Visual Architect

a Turbo Architecture Front-End Processor

ITS America Annual Meeting
Philadelphia, PA

Session 46

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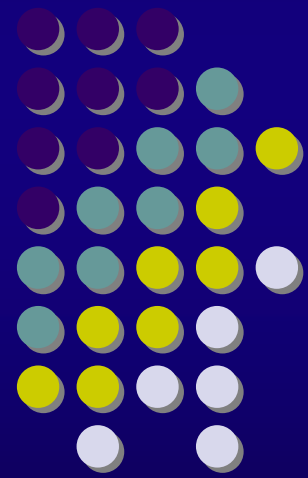

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Presentation Outline

National ITS Architecture	Why ITS Architectures?
Turbo Architecture	Turbo Architecture as a tool for documenting architectures
Market Package Diagrams	Customized Market Package Diagrams as a visual tool for transportation services
Visual Architect	Front-end interface for involving stakeholders in developing regional ITS architectures

Presentation Outline

- Motivation:
  - Review tools to engage stakeholders, simplify the development, and accurately document and maintain regional ITS architectures.

ITS Architectures

FHWA Rule 940/FTA Policy

- FHWA Rule 940/FTA Policy on ITS Architecture and Standards
  - Became effective April 8, 2001
  - Implements Section 5206(e) of TEA-21
  - Requires federally funded ITS projects to conform to the National ITS Architecture and approved (through rulemaking) USDOT standards

FHWA Rule 940/FTA Policy
Regional ITS Architecture Requirements

1. Description of the region
2. Identification of participating agencies and other stakeholders
3. Operational concept
4. Agreements required for implementation
5. System functional requirements
6. Interface requirements
7. Identification of ITS standards, and
8. Sequence of projects required for implementation
9. Process for maintaining your Regional ITS Architecture

FHWA Rule 940/FTA Policy
Project Requirements

- Any ITS project that moves into design is required to follow a systems engineering analysis that is commensurate with the project scope
- An ITS project is defined as an ITS project or program that receives federal-aid
- If the ITS project moves into design prior to the completion of a regional ITS architecture, a project architecture is required to support the systems engineering analysis

FHWA Rule 940

Project Systems Engineering Analysis Requirements

The systems engineering analysis shall include:

1. Identification of portions of the regional architecture being implemented
2. Identification of participating agencies roles and responsibilities
3. Requirements definition
4. Analysis of alternate system configurations and technology options to meet requirements
5. Procurement options
6. Identification of applicable standards and testing procedures, and
7. Procedures and resources necessary for operations and management of the system

Regional ITS Architectures

- Regional ITS Architectures
  - Shared vision of how transportation systems in a region may work together to share information and resources to provide a safer, more efficient transportation system

Regional ITS Architectures

Regional ITS Architectures (continued):

- Inherently involves many stakeholders in a region
- Can contain many details, including:
  - Stakeholders
  - ITS systems (elements)
  - information exchanges
  - transportation services
  - ITS standards
  - functional requirements
- Naturally encoded as a relational database

Developing Regional ITS Architectures

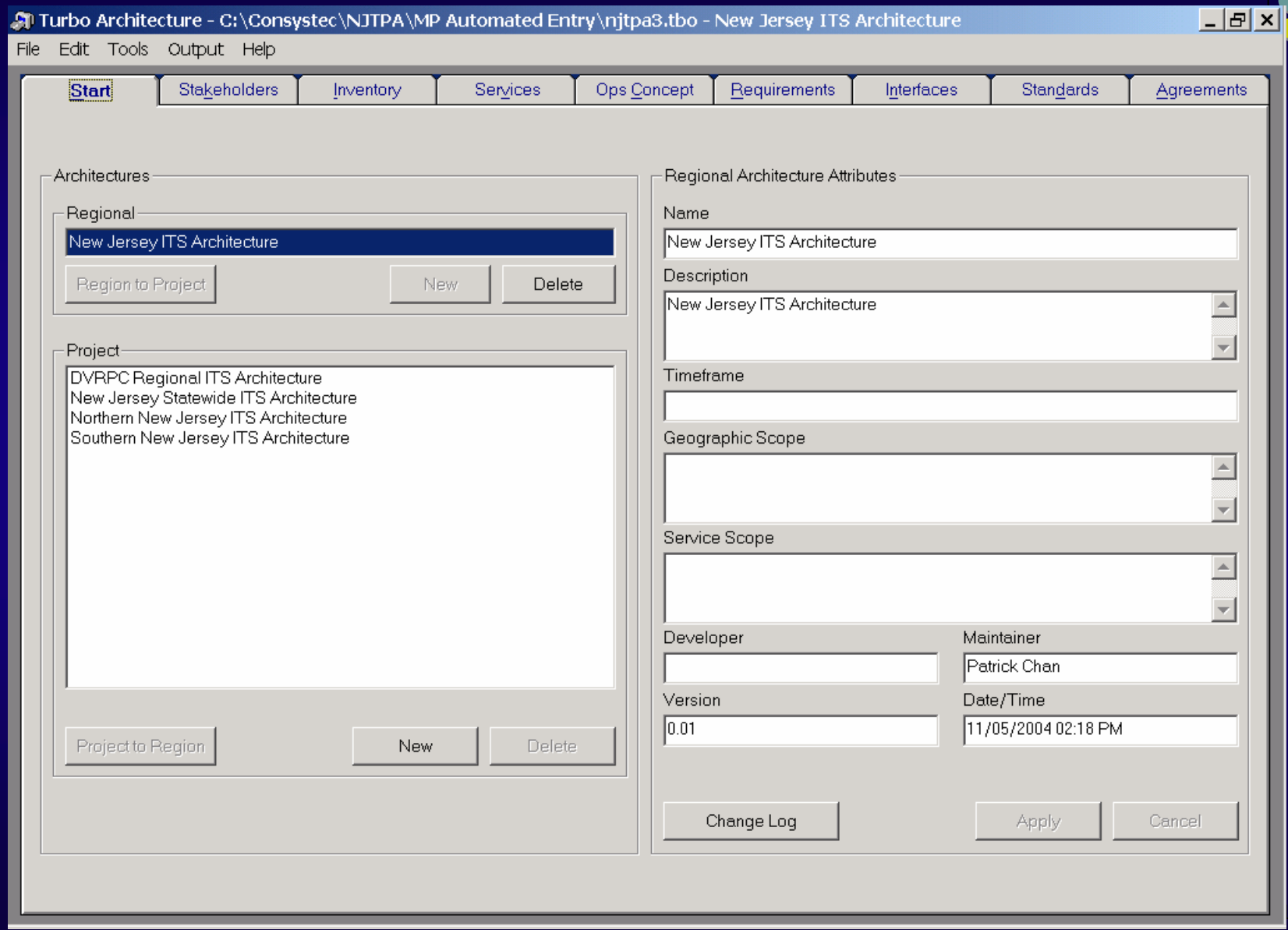
Vital to keep stakeholders involved with the development process!

Turbo Architecture

Turbo Architecture

- De-facto standard for documenting regional ITS architectures
- Documents 7 of the 9 FHWA/FTA requirements
  - Does not document project sequencing
  - Does not document maintenance of the architecture
- Based on Microsoft Access database engine

Turbo Architecture



Turbo Architecture

- Weaknesses:
  - Very data intensive
  - Difficult to visualize
  - Difficult to review with multiple stakeholders

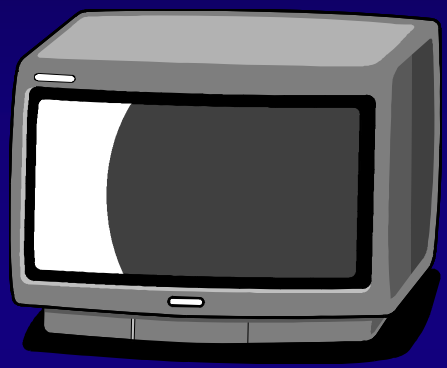
Market Package Diagrams

Modeling Possible ITS Architecture Solutions

- Market Package Diagrams
  - illustrate ITS elements that can be grouped to provide ITS services to transportation system users.

… let's look at a few examples of ITS Services

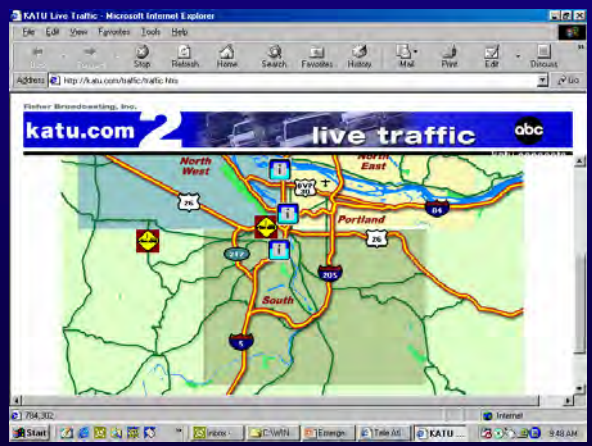
Traffic Information Dissemination



Television Station

TMC

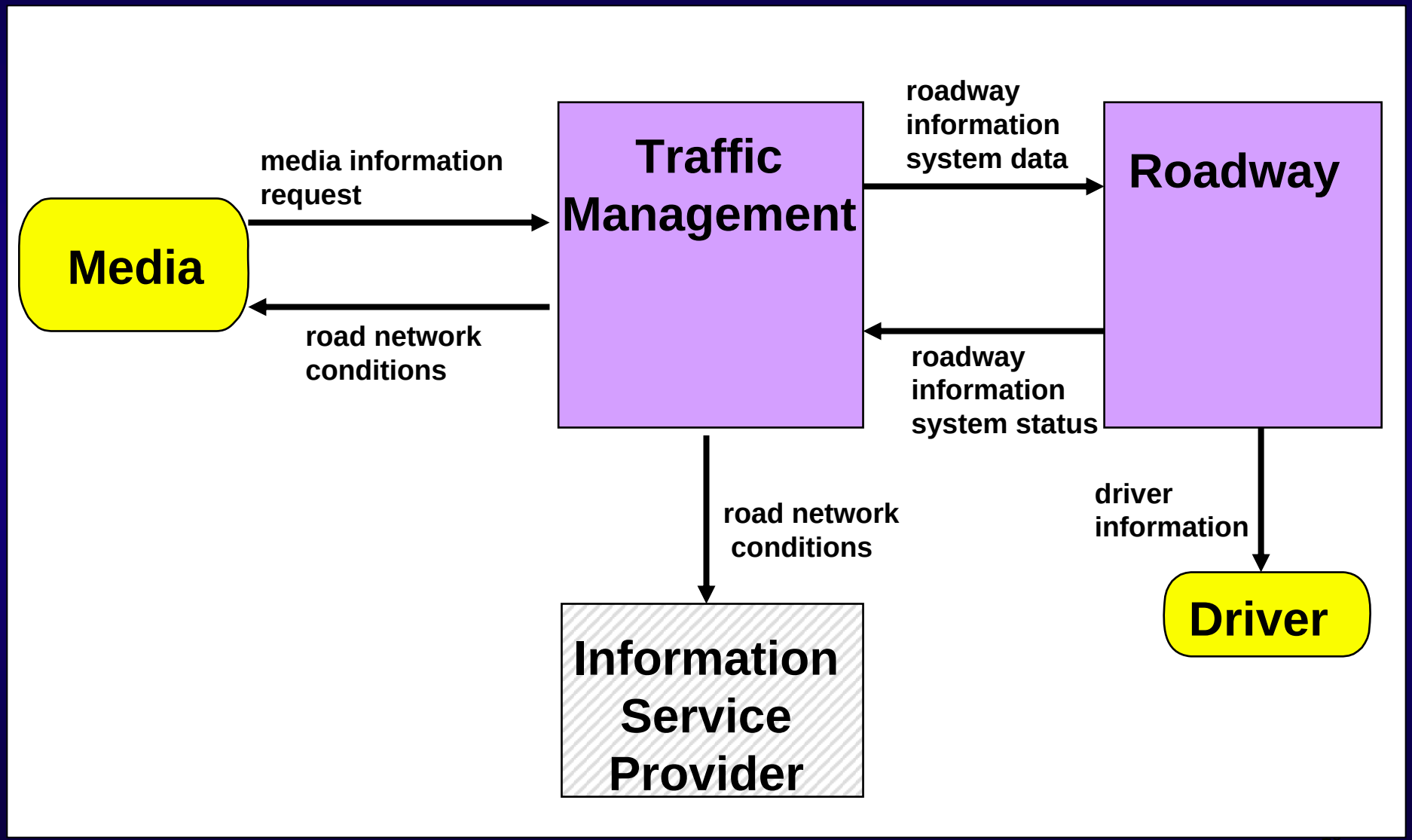
Dynamic Message Signs



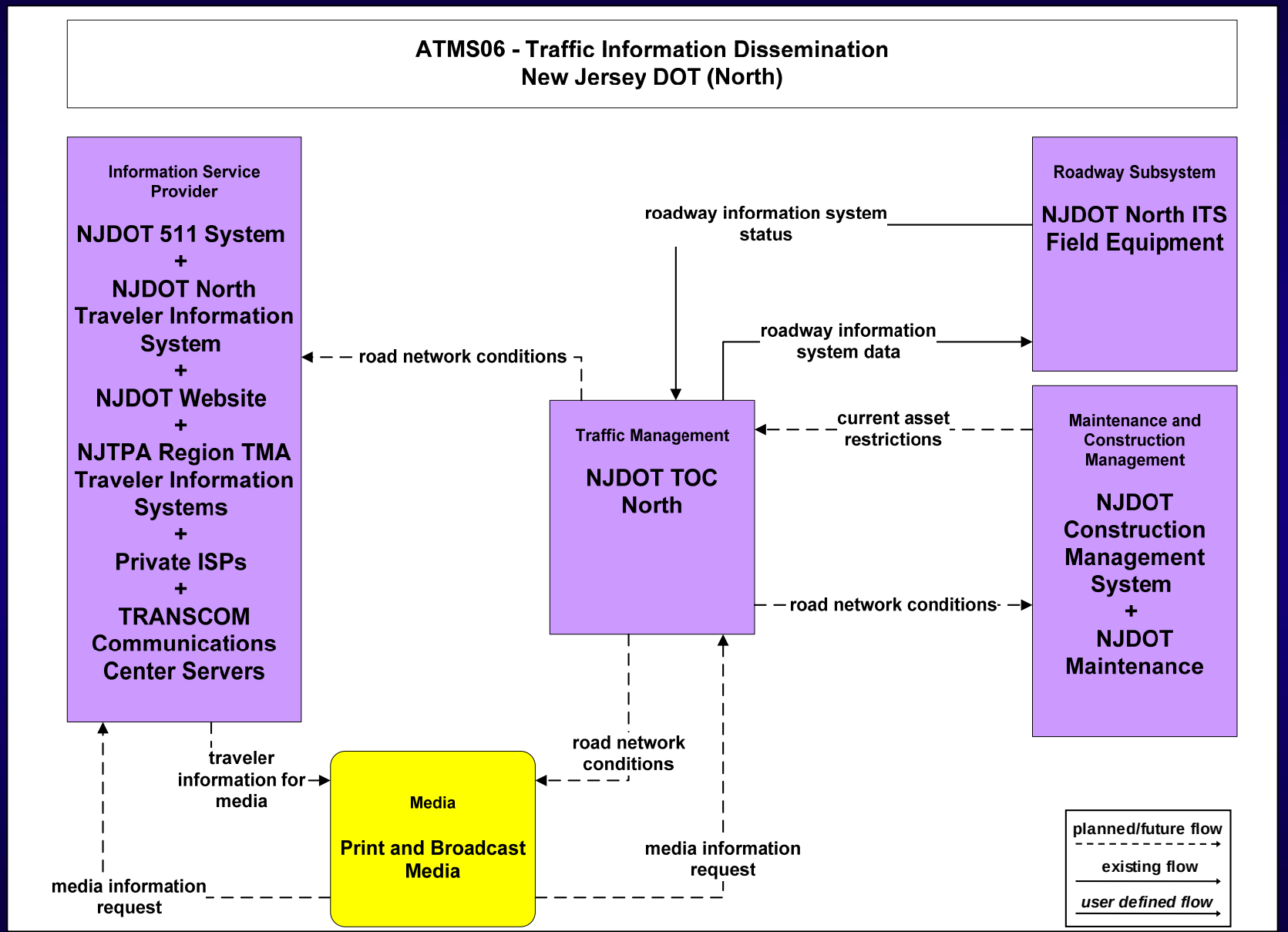
Web Site

Motorist

ATMS06 – Traffic Information Dissemination
National ITS Architecture Market Package



New Jersey Statewide ITS Architecture Market Package



Automated Transit Fare Payment

Enforcement

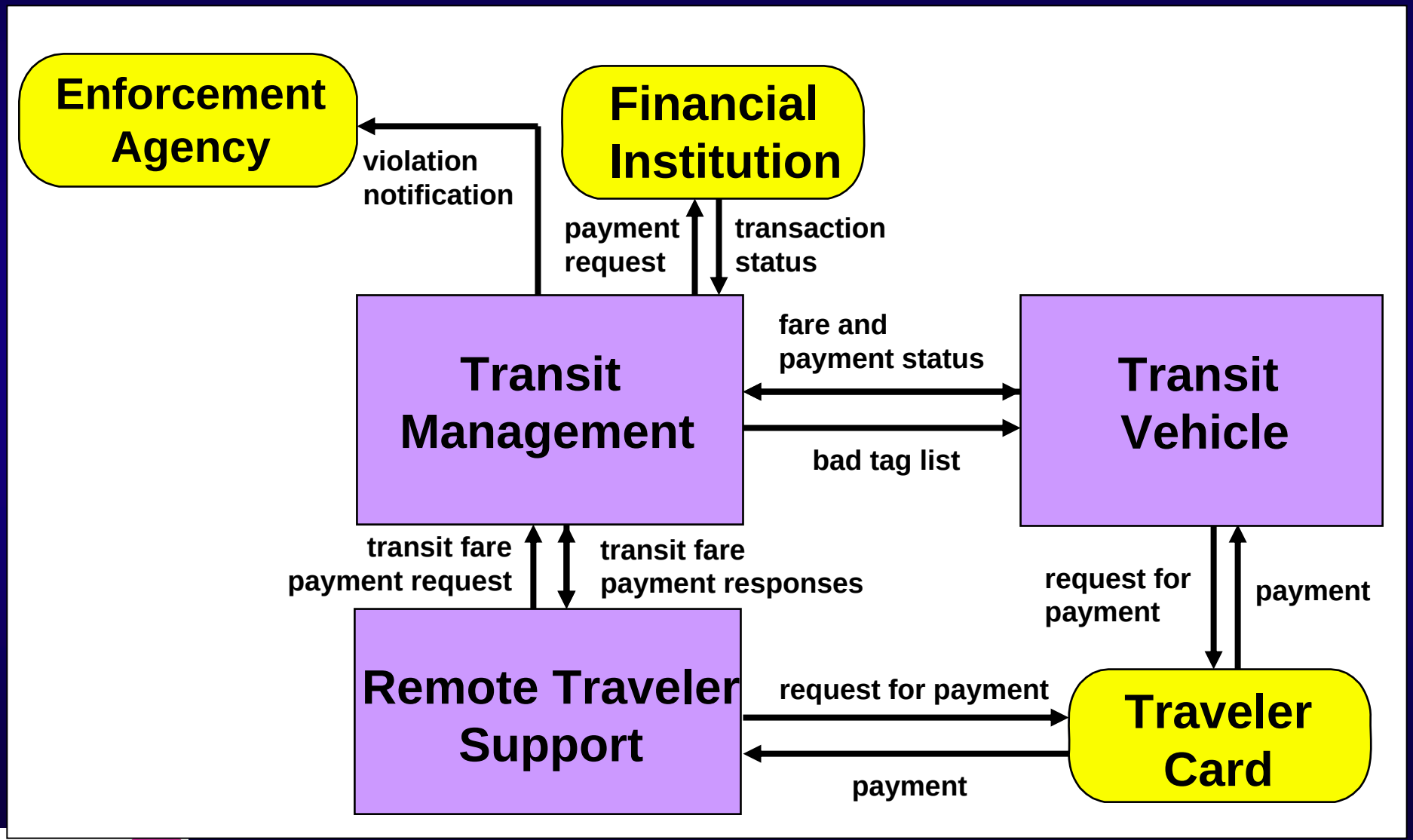
Financial Institution

Transit Management Center

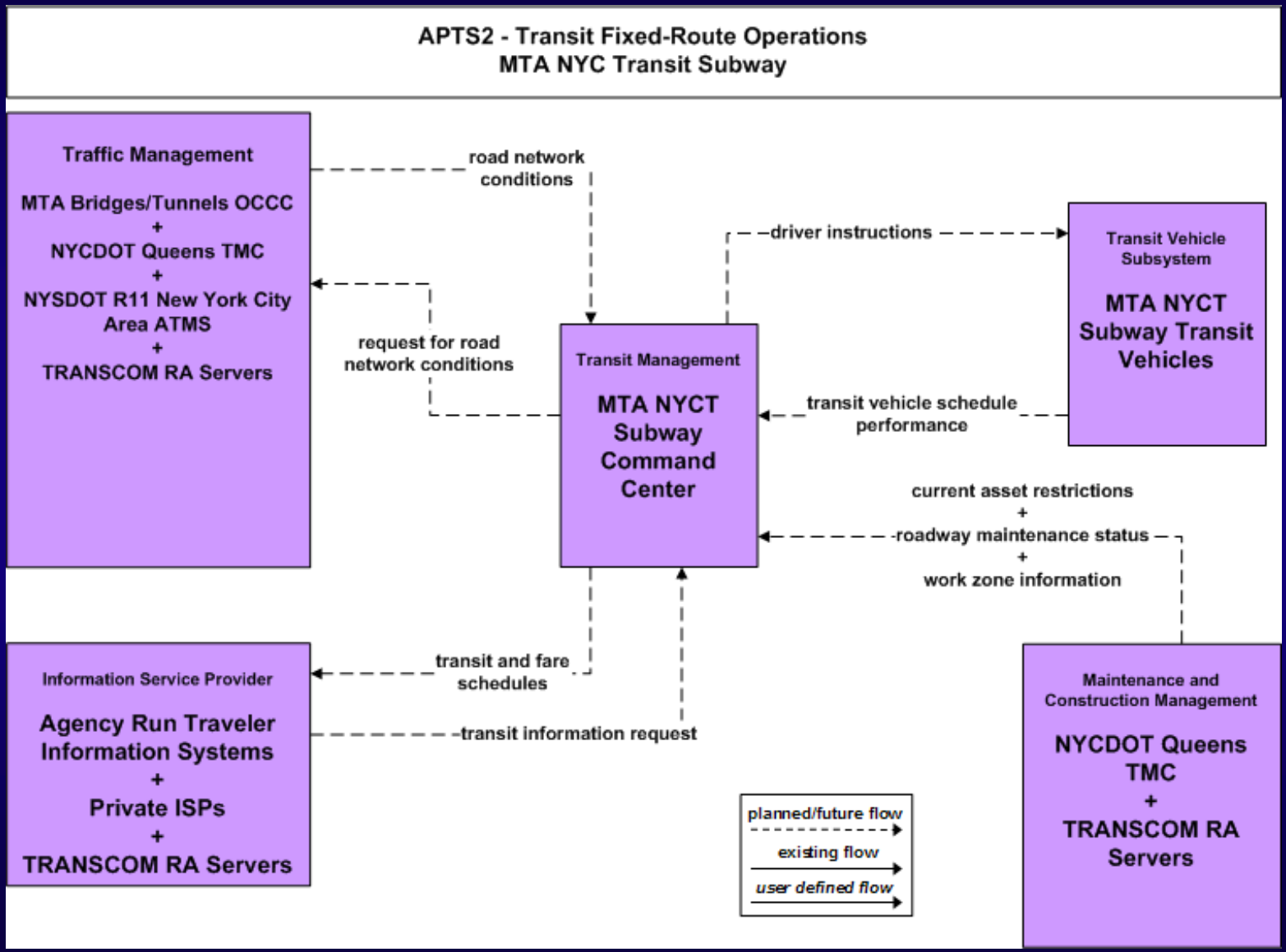
Transit Vehicle

Point of Sale / Kiosk

APTS4 - Automated Fare Payment
National ITS Architecture Market Package



Example: New York City Sub-Regional ITS Architecture Market Package

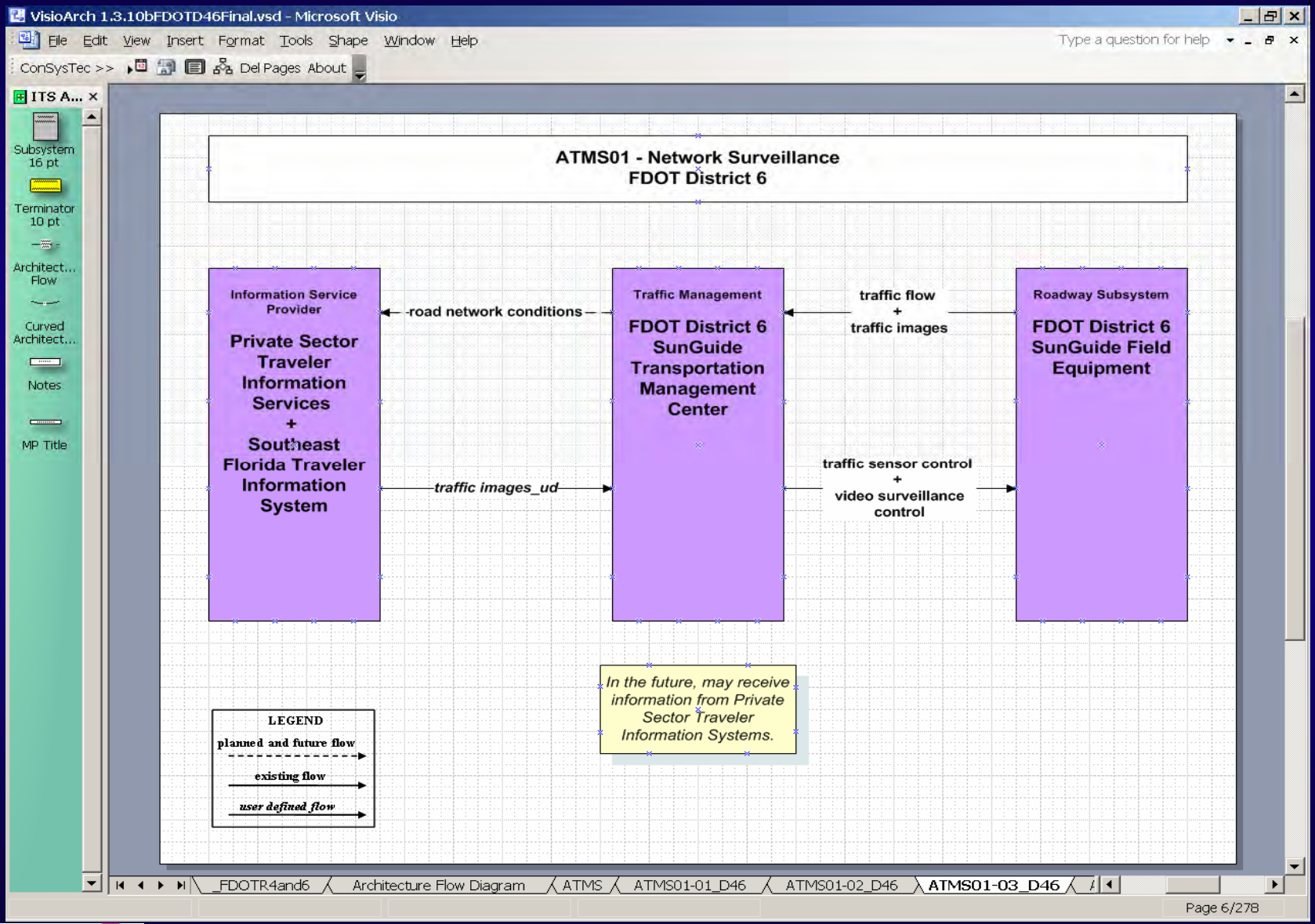


Market Package Diagrams

- Tool to understand and visualize how transportation services are, or will be, provided.
- Represent the stakeholder consensus requirements for information that may be exchanged between specific ITS elements to effect specific sets of ITS services.
- Collectively represent the operational concept for a region.

Visual Architect

Visual Architect



Visual Architect

- Visual Architect
  - A Microsoft Visual Basic application operating on top of Microsoft Visio.
  - Provides a highly interactive, graphical view of the ITS Elements and their associated system interfaces being defined in the ITS architecture.
  - Used to create and modify customized market package diagrams based on the U.S. National ITS Architecture.

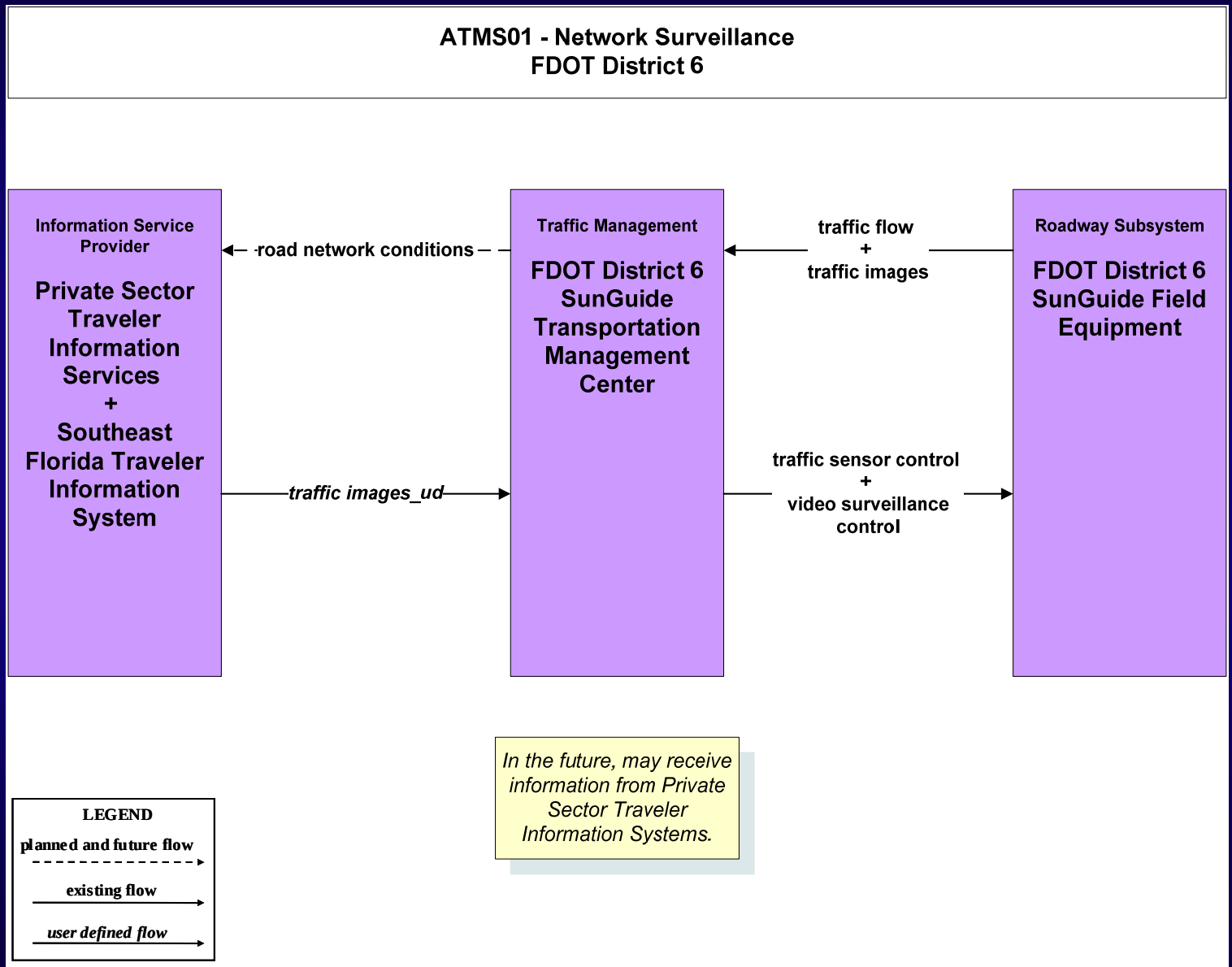
Visual Architect

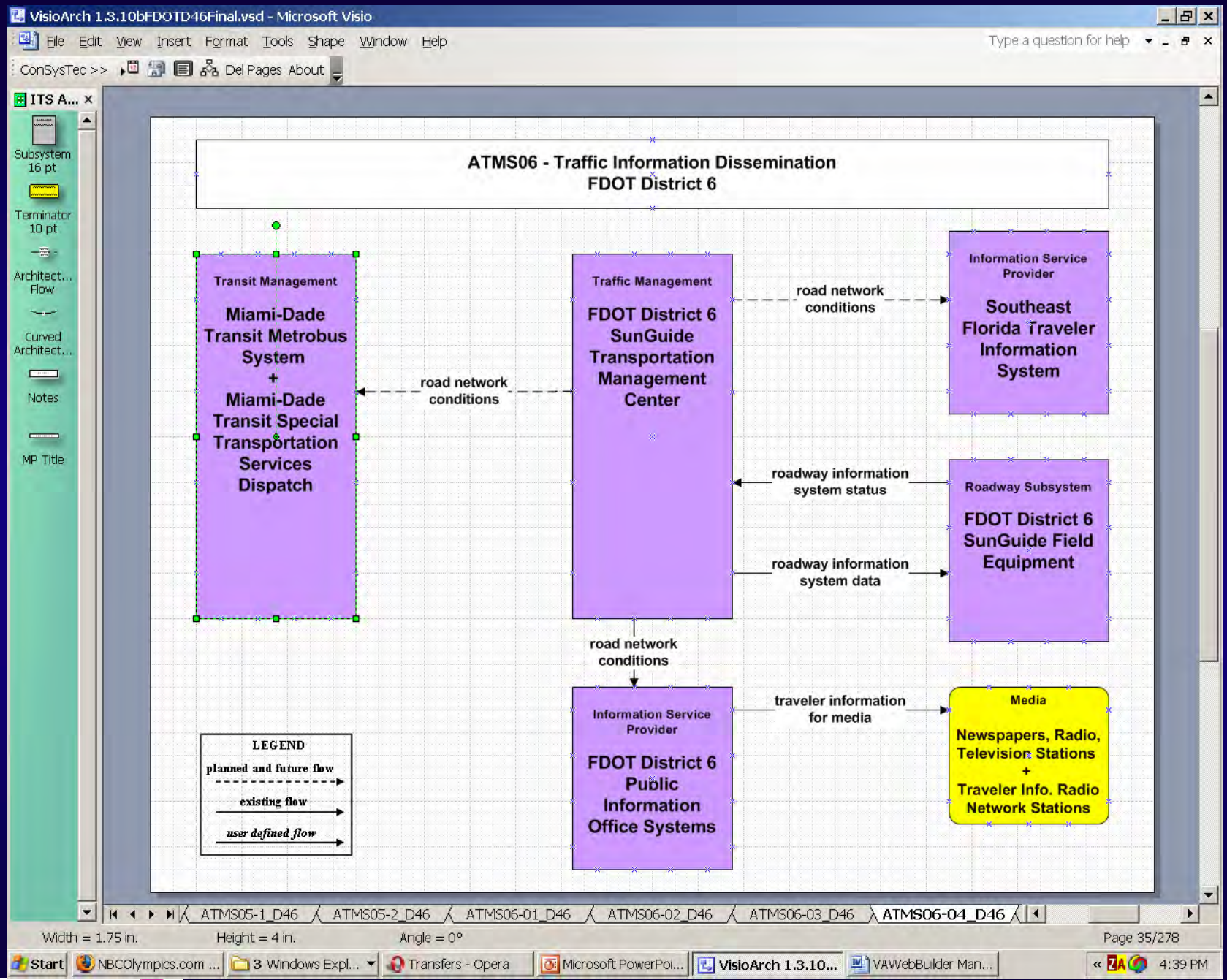
- Visual Architect
  - Provides an interface to the Turbo Architecture database – depends on it to edit elements from the ITS inventory.
  - Speeds the time required to communicate operational concepts to stakeholders, encode regional ITS architecture topology information into Turbo Architecture, and enables accurately managing large ITS architectures an economic reality.

Overview – Visual Architect

- Features:
  - Create/Add New Customized Market Package Diagrams to the set
  - Reposition any Customize Market Package Diagram Page within the set
  - Delete a Customized Market Package Diagram from the set
  - Edit Customized Market Package Diagrams
  - Synchronize Content from the Set of Diagrams with Turbo Architecture
  - Can export all market package diagrams to .gif, .emf, or .wmf formats
  - Create HTML for the web site
  - Using Adobe Acrobat, can export all market package diagrams to .pdf format
    - Can also export market package diagrams to .pdf format by functional area and/or stakeholder.

Visual Architect

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ATMS06 - Traffic Information Dissemination
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Transit Management
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Miami-Dade Transit Special Transportation Services Dispatch
road network conditions
Traffic Management
FDOT District 6 SunGuide Transportation Management Center
road network conditions
Information Service Provider
Southeast Florida Traveler Information System
roadway information system status
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Roadway Subsystem
FDOT District 6 SunGuide Field Equipment
road network conditions
Information Service Provider
FDOT District 6 Public Information Office Systems
traveler information for media
Media
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Traveler Info. Radio Network Stations
LEGEND
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existing flow
user defined flow
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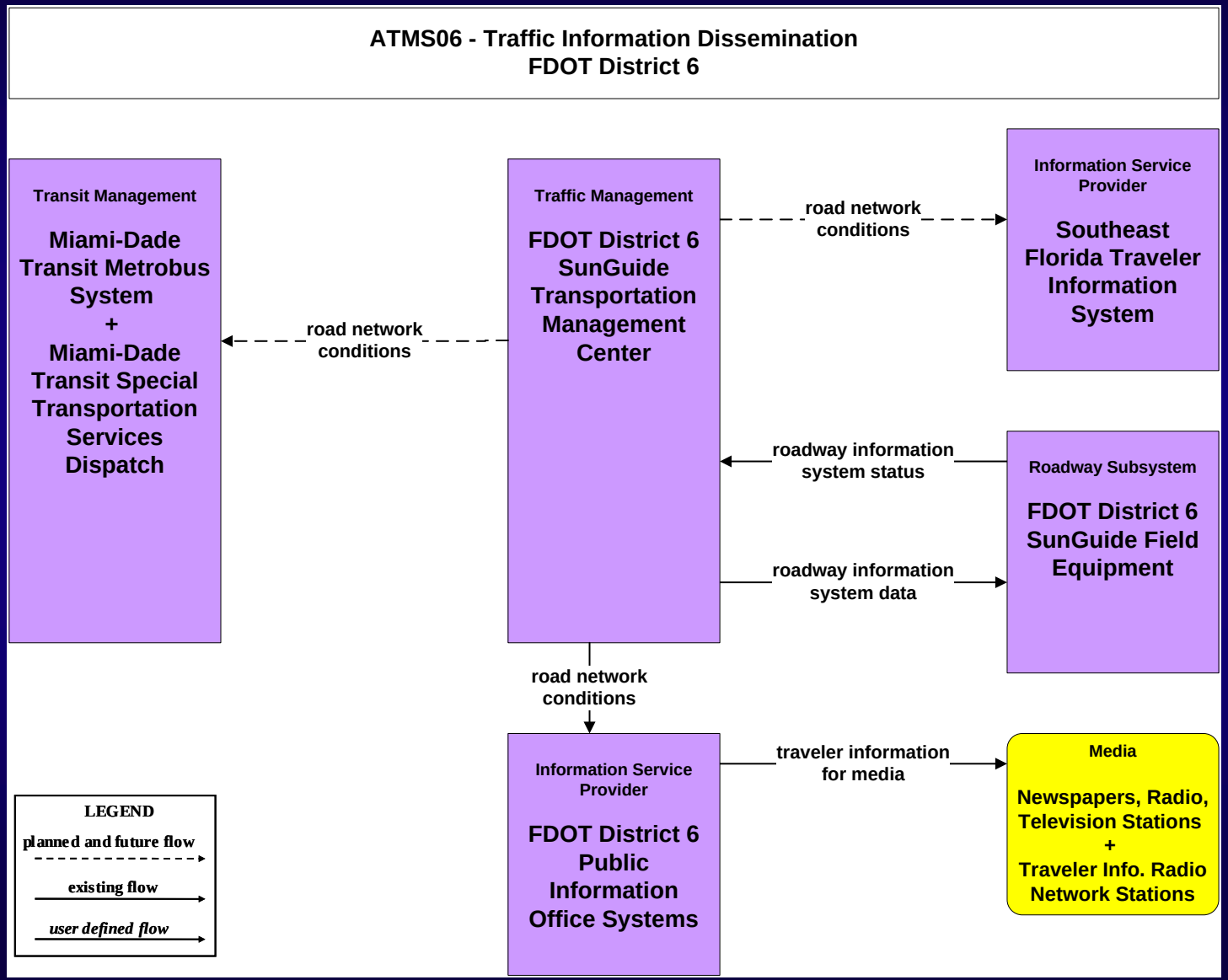
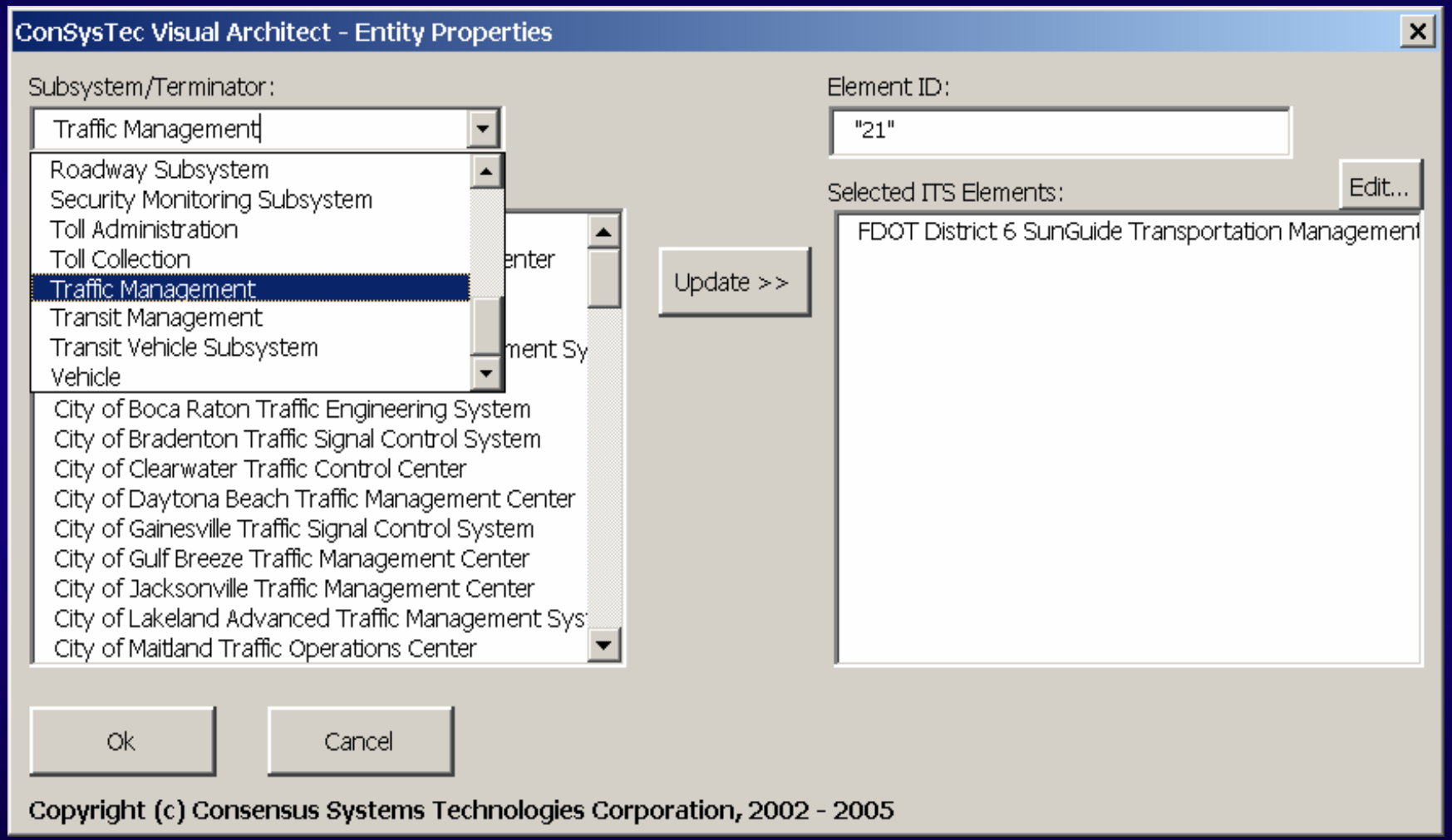
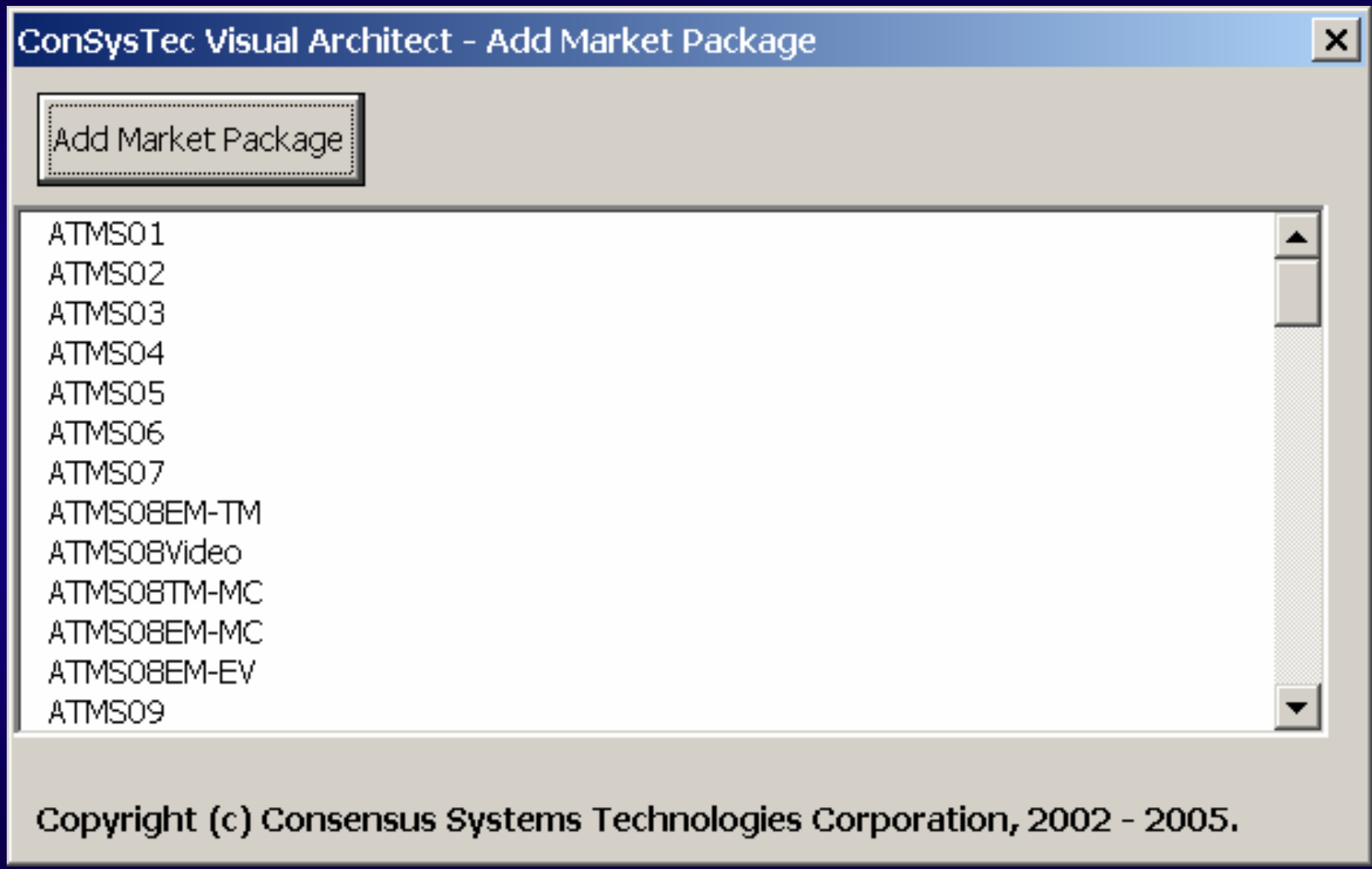
Visual Architect – ITS Elements



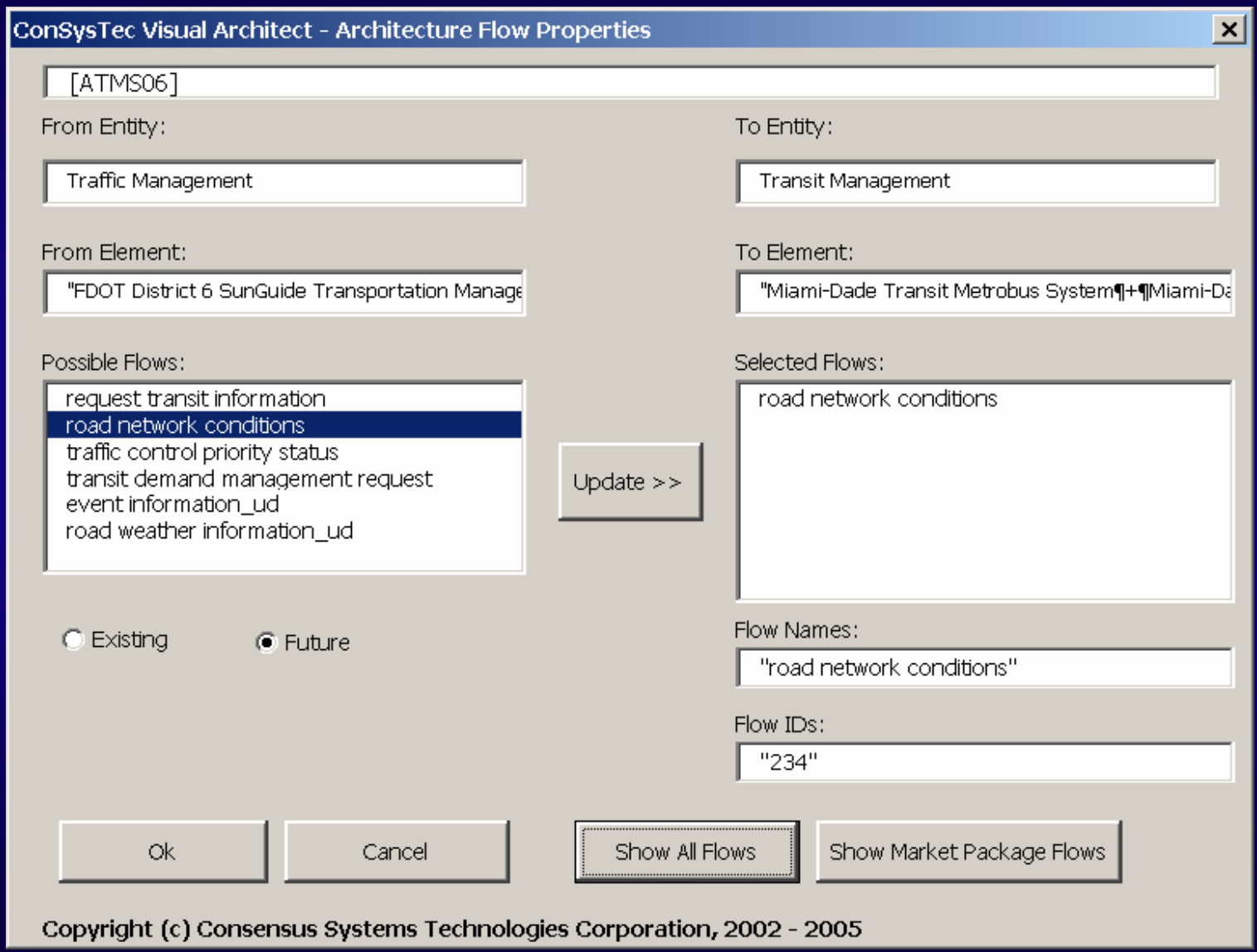
Visual Architect – ITS Elements



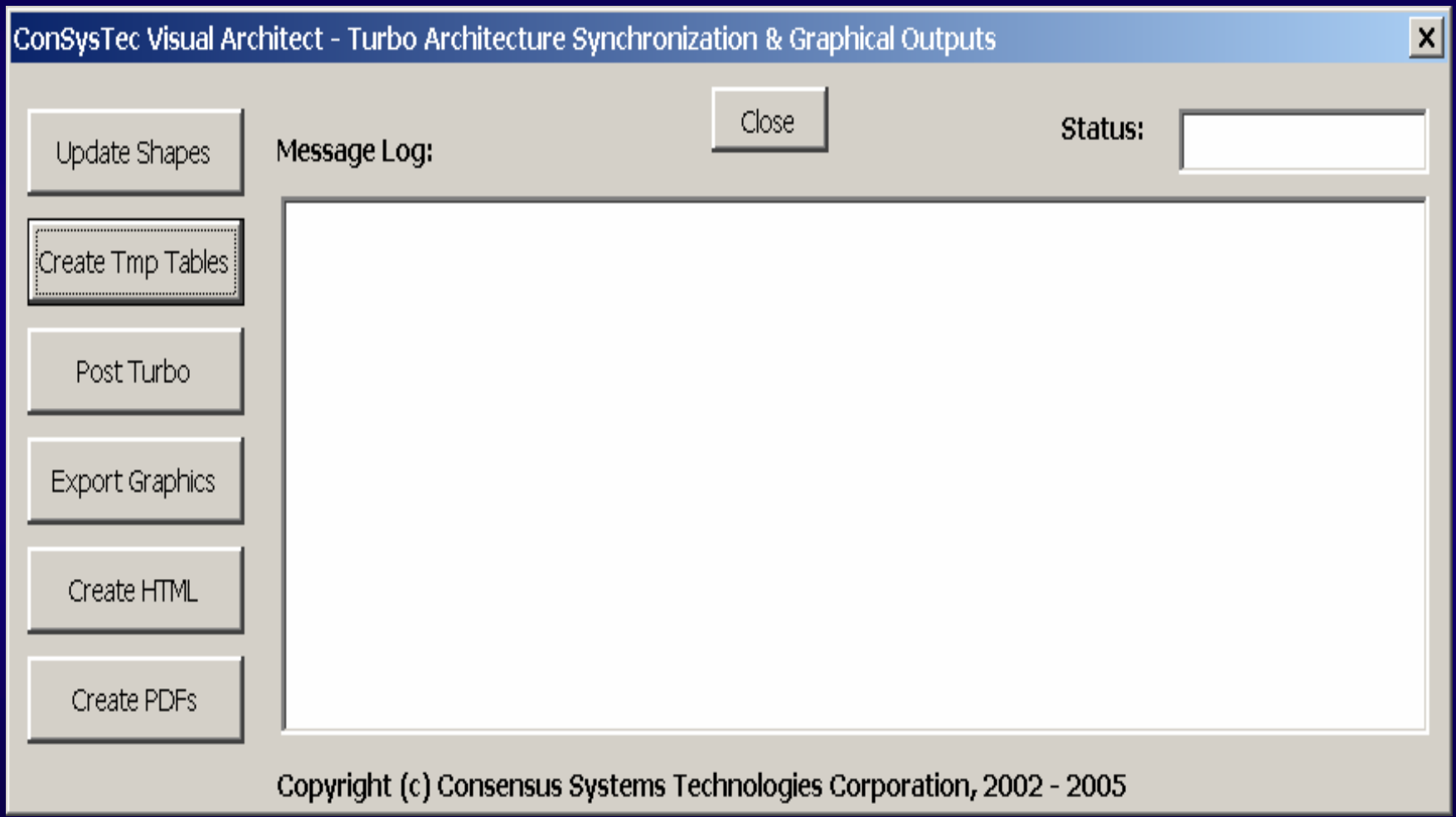
Visual Architect – Adding Market Packages



Visual Architect – Architecture Flows



Visual Architect - Outputs



Visual Architect - Outputs

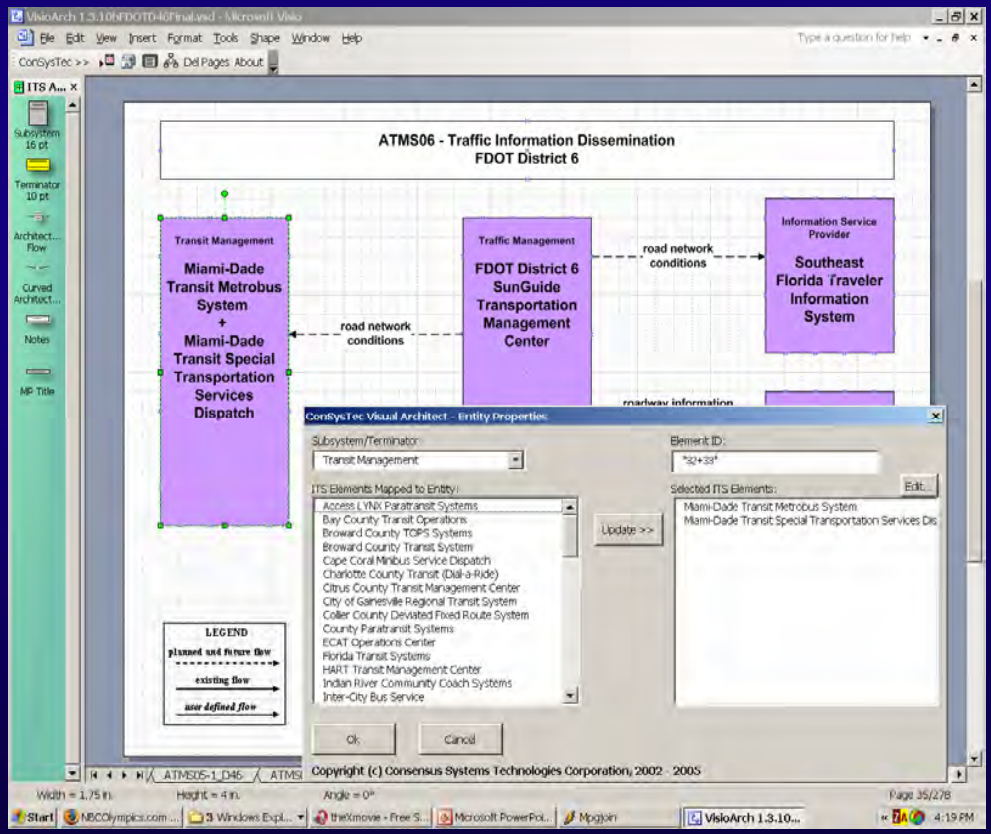
- Post to Turbo Architecture
  - Market Package Instances
    - Each customized market package diagram
  - Interfaces
    - Interfaces between ITS Elements
  - Flows
    - Architecture flows between ITS Elements, including status
  - Changes to ITS Element names

Visual Architect - Outputs

- Other Outputs
  - Portable Document File (.pdf)
    - Entire architecture
    - By Functional Area
    - By Stakeholder
  - Excel Spreadsheet
    - List of Customized Market Package Diagrams
  - Graphic Files
    - .gifs, .emfs, .wmfs

Visual Architect

The ability for interact with stakeholders in real-time is KEY!



- Stakeholders can view and make changes to the architecture
- Changes are then “posted” to the Turbo Architecture

Summary

Summary

Turbo Architecture

- De-facto standard for documenting regional ITS architectures
- Based on Microsoft Access database engine.

Summary

Visual Architect

- Interfaces with Turbo Architecture.
- Provides a graphical front-end to document and visualize relationships and interfaces between ITS Elements in support of a transportation service.

Summary

Most Importantly:

- Is a powerful tool for engaging stakeholders
  - Allows interaction with stakeholders through real-time feedback

Acknowledgements and Thank-You

- *Visual Architect* Development:
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  - Patrick Chan, P.E.
  - Robert S. Jaffe, Ph.D.

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