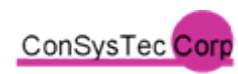




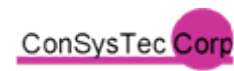
Architecture Training



Purpose



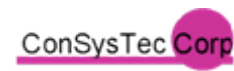
- Provide information and examples on developing ITS projects that are consistent with the Florida Statewide ITS Architecture





Topics

- Federal ITS Architecture Consistency Requirements
- Process for compliance with Federal ITS Architecture Requirements
- Sample ITS project examples
- Summary



Federal ITS Architecture Requirements



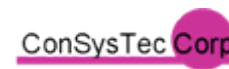
- On January 8, 2001, the U.S. Department of Transportation published two important and related documents in the *Federal Register*.
 - The Federal Highway Administration's **Final Rule** on the National ITS Architecture
 - The Federal Transit Administration's **Policy** on the National ITS Architecture.
 - These documents are similar in nature and both became effective on April 8, 2005
 - Frequently referred to as "Rule 940"





Reason for the Rule/Policy

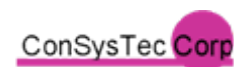
- In 1997, Congress passed the Transportation Equity Act for the 21st Century (TEA-21) to address the need for working toward **regionally integrated transportation systems**. With the application of ITS technologies, different transportation networks run by different agencies can begin to function cooperatively to achieve greater efficiency and safety.
- The Rule/Policy implements Section 5206(e) of TEA-21, which requires that all ITS projects funded from the Highway Trust Fund (which includes transit projects funded from the Mass Transit Account) be in **conformance with the National ITS Architecture and appropriate standards**.



What is an ITS project?



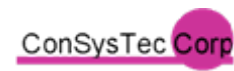
- “*Intelligent Transportation System (ITS)*” means electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system. *ITS project* means any project that in whole or in part funds the acquisition of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture” (Section 940.3 in the FHWA Final Rule, January 2001).



What Projects are Excluded?



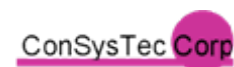
- Operations and maintenance
- Research projects
- Update or expansion of an ITS system in existence on July 22, 1998, if the USDOT Secretary determines that the upgrade or expansion:
 - Would not adversely affect the goals or purposes of Subtitle C (Intelligent Transportation Systems Act of 1998) of the TEA-21;
 - Is carried out before the end of the useful life of such system; and
 - Is cost-effective compared to alternatives that would meet the conformity requirements of this rule.





ITS Project Requirements

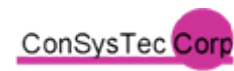
- Assuming no exceptions, the two requirements for ITS projects:
 - Adhere to the Statewide ITS Architecture (regional architecture)
 - Perform a Systems Engineering Analysis



Adhere to the Regional ITS Architecture



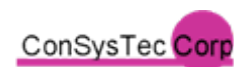
- ITS projects shall conform to the National ITS Architecture and those ITS standards that the USDOT has formally adopted.
 - Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture, and the subsequent adherence of all ITS projects to that regional architecture.
- ITS projects “shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture”. (Federal Rule, Section 940.11[d])
- The Rule/Policy also states that “If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated...to reflect the changes”. (Section 940.11[d])



Florida Statewide ITS Architecture



- February 20, 2001 – Florida Statewide ITS Architecture published
- December 2005 – Updated Florida Statewide ITS Architecture will be published, including:
 - Statewide ITS Architecture
 - I-4, I-10, I-75, I-95 and Turnpike ITS Architectures
 - District 3 ITS Architecture
 - District 7 ITS Architecture



Perform a Systems Engineering Analysis



- In the development of an ITS project, a systems engineering analysis shall be conducted on a scope and scale commensurate with the project scope.
- “Systems engineering is a structured process for arriving at a final design of a system. The final design is selected from a number of alternatives that would accomplish the same objectives and considers the total life cycle of the project, including not only the technical merits of potential solutions but also the costs and relative value of alternatives” (Federal ITS Rule, Section 940.3).

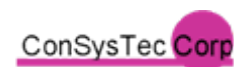


Perform a Systems Engineering Analysis



Per FHWA / FTA, a systems engineering analysis must include at a minimum:

- Identification of portions of the regional ITS architecture being implemented
- Identification of participating agencies roles and responsibilities
- Requirements definitions
- Analysis of alternative system configurations and technology options to meet requirements
- Procurement options
- Identification of applicable ITS standards and testing procedures
- Procedures and resources necessary for operations and management of the system





Other Aspects of the Rule

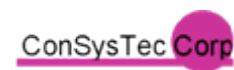
- No specific recommended federal process for consistency
 - A regional process should be established
- Certification of consistency is in the hands of the region
 - Self-certification by federal funding grantees
- Compliance monitoring done as part of normal oversight by FHWA / FTA



What Does It Mean For Local Government?



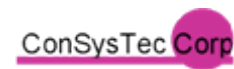
- All ITS projects funded by the FHWA and FTA must conform to the Regional ITS Architecture
- All major ITS projects must be developed using a systems engineering process
- Federally funded projects must use USDOT-adopted ITS standards as appropriate
- The Rule does not require modifications to existing systems in order to conform with the National ITS Architecture



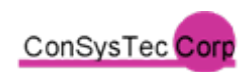
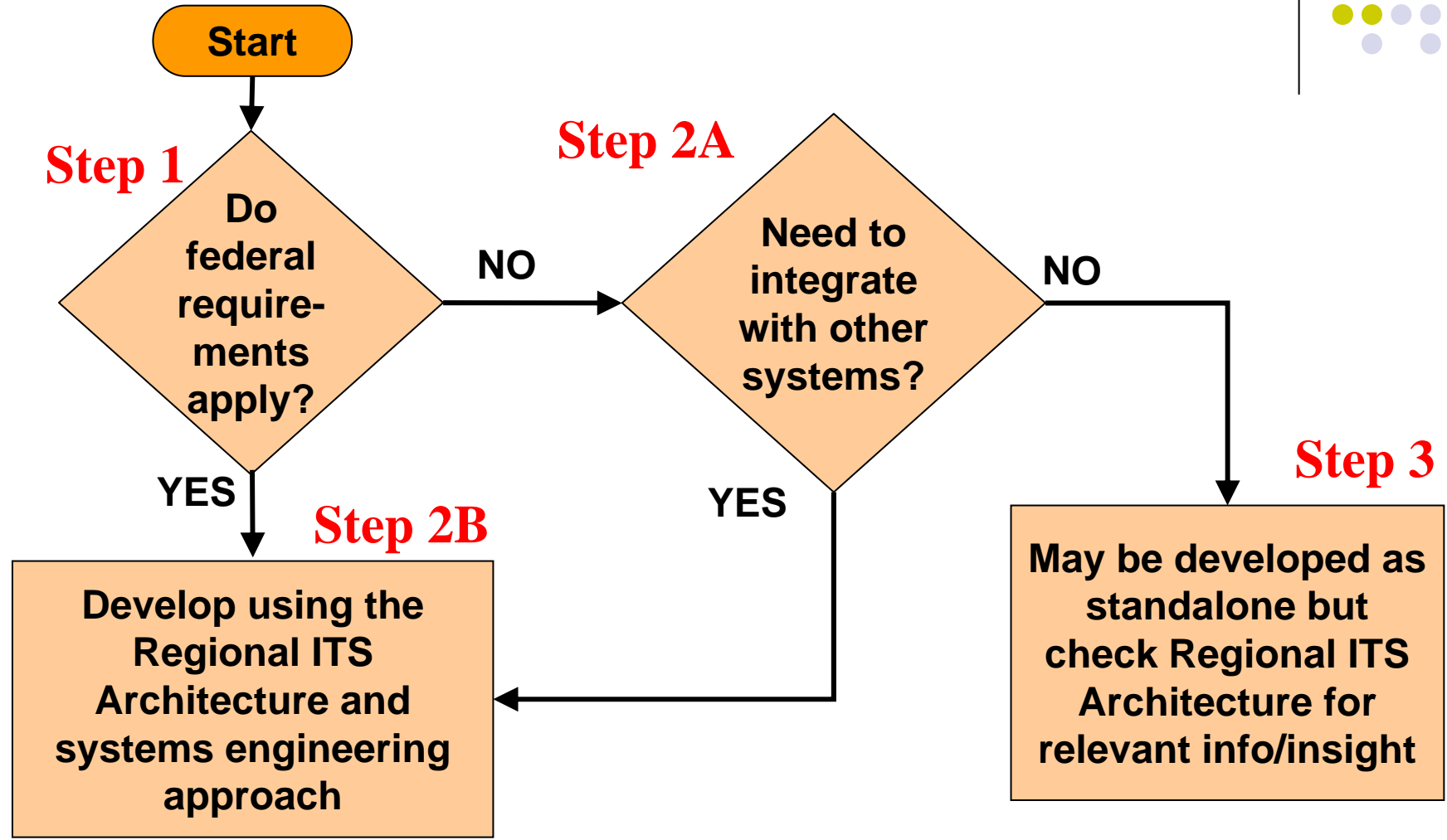
Conformity Process Overview



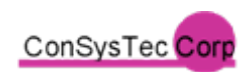
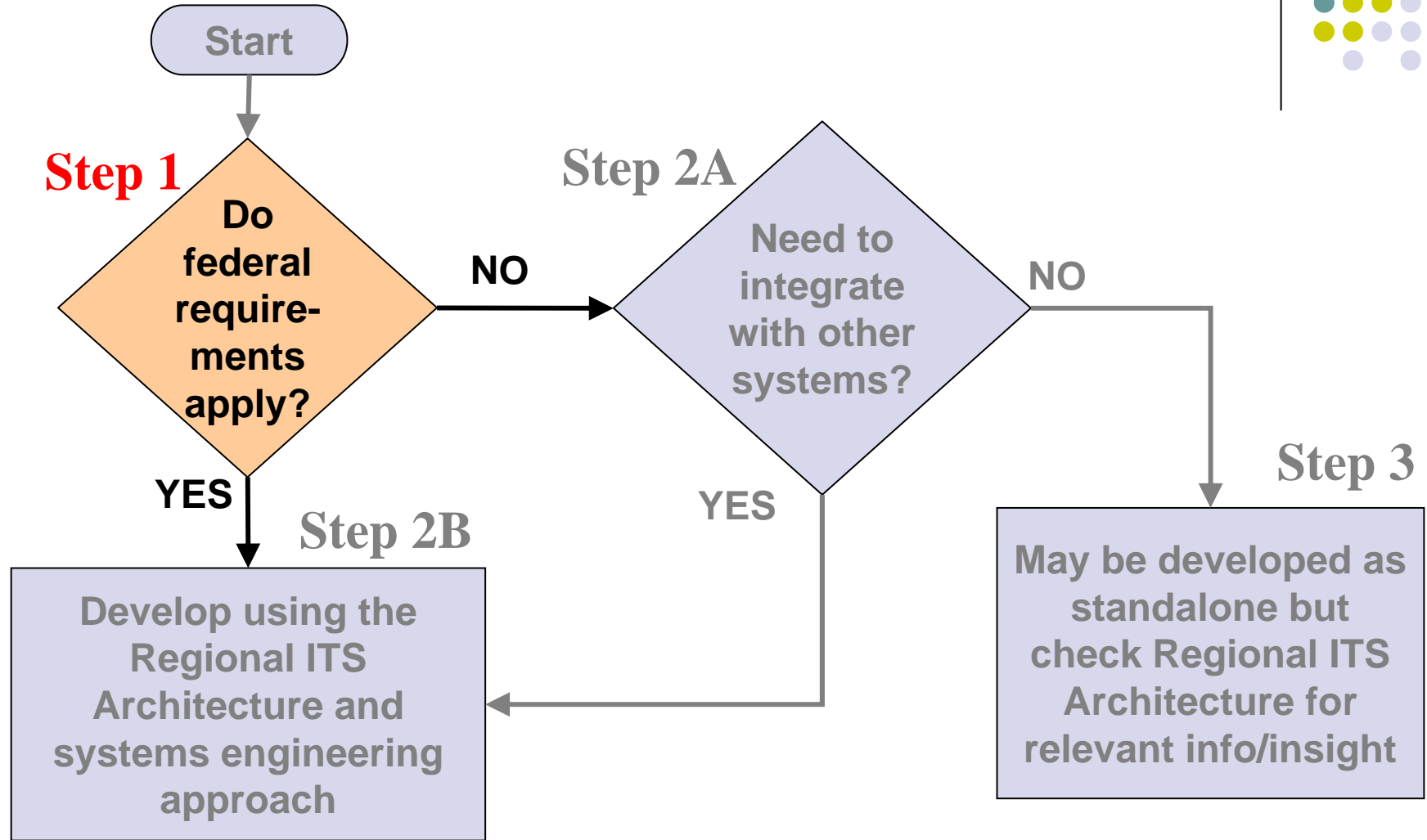
- Primary responsibility for determining applicability and for complying resides with federal funding grantee (typically the project sponsor).
- Need to conform and approach to conformity determined through a ***three-step process***.



Conformity Determination Process



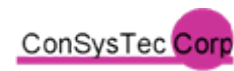
Conformity Determination Process



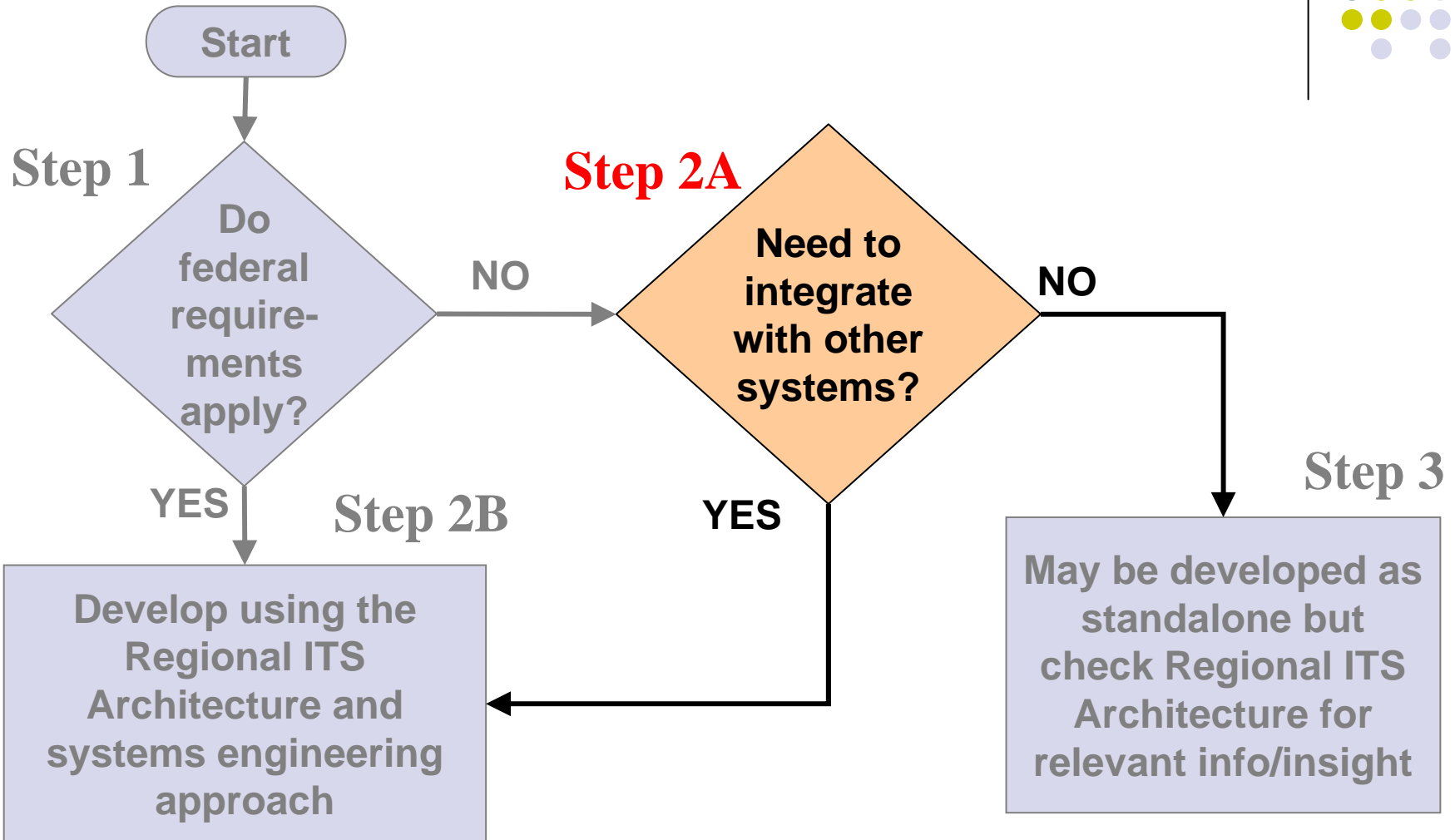
Step 1: Do Federal Requirements Apply?

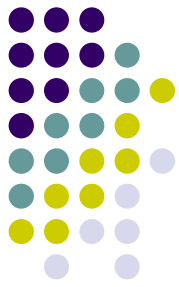


- Two considerations:
 - Is it an ITS project?
 - Will the project utilize federal funds?
- If “yes” to both, then proceed to Step 2B
- If an ITS project, but not utilizing federal funds, proceed to Step 2A



Conformity Determination Process





Step 2A: Need to Integrate?

- What extent does the project impact, or is impacted by, other ITS systems?
- Consider the following factors:
 - Project identified in the regional ITS Strategic Plan?
 - Related to a project identified in the ITS Strategic Plan?
 - Contiguous geographic expansion
 - Prerequisite or subcomponent
 - Same project, different location
 - Exchanging information with any other regional ITS system or element?



Step 2A: Need to Integrate?

(cont'd.)



- If “**yes**” to any of the previous questions, then it is wise but not required to follow the systems engineering project development process (scaled to fit the project) used to meet federal ITS requirements (Step 2B).
- If “**no**” to all of the previous questions, develop as a stand-alone project:
 - Consult regional architecture for information, but you need not follow a formal approach.

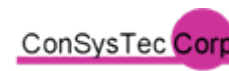


Step 2A: Need to Integrate?

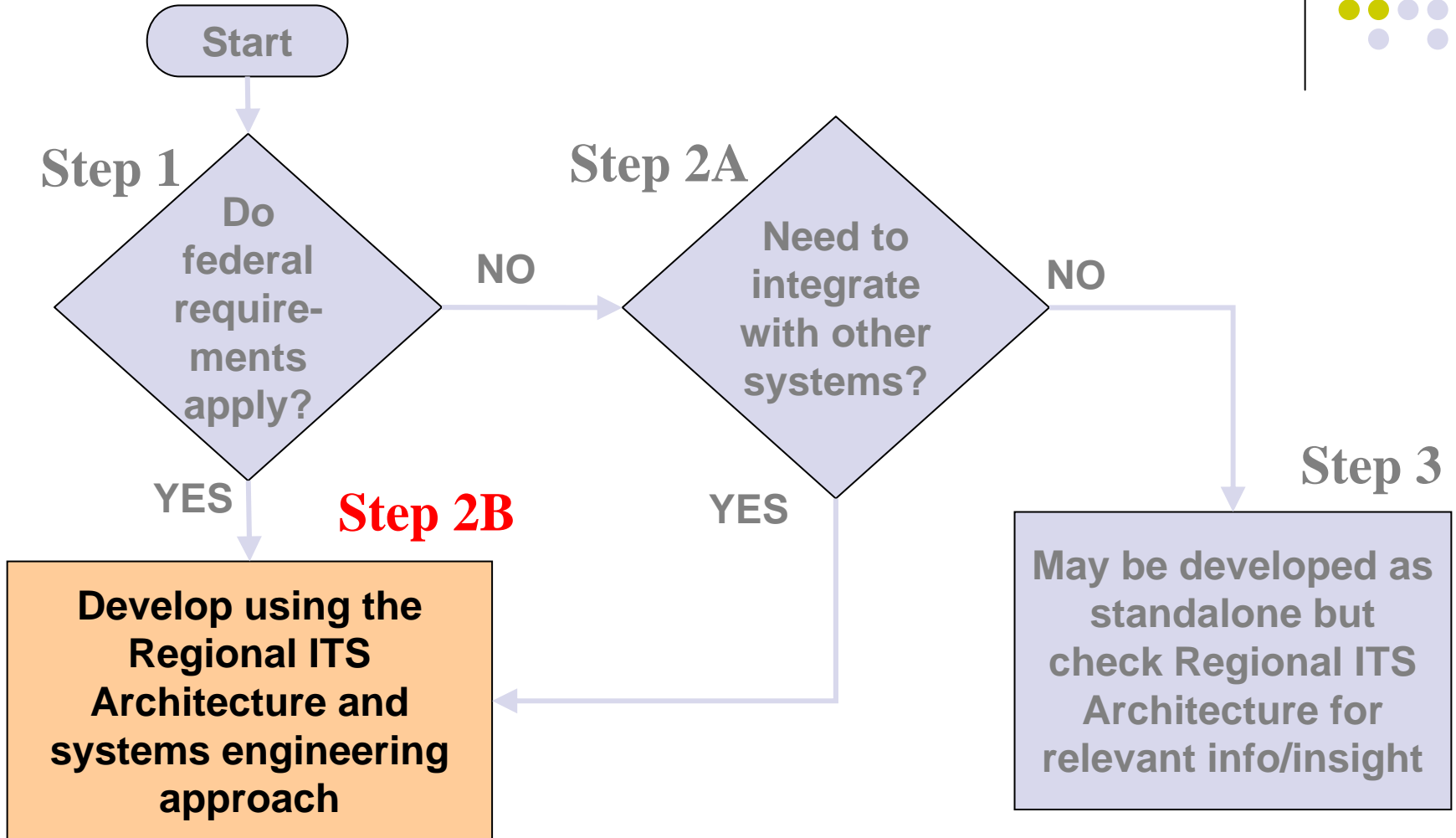
(cont'd.)



- In determining extent of integration and appropriate scale of effort, consider the three possible levels of integration:
 - Level I – Peaceful coexistence – no physical connections
 - Level II – Information sharing; no dependency
 - Level III – Information sharing; with dependency



Conformity Determination Process



Step 2B: Regional Architecture Consistency



- Two basic requirements:
 - Adhere to (be consistent with) the Regional ITS Architecture; and
 - Develop project using a systems engineering analysis
- If there's a good rationale for inconsistency with the Regional ITS Architecture, steps should be taken to update the Regional ITS Architecture to be consistent with the project
- Project sponsor completes a form and submits it to FHWA
 - Example included in Appendix A of SEMP

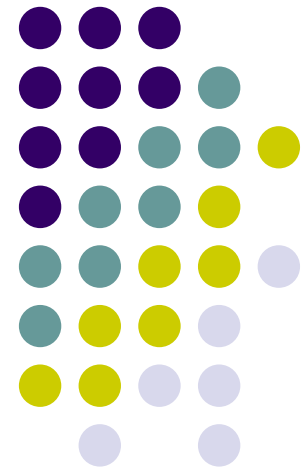


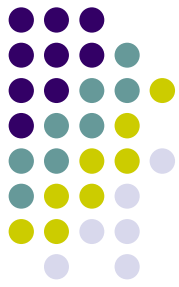
ITS Architecture Consistency Examples

Example 1: Federally funded

Example 2: Locally funded with significant
integration

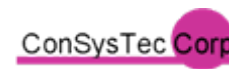
Example 3: Locally funded without
significant integration



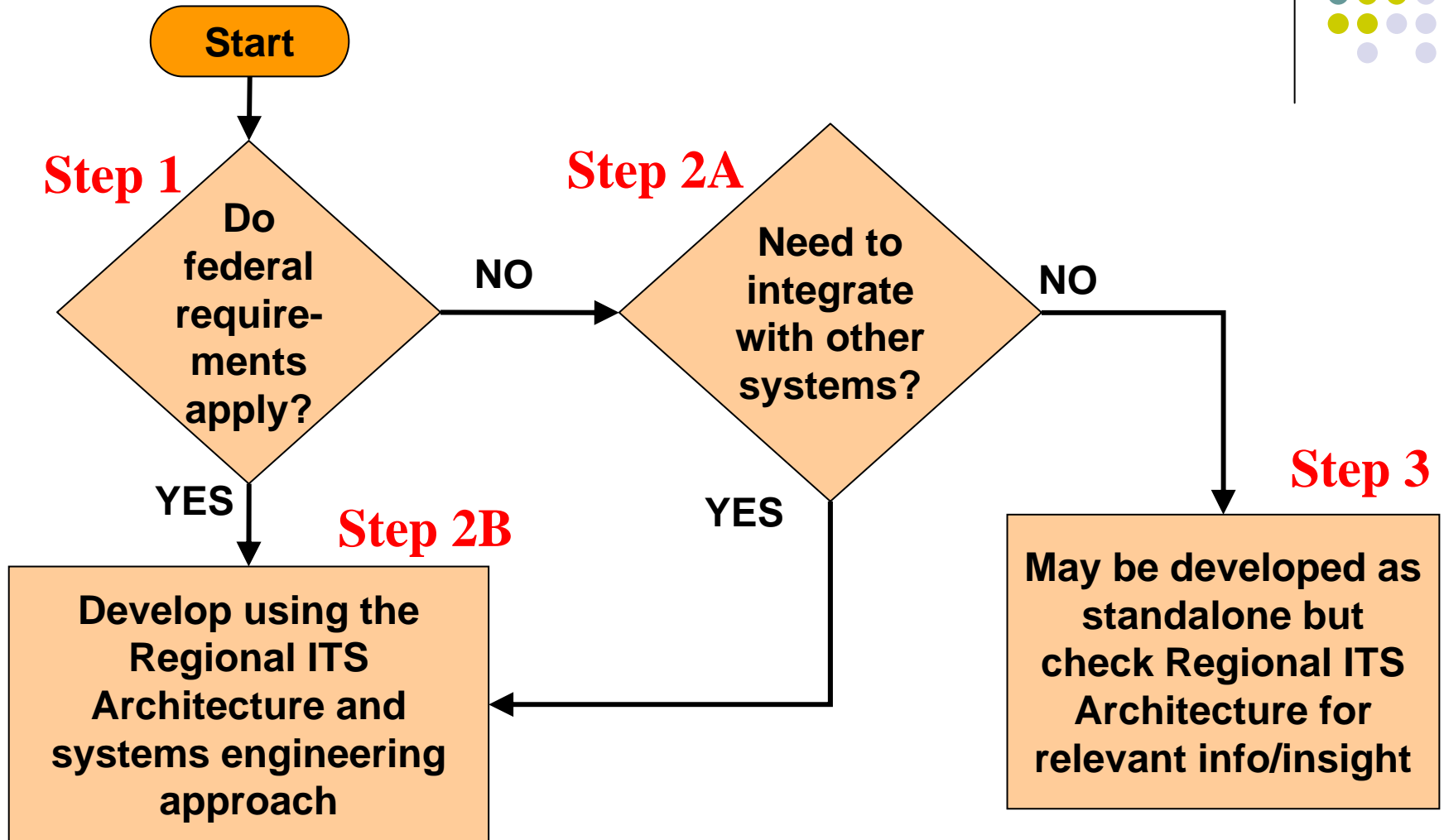


Example 1: Federally Funded

- **Project Owner** = City of Orlando
- **Project Name** = Surveillance at Strategic Arterial Locations
- **Project Scope and Geographic Location**
 - Implement closed-circuit television (CCTV) cameras at three arterial street intersections.
 - Will support more effective incident management.



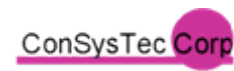
Conformity Determination Process



Example 1: Federally Funded (cont'd.)



- Applicability of federal ITS requirements?
 - Is it an ITS project? – YES
 - Will the project utilize federal funds? – YES
- Project must conform to regional architecture and utilize a systems engineering process – Proceed to Step 2B.



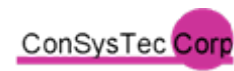
Step 2B



The systems engineering analysis must include the following at a minimum:

- Identification of portions of the Regional ITS Architecture being implemented
- Identification of participating agencies roles and responsibilities
- Requirements definitions
- Analysis of alternative system configurations and technology options to meet requirements
- Procurement options
- Identification of applicable ITS standards and testing procedures
- Procedures and resources necessary for operation and management of the system

Also – Complete checklist and provide supporting documentation when request for funding is submitted



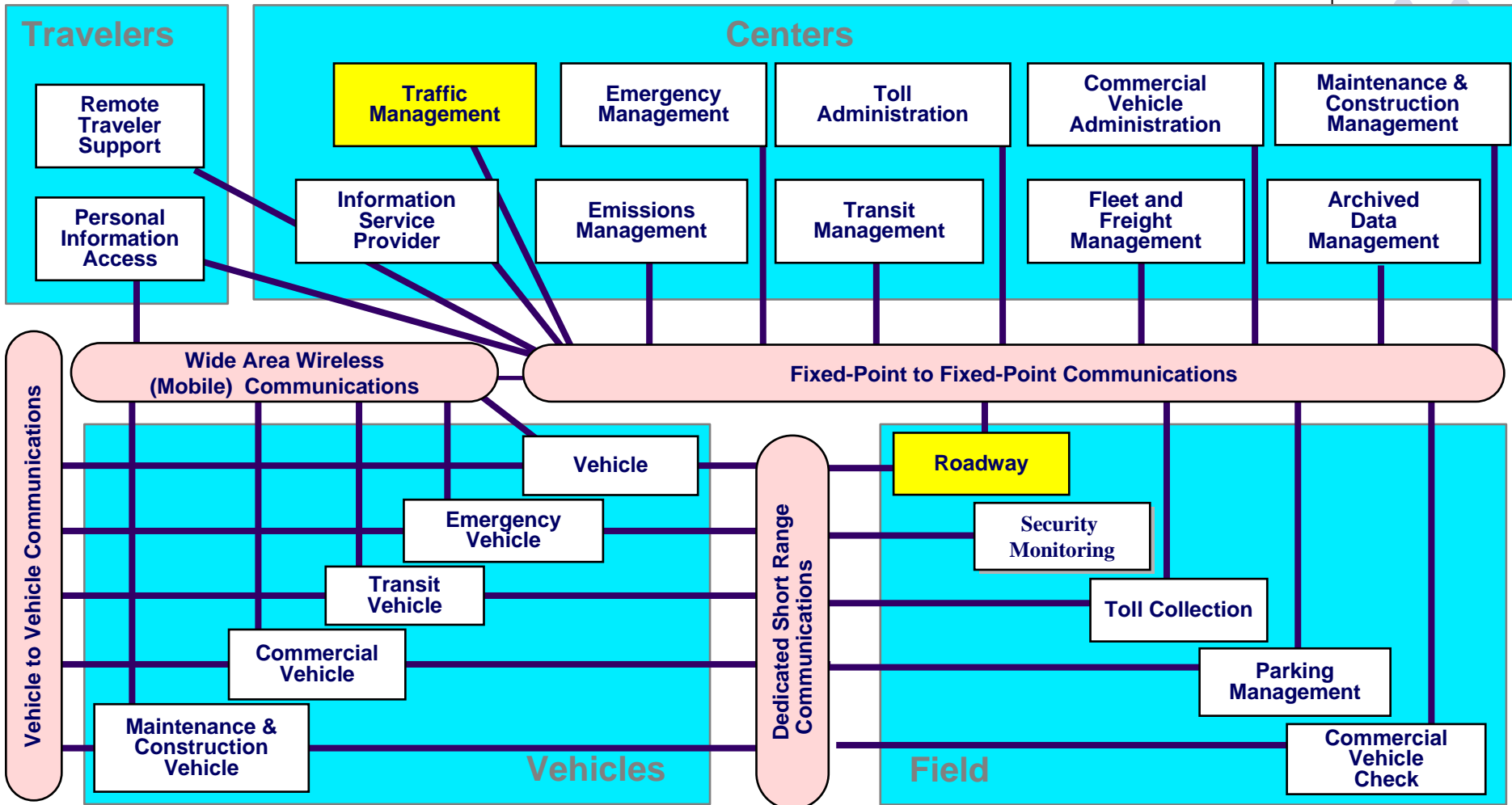
Example 1: Federally Funded (cont'd.)



- Systems Engineering Analysis:
 - Step 1: Identify Relevant Portions of Regional Architecture:
 - “Location” within the regional “sausage diagram”
 - Roadside Subsystems
 - Traffic Management Subsystems
 - Associated Market Package(s) and associated data flows
 - Network Surveillance ATMS 01
 - Regional Traffic Control ATMS 07



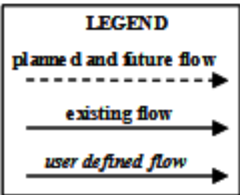
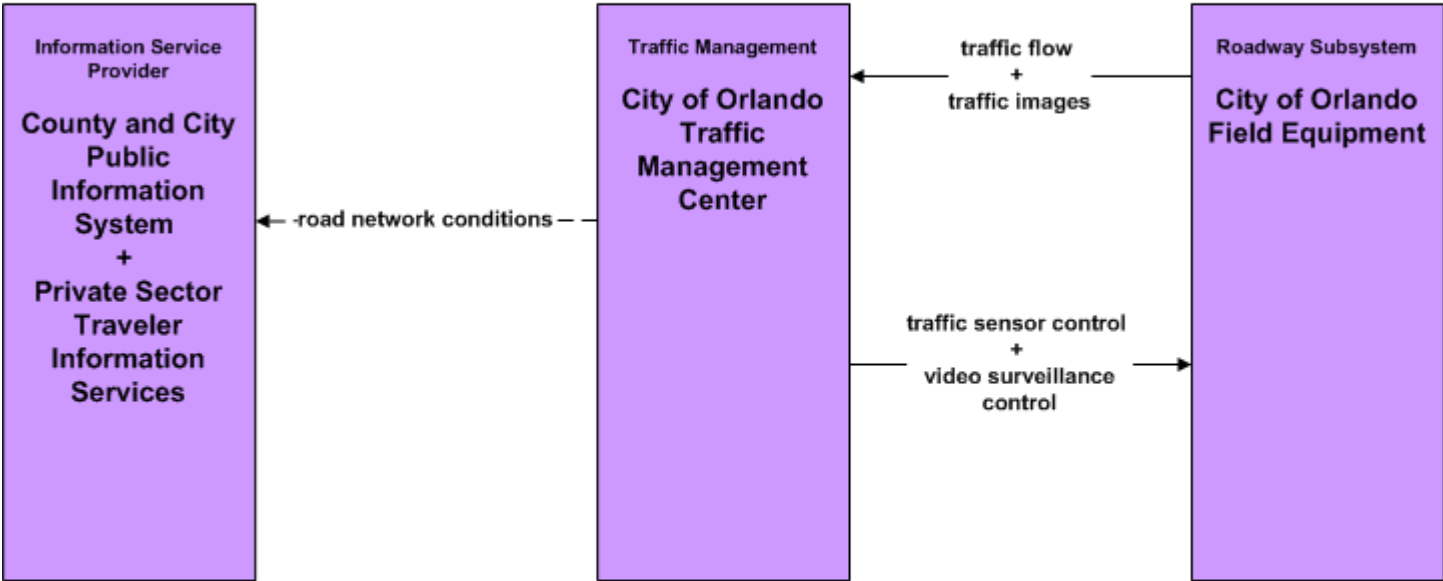
Example 1: Federally Funded (cont'd.)



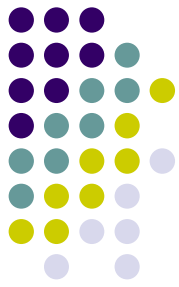
Example 1: Federally Funded (cont'd.)



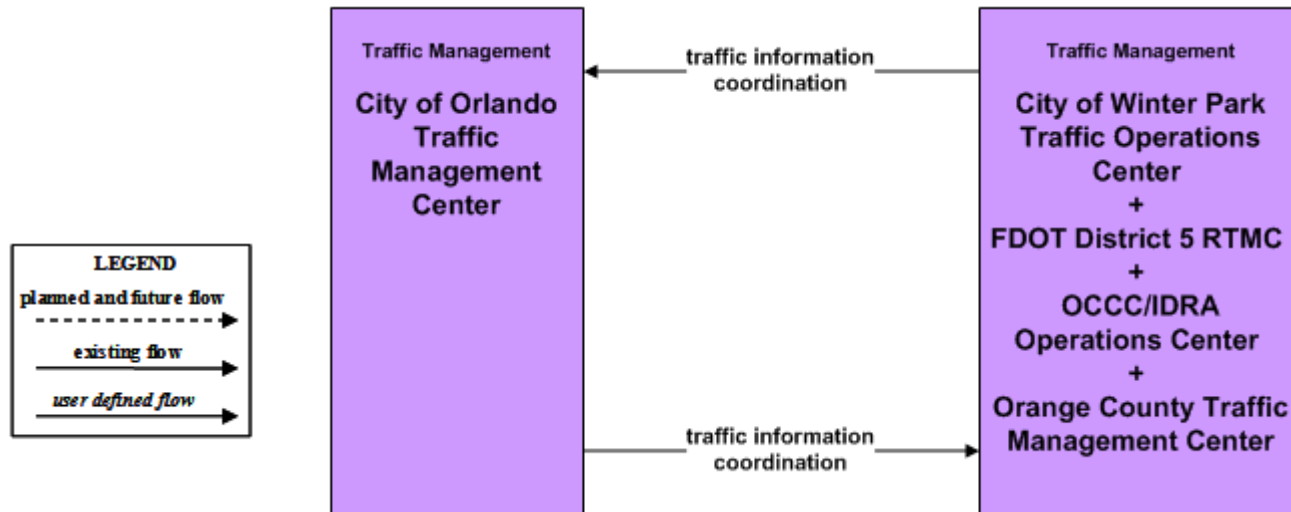
ATMS01 - Network Surveillance
City of Orlando Traffic Management Center



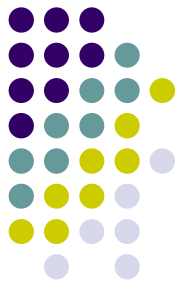
Example 1: Federally Funded (cont'd.)



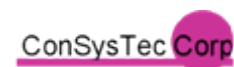
ATMS07 - Regional Traffic Control Orange County



Example 1: Federally Funded (cont'd.)



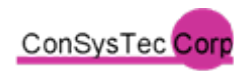
- **Systems Engineering Analysis:**
 - **Step 2: Identification of Roles and Responsibilities:**
 - City of Orlando will own, operate and maintain the system.
 - **Step 3: Requirements Definition:**
 - The CCTV system shall provide traffic surveillance at the designated locations in both directions of travel. The cameras shall have the capability of tilt, pan and zoom and provide full-motion video images of the intersection to detect and verify traffic and incident-related information.
 - Integration shall be supported with other regional ITS systems:
 - District 5 CCTV System



Example 1: Federally Funded (cont'd.)



- **Systems Engineering Analysis:**
 - **Step 4: Analysis of Alternative System Configurations and Technology Options**
 - System will be consistent with other CCTV cameras deployed by the City and will allow sharing of video with FDOT.
 - **Step 5: Procurement Options**
 - Request for Proposal (RFP)



Example 1: Federally Funded (cont'd.)



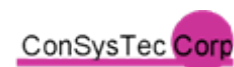
- **Systems Engineering Analysis:**
 - Step 6: Identification of Applicable ITS Standards
 - Traffic Management (Center-to-Center)
 - Video Surveillance (Center-to-Roadside)
 - Step 7: Procedures for Operation and Maintenance
 - Operations will be conducted by the City of Orlando.
 - Maintenance will be provided by the vendor for the first 24 months after deployment and then will be included in the City's operating budget after the warranty period is over.



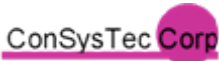
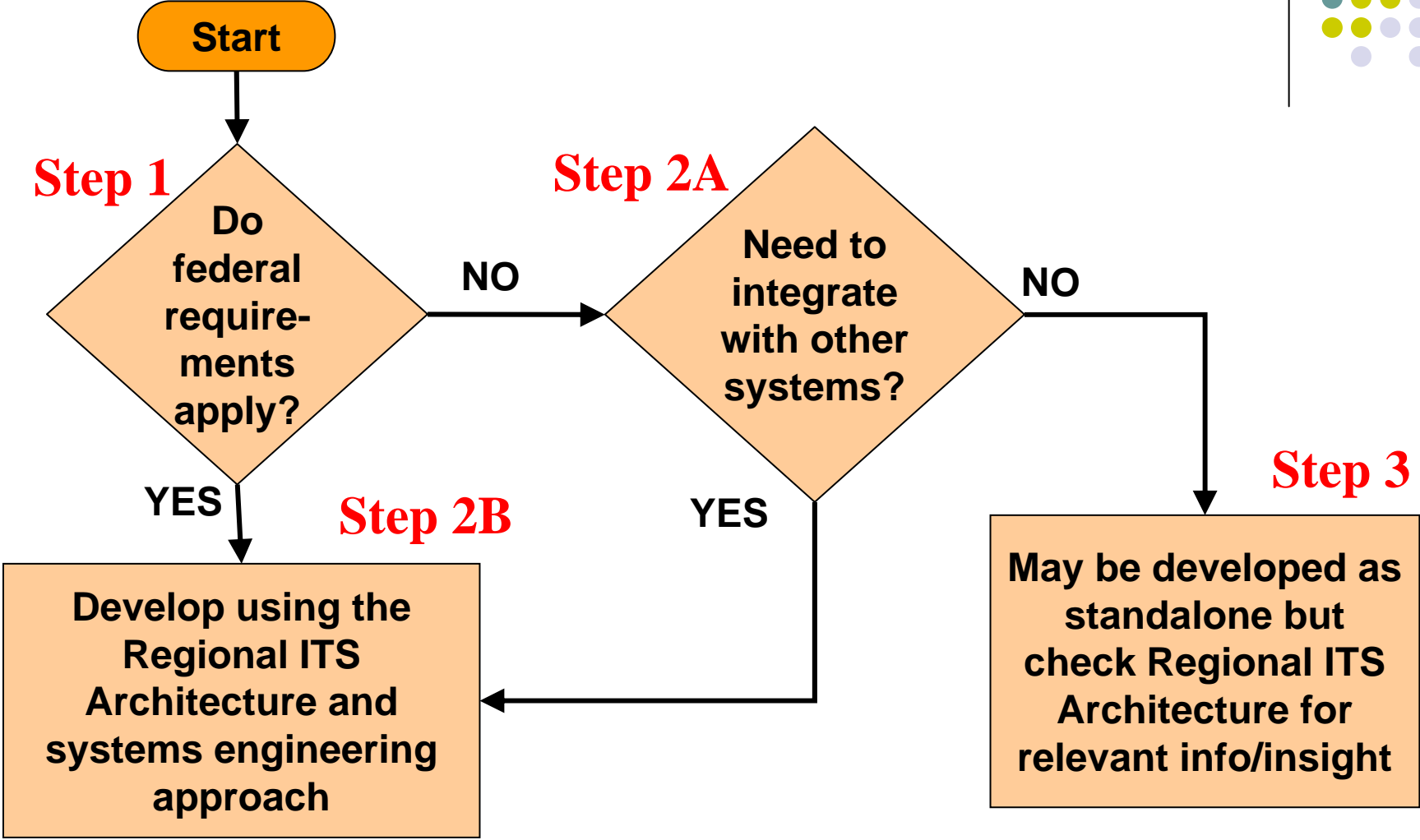
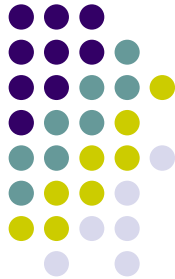
Example 2: Locally Funded with Integration



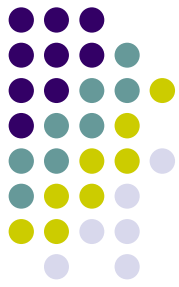
- Project Owner = Bay County
- Project Name = Road Weather Information Systems (RWIS)
- Project Scope and Geographic Location
 - Deploy pavement and weather sensors at strategic locations along flood-prone roadways.
 - Equipment includes a remote processing unit that collects information from sensors and relays it back to a central processing unit.
 - Information to be provided to the public and used by Bay County maintenance crews.



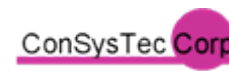
Conformity Determination Process



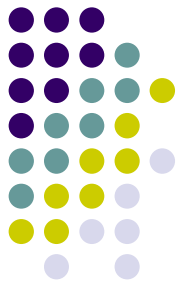
Example 2: Locally Funded with Integration (cont'd.)



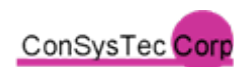
- Applicability of federal ITS requirements?
 - Is it an ITS project? – YES
 - Will the project utilize federal funds? – NO
 - Federal requirements not mandated because project does not use federal funding.



Example 2: Locally Funded with Integration (cont'd.)



- Need to integrate with other regional ITS systems?
 - YES – Regional Alert System
- It was determined by the agency that following a systems engineering approach was the best method to develop the project so proceed to Step 2B.



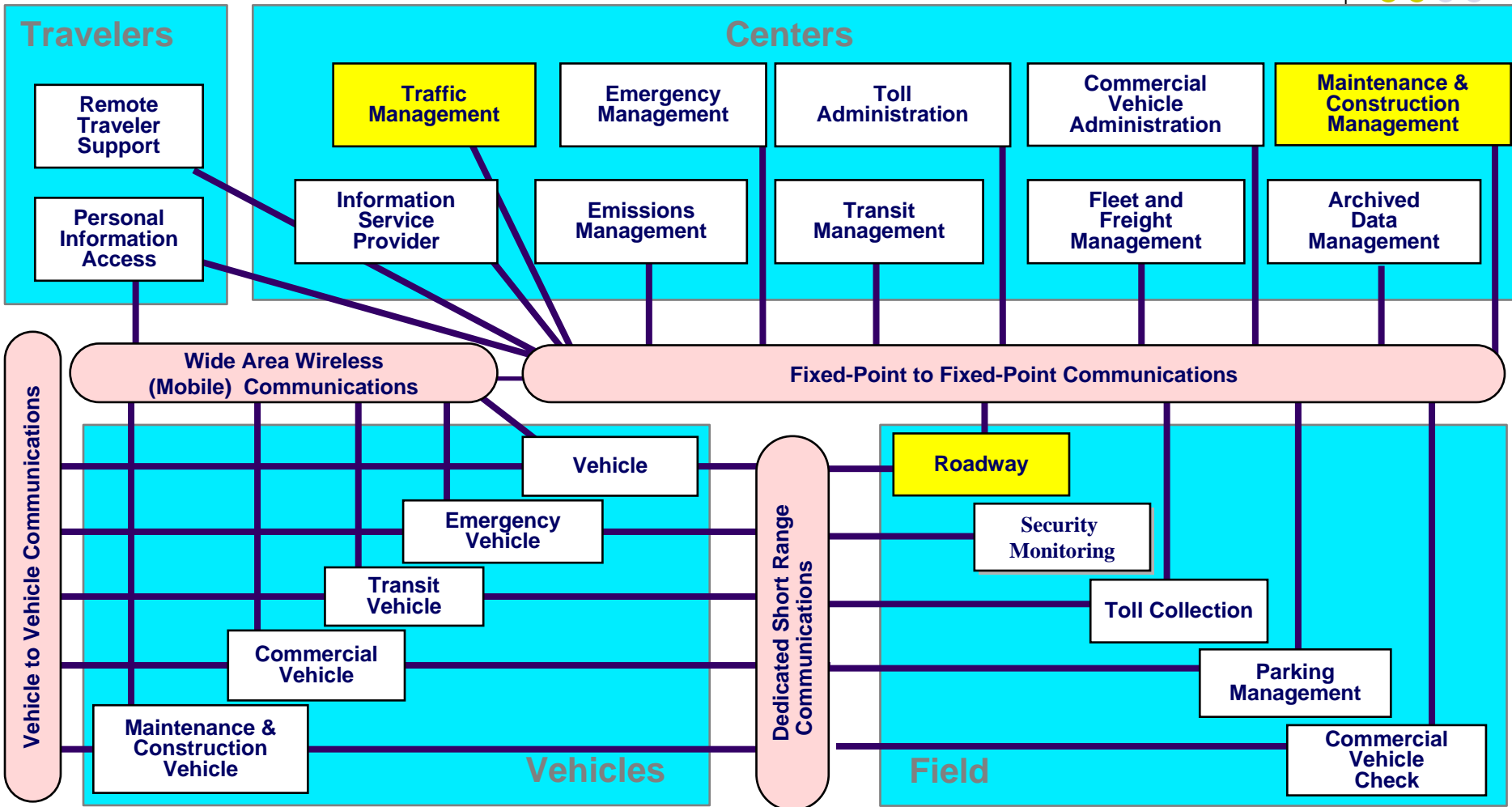
Example 2: Locally Funded with Integration (cont'd.)



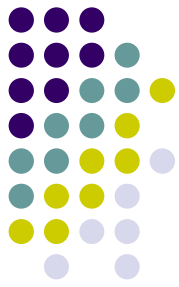
- Systems Engineering Analysis:
 - Step 1: Identify Relevant Portions of Regional Architecture
 - “Location” within the regional “sausage diagram”
 - Roadside Subsystem
 - Traffic Management Subsystem
 - Maintenance & Construction Management Subsystem
 - Associated Market Package(s) and associated data flows
 - Road Weather Data Collection MC03
 - Weather Information Processing and Distribution MC04



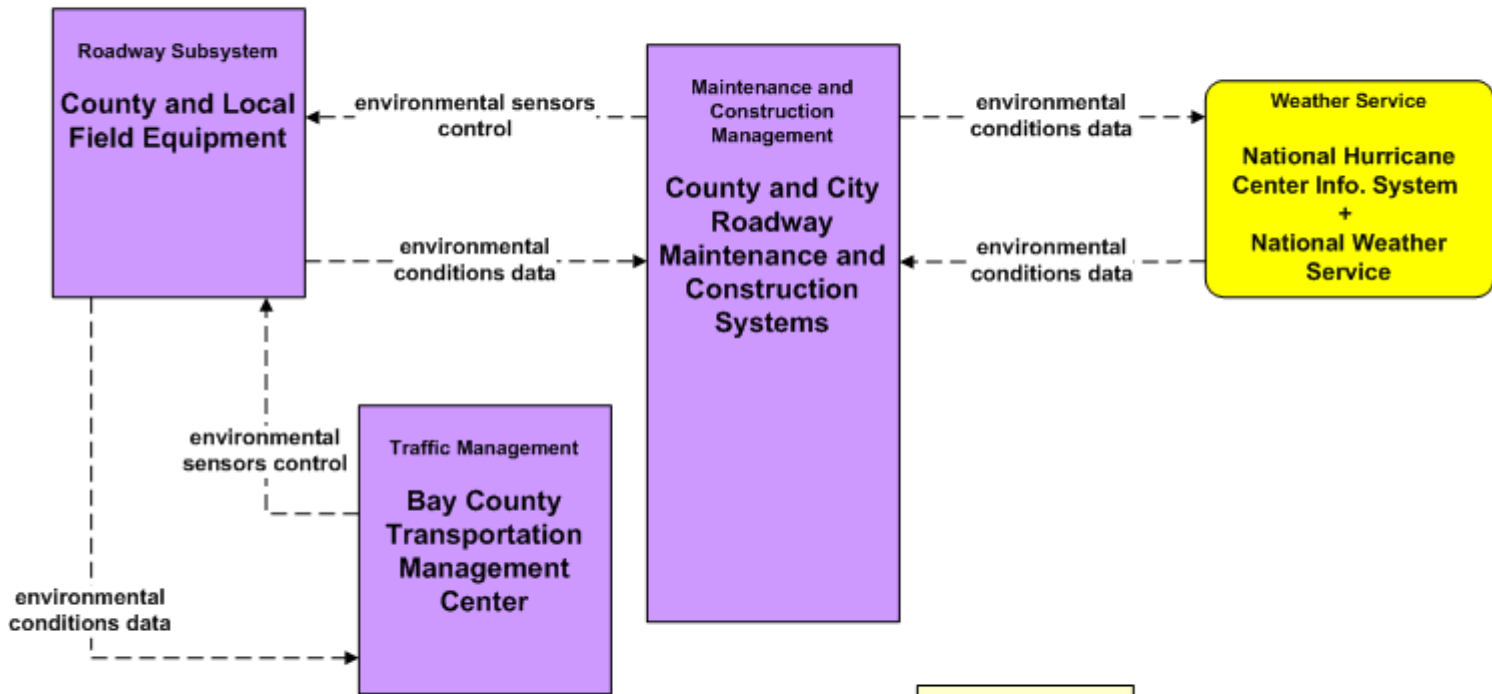
Example 2: Locally Funded with Integration (cont'd.)



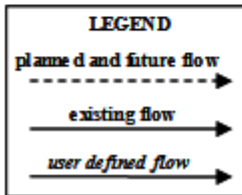
Example 2: Locally Funded with Integration (cont'd.)



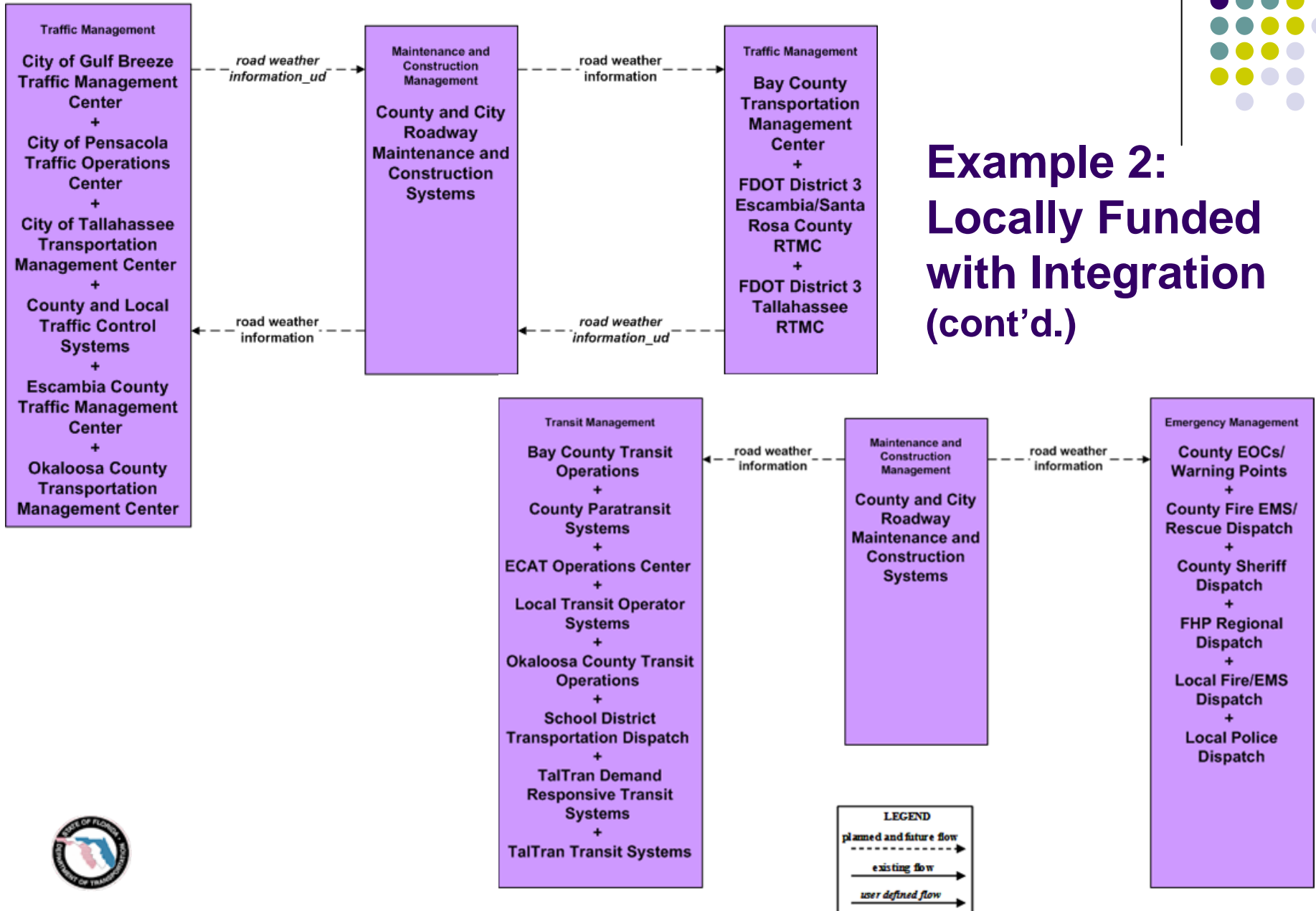
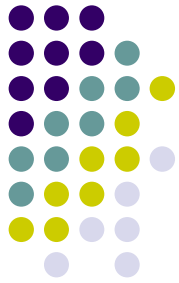
MC03 - Road Weather Data Collection
County and Municipal Maintenance



E.g., RWIS on Hathaway Bridge



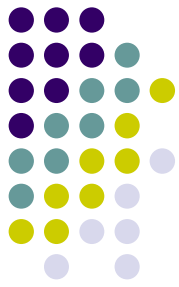
MC04 - Weather Information Processing and Distribution
County and Municipal Maintenance (1 of 2)



Example 2: Locally Funded with Integration (cont'd.)



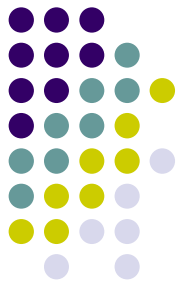
Example 2: Locally Funded with Integration (cont'd.)



- Systems Engineering Analysis
 - Step 2: Identification of Roles and Responsibilities
 - Bay County will deploy the system, integrate with other regional weather data collection systems, and maintain the system. Monitoring the system will be performed at the County EOC Warning Point.
 - Step 3: Requirements Definition
 - The RWIS shall provide Maintenance and Construction Operations functions to support monitoring, operating, maintaining, improving, and managing the physical condition of roadways, the associated infrastructure equipment, and the required resources.
 - The RWIS shall monitor and forecast conditions and manage treatment of roadways during various travel conditions.
 - The sensors shall be integrated with the County Flood Alert System.



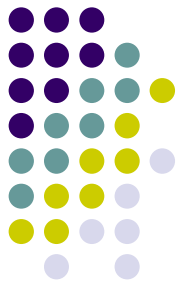
Example 2: Locally Funded with Integration (cont'd.)



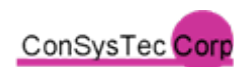
- Systems Engineering Analysis
 - Step 4: Analysis of Alternative System Configurations and Technology Options
 - The RWIS shall be equivalent to the existing sensors being operated by Bay County.
 - Step 5: Procurement Options
 - Sole Source
 - Step 6: Identification of Applicable ITS Standards
 - Data Collection and Monitoring (Center-to-Center)
 - Environmental Monitoring (Center-to-Roadside)
 - Step 7: Procedures for Operation and Maintenance
 - Once the system is integrated with the existing system, the EOC will be responsible for operations.
 - Bay County will maintain the system after the vendor warranty and maintenance contract expires.



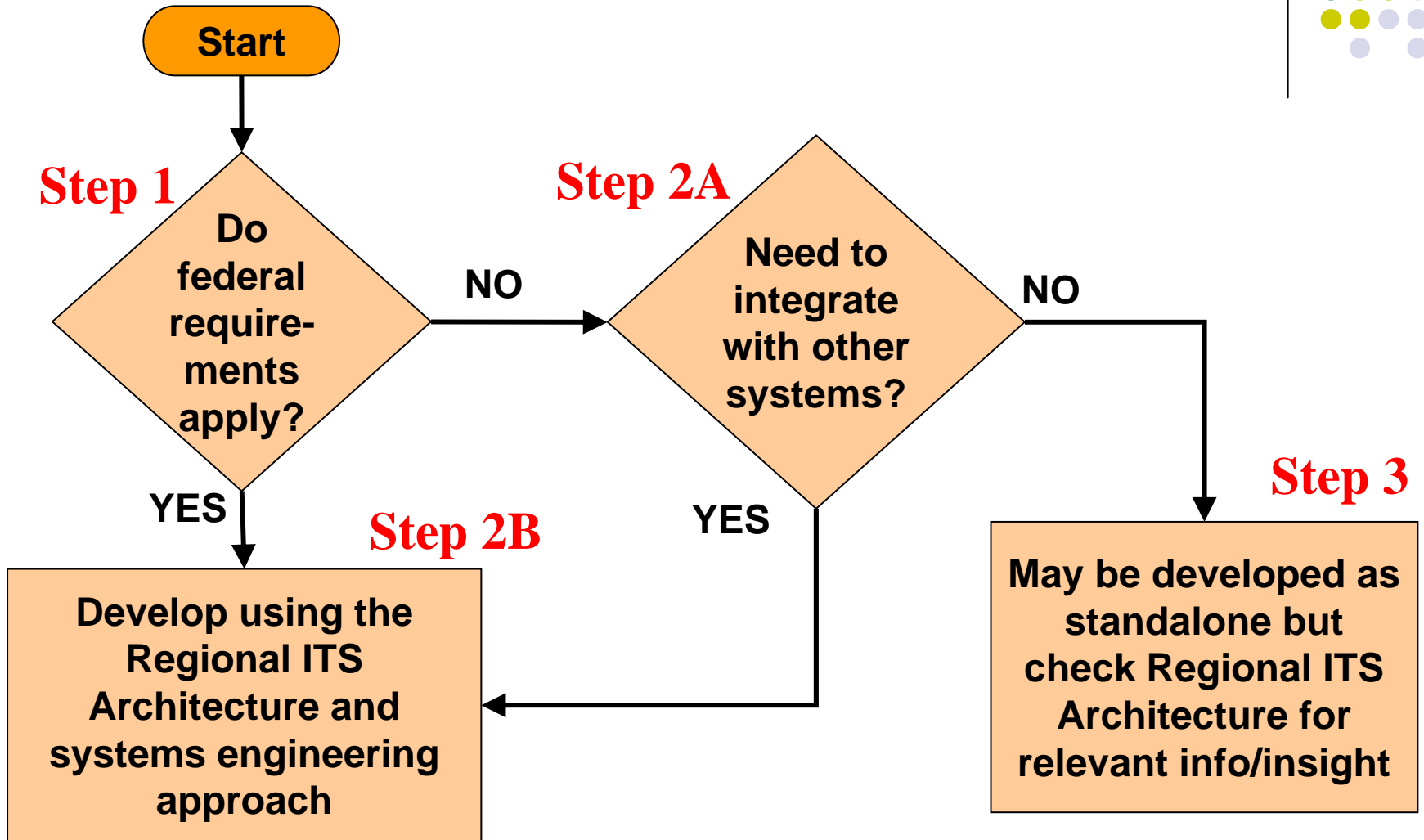
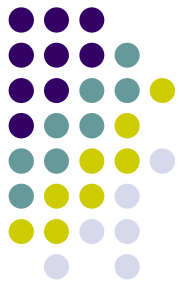
Example 3: Locally Funded without Integration



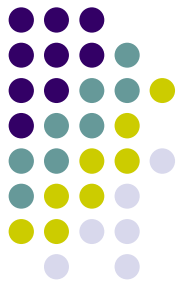
- Project Owner = Rural town
- Project Name = Isolated Traffic Signal Field Hardware Modernization and Interconnection
- Project Scope and Geographic Location
 - Interconnection of two adjacent, but isolated, traffic signals in a rural area and upgrade signal hardware.
 - Hardware upgrades include new controllers and cabinets.
 - Signals will not be integrated into any system.



Conformity Determination Process



Example 3: Locally Funded without Integration (cont'd.)



- Applicability of federal ITS requirements?
 - Is it an ITS project? – YES
 - Involves physical coordination of electronic traffic control equipment.
 - Will the project utilize federal funds? – NO
 - Federal requirements not mandated because project does not use federal funding – Proceed to Step 2A – Need to Integrate?



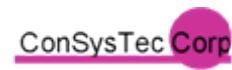
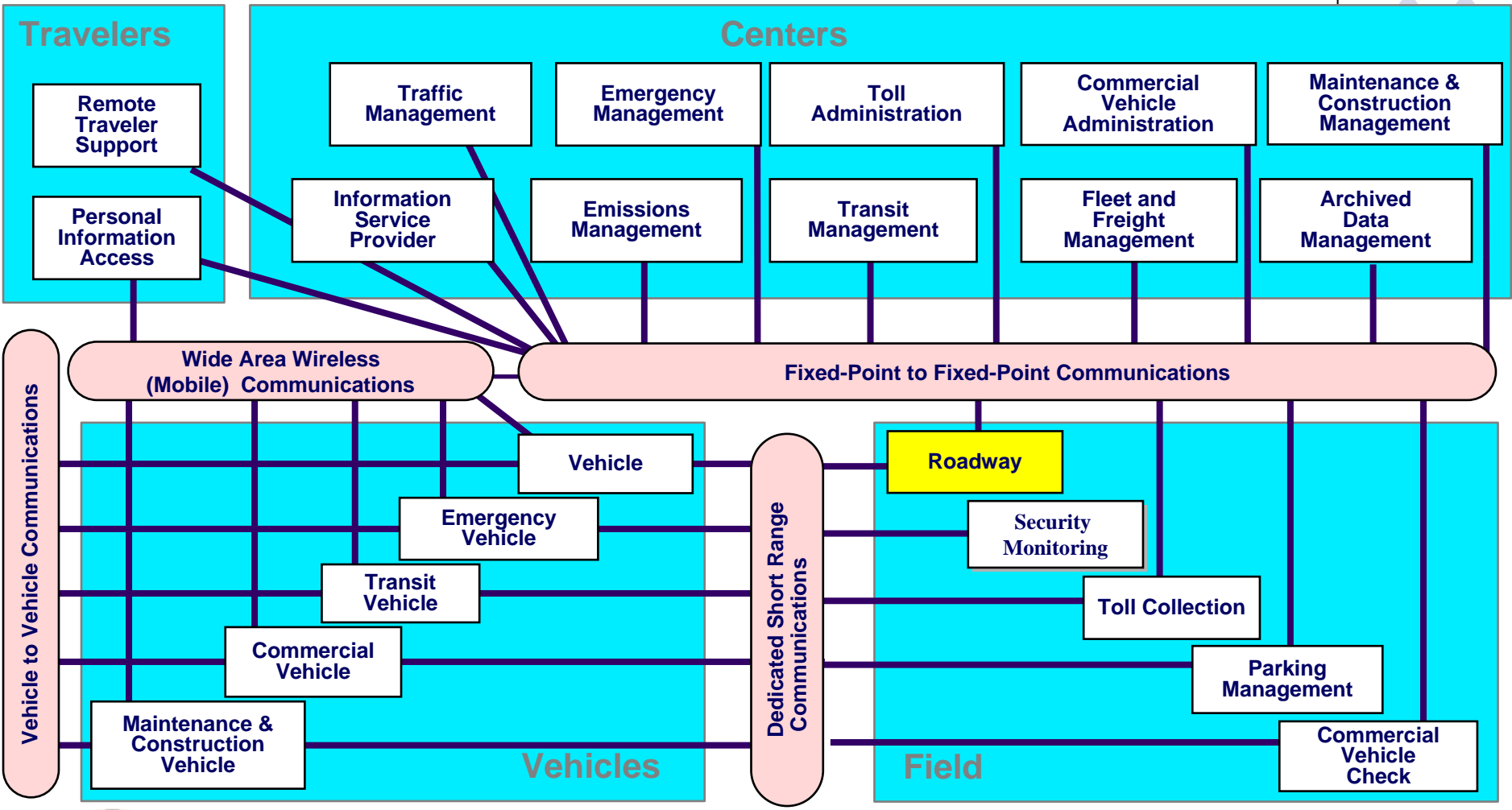
Example 3: Locally Funded without Integration (cont'd.)



- Need to integrate with other regional ITS systems?
 - NO – An isolated traffic signal, no plans to integrate or share information with any other system.
- Develop as a standalone project
 - Local agency will consult regional ITS strategic plan and architecture documents as a guide.
 - “Location” within the regional “sausage diagram”
 - Roadside Subsystem
 - Associated Market Package(s) and associated data flows
 - Surface Street Control ATMS 03



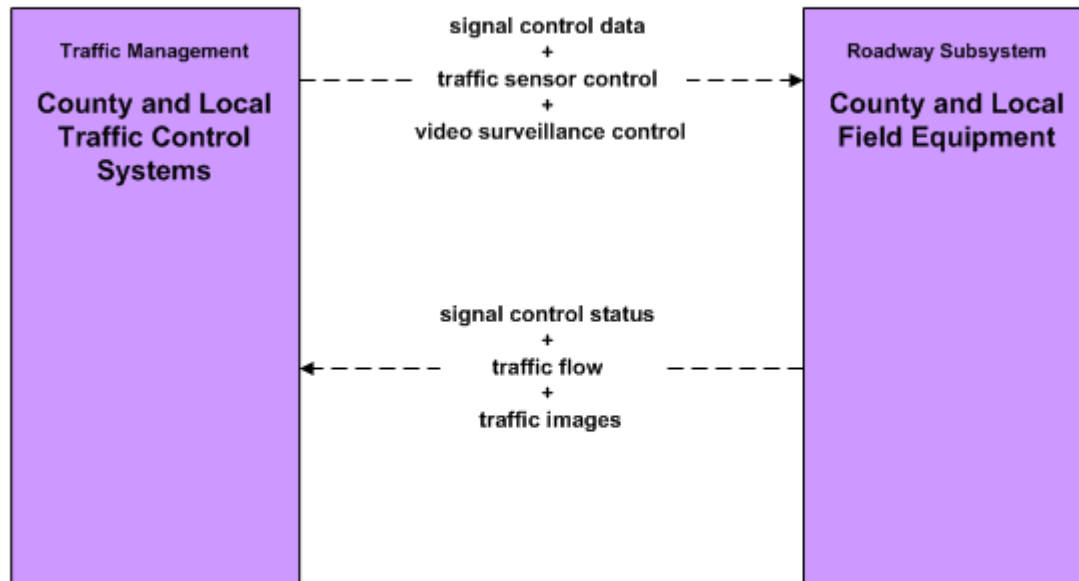
Example 3: Locally Funded without Integration (cont'd.)



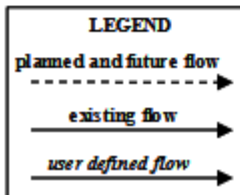
Example 3: Locally Funded without Integration (cont'd.)



ATMS03 - Surface Street Control County and Local Traffic Control Systems



County and Local Traffic Systems. For example: Monroe County, City of Doral, City of Fort Pierce, City of Holmstead, City of Port St. Lucie, and Town of Palm Beach.



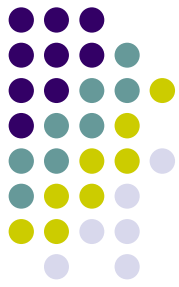
Summary



- Applicable to all projects that include ITS elements (not just those that are federally funded)
- Self-certification
 - Cross-reference to corresponding regional and national ITS architectures
 - Primary responsibility for determining applicability and for complying resides with federal funding grantee (typically the project sponsor)
- FDOT a resource to review and advise
 - Determining applicability of requirements
 - Carrying out systems engineering analysis



Summary (cont'd.)



- 3-step process for conformity
- Standard form/format for project submittals
 - The form is a summary; significant additional documentation appropriate for complex projects.
 - Relate to regional ITS architecture (SITSA)
 - “Sausage Diagram”
 - Market Packages (and data flows)
 - Systems Engineering Analysis
 - Portions of the regional ITS architecture being implemented
 - Participating agencies roles and responsibilities
 - Requirements definitions
 - Analysis of alternative system configurations and technology
 - Procurement options
 - applicable ITS standards and testing procedures
 - operations and management of the system



References/Contacts

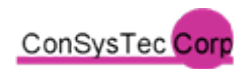


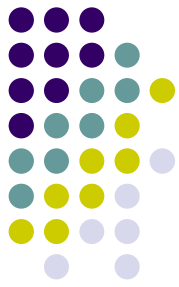
- FDOT Resources

- www.dot.state.fl.us/trafficoperations/its/its_default.htm
- www.floridait.com

- National ITS Architecture and Conformity

- USDOT ITS Web site: <http://www.its.dot.gov>
- Includes links to:
 - National ITS Architecture
 - Architecture Conformity
 - FHWA Rule and FTA Policy
 - Architecture guidance documents
 - ITS Standards
 - Related sites, including ITS America – www.itsa.org





Contact Information

- Please follow the below link to download the project database.

www.consystemec.com/florida/d5/web/_projectdocs.htm

- If you have any questions . . .
 - Call Ms.Tahira Faquir at (850) 410-5617
 - Send an e-mail to 18499@pbsj.com

