FDOT CAR PROJECT

Final Report Out

January 31, 2020

northhighland
WORLDWIDE CONSULTING

DELIVERABLES

This project was tasked with developing the following deliverables:

Start: Dec 4th **End: Jan 31st**

Deliverables/Work Product	General Description
Crash Data Interviews –Crash Data Systems Work Product	Review current FDOT systems that utilize crash data
Signal Four System Review	Review the University of Florida Signal Four System
Crash Data Process Diagrams	Develop current state process flows for the process of taking Crash Data from intake to publishing
Crash Data Flow Diagrams	Develop current state data flows for the process of taking Crash Data from intake to publishing
Crash Data Recommendations	Develop actionable recommendations for process improvements, data quality, and data availability

CONTENTS

CAR-S4 CURRENT BUSINESS PROCESS

CAR-S4 Business Process

CAR-S4 Business Process

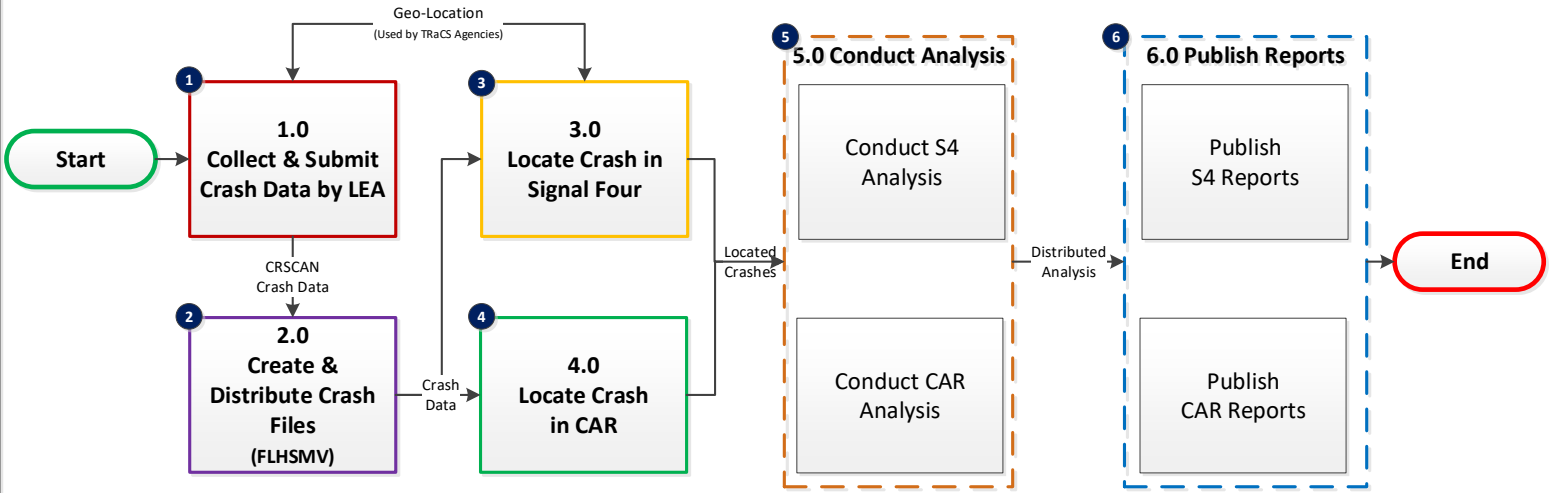
northhighland
WORLDWIDE CONSULTING

CURRENT CAR-S4 BUSINESS PROCESS

Crash Data Analysis and Reporting End-to-End Current Process (CAR/S4 Focus)

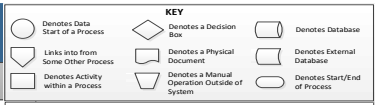
Level 1 Crash Analysis Reporting Process

Business Process Model



Glossary of Terms

ARBM	All Roads Base Maps
CAR	Crash Analysis Reports
CLS	Crash Locating System
CRSCAN	Official Statewide Repository
EMS	Emergency Medical Services
FARS	Fatality Analysis Reporting System
FCCC	Florida Court Clerks Comptrollers
FCIC	Federal Crime Information Center
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FLHSMV	Florida Highway Safety and Motor Vehicles
LEA	Law Enforcement Agency
LRS	Linear Reference System
MMUCC	Model Minimum Unified Crash Criteria
NCIC	National Crime Information Center
PRIDE	Prison Rehabilitative Industries and Diversified Enterprises
RCI	Roadway Characteristics Inventory
S4	Signal Four
SHS	State Highway System
SSO	State Safety Office
TIFF	Tagged Image File Format
UBR	Unified Base Map Repository



Interaction Notes

1. Process starts with the capturing of crash data using electronic or paper form and ends when crash reports have been reviewed and validated and provided to FLHSMV. Major activities involve the capture of crash data using E-Crash reporting software and on paper form (HSMV 90010S), the utilization of enabling tools (e.g., geo-location), manual reviews of data by LEA agencies and automated edit checks by respective systems. Process usually occurs within a ten-day time frame.

2. Process starts when approved crash report data has been received into FLHSMV DB and ends when CSV files have been created for distribution. Major activities include the creation of extract files and encrypted CSV files and the distribution of crash data (e.g., S4, CAR, FDOH, etc.). Process occurs nightly.

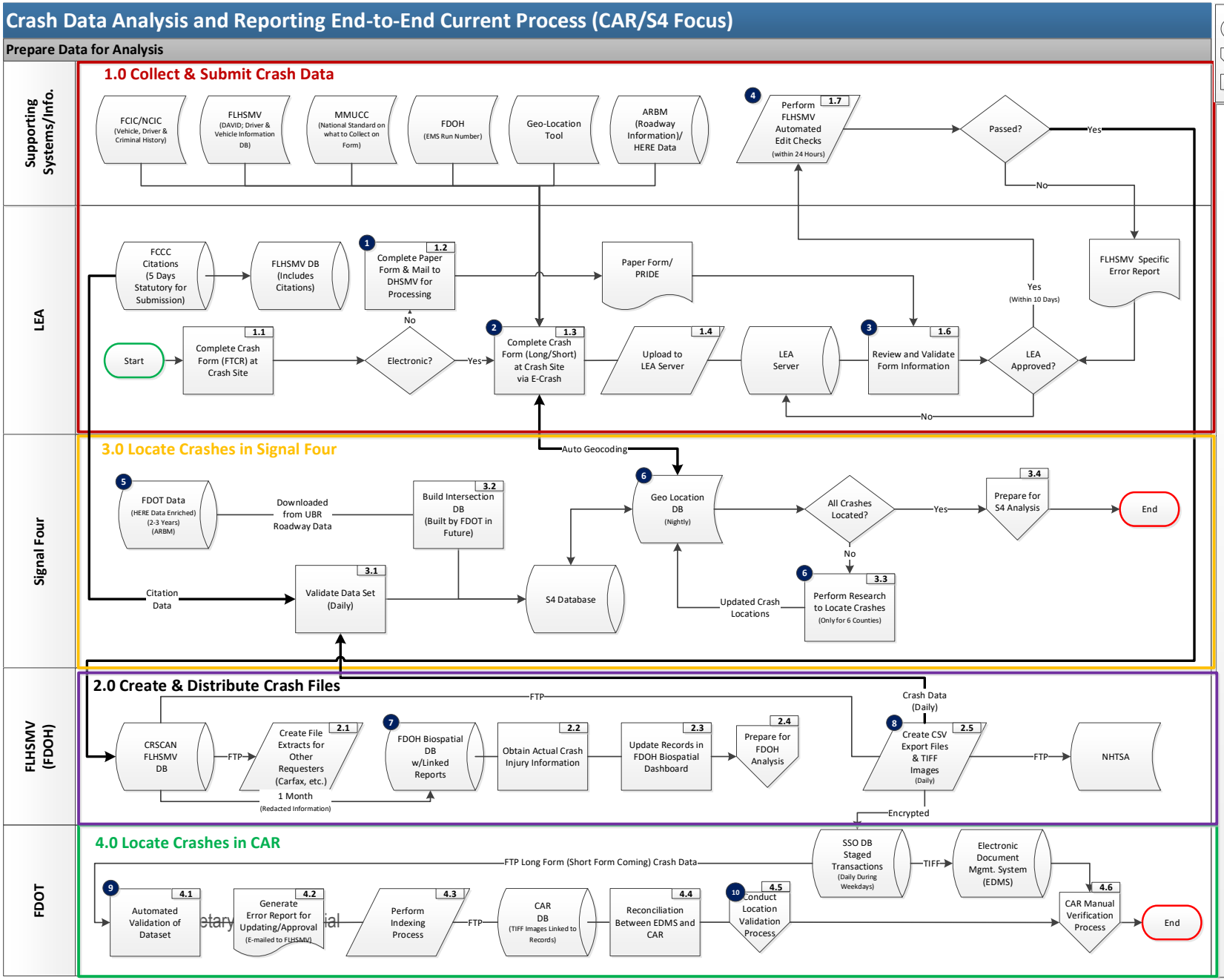
3. Process starts when CSV extract files have been sent to S4 from CRSCAN/FLHSMV and ends when crashes have been located and validated. Major activities include data access/capture through multiple sources, determining the exact geo-location of crashes and the performing of automated and manual verification checks. Process occurs daily.

4. Process starts when CSV extract files have been sent to CAR DB from CRSCAN/FLHSMV and ends when crashes have been located and verified in CAR. Major activities include importing data into CAR DB, on/off state highway system (SHS) crash locating, manual validation of crash locations by FDOT analysts for current and past years. Update process occurs daily. The process which supports annual publishing occurs annually but lags 10-11 months after calendar year end due to the finalization of the FLHSMV process.

5. Process starts when crash locations for a specific time frame have been verified and ends when output is ready for distribution. Major activities include conducting unique and common analysis in both CAR and S4 Analytics. Process occurs daily and annually for specified published reports.

6. The process starts when analysis output has been distributed and ends when publishing is complete. Major activities include: data reconciliation, daily queries and reporting and publishing of annual reports. Process occurs daily and on an annual basis. However, it lags a few months due to reconciliation/ data management activities.

CURRENT CAR-S4 BUSINESS PROCESS



Interaction Notes

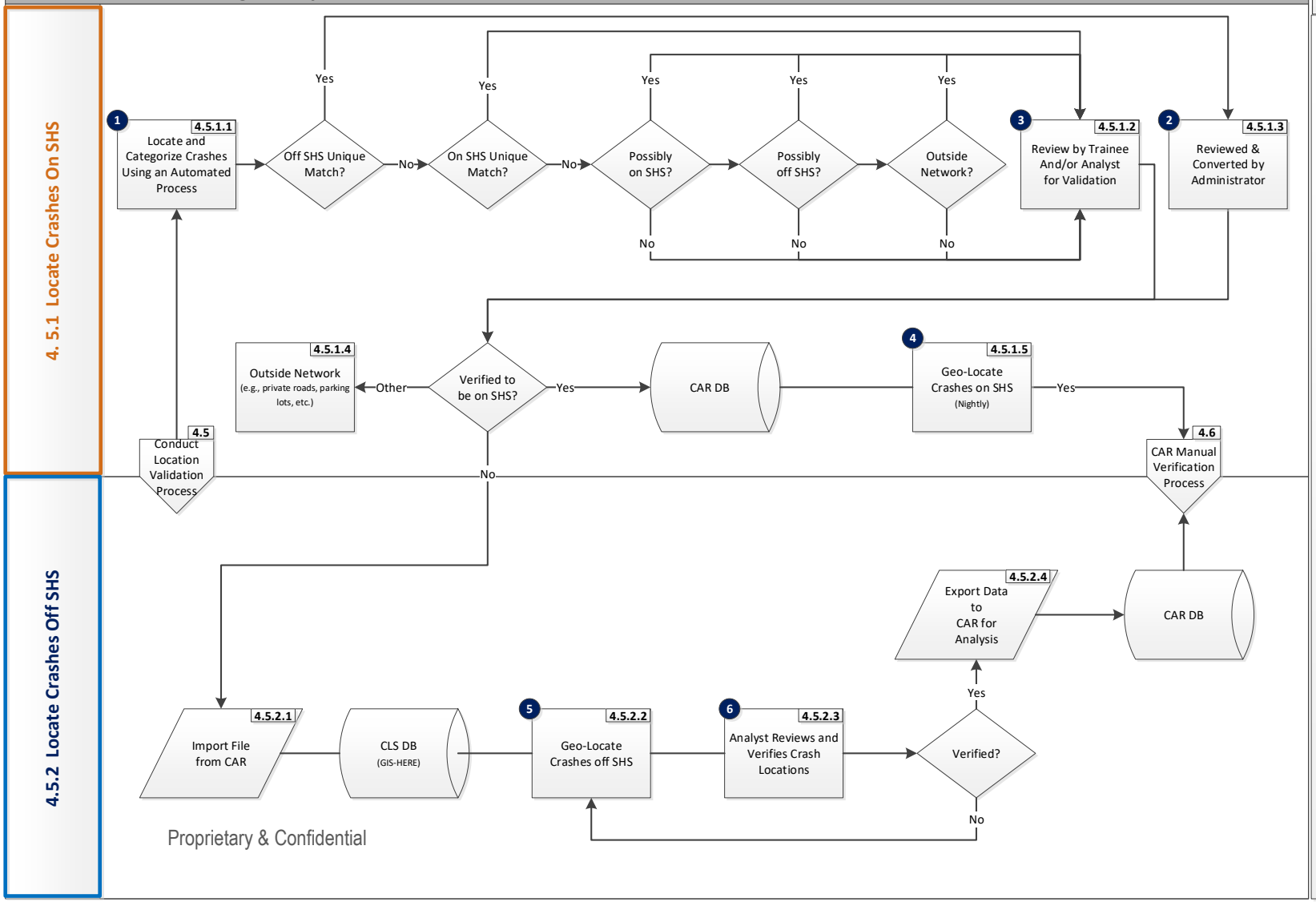
1. The majority of crash forms (HSMV 90010S) are completed electronically. However, about 5% are completed on paper. When this occurs, these forms are mailed to FLHSMV, which in turn are mailed to a 3rd Party (PRIDE) are scanned to a Tagged Image File Format (TIFF) and keyed into a digital DB.
2. Forms completed electronically by law enforcement agencies (LEA) using various E-Crash reporting software on their laptop. During this process, multiple supporting databases are used to facilitate this process including the capture of the EMS run number, S4 geo-location, etc.. A combined Signal Four geo-location/diagraming tool is in progress, which will facilitate the geolocating and diagraming of the crash.
3. All crash form data (electronic and paper) is reviewed by a supervisor (or multiple) before being uploaded. This process typically takes 1-2 days, but target completion is within 10 days of which ~80% achieve this time frame. Most received within 30 days. The small financial incentive provided, if completed within 10 days, helps if sold.
4. LEA data is uploaded nightly into CRSCAN where it is validated via automated edit checks/business rules. An error report is sent back to the LEA for updating if issues are found.
5. This data is typically updated less frequently than annually. However, annual is the goal. The HERE data is enriched from FDOT with additional information (e.g., number of lanes, speed limits, functional classifications, etc.) and is used to generate the ARBM.
6. A nightly batch is run to geocode crashes. On exception, If a crash is not able to be located, the Signal Four (S4) staff maps this manually. If a location can't be determined, S4 works with FDOT and others to reconcile by the close of the year.
7. Once FLHSMV sends crash data to FDOH, a probabilistic match (typically 70% to 80% match) is run to link EMS Reports to crash reports using run number or other means (age, gender, time, location, etc.). Matched data is uploaded into the FDOH Biospatial Dashboard for analysis. Looking to utilize deterministic approach for matching in the future.
8. CRSCAN data are formatted together with one TIFF document for each of the crashes in the event. CSV files are grouped together, after which encryption and transfer occurs.
9. The file received from FLHSMV is unencrypted and the data (.csv files) are loaded into the CAR database while the documents (TIFF files) are loaded into EDMS database. The process uses automated checks prior to loading data in CAR.

   More specifically, the CAR db receives the data files from the export and it loads 9 of the 10 files exactly as they are, generating 9 tables with the raw data. The process does not load the witness.csv file because the witness information is not used in the processes and is not needed for reporting or analysis. The TIFF documents are loaded to the EDMS, separate from the data. During the load process, calculated and replicated data are used to generate 10th table with versions of the fields that are used in the location and quality control processes.
10. CAR has an established process for identifying the exact location of crashes on both state owned and non-state owned roadways, which is described in more detail in the referenced flow.

CURRENT CAR-S4 BUSINESS PROCESS

Crash Data Analysis and Reporting End-to-End Current Process (CAR/S4 Focus)

4.5 Locate Crashes Using CAR System



KEY

Denotes Data Start of a Process
Denotes a Decision Box
Denotes Database
Links into from Some Other Process
Denotes a Physical Document
Denotes External Database
Denotes Activity within a Process
Denotes a Manual Operation Outside of System
Denotes Start/End of Process

Interaction Notes

1. SSO data and other FDOT data is screened through an automated process utilizing a Linear Reference System (LRS) to determine crash locations on and off the State Highway System (SHS). On SHS uses FDOT's Roadway Characteristics Inventory (RCI). Off SHS utilize a GIS method for locating crashes. In some cases, crashes are outside the public roads network and are not given location coordinates.

   As part of this process, crash locations are categorized as follows:
   1) Single Unique Match for on SHS (S11)~17%
   2) Single Unique Match for off SHS (S17)~16%
   3) No Unique Match (S12-S15)~57%
   4) Outside Network (S16)- ~10%

2. Those crashes where a unique match is found either on or off the State Highway System (SHS) are manually reviewed or converted directly by the administrator into their respective data base (i.e., manually reviewed in the CAR DB for on SHS crashes or replicated into the Crash Location System (CLS) DB for separate review for the off-SHS crashes.)

3. All other crash categories are manually reviewed by a location analyst.

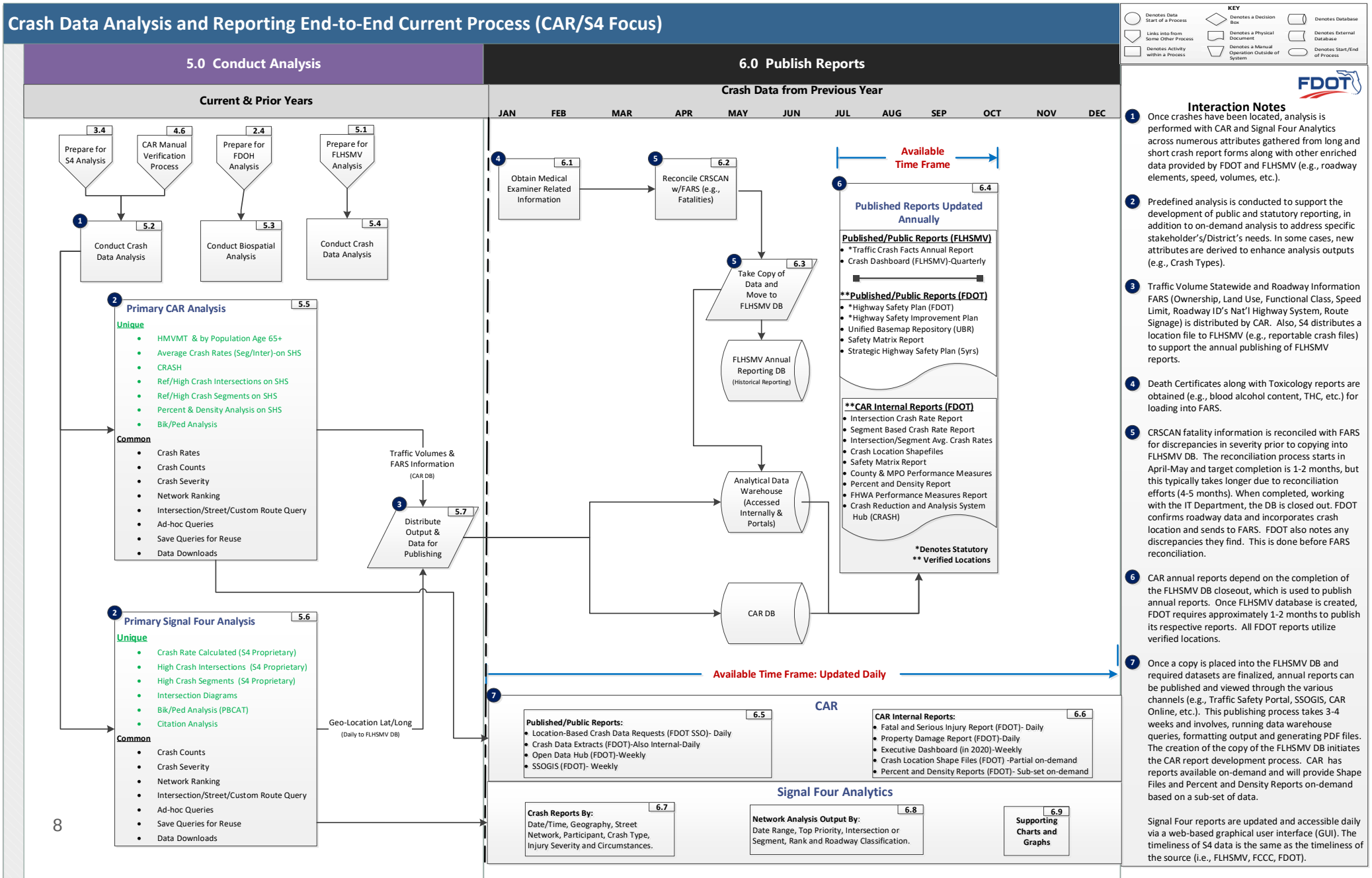
4. Geographic coordinates for crashes confirmed on the SHS by location analyst are generated each evening by a process that uses the LRS location to find latitude and longitude and then those geographic coordinates are added to the database.

5. Crash records for crashes determined to be located on roadway that is not actively maintained by the FDOT are processed using a Geographic Information System (GIS) based application called the CLS using a commercial GIS (map) dataset from HERE Technologies (unmodified). Target is to use All Roads Base Map (ARBM) for this process. ARBM is the FDOT inventory combined with the HERE data set to capture all public roads.

6. Crashes are then located and verified by analysts. Verified locations are then exported to CAR for analysis.

CURRENT CAR-S4 BUSINESS PROCESS

Crash Data Analysis and Reporting End-to-End Current Process (CAR/S4 Focus)



Interaction Notes

1. Once crashes have been located, analysis is performed with CAR and Signal Four Analytics across numerous attributes gathered from long and short crash report forms along with other enriched data provided by FDOT and FLHSMV (e.g., roadway elements, speed, volumes, etc.).
2. Predefined analysis is conducted to support the development of public and statutory reporting, in addition to on-demand analysis to address specific stakeholder's/District's needs. In some cases, new attributes are derived to enhance analysis outputs (e.g., Crash Types).
3. Traffic Volume Statewide and Roadway Information FARS (Ownership, Land Use, Functional Class, Speed Limit, Roadway ID's Nat'l Highway System, Route Signage) is distributed by CAR. Also, S4 distributes a location file to FLHSMV (e.g., reportable crash files) to support the annual publishing of FLHSMV reports.
4. Death Certificates along with Toxicology reports are obtained (e.g., blood alcohol content, THC, etc.) for loading into FARS.
5. CRSCAN fatality information is reconciled with FARS for discrepancies in severity prior to copying into FLHSMV DB. The reconciliation process starts in April-May and target completion is 1-2 months, but this typically takes longer due to reconciliation efforts (4-5 months). When completed, working with the IT Department, the DB is closed out. FDOT confirms roadway data and incorporates crash location and sends to FARS. FDOT also notes any discrepancies they find. This is done before FARS reconciliation.
6. CAR annual reports depend on the completion of the FLHSMV DB closeout, which is used to publish annual reports. Once FLHSMV database is created, FDOT requires approximately 1-2 months to publish its respective reports. All FDOT reports utilize verified locations.
7. Once a copy is placed into the FLHSMV DB and required datasets are finalized, annual reports can be published and viewed through the various channels (e.g., Traffic Safety Portal, SSOGIS, CAR Online, etc.). This publishing process takes 3-4 weeks and involves, running data warehouse queries, formatting output and generating PDF files. The creation of the copy of the FLHSMV DB initiates the CAR report development process. CAR has reports available on-demand and will provide Shape Files and Percent and Density Reports on-demand based on a sub-set of data.

   Signal Four reports are updated and accessible daily via a web-based graphical user interface (GUI). The timeliness of S4 data is the same as the timeliness of the source (i.e., FLHSMV, FCCC, FDOT).

Data Gaps

DATA GAP ASSESSMENT

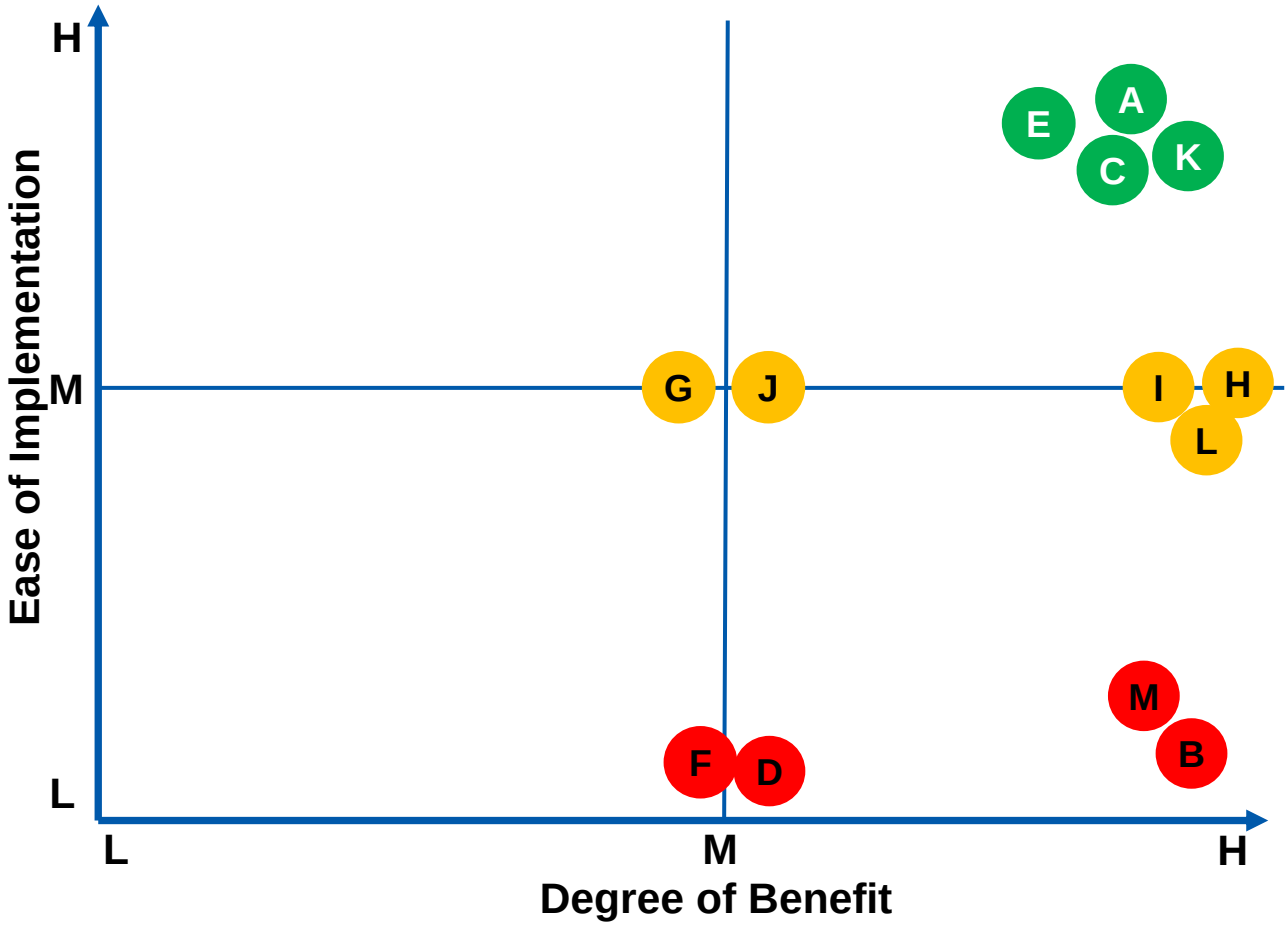
DATA GAP ASSESSMENT

13 data gaps and their associated closure approaches have been Identified.

Ref	Data Gap	Owner	Closure Approach
A	Missing Short Forms in CAR	FDOT	Use S4, leveraged with efficiency gains
B	Underdeveloped ARBM	FDOT	Contract ends 6/30/20. Redefine GIS/HERE requirements (FDOT and Safety)
C	Determine Side of Public Road Crash Occurred	FDOT	Use S4 and updated interface to add/maintain data. Pending NHTSA approval
D	Limited Number of MIRE Elements for Analysis	FDOT	Focus on Fundamental Data Elements (FDE) first, coordinate with other offices
E	Missing CRSCAN vs. FARS Exception Report	FLHSMV	Re-develop hack report. Bring on resource to support develop a report
F	No Ability to Modify Individual Crash Records	FLHSMV	Using manual approach, but need to ability to change within system
G	Limited User Flexibility to Analyze Crash Data	FLHSMV/FDOT	Lost some ability with Lexis/Nexis. Look at alternative enterprise solution
H	Infrequent Updates to ARBM	FDOT	Target annual updates utilizing additional CAR resource capacity
I	Actual EMS Severity Not Captured in Crash Data	FDOH	Coordinate with FDOH to obtain and map information into geolocation process
J	Limited Ability to Fix Recurring LEA Data Issues	FLHSMV	Work with LEA to establish a balanced process for updating at the source
K	Inconsistent Crash Type Derivation	FDOT	Understand current methodologies and standardize on one to use in S4
L	Missing Collision Diagrams in CAR	FDOT	Work with districts to enhance what's in S4 today
M	SPF and HSM are not Integrated	FDOT	Integrate SPF and HSM methods leveraging current Traffic Eng. & Ops analysis

DATA GAP ASSESSMENT

Ease of Implementation vs. Degree of Benefit



Ref	Data Gap
A	Missing Short Forms in CAR
B	Underdeveloped ARBM
C	Determine Side of Public Road Crash Occurred
D	Limited Number of MIRE Elements for Analysis
E	Missing CRSCAN vs. FARS Exception Report
F	No Ability to Modify Individual Crash Records
G	Limited User Flexibility to Analyze Crash Data
H	Infrequent Updates to ARBM
I	Actual EMS Severity Not Captured in Crash Data
J	Limited Ability to Fix Recurring LEA Data Issues
K	Inconsistent Crash Type Derivation
L	Missing Collision Diagrams in CAR
M	SPF and HSM are not Integrated

LEGEND

- Tier 1: Quick Hits
- Tier 2: Next in Line
- Tier 3: Challenging

CAR-S4 Capability Assessment

CAR-S4 CAPABILITY GAP ASSESSMENT

CAPABILITY GAP ASSESSMENT

Summary of Analysis

1. A total of 86 Core Capabilities have been identified across Geolocating, Analytics and Roadway Reference category areas

2. A total of 18 gaps were identified with feasible Mitigation Approaches

3. The move to Signal Four will allow the organization to inherit additional geolocating and analysis core capabilities across (10)

4. Core Capabilities were concentrated in Crash Locating, Crash Analysis, Crash Reports and Crash Data Management (Ref. Appendix)

5. Most capabilities will align to Signal Four (32) and both systems (44) going forward, with CAR focusing on analysis (10) (Ref. Appendix)

CAPABILITY GAP ASSESSMENT

18 capability gaps have been identified

Ref#	Area	Core Capability	Description	In CAR	In S4	Target System	Gap Reason
58	Analytics	Crash Analysis	Determine the "Crash Type" (derived)	N	Y	Both	Not done in CARS
64	Analytics	Crash Analysis	Conduct analysis around predefined points of interest (e.g., Schools, Hospitals, Fire Stations, Police Stations, etc.)	N	Y	Both	Part of Open Data Hub via web apps in CARS
65	Analytics	Crash Analysis	Generate "Crash Types" (derived) for analysis and highlight with various icons and tools tips for further explanation	N	Y	Both	CARS currently doesn't derive Crash Types
84	Analytics	Crash Analysis	Chart-based reporting dashboard	N	Y	S4	CARS currently does not do charting
4	Geolocation	Crash Locating	Automated crash locating on non-state roadways -	Y	P	S4	Location limited to county and classification as “Off” State Highway System
5	Geolocation	Crash Locating	Manual crash locating on non-state roadways	Y	Y	S4	Using two systems and would like to use one (i.e., S4). Need to streamline
78	Geolocation	Crash Locating	Additional data collected during location review process, both analyst-generated and derived from base map	Y	N	S4	Not done in S4
38	Geolocation	Crash Locating	Automated crash locating on non-state roadways	N	Y	S4	Doesn’t do this automatically. This is manual in CARS
8	Analytics	Crash Data Management	Add or update individual crash records, including notes	Y	P	Both	S4 not able to capture notes. CAR does, but this for internal purposes for geo-location purposes to justify/explain decisions.

CAPABILITY GAP ASSESSMENT

18 capability gaps have been identified -Cont'd

Ref#	Area	Core Capability	Description	In CAR	In S4	Target System	Gap Reason
80	Geolocation	Crash Data Management	Ad hoc reporting capabilities, that can be used to populate reporting tables in the FDOT database	N	N	S4	Targeted future functionality
81	Analytics	Crash Data Management	An export of crash location and reference data to be loaded in the FDOT database	N	N	S4	Targeted future functionality
7	Analytics	Crash Viewing	View crashes for State Highway System on-line at detailed and summary levels	Y	P	Both	S4 does detail, but not summary
63	Analytics	GUI for Analysis	Use GUI for defining a custom geographic area for analysis by selecting or drawing a search area around the area of interest and save for later reuse	P	Y	Both	CARS has ability to draw this in SSOGIS, but it can not be saved since this is public.
77	Geolocation	Interactive geocoding	Ability to edit the location type (intersection/segment/ramp/off roadway)	P	Y	S4	Want to use the web-based tool for this for CAR
79	Geolocation	Interactive geocoding	Store both the point at the absolute location and the point on the street centerline	N	Y	S4	Not done in CAR
32	Roadway Reference	RCI Management	Extract, transform and load relevant RCI inventory fields for roadway data reference during CAR system location processing	Y	N	ARBM/S4	Would like to use ARBM in S4. This is an ARBM gap
33	Roadway Reference	RCI Management	Archive (Freeze) RCI inventory ETL fields for roadway data reference during CAR system location processing for previous years using the RCI for that year	Y	N	ARBM/S4	Would like to use ARBM in S4
30	Roadway Reference	Route Sequencing	Identify, for all state-maintained roadways, the sequence in which they are traveled statewide from North to South and East to West.	Y	N	ARBM/S4	Would like to use ARBM in S4

CAPABILITY GAP ASSESSMENT

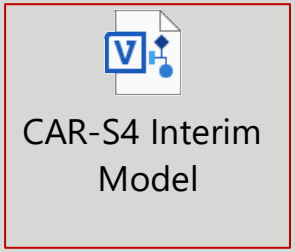
10 new capabilities will be inherited with the integration

Ref#	Area	Core Capability	Description	In CAR	In S4	Target System
55	Analytics	Charting	Chart crash data within the application to support analysis	N	Y	S4
85	Analytics	Citation Analysis	Mapping, query, charting, reports and data export for citations	N	Y	S4
76	Analytics	Crash Analysis	Network analysis based on link ID crash rates, severity and crash counts	N	Y	S4
61	Analytics	Crash Analysis	Automatically conduct crash analysis by city	N	Y	Both
40	Analytics	Crash Data Mgmt.	Conduct analysis using both long and short form crash data - POSSIBLE WITH CAR FOR STATE HIGHWAY SYSTEM, BUT SHORT FORMS NOT IN CAR DB	N	Y	S4
47	Geolocation	Crash Reports	Generate statistical reports detailing the success rate and confidence level of automatic batch geocoding	N	Y	S4
48	Geolocation	Crash Reports	Generate statistical reports detailing use of the Geolocation Service by vendor and reporting agency	N	Y	S4
74	Analytics	Export Output	Bike/Ped crash type detail (PBCAT)	N	Y	S4
62	Analytics	GUI for Analysis	Use a GUI for adding or removing segments for analysis	N	Y	S4
57	Analytics	Print Output	Print out analysis, charts or maps to files (including PDF's)	N	Y	S4

BENEFITS OF UTILIZING SIGNAL FOUR

Utilizing Signal Four as the centralized Geolocating tool will:

1. Help Close Data Gaps (4 out of 13 or ~30%)
2. Help Close Capability Gaps (9 out of 18 or ~50%)
3. Allow the Inheritance of new Geo-Locating and Analysis Capabilities (10)
4. Increase throughput efficiencies (~50%)
5. Decrease cost per crash record from an estimated $1.15 to $.76



CAR-S4 INTERIM FUTURE STATE BUSINESS MODEL

CAR-S4 INTERIM FUTURE STATE BUSINESS MODEL

Instructional Note

Organization Objective

Document the strengths and challenges towards establishing a single statewide crash repository to ultimately provide safety stakeholders quality data when, where and in the form needed. This will provide the ability to maximize the efficiency and effectiveness of traffic records data resources, collection, analysis, and reporting needs.

Capabilities Pending NHTSA Approval

1. CRSCAN Central Crash Repository Updates and Improved Data Quality
   - Web service to distribute crash report images
   - Revised CRSCAN ingestion of aerial photo-based crash diagrams
   - Synchronize FLHSMV CRSCAN w/S4 Analytics
2. CAR-S4 Geocoding Tools Development & Integration
   - Geolocating tools to meet FDOT requirements
   - Platform change from Silverlight to HTML5
   - Switch from Google to ESRI for maps
   - Single Common FDOT and S4 intersection DB
3. Enhanced Web-based Geolocation Diagraming Tool {L} compatible w/S4

Data Gaps Addressed

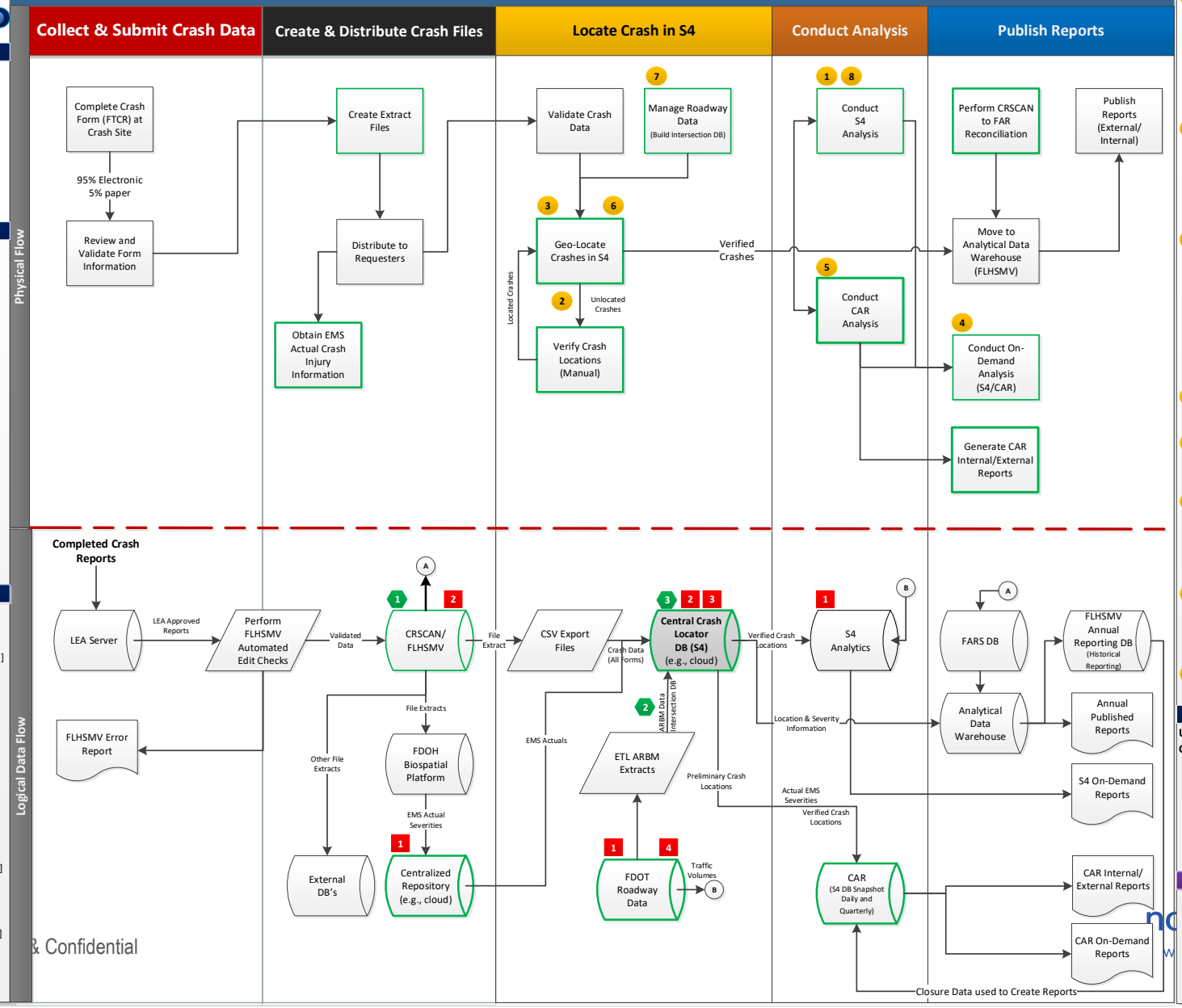
1 Crash Analysis
- Limited User Flexibility to Analyze Crash Data [G]
- Actual EMS Severity Not Captured in Crash Data [I]
- Inconsistent Crash Type Derivation [K]
- SPF and HSM are not Integrated [M]

2 Crash Data Management
- Missing Short Forms in CAR [A]
- Missing CRSCAN vs. FARS Exception Report [E]
- No Ability to Modify Individual Crash Records [F]
- Limited Ability to Fix Recurring LEA Data Issues [J]
- Missing Collision Diagrams in CAR [L]

3 Crash Locating
- Determine Side of Public Road Crash Occurred [C]

4 RCI Management
- Underdeveloped ARBM [B]
- Limited Number of MIRE Elements for Analysis [D]
- Infrequent Updates to ARBM [H]

Crash Data Analysis and Reporting End-to-End Future State Process (CAR/S4 Focus)



Capability Gaps Addressed

1 Crash Analysis
- Determine the "Crash Type" (derived) [58]
- Conduct Crash Analysis around areas of interest in S4 [64]
- Highlight Crash Type w/Icons and Various Tool Tips for Further Explanation [65]
- Chart-based reporting dashboard in S4 [84]

2 Crash Data Management
- Inclusion of Notes on S4 Crash Records [8]
- Reporting capabilities used to populate reporting tables in FDOT database [80]
- An export of crash location and reference data to be loaded in the FDOT database [81]

3 Crash Locating
- S4 Crash Location Identification on State Roads [4]
- Using one system to conduct manual crash locating on non-state roadways [5]
- Will gain automated crash location on non-state roadways in S4 [38]
- Additional data collected during location review process, both analyst-generated and derived from base map [78]

4 Crash Viewing
- Summarized Reporting for Crash S4 [7]

5 GUI for Analysis
- Will be able to leverage a GUI to Draw boundaries to select areas of interest in S4 [63]

6 Interactive Geocoding
- Edit the location type (intersection/segment/ramp/ off roadway) in S4 [77]
- Store both the point at the absolute location and the point on the street centerline in S4 [79]

7 RCI Management
- Extract, Transform & Load RCI Data into S4 [32]
- Freeze RCI Data in S4 for Archive to Support Historical Reporting [33]

8 Route Sequence
- Route Sequence Development in S4 [30]

Statements of Benefit

Utilizing Signal Four as the centralized Geolocating tool will:
- Help Close Data Gaps (4 out of 13 or ~30%)
- Help Close Capability Gaps (9 out of 18 or ~50%)
- Allow the Inheritance of New Capabilities (10)
- Increase throughput efficiencies (~50%)
- Reduced Training Effort (~67%)
- Increased efficiencies will help decrease cost per crash records from an estimated $1.15 to $.76

LEGEND

- Capabilities Pending NHTSA Approval
- Capability Gaps Addressed by Future State
- Data Gaps Addressed by Future State
- [1] Ref. to Capability Gap Spreadsheet Details
- [A] Ref. to Data Gap Spreadsheet Details

RECOMMENDATIONS

RECOMMENDATIONS

1. **Consolidate crash location process into a single platform** 
2. Establish a cross-organizational task group charged with the implementation of the portfolio of quick hits regarding Data and Capability Gaps
3. Establish organizational governance structure for the future of Signal 4
4. Dedicate the required resources to maintain the All Roads Base Map (ARBM)
5. Need to expand the Model Inventory of Roadway Elements (MIRE) currently captured
6. Develop a single accessible repository for all Crash related data for the safety stakeholders
7. Define user needs for data analysis and reporting

 = Project Inflight

RECOMMENDATIONS

Consolidate crash location process into a single platform

Benefits

1. Provides a single source for crash location both preliminary and verified
2. Streamlines the verified location process by ~ 50%
   a. Decrease cost per crash record from $1.15 to $0.76
3. Eliminates location variances across multiple systems
4. Modernizes the FDOT tools used to locate crashes and simplifies the process and reduces the training required by 67%
5. Help close 30% of identified data gaps and 50% of identified capability gaps

Challenges

- Since not all CAR functionality will move to Signal 4, a version of CAR will still need to be maintained and interface with Signal 4
- CAR Verification workflow does not currently exist in Signal 4
- Need to determine what, if any, data needs to be converted from CAR to Signal 4 (e.g., roadway data, verified location)
- Need to go back 5 years and validate location of short forms

Next Steps

- Currently pending NHTSA approval
- Initiate project with Signal 4
- Define requirements for current CAR verification workflow
- Develop approach for data migration and determine any required pre-migration activities
- Coordinate with the CAR Rewrite project and set a milestone to determine best location for current CAR analysis functionality

Timeline

- Start within the next 3 months

RECOMMENDATIONS

Establish a cross-organizational task group charged with the implementation of the portfolio of quick hits regarding Data and Capability Gaps

Benefits

Determine Side of Public Road Crash Occurred [C]

1. Provides necessary data for safety analysis

Missing CRSCAN vs. FARS Exception Report [E]

1. Could save 25-30 business days in the annual FLHSMV closeout process
2. Allows FDOT to begin developing annual reports faster

Inconsistent Crash Type Derivation [K]

1. Standardizes crash type across all stakeholders and systems

Next Steps

- Identify cross agency team to focus quick hits
- Prioritize quick hits and develop schedule to address each
- Once quick hit items are complete, move on to tier 2 gaps

Challenges

- Will need to coordinate with other initiatives already in progress
- All impacted agencies will need to commit the time and resources to participate
- The reconciliation process and business rules for CRSCAN and FARS are complex
- Signal 4 does not currently determine side of road for crashes

Timeline

- Start within the next 3 months

RECOMMENDATIONS

Establish organizational governance structure for the future of Signal 4

Benefits

1. Ensures decisions can be made timely with input from all impacted stakeholders
2. Clearly defines roles and responsibilities for the future of Signal 4 operations and maintenance
3. Effective governance provides:
   a. Continuous alignment with program strategy
   b. Optimized utilization of resources
   c. Tracking and monitoring of project delivery
   d. Identification, assessment, and mitigation of risks

Next Steps

- Establish the goals and objectives of governance and the expectations for all agencies
- Obtain leadership buy-in and support
- Define the operating requirements for the governance model
- Factor in any applicable regulatory, governance or legal requirements
- Define governance guiding principles
- Design the governance structure

Challenges

- All impacted agencies will need to commit the time and resources to participate

Timeline

- Start within the next 3 months

RECOMMENDATIONS

Dedicate the required resources to maintain the All Roads Base Map (ARBM)

Benefits

1. ARBM is currently used by Signal 4 to tie location data to the roadway. The ARBM is updated every 2 years currently. Updating the ARMB annually, at minimum, will ensure more accurate location data.

Next Steps

- Identify additional resources that can support the maintenance of ARBM
- Inventory all Data Sets currently being maintain to understand what FDOT is currently spending to maintain multiple data sets
- Assess the ability to consolidate into a single data set for all FDOT needs

Challenges

- Currently there is only a single FDOT resource that maintains the ARBM
- Currently RCI data and HERE data conflation process is time intensive because there is not a common geometry used between the two
- HERE contract is proprietary and not shareable to the public

Timeline

- Start within the next 3 months

RECOMMENDATIONS

Need to expand the Model Inventory of Roadway Elements (MIRE) currently captured

Benefits

1. Additional data would help identify more effective safety counter measures
2. Aligns to FHWA guidance

Next Steps

- Focus on a sub-set of MIRE that are used for fundamental safety analysis first
- Coordinate with the IRAIS/ESRI Roads and Highways project

Challenges

- Limited resources to make changes
- Changes would be needed in RCI and HERE data
- Coordination with other offices in FDOT that collect and use the data is needed

Timeline

- Start within the next 6-12 months

RECOMMENDATIONS

Develop a single accessible repository for all Crash related data for the safety stakeholders

Benefits

1. Ensures data that is enhanced by a crash data stakeholders is distributed to all users
   a. Example: Validated location data from FDOT could be provided to FLHSMV, DOH, and the public
   b. Example: Linked EMS data could be provided to FLHSMV and FDOT, to increase the accuracy of injury severity
2. Eliminates the duplication of data across agencies

Next Steps

- Define single repository architecture design for all Traffic Record Systems
- Define multi-agency data model for single repository
  - Synchronize definitions across Crash data stakeholders
- Review potential cloud options for a centralized repository
- Develop a pilot using the current Signal 4 and EMS data as a proof of concept
  - Establish success criteria for pilot

Challenges

- Need to determine who would own own and maintain the centralize repository (data governance)
- Define table/field level access and security requirements for each agency to limit access to only required data

Timeline

- Planning - Start in next 3 months
- Detailed Design, Development, and Implementation – Start in 12+ month

RECOMMENDATIONS

Define user needs for data analysis and reporting

Benefits

1. Provides more real time access to crash data for analysis
2. Ensures stakeholder reporting needs are met
3. Identify unmet reporting and analysis needs

Next Steps

- Decision driven approach for report/query development: Understand the decisions being made across the organization and the information/knowledge needed to address these
- Performance Management Driven: Understand the current metrics, identify new ones and ensure the reporting supports those needs
- Establish quality levels for interim reports and verified report
- Determine data sharing methods
- Coordinate with Signal 4 around current reporting and analysis efforts

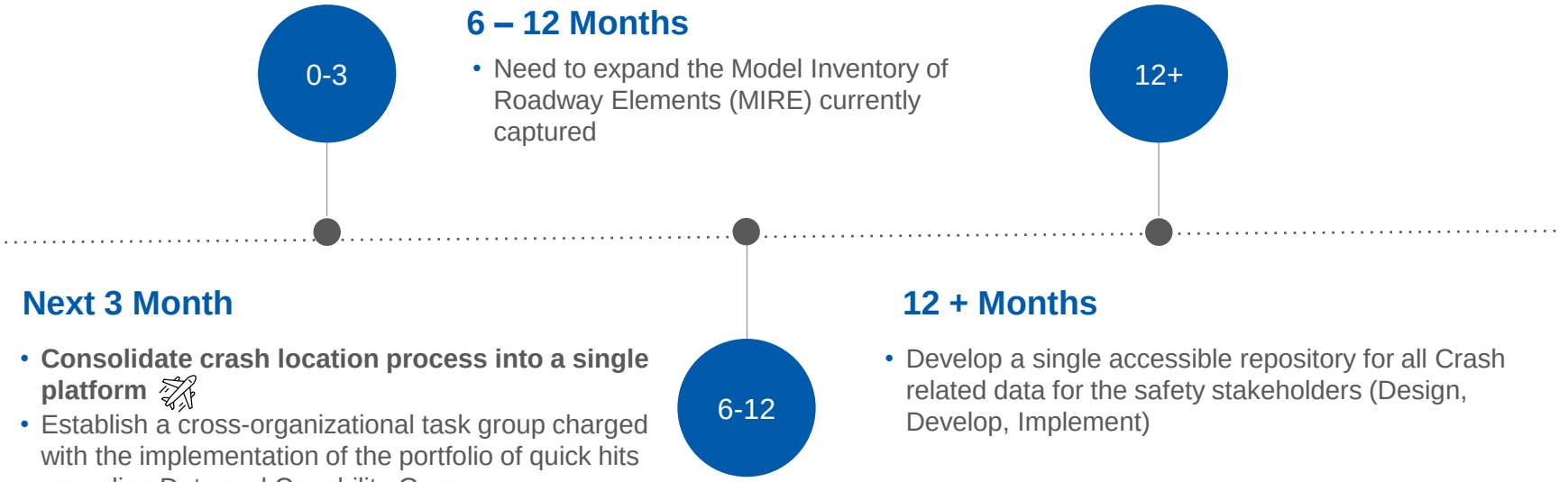
Challenges

- Need to identify all impacted stakeholder groups and reporting needs
- All impacted agencies will need to commit the time and resources to participate
- Some data may have restrictions on how it can be shared

Timeline

- Start within the next 3 months

TIMELINE



APPENDIX

Capability Gap Assessment Supporting Tables

northhighland
WORLDWIDE CONSULTING

CAPABILITY GAP ASSESSMENT

86 capabilities have been identified across the three core areas listed below

Geo-Locating (22)	Analytics (52)	Roadway Reference (12)
Automated Geocoding (1)	Charting (1)	Alias Names (2)
Crash Data Management (2)	Citation Analysis (1)	Crash Data Management (2)
Crash Locating (9)	Crash Analysis (16)	Node Management (2)
Crash Reports (2)	Crash Data Management (7)	RCI Management (4)
Interactive Editing (4)	Crash Rate Confidence (1)	Route Sequencing (2)
Interactive Geocoding (4)	Crash Reports (10)	
	Crash Viewing (2)	
	Export Output (2)	
	GUI for Analysis (2)	
	GUI for Queries (1)	
	Map-Based Analytics (3)	
	Print Output (1)	
	Query Management (3)	
	Subset Creation (1)	
	User Management (1)	

northhighland.
WORLDWIDE CONSULTING

CAPABILITY GAP ASSESSMENT

Core Capabilities align across CAR and Signal Four as reflected

CAR (10)	Signal Four (32)	Both (44)
ARBM (3)	Automated Geocoding (1)	Crash Analysis (8)
Crash Analysis (5)	Citation Analysis (1)	Crash Data Management (6)
Crash Reports (1)	Crash Analysis (3)	Crash Reports (9)
Crash Rate Confidence (1)	Crash Locating (7)	Crash Viewing (2)
	Crash Data Management (2)	Export Output (1)
	Crash Reports (2)	GUI for Analysis (1)
	Interactive Editing (4)	GUI for Queries (1)
	Interactive Geocoding (4)	Map-Based Analytics (3)
	Charting (1)	Query Management (3)
	GUI Analysis (1)	Subset Creation (1)
	Map Based Analytics (1)	User Management (1)
	Print Output (1)	Alias Names (2)
	GUI for Analysis (1)	Node Management (1)
	Map-Based Analytics (3)	RCI Management (3)
		Route Sequencing (2)

northhighland.
WORLDWIDE CONSULTING

SIGNAL 4 VISION