAN.                                             |
| FDOT   | Standardization of Crash Analysis         | A report that details the analysis of crash data and its usefulness to FDOT efforts.                    |
| FDOT   | Crash Data Management                     | A report that details the crash data process from crash reporting to performing safety analyses.        |

The team used the provided documentation to create general observations of the crash data systems. This information was for the development of the system inventory for the State crash



data repositories. This also guided the GO Team to obtain more clarity on the relationships of the system.

## Crash Data System Manager Interviews

The interview portion of the GO Team effort allowed the team to speak to the State's experts on each of the systems. The team conducted these interviews with staff from FDOT, the DHSMV, and the University of Florida (UF). While there were some differences among the interviews, each covered the following questions.

- What is the role of the data repository within the Crash Data System?
- Is each applicable system public facing?
- Who is the lead contact person for each applicable system?
- What data is collected within the system?
- Are there any overlaps with other crash data systems?
- What are the current data exchanges among the data systems?
- What reports are generated?
- How is the data quality measured for each system?
- How is the system funded?

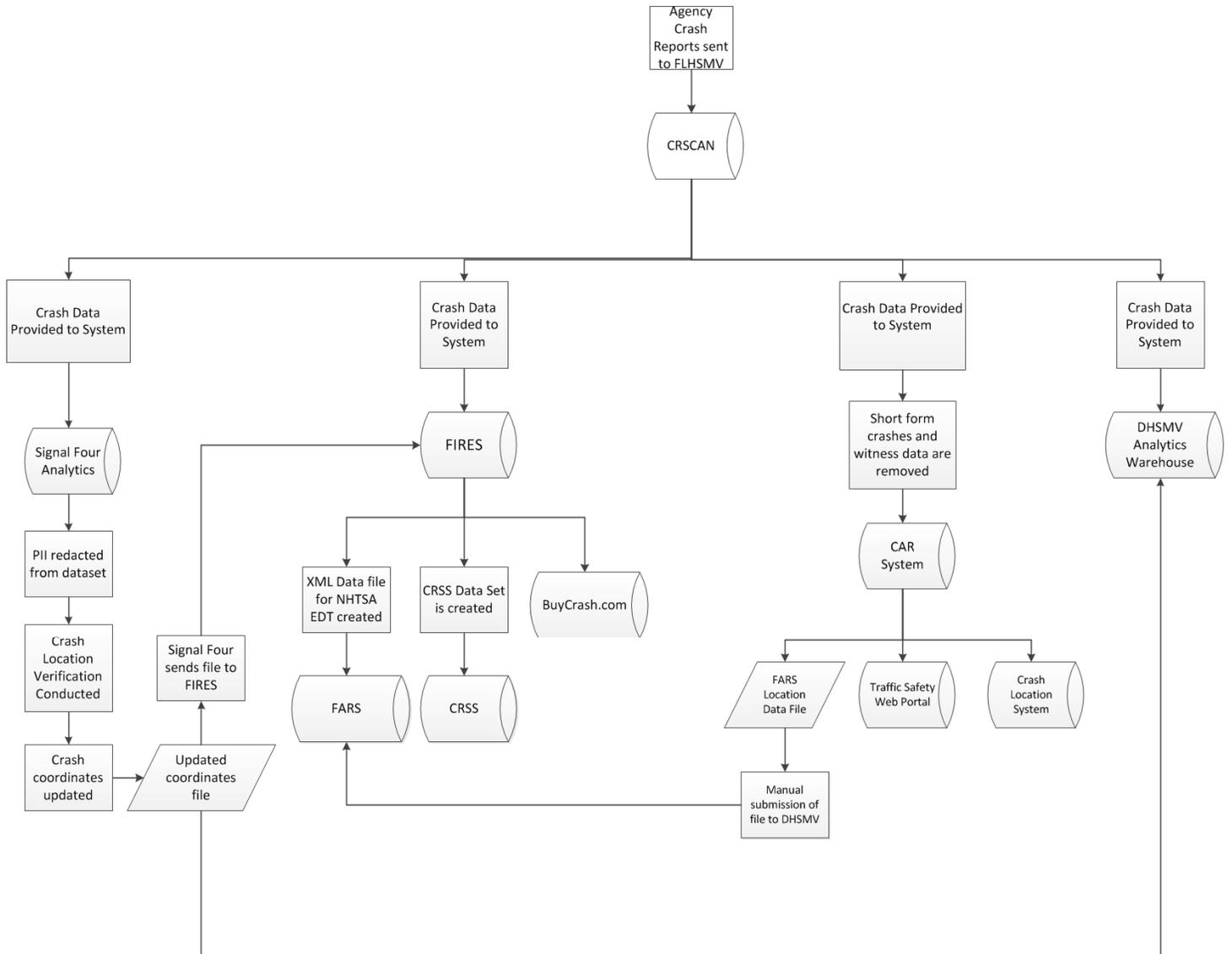
The team also followed up with email correspondence after the interviews. The results of the interviews and follow-up emails helped the team develop the State crash data system inventory.

## Facilitated Session and Subsequent Follow-up

The GO Team conducted a facilitated on-site meeting at the FDOT on January 23, 2017. The meeting provided an opportunity to review the GO Team's initial observations and gain input from a broad group of crash data stakeholders. The GO Team provided the State with their observations along with a high-level data flow. The State provided feedback in the form of corrections and details not captured during the interview phase. With the new information on the State crash systems practices, the GO Team revised and confirmed a final data flow as shown in Figure 1.



The facilitated meeting also gave the State an opportunity to discuss next steps and a potential follow-up effort to expand the review of multiple systems.



**Figure 1. High Level Crash Systems Relationship.**



# Crash Data System Inventory

This Crash Data System Inventory lists the following information about the various crash data systems in Florida, as of the date of this report.

- Overview of the crash data system.
- Information about the owner, users, and contact information for the system.
- Description of how each core system validates the data collected.
- Strengths and limitations of the system.

The information in this inventory can help the system managers evaluate their systems, identify opportunities for improvements, and eliminate duplication of effort among the crash systems.

## CRSCAN

### State Point of Contact

|              |                                                                            |
|--------------|----------------------------------------------------------------------------|
| Name:        | Stephanie Duhart                                                           |
| Title:       | Chief of the Bureau of Records                                             |
| Agency Name: | Florida Department of Highway Safety and Motor Vehicles                    |
| Address:     | 2900 Apalachee Pkwy, Tallahassee, FL 32399                                 |
| Phone:       | 850-617-2702                                                               |
| Email:       | <a href="mailto:StephanieDuhart@flhsmv.gov">StephanieDuhart@flhsmv.gov</a> |

### System Description

CRSCAN is the official statewide repository for all crash reports submitted by all law enforcement agencies in the State. The law enforcement agency investigating a reportable crash must provide the data to DHSMV. DHSMV stores the data in CRSCAN, which serves as Florida's central crash data repository in accordance with [Florida Statute 316.066](#). The Florida Traffic Crash Report (FTCR) has two methodologies for completing the form. [Florida Statute 316.066](#) prescribes that a law enforcement agency may provide either a long- or short-form version of the crash report. Florida Statute 316.066 requires the long form FTCR for any crash meeting the following criteria.

1. Resulted in death of, personal injury to, or any indication of complaints of pain or discomfort by any of the parties or passengers involved in the crash;
2. Involved a violation of s. [316.061](#)(1) or s. [316.193](#);
3. Rendered a vehicle inoperable to a degree that required a wrecker to remove it from the scene of the crash; or
4. Involved a commercial motor vehicle.



- 

For all other crashes, agencies must submit the short form FTCT or provide a driver self-report form. The short form does not require the narrative and diagram portions of the FTCT. The short form must include the following items.

- The date, time, and location of the crash.
- A description of the vehicles involved.
- The names and addresses of the parties involved, including all drivers and passengers, and the identification of the vehicle in which each was a driver or a passenger.
- The names and addresses of witnesses.
- The name, badge number, and law enforcement agency of the officer investigating the crash.
- The names of the insurance companies for the respective parties involved in the crash.

CRSCAN’s structure includes the following ten database tables, shown in Table 2.

**Table 2. CRSCAN Database Tables.**

| <b>Data Table Name</b> | <b>Description</b>                                                                                                |
|------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Events</b>          | Parent file for relational database; Contains data specific to the crash event (date, time, harmful event, etc.). |
| <b>Drivers</b>         | Contains data regarding each driver in the crash.                                                                 |
| <b>Passengers</b>      | Contains data regarding each passenger involved in the crash.                                                     |
| <b>Non Motorists</b>   | Contains data regarding non-motorists involved in the crash.                                                      |
| <b>Property</b>        | Contains data regarding non-vehicle property.                                                                     |
| <b>Vehicles</b>        | Contains data regarding vehicles involved in the crash.                                                           |
| <b>Violations</b>      | Contains data regarding citations issued at the scene.                                                            |
| <b>Motor Carrier</b>   | Contains data on commercial motor vehicles and carriers involved in the crash.                                    |
| <b>Witness</b>         | Contains data on persons that witnessed the crash.                                                                |
| <b>Trailer</b>         | Contains data on trailers involved in the crash.                                                                  |

## Funding Source

CRSCAN is a State-funded system, and is part of the DHSMV operations budget.



## Standards Used

The State of Florida uses the following standards for defining the crash system:

- Model Minimum Uniform Crash Criteria Guideline (MMUCC)
- American National Standards Institute (ANSI) D.16 and D.20

## Users

The data tables and crash report images are provided to the other crash data system repositories. The driver, vehicle, and financial responsibility sections of DHSMV use the exports from CRSCAN in the analytics warehouse for internal reporting.

## Data Inputs

Law enforcement agencies submit approximately 92% of all crash reports electronically to CRSCAN, with the remainder submitted on paper. Paper forms are scanned and sent through an electronic data exchange to the Prison Rehabilitative Industries and Diversified Enterprise Inc (PRIDE) for data entry.

## Quality Control

CRSCAN has 226 different business rules associated with the data imports. The crash data validation spreadsheet provides a number to each field name on the FTCD. The spreadsheet listing the business rules providing the following information:

- The acceptable input values for the field (data type such as DATETIME, VARCHAR, NUMBER, etc.).
- Required field.
- Valid values for the field.
- Any additional validation rules (including cross-field validations for logical agreement).

If the system does not accept the data, CRSCAN generates a load error report for the 3<sup>rd</sup> party vendors for an agency submitting the crash data. This information is provided back to the submitting agency. Agencies that use electronic field data collection software may catch some of the errors prior to submitting the report. Through electronic submission and data validation edits, error rates will be reduced.



## Data Exchanges

CRSCAN provides the crash report image (TIFF file), which includes the diagram and narrative, and the ten database tables shown in Table 2 directly to the following systems. More information on these systems are available later in this report.

- FIRES.
- DHSMV Analytics Warehouse.
- CAR System.
- Signal Four Analytics.

These four systems receive the tables in comma separated value (CSV) file format. Each of these systems are one of the core data systems that contribute to the State crash data system. CRSCAN does not receive any of the updates made to the crash dataset in other systems following the export.

CRSCAN also supports the Federal Motor Carrier Safety Administration's SAFETYNET system as one of its data exchanges. The SAFETYNET system collects crash data on commercial motor vehicle crashes. This data exchange provides crash data to SAFETYNET that meet the reportable crash guidelines for that system. It is not described in this report, as it is a federal database which is not generally used for safety analysis by the State.



## Reports Generated by CRSCAN

Table 3 lists the reports created by CRSCAN.

**Table 3. Reports Generated in CRSCAN**

| Report Name                      | Description                                                                                                                                                                                                                                                                                                            |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Load Error Report</b>         | A report that logs issues with the transfer of the data files to traffic safety stakeholders. This includes FDOT, FIRES, and Signal Four. The system provides the report to the DHSMV Oracle DBA to examine the issue and recreate the data file if necessary.                                                         |
| <b>Daily E-crash Load Report</b> | A daily report returned to the law enforcement agencies which lists the number of ZIP files provided, the number of total records provided, number of new and updated reports provided by report type (long or short), the number of load errors, the number of abort errors, and a details description of the errors. |
| <b>Fatality Report</b>           | A report that identifies all crash reports that contain an injury severity code of 5 (fatal within 30 days) or 6 (non-traffic fatality).                                                                                                                                                                               |
| <b>PRIDE Error Report</b>        | A report that identifies manually entered crash reports that contain errors and did not pass the data validation process.                                                                                                                                                                                              |
| <b>File Creation Report</b>      | A report listing the errors after the data files are created.                                                                                                                                                                                                                                                          |
| <b>Export Transaction Report</b> | A report that logs the transmission of the data files.                                                                                                                                                                                                                                                                 |

## Strengths and Limitations

### Strengths

- All of Florida’s other crash systems rely on CRSCAN as their source.
- The documentation for the CRSCAN is comprehensive.
- The data dictionary contains values consistent with Florida’s crash coding manuals, the FTCT form, and all other data collection and training materials.
- MMUCC is the primary reference defining State data elements for collection.
- Data interfaces between CRSCAN and several other traffic records systems already exist.



### *Limitations*

- CRSCAN is designed to maintain the integrity of the data provided by the law enforcement agencies on the crash report and therefore has a one-way exchange with the to maintain the integrity of the data provided by the law enforcement agencies. If one of the other crash systems updates the data it contains, it is not transferred back to the source system.

### **CRSCAN Process Diagram**

Figure 2. CRSCAN Process Diagram. contains a high-level diagram of the processes in which CRSCAN consumes and disseminates crash data. This diagram shows how the system receives the electronic and paper FTCTRs from law enforcement agencies (LEA) and how it is distributed to the other crash systems.

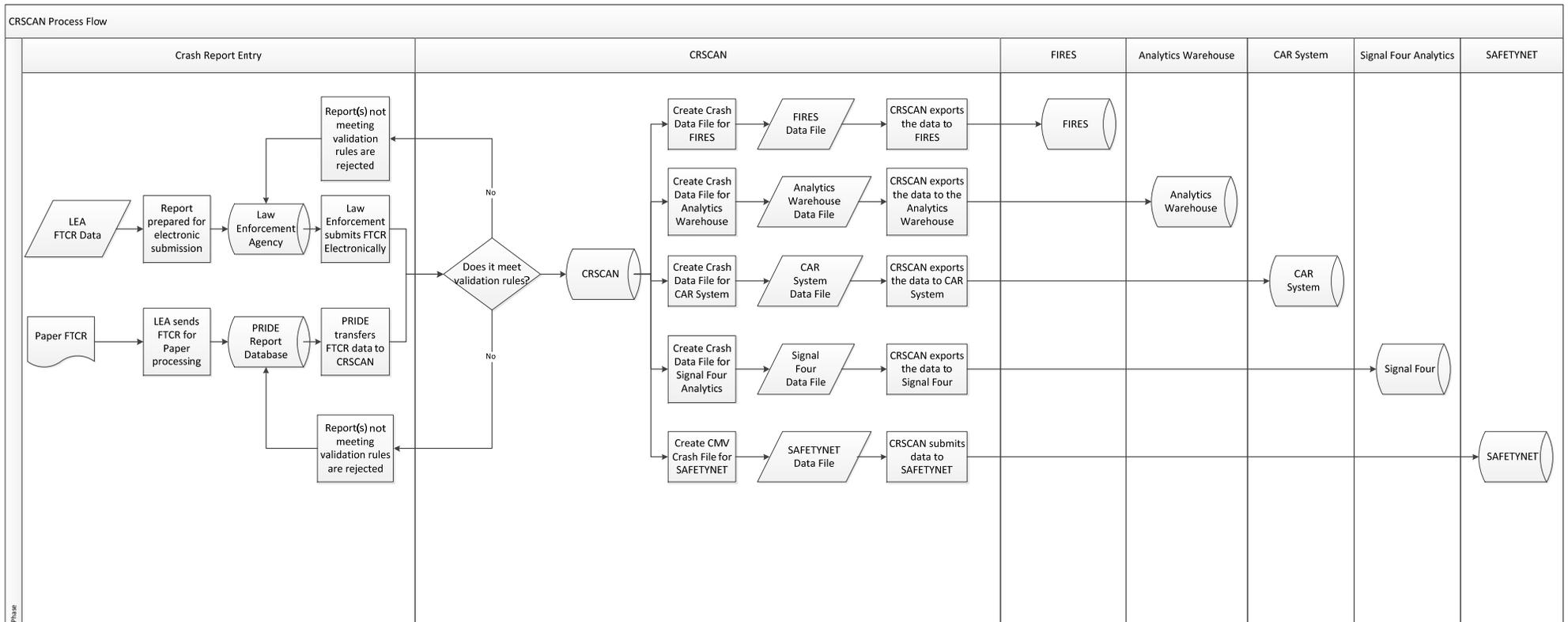


Figure 2. CRSCAN Process Diagram.



## Florida Integrated Report Exchange System (FIRES)

### State Points of Contact

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### System Description

FIRES is developed and maintained by a vendor on behalf of the Florida Department of Highway Safety and Motor Vehicles. It serves as a portal into the State of Florida's repository for traffic crash reports completed by Florida law enforcement agencies. This system also serves as an analysis portal for the State crash data. Through the online web portal, the general public, highway safety practitioners, engineers, law enforcement, and other traffic safety stakeholders have access to reports using the crash data. FIRES is intended as a tool to aid in decision making. DHSMV controls access to the more sophisticated functions of the application, but FIRES' public reporting function allows anyone to generate predefined reports or view "Quick Stats" directly from the public website. Authorized users can build custom queries and generate more detailed reports than those using the publicly accessible webpage. FIRES allows for users to query all short or long form crashes and all other driver self-reported crashes.

### Funding Source

The Florida Department of Highway Safety and Motor Vehicles provides the portal through a no-cost vendor contract that uses the revenue generated from the online sales of crash reports to sustain operations.



## Standards Used

This system receives the crash data from CRSCAN. The dataset follows the same standards as that of CRSCAN.

## Users

FIRES is the public facing portal used to generate reports and statistical information relating to crashes in Florida and to exchange data with other users. The web portal receives roughly 400,000 visits per year. These reports are often used for—but not limited to—law enforcement challenge campaigns, engineering studies, performance measurement, and reporting to the legislature. The list of FIRES users includes, but not limited to:

- DHSMV.
- LEAs.
- FDOT.
- Traffic safety stakeholders.
- General public.

FIRES currently has 3,078 active users, including such entities as US DOT, US Department of Labor, Air Force Legal Operations Agency, circuit courts, Florida Department of Health, medical examiners

## Data Inputs

FIRES receives crash data from the CRSCAN and also receives updated geolocation information from Signal Four Analytics (described later in this section). The system receives a file containing the crash data locations retrieved during the automated process.

## Quality Control

FIRES relies on the data validation edits used in CRSCAN to maintain a level of data accuracy and completeness with the data collection. FIRES performs a reconciliation between the data entered and what is sent back through CRSCAN. The report totals match with 99.5% accuracy. DHSMV provides a daily report with 10 fields, which FIRES uses to match their totals to CRSCAN, this process is being enhanced to provide 41 total fields.

## Data Exchanges

FIRES supports the following systems through electronic data exchanges:

- BuyCrash.com – This is an online portal that the public can use to purchase crash reports.
- NHTSA Electronic Data Transfer– Supports the submission of crash reports to NHTSA.



- Crash Report Sampling Service (CRSS) – Provides a random sample of crash reports to NHTSA. These crashes involve at least one motor vehicle traveling on a roadway. The crash must result in property damage, injury, or death.
- Signal Four Geolocated Crash Data Update – A file is provided by Signal 4 with updated geo-location data. Reports Generated from FIRES.

Table 4 shows the reports generated from FIRES.

**Table 4. FIRES Reports.**

| <b>Report Name</b>                         | <b>Description</b>                                                                                                                           |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Annual Crash Facts</b>                  | A publicly available report that provides summary statistics on crash data for all crashes available within FIRES.                           |
| <b>Law Enforcement Challenge Reports</b>   | A report used by LEAs that provides statistics paired to a specific enforcement campaign.                                                    |
| <b>Safety Campaign Reports</b>             | A report used by traffic safety stakeholders that provides statistics on State and federal campaigns for improving roadway safety behaviors. |
| <b>Monthly Timeliness Report</b>           | A report used to provide a measurement of timeliness for the State crash data.                                                               |
| <b>Ad-Hoc reports for authorized users</b> | Reports that users can generate using the query features built into the FIRES portal.                                                        |
| <b>Traffic Fatality Report by County</b>   | A report to provide data for the Annual Crash Facts.                                                                                         |

## Strengths and Limitations

### Strengths

- Report data is easily accessible for all data users.
- Reporting capabilities are easy to access and use.
- Receives updated geolocation data from Signal Four Analytics.
- FIRES has a public-facing portal.
- The system contains both long and short form crashes.



## FIRES Process Diagram

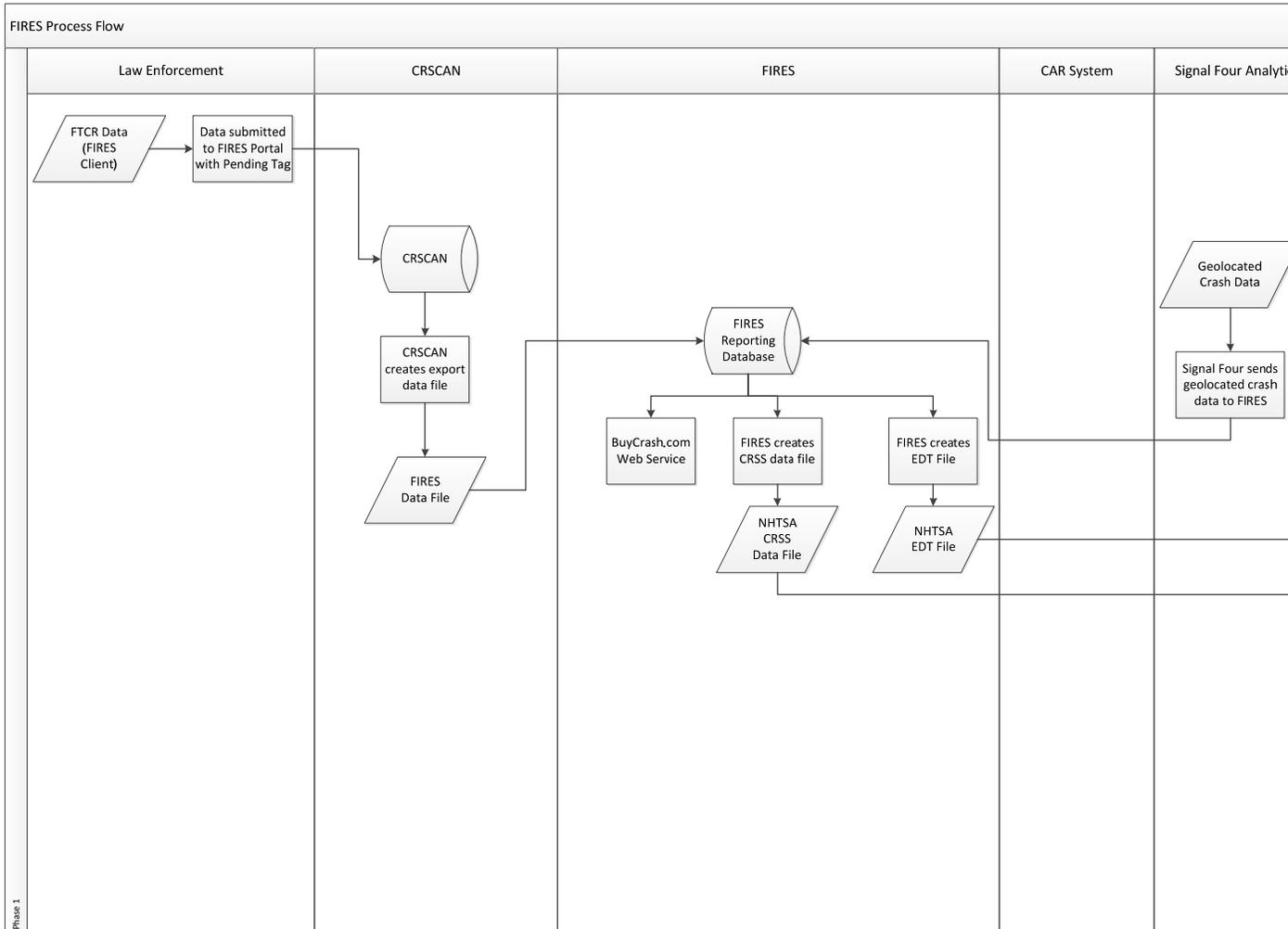


Figure 3. FIRES Process Diagram. diagrams the processes in which FIRES receives and disseminates crash data.

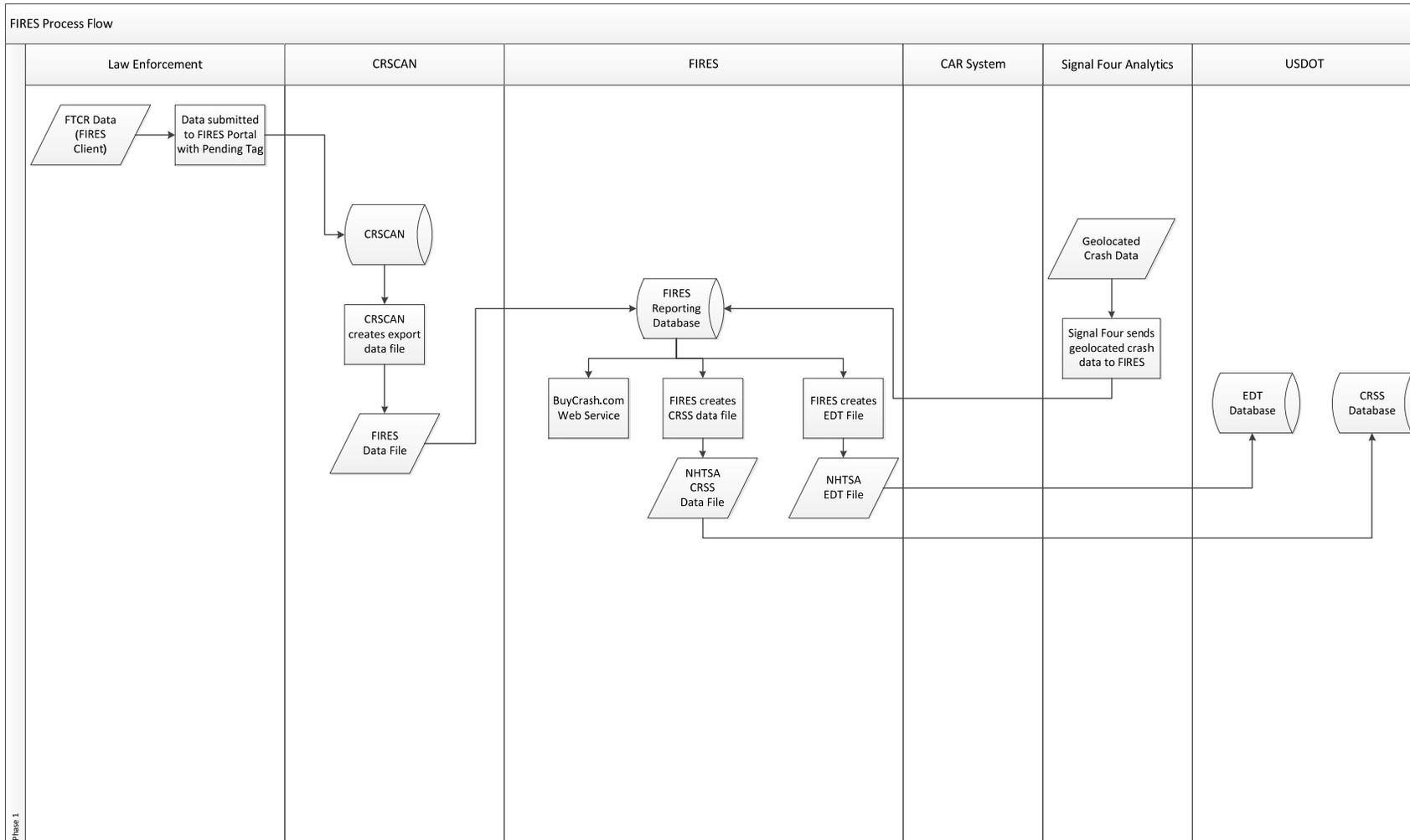


Figure 3. FIRES Process Diagram.



## DHSMV Analytics Warehouse

### State Point of Contact

|              |                                                         |
|--------------|---------------------------------------------------------|
| Name:        | Larry Gowen Stephanie Duhart                            |
| Title:       | Chief Performance Officer                               |
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| Address:     | 2900 Apalachee Pkwy, Tallahassee, FL 32399              |
| Phone:       | 850-617-2117                                            |
| Email:       | LarryGowen@flhsmv.gov                                   |

### System Description

The Analytics Warehouse is where DHSMV performs all the internal analytics of the crash data files. This system is linked to the vehicle, driver, and citation databases for reporting purposes. This system allows for DHSMV to have a reporting location for all data.

### Funding Source

The DHSMV Analytics Warehouse is a State-funded effort.

### Standards Used

This system receives the crash data from CRSCAN. The dataset follows the same standards as that of CRSCAN.

### Users

Users are DHSMV staff only.

### Data Input

The Analytics Warehouse receives data through an export of CRSCAN.

### Quality Control

The DHSMV did not list any validation edits within the Analytics Warehouse documentation. The system leverages the validation edits used in CRSCAN.

The Analytics Warehouse performs quality control on its data through reconciliation reports on the data being transferred from CRSCAN. This report evaluates the variance between what records are within the database.



## Data Exchanges

The only data exchange with this system is the input from CRSCAN.

DHSMV has implemented a new exchange from Signal Four to the Warehouse, which would provide updated location information to this system.

## Strengths and Limitations

### *Strengths*

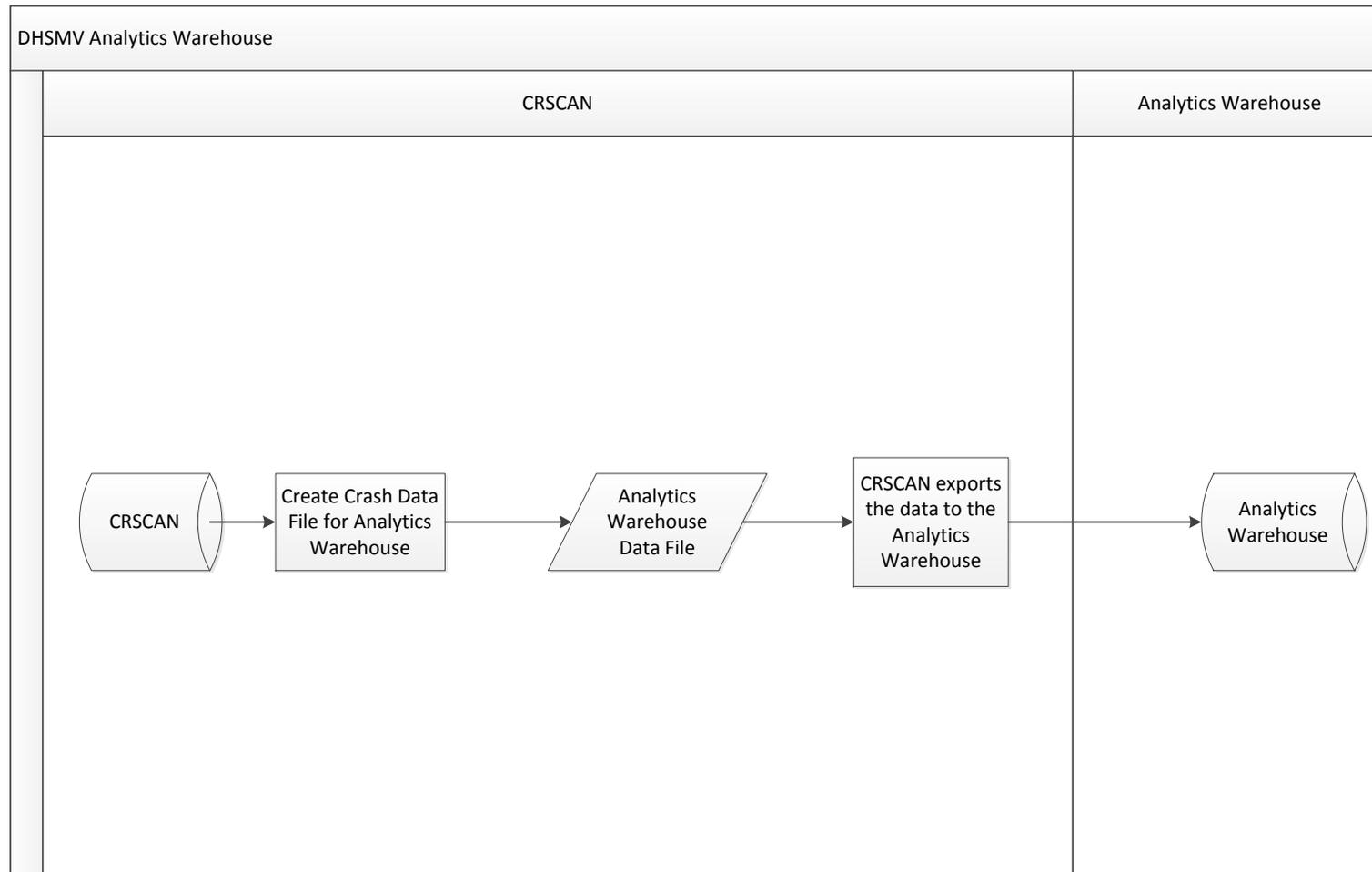
- Uses the same validation rules as the crash data repository.
- Can generate reports using integrated driver, vehicle, and citation data.
- Location information from Signal Four.

### *Limitations*

- Documentation describing this system is not on par with the documentation for other DHSMV systems.
- Can only be accessed by authorized DHSMV staff. This access must be controlled as personal information in driver and vehicle data, unlike crash data, is subject to the provisions of the Federal Driver Privacy Protection Act.

## Analytics Warehouse Data Flow

Figure 4 diagrams how the Analytics Warehouse receives the data from CRSCAN and imports the data into its database tables.



**Figure 4. Analytics Warehouse Process Diagram.**



## Crash Analysis Reporting (CAR) System

### State Point of Contact

|              |                                          |
|--------------|------------------------------------------|
| Name:        | Ben Jacobs                               |
| Title:       | Crash Records and Research Administrator |
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### System Description

The FDOT CAR system is the primary crash data system and repository for FDOT. The CAR system provides crash-specific data and aggregate reporting for most of the fields on the crash report. The system integrates the roadway data with all long-form crashes that occur on the State Highway System (SHS). The CAR does not include short-form crash reports. The system appends the following data elements to the CRSCAN data.

- Roadway functional class.
- Posted speed limit.
- Route type.
- National Highway System (NHS) indicator.
- Route number (i.e., for interstates, US routes, etc.).
- Number of lanes.

FDOT manually verifies the crash locations. The FDOT Crash Locator System (CLS) generates the locations of all crashes that are not on the SHS based on the lat/ long.

The CAR System has reporting capabilities that allow for queries on any long-form crash occurring on the SHS. The results can be exported as a PDF or the raw data can be exported as a CSV file.

FDOT sends an data file containing updated crash report locations to the FARS unit. This file is sent manually at least once per year.

### Funding Source

The CAR system is a State-funded system.



## Standards Used

The data elements collected within the CAR system adhere to the same data elements collected on the crash form. FDOT appends data from the roadway characteristics inventory (RCI) to the crash records.

## Users

The CAR system application is limited to FDOT users and FDOT's authorized contractors and consultants.

## Data Inputs

The CAR system receives nine (i.e., all but the witness table) of the CRSCAN tables in CSV format. TIFF image files of the crash reports are also stored as part of a document management system that CAR accesses through the crash records.

## Quality Control

The CAR system has quality control processes associated with the data that is imported into the system. The system performs a check for duplicate reports as the data is brought into CAR to assure the records are consistent with the data from CRSCAN. There is an automated location process that verifies all crash report locations. If the location is not found on the SHS, the FDOT Crash Records and Research section staff uses the crash form and diagram with the mapping tool to pinpoint the crash to either the SHS or local roadway system. Once verified, these locations are placed into the analysis dataset within CAR.

## Data Exchanges

The CAR system data exchanges are primarily internal to the FDOT. CAR has the following data exchanges:

- CRSCAN data files (import).
- Traffic Safety Web Portal (export).
- CLS.
- FARS Data File



## Reports Generated from CAR System

Table 5 shows the reports generated by the CAR system.

**Table 5. CAR Reports.**

| Report Name                 | Description                                                                                                                              |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Crash Detail Listing        | This report provides summary tables for various crashes types                                                                            |
| Annual Matrix Report        | A summary count of fatalities and serious injuries on the SHS. The ranking contained within the report is by county and then city/town.  |
| Reports from Ad-hoc Queries | Custom reports that users can generate using the query feature within CAR. This includes requests made to from the media for crash data. |

## Strengths and Limitations

### Strengths

- FDOT’s RCI is integrated with the crash data.
- The system uses a combination of manual and automated location coding processes with validation.

### Limitations

- CAR only contains long-form crash reports.
- FDOT does not receive the reportable crash flag from CRSCAN, and therefore cannot distinguish between crashes that meet the reportable threshold or not.
- Manual location data processing is time consuming, so FDOT is only able to provide this processing for crashes reported with the long-form format.

## CAR System Process

Figure 5. CAR System diagrams the processes in which the CAR system receives the crash data and how it is used alongside other FDOT systems. This diagram shows the receipt of crash data from CRSCAN, importing the data file into the reporting database, and dissemination to the other three FDOT systems that use the crash data.

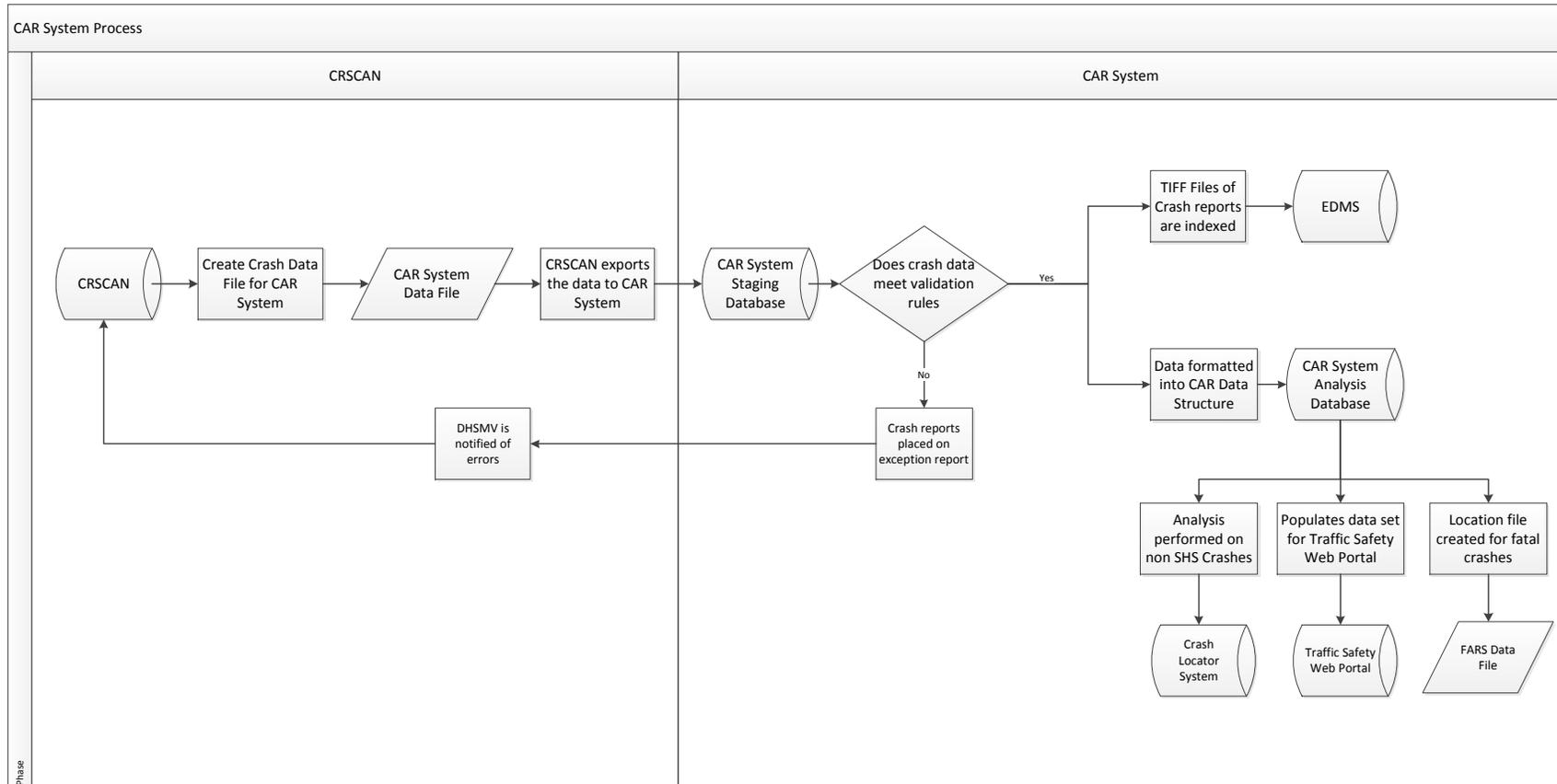


Figure 5. CAR System Process Diagram



## Signal Four Analytics

### State Point of Contact

|              |                                                                  |
|--------------|------------------------------------------------------------------|
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### System Description

Signal Four Analytics is a web-based GIS and analysis application that provides users with tools to perform crash data analysis. The tools rely on the geolocation of traffic crashes. The application is accessible online, but only available to authorized users approved by DHSMV.

Signal Four Analytics has an automated extract-transform-load (ETL) process to map the latitude and longitude from the crash report. The system geocodes these locations using the Florida Geographic Data Library and the Florida Unified Roadway Basemap. From the Signal Four Analytics dataset, users can build queries that can be filtered by the data types within the crash data. All users can see the queries built by any user of the system.

### Funding Source

The Florida TRCC funds Signal Four Analytics annually through a 23 USC 405(c) grant. The system also receives funding from MetroPlan Orlando and Brevard County to perform geolocation services in those regions.

### Standards Used

This system receives the crash data from CRSCAN. The dataset follows the same standards as that of CRSCAN.

### Users

Signal Four users consist primarily of planners and engineers. The users of this system include:

- Transportation planners.
- Metropolitan planning organizations.
- FDOT.
- University researchers.



- LEAs.
- DHSMV

## Data Inputs

Signal Four imports data from CRSCAN. Crash records are geolocated by an automated geolocation process. In the cases where an LEA is using the manual mapping services in Signal Four, the application does not have to review the report. The location mapping data sources are:

- Florida Unified Roadway Basemap.
- Florida Geographic Data Library.
- Local maps from counties that provide contractual services.

## Quality Control

Signal Four has validation edits built into the ETL process. If there is a violation, the system generates a report that an analyst reviews and the analyst will adjust the location manually as needed.

## Data Exchanges

Signal Four Analytics has two primary outputs. First, the system provides FIRES with a nightly file of crash location coordinates. DHSMV updates the crash records within FIRES with the locations verified during the automated process. The second output is the geolocation service itself for law enforcement agencies mapping crashes using Signal Four. This map, integrated in electronic crash data collection software, allows officers to select where the crash occurred on the roadway and populates the corresponding location data elements on the crash report record. Law enforcement agencies may use this mapping utility free of charge.

## Strengths and Limitations

### *Strengths*

- Completely web-based.
- The system uses reportable (i.e., long- and short-form crashes) as part of the analysis.
- Multiple map layers are used with the location service provided.
- Free access for LEAs using the crash locator tool.

### *Limitations*

- Location verification is an automated process with only limited manual correction for some jurisdictions.



## Signal Four Analytics System Process

Figure 6 diagrams the processes in which the Signal Four system receives the crash data and how it is imported into the reporting system. This diagram shows the receipt of crash data from CRSCAN, importing the data file into the reporting database, and the dissemination of the updated coordinates file for FIRES.

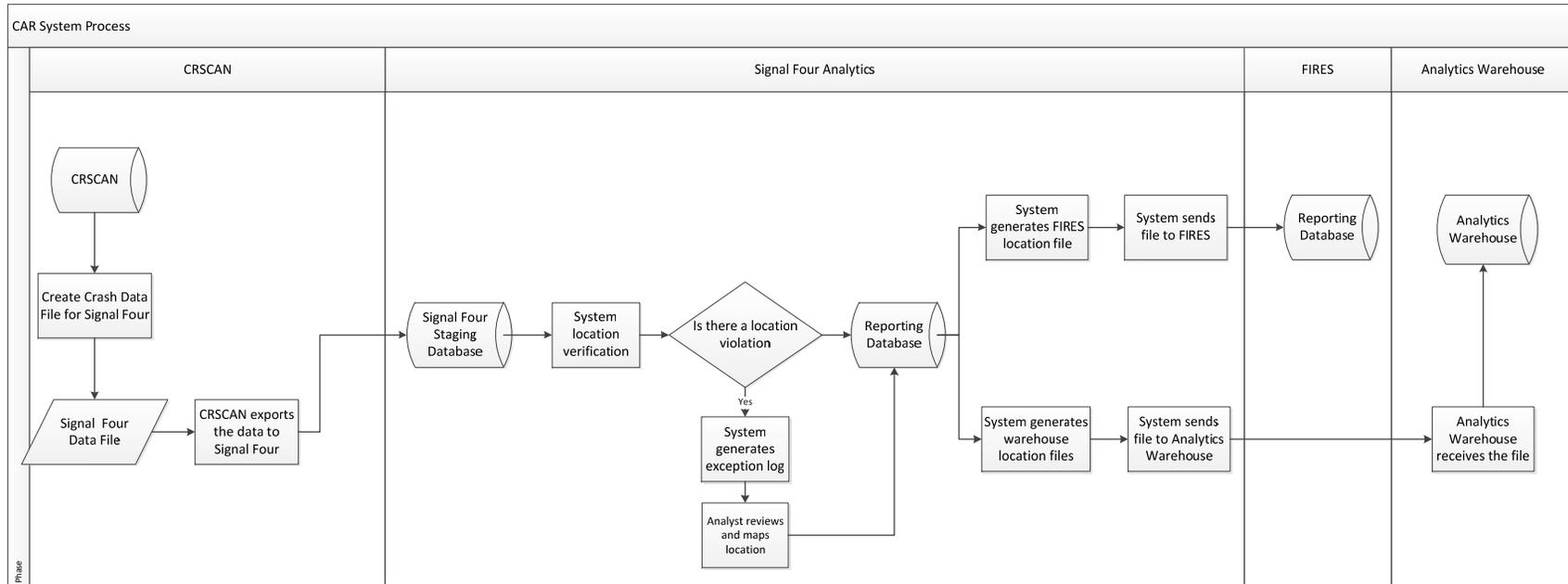


Figure 6. Signal Four Analytics System Process Diagram



# Crash System Observations

Following the inventory of this State’s data system, the GO Team made the following observations into the State’s crash system based on the data process flows identified from the existing documentation provided and stakeholder interviews.

## Replication of Data between Crash Data Systems

Florida currently houses full and partial instances of the crash data system in multiple systems under multiple agencies. CRSCAN is the common point of both entry and distribution for the major crash data systems. CRSCAN provides data tables, outlined in Table 2, as CSV files to the other systems described in this report. Each of these other systems collects the tables and imports the data into its system. Since CRSCAN exports are a direct copy of the crash data instance, the personally identifiable information (PII) is also transmitted to the other agencies and systems. The PII is not redacted upon entry. PII is only provided if the entity meets the outline of FS 316.066. Each system makes slight modifications to the data set. Table 6 compares the characteristics of the five primary crash systems in Florida.

**Table 6. Florida Crash System Characteristics.**

|                                    | <b>CRSCAN</b>     | <b>FIRES</b>     | <b>Analytics Warehouse</b> | <b>CAR</b> | <b>Signal Four Analytics</b> |
|------------------------------------|-------------------|------------------|----------------------------|------------|------------------------------|
| <b>Source of Crash Data</b>        | LEA RMS/<br>PRIDE | CRSCAN           | CRSCAN                     | CRSCAN     | CRSCAN                       |
| <b>Long Form FTCR</b>              | Yes               | Yes              | Yes                        | Yes        | Yes                          |
| <b>Short Form FTCR</b>             | Yes               | Yes              | Yes                        | No         | Yes                          |
| <b>PII received in data set</b>    | Yes               | Yes              | Yes                        | Yes        | Yes                          |
| <b>Reportable Crash Flag in DB</b> | Yes               | Yes              | Yes                        | No         | Yes                          |
| <b>Validated Location</b>          | No                | Yes; Signal Four | Yes, Signal Four           | Yes, FDOT  | Yes, Signal Four             |
| <b>Roadway Engineering Data</b>    | No                | No               | No                         | Yes, FDOT  | No                           |
| <b>User defined queries</b>        | Yes               | Yes              | Yes                        | Yes        | Yes                          |
| <b>Public Access</b>               | No                | Yes              | No                         | No         | Yes, with authorization      |



|                                                           |    |     |    |     |    |
|-----------------------------------------------------------|----|-----|----|-----|----|
| <b>Provides summary crash statistics to media outlets</b> | No | Yes | No | Yes | No |
|-----------------------------------------------------------|----|-----|----|-----|----|

Table 6. Florida Crash System Characteristics. highlights the commonality between the crash data systems. The Analytics Warehouse and FIRES have the same capabilities with the only difference being that FIRES has a public facing portal. CAR is the only system that contains valuable highway inventory information which is useful for roadway engineers. CRSCAN also includes a flag that determines if the crash is reportable. These are crash reports that address the requirements of Florida Statute 316.066. Crashes completed on the long-form FTCT may not necessarily meet the requirements to be code-able crashes. Once the CRSCAN considers a crash reportable, the reportable flag is provided to FIRES, the Analytics Warehouse, and Signal Four.

The CAR system is least consistent with the other crash data systems. CAR integrates all crashes that occur on the State Highway System (SHS) with the roadway data. FDOT staff manually verify crash location data and compare it with the State’s linear reference system. Crashes that do not occur on the SHS are not stored within the database. FDOT publishes GIS shapefiles on an annual basis. Another difference from FIRES, CRSCAN, and Signal Four is that the CAR system only imports the long-form crashes. This, and the lack of off-SHS crash data, prohibits the CAR system from operating as a comprehensive reporting crash repository.

## Location Verification Differences

The manner of verifying locations within CAR and Signal Four Analytics are different. The verification process for CAR requires staff to verify each location manually. Each crash location must run through the quality control process before it becomes a part of the analysis data table. Signal Four uses an automated address name matching process to verify the location. The Signal Four process produces more timely availability of the crash location coordinates, which is what feeds into the FIRES database and the DHSMV Data Analytics Warehouse. The team did not receive any performance measures showing the difference in location accuracy between Signal Four Analytics and the CAR system.



## Overlap in Statewide Summary Reporting Capabilities

Florida uses several different reports to provide summary crash statistics. The three main reports are listed in Table 7.

**Table 7. Crash Summary Statistics Reports in Florida.**

| <b>Report Name</b>                    | <b>Description</b>                                                                                                                 | <b>System Source</b> |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Crash Detail Listing</b>           | This report provides summary tables for various crashes types                                                                      | CAR System           |
| <b>Annual Matrix Report</b>           | A summary count of serious injuries and fatalities on the SHS. The ranking contained within the report is by county and then city. | CAR System           |
| <b>Annual Crash Facts Publication</b> | A publicly available report that provides summary statistics on crash data for all code-able crashes available within FIRES.       | FIRES                |

The CAR system contains all long-form crash records, while FIRES has the entire dataset. FIRES also has an additional flag that indicates reportable crashes. State personnel mentioned that media outlets contact either FDOT or DHSMV for summary crash statistics, and thus may get different answers depending on which agency they contact and which system is used to answer the questions. FDOT has more complete information for crashes occurring on the SHS. CRSCAN, the Analytics Warehouse, and FIRES have all crashes.



# GO Team Conclusions

Florida expressed interest in completing a second GO Team that would follow up on the information provided within this report and further assess user requirements and address duplicative efforts and systems. This report is a stepping stone for the State's crash data system evaluation. The GO Team identified the following actions for future consideration by Florida.

1. Document all crash data-related systems.
  - Identify and conduct a mapping of all systems that use crash data. There are other systems that rely on one or more of the primary systems listed in this document, which serve specific analysis, reporting, or other purposes for various stakeholders.
2. Document the major crash data user groups and contributors.
  - Survey these groups to get an accurate picture of their involvement with the various systems.
  - Obtain the reports used by these users.
3. Document all user and contributor needs.
  - An SME team could perform a gap analysis comparing users' needs to the available data and system capabilities. The gap analysis could also include the reports that are currently not available that these user groups would like to have.
4. Facilitate a decision-making session.
  - This session will use the observations from this report and the considerations from subsequent efforts to help the State determine the direction it needs to move in to provide the most cost-effective and comprehensive support for crash data users.

## Ongoing Support

The Florida TRCC has excellent support from within Florida DOT, from the NHTSA Regional Office, and the FMCSA and FHWA Division Offices. Further, the GO Team members are available to answer questions via email or phone call should the State feel the need for further explanation.