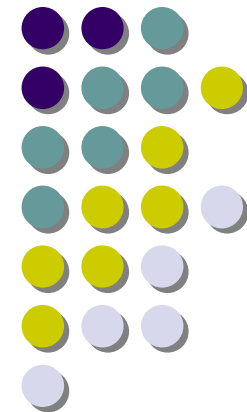


New York City Sub-Regional ITS Architecture Working Committee Meeting

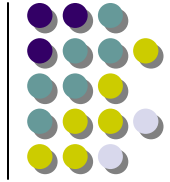
NYSDOT Region 11 Offices
Long Island City, NY
February 28, 2007



ConSysTec 
www.consystemec.com

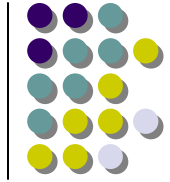
Robert S. Jaffe, Ph.D.
rsj@consystemec.com
(914) 248-8466

Manny Insignares
manny.insignares@consystemec.com
(212) 687-7911



Agenda

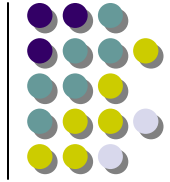
- Introductions and Announcements (5 min)
- National ITS Architecture Update (30 min)
 - Versions 5 & 6
 - Federal Perspective
- Uncompleted Issues (30 min)
 - Website Security of Documents
 - Architecture Maintenance Activities
- NYC Sub-regional Architecture (60 min)
 - Agency Experiences
 - Changes to Architecture Elements
 - Project Systems Engineering Analyses
 - Project Sequencing
- Training Opportunities (10 min)
- Next Architecture Steps for Consideration (15 min)



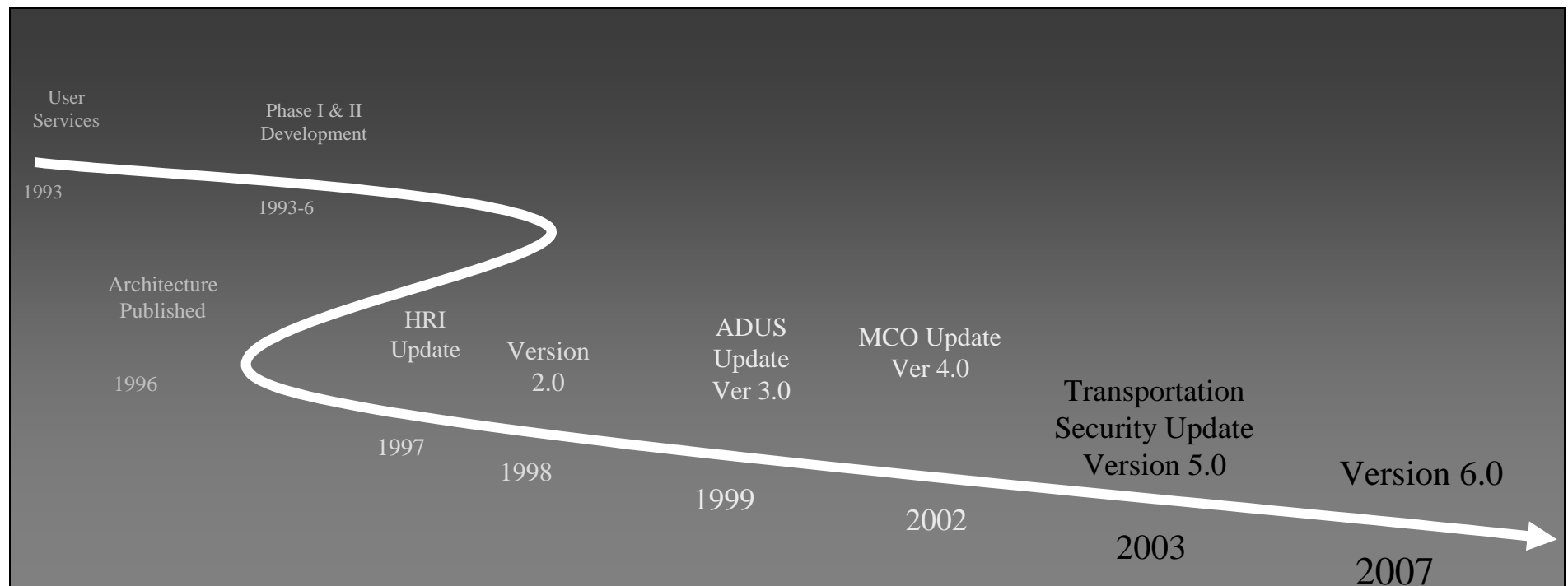
National ITS Architecture Update

- NYC SRA Update
 - Currently Version 4.0
 - Update to Version 6.0 of the NITSA

National ITS Architecture is a “Living Document”

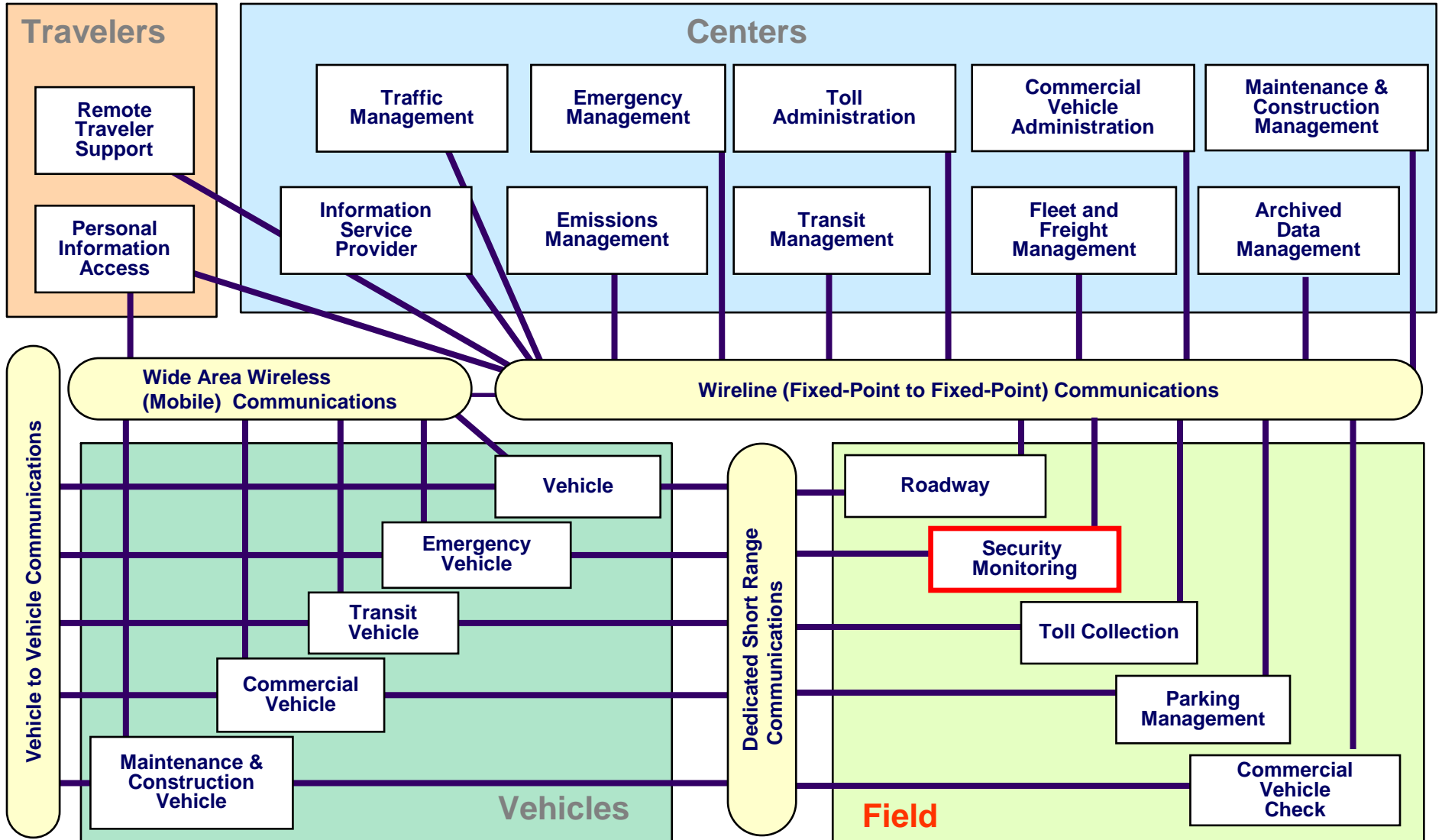


- Continuing evolution of the architecture over 10+ years
- Version 6.0 continues supporting ITS tech evolution and deployers



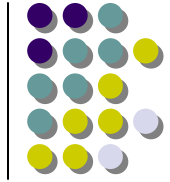
National ITS Architecture

Versions 5 & 6 - "Sausage Diagram"



National ITS Architecture Update

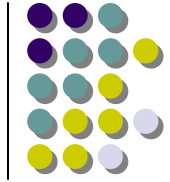
Version 5



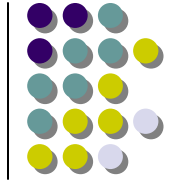
- Version 5 – New Market Packages
 - ATMS21 - Roadway Closure Management
 - Road Closure Management
 - CVO11 - Roadside HAZMAT Security Detection & Mitigation
 - HAZMAT Security
 - CVO12 - CV Driver Security Authentication
 - HAZMAT Security
 - CVO13 - Freight Assignment Tracking
 - Freight and Commercial Vehicle Security
 - EM05 - Transportation Infrastructure Protection
 - Rail Security
 - Transportation Infrastructure Security

National ITS Architecture Update

Version 5

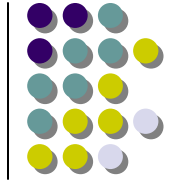


- Version 5 – New Market Packages (Cont'd)
 - EM06 - Wide-Area Alert
 - Support for 511
 - Disaster Response / Evacuation
 - Wide Area Alert
 - EM07 - Early Warning System
 - Disaster Response / Evacuation
 - EM08 - Disaster Response and Recovery
 - Disaster Response / Evacuation
 - Rail Security
 - EM09 - Evacuation and Reentry Management
 - Disaster Response / Evacuation
 - Rail Security
 - EM10 - Disaster Traveler Information
 - Support for 511
 - Disaster Response / Evacuation



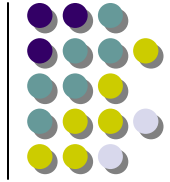
Version 6.0 Changes

- No New Subsystems, but New Terminators:
 - Border Inspection Administration Systems
 - Border Inspection Systems
 - Driver ID Card
 - Public Health Systems
 - Vehicle Infrastructure Integration (VII) Administration
- New Market Packages:
 - ATIS10 - VII Traveler Information
 - ATMS22 - Roadside Lighting System Control
 - AVSS12 – Cooperative Vehicle Safety Systems
 - APTS9 - Transit Passenger Counting
 - APTS10 – Transit Signal Priority
 - MC11 - Environmental Probe Data Collection
 - MC12 – Infrastructure Monitoring



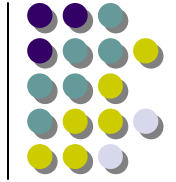
Version 6.0

- No New User Services, but...
- New User Service Requirements
 - 2.1.5 [Public Transit] Vehicle Management, scheduling
 - 4.1.1.2.1 Motor Carriers ... certify safety/legal
 - 4.3.2.5 CV Vehicle Asset Management (VAM) function
 - 8.1.2.11 Roadway Management (RWM) ... electrical lighting systems



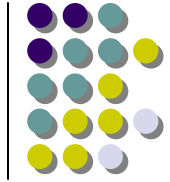
Version 6.0 Schedule

- 31-Mar-07 Website, Docs Ready
- 15-Apr-07 Draft CD Test
- 30-Apr-07 CD Ready for Production
- 04-Jun-07 ITS America – Handout CDs, Present 6.0 at Session
- Summer Turbo release to McTrans



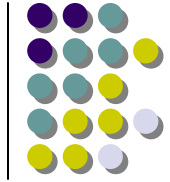
National ITS Architecture Update

- Federal Perspective
 - Summary by Mr. Arthur O'Connor



Website Security of Documents

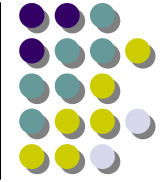
- Website with NYC SRA still hosted on ConSysTec's website
 - Still requires user name and password for access
- Consultants may need access to certain web pages and/or documents to perform the required systems engineering analysis
 - Provide consultants with the user name and password on an as-needed basis
 - Require a second user name and password for documents deemed "sensitive"
- Related policies



Architecture Maintenance Activities

- Support Architecture Maintenance
 - Ask stakeholders to review their sections and submit change requests
 - To whom?
 - Receive and analyze change requests
 - Enter into comments database
 - Distribute for comments and review
 - Update baseline documents

Systems Engineering Analysis



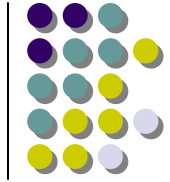
Includes the following:

1. Portion of the regional architecture being implemented
2. Roles and responsibilities of participating and affected agencies
3. Functional requirements
4. Identification of alternative communications infrastructure and configurations
5. Identification of applicable ITS standards and testing procedures
6. Identification of procurement options
7. Procedures and resources necessary for operations and management of the system

NYSDOT Guide Recommends to Submit with Final Design Report

The list is based on FHWA Rule 940/FTA Policy

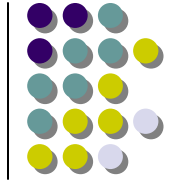
Project Sequencing Discussion



In future updates to architecture may include:

1. More “TIP-like” description
2. Geographic or transportation facility boundary
3. Budgetary Cost Estimate
4. Agency Lead
5. Reference to Market Packages

Group Discussion

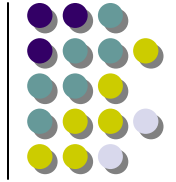


Training Opportunities

- Architecture Training
 - Basics of Architecture
 - Using ITS Architecture in Transportation Planning
 - Using ITS Architecture in Project Development
 - Two levels of detail for each
 - Managers (Overview)
 - Project level managers (More Detail)

Next Steps for Consideration

- Group Discussion

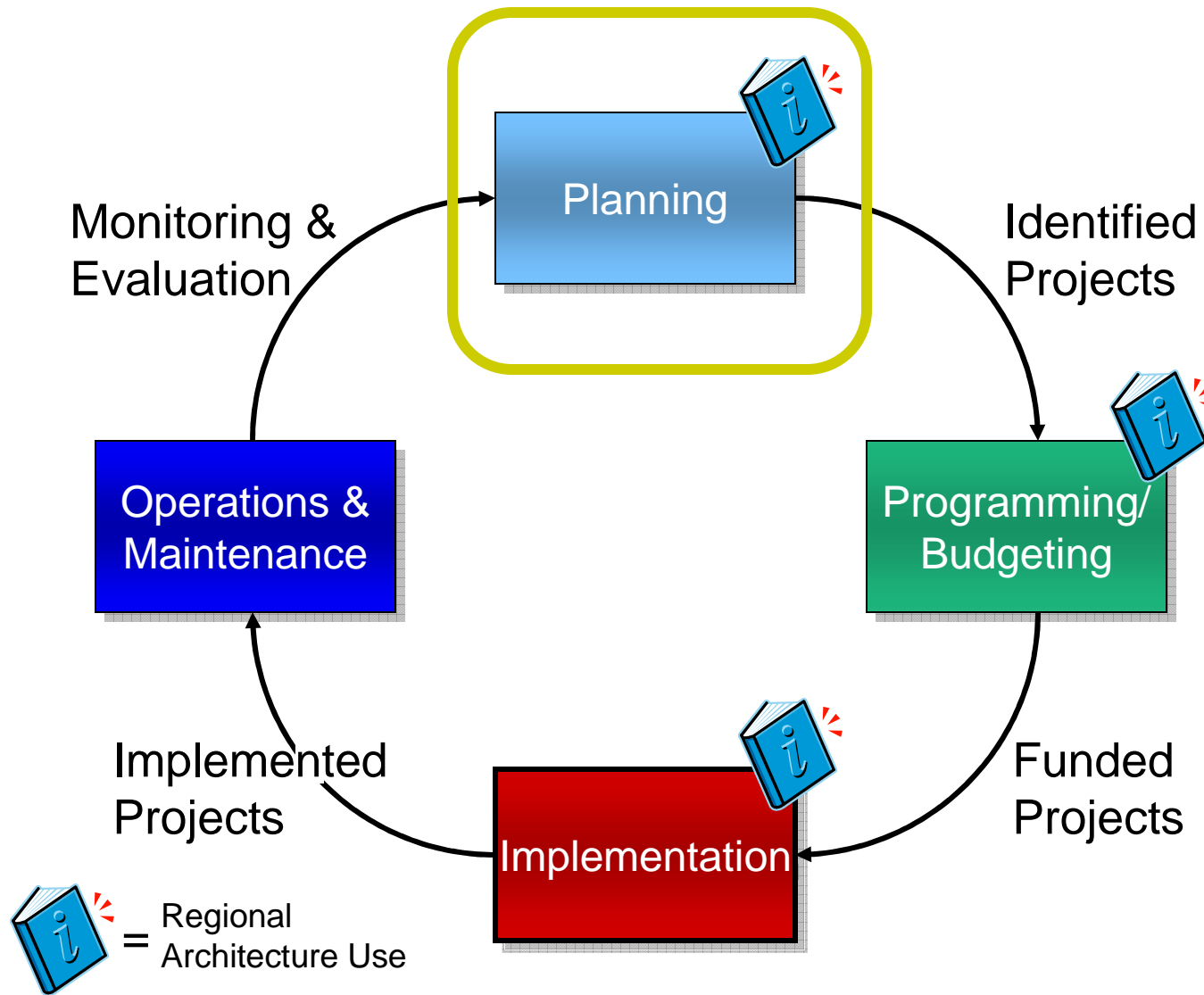
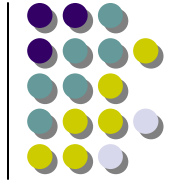


Update on NYSDOT Guidance Document

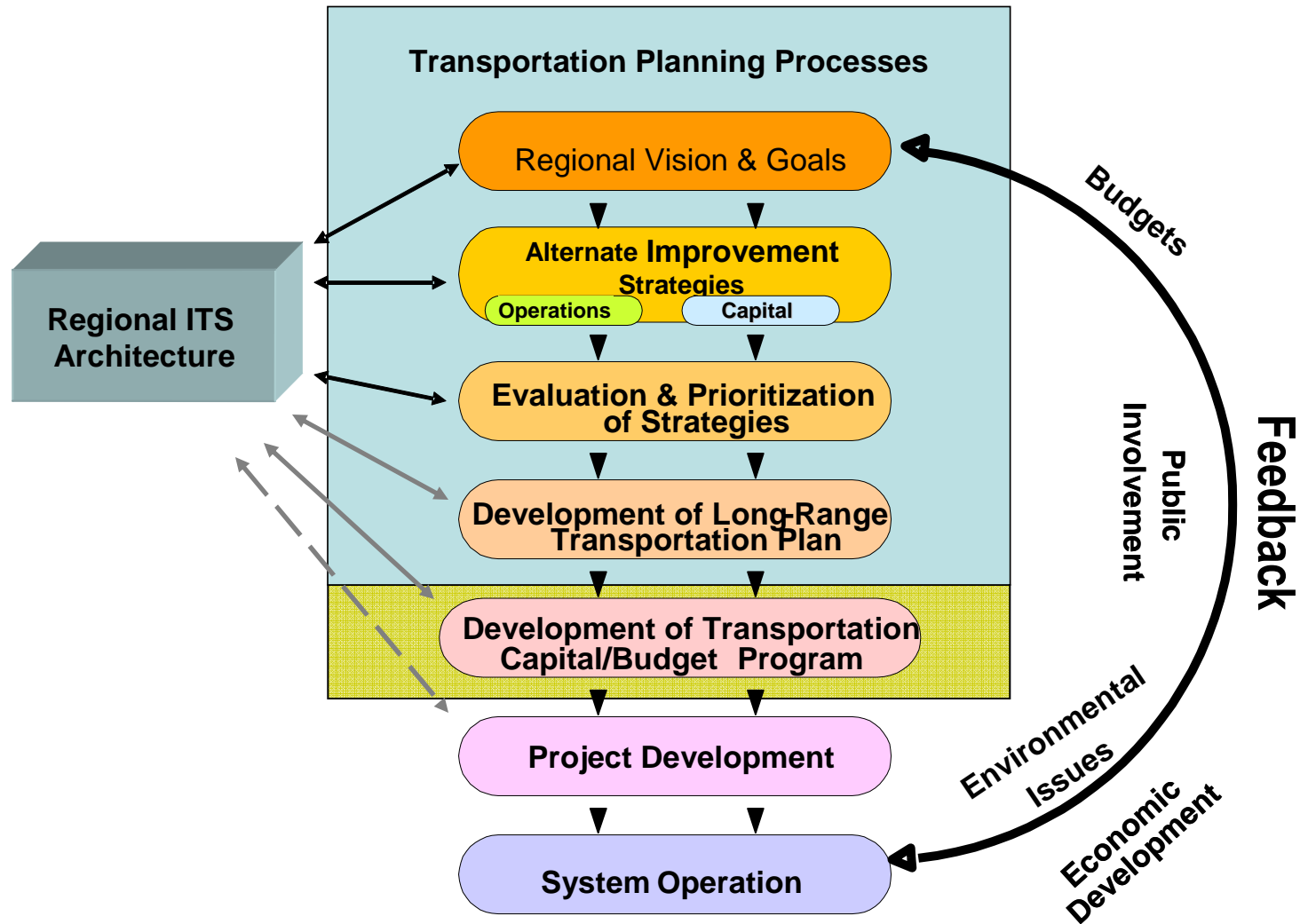
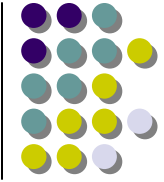


- NYSDOT Central Office is developing ITS Standards Specification Development Guide
 - Traces through Systems Engineering Process starting with Architecture
 - Draft if available: www.consystem.com/nystandards
- Transportation Planning and Project Programming
 - Using ITS Architecture to identify ITS components of Transportation Projects
 - Relation to Long Range Plan and Transportation Improvement Program
- Project Design and Development
 - Evaluate ITS project design alternatives
 - Develop Specifications for ITS Standards
 - System Testing / System Integration
 - Testing ITS Standards Specifications
 - Field Testing
 - System Acceptance Testing

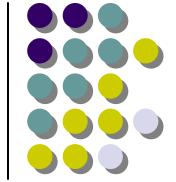
Project Life Cycle



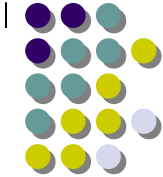
Transportation Planning Process



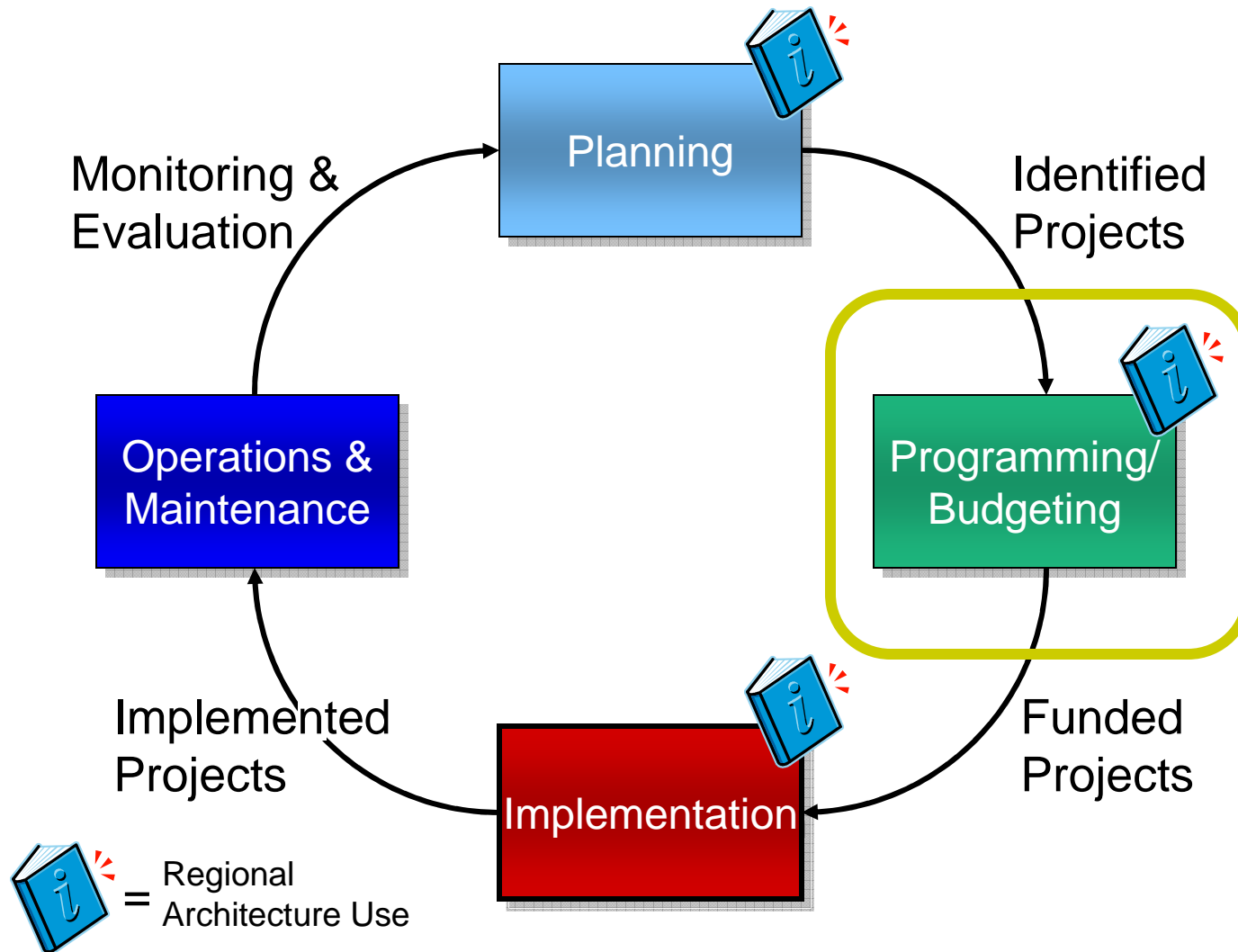
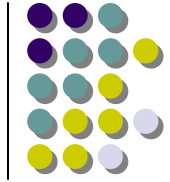
Operational Strategies



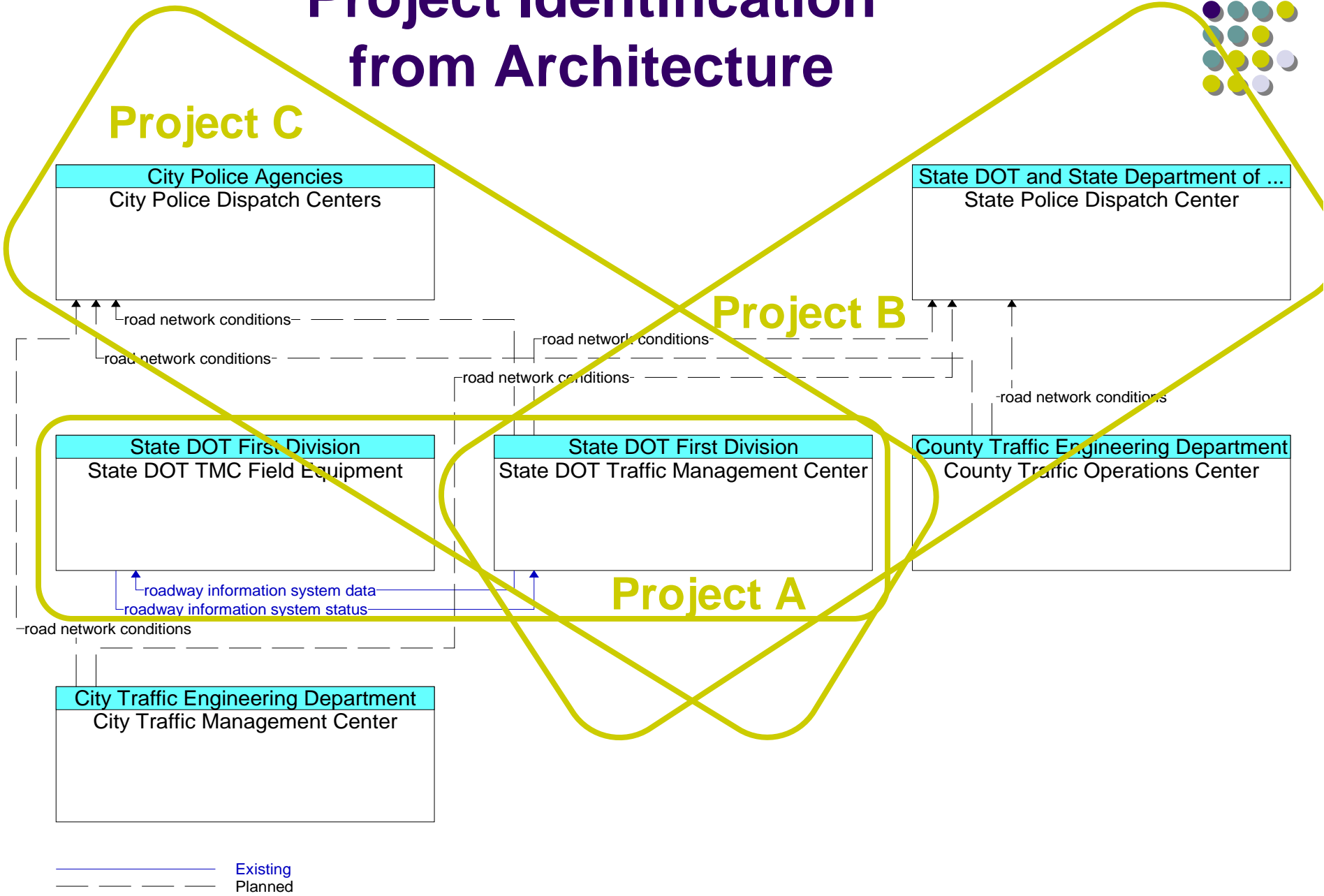
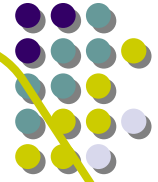
Strategy Evaluation and Prioritization



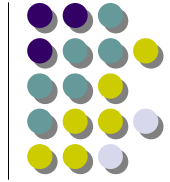
Project Life Cycle



Project Identification from Architecture

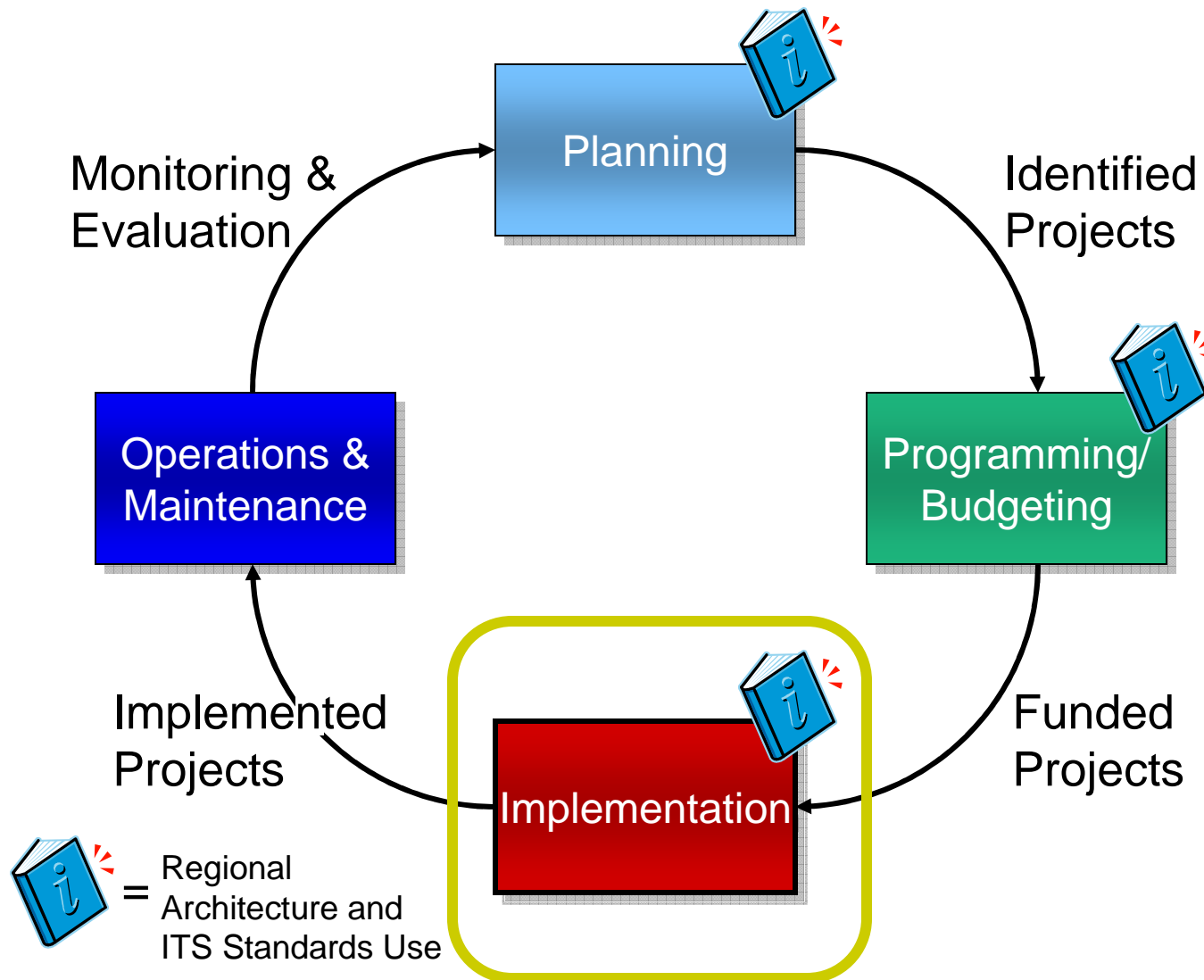
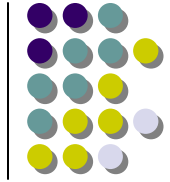


Using ITS Architecture for Short Term Planning

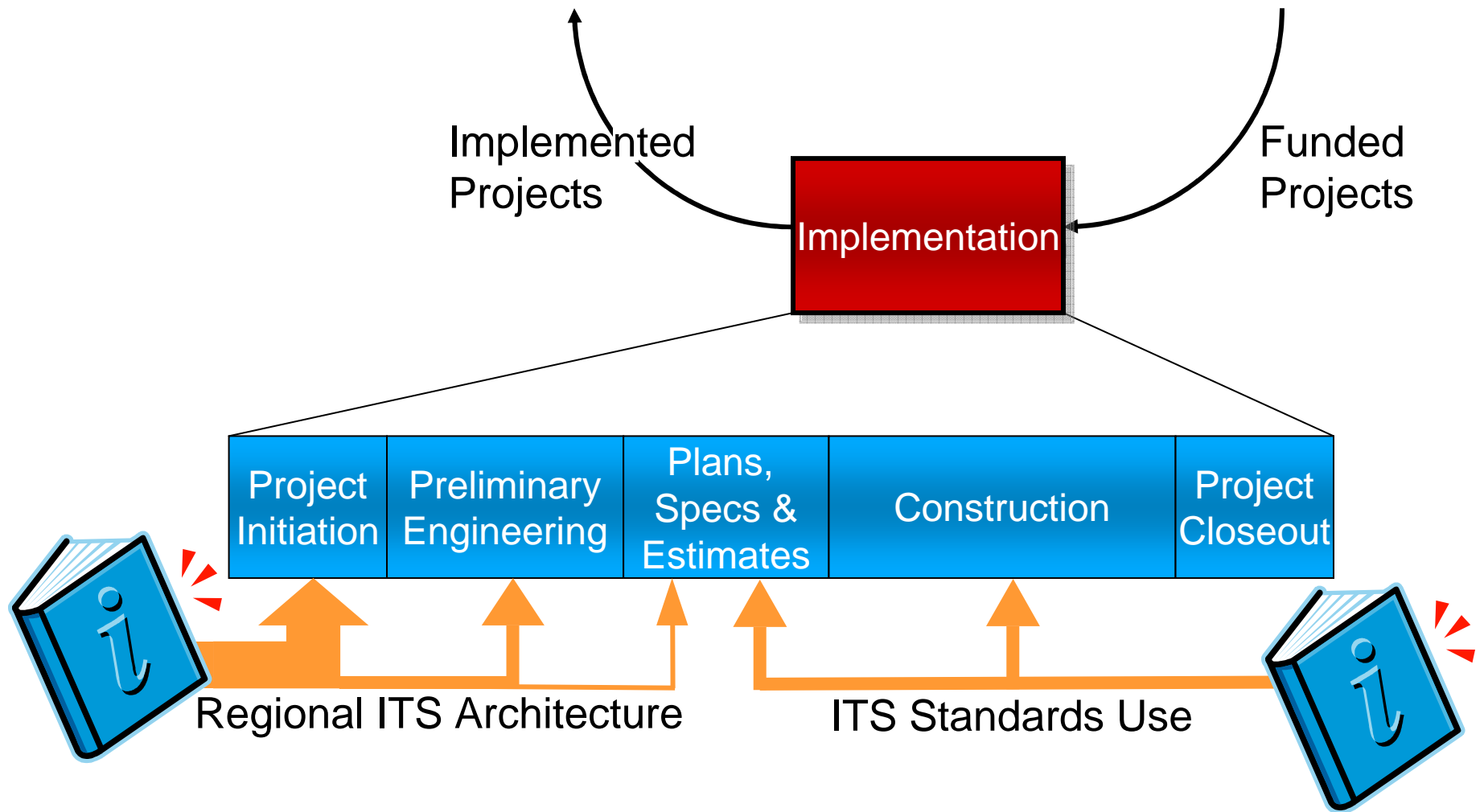


- Use ITS Architecture for budgeting ITS projects
- Define near term projects in more specificity to feed into budgeting processes
- Promote integration projects in region
- Establish a Process based on the ITS Architecture

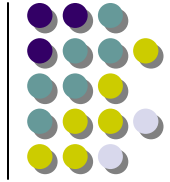
Project Life Cycle



Traditional Project Development Lifecycle



What is the Purpose of Systems Engineering?

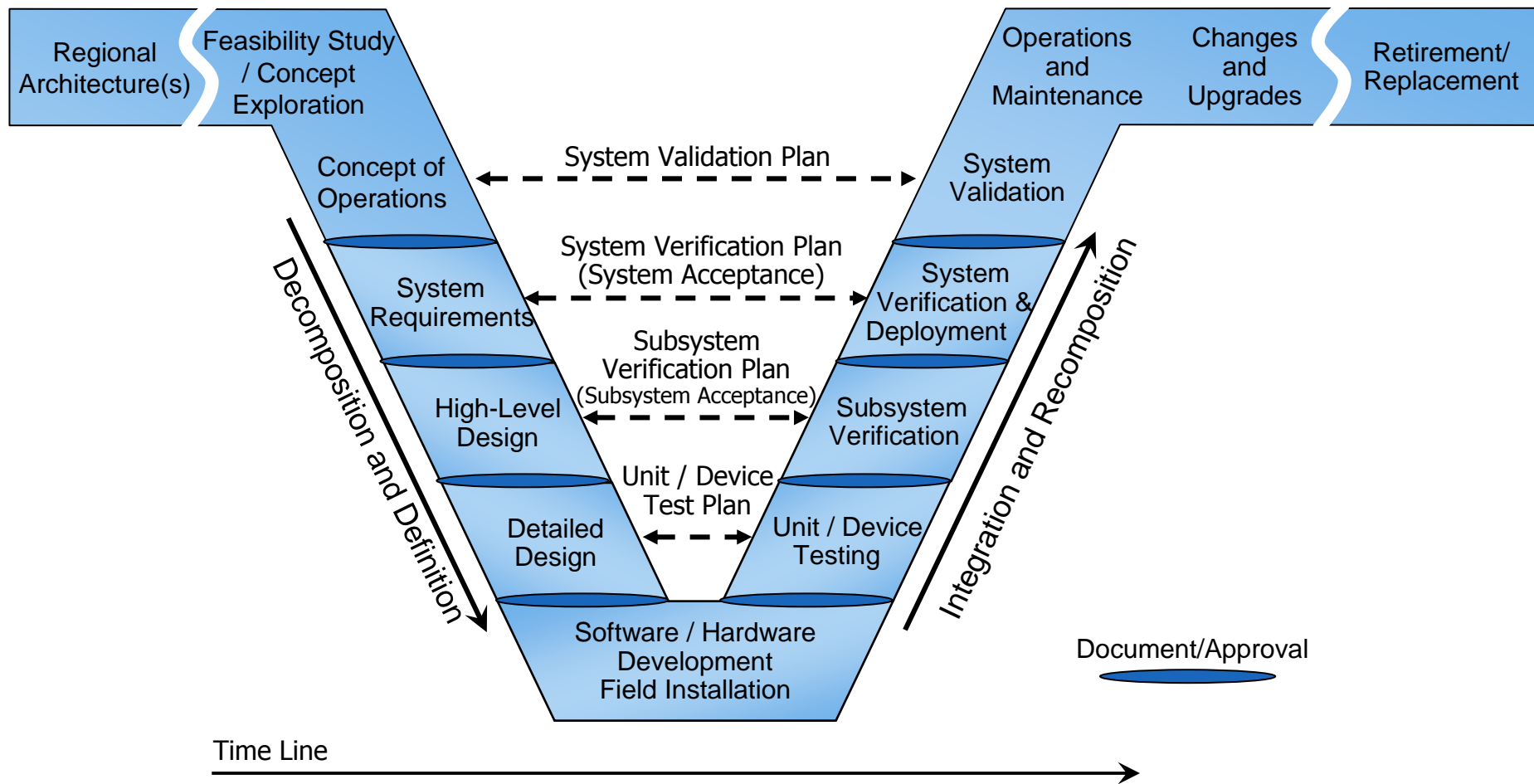


- It improves the chances of developing a system on-time and on-budget that meets the users' needs
 - Reduce Risk -- Control Cost and Schedule
 - Satisfy users' needs
 - Improve system quality



Deployment of ITS Projects based on Architecture and Standards

Project Systems Engineering “VEE” Diagram

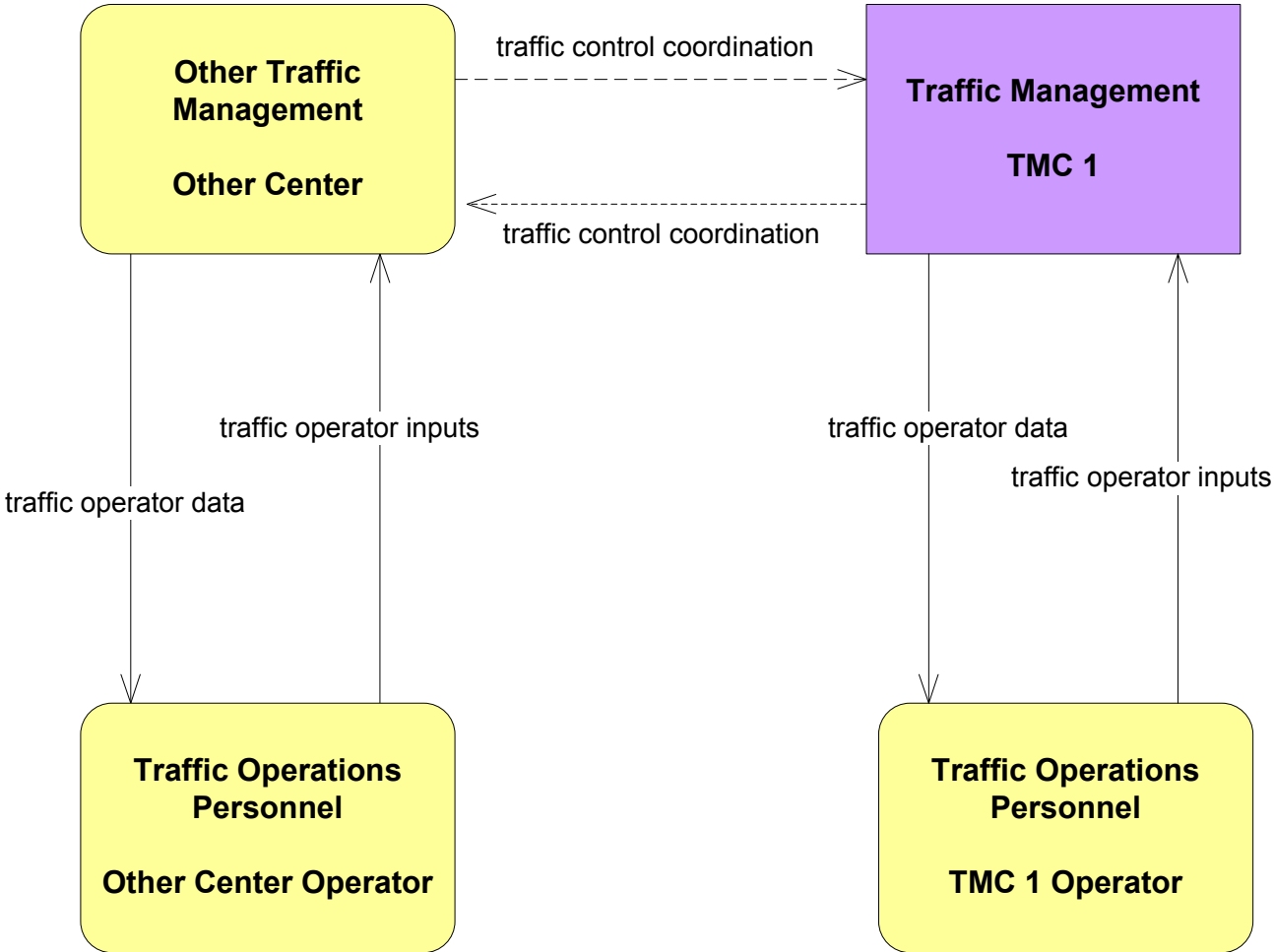


Regional ITS Architecture



Example “Customized” Market Package

- Regional Needs
- Stakeholders
- Roles and Responsibilities
- ITS Element Interfaces
- ITS Services

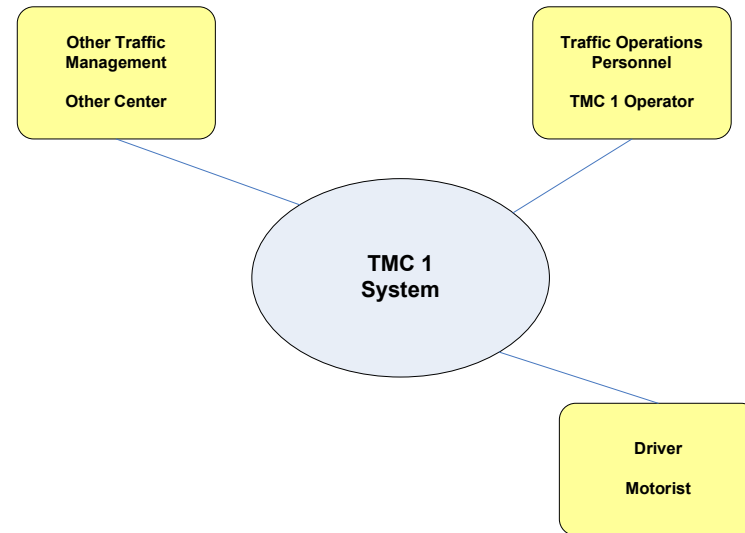


Concept of Operations

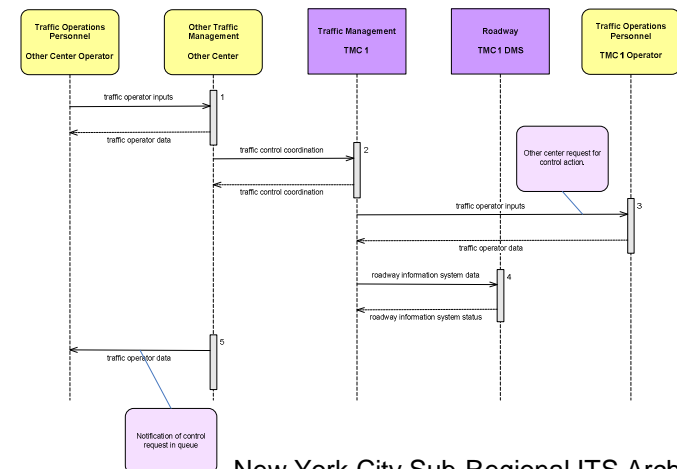


- Project Needs
 - Cost-Benefit Assessment
 - Metrics / Measures for System Validation
- Identification of
 - Users
 - Roles and Responsibilities
- Operational Scenarios
 - Defines how workflow (system and non-system elements) satisfy user needs
 - Optimization opportunities
 - More efficient use of resources
- System Overview
- Traceable to
 - Regional ITS Architecture Elements
 - User Needs

Example System Overview



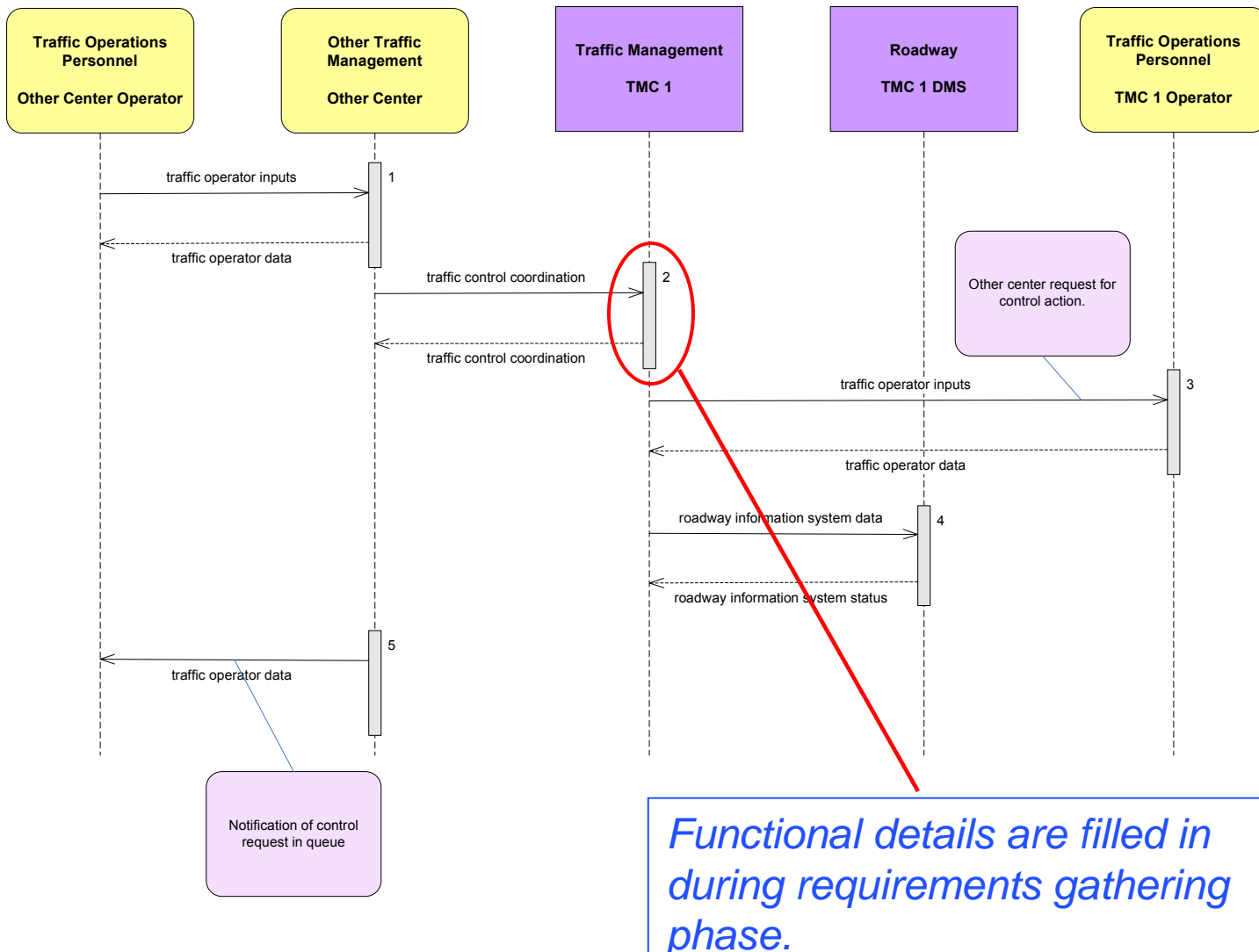
Example Operational Scenario





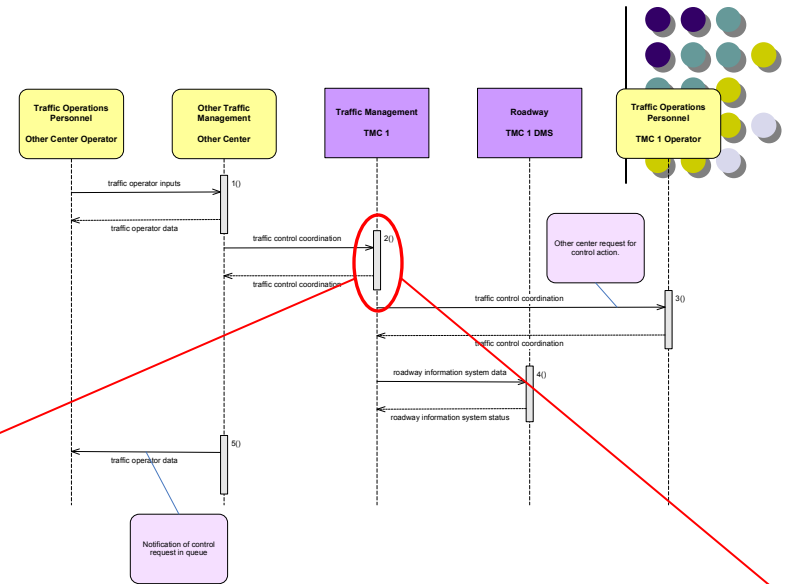
Concept of Operations

Operational scenario shows workflow steps of system and non-system elements to satisfy user needs.



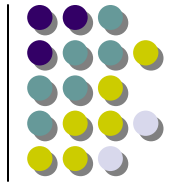
Use Case and Requirements Development

- Use Cases Analysis is used to define / refine interfaces in operational scenarios.
 - Traceable to Steps of the Operational Scenario
- Approach guarantees consistency in detail and completeness.
 - User Interface Dialogs
 - System to System Dialogs
 - Processing Details
- Requirements written as “shall” statements.



User	UCDescription	UCPreConditions	UCBasicCourseEvents-Requirements	UCExceptionEvents	UCPostConditions	Technical Requirements	TestCase
TMC 1	Provide DMS Inventory to Remote Centers	The remote center sends a DMS inventory request message to the local center that controls a sign that is being queried.	1. Receive DMS Inventory Request. 1.1. The local center shall be capable of accepting and processing valid DMS inventory requests. 1.2. The request shall include the following: - The ID of the receiving center - The ID of the sending center - The unique request identifier assigned by the requesting center - The security attribute (user name and password) - The operator and agency name making the request 2. Validate and Parse Request Message. 3. Retrieve DMS Inventory. 3.1. Create DMS Inventory Query. 3.2 Retrieve DMS Inventory. 4. Create Response Message. 5. Send DMS Inventory Response. 5.1. The local center shall be capable of sending a response to the requesting center. 5.2. The response to a DMS inventory request shall include the following: - The ID of the receiving center - The ID of the sending center - The unique request identifier - The operator and agency name in the request. - The name of the operator at the local center acting on the request - The contact information (name, phone number, pager, email address) for the owning center		The remote center receives the response to a DMS inventory request.		

Use Case and Requirements



Example Use Case and Requirements traceable to Step 2 of the Operational Scenario

Microsoft Excel - uc-requirements.xls

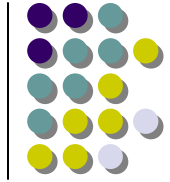
File Edit View Insert Format Tools Data Window Help

Type a question for help

100% Arial 8

C2	TMC 1							
User	UCDescription	UCPreConditions	UCBasicCourseEvents-Requirements	UCExceptionEvents	UCPostConditions	Technical Requirements	TestCase	
1	TMC 1	Provide DMS Inventory to Remote Centers	The remote center sends a DMS inventory request message to the local center that controls a sign that is being queried.	<p>1. Receive DMS Inventory Request.</p> <p>1.1. The local center shall be capable of accepting and processing valid DMS inventory requests.</p> <p>1.2. The request shall include the following:</p> <ul style="list-style-type: none"> - The ID of the receiving center - The ID of the sending center - The unique request identifier assigned by the requesting center - The security attribute (user name and password) - The operator and agency name making the request <p>2. Validate and Parse Request Message.</p> <p>3. Retrieve DMS Inventory.</p> <p>3.1. Create DMS Inventory Query.</p> <p>3.2 Retrieve DMS Inventory.</p> <p>4. Create Response Message.</p> <p>5. Send DMS Inventory Response.</p> <p>5.1. The local center shall be capable of sending a response to the requesting center.</p> <p>5.2. The response to a DMS inventory request shall include the following:</p> <ul style="list-style-type: none"> - The ID of the receiving center - The ID of the sending center - The unique request identifier - The operator and agency name in the request - The name of the operator at the local center acting on the request - The contact information (name, phone number, pager, email address) for the owning center 		The remote center receives the response to a DMS inventory request.		
2								

Ready



High Level Design

- Design / Implementation Alternatives Analysis
- Requirements are partitioned to system components
- Computing Architecture Trade-off is performed:
 - Client-Server
 - Web Services
- User Interface Alternatives:
 - Mobile
 - Web Browser
 - Map-based
 - Forms-based
- Communications Alternatives
- Data Storage / Retrieval
 - Data Warehouse
 - Geographic Information Systems
- Cost Assessment
 - Build-Buy

Use Cases & Requirements

Alternatives Analysis

User Interface

Center Systems

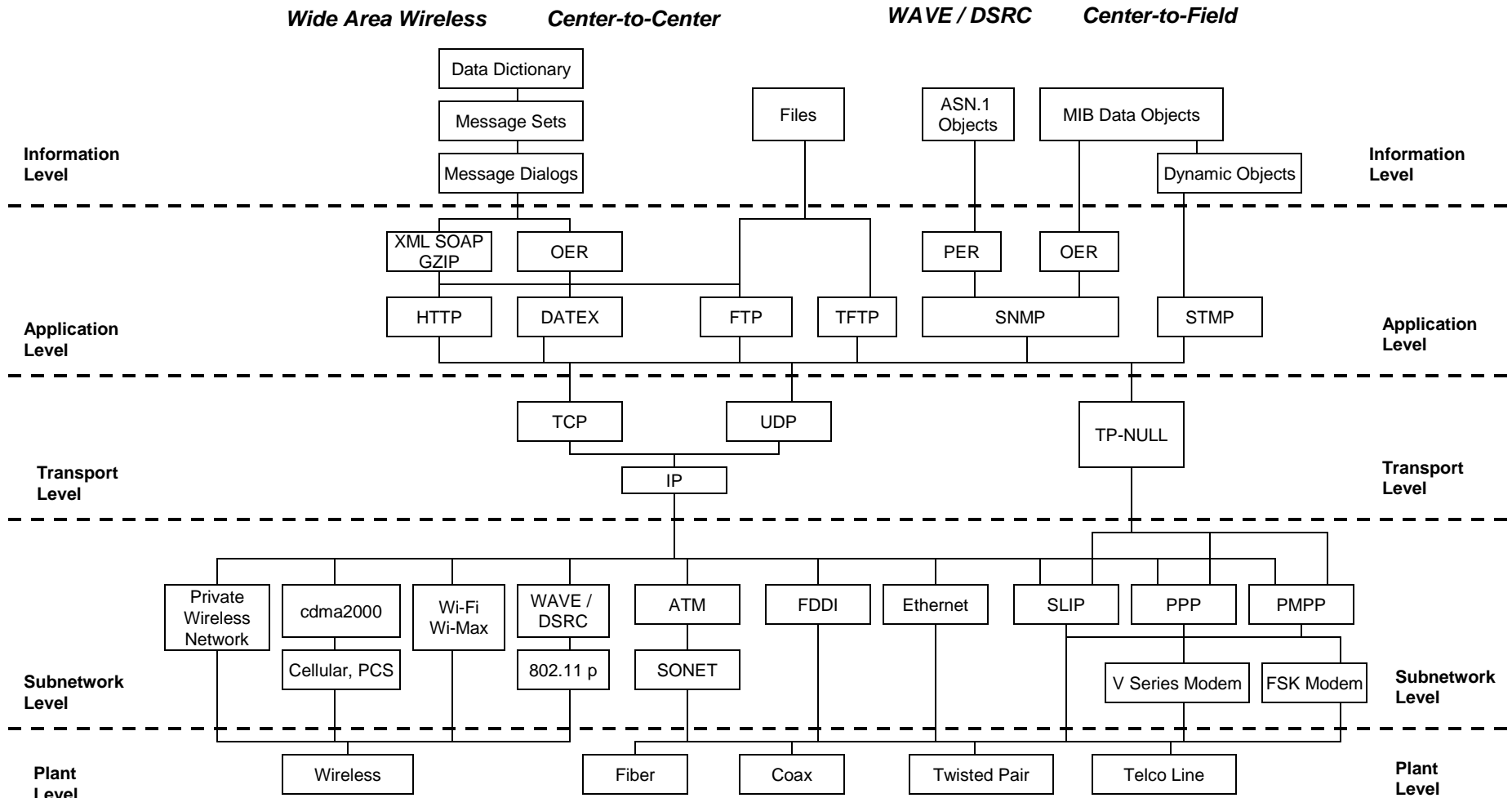
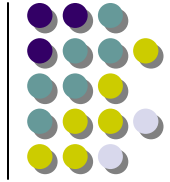
Communications

Field Elements

Data Storage Retrieval

\$ \$ \$ \$ \$

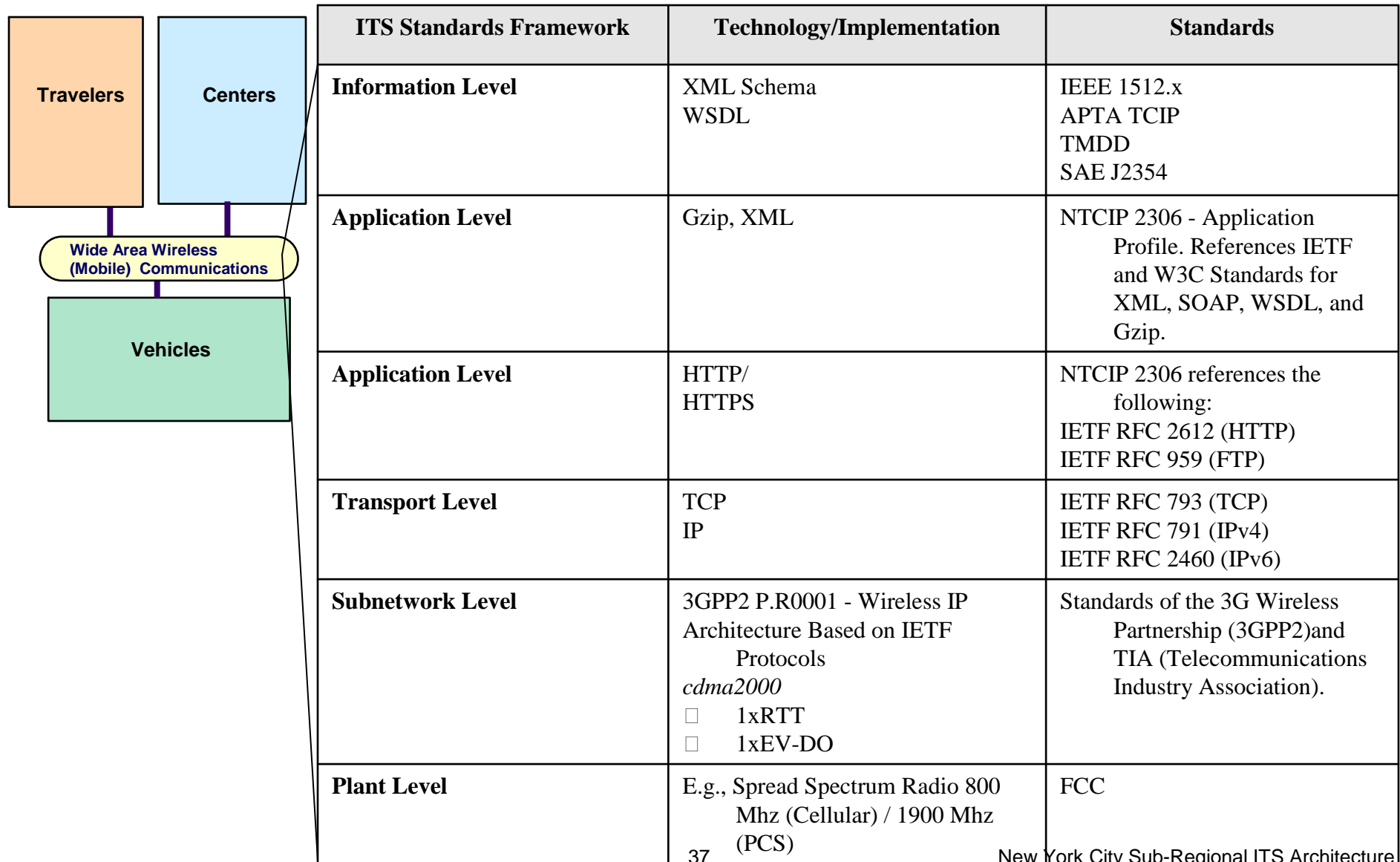
High Level Design ITS Communications Analysis Framework



Wide Area Wireless CP 1 - Mobile XML Messaging over Cellular Networks

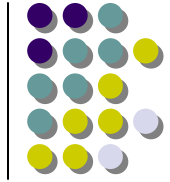


Example: Wide Area Wireless Communications Packages

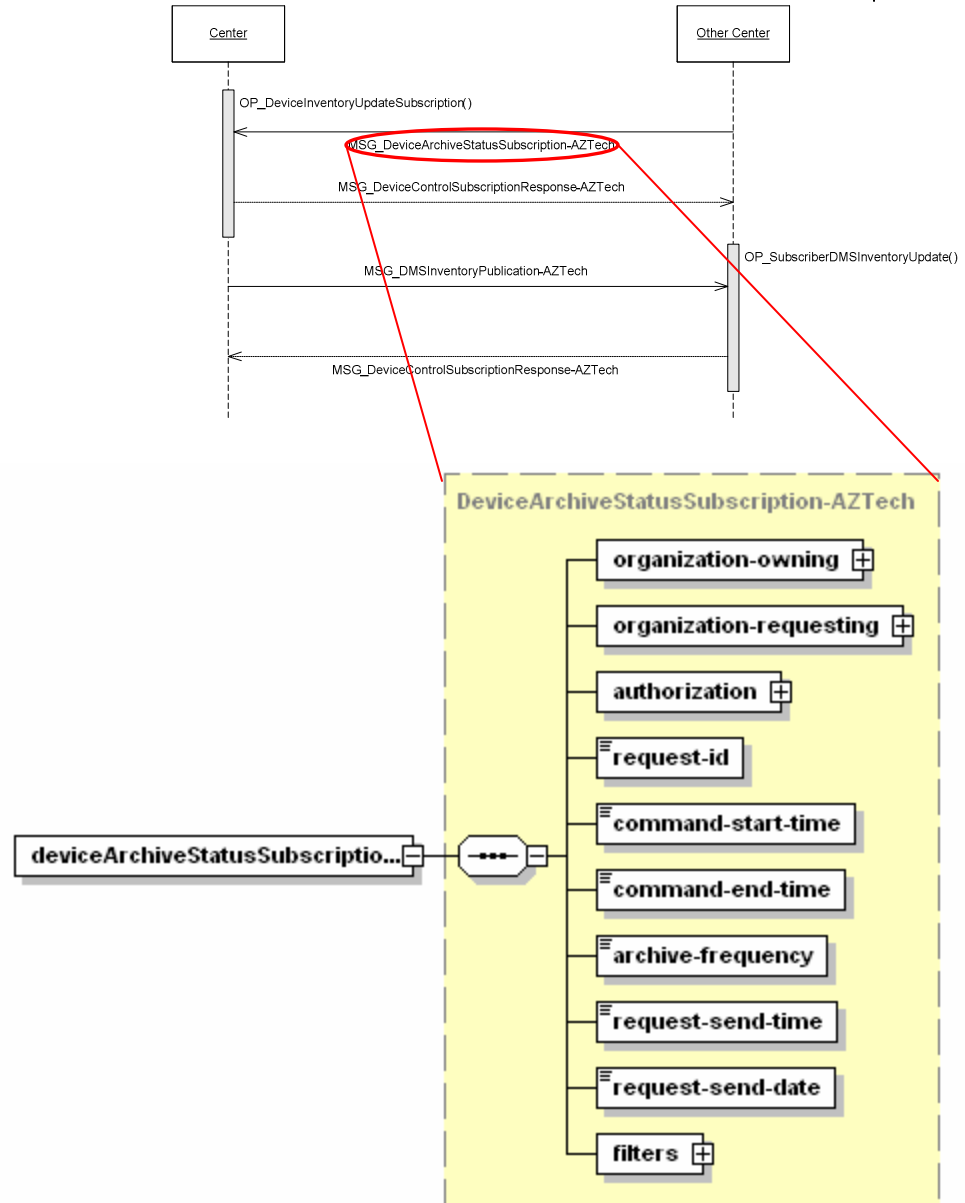


Detailed Design

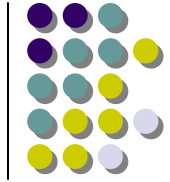
Human and Standards Based System Interfaces



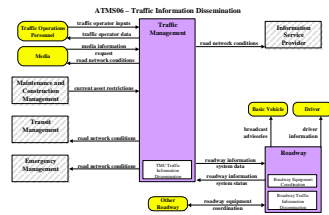
- Detailed Design Specifications are based on interface dialogs
 - Human: User Interface Form
 - Center-to-Center: WSDL and XML Schema
 - Center-to-Field: MIB
- Test Procedure Development
 - Dialog Verification
 - Information Verification
- Traceable to Use Case and Requirements
 - Document in Requirements Traceability Matrix (RTM)



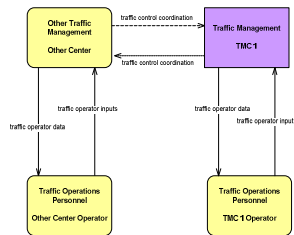
ITS System Journey from Plan to Deployment



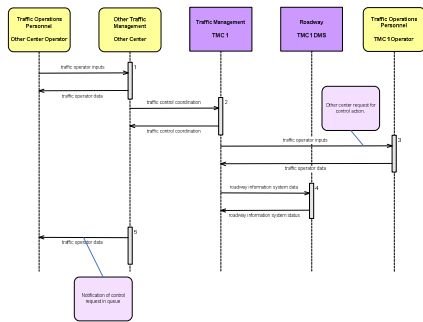
National ITS Architecture



Regional ITS Architecture



Concept of Operations

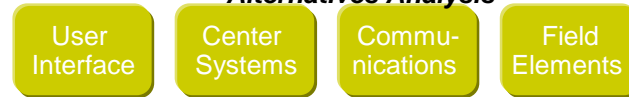


Requirements

Alternatives Analysis (High Level Design)

Use Cases & Requirements

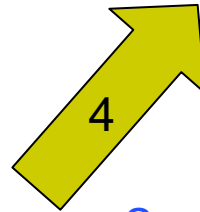
Alternatives Analysis



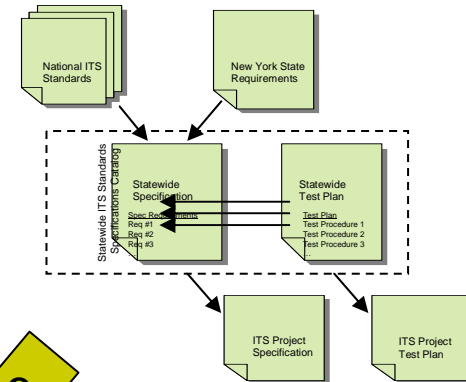
Data Storage Retrieval

\$\$\$\$\$

Final Design Report System Engineering Analysis



Specifications and Test Plans



Deployment and Testing

