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|  | Florida ITS Architecture Support and Maintenance Project  SITSA Conversion Report (ARC-IT 9.0)  Version 1.0 |

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# Introduction

This Architecture Conversion Report records the Statewide Intelligent Transportation System (ITS) Architecture (SITSA) conversion from its reference in the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) Version 8.3 to ARC-IT Version 9.0. This report addresses the results of the conversion process.

# Conversion Process

The architecture conversion process uses the Regional Architecture Development for Intelligent Transportation (RAD-IT) software Version 9.0 to convert the architecture to be compatible with ARC-IT Version 9.0. The process includes the following steps to accomplish the conversion.

* Architecture conversion: Conversion features in RAD-IT Version 9.0 convert the architecture database schema to be compatible with RAD-IT Version 9.0 and aligned to reference ARC-IT Version 9.0 content.
* Conversion analysis: Conversion information is produced by RAD-IT for the architecture conversion noting the changes made. The conversion information notes the schema and content changes, such as service splits or consolidations, element divisions, and information flow adjustments. Analysis is required for each converted item to assess the appropriateness of each change for the architecture. For example, the roadway equipment coordination information flow was split into 14 separate information flows which need to be analyzed to determine which apply for each architecture. Another example includes the addition of the new CVO05 Commercial Vehicle Parking service which also involves the division of the Parking Management System element into two new elements, namely the Parking Area Equipment and Parking Management Center elements. These new elements along with the new CVO05 service are applicable to all eight Florida ITS Architectures requiring analysis and update of the architectures to accommodate the new ARC-IT content.

A substantial change that ARC-IT Version 9.0 imposes on the Florida ITS Architectures during conversion is the reorganization of the standards associated with each information flow in each of the architectures and their associated projects. The reorganization introduces solutions which associate sets of standards for consideration to address an interface or information flow implementation. The conversion process does not provide the solutions information automatically. The standards solutions were populated with default selections and the selections were analyzed for their applicability for the architecture and each project. In the RAD-IT software, the Standards tab in the user interface is now the Communications tab.

* Architecture content update: The intent of the conversion process was to maintain the alignment of the converted Architecture content to the greatest extent possible with the pre-conversion Architecture content. As noted above, element physical object mapping changes, service package changes, information flow additions and adjustments, and the evolution of the standards mappings in ARC-IT Version 9.0 required changes to be made to the Architecture content. Unless it was necessary, no additional changes beyond those required to align the pre-conversion and converted architecture content were made. During the course of the Annual Architecture Maintenance Update, ARC-IT Version 9.0 features that could be considered as additional information to the Architecture will be assessed.
* Architecture website posting: The converted architecture will be posted to the Florida ITS Architecture website.

# Architecture Conversion Results

The SITSA was converted to be compatible with ARC-IT Version 9.0. The following sections highlight the changes made to the architecture as a result of the conversion process.

## Architecture Inventory Elements

Table 1 provides conversion results for architecture inventory elements impacted by the conversion process. The table information shows the element impacted, the results of the element conversion, the analysis disposition, and the notes of the conversion implementation.

Table 1 Conversion Analysis of Inventory Elements

| **Element in Source Architecture** | **Element in Converted Architecture** | **Conversion Disposition** | **Conversion Notes** |
| --- | --- | --- | --- |
| County City and Local Parking Management Systems. Mapped to:   * Parking Management System | County City and Local Parking Management Systems. Mapped to:   * Parking Management Center * Parking Area Equipment | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. County City and Local Parking Management Systems element is not included in any services but has interface with FL511 with flows that are included in PM05 service package (SP) on the PMC and TIC interface. Need to add PM05- Parking Reservation SP and include ‘Private Travelers Personal Computing Devices’ in it. | Added ‘PM05: Parking Reservations (County City and Local Parking)’ SP. |
| FDOT TPAS. Mapped to:   * Parking Management System * Traffic Management Center | FDOT TPAS. Mapped to:   * Parking Management Center * Parking Area Equipment * Traffic Management Center | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a ‘Parking Area Equipment’ element and an interface with appropriate flows to the ‘FDOT TPAS’ element using CVO05 SP which will replace the existing PM04: Regional Parking Management (TPAS) SP. | Added ‘FDOT TPAS Equipment’ element. Deleted’ PM04: Regional Parking Management (TPAS)’ and added ‘CVO05: Commercial Vehicle Parking (TPAS)” SP. |

## Architecture Services

Table 2 provides conversion results for architecture services impacted by the conversion process. The table information shows the services impacted, the results of the service conversion, the analysis disposition, and the notes of the conversion implementation.

Table 2 Conversion Analysis of Services

| **Service in Source Architecture** | **Service in Converted Architecture** | **Conversion Disposition** | **Conversion Notes** |
| --- | --- | --- | --- |
| PM04: Regional Parking Management (TPAS) | CVO05: Commercial Vehicle Parking | The Truck Parking Availability System (TPAS) is now more directly supported with CVO05: Commercial Vehicle Parking SP. Replace PM04: Regional Parking Management (TPAS) SP with CVO05: Commercial Vehicle Parking (TPAS) SP along with the related inventory elements as noted in Table 1. | Replaced PM04: Regional Parking Management (TPAS) SP with CVO05: Commercial Vehicle Parking (TPAS) SP. |
| No SP supporting County City and Local Parking Management Systems which was functionally split during conversion. | PM05: Parking Reservations (County City and Local Parking) | Add PM05: Parking Reservations (County City and Local Parking) SP to support inventory elements as noted in Table 1. | Added PM05: Parking Reservations (County City and Local Parking) SP |

## Architecture Functional Requirements

The functional requirements were reviewed in the converted architecture for any changes resulting from conversion. Minor changes resulted from the conversion process to 54 functional requirements. No issues were found with the conversion changes. An example of the changes to the requirements are provided in Table 3.

Table 3 Functional REquirements Conversion Examples

| **Element Name** | **Functional Object** | **Req Num** | **Old Requirement** | **New Requirement** |
| --- | --- | --- | --- | --- |
| FDOT District Transportation Management Centers using SunGuide | Emergency Response Management | 20 | The center shall receive temporary facility restrictions that are imposed during maintenance and construction. | The center shall receive temporary facility restrictions that are imposed during maintenance and construction that may impact emergency response. |
| FDOT District Transportation Management Centers using SunGuide | Emergency Response Management | 21 | The center shall receive proposed maintenance and construction work plans, analyze the activity as a possible incident, and provide work plan feedback to the sending center. | The center shall receive proposed maintenance and construction work plans, analyze the activity as a possible incident requiring emergency response, and provide work plan feedback to the sending center. |
| FDOT District Transportation Management Centers using SunGuide | Emergency Secure Area Sensor Management | 12 | The center shall monitor maintenance status of the security sensor field equipment. | The center shall maintain the status of the security sensor field equipment. |
| FDOT District Transportation Management Centers using SunGuide | MCM Incident Management | 01 | The center shall receive inputs from the Alerting and Advisory System concerning the possibility or occurrence of severe weather, terrorist activity, or other major emergency, including information provided by the Emergency Alert System. | The maintenance center shall receive inputs from the Alerting and Advisory System concerning the possibility or occurrence of severe weather, terrorist activity, or other major emergency, including information provided by the Emergency Alert System. |
| FDOT District Transportation Management Centers using SunGuide | MCM Incident Management | 02 | The center shall exchange alert information and status with emergency management centers. The information includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction. The information may include the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, etc. | The maintenance center shall exchange alert information and status with emergency management centers. The information includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction. The information may include the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, etc. |

## Architecture Information Flows

During the conversion process, 4794 new information flows were added to the interface tab in the RAD-IT software but were not added to the architecture. This makes these new flows available for future tailoring based on stakeholder needs or requests, but did not change the architecture content represented by the pre-conversion architecture.

The conversion process included the renaming of 13 information flows corresponding to ARC-IT Version 9.0 changes. The modified information flow names were reviewed in the converted architecture and no issues were found that would impact the architecture content and meaning. Table 4 provides the information flow changes resulting from conversion.

Table 4 Information Flow Conversion Changes

| **Source Element** | **Destination Element** | **Old Flow Name** | **New Flow Name** |
| --- | --- | --- | --- |
| FHP Vehicle | FHP Regional Dispatch | incident status | incident scene status |
| Financial Institutions | FDOT OS/OW Permit System | transaction status | settlement |
| Financial Institutions | Florida License Registration and Fuel Tax System | transaction status | settlement |
| Florida Transit Systems | FL511 | transit incidents for media | transit incident information |
| Financial Institutions | FDOT OS/OW Permit System | transaction status | settlement |
| Financial Institutions | FDOT OS/OW Permit System | transaction status | settlement |
| Florida Transit Systems | FL511 | transit incidents for media | transit incident information |
| Florida Transit Systems | FL511 | transit incidents for media | transit incident information |
| FHP Vehicle | FHP Regional Dispatch | incident status | incident scene status |
| Florida Transit Systems | FL511 | transit incidents for media | transit incident information |
| Financial Institutions | FDOT OS/OW Permit System | transaction status | settlement |
| FHP Vehicle | FHP Regional Dispatch | incident status | incident scene status |
| Florida Transit Systems | FL511 | transit incidents for media | transit incident information |

## Architecture User Defined Information Flows

The conversion process can generate information flow alternatives for user defined flows in the original architecture. Where these information flow alternatives were available, they were reviewed against the user defined flows in the architecture for potential replacement. This a manual process requiring comparison of the user defined information flows with alternatives. In many cases, the user defined flows exist between inventory elements that are not functionally supported by the physical object pairs and selected services. In those cases, the user defined flows were retained. Where information flow alternatives provided an exact replacement, the user defined flows were replaced with the ARC-IT information flows. Examples of user defined information flows that were revised during conversion are provided in Table 5.

Table 5 User Defined Information Flow Change Examples

| **Source Element** | **Destination Element** | **User Defined Flow** | **ARC-IT Flow** |
| --- | --- | --- | --- |
| FHP Regional Dispatch | FLHSMV CR SCAN Database | emergency archive data\_ud | emergency archive data |
| FHP Resource Analysis System | FLHSMV Crash Data Portal | emergency archive data\_ud | emergency archive data |
| FDOT District Transportation Management Centers using SunGuide | FDOT District Construction and Maintenance | environmental conditions data\_ud | environmental conditions data |
| FDOT District Transportation Management Centers using SunGuide | FDOT District Construction and Maintenance | road weather information\_ud | road weather information |

## Standards

ARC-IT Version 9.0 reorganized the standards associated with each information flow. The reorganization introduces solutions which associate sets of standards for consideration to address an interface or information flow implementation. During the conversion process, standards solutions are not automatically converted. The auto-selection function was used to populate the standards solutions associated with the architecture interface content. The standards solutions selections were reviewed for consistency with the pre-conversion architecture. While additional standards information is now available in the converted architecture, the information was found to be appropriate for each interface to support system design considerations and decisions. The following is an example of the type of standards information now available in the architecture.

**Source Element:** FDOT District Transportation Management Centers using SunGuide

**Destination Element**: FDOT District Construction and Maintenance

**Information Flow**: incident information

**Standards Solution**: TMDD - NTCIP Messaging

**Solution Description**: This solution is used within the U.S. It combines standards associated with US: TMDD with those for C-C: NTCIP Messaging. The US: TMDD standards include upper-layer standards required to implement center-to-center communications with traffic management systems. The C-C: NTCIP Messaging standards include lower-layer standards that support partially secure communications between two centers as commonly used in the US.

**Solution Readiness**: Moderate-Low

**Solution Issues**: Data not fully defined (medium)

* Some of the data elements for this information flow are not fully defined.
* The TMDD defines how to exchange information about the operational status of devices; however, it does not define a mechanism to explicitly ask for maintenance.

Overlap of standards

* Multiple standards have been developed to address this information and it is unclear which standard should be used to address this specific information flow.
* Incident information is defined in:
  + APTA TCIP,
  + IEEE 1512 (IM),
  + ITE TMDD, and
  + SAE ATIS. The standards are unclear when the various standards should be used.

## Projects

Each project in the architecture was analyzed for impacts from the conversion process. Results of the project analysis and disposition are provided in Table 6.

Table 6 Project Conversion Disposition

| **Project** | **Conversion Disposition** |
| --- | --- |
| FDOT CAV Wrong-Way Driving | Replaced VS03: Situational Awareness (Wrong-Way Driving) SP with TM25: Wrong Way Vehicle Detection and Warning (FDOT CAV Wrong-Way Driving) SP.   * + - The TM25 service package more clearly distinguishes the functionality allocations resulting in the replacement of the FDOT District Field Equipment inventory element with the FDOT District CAV Field Equipment inventory element.     - The TM25 service package afforded the addition of the *vehicle location and motion* information flow between the Vehicle and the FDOT District CAV Field Equipment inventory elements which better describes the exchange of information in this project. |
| FDOT TPAS | Replaced PM04: Regional Parking Management (FDOT TPAS) SP with CVO05: Commercial Vehicle Parking (FDOT TPAS) SP.  Adjusted project information flows to align with CVO05 SP   * + - Added parking information flow between FDOT TPAS and FL511 |
| FHP Resource Position Analysis Support | The FDOT District Transportation Data Warehouses inventory element in this project was not connected to the FHP Resource Analysis System inventory element. The appropriate information flows were added to the project. |
| FHP Statewide CAD | Refinement and restructure of the Communications Solutions in ARC-IT, formerly referenced in RAD-IT as the Standards tab, more specifically defined interface standards mappings to individual information flows in ARC-IT. In addition, one of the standards formerly mapped to information flows in this project was IEEE 1512 which has been marked as in active by IEEE and is not being maintained. As a result, the information flows for this project, *incident report* and *incident response coordination*, do not have specific standards associated for these flows. |