

Maintain Regional Architecture's Continuity

Within a Dynamic Environment

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Session #31 – Applying Rule 940: Benefits and Challenges

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OUTLINE

- What Have We Done?
- How Did We Maintain Regional Architecture?
- Are We Conforming to Rule 940?
 - Regional level
 - Planning & Process Level
 - Project level
- Why Are We Conforming to Rule 940 – the Benefit
- Challenges
- Mitigation



When	What	Environment
12/1999	Inventory, Strategic Plan, Projects, Traceability of Functions to User Service Requirements	No Turbo tool. Early stage of Nat'l Architecture.
05/2002	NOVA Regional ITS Architecture v. 1.0	Turbo 1.1, Nat'l Arch. 3.0
02/2003	Conduct day-long training: Use of NOVA Architecture with VDOT NOVA PMs	Not a requirement. Difficult to reach out to project managers
05/2004	NOVA Regional ITS Architecture v. 1.2	Turbo 3.0, Nat'l Arch 5.0
04/2005	Update for Rule Conformity, v. 2.0	Personnel change
12/2005	NOVA Regional ITS Architecture v. 2.1	More knowledgeable.
12/2005	Training: Use of NOVA Architecture and Rule Conformity	More tools.
03/2006	Inventory, Strategic Plan, Stakeholder Needs, Regional Operating Concept (link with Architecture) and Project Guidance	Rule Requirement generated interest by PMs.
05/2006	User Guide - Use NOVA Architecture & System Engineering to Conform to Rule 940	Major projects are uncertain (e.g. HOT PPTA)
		Rule Requirement. Guide is in demand.



Version

- Upgrade to latest Turbo version & Nat'l architecture

Definition

- Collect project architecture via website
- Collect existing & planned projects continuously & informally
- Update architecture definition
- Communicate with the impacted stakeholders
- Coordinate with adjacent regional architectures

Update Architecture Turbo Database and website

Document changes



Regional ITS Architecture

- Develop & actively maintain, guide project development
- Conform to Rule 940's 12 Criteria

Planning & Programming Process

- Streamline process
- Integrate architecture and system engineering into the process
- Provide a means to update and maintain a “living” architecture.

Project Level

- Systematically use the architecture before funding – explore integration opportunities.
- Systematically use the Rule 940 Checklist and the architecture after funding is programmed – fulfill requirements for federally funded ITS projects
- Allow project managers to follow sound systems engineering principles throughout the project's life cycle



Regional Architecture v. 1.2 Update in 2004

- Update Definition, add & tailor Market Packages
- Consistent with National ITS Architecture v. 5.0
- Assess Rule 940 Conformity:

Criteria

v. 1.2 Status

Architecture Scope and Region Description	Timeframe & Scope: partly defined.
Stakeholder Identification	Roles and responsibilities: not defined.
System Inventory	100% conform
Needs and Services	Needs: not defined
Operational Concept	Concept for each flow diagram, only described at the services level.
Functional Requirements	Documented, but not in Turbo. No shall statements.
Interfaces / Information Flows	100% conform
Project Sequencing	Not conform
Agreements	Not conform
Standards Identification	100% conform
Using the Regional ITS Architecture	100% conform
Maintenance Plan	100% conform



Regional Architecture v. 2.0 Update in 2005

- Update Definition
- Consistent with Washington Metropolitan Architecture
- Fulfill Rule 940 Conformity Requirements:

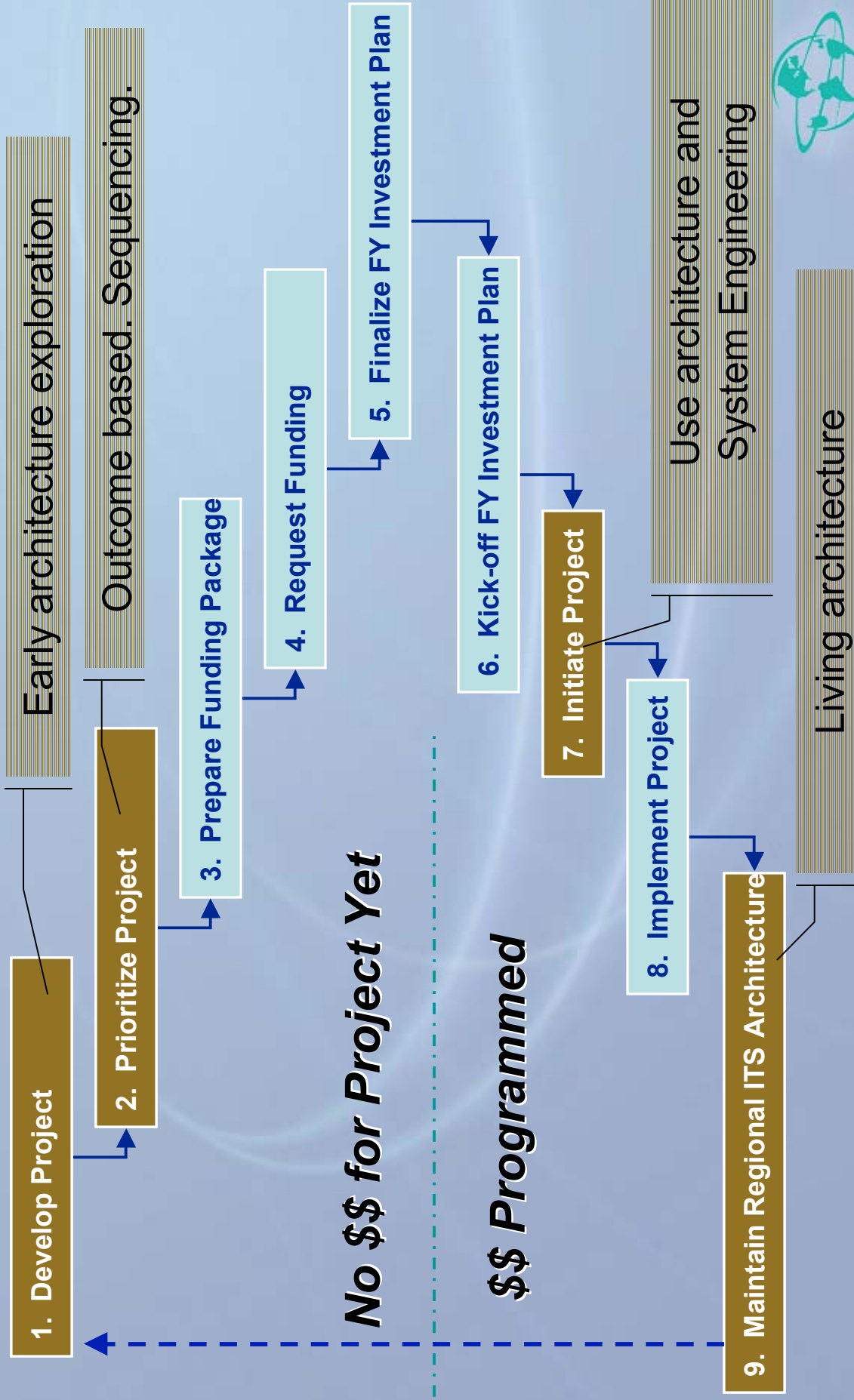
Criteria

v. 1.2 Status

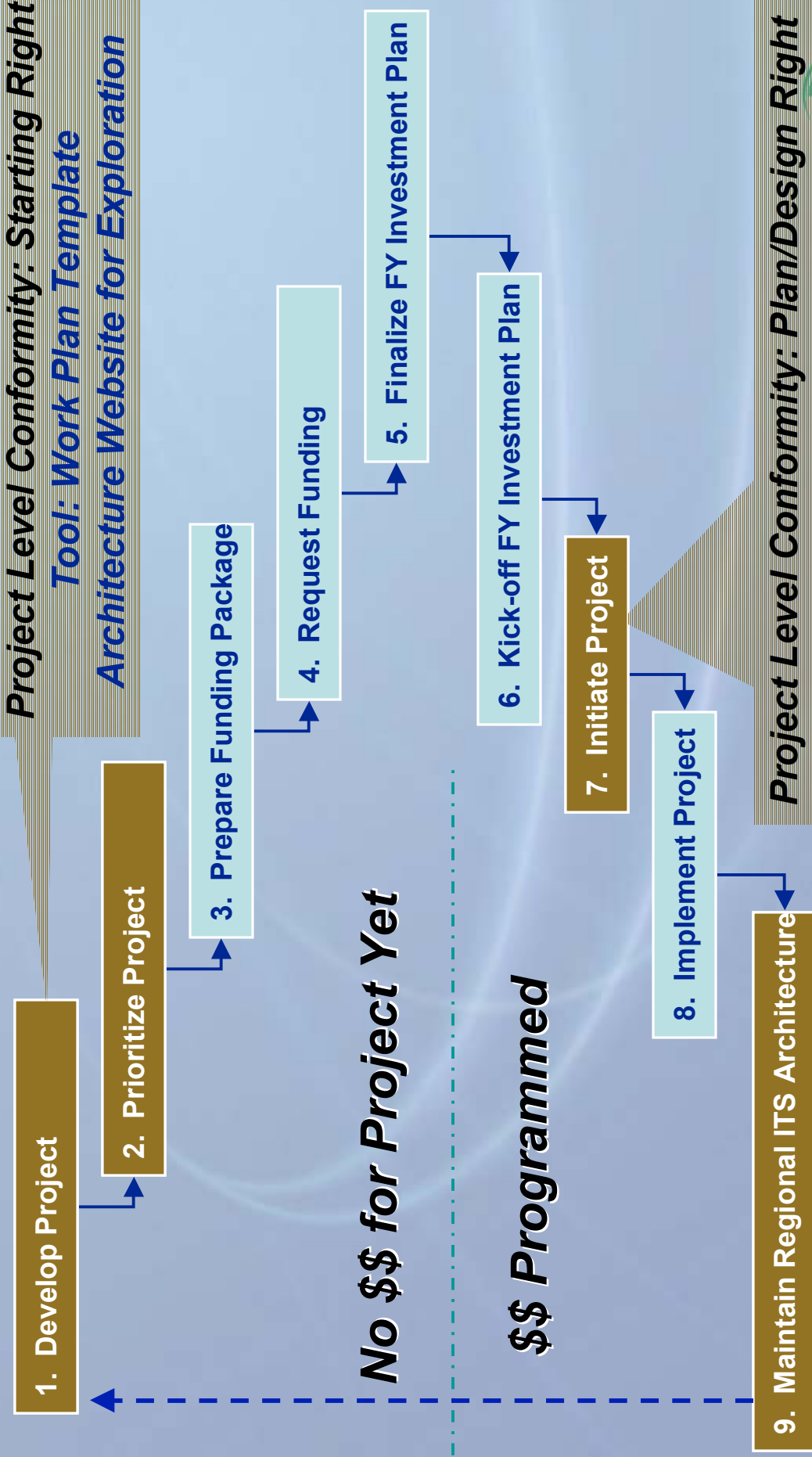
Architecture Scope and Region Description	100% conform
Stakeholder Identification	100% conform (Roles/Responsibilities in Turbo)
System Inventory	100% conform
Needs and Services	100% conform (Needs in Program Plan)
Operational Concept	100% conform (in Turbo and Program Plan)
Functional Requirements	100% conform (Shall statements in Turbo)
Interfaces / Information Flows	100% conform
Project Sequencing	100% conform (NOVA \$\$ Programming Process)
Agreements	100% conform (Copies available, list in Turbo)
Standards Identification	100% conform
Using the Regional ITS Architecture	100% conform
Maintenance Plan	100% conform



Are We Conforming to Rule 940?



Are We Conforming to Rule 940?



Project Level Conformity: Starting Right
Tool: Work Plan Template
Architecture Website for Exploration


Project Level Conformity: Plan/Design Right
Tool: Checklist, Architecture Turbo
Database and Website



Are We Conforming to Rule 940?

Project Level Conformity: Checklist

- 11 Sections
Consistent with System Engineering VEE process
- 9 Sections:
respond to Rule 940 Requirements
- 5 Sections:
can use Turbo Architecture to generate supporting reports



ITS Projects – Systems Engineering and Architecture Compliance (Rule 940) Checklist

The Checklist needs to be filled out by the NOVA ITS Planning staff and Project Manager.

HOV Condition Monitoring and Improvement	
Date	Name of Person Filing/Modifying the Form
11/8/06	Andy Tsang, MCE/Urban
	Notes
	Documents still to be developed
	– Detailed Work Plan
	– Requirements
	– Detailed Design
	– Integration Plan
	– Test Plan and System Verification Plan
	– RFP for contract with Private ISP
	– Evaluation Plan



Why Are We Conforming?

Beyond the Obvious Rule Requirement ...

Right thing to do

Reduce possibility of a failure

- Save money and time caused by future project failure
- Manage risk early on

Helps ensure coordination & integration

- Bring people together to share plans and ideas EARLY
- Identify integration opportunities and needs EARLY
- Consider Ops & Maintenance resource need EARLY

A Streamlined Process

- Feeds into traditional transportation plans

Secure federal funds



Resource

- Staffing shortage: maintain regional architecture and review project architectures
- Staffing or consultant change
- Knowledge upkeep
- Stakeholder: Constant change of personnel, loose continuity, need re-train
- Financing: needs routine budget to maintain and update

Process

- Constant change of projects design/deployment that are not shared with Architecture “maintainer”
- Coordination: sync with other regional architectures
- Changes in other Architectures that impact ours, vice versa.
- Maintain changes & consistency: Architecture, COO, Strategic Plan



Chase Changes

- System: collect changes or stakeholders need to know whom to inform the systems changes
- Stakeholder: stakeholder representatives change
- Nat'l ITS architecture and Turbo: keep up the versions and train/re-train with latest

Institutional Support & Commitment

- Unfamiliar with ITS Architecture terminology, concepts, and rule requirement
- Unfamiliar with the benefit
- Uncertain what to guide the agency personnel



Resource

- Develop project: no money or resource to spend at this stage.

Willingness & Interest

- If not using Federal fund: willing?
- Institutional commitment: local, state, federal
- What's good if Project Managers do not commit or understand!
- Difficult to keep stakeholders' interest and tune in architecture beyond initial architecture development outreach phase
- Difficult to keep non-transportation agencies such as public safety community remain awareness of ITS and architecture



Confusion

- Definition of ITS: Signals? Public Safety?
- What happens to grandfather projects?
- Project initiation: PMs unaware if a project needs to conform to Rule 940, how to show conformity, and what steps to take
- Architecture? System Engineering? Rule 940?
- Do FHWA regional offices practice review uniformly?
- Lack of consistent & extensive effort to bring all parties to the good level of understanding

Administrative

- Local project: State-Local agreement not catching up



Regional Architecture Maintainers Continuity

- Have a “Transition Plan”
 - History of the architecture development and maintenance
 - Architecture content & Turbo
 - Website structure
 - Training content and strategy
 - Unfinished/planned business

If maintainer is consultant, also ...

- Get budget and procurement ready to transition knowledge from old team to new team.
- Knowledgeable staff to fill the gap between consultants

If maintainer is in-house staff, also ...

- More than 1 person knowledgeable of architecture.

Document, Document, and Document!



Ensure maintainer is aware of changes

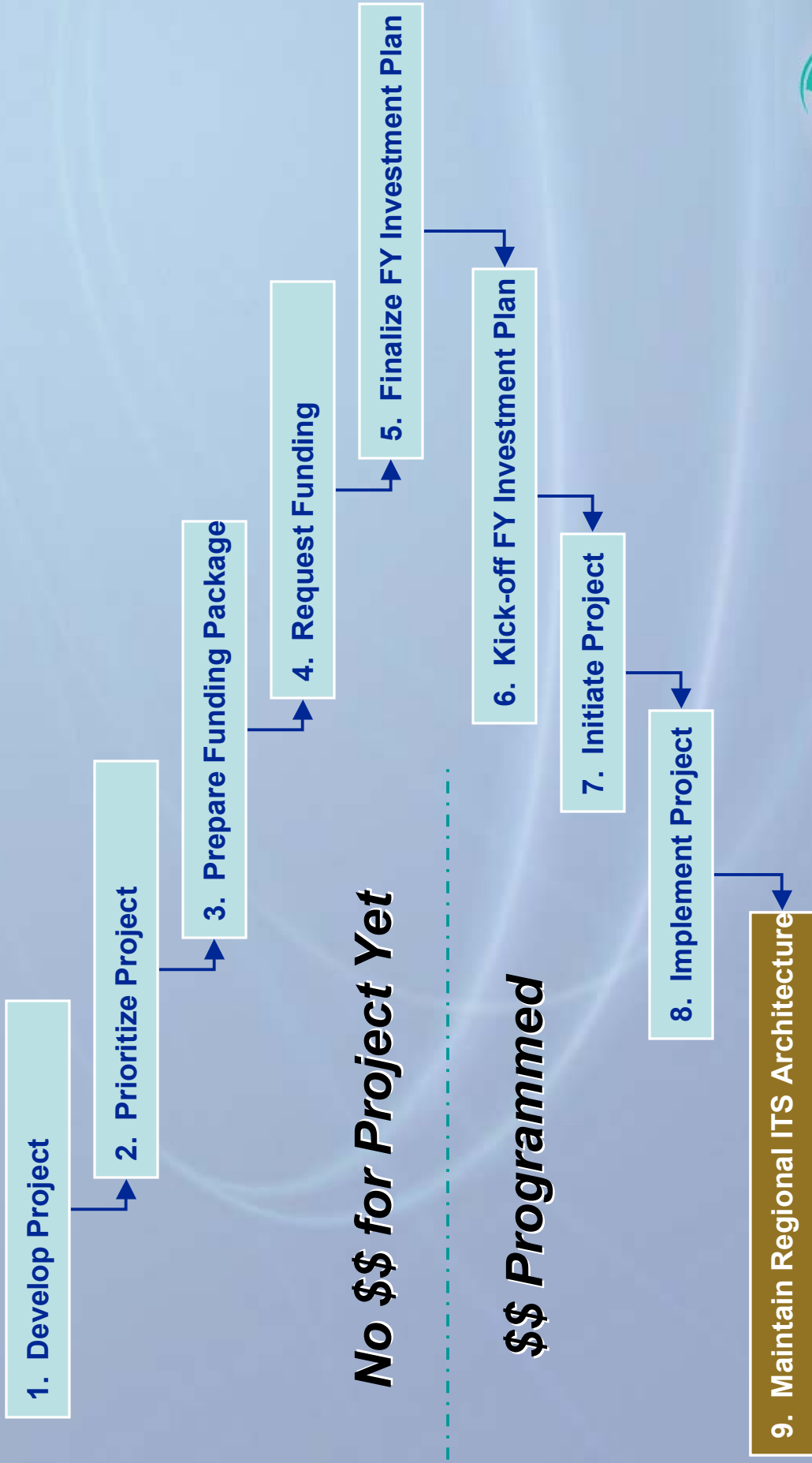
- Follow the process
- Borrow from Configuration Management Control Board Concept.

Ensure consistency

- Ensure consistency between Program Plan (mainly operational concept) and Architecture
- Continuous communication with other agencies' architecture maintainer.
- Ensure agreement on how changes should be made across several impacted regional architectures



Mitigation: Maintain Architecture



Mitigation: Maintain Architecture

9. Maintain Regional ITS Architecture

Update checklist,
Submit project
architectures

Compile all changes to
regional architecture
(various projects)

Architecture update
Validation Workshop

**Stakeholders agree and
aware of changes**

**Ensure maintainer is
aware of changes**

Update NOVA
ITS Architecture

Consistency

**Configuration Mgmt
Control Board**

NOVA Program Plan
(Operating Concept)

VDOT Statewide
Architecture

Metro. Washington
Regional Architecture

Knowledge is Power!

Tools Available

- Keep living architecture available
- User Guide: Provide step-by-step sounding process
- Checklist: Integrate SE, architecture, and Rule 940
- Website: Provide general navigation
- Turbo Database: Ready to download

Hands-On Training

- When and How to use various tools
- How to use the website
- Increase familiarity therefore decrease “fear” and “resistance”
- Training, user guide, checklists, website tool and information



Outreach & Institutional Embracement

- Outreach to decision makers for awareness & support
- Keep-up routine (every 6 – 12 months) outreach effort with stakeholders
- On-going champion effort to PMs to illustrate the benefit and use of architecture & system engineering
- Clarify when to use NOVA vs. DC regional architecture

Budget for maintaining architecture and tools

Develop project without money?

- Website is free for view/print architecture diagrams



**Not an easy task to keep it up
or get stakeholders and PM to care.**

However, it is certainly doable if you have ...

- the will**
- the knowledge and skill**
- the budget / procurement method**
- and most importantly**
 - manager's/agency's support**

Questions or Comments?

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