TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

Project Management Strategies for Complex Projects (R10)

FHWA SHRP2 R10 Train-the-Facilitator Training
Wisconsin Department of Transportation
November 17-18, 2015

U.S. Department of Transportation
Federal Highway Administration

AASHTO
THE VOICE OF TRANSPORTATION

AGENDA
FHWA SHRP2 R10 Train-the-Facilitator Workshop
Wisconsin Department of Transportation
November 17-18, 2015

OBJECTIVE:

The objective of the Train-the-Facilitator Session is threefold:

1. To furnish training on the SHRP2 R-10 product to DOT members who manage complex projects.
2. To train designated DOT members to teach complex project management principles and to demonstrate the use of the *Project Management Strategies for Complex Projects Guidebook* to complex project team members.
3. To establish an internal center of expertise on complex project management.

DAY 1			
Time	**Module**	**Topic**	**Remarks**
8:30- 8:40	-	Welcome and Opening Remarks—FHWA/State DOT Leadership	Carlos Figueroa/ State DOT
8:40-8:50	-	Opening Remarks – FHWA Division	
8:50-9:00	-	Housekeeping and Instructional Material Orientation—ARA Lead Facilitator	Kevin Chesnik
9:00-10:00	1	Introduction to 5-Dimensional Project Management (5DPM)	Kevin Chesnik
10:00-10:15	-	BREAK	
10:15-11:00	-	Self-Assessment Tool Application and Implementation	Jim Hunt
11:00- 12:00	2	5DPM Project Execution Tools: Definition and Selection	Kevin Chesnik
12:00-1:00	-	LUNCH	*On your own*
1:00-1:30	3	Complexity Map Development	Kevin Chesnik
1:30-2:15	3.1	Complexity Map Practical Exercise (PE)	Team exercise
2:15-3:00	4	Define Critical Project Success Factors	Jim Hunt
3:00-3:15	-	BREAK	
3:15-3:45	4.1	Critical Project Success Factors PE	Team exercise
3:45-4:15	5	Assemble Project Team & Select Project Arrangements	Kevin Chesnik
4:15-4:30	5.1	Assemble Project Team & Select Project Arrangements PE	Team Exercise

DAY 2			
Time	**Module**	**Topic**	**Remarks**
8:30-8:45	-	Day 1 Recap	Jim Hunt
8:45-9:15	6	Prepare Early Cost Model and Finance Plan	Kevin Chesnik/Jim Hunt
9:15-9:45	6.1	Prepare Early Cost Model and Finance Plan PE	Team Exercise
9:45-10:00	-	BREAK	
10:00-11:00	7	Develop Targeted Project Action Plans	Jim Hunt
11:00-11:30	7.1	Targeted Project Action Plan PE (map to PMP)	Team exercise
11:30-12:30	-	LUNCH	*On your own*
12:30-1:15	7.2	Documenting 5DPM during Project Development and Execution	Kevin Chesnik
1:15-1:45		Open Questions from the group	All
1:45-2:00	-	Summary & Closure	Kevin Chesnik/Carlos Figueroa

Notes:

- The first half of Day 1 will be mostly devoted to presentation of 5DPM theory and applications on a general basis. These 4 hours will be training-oriented and include instruction on how to self-assess your agency periodically to gage progress.
- The second half of Day 1 consists of training and practical exercises of 5DPM Methods 1 through 3.
- Day 2 will be devoted to presentation of 5DPM Methods 4& 5- Finance Plans and Cost models as well as Project action plan development. These will be related to the FHWA PMP and include team exercises to reinforce the learning.
- Workshop materials include:
  - SHRP2 R-10 Guidebook
  - Train-the Facilitator Workshop workbook.
  - Training workshop exercises.
  - Trainer's complex project training package on flash drive containing the slides in PPT, workbook in MS Word, SHRP2 R-10 Guidebook in PDF, self-assessment survey and complexity map files in XLS, and other miscellaneous items.
- Workshop deliverables include:
  - Roster of 5DPM Facilitators who successfully completed the course.
  - Brief summary of issues encountered during the training with potential resolution plans.
  - Summary of DOT needs for future training or technical assistance.

Slide 1

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

SHRP2 Project Management Tools

Project *Management Strategies for Complex Projects (R10), Wisconsin DOT*

Carlos F. Figueroa, FHWA
Keith Platte, AASHTO

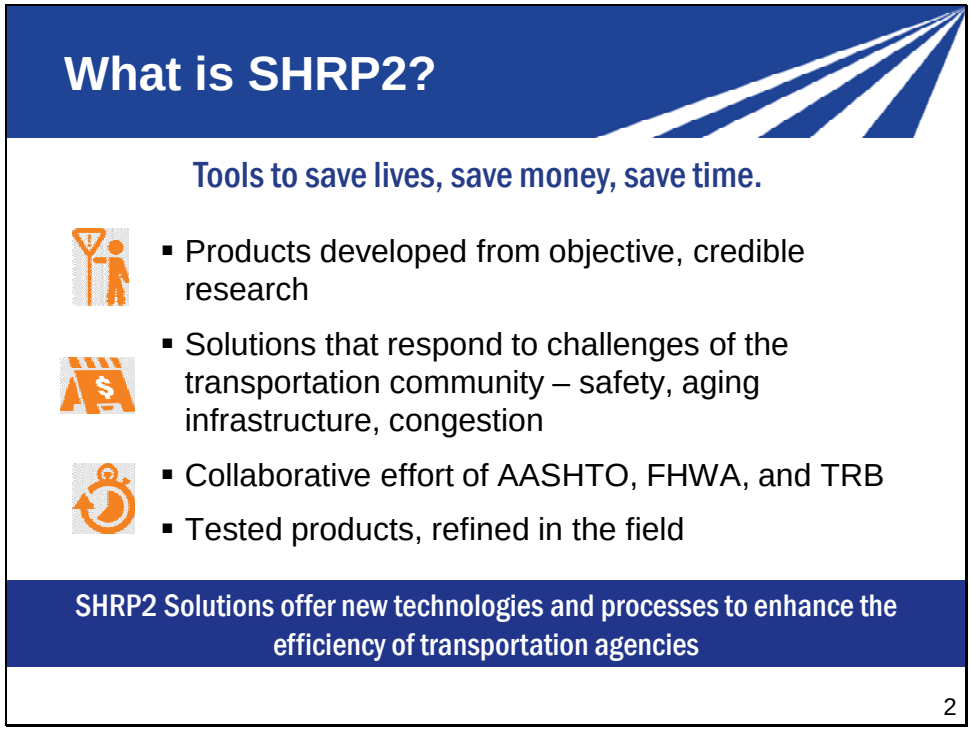
Nov. 17-18, 2015

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO
The Voice of Transportation

Transportation Research Board
of the National Academies

Slide 2



(Keith Platte, AASHTO)

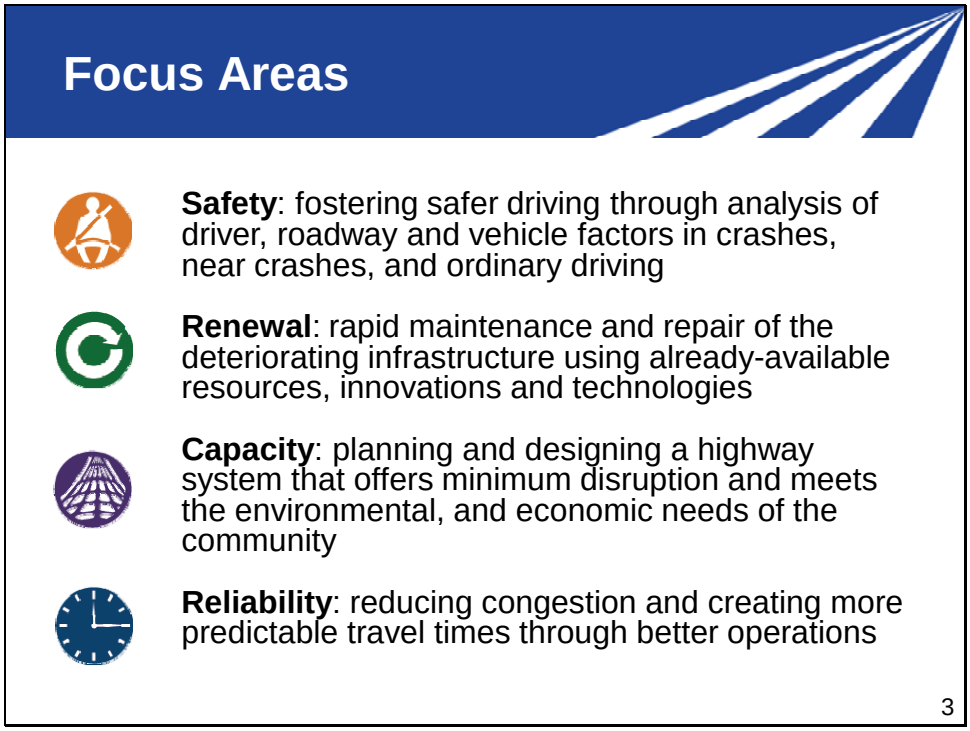
SHRP2 is a **collaborative effort** to develop products and processes that can be used by transportation agencies to address key challenges, **including safety, aging infrastructure, and congestion**.

SHRP2 implementation is managed by the FHWA in cooperation with AASHTO and TRB.

SHRP2 Products are Diverse and Benefits are Far-Reaching: The benefits will improve safety for motorists and workers; will enable transportation agencies to improve their infrastructure more quickly and have a longer-lasting system; will target resources and enhance existing processes; and provide faster responses to congestion, making the system more reliable for travelers.

Not all SHRP2 Solutions are totally new innovations. Some products advance the state of practice of existing tools by showcasing how a technique can be used more widely. Others provide tools or evidence that fill gaps in existing approaches, making them more viable and easier to implement. Because of the diversity of solutions emerging from SHRP2, the biggest challenge will be to understand the needs of our customers and match their unique needs with the right product.

Slide 3



(Keith Platte, AASHTO)
More than 700 volunteers from academia, departments of transportation (DOTs), and related associations and industries participated in the research, which was organized into four Focus Areas addressing the core challenges facing the transportation community and central to quality of life.

Safety *(led by the Office of Safety) is conducting the largest ever in-vehicle study of driver behavior to better understand the interaction among various factors involved in highway crashes—driver, vehicle, and infrastructure—so that better safety countermeasures can be developed and applied to save lives.*

Renewal *(led by the Office of Infrastructure and Office of Innovative Program Delivery) is developing technologies and institutional solutions to support more rapid and systematic rehabilitation of highway infrastructure in a way that presents minimal disruption to users, and results in longer-lasting facilities.*

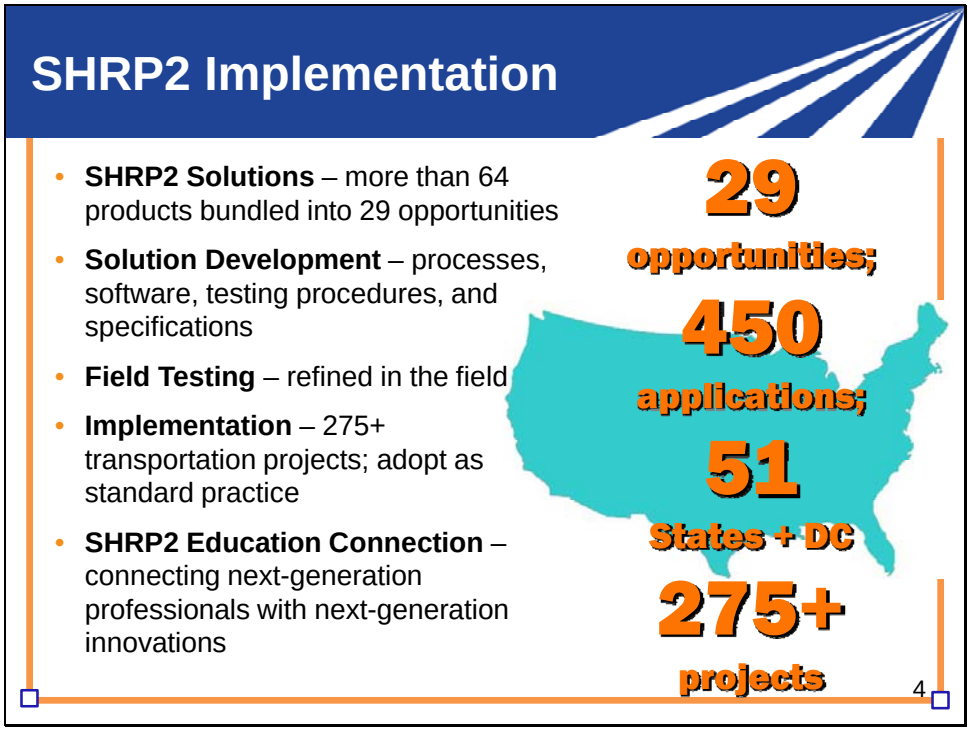
Capacity *(led by the Office of Environment and Planning) is developing tools that will integrate environmental, economic, and community requirements into the analysis, planning, and design of new highway capacity to align them with community goals so that delays due to conflicts can be avoided.*

Reliability *(led by the Office of Operations) is developing analytical techniques, design procedures, and institutional approaches to address events—such as crashes, work zones, special events, and inclement weather—that result in unpredictable congestion and make travel times unreliable.*

Anticipated benefits of products emerging from SHRP2:

- Safer roads through a comprehensive understanding of driver behavior
- Lower-cost, longer-lasting, rapidly-installed facilities that require minimal maintenance; "Get in, get out, and stay out"
- More predictable and consistent travel times
- Expedited project approvals through collaborative, systematic decision making

Slide 4



(Keith Platte, AASHTO)
FHWA and AASHTO have bundled the 64 products for implementation into 29 packages of products that are being offered through the Implementation Assistance Program.

As you know, the Implementation Assistance Program is our main vehicle for implementing SHRP2 solutions. This slide paints a picture of the IAP rounds 1 through 5.

So through 5 rounds, we've received more than **450 applications**. These came from:
- 49 state DOTs + DC DOT.
- 43 distinct MPOs submitted apps, several submitted more than one
- 10 distinct tribes, 6 others, 2 local agencies, and FHWA/FLH

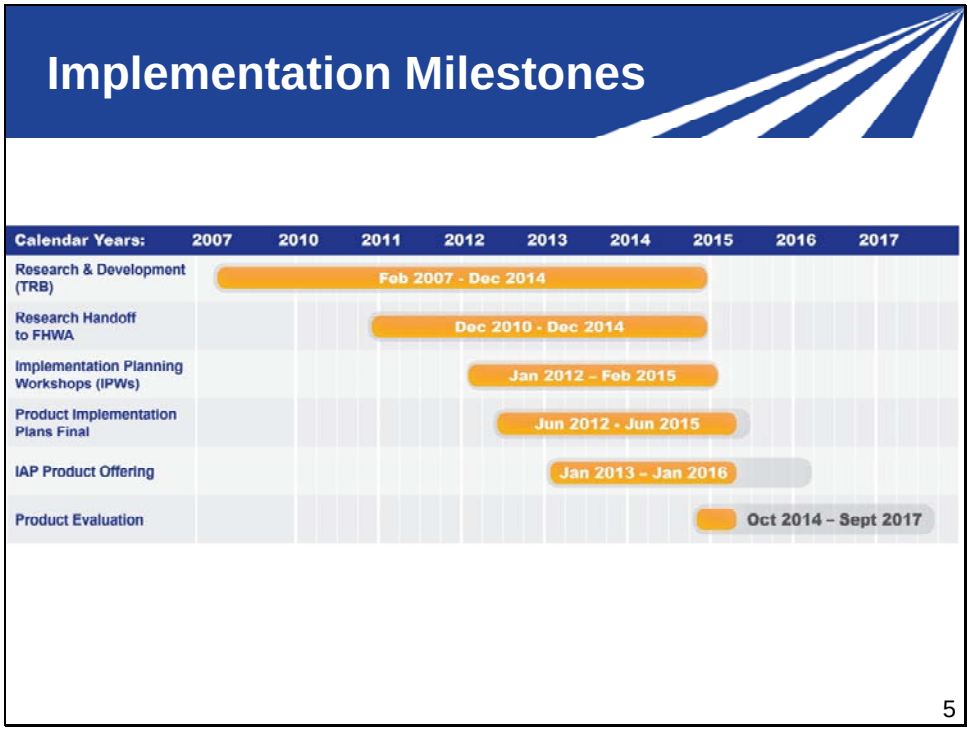
Looking at the recipients, we've had 79 unique recipients.
- 49 of these recipients were state DOTs, plus the DC DOT. *(All state DOTs that applied have received assistance)*
- 25 distinct MPOs received incentives1
- 1 tribal agency, 2 others, FHWA/FLH

Beyond the Implementation Assistance Program successful implementation efforts ongoing in Traffic Incident Management in all 50 states.
The bottom line is all 50 states and DC are engaged in SHRP2 implementation – not just through the IAP projects themselves, but more broadly through a variety of product-related workshops, peer exchanges, training, and other activities.

The goal of the SHRP2 Program is to help transportation professionals advance the state of our industry practice, making use of these products and adopting them as part of their standard practices.

Earlier this year, FHWA launched a new initiative called SHRP2 Education Connection. This opportunity is designed to introduce SHRP2's proven innovations and technologies to the next generation of transportation professionals encouraging academia to incorporate SHRP2 Solutions into transportation coursework—and bringing SHRP2 products into the classroom.

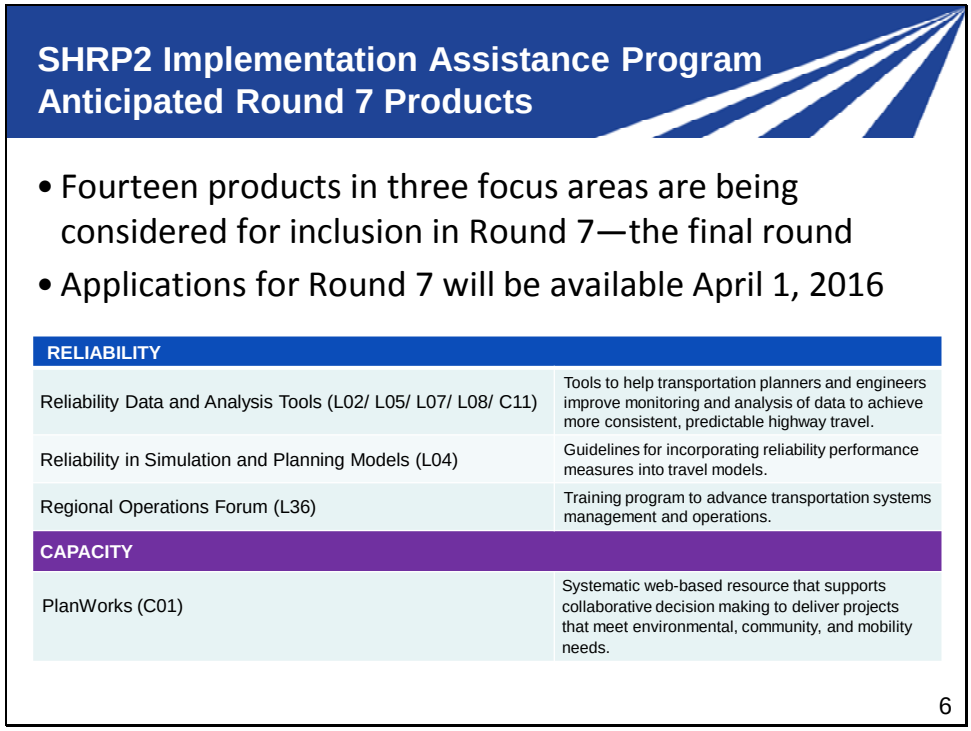
Slide 5



(Keith Platte, AASHTO)
This just gives a quick snapshot of key milestones for SHRP2 Implementation.

- TRB Research Phase is now complete and all deliverables have been provided to FHWA
- FHWA/AASHTO Implementation Planning Workshops for all SHRP2 products are now complete.
- We anticipate the Implementation Plans for all products will be complete by summer
- Implementation Assistance Program offerings will continue through the beginning of 2016, with Round 7 planned as the last offering
- SHRP2 Program Evaluation has been launched and will continue through the end of the implementation phase.

Slide 6



Notes

The FHWA/AASHTO Implementation Assistance Program (IAP) in 2016 will be the last opportunity to take advantage of the IAP's financial and technical assistance to implement SHRP2 products. Applications for Round 7 will be available April 1, 2016.

Slide 7

SHRP2 Implementation Assistance Program
Anticipated Round 7 Products

RENEWAL	
Utilities Bundle (R01A/R01B/R15B)	Products to identify, record, and retrieve utility locations throughout the design process to aid in reducing costly relocations.
Railroad-DOT Mitigation Strategies (R16)	Model agreements to improve coordination between transportation agencies and railroads.
Techniques to Fingerprint Construction Materials (R06B)	Procedures and equipment to identify various construction materials in the laboratory and with portable devices.
Advanced Methods to Identifying Pavement Delamination (R06D)	Tools to detect subsurface delamination in asphalt pavements.
Guidelines for the Preservation of High-Traffic-Volume Roadways (R26)	Your guide to selecting the most-affordable options for extending pavement life.
Nondestructive Testing for Concrete Bridge Decks (R06A)	Recommended technologies to detect deterioration of concrete bridge decks.
Nondestructive Testing for Tunnel Linings (R06G)	Nondestructive testing technologies to pinpoint defects in or behind tunnel linings.
Service Life Design for Bridges (R19A)	Guidance, training, and technical assistance promoting service life design concepts and methods.
Service Limit State Design for Bridges (R19B)	Tool kit to perform state or site-specific calibrations for service limit state design for bridges.

Slide 8

(Carlos F. Figueroa, FHWA)

R09/R10: Guidelines to accelerate sound decision making and reduce risks during rapid construction projects.

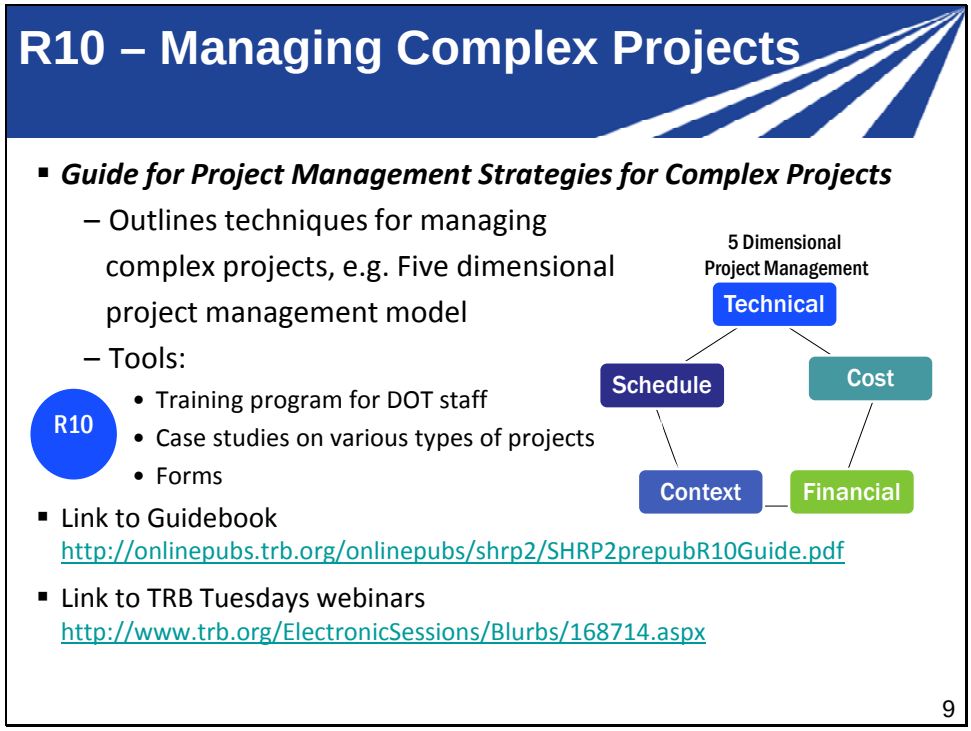
- Focus of R09: managing risks at the project level throughout project development, specifically by contract item or activity.
- Focus of R10: managing risks at the project level throughout project development, specifically by project dimension (higher level or picture of RM) and implementing tools to aid project team' cohesion, structure and overall project management.
- **R09 is also one of the tools recommended in the R10 product (Tool 3- Comprehensive Risk Analysis).**
- Focus of R07: Performance Specifications for Rapid Renewal Projects :
    - Clarify desired performance for project selection, procurement, and specification development.
    - Allows contractor ingenuity/innovation, reduction of costly oversight, and accelerate construction.
    - This is an overarching technology that can be used in any area (pavements (IRI-roughness), bridges, etc.)

Summary: The SHRP2 Next Generation Project Management Tools **provide practical tools and techniques to optimize innovation, integrate teams, minimize schedule and budget risks, and build better projects.**

Complex highway projects have characteristics for which standard practices cannot be used to achieve project success. For example, size, financing mechanisms, delivery methods, project impacts, environmental constraints, and duration are project characteristics that may make a highway project complex. Work on such projects often involves navigating complex logistics, new construction methods, controversial stakeholder issues, and restrictive regulations that require careful planning and execution. Similarly, underestimating cost, schedule, or disruption can add costs, increase delays, undermine public confidence, and necessitate expensive changes.

Moving beyond traditional approaches requires stronger partnerships among transportation agencies, contractors, consulting engineers, and external stakeholders. Better strategic planning and execution must occur from startup through construction. The SHRP2 Next Generation Project Management Tools **provide practical tools and techniques to optimize innovation, integrate teams, minimize schedule and budget risks, and build better projects.**

Slide 9



(Carlos F. Figueroa, FHWA)

Management Strategies for Complex Projects

The *Guide for Project Management Strategies for Complex Projects* identifies effective strategies involved in successfully managing complex transportation design and construction projects. It provides a formal plan for project management, enabling organizations to be transparent with the public, partners, and stakeholders and facilitates the development of project management plans. The guide applies the Five Dimensional Project Management approach which adds financial and context considerations to the traditional project management model that includes technical, schedule, and cost factors. The guide also includes case studies as well as project execution tools that can be used to achieve project success.

Lastly, it should be noted that both of these management tools are versatile, flexible, scalable, and can be applied to any size and type of project.

Slide 10

R10 - Managing Complex Projects

Benefits:

- Early communication in the process
- Early identification of complexity based on needs of the specific project
- Early preparation of the financials, schedule, and resources
- Looking at context and financing as drivers of the project
- Earlier identification of critical success factors
- Creates a realistic balance between the available funding and scope
- Reduces uncertainties
- Develop project action plans for success

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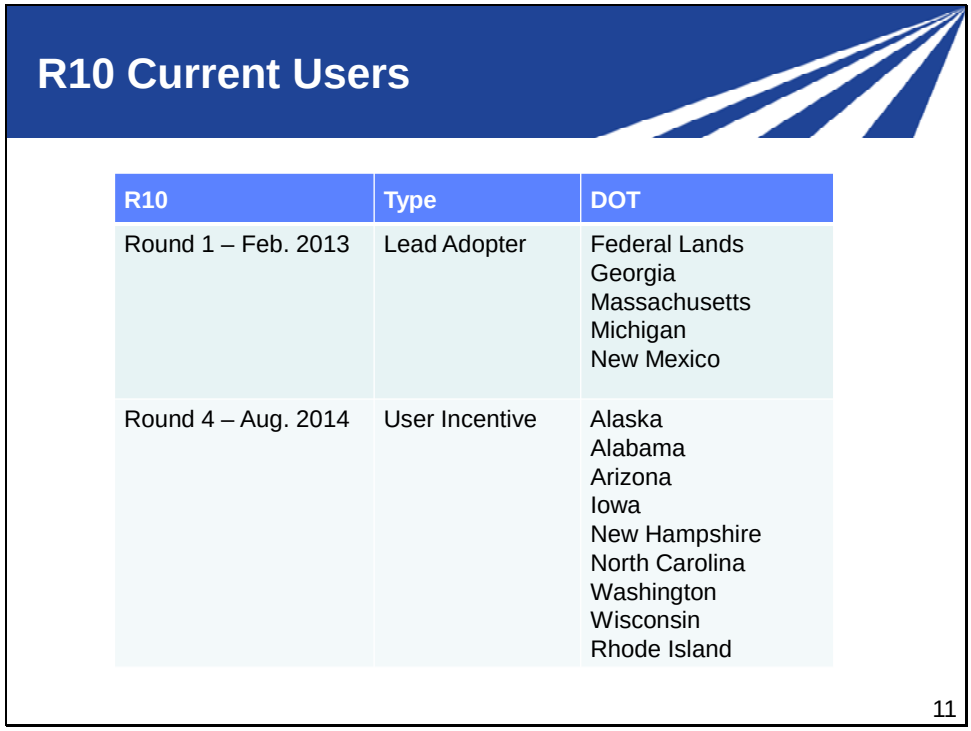
(Carlos F. Figueroa, FHWA)

Slide 11

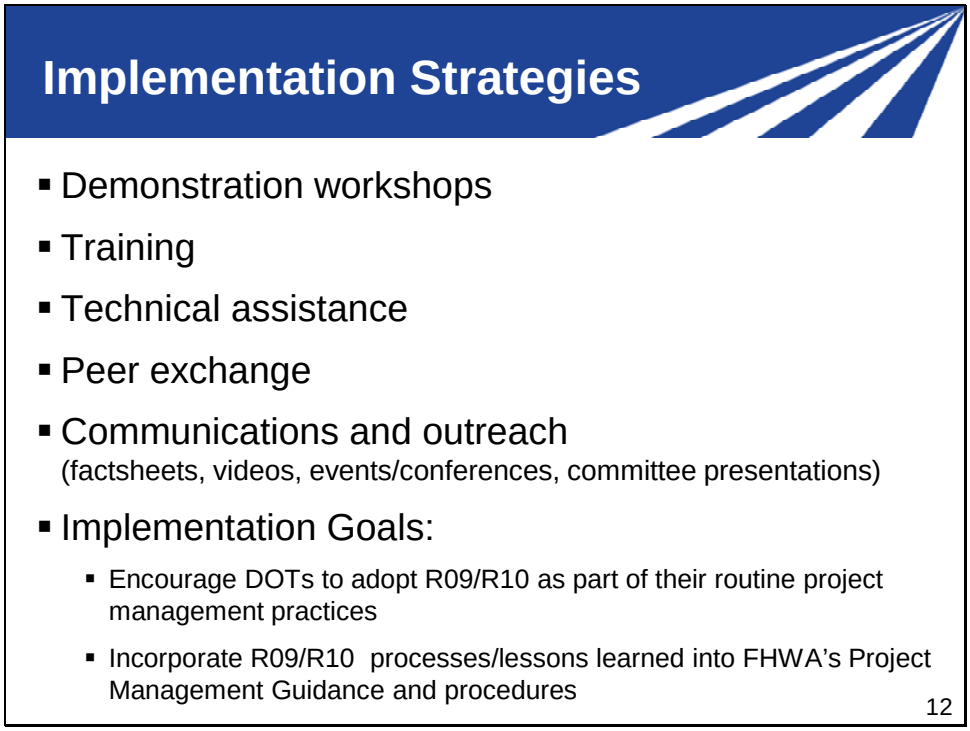


Lastly, these are the State DOTs that have been awarded R09 and R10 assistance after the first two SHRP2 implementation assistance rounds. In the first two rounds, 2 Proof of Concept Pilot and 8 Lead Adopter opportunities were available.

In Round 4, since the products have been in implementation for some time **and have matured**, we are ONLY offering User Incentive opportunities for both products (8/product).

Alabama DOT is implementing R09 on the ***I-10 Mobile River Bridge and Bayway Widening Project*** and as part of the implementation plan was interested in having a R10 workshop on the same project to get assistance in the development of the project management plan (PMP).

Slide 12

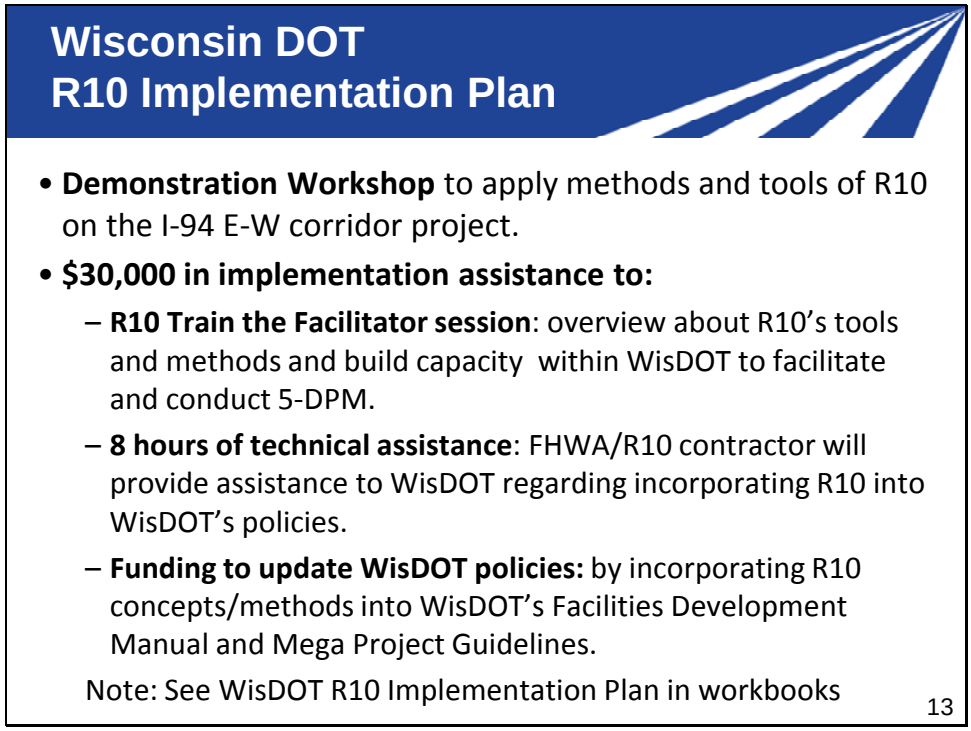


(Carlos F. Figueroa, FHWA)

In addition to the financial assistance FHWA, together with AASHTO and TRB, will be providing other support to the States, industry and others to advance SHRP2 product implementation. This will include:

- Technical assistance
- Training
- Peer exchanges
- Case studies
- Communications and outreach at the program, topic, and product level and
- Assistance from lead or champion States

Slide 13

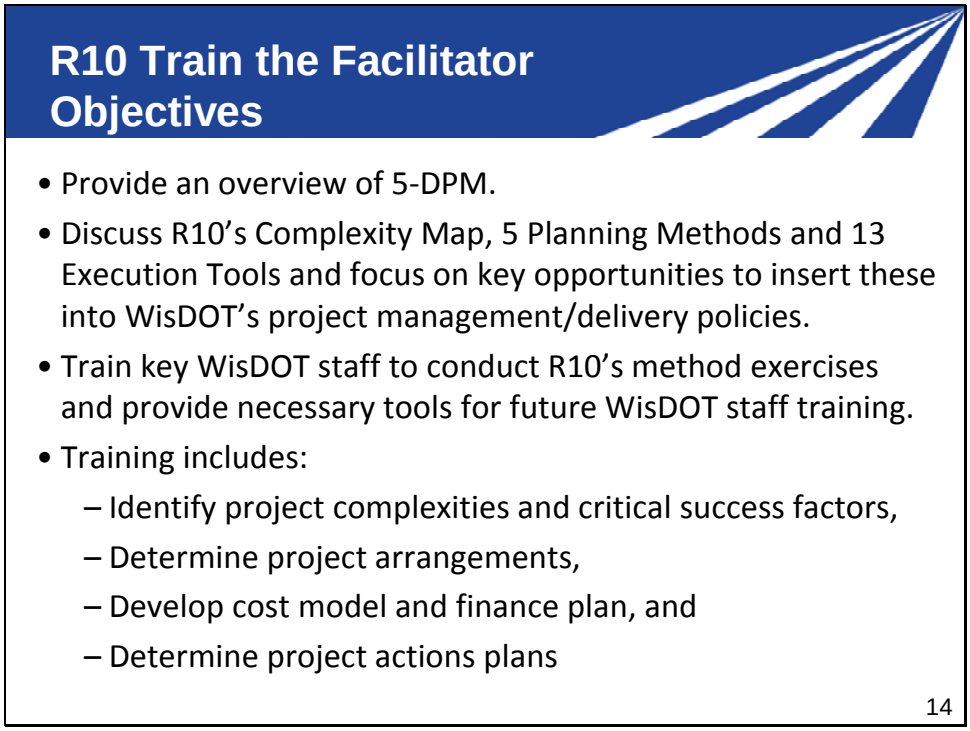


(Carlos F. Figueroa, FHWA)

- **Demonstration Workshop** to apply methods and tools of R10 on the I-94 E-W corridor project.
- **$30,000 in implementation assistance to:**
    - **R10 Train the Facilitator session**: general overview about R10's dimensions, tools and methods and build capacity within WisDOT to facilitate and conduct 5-DPM.
    - **8 hours of technical assistance**: FHWA/R10 contractor will provide assistance to WisDOT regarding incorporating R10 into WisDOT's policies.
    - **Funding to update WisDOT policies:** by incorporating R10 concepts/methods into WisDOT's Facilities Development Manual and Mega Project Guidelines.

Note: See WisDOT R10 Implementation Plan in your workbooks.

Slide 14



(Carlos F. Figueroa, FHWA)

Train the Facilitator Objectives

Provide an overview of 5-DPM.

Discuss R10's Complexity Map, 5 Planning Methods and 13 Execution Tools and focus on key opportunities to insert these into WisDOT's project management/delivery policies.

Train key WisDOT staff to conduct R10's method exercises and provide necessary tools for future WisDOT staff training.

Training includes:

Identify project complexities and critical success factors,
Determine project arrangements,
Develop cost model and finance plan, and
Determine project actions plans

Slide 15

Contact Information

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SHRP2 Implementation Assistance Websites

http://www.fhwa.dot.gov/goshrp2

http://shrp2.transportation.org/Pages/Default.aspx

Slide 16

Key Message

This module focuses on an overall introduction to 5-Dimensional Project Management (5DPM).

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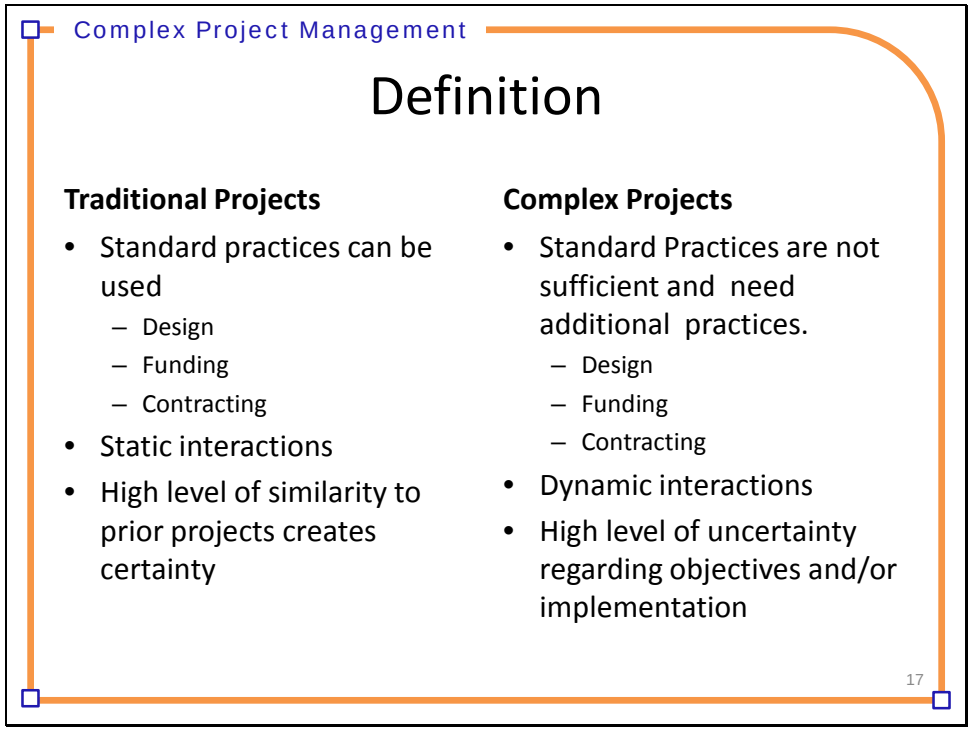


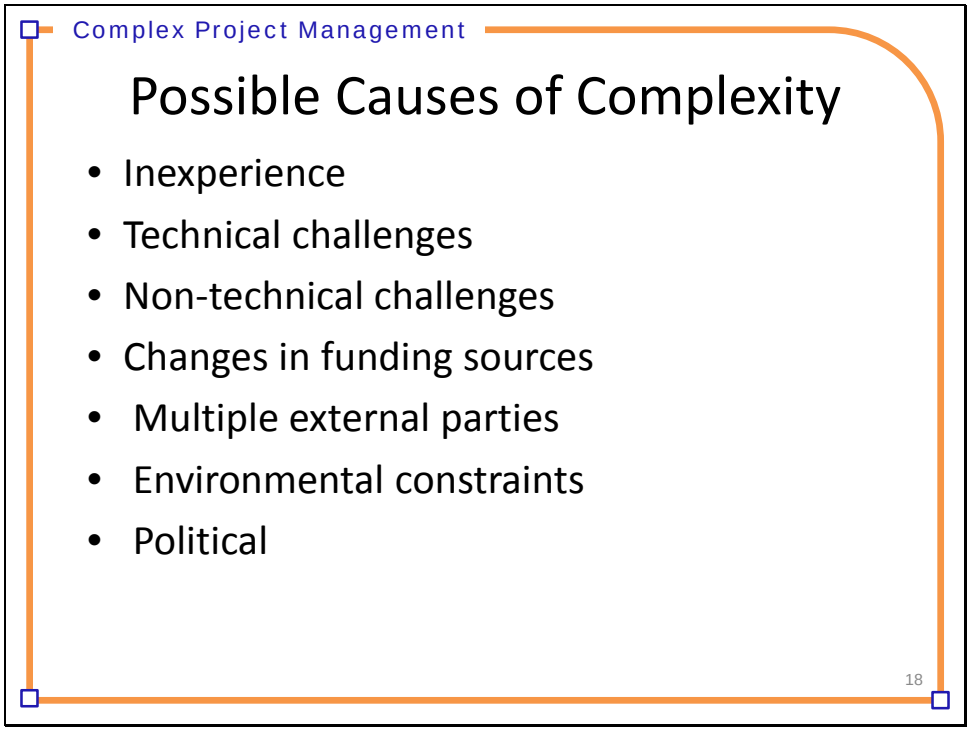
Key Message
Complex projects have different definitions depending on who you are talking to.

Background and Notes
Complex projects are characterized by a degree of disorder, instability, emergence, non-linearity, recursiveness, uncertainty, irregularity and randomness. There is dynamic complexity where the parts in a system can react/interact with each other in different ways (a chess game). There is also high uncertainty about what the objectives are and/or high uncertainty in how to implement the objectives. The level of uncertainty varies with the maturity of the individual/organization (CCPM 2006).

These projects are not going to fit in the “standard/normal” process.

Guidebook Location
Section 1.3

Slide 18



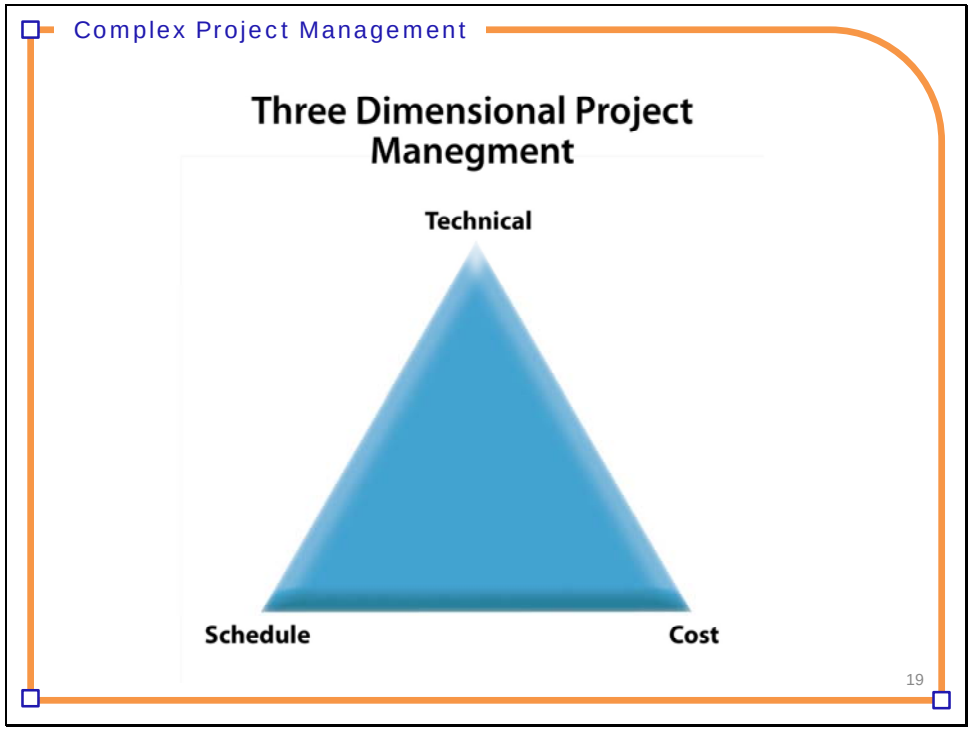
Key Message
There are an unlimited number of causes of complexity.

Background and Notes
There are a number of different reasons for complexity and they are different for every project. In addition, reasons for complexity today are not going to be the same three, five, or 10 years from now, as you gain more experience in an area. Complexity is going to be fluid. As an example of something we hadn't done before but gained experience with, the first few design-build projects were complex; but, once several had been done, we knew what was going on and it was no longer the complex piece of the project.

Guidebook Location
Section 1.3

Interactivity
What are some other causes of complexity on major projects currently in your program?

Slide 19



Key Message
The traditional approach to project management has generally served the industry well during the expansion of the US transportation infrastructure.

Background and Notes
Dimension #1: Cost. This dimension involves quantifying the scope of work in dollar terms. The cost dimension is comprised of the following categories:

- Risk
- Preliminary program
- Planning/construction
- Issues

Dimension #2: Schedule. This dimension relates to the calendar-driven aspects of the project. The schedule dimension is comprised of the following categories:

- Time
- Risk
- Planning/construction
- Technology
- Mathematical modeling

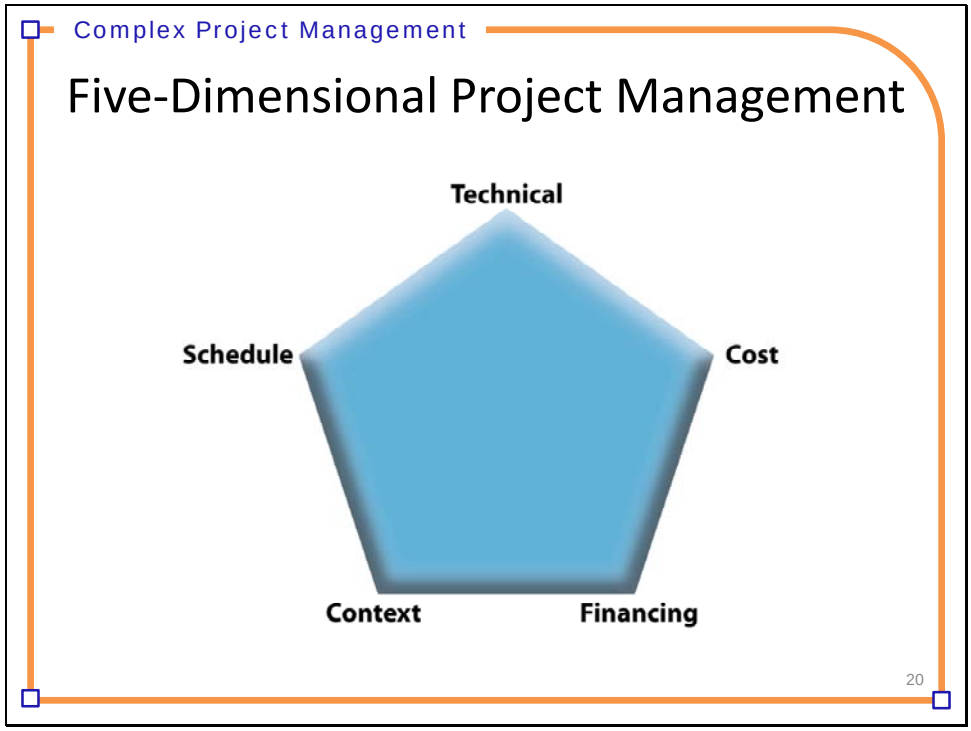
Dimension #3: Technical. This dimension includes all of the typical engineering requirements. The technical dimension is comprised of the following categories:

- Scope
- Internal structure

- Contract
- Design
- Construction
- Technology

Guidebook Location
Sections 1.4 and 1.5

Slide 20



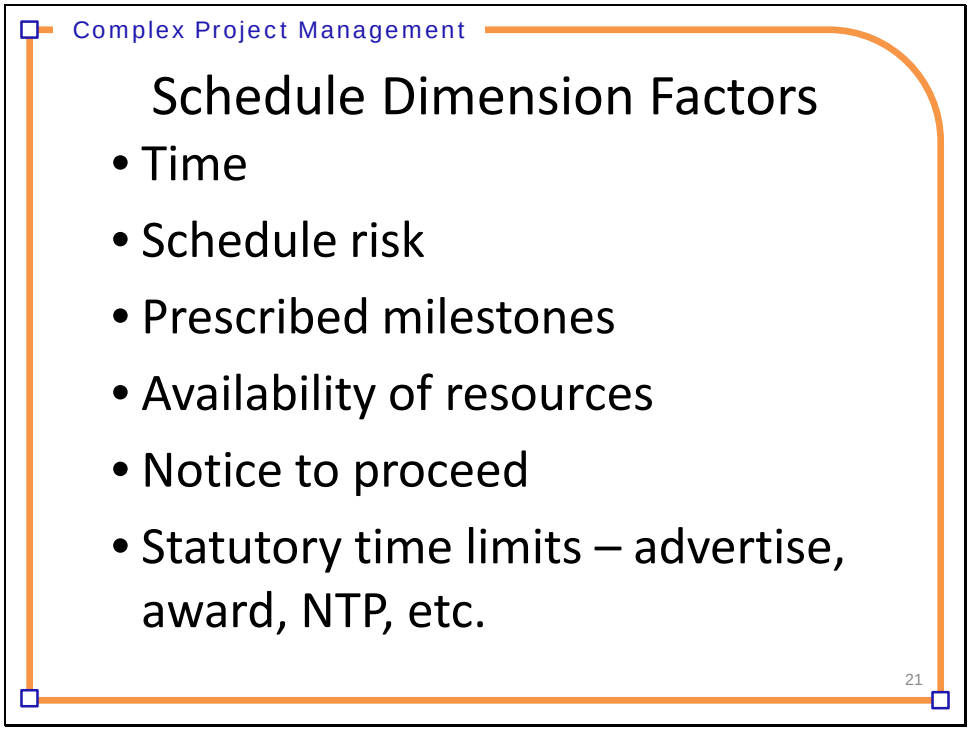
Key Message
Two new dimensions, Context and Financing, were previously part of the original three dimensions, but they are now being elevated to their own dimensions, because of what is being seen in project management. In the future, there may be additional dimensions, but, from the literature, case studies, and tools, these are the five dimensions of complex project management today.

Background and Notes
Project managers of complex projects, both large and small, must ultimately optimize the available resources (time and money) with the technical performance needs of the project (design) while operating under both known and unknown constraints (context), all the while accommodating the requirements of new financing partners and funding models (financing).

• Complexity Dimension #1: Cost. Involves quantifying the scope of work in dollar terms.
• Complexity Dimension #2: Schedule. Relates to the calendar-driven aspects of the project.
• Complexity Dimension #3: Technical. Includes all of the typical engineering requirements.
• Complexity Dimension #4: Context. Encompasses the external influences that have an impact on project development and progress.
• Complexity Dimension #5: Financing. Relates to the need for understanding the fact that the manner in which the project is funded has an impact on the final scope of work.

Guidebook Location
Sections 1.4 and 1.5

Slide 21



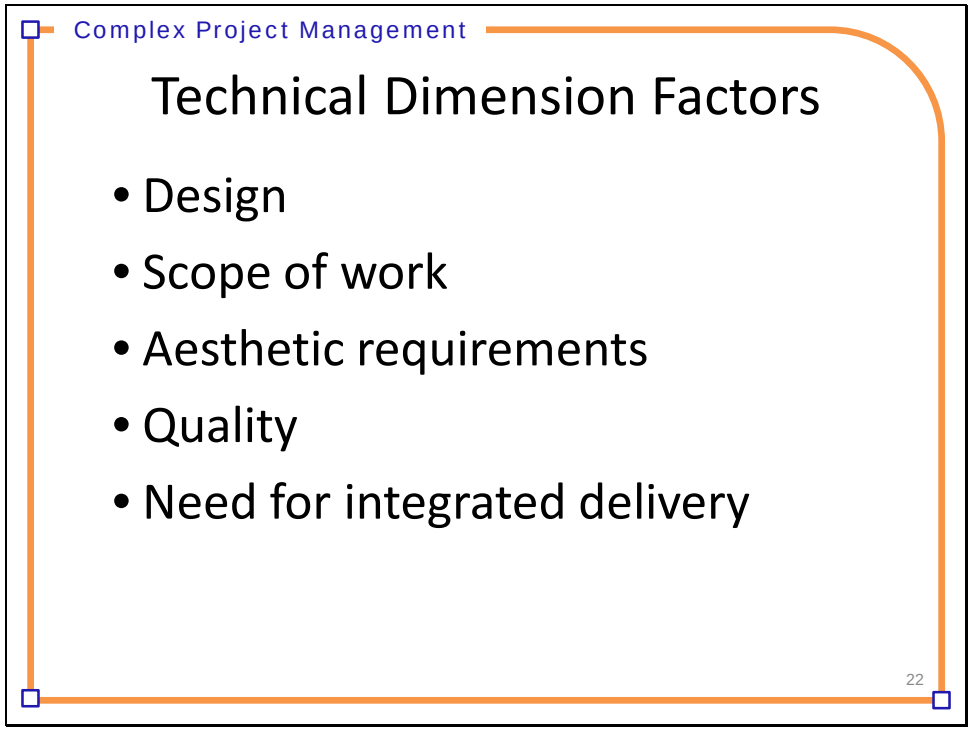
Background and Notes

The project schedule is closely associated with the Cost Dimension. This dimension is affected by and directly affects the cost of the overall project, depending on the management and decision-making during the venture. The Schedule Dimension looks at variables such as the overall time/deadline, risk, milestones, control, and problems associated with managing and planning for issues that arise before and during construction. The advent of new technology will also be discussed as it pertains to affecting the management of the project schedule.

Guidebook Location

Section 2.1

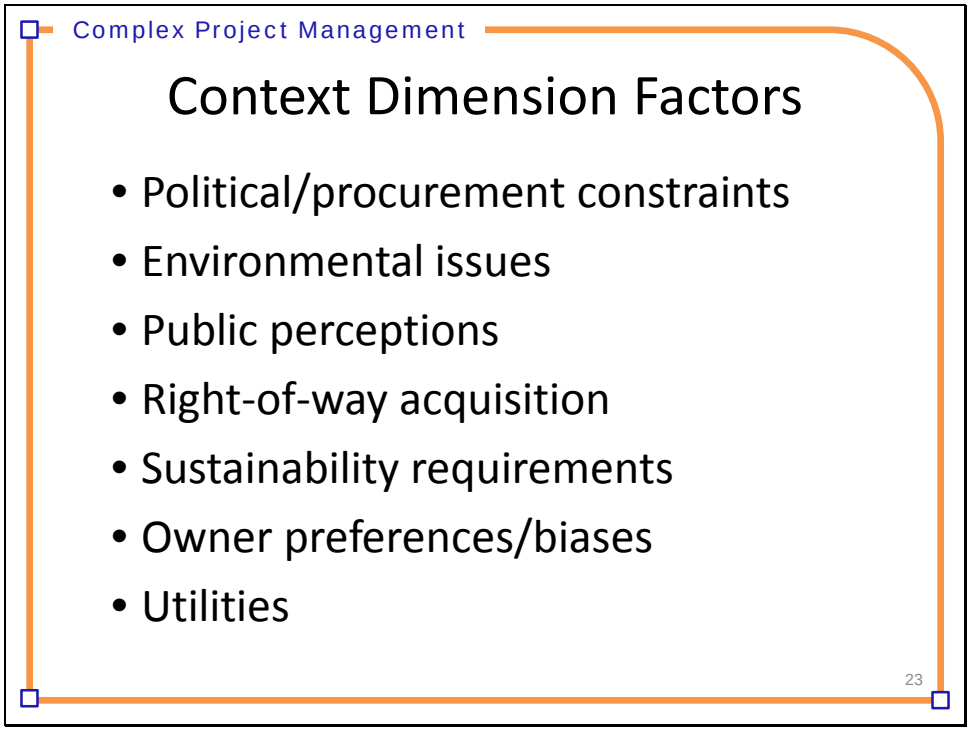
Slide 22



Background and Notes
The technical aspects of the project include all of the typical engineering requirements. Issues identified for this dimension include design requirements, scope of the project, quality of construction, and the organizational structure of the owner undertaking the project. This area also includes items such as contract language and structure and the implementation of new technology for effective management of the project.

Guidebook Location
Section 2.1

Slide 23



Key Message
The Context Dimension encompasses the external influences that have an impact on project development and progress.

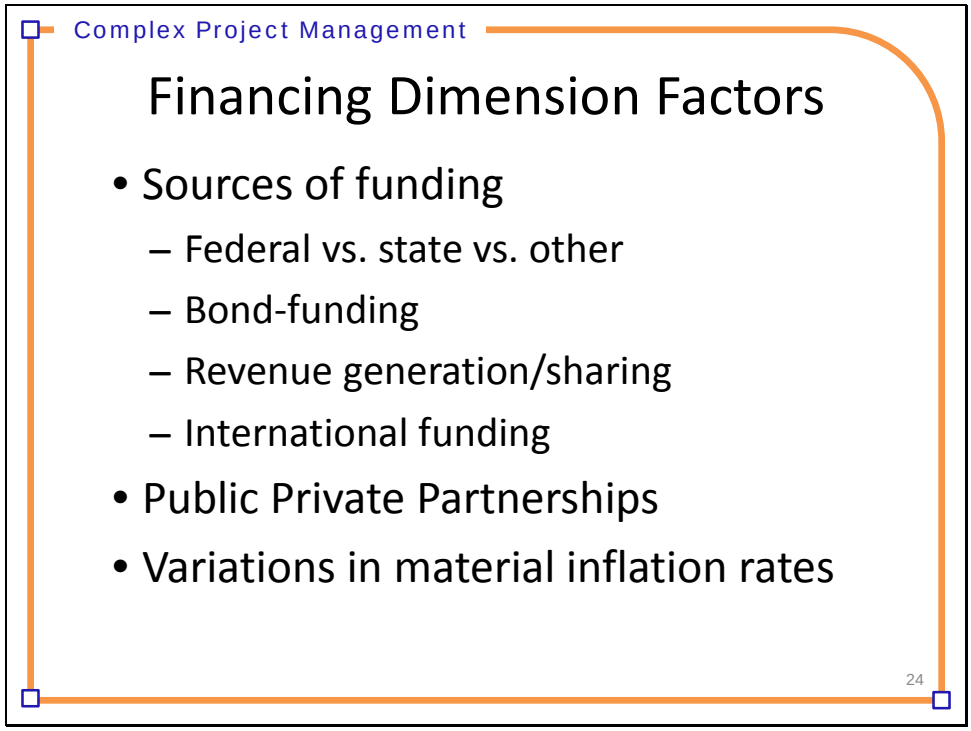
Background and Notes
The Context Dimension refers to all of the external factors that have an impact on the project and these factors can be some of the most difficult to predict and plan for before and during construction. Context includes stakeholders, environmental issues, legal and legislative requirements, local issues, and project-specific factors. The Context Dimension is comprised of the following categories:

- Stakeholders
- Project-specific
- Local issues
- Resource availability
- Environmental
- Legal/legislative
- Global/national
- Unusual conditions

Note that Context is different than context-sensitive design.

Guidebook Location
Section 2.1

Slide 24



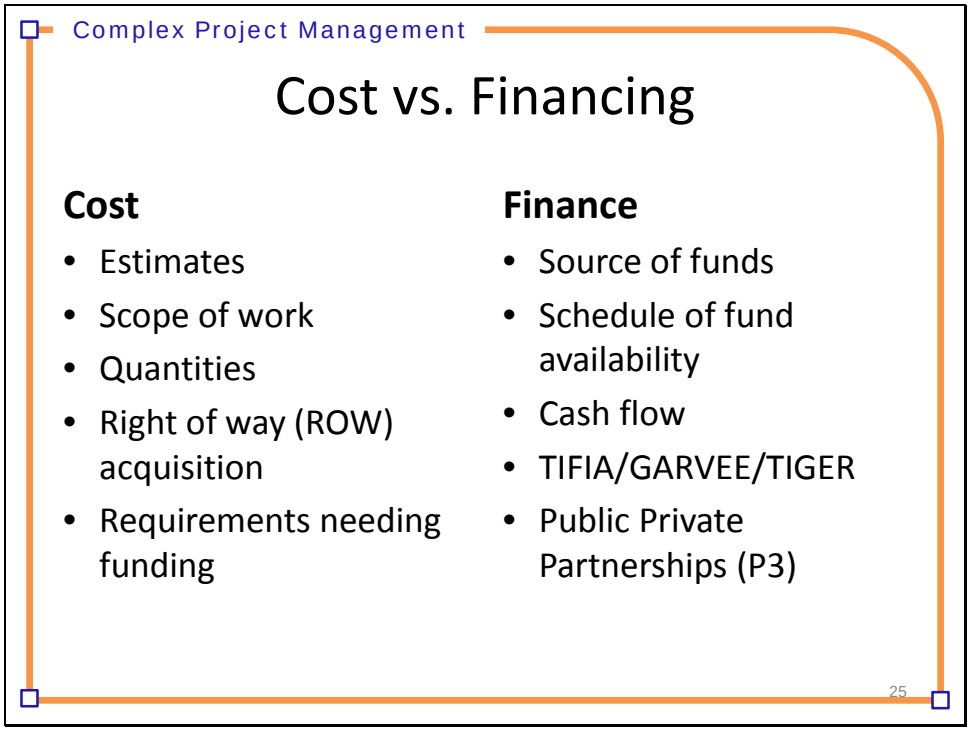
Key Message
The Financing Dimension relates to the need for understanding how the project is being paid for.

Background and Notes
It is no longer sufficient to merely know a project's cost. The owner must know how it will be paid for and integrate that knowledge into the project's scope of work. The mechanics of the financing can have a direct impact on the project design, the speed with which it can be delivered, and the ability to achieve contextual requirements. One of the first steps in complex project management is to identify available financing and the constraints inherent to the debt servicing process. The Financing Dimension is comprised of the following categories:

- Process
- Public
- Revenue stream
- Asset value
- Project delivery methods
- Risk

Guidebook Location
Section 2.1

Slide 25

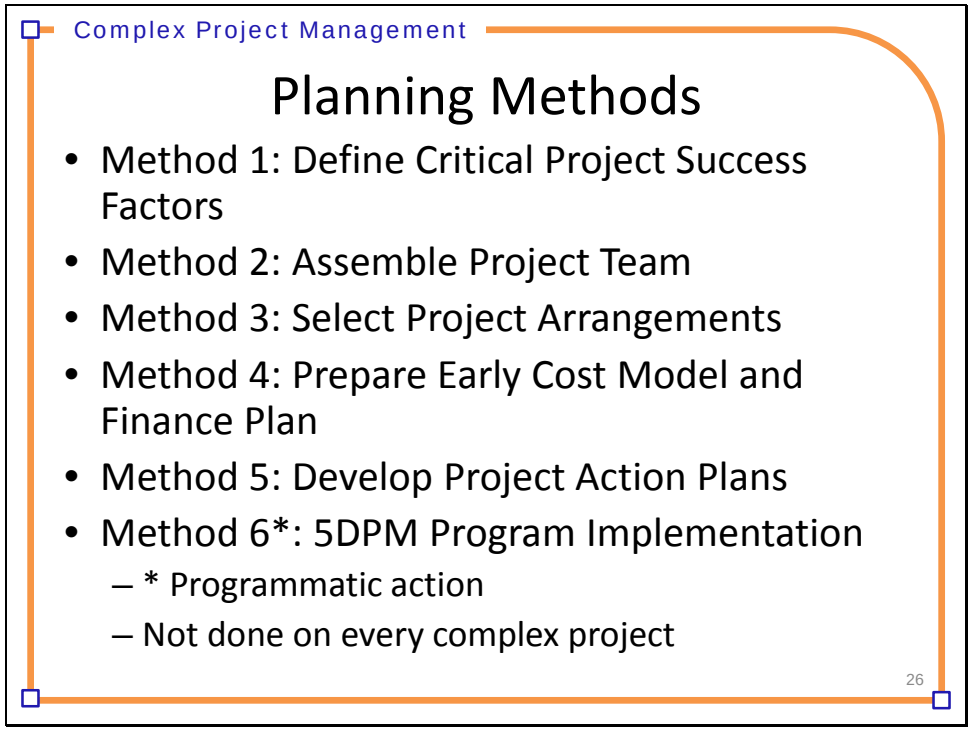


Key Message
While closely related, Cost and Financing are not the same dimensions in complex projects.

Background and Notes
On complex projects, it is no longer sufficient to merely know a project's cost… the owner must know how it will be paid for and integrate that knowledge into the project's scope of work. The mechanics of the financing can have a direct impact on the project's design, the speed with which it can be delivered, and the ability to achieve contextual requirements.

Guidebook Location
Section 2.1

Slide 26

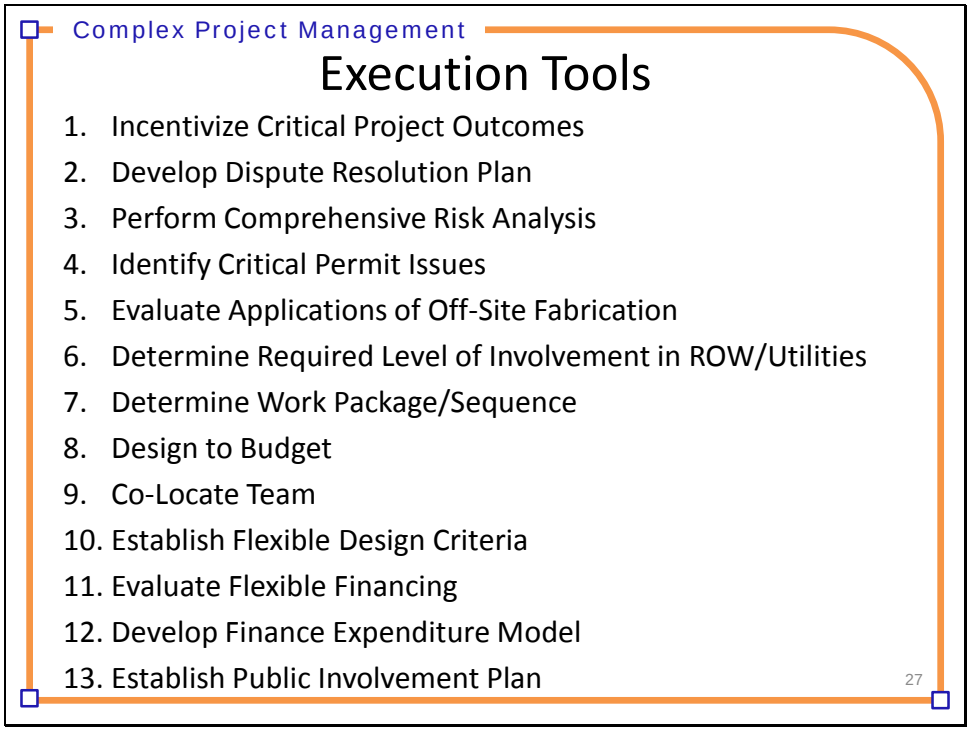


Key Message
There are 6 methods to be used in conjunction with the complexity maps to help ensure project success.

Background and Notes
A complexity map and Method 5 should be completed each time one of the first four methods is completed.

Guidebook Location
Section 3.1-3.6

Slide 27



Key Message

There are 13 Project execution tools that can be used to achieve project success. This is not an exhaustive list. More tool may be added as they become needed.

Background and Notes

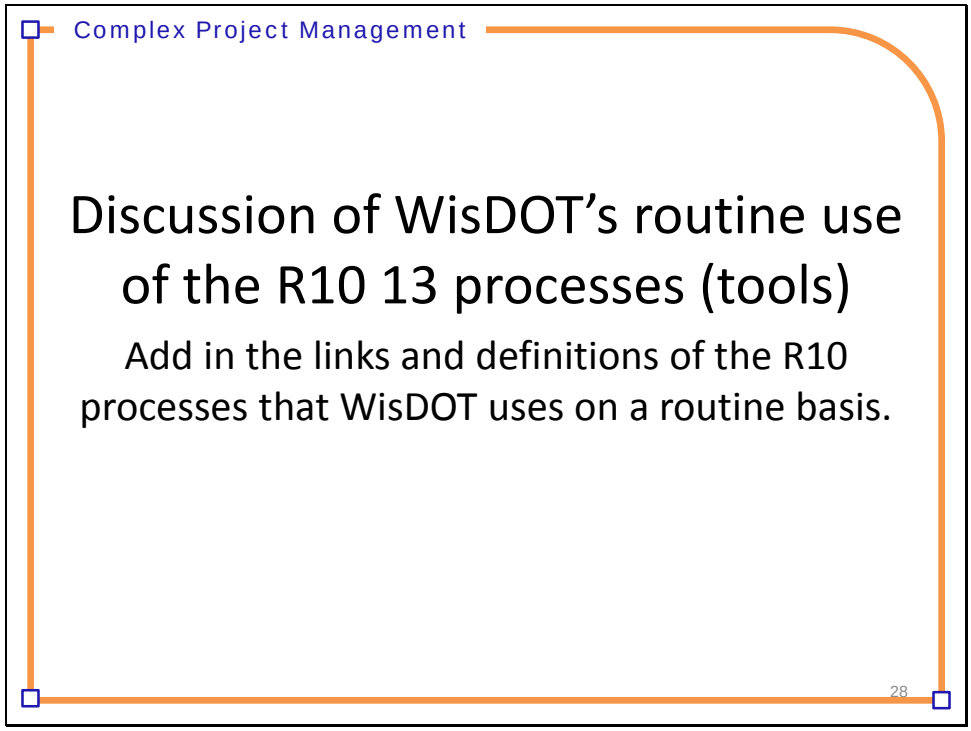
Not every tool will be used on every project. For your specific project, you will need to select the tools that will help throughout the development of the complex project management plan. There is no correct number of tools to be used on a project; use as many or as few as will work for your project.

It is important to remember that the tools are used to help with the management of your complex project.

Guidebook Location

Section 4.1 – 4.14

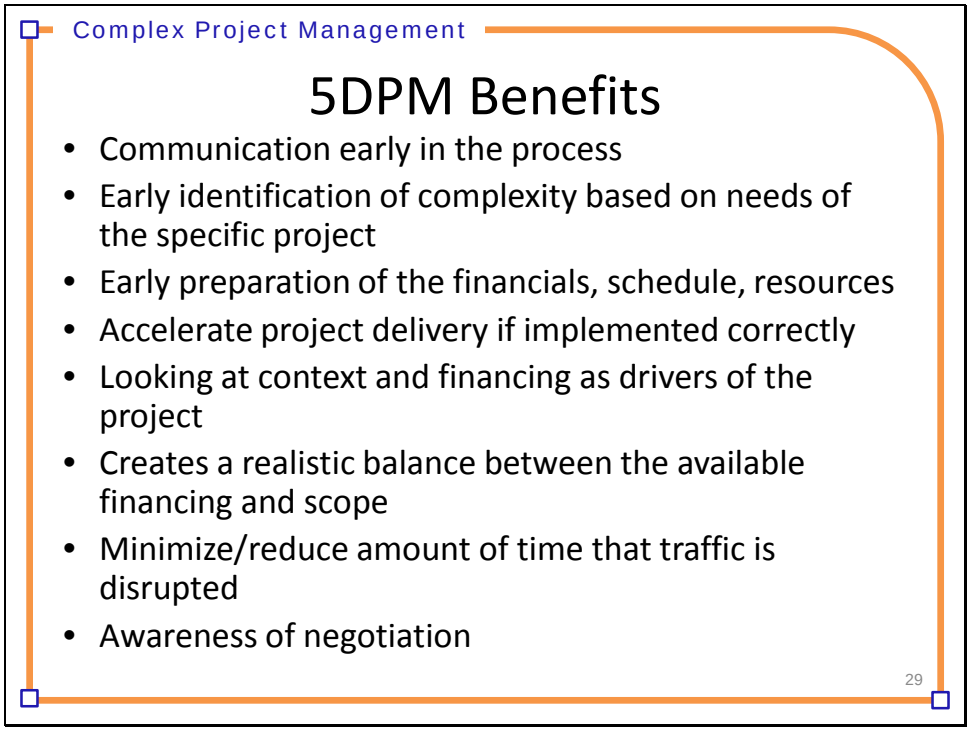
Slide 28



Key Message: Every DOT has unique processes that can be implemented to help resolve project delivery conflicts.

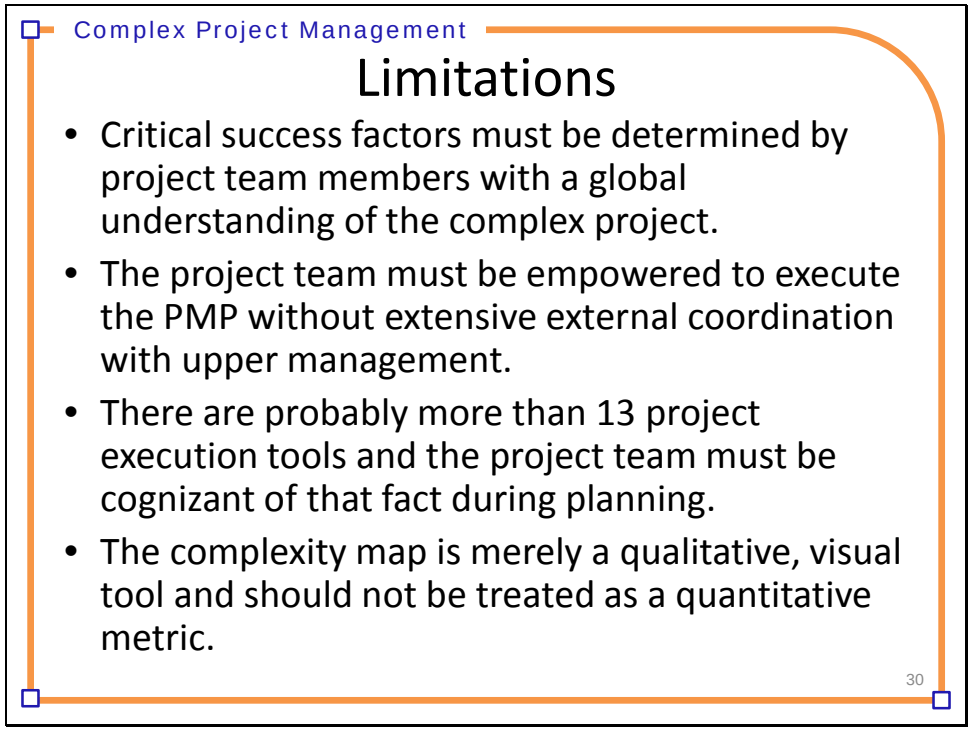
Background and Notes: Identify the routine processes (tools) from the 13 recommended R10 tools (more or less) that WisDOT typically uses.

Slide 29



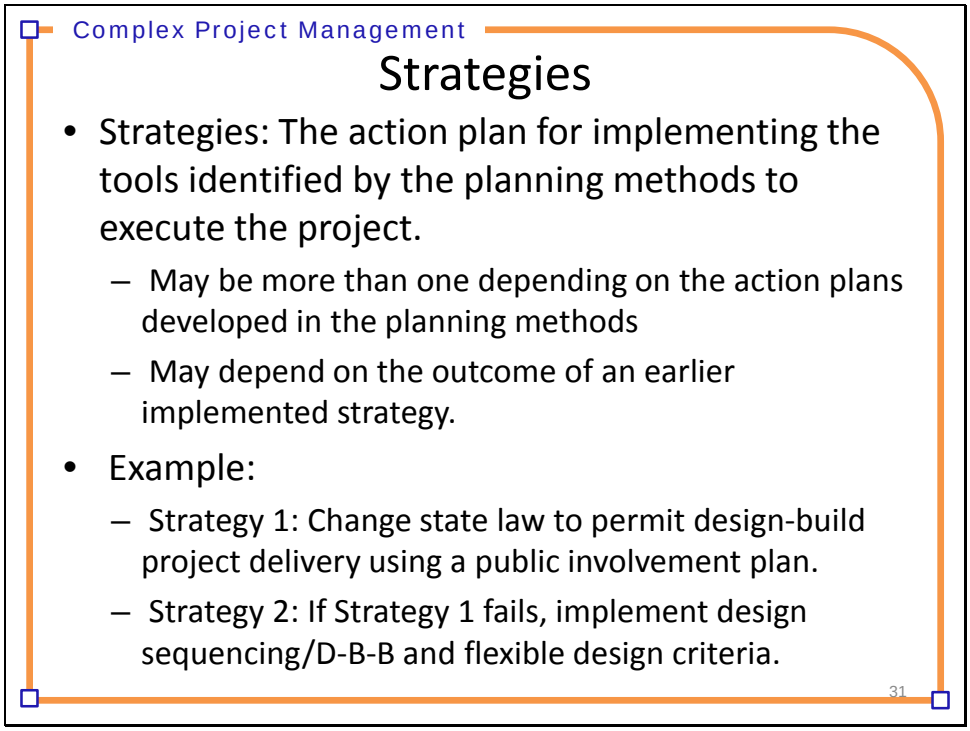
Key Message: Early identification, preparation and communication are keys to a successful 5DPM process.

Slide 30



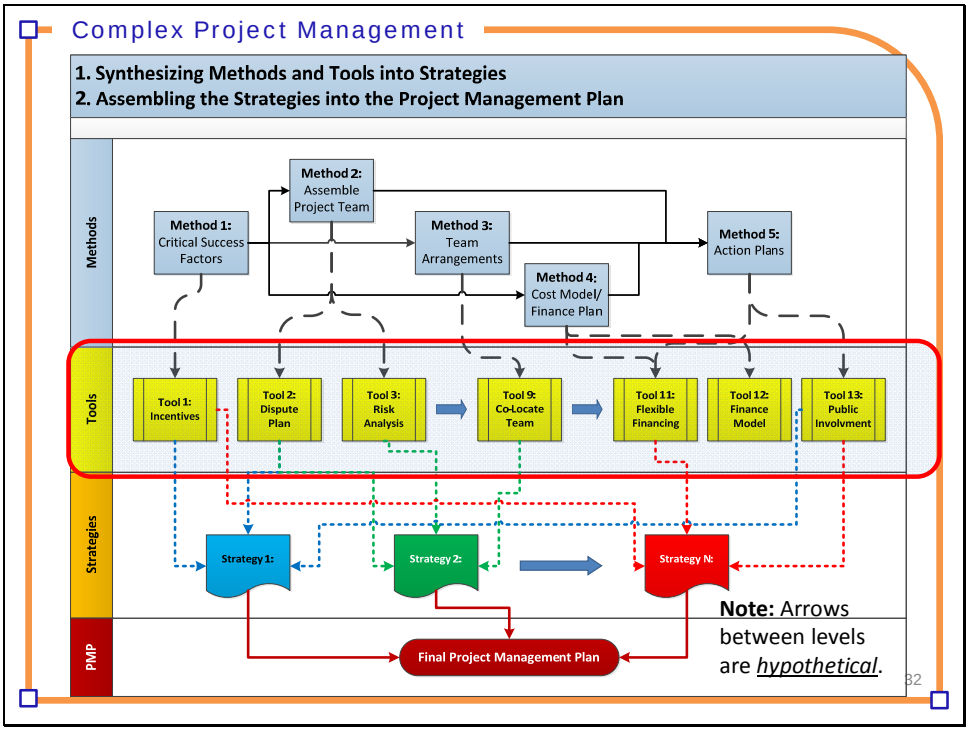
Key Message: 5DPM is not a magic bullet. There still needs to be an understanding of what the limitations are and how to make project adjustments necessary to implement the recommendations.

Slide 31



Key Message: Strategies represent the official outcome or directions and actions that need to occur.

Slide 32



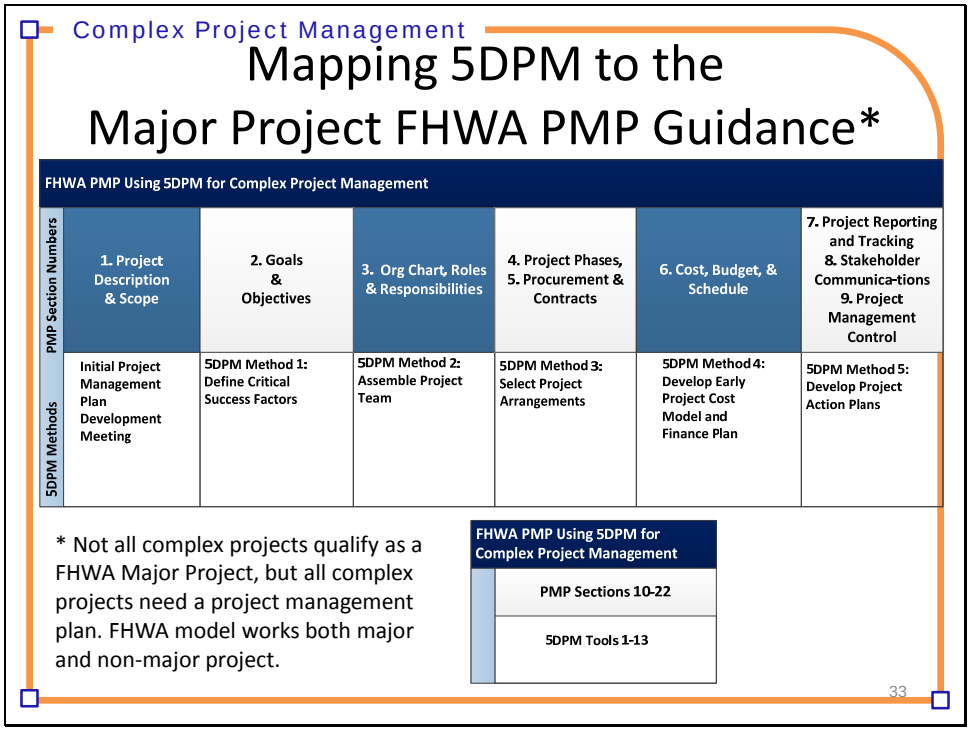
Key Message

5DPM uses the 5 planning methods' project execution tool selections to form strategies that eventually form the content of the PMP.

Background and Notes

The flow chart shows the interrelationship of the tools and methods that lead to defining the strategies to adopt to create a final project management plan.

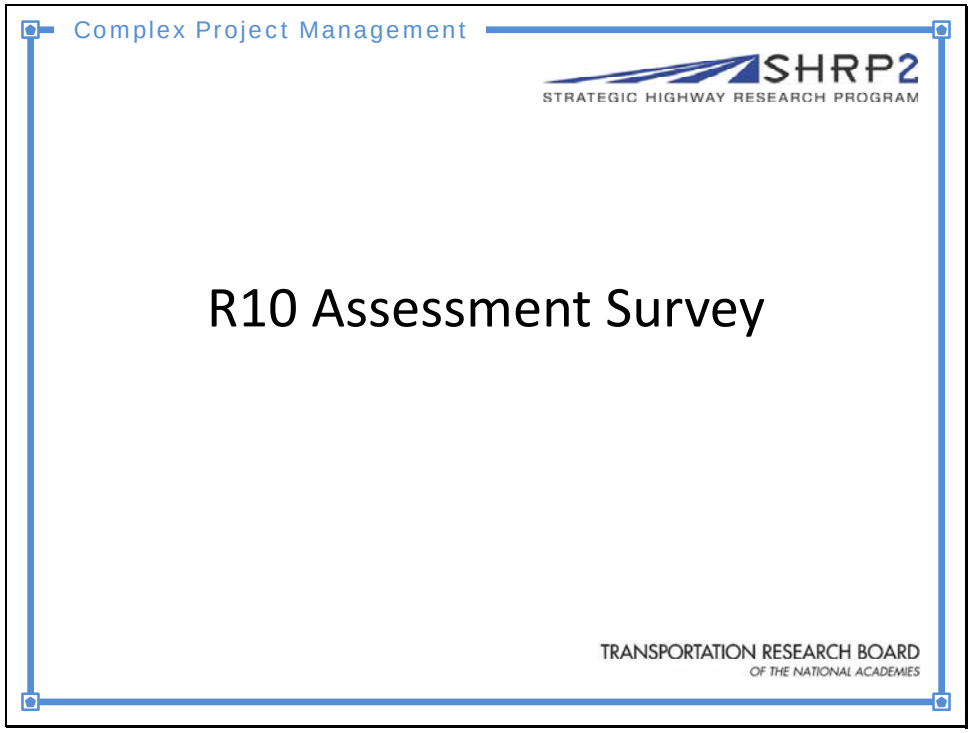
Slide 33



The PMP is required by FHWA for projects over $500 M but due to the benefits of developing and using a PMP, FHWA is recommending the development and use of a PMP on all complex projects even if they are not major projects ($500M).

Notice the relation between the first 9 sections of FHWA's Major Project PMP Guidance with the 5 Methods of 5DPM.

Slide 34



Key Message
Organizational assessments should be down periodically after establishing a baseline to measure to. This will provide a way to track the success of the organization in adopting key 5DPM initiatives and showing improvement in project development on a programmatic basis.

Slide 35

Why Organizational Maturity?

- Just as individuals benefit from achieving personal maturity, organizations benefit from organizational maturity. Organizational maturity enables an organization to:
  - Translate organizational strategy into success
  - Drive business improvement
  - Gain competitive edge

"All organizations should continually look for ways to improve – that's just a law of ***economics,*** *a matter of competitive survival"*

-Jay Douglas, Manager, Business Development

Carnegie Mellon Software Engineering Institute, PA

Definitions

- Organizational Maturity is the process of adopting and refining business processes to ensure success
- Project Management Maturity is more specifically an organization's level of achievement with consistent methods and repeatable delivery of project management goals

A project management maturity model allows an organization to examine its strengths and weaknesses and develop a maturity assessment

Slide 37

Traditional Organizational Maturity Model

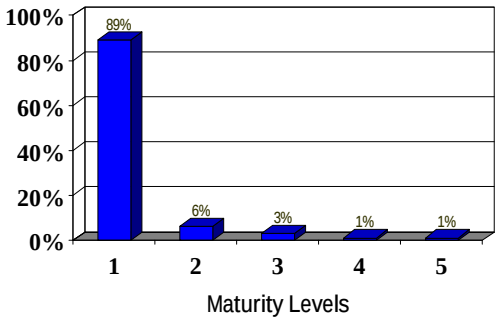
- Traditional Organizational Maturity consists of:
  - Level 1: Initial
  - Level 2: Repeatable
  - Level 3: Defined
  - Level 4: Managed
  - Level 5: Optimized

Various models use different terms to identify levels but all of them essentially mirror CMM and PMBOK methodologies.

Slide 38

Current Situation

Survey of organizations



Survey of 126 senior level project management practitioners by the Center for Business Practices

Slide 39

Maturity Level 1: Initial - Generic

Features:

- "Fire Fighting is the way of Life"
- Success depends upon individual heroics
- Few stable processes exist or used
- The introduction of new technology is risky
- Data collection and analysis are ad-hoc

Steps to go to next level:

- An organization must focus on the fundamentals
- Establish basic project management concepts, training and simple processes

Slide 40

Maturity Level 2: Repeatable - Generic

Features:

- Success depends on management system support
- Documented processes at project level
- Technology supports established stable practices
- Planning and management data is used by individual projects

Steps to go to next level:

- Formalize and document the PM processes
- Customize training according to the roles
- Work toward integrated management processes

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Maturity Level 3: Defined - Generic

Features:

- Project groups work together
- Training is planned and provided according to the roles
- Integrated management and engineering processes are used across the organization
- New technologies are evaluated on a qualitative basis
- Data is systematically shared across projects

Steps to go to next level:

- Establish standardized data definition and collection processes across the organization
- Encourage team work within and across the projects
- Collect project planning and management data across the organization

Slide 42

Maturity Level 4: Managed - Generic

Features:

- A strong sense of teamwork exists within each project
- Processes are quantitatively understood and stabilized
- New technologies are evaluated on the quantitative basis
- Data definition and collection are standardized across the organization

Steps to go to next level:

- Establish process improvement teams
- Perform trend analysis on data gathered

Slide 43

Maturity Level 5: Optimized - Generic

Features:

- A strong sense of teamwork exists across the organization
- Processes are continuously and systematically improved
- New technologies are proactively pursued and deployed
- Data is used to evaluate and select process improvements

Keep up the good work!!!!

Continuous Improvement

Slide 44

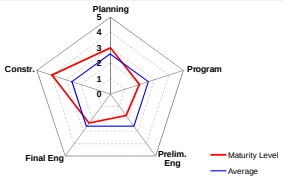
Maturity Assessment

- Connect organizational capabilities to project complexity…Another dynamic component

1) Maturity of 5DPM Project Planning Methods

	Planning	Program	Prelim.	Final	Constr.	Operation
Method 1	2	2				
Method 2	3	1	1	3		
Method 3		3	3	2		
Method 4		1	2			
Method 5	4	3	1	2	4	
Maturity by Stage	3.0	2.0	1.8	2.3	4.0	-

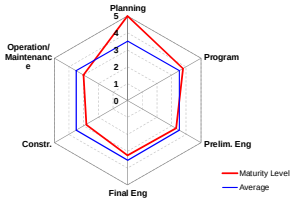
Reference	
Optimized	5
Integrated	4
Defined	3
Managed	2
Initial	1



2) Maturity of 5DPM Project Execution Tools

	Planning	Program	Prelim.	Final	Constr.	Operation
Tool 1	5	4	2	3	2	5
Tool 2		5	3	1	3	2
Tool 3	5	2	4	5	4	2
Tool 4			4	3		
Tool 5			2	4		
Tool 6		5	5	5	2	
Tool 7		5	4	1		
Tool 8		4	5	4		
Tool 9			1	5	2	
Tool 10			5	1		
Tool 11		4	2	5		
Tool 12		3	2	1		
Tool 13		2	4	4	4	
Maturity by Stage	5.0	3.8	3.3	3.2	2.8	3.0

Reference	
Optimized	5
Integrated	4
Defined	3
Managed	2
Initial	1



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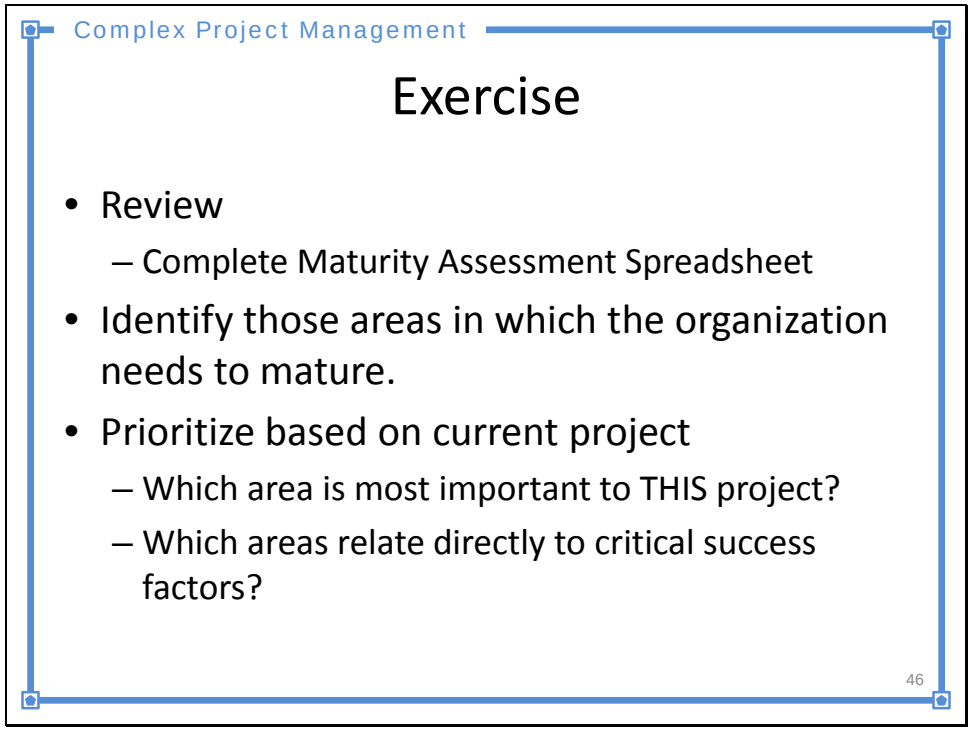
Benefits of Maturity Models

- Provide a roadmap for strategic improvement
- Allow to look into the organization's strength and weakness
- Assess organization's project management against agreed criteria
- Set realistic targets for improvement
- Measure progress towards enhanced capability
- Identify the links between needs and real education requirements

Think of the maturity model as a corporate stethoscope that can assess and diagnose organization's health

Slide 46



Key Message
Know how to complete and score the assessment survey. Ensure that it is based on a broad group of Department staff rating the PROGRAMATIC responses not just project related answers.

Slide 47

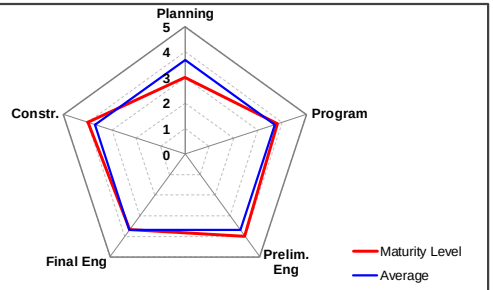
Complex Project Management

Maturity Assessment Result Review

1) Maturity of 5DPM Project Planning Methods

Method 1	1	4				
Method 2	4	4	4	4		
Method 3		3	4	3		
Method 4		4	4			
Method 5	4	4	4	4	4	
	Planning	Program	Prelim.	Final	Constr.	Operation
Maturity by Stage	3.0	3.8	4.0	3.7	4.0	-

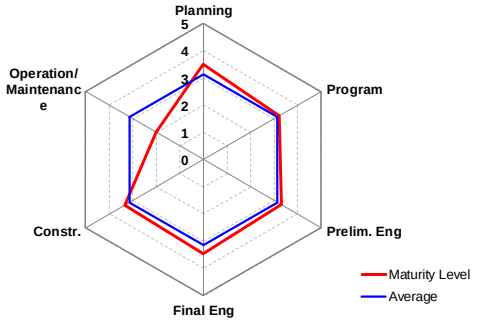
Optimized	5
Integrated	4
Defined	3
Managed	2
Initial	1
Reference	



2) Maturity of 5DPM Project Execution Tools

Tool 1	3	3	3	3	3	2
Tool 2		3	3	4	4	2
Tool 3	4	3	4	3	4	2
Tool 4			4	4		
Tool 5			3	3		
Tool 6		4	4	4	4	
Tool 7		4	4	4		
Tool 8		3	3	3		
Tool 9			2	2	2	
Tool 10			4	4		
Tool 11		3	3	4		
Tool 12		3	3	4		
Tool 13		3	3	3	3	
	Planning	Program	Prelim.	Final	Constr.	Operation
Maturity by Stage	3.5	3.2	3.3	3.5	3.3	2.0

Optimized	5
Integrated	4
Defined	3
Managed	2
Initial	1
Reference	



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Complex Project Management

3) Maturity of 5DPM Project Planning Methods - by the Five-Dimension

	Cost	Schedule	Technical	Finance	Context
Planning	4.0	2.5	3.0	2.5	3.0
Program	4.0	3.7	3.8	4.0	3.8
Prelim. Eng.	4.0	4.0	4.0	4.0	4.0
Final Eng.	4.0	3.5	3.7	4.0	3.7
Constr.	4.0	4.0	4.0	4.0	4.0
Dimensional Rating	**4.0**	**3.5**	**3.7**	**3.7**	**3.7**

4) Maturity of 5DPM Project Execution Tools - by the Five-Dimension

	Cost	Schedule	Technical	Finance	Context
Planning	3.5	3.5	3.5	4.0	3.5
Program	3.2	3.3	3.3	3.2	3.2
Prelim. Eng.	3.4	3.4	3.5	3.2	3.3
Final Eng.	3.4	3.5	3.5	3.6	3.3
Constr.	3.3	3.2	3.6	3.5	3.3
Operation/Maintenance	2.0	2.0	2.0	2.0	2.0
Dimensional Rating	**3.1**	**3.1**	**3.2**	**3.3**	**3.1**

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Complex Project Management

Self-Assessment Tool for Complex Project Management Maturity

Description

This tool is to help the agency self-assess the current level of maturity of managing a complex project during the project development process in terms of project management functions related to 5DPM methods and tools. By answering each question on a scale of 1 to 5 (5 being the highest maturity), the agency can evaluate the organization's maturity level of project management functions associated with 5DPM methods and tools. In addition, the self-assessment results can be used to rate the maturity level of each project development stage and the maturity level of the entire organization in managing complex projects by aggregating the answers of the individual questions.

	Planning	Programming	Preliminary Engineering	Final Engineering	Construction	Operation/ Maintenance
Method 1	√	√				
Method 2	√	√	√	√		
Method 3		√	√	√		
Method 4		√	√			
Method 5	√	√	√	√	√	
Tool 1	√	√	√	√	√	√
Tool 2		√	√	√	√	√
Tool 3	√	√	√	√	√	√
Tool 4			√	√		
Tool 5			√	√		
Tool 6		√	√	√	√	
Tool 7		√	√	√		
Tool 8		√	√	√		
Tool 9			√	√	√	
Tool 10			√	√		
Tool 11		√	√	√		
Tool 12		√	√	√		
Tool 13		√	√	√	√	

Start Assessment

Maturity Level

SHRP2 STRATEGIC HIGHWAY RESEARCH PROGRAM

TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

Note: This tool is developed only for answering the self-assessment questionnaire and showing the results. The entire questionnaire with full descriptions and recommendations are not provided here. Users should refer to the Appendix in the R10 report or the guidebook to use this tool.

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Complex Project Management

Maturity Level Used in this Tool

Description

To assess the maturity of complex project management, the five-staged maturity level is defined as below.

Level	Description
1	***Initial:*** No project management function is applied or considered.
2	***Managed:*** There is no formal process, tool or designated staff. Ad-hoc methods are applied by few specialists.
3	***Defined:*** Basic process and tools are repeatedly used but not standardized. Management practices vary from project to project.
4	***Integrated:*** Organizational standard process, methods, tools and staffs are established and documented.
5	***Optimized:*** Lesson learned and best practices are applied for continuous improvement. Performance management is enabled by quantitative feedback.

Home | Start Assessment

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Complex Project Management

Self Assessment: 5DPM Project Planning Methods

Select an answer choice that most appropriately represents your agency's current level of use of the 5DPM planning method in each project stage.

Current Practice	Not considered	Ad-hoc basis or hire external expert	Process not well-defined or is project-specific	Standard process in effect	Additional feedback / Lesson learned system
I. Project Planning Stage					
M01. Define Critical Project Success Factors	☉	☐	☐	☐	☐
M02. Assemble Project Team	☉	☐	☐	☐	☐
M05. Develop Project Action Plans to Address Resource Issues	☉	☐	☐	☐	☐
II. Programming Stage					
M01. Define Critical Project Success Factors	☉	☐	☐	☐	☐
M02. Assemble Project Team	☉	☐	☐	☐	☐
M03. Select Project Arrangements	☉	☐	☐	☐	☐
M04. Prepare Early Cost Model and Finance Plan	☉	☐	☐	☐	☐
M05. Develop Project Action Plans to Address Resource Issues	☉	☐	☐	☐	☐
III. Preliminary Engineering Stage					
M02. Assemble Project Team	☉	☐	☐	☐	☐
M03. Select Project Arrangements	☉	☐	☐	☐	☐
M04. Prepare Early Cost Model and Finance Plan	☉	☐	☐	☐	☐
M05. Develop Project Action Plans to Address Resource Issues	☉	☐	☐	☐	☐
IV. Final Engineering Stage					
M02. Assemble Project Team	☉	☐	☐	☐	☐
M03. Select Project Arrangements	☉	☐	☐	☐	☐
M05. Develop Project Action Plans to Address Resource Issues	☉	☐	☐	☐	☐
V. Construction Stage					
M05. Develop Project Action Plans to Address Resource Issues	☉	☐	☐	☐	☐

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Complex Project Management

Self Assessment: 5DPM Project Execution Tools

Select an answer choice that most appropriately represents your agency's current level of use of the 5DPM tool in each project stage.

Current Practice	Not considered	Ad-hoc basis or hire external expert	Process not well-defined or is project-specific	Standard process in effect	Additional feedback / Lesson learned system
I. Project Planning Stage					
T01. Incentivize Critical Project Outcomes	☐	☐	☐	☐	☐
T03. Perform Comprehensive Risk Analysis	☐	☐	☐	☐	☐
II. Programming Stage					
T01. Incentivize Critial Project Outcomes	☐	☐	☐	☐	☐
T02. Develop Dispute Resolutioin Plan	☐	☐	☐	☐	☐
T03. Perform Comprehensive Risk Analysis	☐	☐	☐	☐	☐
T06. Determine Required Level of Involvement in ROW/Utilities	☐	☐	☐	☐	☐
T07. Determine Work Package/Sequences	☐	☐	☐	☐	☐
T08. Design to Budget	☐	☐	☐	☐	☐
T11. Evaluate Flexible Financing	☐	☐	☐	☐	☐
T12. Develop Finance Expenditure Model	☐	☐	☐	☐	☐
T13. Establish Public Involvement Plan	☐	☐	☐	☐	☐
III. Preliminary Engineering Stage					
T01. Incentivize Critial Project Outcomes	☐	☐	☐	☐	☐
T02. Develop Dispute Resolutioin Plan	☐	☐	☐	☐	☐
T03. Perform Comprehensive Risk Analysis	☐	☐	☐	☐	☐
T04. Identify Critical Permit Issues	☐	☐	☐	☐	☐
T05. Evaluate Application of Off-Site Fabrication	☐	☐	☐	☐	☐
T06. Determine Required Level of Involvement in ROW/Utilities	☐	☐	☐	☐	☐
T07. Determine Work Package/Sequences	☐	☐	☐	☐	☐
T08. Design to Budget	☐	☐	☐	☐	☐
T09. Co-Locate Team	☐	☐	☐	☐	☐
T10. Establish Flexible Design Criteria	☐	☐	☐	☐	☐
T11. Evaluate Flexible Financing	☐	☐	☐	☐	☐
T12. Develop Finance Expenditure Model	☐	☐	☐	☐	☐
T13. Establish Public Involvement Plan	☐	☐	☐	☐	☐
IV. Final Engineering Stage					
T01. Incentivize Critial Project Outcomes	☐	☐	☐	☐	☐
T02. Develop Dispute Resolutioin Plan	☐	☐	☐	☐	☐
T03. Perform Comprehensive Risk Analysis	☐	☐	☐	☐	☐
T04. Identify Critical Permit Issues	☐	☐	☐	☐	☐
T05. Evaluate Application of Off-Site Fabrication	☐	☐	☐	☐	☐
T06. Determine Required Level of Involvement in ROW/Utilities	☐	☐	☐	☐	☐
T07. Determine Work Package/Sequences	☐	☐	☐	☐	☐
T08. Design to Budget	☐	☐	☐	☐	☐
T09. Co-Locate Team	☐	☐	☐	☐	☐
T10. Establish Flexible Design Criteria	☐	☐	☐	☐	☐
T11. Evaluate Flexible Financing	☐	☐	☐	☐	☐
T12. Develop Finance Expenditure Model	☐	☐	☐	☐	☐
T13. Establish Public Involvement Plan	☐	☐	☐	☐	☐
V. Construction Stage					
T01. Incentivize Critial Project Outcomes	☐	☐	☐	☐	☐
T02. Develop Dispute Resolutioin Plan	☐	☐	☐	☐	☐
T03. Perform Comprehensive Risk Analysis	☐	☐	☐	☐	☐
T06. Determine Required Level of Involvement in ROW/Utilities	☐	☐	☐	☐	☐
T09. Co-Locate Team	☐	☐	☐	☐	☐
T13. Establish Public Involvement Plan	☐	☐	☐	☐	☐
VI. Operation and Maintenance Stage					
T01. Incentivize Critial Project Outcomes	☐	☐	☐	☐	☐
T02. Develop Dispute Resolutioin Plan	☐	☐	☐	☐	☐
T03. Perform Comprehensive Risk Analysis	☐	☐	☐	☐	☐

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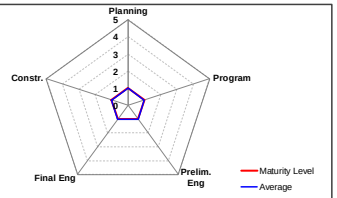
Complex Project Management

Maturity Assessment Result Review

1) Maturity of 5DPM Project Planning Methods

	Planning	Program	Prelim.	Final	Constr.	Operation
Method 1	1	1				
Method 2	1	1	1	1		
Method 3		1	1	1		
Method 4		1	1			
Method 5	1	1	1	1	1	
Maturity by Stage	1.0	1.0	1.0	1.0	1.0	-

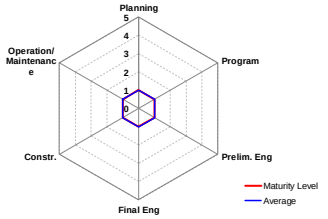
Optimized	5
Integrated	4
Defined	3
Managed	2
Initial	1
Reference	



2) Maturity of 5DPM Project Execution Tools

	Planning	Program	Prelim.	Final	Constr.	Operation
Tool 1	1	1	1	1	1	1
Tool 2		1	1	1	1	1
Tool 3	1	1	1	1	1	1
Tool 4			1	1		
Tool 5			1	1		
Tool 6		1	1	1	1	
Tool 7		1	1	1		
Tool 8		1	1	1		
Tool 9			1	1	1	
Tool 10			1	1		
Tool 11		1	1	1		
Tool 12		1	1	1		
Tool 13		1	1	1	1	
Maturity by Stage	1.0	1.0	1.0	1.0	1.0	1.0

Optimized	5
Integrated	4
Defined	3
Managed	2
Initial	1
Reference	



3) Maturity of 5DPM Project Planning Methods - by the Five-Dimension

	Cost	Schedule	Technical	Finance	Context
Planning	1.0	1.0	1.0	1.0	1.0
Program	1.0	1.0	1.0	1.0	1.0
Prelim. Eng.	1.0	1.0	1.0	1.0	1.0
Final Eng.	1.0	1.0	1.0	1.0	1.0
Constr.	1.0	1.0	1.0	1.0	1.0
Dimensional Rating	1.0	1.0	1.0	1.0	1.0

4) Maturity of 5DPM Project Execution Tools - by the Five-Dimension

	Cost	Schedule	Technical	Finance	Context
Planning	1.0	1.0	1.0	1.0	1.0
Program	1.0	1.0	1.0	1.0	1.0
Prelim. Eng.	1.0	1.0	1.0	1.0	1.0
Final Eng.	1.0	1.0	1.0	1.0	1.0
Constr.	1.0	1.0	1.0	1.0	1.0
Operation/Maintenance	1.0	1.0	1.0	1.0	1.0
Dimensional Rating	1.0	1.0	1.0	1.0	1.0

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Complex Project Management

General Question	Not considered	Ad-hoc basis or hire external expert	Process not well-defined or is project-specific	Standard process in effect	Additional feedback / Lesson learned system	SHRP2 R-10 Case Study Example
Method	Detailed Explanation for Specific Method					Method
M01. Define Critical Project Success Factors	We do not consider this method in this stage	The project team may use their subjective judgments on an ad hoc basis or hire a subject matter expert	The project team is supposed to do this task but the process is not well defined and it may vary from project to project	We have a standard and documented process equivalent to this method.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Saskatoon Green Streets Project**
M02. Assemble Project Team	We do not consider this method in this stage	The project team may use their subjective judgments on an ad hoc basis	A routine process exists but may vary from project to project	We have a standard and documented process equivalent to this method.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Northern Gateway Toll Road**
M03. Select Project Arrangements	We do not consider this method in this stage	The project team may use their subjective judgments on an ad hoc basis	A routine process exists but may vary from project to project	We have a standard and documented process equivalent to this method.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Lewis and Clark Bridge**
M04. Prepare Early Cost Model and Finance Plan	We do not consider this method in this stage	The project team may use their subjective judgments on an ad hoc basis or hire a subject matter expert	A routine process exists but may vary from project to project	We have a standard and documented process equivalent to this method.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**North Carolina Tollway**
M05. Develop Project Action Plans to Address Resource Issues	We do not consider this method in this stage	The project team may use their subjective judgments on an ad hoc basis or hire a subject matter expert	A routine process exists but may vary from project to project	We have a standard and documented process equivalent to this method.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Louisville-Southern Indiana Ohio River Bridges**

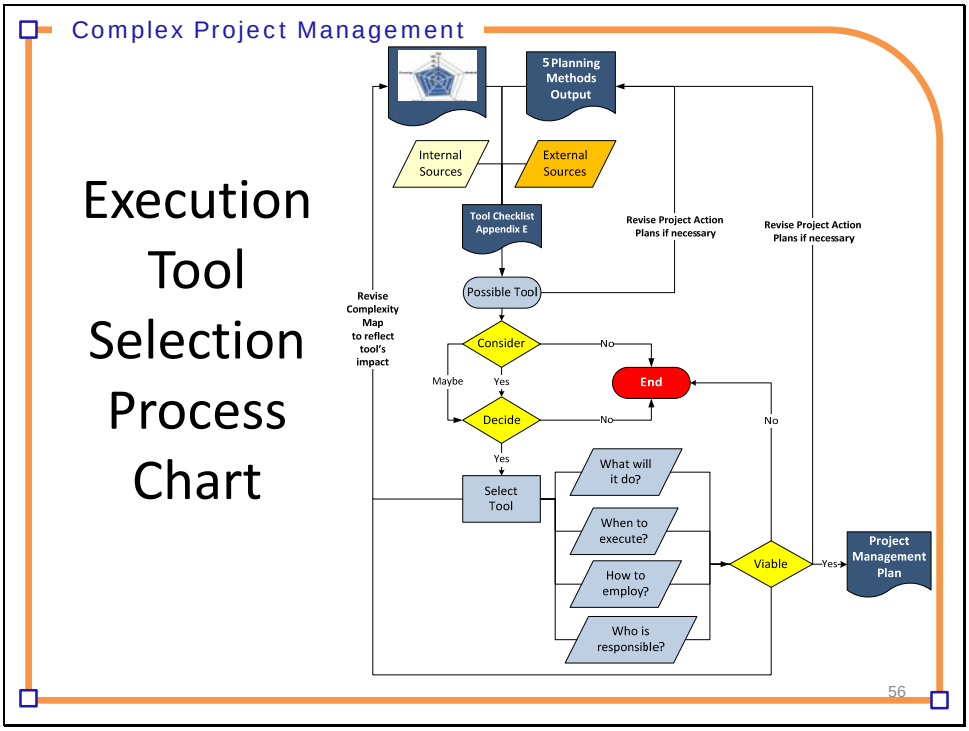
General Question	Not considered	Ad-hoc basis or hire external expert	Process not well-defined or is project-specific	Standard process in effect	Additional feedback / Lesson learned system	SHRP2 R-10 Case Study Example
Tool	Detailed Explanation for Specific Tool					Tool
T01. Incentivize Critial Project Outcomes	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**InterCounty Connector**
T02. Develop Dispute Resolution Plan	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**InterCounty Connector**
T03. Perform Comprehensive Risk Analysis	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**I-40 Crosstown Relocation**
T04. Identify Critical Permit Issues	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Louisville-Southern Indiana Ohio River Bridges**
T05. Evaluate Application of Off-Site Fabrication	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**I-40 Crosstown Relocation**
T06. Determine Required Level of Involvement in ROW/Utilities	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**T-REX**
T07. Determine Work Package/Sequences	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**New Mississippi River Bridge**
T08. Design to Budget	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**New Mississippi River Bridge**
T09. Co-Locate Team	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Northern Gateway Toll Road**
T10. Establish Flexible Design Criteria	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**I-95 New Haven Harbor Crossing Corridor**
T11. Evaluate Flexible Financing	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Example: Detroit River International Crossing**
T12. Develop Finance Expenditure Model	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**Example: I-95 New Haven Harbor Crossing Corridor**
T13. Establish Public Involvement Plan	We do not consider this particular tool in this stage	The project team may consider this tool on an ad hoc basis or a subject matter expert might bring it up.	A routine process that includes this tool exists but may vary from project to project	We have a standard and documented process to utilize this tool if it is appropriate for the project.	In addition to previous item, there is a system for the feedback/lessons learned by collecting information after the project is completed in order to continuously improve the process	**James River Bridge**

Slide 55

Key Message

This module focuses on the 13 recommended 5DPM execution tools and its consideration and selection process.

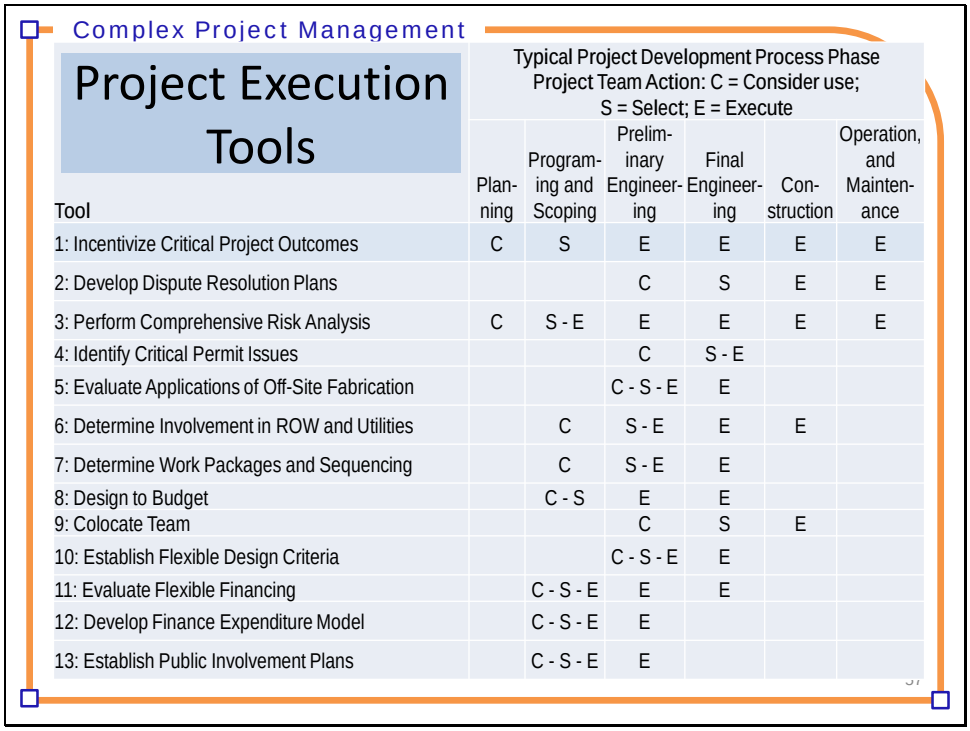
Slide 56



Key Message

This flow chart details how to consider the appropriate Project Execution Tool to select to fit the need of the project. Note, once a tool is selected there are standard questions to answer like What When How and Who. This is the information about the tool or process that will be documented into the project management plan.

Slide 57



Key Message

Remember the 13 tools that you can use to execute your project action plans. Some tools will make more sense for each method than others.

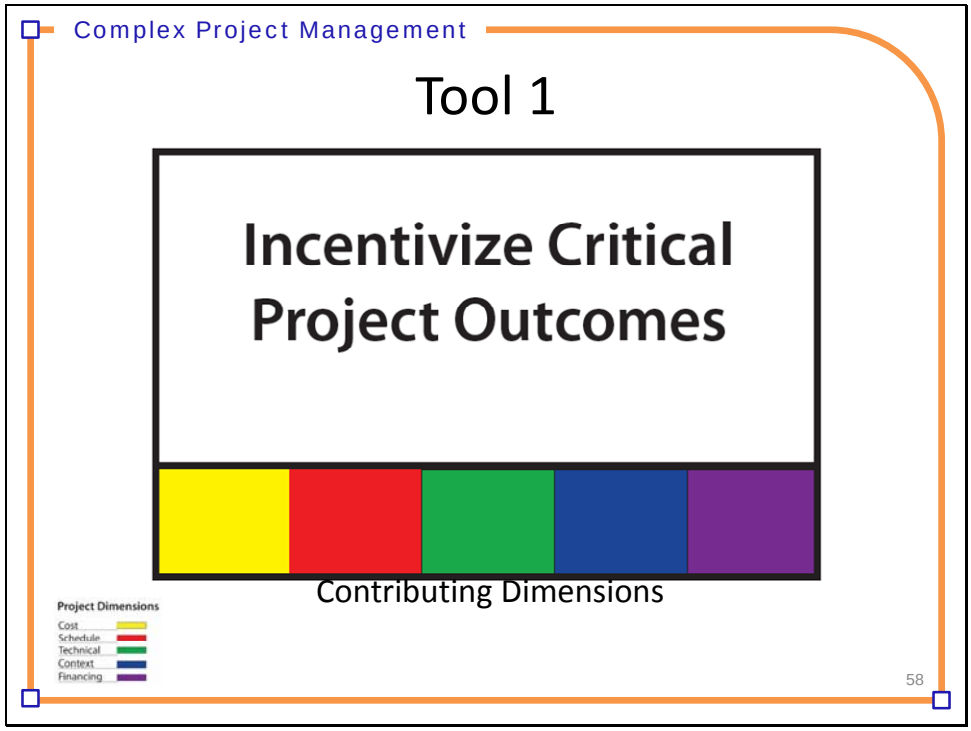
Background and Notes

In developing action plans, the tools might help address some of the specific roadblocks or speed bumps. For instance, a roadblock may be public acceptance of the project, so establishing a public involvement plan (one of the tools) early in project development will be helpful. A speed bump might be the time that it takes to get permits, so identifying the critical permit issues (one of the tools) and taking action to begin the permitting process may reduce the impact of that process on the overall project.

Guidebook Location

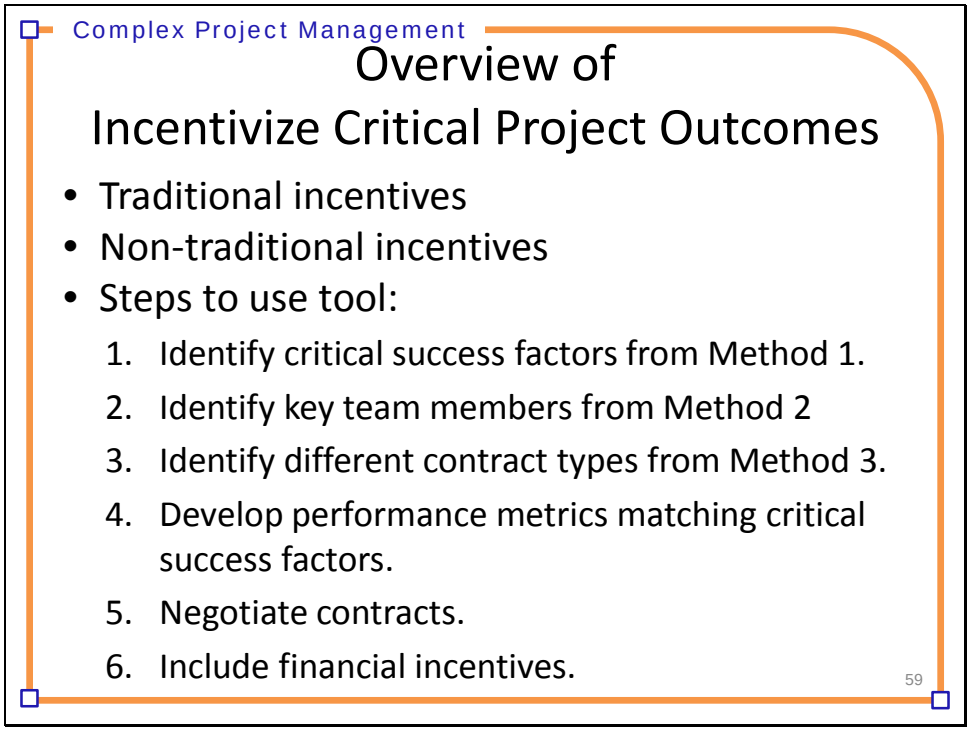
Chapter 4

Slide 58



Key Message
Incentivizing critical project outcomes is influenced by all five dimensions.

Slide 59



Key Message

After evaluating and mapping the project complexity and developing a clear understanding of the sources of the complexity on the project, the following steps can be used to develop contract incentives to align the interests of contracted parties with those of the overall project, the project owner, and/or the public at large.

Background and Notes

Step 1

Identify critical success factors from Method 1.

Step 2

Identify different contract types from Method 2.

Step 3

Identify key team members from Method 3.

Step 4

Develop performance metrics matching critical success factors.

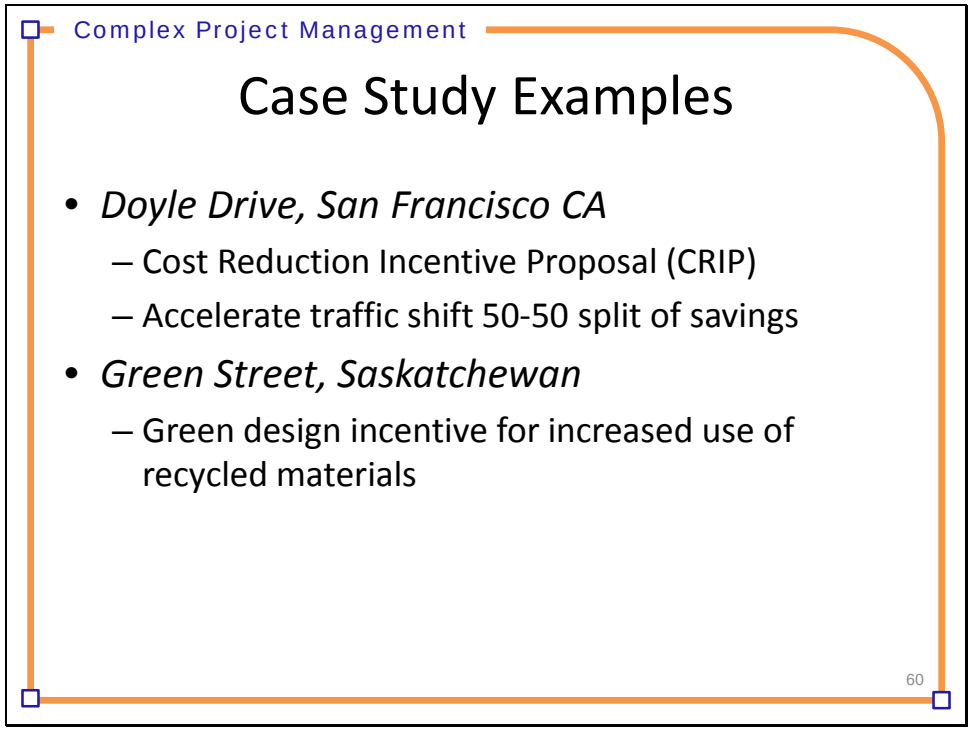
Step 5

Negotiate contracts with key team members that include performance metrics from Step 4.

Step 6

Include financial incentives for exceeding minimum contract performance.

Slide 60



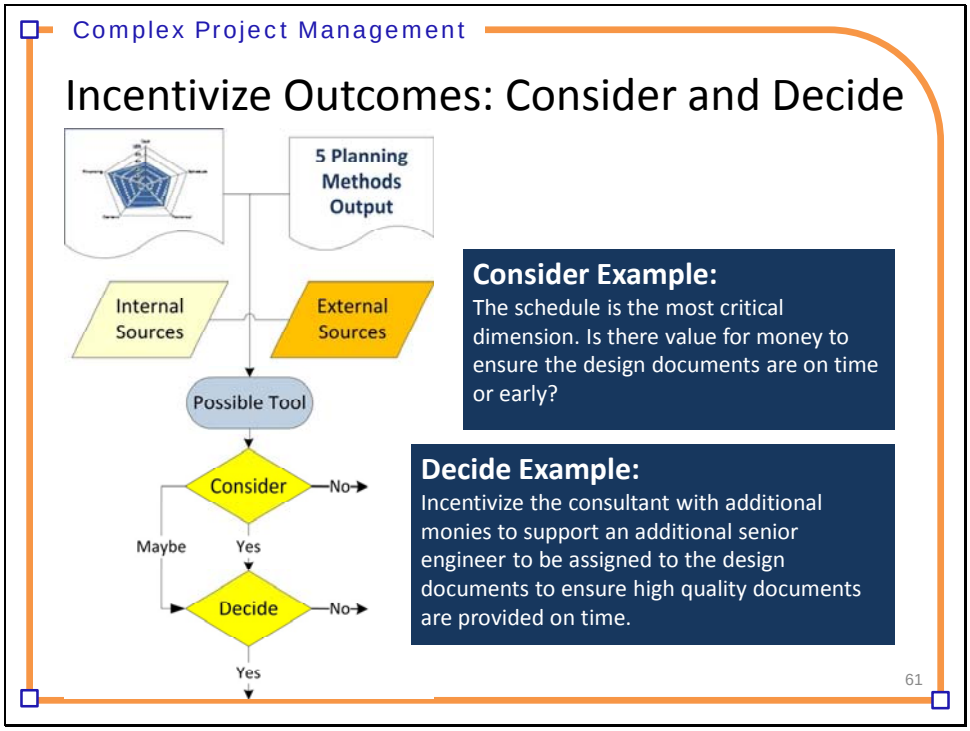
Key Message
Examples of incentivizing critical project outcomes were found in several case study projects.

Background and Notes
Doyle Drive
Incentive contracts were made to two of eight projects to accelerate traffic shift. Contractors submitted Cost Reduction Incentive Proposal (CRIP) that cost savings would be halved between contractors and Caltrans.

Green Street
The project was designed to develop tools that would result in improved use of recycled materials. Incentives are provided for green design.

Intercounty Connector
An environmental incentive pool was set aside for each contract to incentivize contractors to reduce environmental impacts. Results for the incentive pool were reduced wetlands impact by 40 percent and streams impact by 10 percent using weekly pass/fail rating of erosion and sediment control. Based on ratings, cost incentives are issued and disincentives for failure (have to pass all quarterly ratings for incentives), had to demonstrate tough love on rating system.

Slide 61



Key Message

After you have identified all initial inputs, you look at each tool individually and, in this case, Tool 1: Incentivize Critical Project Outcomes.

First you need to *consider* how this tool might be used in your project. This is used as the brainstorming step of the process.

The shaded box on the right provides an example of what you could consider at this point. You will need to determine and *decide* how this tool can be used with your project.

Background and Notes

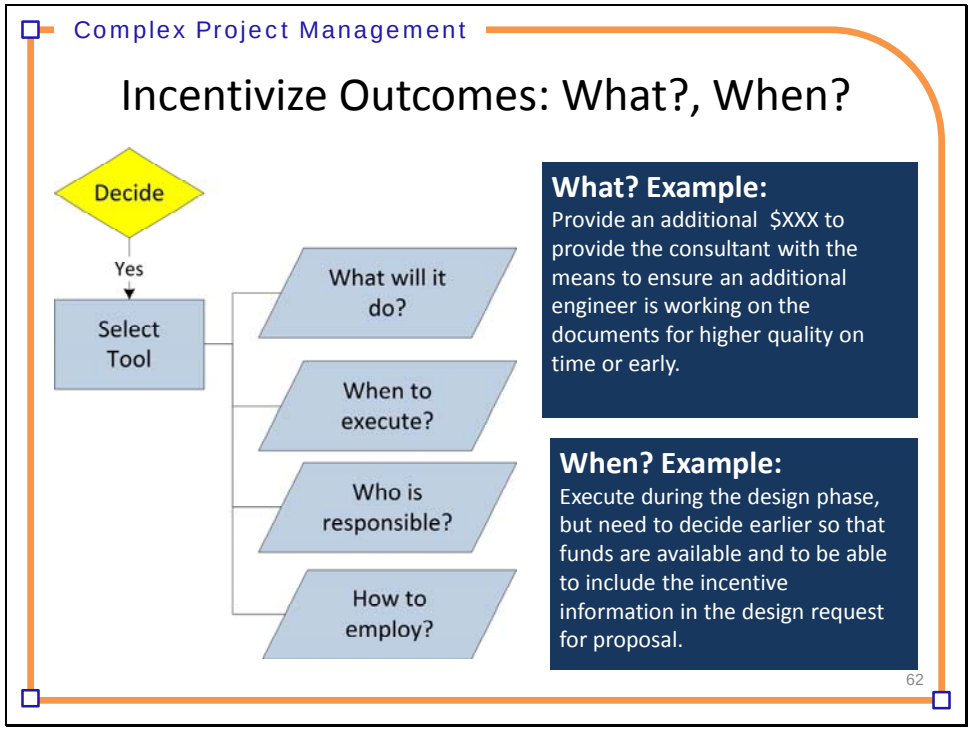
The use of incentives can apply to complexity from any of the five dimensions or from interactions among any of the dimensions. No matter which dimension is your most complex one, you may find it beneficial to utilize this tool.

If use of this tool doesn't fit with your project, your response to this consideration will be No, and you can document it and move on to the next tool.

Guide Location

Section 4.2

Slide 62



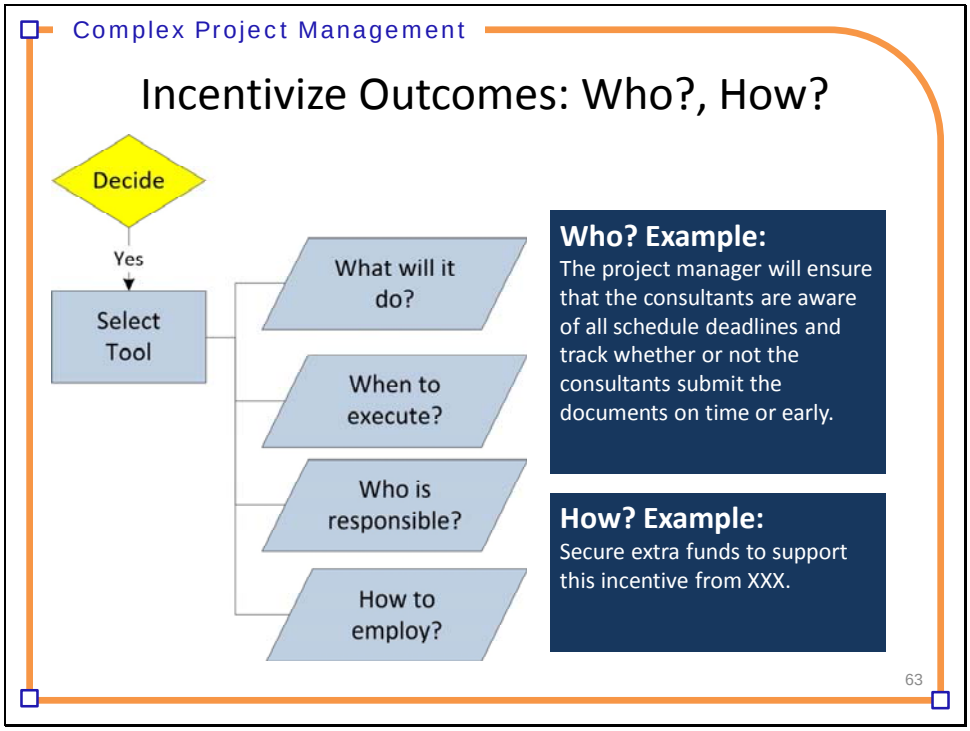
Key Message
After you make the decision to use the tool, you must determine what, when, how, and who will execute the tool.
What do you need to do to execute the project plan for this tool?

Again, the shaded box on the right continues with the previous example.

Background and Notes
After you decide this tool is applicable to your project, you need to determine what you need to do to execute this tool.

Guide Location
Section 4.2

Slide 63



Key Message

Who and *How* will be responsible for executing this tool?
Again, the shaded box on the right continues with the previous example.

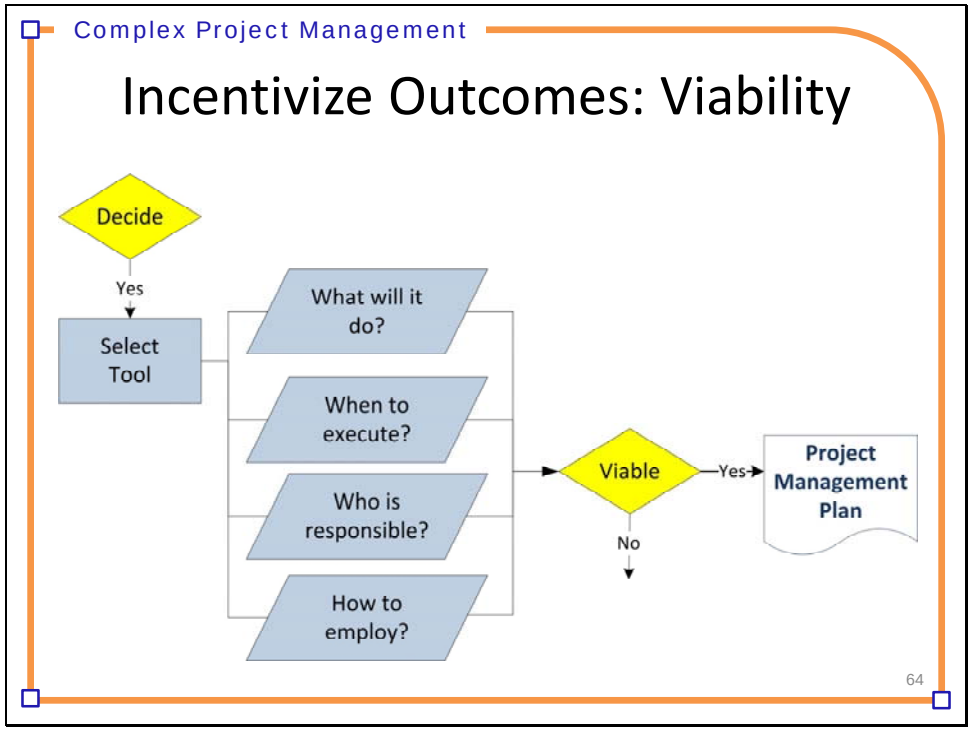
Background and Notes

Finally, it is important to assign a person or group that will take responsibility for executing this tool. Be sure to assign this task to the person or group most able to fully execute the plan. You need to determine who is the most qualified person to determine whether the consultant or contractor has met the requirements of the incentive clause.

Guide Location

Section 4.2

Slide 64

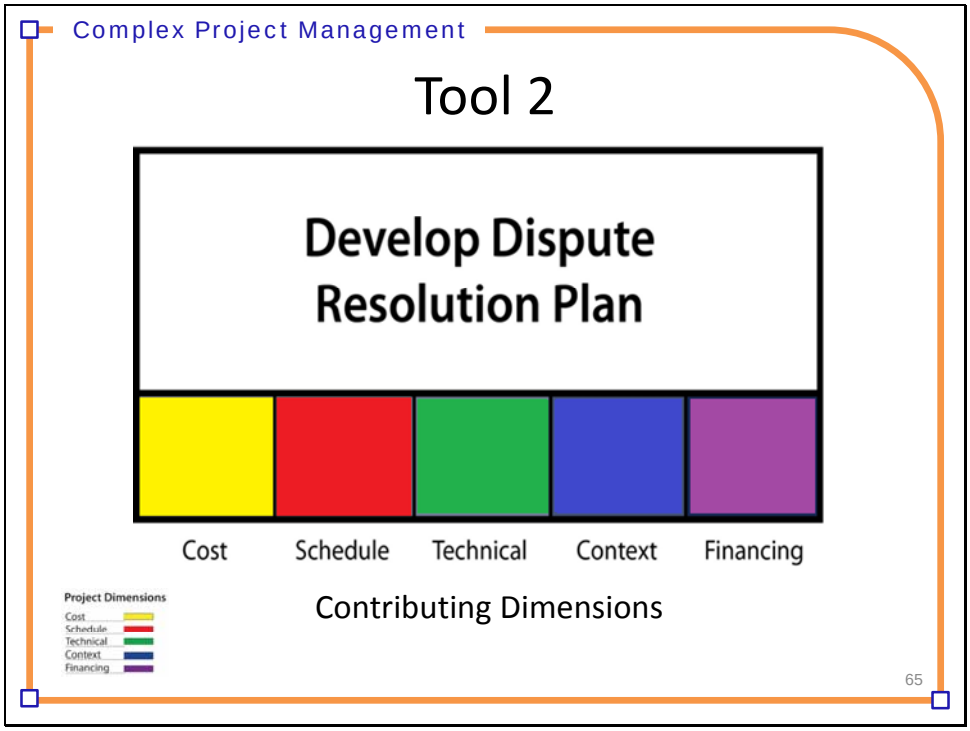


Key Message
Decide if your execution plan is viable. If it is, add it to the project management plan.

Background and Notes
Although you may come up with several good ideas and plans, they may not all be viable for various reasons (e.g., time, money).
If your execution plan is viable, add it to the project management plan and continue to evaluate other project management tools.

Guide Location
Section 4.2

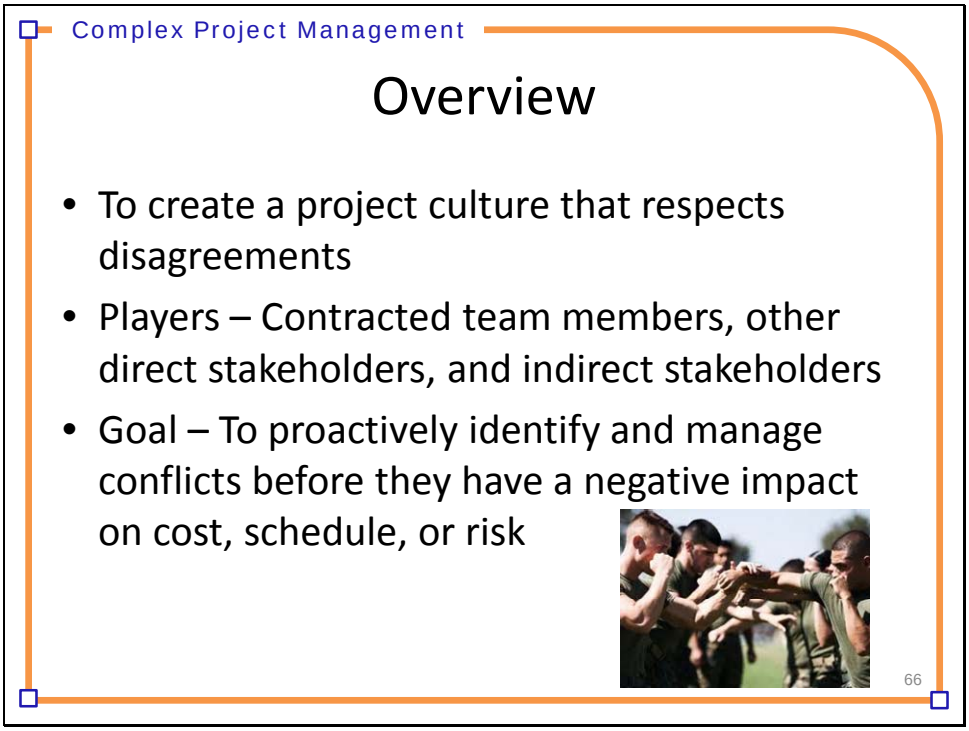
Slide 65



Key Message

Developing a dispute resolution plan is impacted by all five dimensions.

Slide 66



Key Message
Development of a dispute resolution plan prior to beginning the project is important, especially with complex projects. Realizing that complex projects offer greater numbers of dispute points, a thoughtful dispute plan is helpful.

Background and Notes
The dispute resolution plans should be negotiated for neighborhood groups, USDOT 4(f) signatories, and other indirect stakeholders, integrated into a political action plan, and contractually stipulated between designer and owner if scope agreement issues arise. Preparing a Memorandum of Agreement that all local jurisdictions are signatory to and elaborates on a process for resolving disputes, without increasing cost or schedule risk, is a good practical idea.

If new or innovative design solutions are under consideration, cooperation with designers and city/local review agencies on flexible approval processes in advance is important. Mechanistic designs and non-standard protocols are effective solutions to resolve conflicts or disagreements.

Slide 67

Background and Notes

Step 1

Identify key decision makers from each major project partner or stakeholder.

Step 2

To the degree possible, have each partner or stakeholder organization provide written empowerment to their project representative.

Step 3

Establish a “hierarchy” of disputes and a timeframe for moving the dispute to the next level of the hierarchy if it remains unresolved.

Step 4

Establish a multi-partner communication protocol for sharing potential dispute issues early.

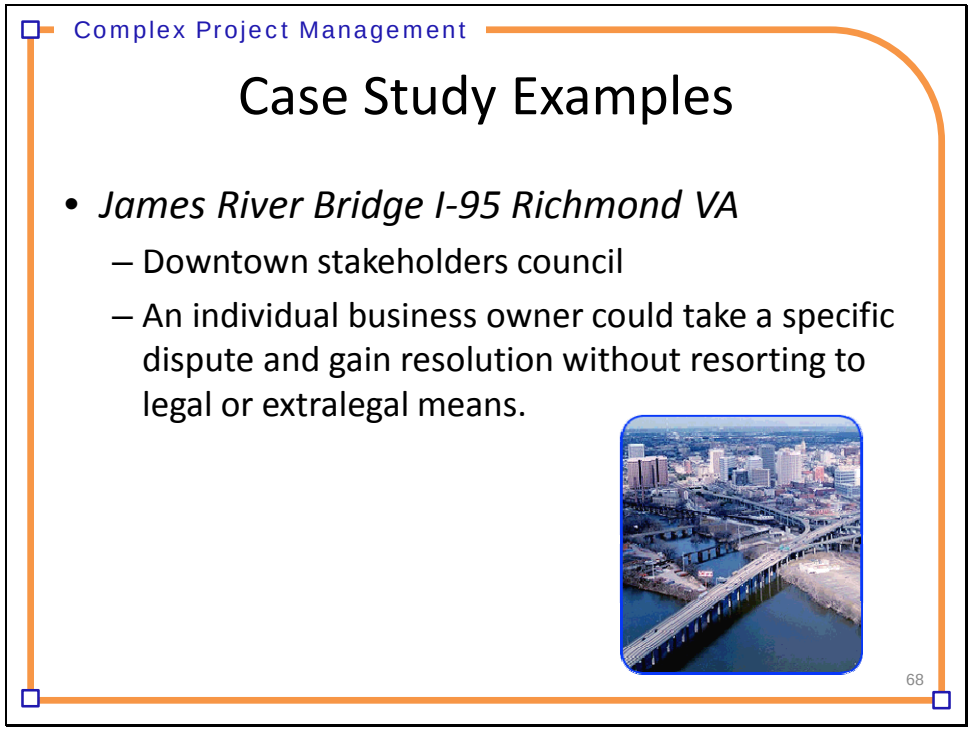
Step 5

Clearly identify a project leader who will be responsible for managing disputes and following up on resolution agreements.

Step 6

Identify potential third party facilitators who can be called on if needed.

Slide 68



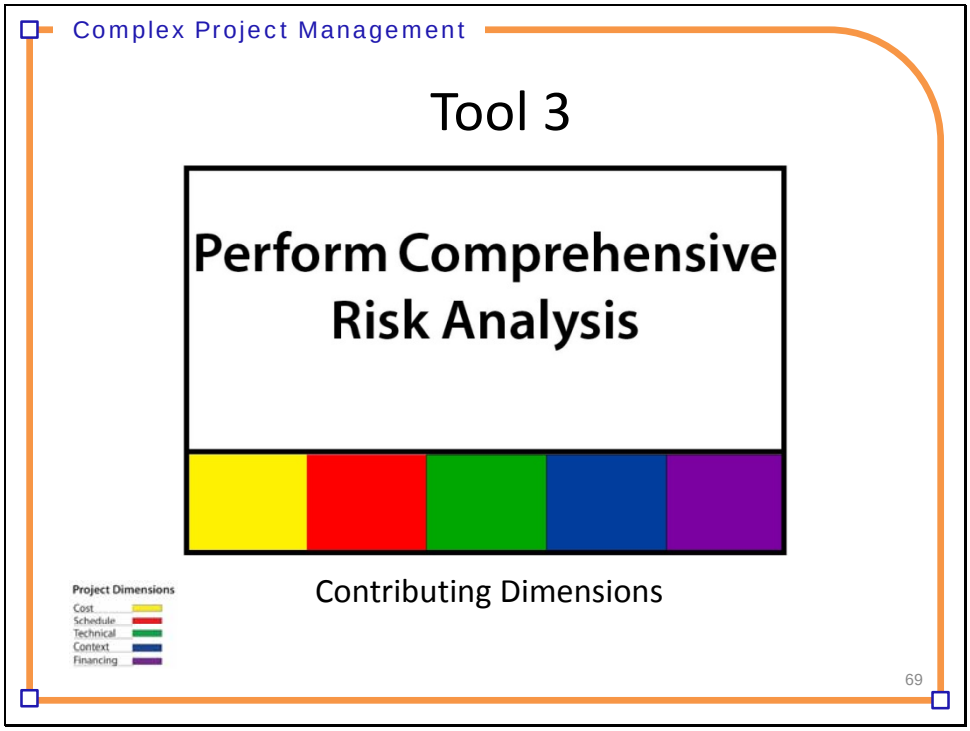
Key Message
Several examples of dispute resolution plans were identified in the case study projects.

Background and Notes
James River Bridge I-95 Richmond
VDOT created a downtown stakeholders' council, whose authority was to mediate specific needs for access to the Richmond central business district (CBD) during construction and the need to complete the construction expeditiously. This acted as a mechanism where an individual business owner could take a specific dispute and gain resolution without resorting to legal or extralegal means. This entity decided the best course of action and then VDOT worked with its contractor to create a solution that minimized impacts to both the project and the community.

North Carolina Tollway
This project has a dispute resolution board that is composed of three people: one person selected by the turnpike, one by the design-builder, and a third, who is selected by the other two on the board. *This board meets every quarter even if there is no dispute*. In addition In addition, the board receives meeting minutes and other documents to keep up-to-date on the project.

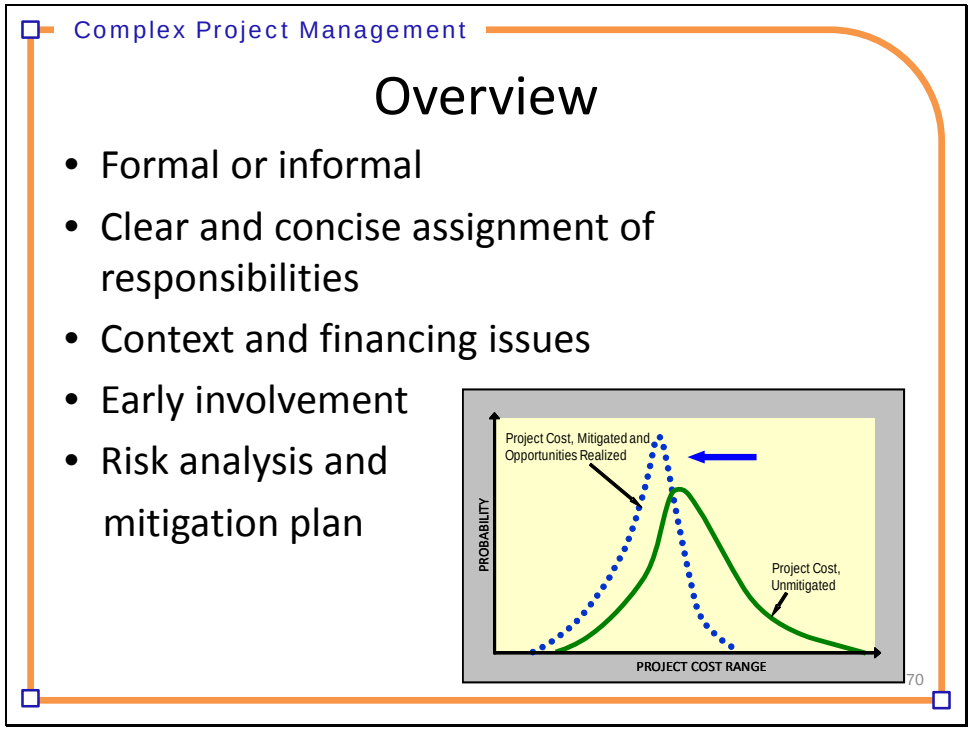
Northern Gateway Toll Road
The "No disputes in an Alliance" clause in the agreement states parties are not allowed to sue other parties. If Fulton Hogan, one of the Alliance partners, made a mistake, all parties pay for it. If any of the partners runs out of budget, all pay for the overrun. Alliance training was executed. A third-party alliance coach is used to develop the team and ensure all remain on the right track.

Slide 69



Key Message
All five of the dimensions have an impact on the Comprehensive Risk Analysis.

Slide 70



Key Message
Implementation of a risk analysis and mitigation plan at early stages of a project is critical to a project's success, regardless of whether the plan is formal or informal.

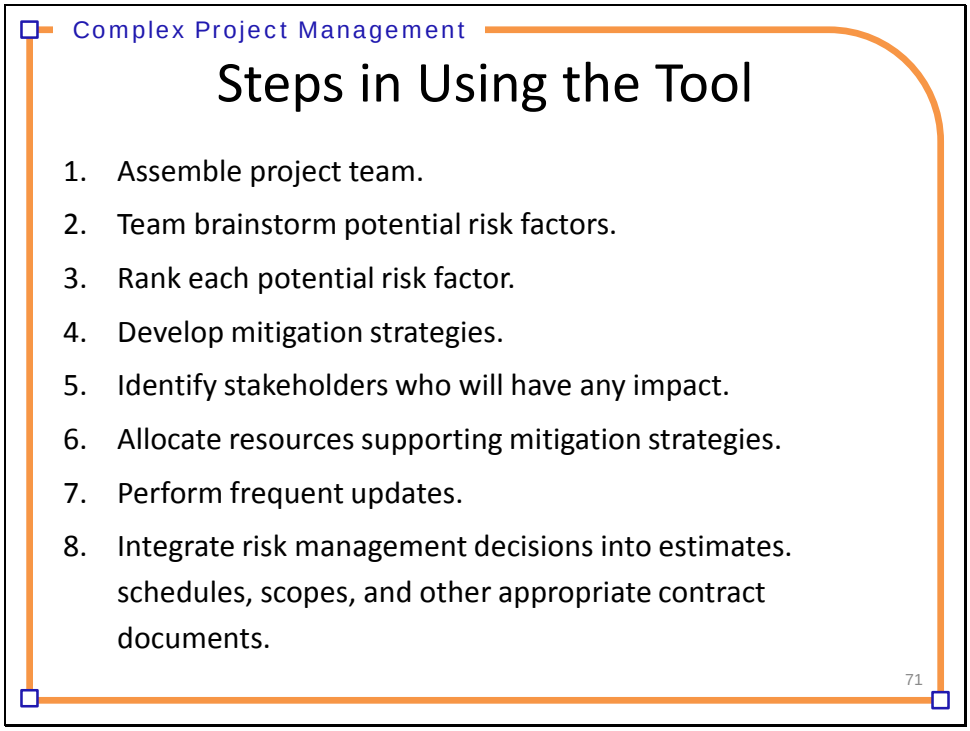
Background and Notes
The risk analysis must include some clear and concise assignment of responsibilities and assignment of designated resources. The risk analysis must include not only traditional cost and schedule issues, but also context and financing issues, such as railroad, utilities, 4(f) issues, NEPA, appropriations/capital bill allocation (use it or lose it funding), and effect of delays on private equity viability.

The risk analysis outcomes can be used to develop aggressive mitigation plans, including the possibility of re-allocating contingency within project segments or phases to prevent delays or cost increases.

Early involvement from the contractor group or construction specialty review board is effective to retrieve input on means, methods, and material supply issues. The evaluation of risk probabilities (qualitative or quantitative) for potential loss events, assigned from expert panels and historical records, must be used in prioritization and mitigation strategies.

The risk analysis and mitigation plan should be integrated with critical project success factors. As for analysis tools and reports, using software products, such as Crystal Ball, is a good option to establish contingencies for the project.

Slide 71



Key Message
These are the first four steps, with eight total steps.

Background and Notes
Step 1
Assemble the project team with broad representation and expertise. Incorporate individuals with local knowledge as well as those with organizational knowledge. Consider dedicated time for developing a risk management plan. Consider using an outside facilitator.

Step 2
Have the team brainstorm potential risk factors.

Step 3
Have the team rank each potential risk factor by considering both likelihood and severity of the risk and impact it will have on achieving project outcomes. Include discussions of both potentially negative and positive risks.

Step 4
Develop a mitigation strategy for each critical risk factor. Assign responsibility for tracking risk to a specific team member.

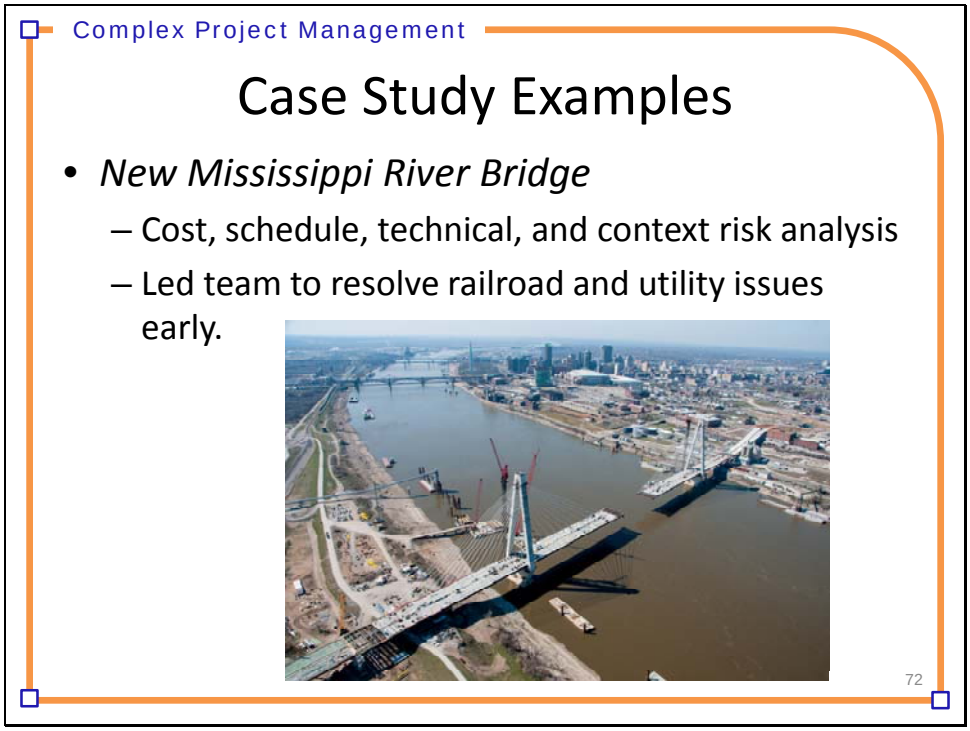
Step 5
Identify stakeholders who will have any impact.

Step 6
Allocate resources supporting mitigation strategies.

Step 7
Perform frequent updates.

Step 8
Integrate risk management decisions into estimates, schedules, scopes, and other appropriate contract documents.

Slide 72



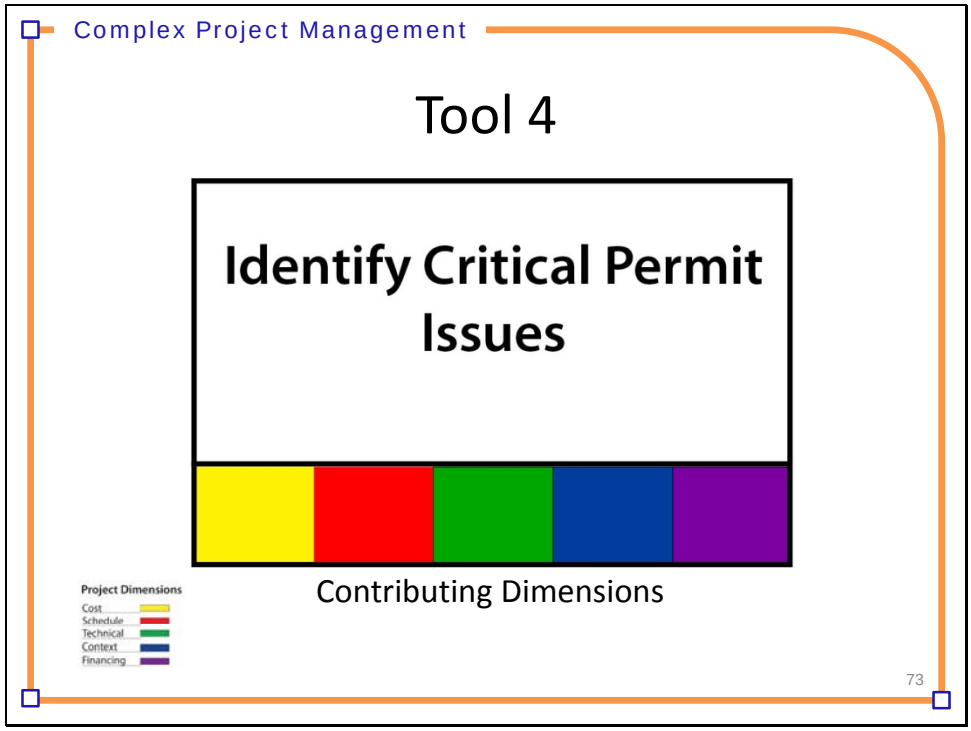
Key Message
Several examples for performing a comprehensive risk analysis were found in the case study projects.

Background and Notes
Detroit River
Formal risk analysis was executed in project funding/financing and legal governance. Probability analysis, Monte Carlo simulation, Crystal Ball, and sensitivity analysis were used to assess risks.

Heathrow
Risk analysis was executed in cost, schedule, and technical aspects including strategic risk in financing as vital to the project. Cascading objectives and strategic risk approaches using systems-thinking were utilized. A new thinking toward risk management was developed by the project team. They found that transferring risks to contractors does not reduce the overall level of risk, as the project ultimately suffers. By considering this, they endeavoured to reduce the risk in design and project execution and resorted to external bodies to share risks.

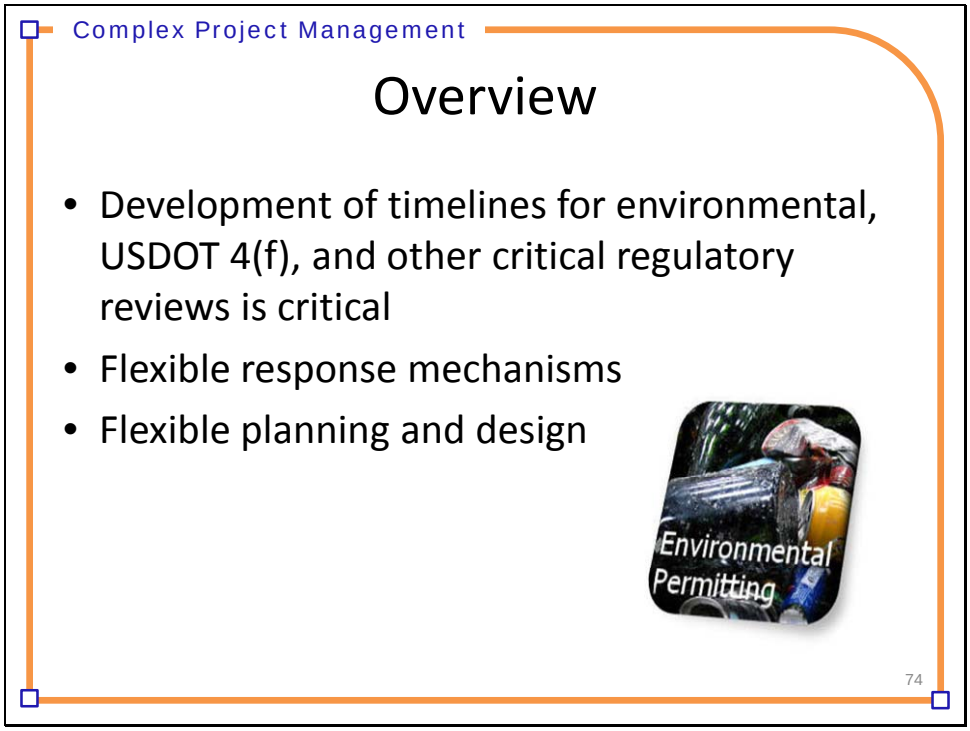
New Mississippi River Bridge
There was a formal risk analysis and mitigation process in place that was an effective tool in managing cost, schedule, technical and context dimensions. The Risk Management Plan was developed early in the process and reviewed weekly, which forced the team to identify potential problems early in the process and develop solutions before cost or schedule were impacted. Use of this tool allowed the team to get started early with railroad and utility issues that could have impacted design, increased costs, and delayed the schedule.

Slide 73



Key Message
All five dimensions have an impact on identifying critical permit issues.

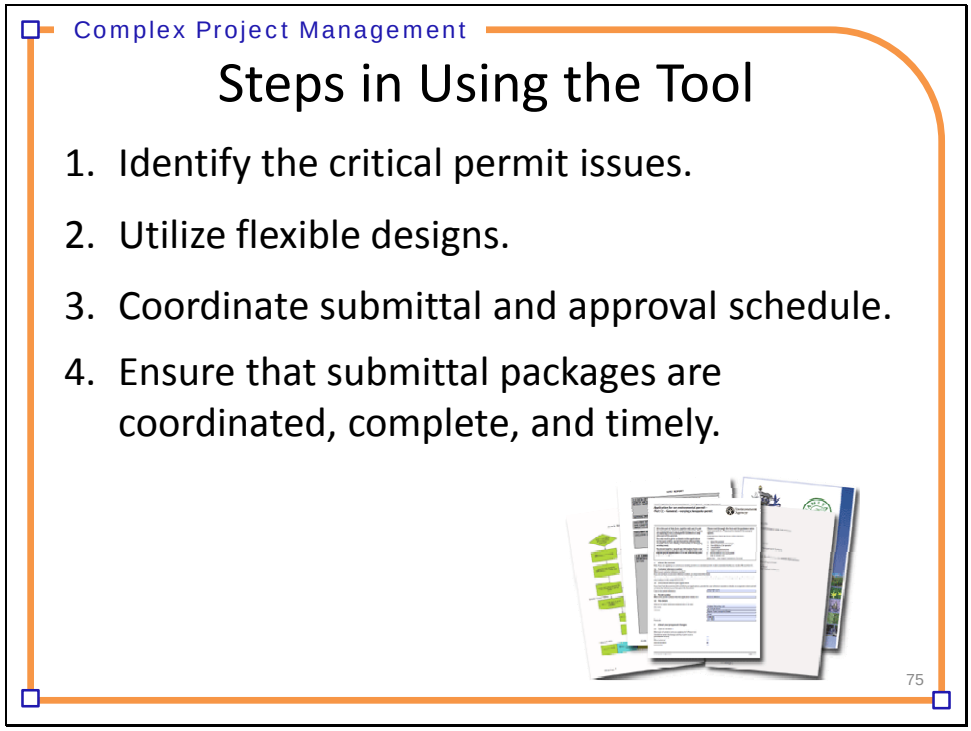
Slide 74



Key Message
Development of timelines for environmental, USDOT 4(f), and other critical regulatory reviews is critical for successful projects, especially very early in the project life cycle.

Key Message
Flexible response mechanisms for permit issues, as well as flexible planning and design for minimal impact from permit issues, must be developed for the success of projects, especially where uncertainty is high (geotechnical and subsurface conditions, SHPO sites, etc.).

Slide 75



Background and Notes

Step 1

Identify the critical permit issues.

Step 2

Utilize flexible designs to minimize impact of potential points of conflict.

Step 3

Coordinate submittal and approval schedule.

- Phased permitting
- Simultaneous reviews
- Fast tracking

Step 4

Ensure that submittal packages are coordinated, complete, and timely.

Interactivity

Information from the complexity evaluation and mapping process, as well as Method 1, will provide insight into critical permits issues that may have a potential negative impact on cost, schedule, technical scope, context, or financing. Also, permitting may be one of the issues identified in the risk management process (Tool 3). The steps in identifying critical permit issues can be used to minimize the impact of permitting on the schedule and to assign design and planning activities as needed to fast track certain aspects of the work. Early identification of critical permit issues can also act as "due diligence" in establishing working relationships with permitting agencies. It can be very

beneficial to have a dialogue on how separate agencies can work together to minimize the negative impact the permitting process might have on the project, while at the same time allowing the permitting agency to share their main concerns with the project team. The steps in this process are outlined below.

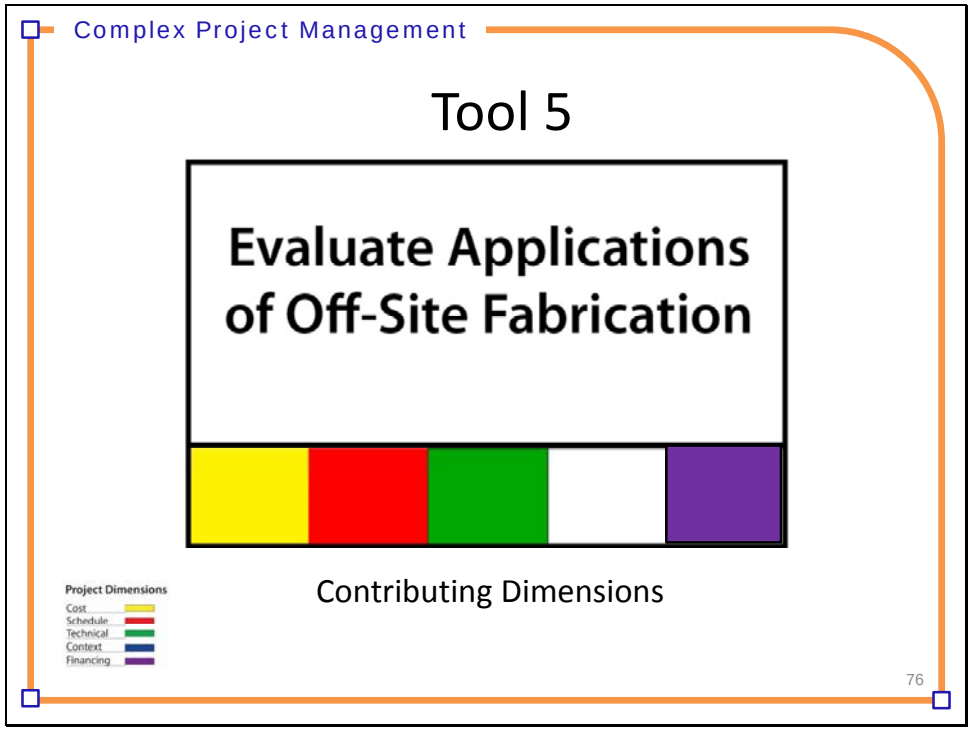
Step 1
From the complexity mapping process and the outcomes of Methods X,Y,Z, identify the critical permit issues that must be resolved before design can be completed and construction can begin.

Step 2
Discuss potential major regulatory issues with responsible agencies and utilize flexible designs to minimize impact of potential points of conflict with permitting agencies (i.e., be responsive to their concerns).

Step 3
Make early contact with regulatory agencies responsible for permits to communicate and coordinate the submittal and approval schedule. Investigate the potential for phased permitting, simultaneous reviews, fast tracking, etc.

Step 4
Ensure that submittal packages are coordinated, complete, and timely.

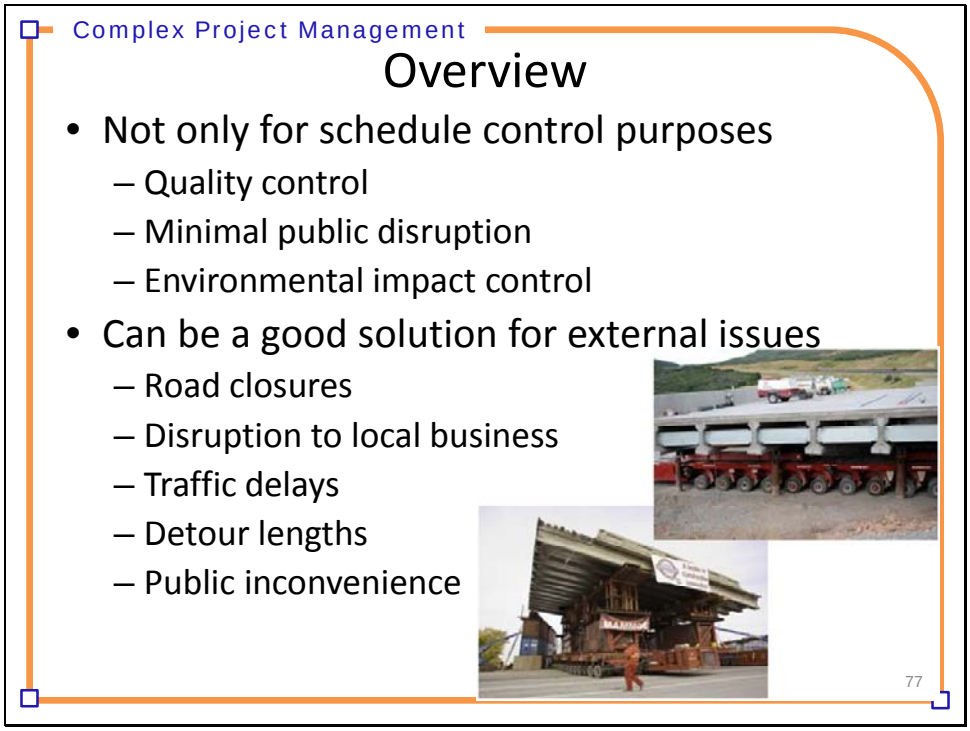
Slide 76



Key Message

The evaluation of off-site fabrication applications can be impacted by the Cost, Schedule, Finance and Technical dimensions.

Slide 77



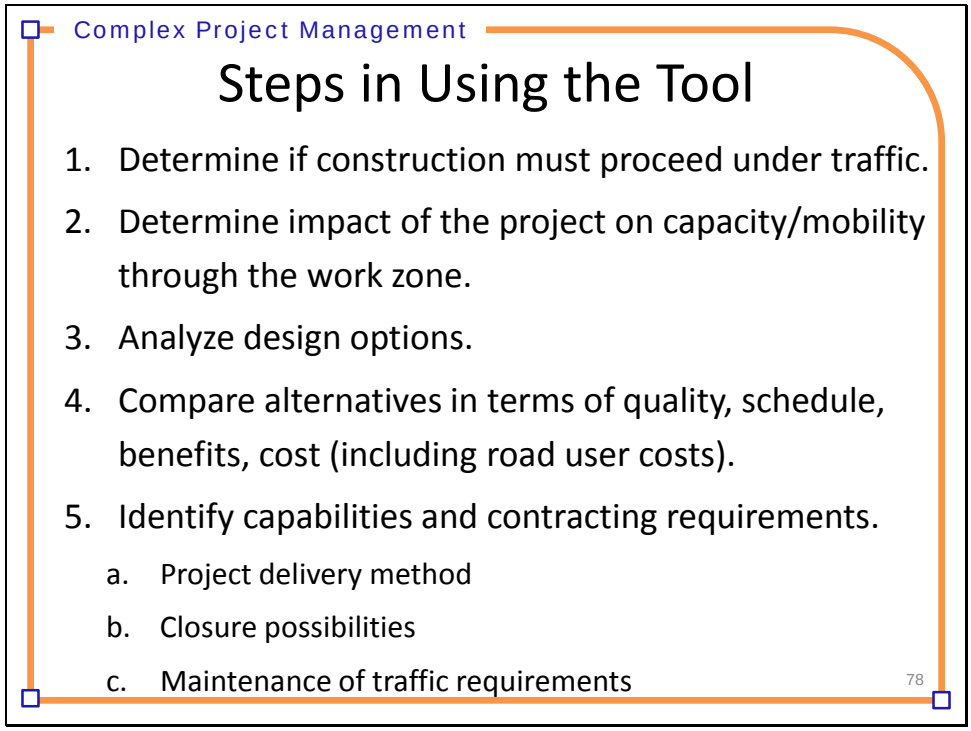
Key Message

Off-site fabrication must be considered for not only schedule control purposes, but also quality control, minimal public disruption (such as noise and loss of access), and environmental impact control.

Background and Notes

Considering that complexity on projects may come from context issues, off-site fabrication can be a good solution for external issues and minimize road closures, disruption to local business, traffic delays, detour lengths, and public inconvenience.

Slide 78



Background and Notes

Step 1

Identify road user costs, feasibility of detours, alternate routes for emergency response vehicles, and other factors to determine if construction must proceed under traffic.

Step 2

If construction must proceed under traffic, determine the impact of the project on capacity/mobility through the work zone.

Step 3

Analyze design options that incorporate off-site fabrication of project elements (e.g., substructure, superstructure, deck).

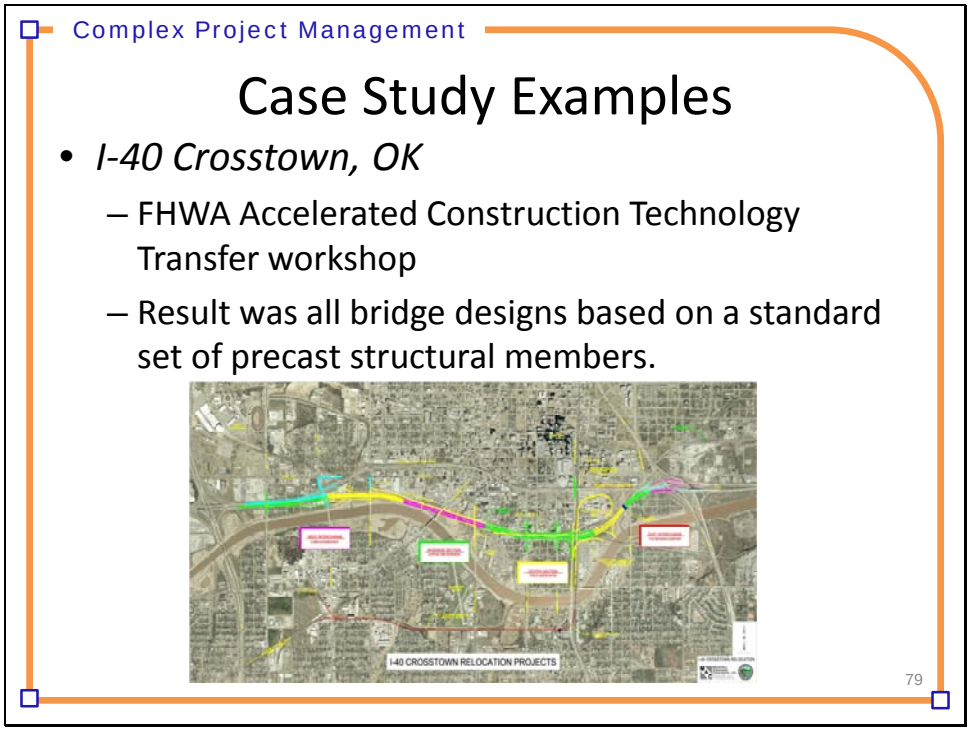
Step 4

Compare the total cost (including RUC), quality, and schedule benefits to any potential increases in construction cost and/or decrease in functionality.

Step 5

Identify capabilities of local sourcing options and contracting requirements for securing sufficient, timely supply.

Slide 79



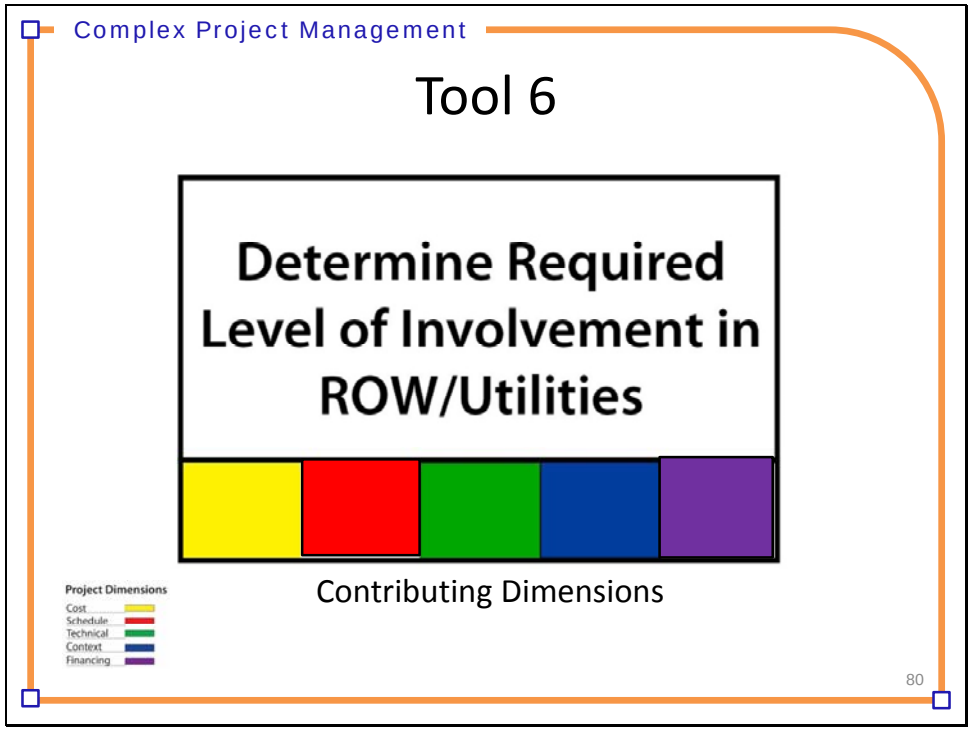
Key Message
Several examples of evaluation of application of off-site fabrication were found in the case study projects.

Background and Notes
Lewis and Clark Bridge
The construction strategy utilized reduced the time that bridge construction had an impact on traffic (but overall schedule for work was unchanged). The contractor revised the placement procedure using self-propelled modular transporters (SPMTs) with a specially designed steel truss frame for lifting and transporting that enabled contractors to meet the scheduling constraints. The SPMTs moved the new panel to the top of the bridge, removed the old panel that crews had just cut out, and then lowered the new panel into place before taking the old panel off the bridge. Again, by using the SPMTs, construction time on the bridge could be reduced, minimizing traffic impact for the public, even though overall schedule for the bridge work remained unchanged. (The off-site fabrication didn't shorten the total schedule, but could shorten construction time on the bridge. This option was selected mostly for community convenience.)

Heathrow
Off-site prefabrication required careful design but was utilized for cost savings.

I-40 Crosstown
The project manager credits a FHWA Accelerated Construction Technology Transfer workshop with identifying the idea to base all bridge designs on a standard set of precast structural members.

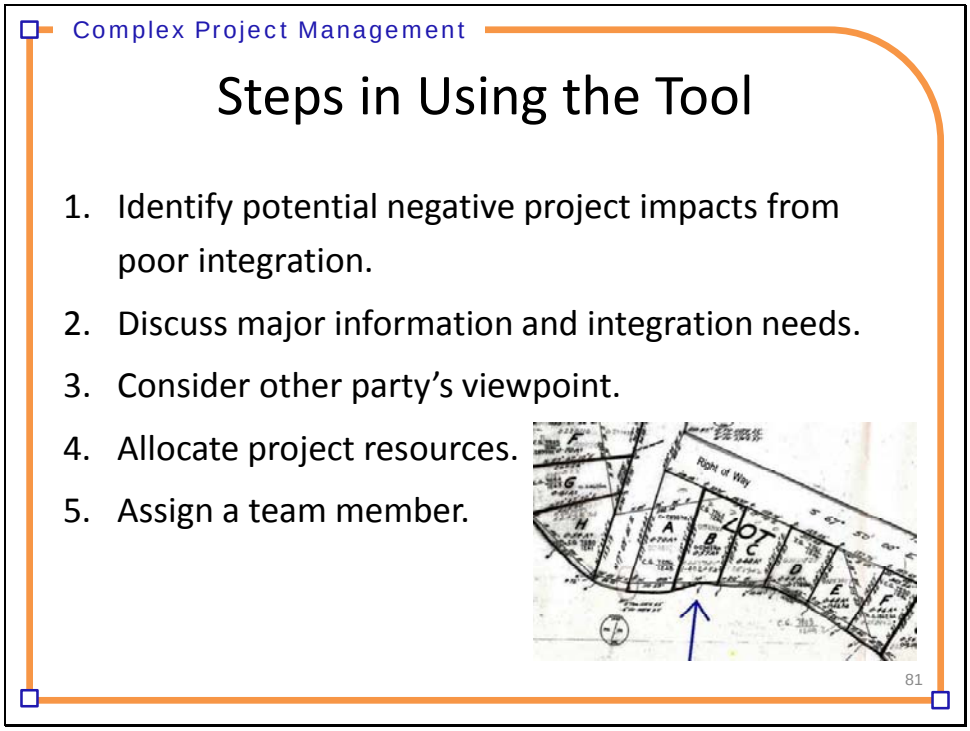
Slide 80



Key Message

All 5 Dimensions (Cost, Technical, Schedule, Finance and Context) have an impact on determining the required level of involvement in ROW/utilities.

Slide 81



Background and Notes

Step 1

From the complexity analysis and Methods 1-5, as well as from Risk Management (Tool 3), identify potential negative project impacts from poorly-integrated ROW, utility, or railroad conflicts.

Step 2

Discuss major information and integration needs with ROW, utilities, and railroads. Early discussions should be held with individuals empowered to commit the organizations to action.

Step 3

Recognize potential organizational/goal conflicts and openly discuss mutually-beneficial options (e.g., try to see the issue from the other party's viewpoint).

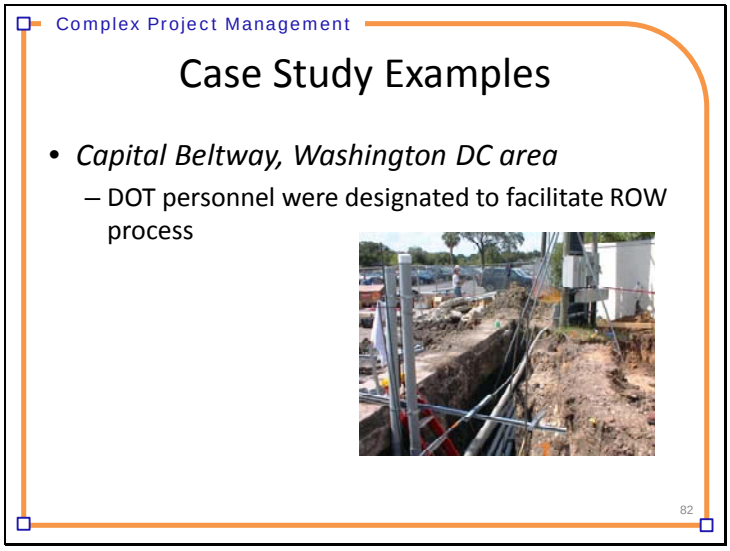
Step 4

Allocate project resources (staff, money, support software, etc.) to the ROW, utility, or railroad as needed to facilitate integration into overall project objectives and success.

Step 5

Assign a team member specific responsibility for tracking communication and integration progress with each ROW utility, or railroad partner.

Slide 82



Key Message
Several examples of determining the level of involvement of ROW and utilities were found in the case study projects.

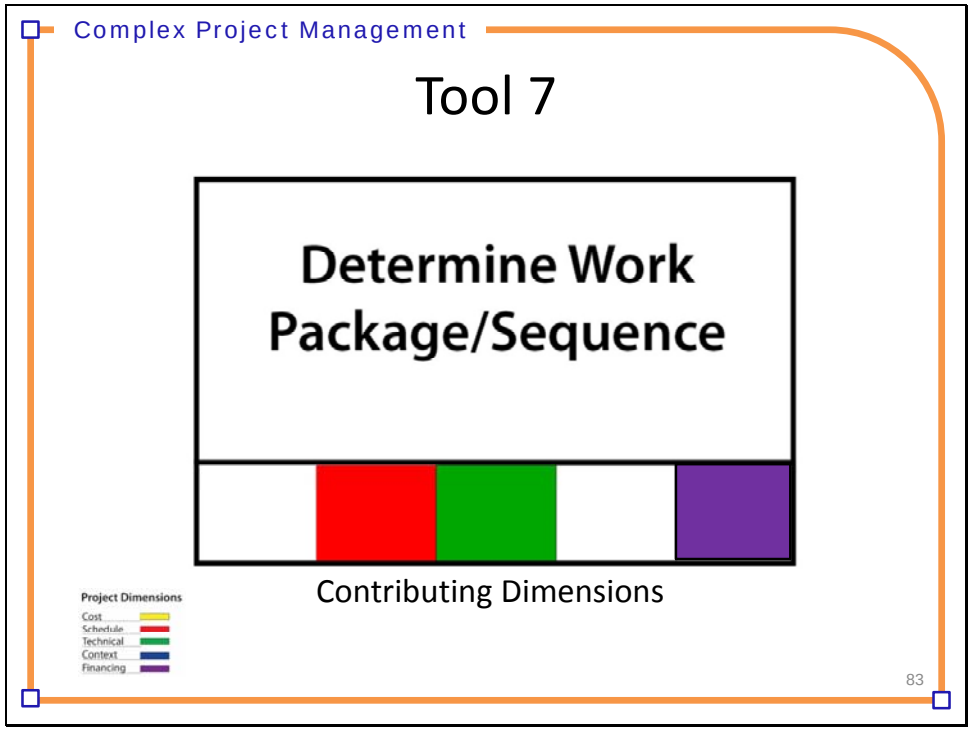
Background and Notes
Capital Beltway
VDOT provided assistance to alleviate schedule risks with ROW acquisition that was primarily the contractor's responsibility. Additional personnel in the VDOT project team were designated to facilitate the ROW process for land acquisition. Once it reaches to condemnation, VDOT's ROW project manager was in charge.

Detroit River
Utility coordination meetings were used to facilitate the utility relocation process. Plans were developed to identify conflicts and utility relocations based on 100 ft. sections. The alignment was adjusted due to a transmission line conflict. Conflicts were identified and dealt with in the NEPA process. A proactive plan and outreach programs were established to address both public/private parcel impacts, including relocation needs. Other efforts for ROW acquisition include educational programs providing an overview of the ROW process, management and leadership support at various meetings with impacted residences/businesses and a clear comprehensive flow chart illustrating the process that will be used for purchasing ROW.

Hudson Bergen
Utility coordination was part of this DBOM. While NJ Transit paid for some aspects of utilities, specialty contractors were hired to handle all utility relocation at a certain intersection with coordination with all utility companies attending meetings. The alignment went through streets and built-up areas. Real estate prices went up even after the deadline for appraisals had passed. The project had to go to the board of directors of NJ Transit to get approval for higher prices. These caused delay and increased ROW cost. They used a very effective tool, property acquisition software

called PAECE TRAK, which was custom-built for NJ transit. It allowed the owner to upload parcel maps, appraisals, track the history, etc.

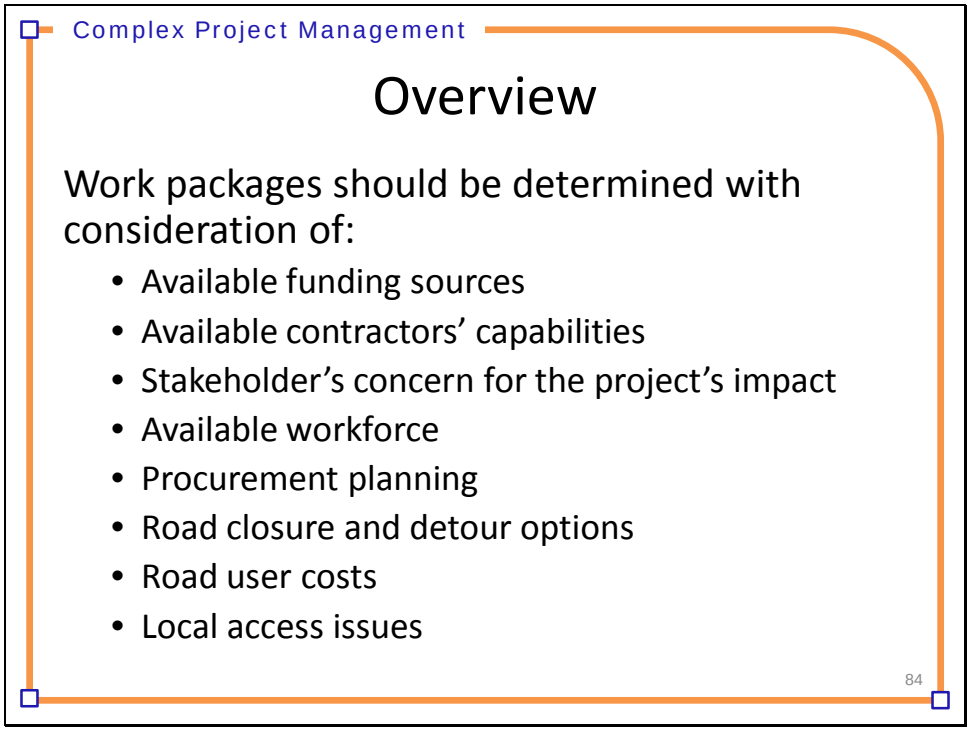
Slide 83



Key Message

The Schedule, Finance and Technical dimensions impact determining the work package/sequence.

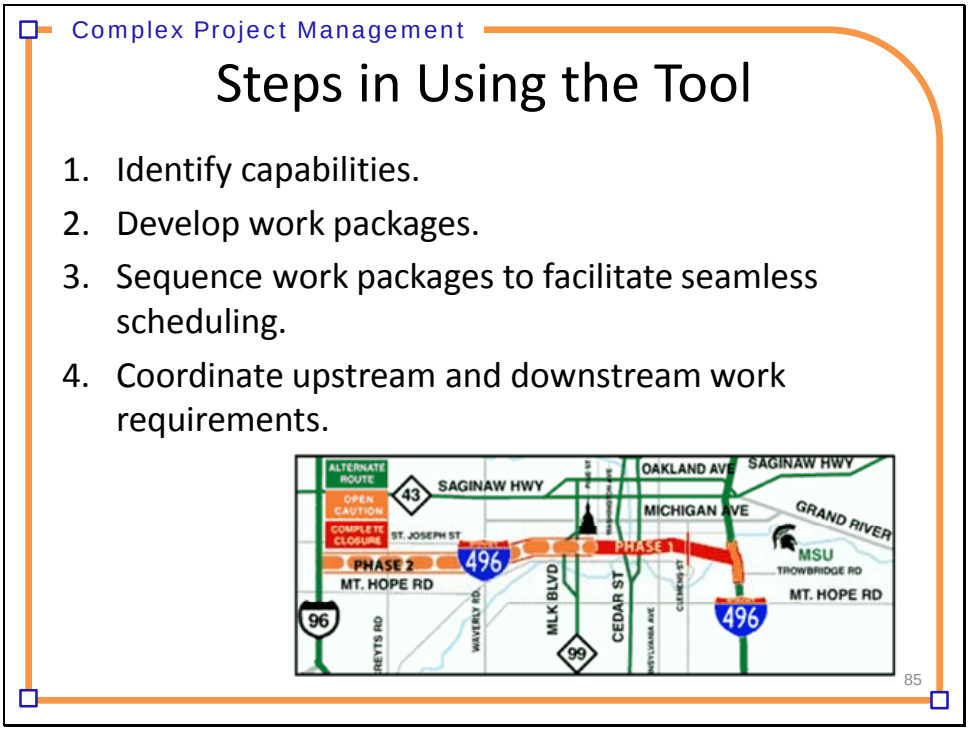
Slide 84



Key Message
Carefully designed work package/sequence can increase project success possibilities.

Background and Notes
Projects may suffer if the work packages are determined without consideration of available funding sources, available contractors' capabilities, and stakeholder's concerns for the project's impact. The work package/sequence must be prepared based on high-certainty funding sources, local contracting capabilities, available work force, bonding issues, procurement planning (division of internal and external work), road closure and detour options, road user costs, and local access issues.

Slide 85



Key Message
After identifying complexity factors and completing Methods 1-5, particularly procurement planning in the contract selection method (Method 3), work packages can be assigned and sequenced.

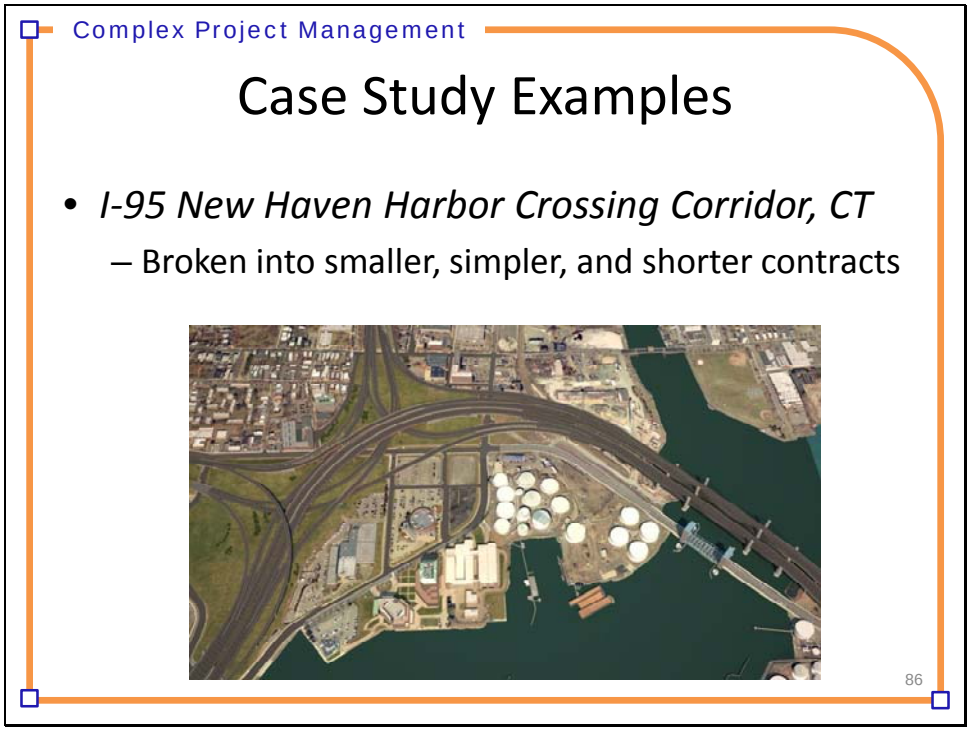
Background and Notes
Step 1
Identify capabilities of local suppliers, vendors, suppliers, contractors, and the labor force.

Step 2
For externally-procured work, develop work packages that can conform to local workforce and regional organizational capabilities.

Step 3
Sequence work packages to facilitate seamless scheduling.

Step 4
Include contract language in each work package to include coordination with upstream and downstream work.

Slide 86



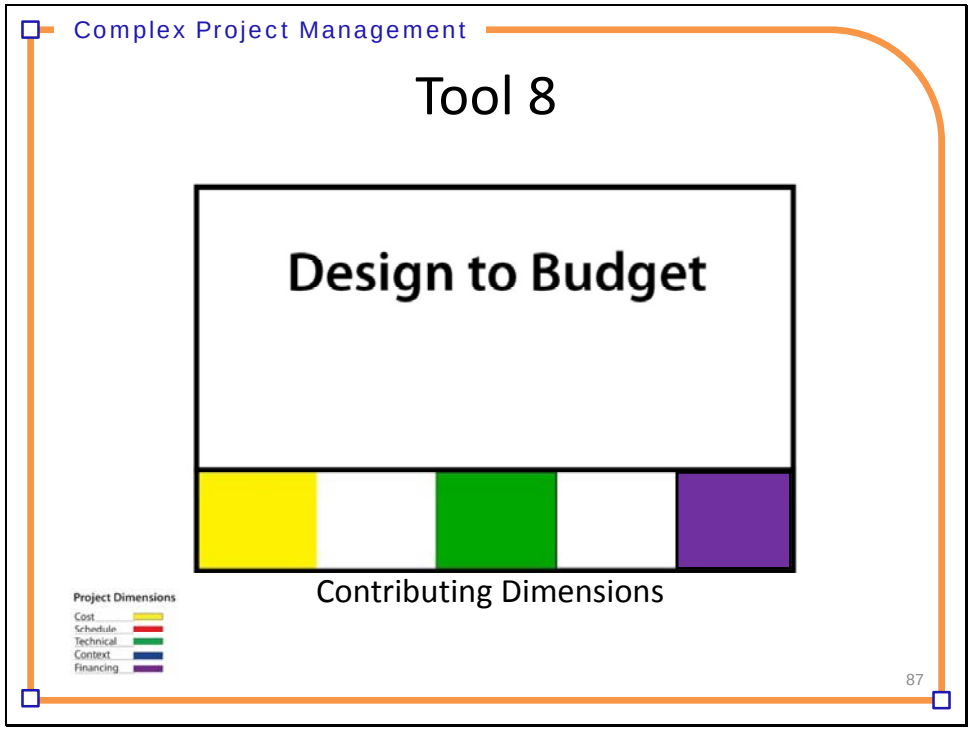
Key Message
Several examples of determining the work package and sequencing were found in the case study projects.

Background and Notes
Doyle Drive
At the start, it was going to be one project. However, the estimated cost was too high, so available funds were not enough. The project was broken into eight contracts to accelerate the schedule.

I-95 New Haven Harbor Crossing Corridor
After experiencing no bidder for the Pearl Harbor Bridge contract (because it was too complex and risky), they broke that project into smaller, simpler, and shorter contracts.

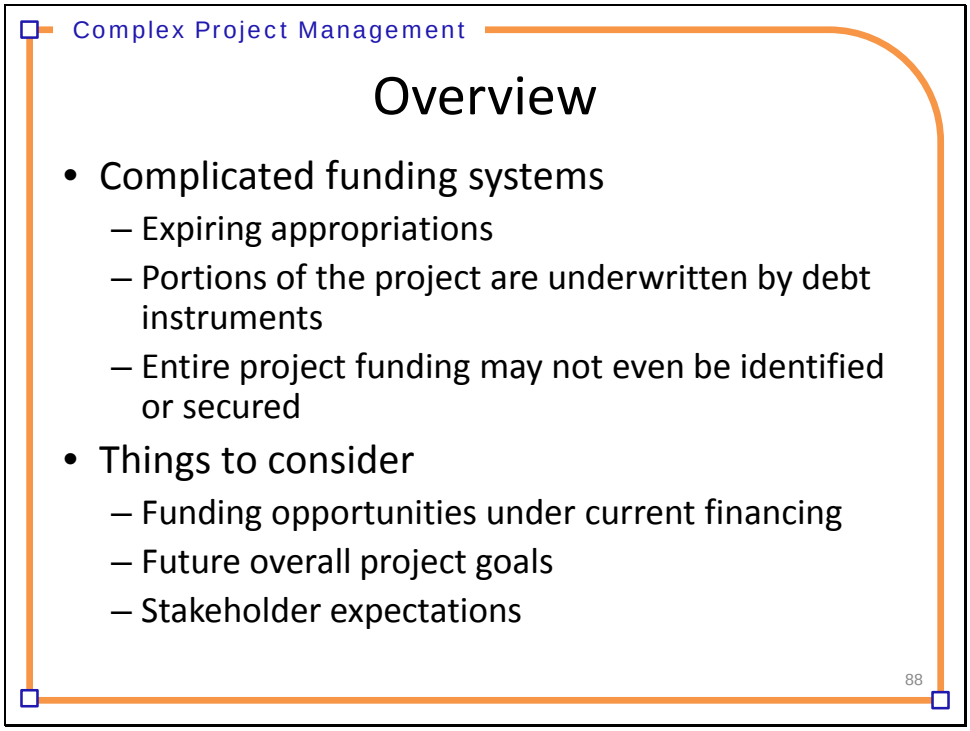
New Mississippi River Bridge
There was a need to keep the project scope within available funding limits. Therefore, breaking the original project into “fundable” phases helped move the project forward. The scope flexibility in phasing the project into “fundable” packages was an effective tool for managing financing complexity.

Slide 87



Key Message
The Cost, Finance and Technical dimensions impact designing to budget.

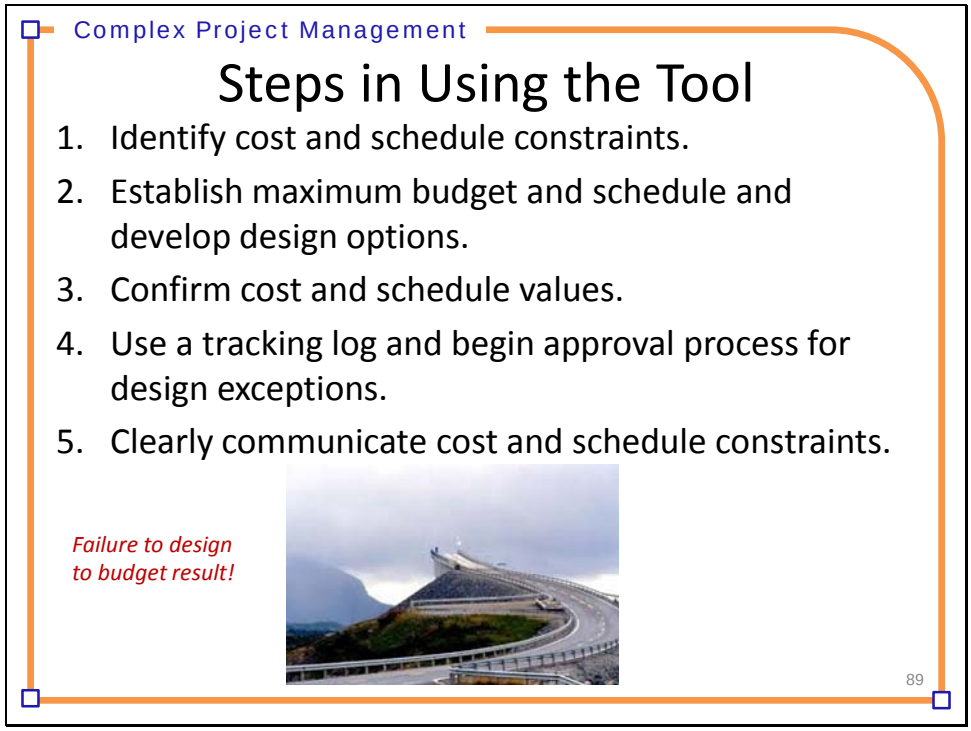
Slide 88



Key Message
Complex projects often have complicated funding systems with fixed, expiring appropriations that cannot be exceeded and must be disbursed within a specified timeframe.

Background and Notes
In other cases, portions of the project are underwritten by debt instruments and, in some cases, entire project funding may not even be identified or secured. In these cases, designing within the budget is the only way to execute the project. However, design to budget should be administered strategically. Project phasing and phased design/estimating must be used to build the segments of the project that can be funded under current financing opportunities, while keeping future overall project goals in mind. Stakeholder expectations should also be considered in the process.

Slide 89



Key Message

From the results of the complexity identification and mapping process, as well as Method 4, identify the cost and schedule constraints that necessitate designing the project to a budget. Historically, design has driven the budget but, as financing becomes an increasingly important aspect of project management, the opposite relationship will hold true—the budget will drive the design. This will require designers to be innovative and will be facilitated by co-location of the design team with the owner and construction team (Tool 9), as well as the use of flexible design criteria (Tool 10).

Background and Notes

Step 1

Identify available funding and other cost and schedule constraints that have an impact on design options, including project phasing and initial project scope.

Step 2

Establish maximum budget and schedule and develop design options intended to remain within those maximum values.

Step 3

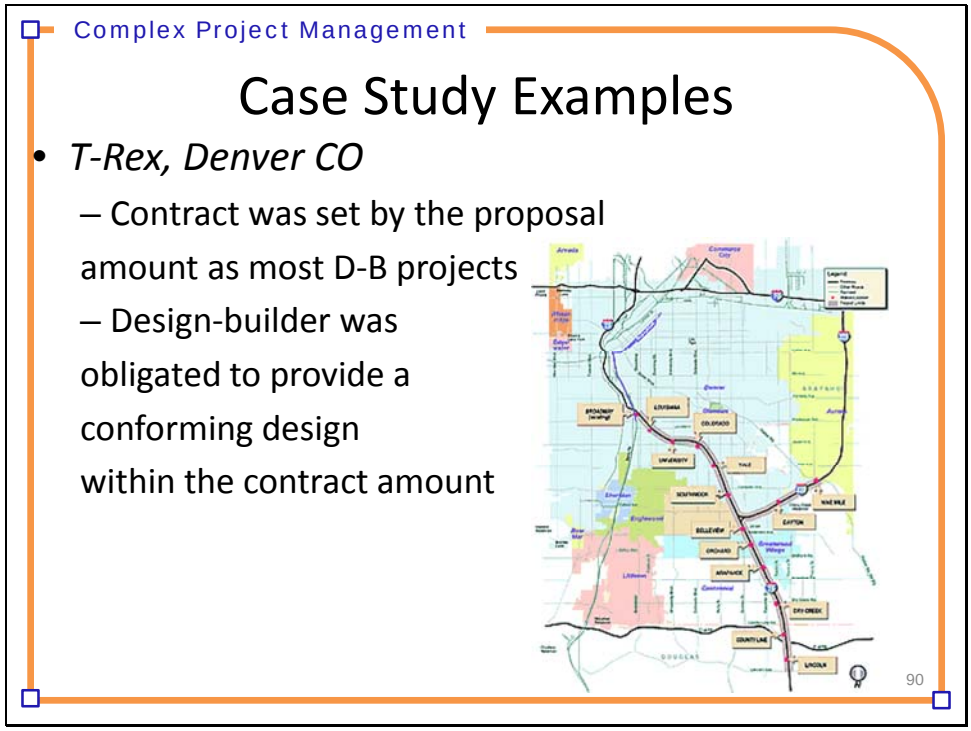
Confirm cost and schedule values early in the design process and update frequently to ensure that design and scope remain within the constraints. This can be achieved through alternative project delivery, early contractor involvement, or use of pre-construction service consultants.

Step 4

Use a tracking log for design exceptions required to maintain project cost and schedule, and begin approval process for design exceptions early. All requests for design exceptions should be communicated early and tracked often.

Step 5
Clearly communicate cost and schedule constraints and financing limitations to external stakeholder groups so that expectations for project outcomes or viability of other design options are managed appropriately.

Slide 90

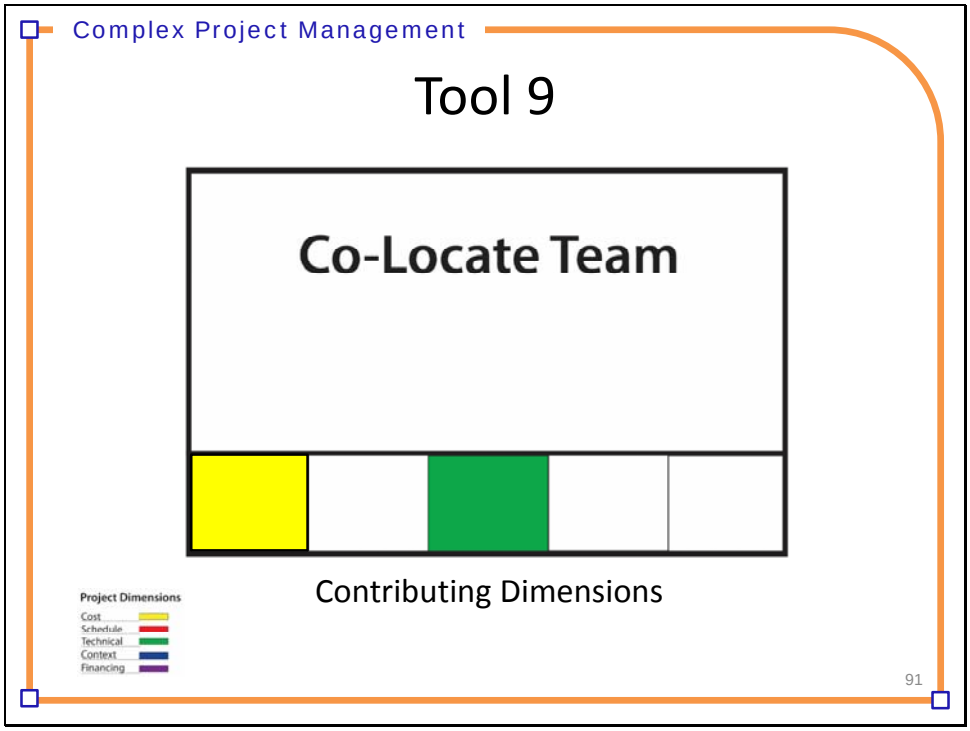


Key Message
Several examples of designing to a budget were found in the case study projects.

Background and Notes
Northern Gateway Toll Road
All the uncertainties in the project, including the necessitated early start of construction, made Design-Bid-Build delivery impossible; essential risk transfer was deemed to make Design-Build too expensive. And, although a Public-Private-Partnership would have been possible from a business case point of view, there was considerable political unease with this method of delivery. However, alliancing gave the option to start construction after a little bit of design and to design to budget because the contractor knows that the risks will be shared. After a little bit of design, a target outturn cost (TOC) was set, and this became the target price. The Alliance had to "make do" with this, although the design was not finished yet. There are no change orders or mechanisms to get more money. The TOC is a fixed line.

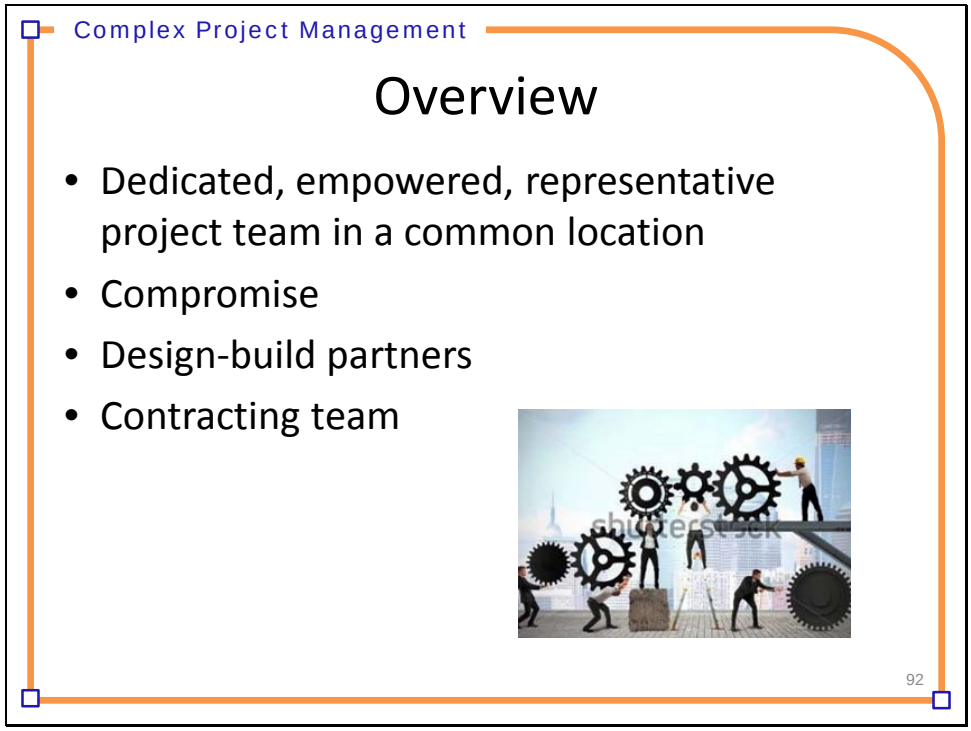
T-Rex
As with most design-build projects, the contract was set by the proposal amount, and the design-builder was obligated to provide a conforming design within the contract amount. However, the owner did not specify a budget amount in advance.

Slide 91



Key Message
The Technical and Cost Dimensions impacts team co-location decisions.

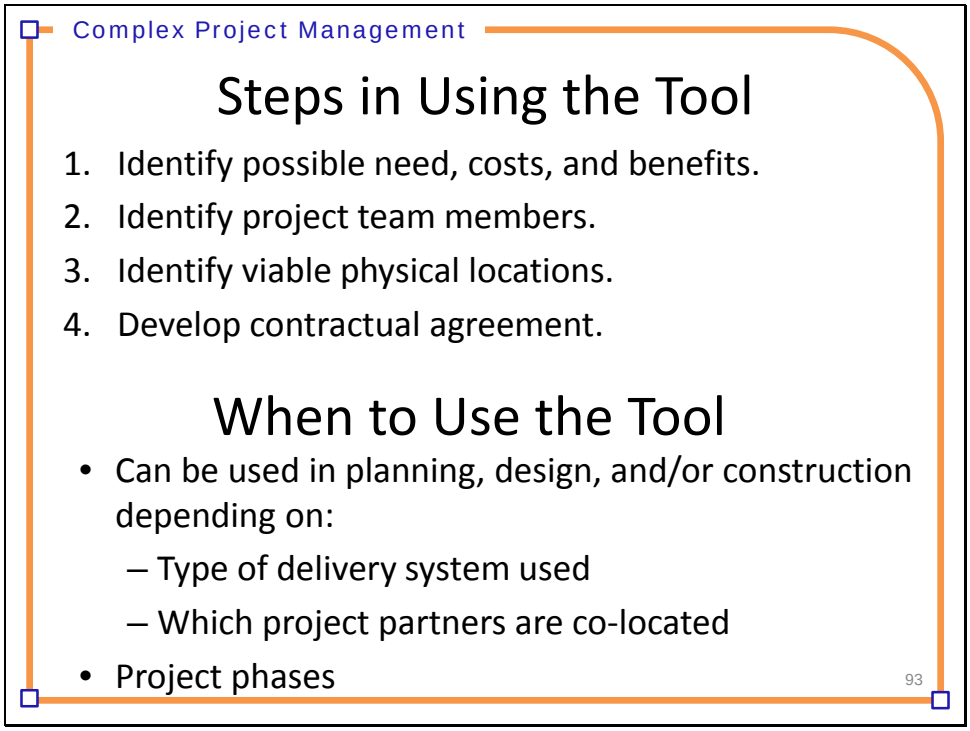
Slide 92



Key Message
Prior to the start of the project, it is very important to discuss the advantages and disadvantages concerning project team co-location.

Background and Notes
Some compromise may be necessary, but having the whole team together most of the time may increase the odds of achieving critical project success factors. Especially, on multi-jurisdictional (e.g., bi-state) projects, placing a dedicated, empowered, representative project team in a common location is important. Depending on the project delivery system utilized, the co-location strategy can be incorporated for design-build partners or the contracting team in later stages.

Slide 93



Key Message
The identification of complexity factors and the outcomes of Methods 1-5 will be used to determine if co-location should be considered, as well as provide input into which team members should be included in the co-location agreement. In addition, the co-location tool integrates with several other tools, including risk management (Tool 3), design to a budget (Tool 8), and flexible design criteria (Tool 10).

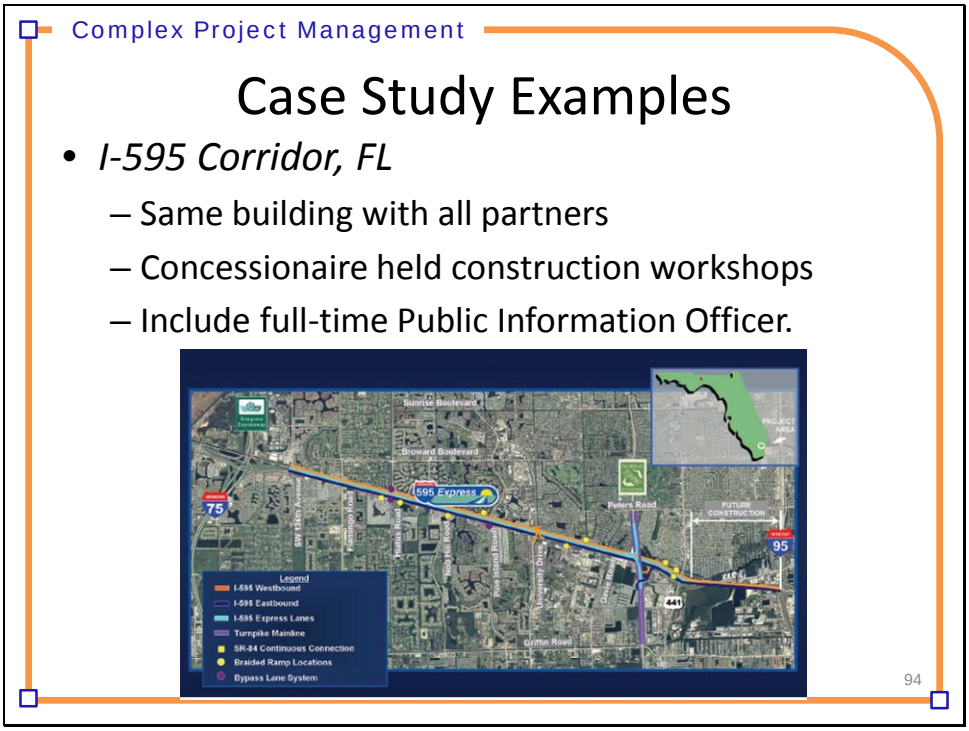
Background and Notes
Step 1
Identify possible need for co-location and evaluate costs and benefits.

Step 2
If co-location is warranted, identify which project team members should be included in the co-location.

Step 3
Identify viable physical locations for co-location and arrange for necessary technology upgrades (voice/data lines, A/V, satellite, high-speed internet, etc.) and space build-out (offices, conference rooms, storage, etc.).

Step 4
Develop contractual agreement for co-location regarding payment for space improvements, lease payment, terms and duration of co-location, and other administrative details.

Slide 94



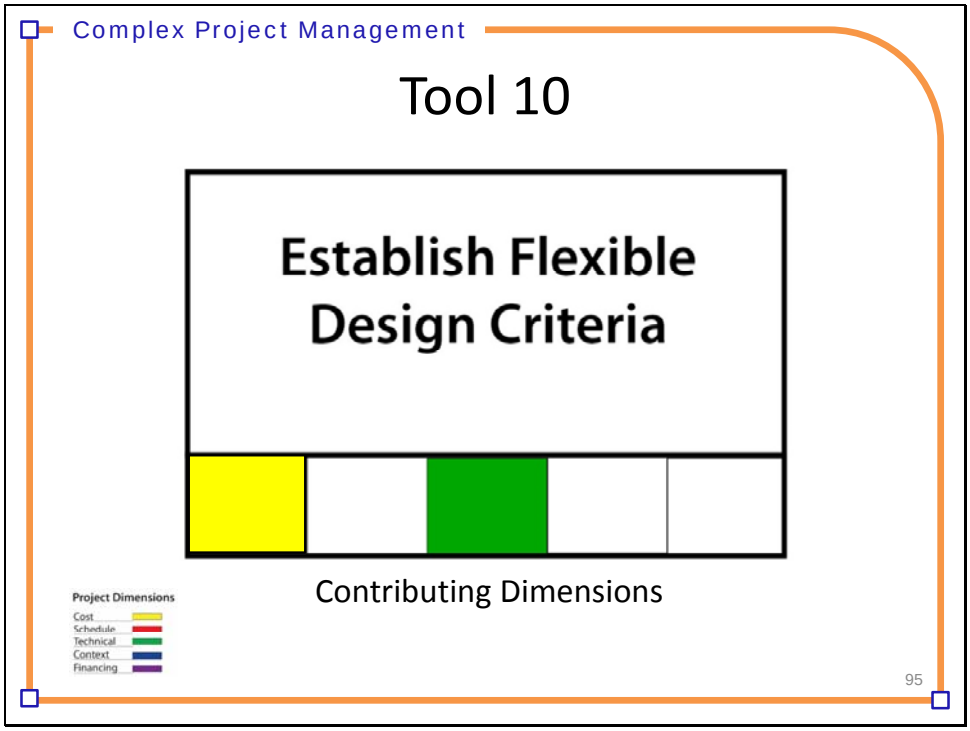
Key Message
Several examples of co-location was found in the case study projects.

Background and Notes
Heathrow
The design was established so the contractors were involved early on in the design process. This firmed up certain aspects of the design but purposely left some of the design flexible. A key approach to this was co-location of the design and contractor teams so they had easy access to each other and acted like the same team.

I-95 New Haven Harbor Crossing Corridor
ConnDOT established the project headquarters in an independent building close to major project contacts, and housed the program management firms in that office. According to project directors, this policy helped to create an effective team atmosphere for managing the program.

I-595 Corridor
Same building with all partners was extremely helpful. Number of meetings and amount of collaboration would have been really difficult without co-location . (Delivery method for this project is DBFOM.)

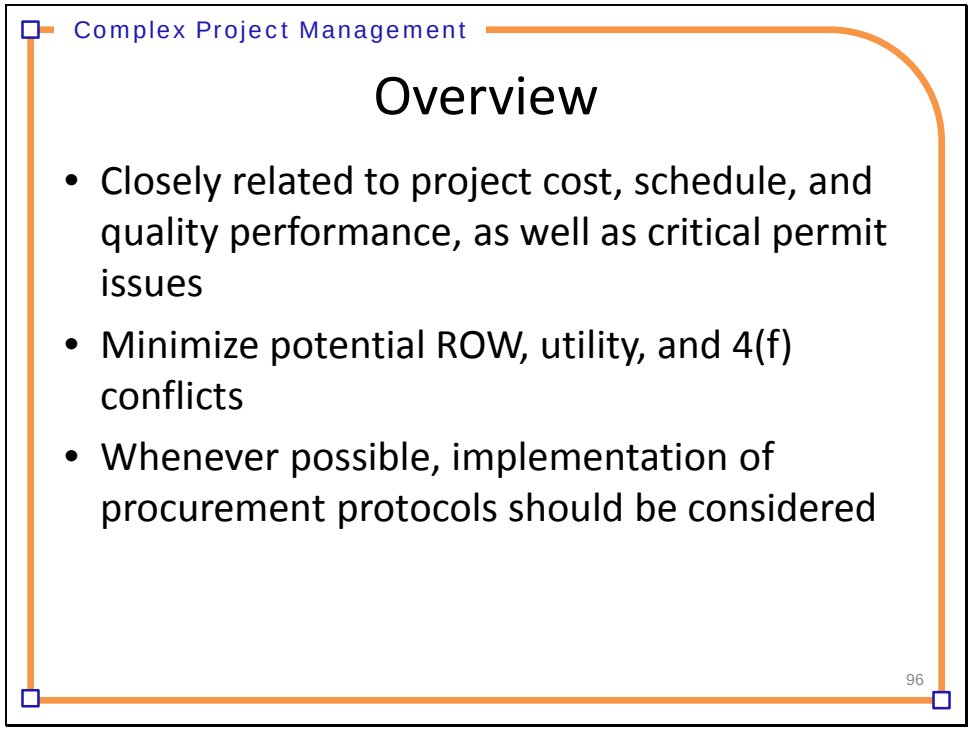
Slide 95



Key Message

The Technical and Cost dimensions have an impact on establishing flexible design criteria has an impact on establishing flexible design criteria.

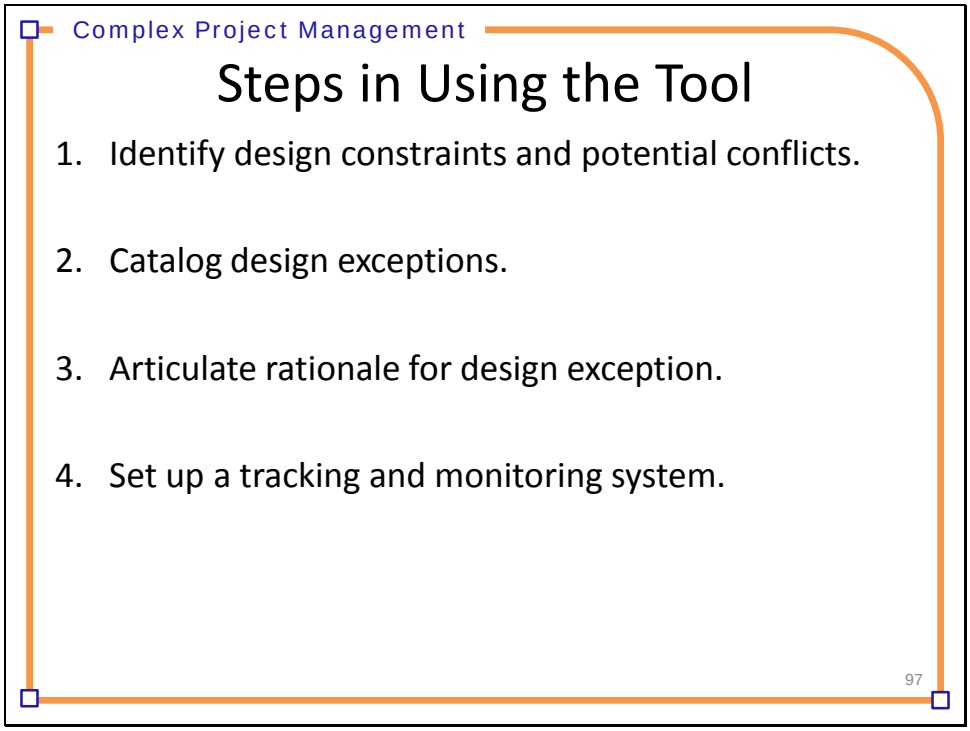
Slide 96



Key Message
Establishment of flexible design criteria is closely related to project cost, schedule, and quality performance (e.g. designing to a budget), as well as critical permit issues.

Background and Notes
Flexible design criteria can minimize potential ROW, utility, and 4(f) conflicts. Flexible designs can be achieved through use of design exceptions, need-based review and approval processes, performance specifications, and mechanistic designs. Whenever possible, implementation of procurement protocols should be considered because they allow designers to work with major material suppliers/vendors early in the project life cycle.

Slide 97



Key Message
The identification and mapping of complexity along with the outcomes of Methods X-Y provide guidance for establishing flexible design criteria. In addition, use of the flexible design criteria tool should be coordinated with designing to a budget (Tool 8), co-location (Tool 9) and development of a public involvement plan (Tool 13).

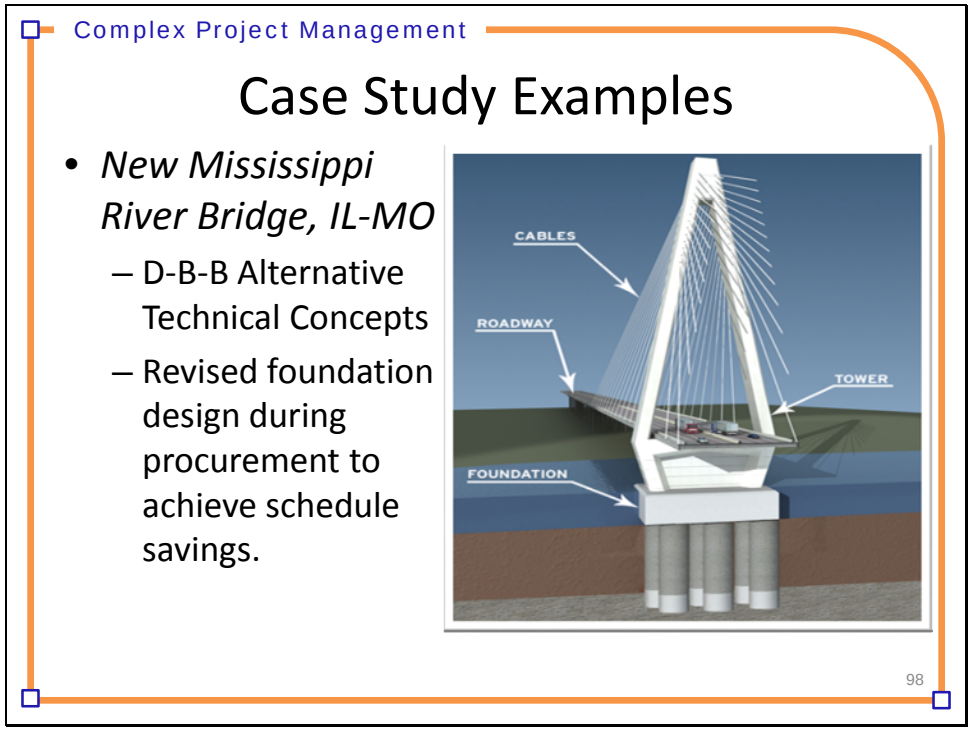
Background and Notes
Step 1
Identify design constraints and potential conflicts (ROW, utility locations, historic neighborhoods, environmentally sensitive areas, etc.) that can be mitigated through alternative/innovative design approaches.

Step 2
Catalog design exceptions required under each design option.

Step 3
Articulate rationale for design exception (use of performance specifications, mitigation of environmental impact, alleviation of ROW issues, etc.).

Step 4
Set up a tracking and monitoring system to manage documentation, request, approval, and implementation of each design exception.

Slide 98



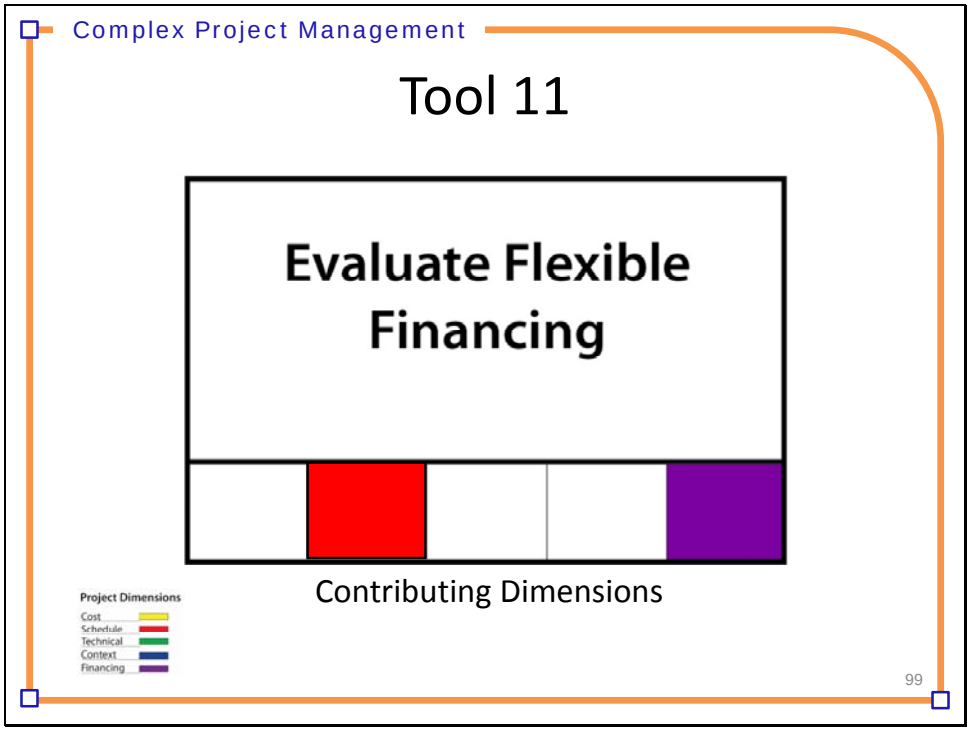
Key Message
Several examples of flexible design criteria were found in the case study projects.

Background and Notes
I-595 Corridor
When FDOT made the decision to use DBFOM project delivery, it recognized that to be attractive to outside investment, design criteria had to be unconstrained wherever possible. In doing so, it created an environment where the concessionaire was able to balance life-cycle design issues with project pro forma requirements for the financing.

Lewis and Clark Bridge
In the design phase of the project, the concrete placement method was changed from standard cast-in-place to precast, which made the whole process complex. Applicability of Self Propelled Modular Transporters (SPMTs) for delivery and removal of deck units was dependent on site-specific constraints, and should be discussed with SPMT suppliers in the early planning stage. However, open attitude for better design made all the changes possible.

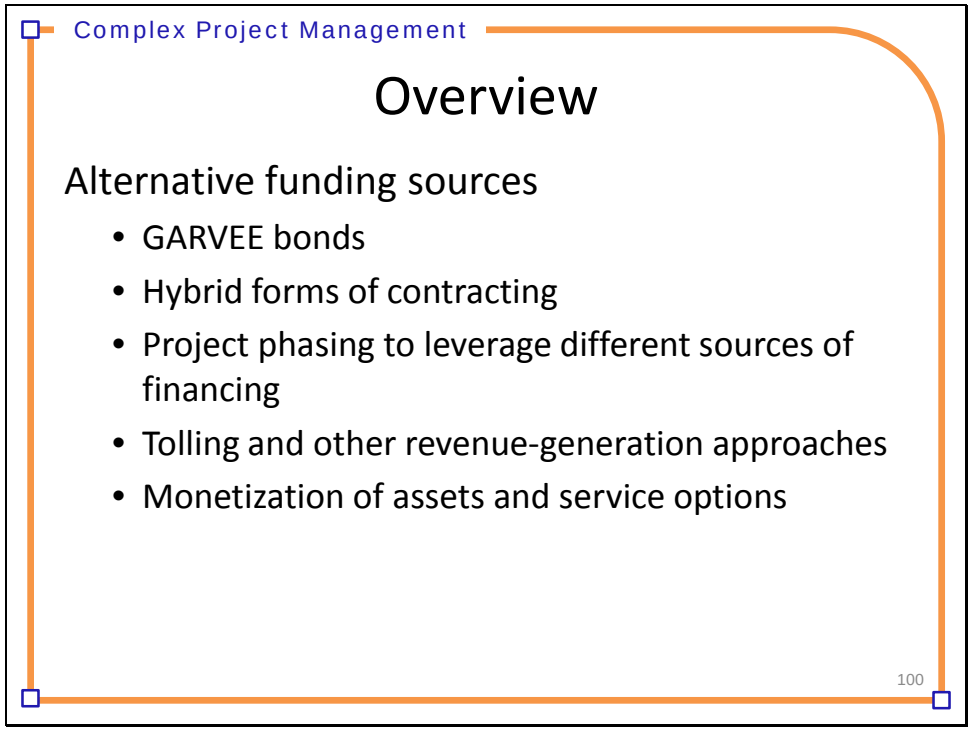
New Mississippi River Bridge
During procurement, the project team had a process for allowing contractors to propose Alternative Technical Concepts in an effort to get good value decisions in the procurement process.

Slide 99



Key Message
Evaluating flexible financing is influenced by the Financing and Scheduling Dimensions.

Slide 100

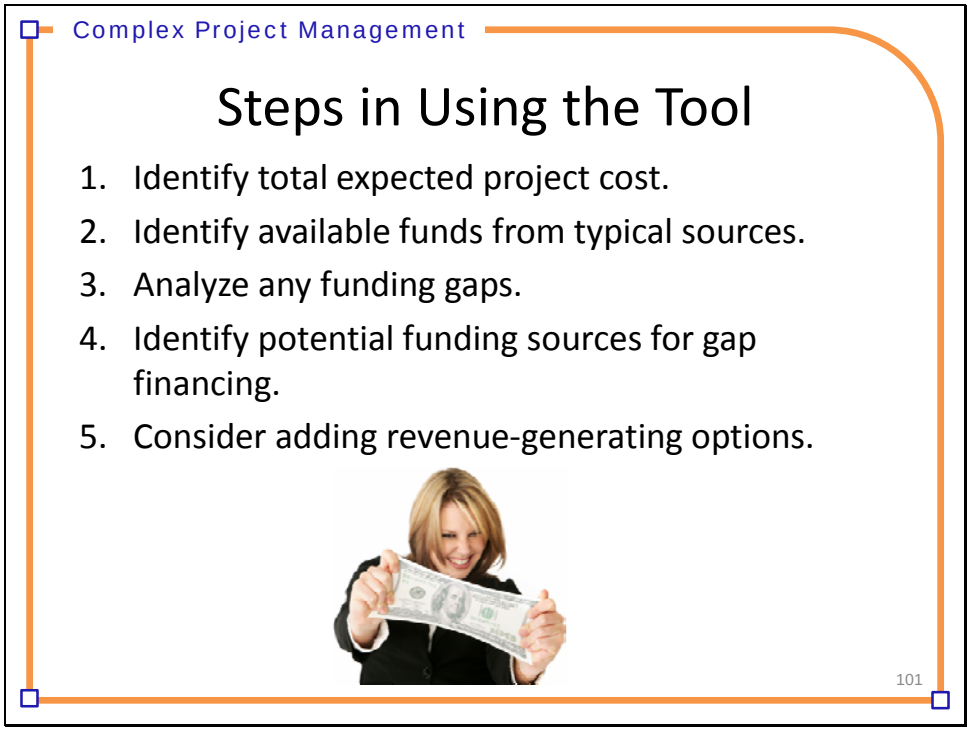


Key Message
Alternative funding sources should not be overlooked to furnish the needed funds for a project.

Background and Notes
Several alternative funding sources are available, including:

- GARVEE bonds
- Hybrid forms of contracting such as Public-Private-Partnerships or various combinations of Design-Build-Operate-Maintain-Transfer
- Project phasing to leverage different sources of financing
- Tolling and other revenue-generation approaches (congestion pricing, hot-lanes, etc.)
- Monetization of assets and service options, such as franchising

Slide 101



Key Message
The identification and mapping of complexity along with the outcomes of Method 4 provide guidance for evaluating flexible financing. In addition, utilization of the flexible financing tool should be coordinated with designing to a budget (Tool 8).

Background and Notes
Step 1
Identify total expected project cost (planning, design, and construction).

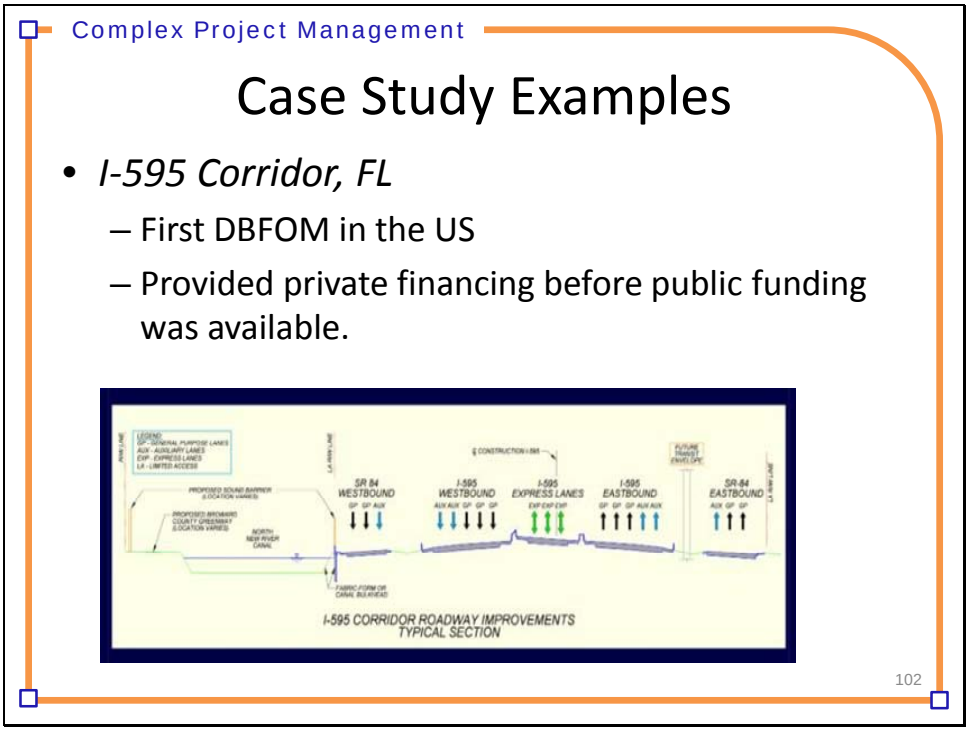
Step 2
Identify available funds from typical sources (state program, federal aid).

Step 3
Analyze any funding gaps.

Step 4
Identify potential funding sources for gap financing, including debt and private equity, if possible, within state regulatory authority.

Step 5
If gap financing is inadequate for project funding, consider adding revenue-generating options, such as congestion pricing, tolling, franchising, etc.

Slide 102



Key Message
Several examples of flexible financing were found in the case study projects.

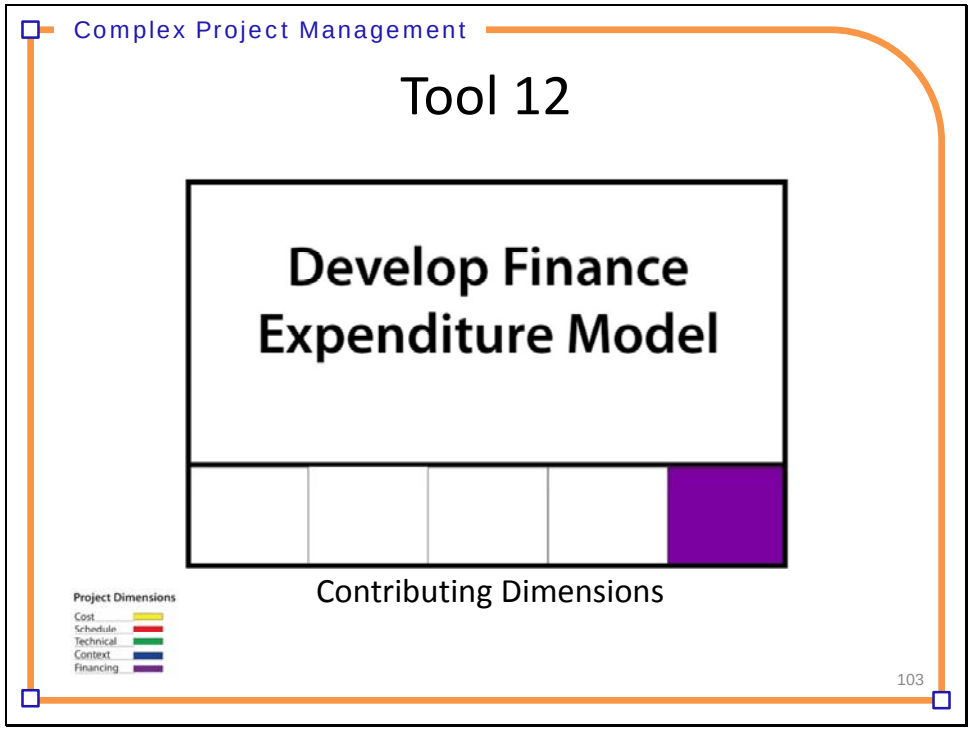
Background and Notes
Detroit River
The owner solicited for a Request for Proposers for Interest (RFPOI) to solicit market feedback, which was used to develop government policy and in structuring a formal DRIC procurement process, and needs for formal agreements with Canada. Currently the project development correlates directly to the mechanism chosen to finance the project. This is to pursue a Public-Private-Partnership (P3) for the bridge and for either all or a portion of the plaza. Alternative funding methods considered include having either the Michigan DOT (MDOT) or a new bridge authority sell revenue bonds, secured by future tolls from the bridge, to finance the construction of the bridge and all or portions of the plaza.

I-595 Corridor
This is the first highway project in the US to be delivered in a DBFOM method. This was attractive to FDOT primarily because the financing was available to the project, thus speeding up the construction schedule.

North Carolina Tollway
There are bonds on this project that are used for financing. There are two pieces: the costs (which cover construction and ROW) and O&M. Together, these costs make the total cost, which is then taken to the bond market. There was concern about if there were cost overruns. The North Carolina

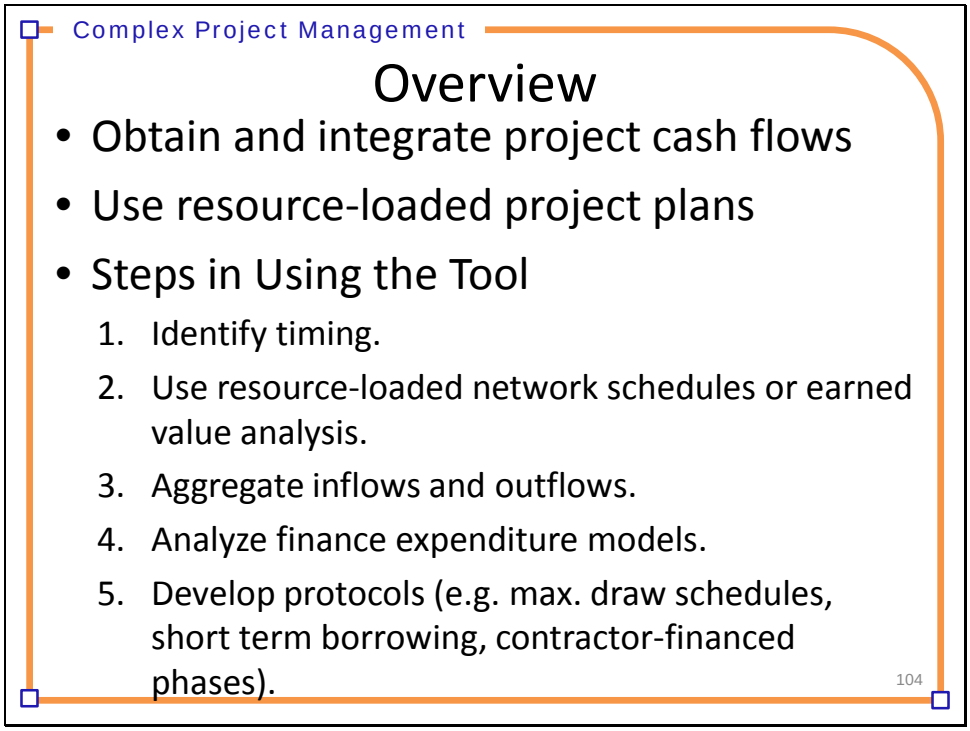
DOT, through legislative action, agreed to pay for any cost overruns by the authority. This helped with the market rating on the bond market.

Slide 103



Key Message
Development of a finance expenditure model is affected by the Financing Dimension.

Slide 104



Key Message
The identification and mapping of complexity along with the outcomes of Method 4 provide guidance for developing a finance expenditure model. In addition, developing the finance expenditure model should be coordinated with designing to a budget (Tool 8) and evaluation of flexible financing (Tool 11).

Background and Notes
Step 1
Identify timing of revenue inflows.

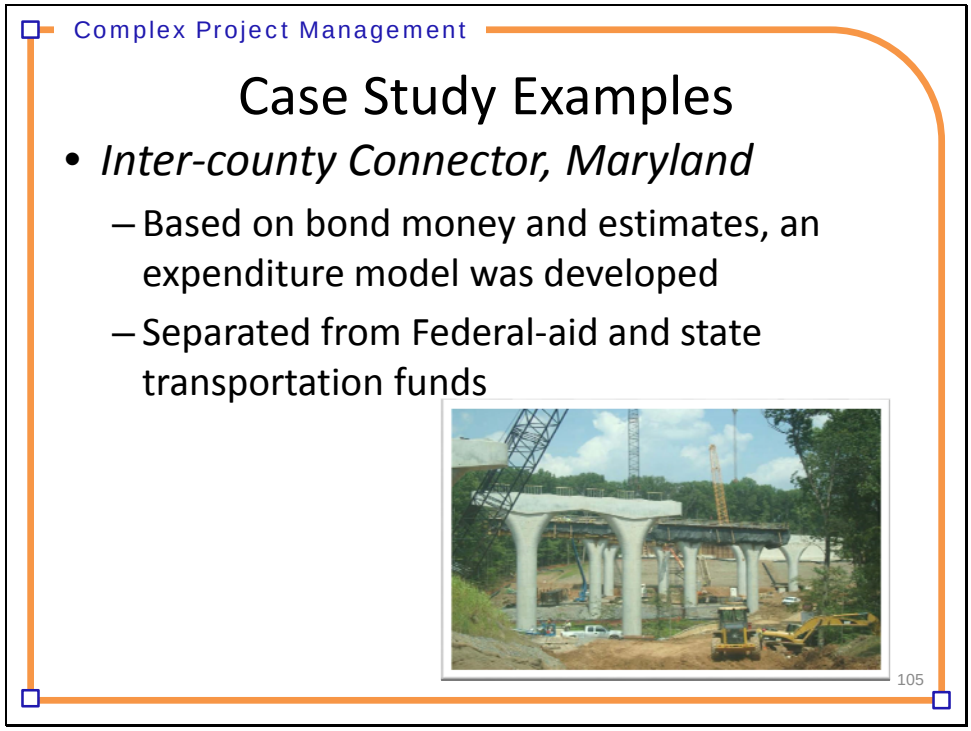
Step 2
Use resource-loaded network schedules or earned value analysis to identify projected cash outflows.

Step 3
Aggregate inflows and outflows to common periods (probably end-of-month).

Step 4
Analyze finance expenditure models to identify cash balance shortfalls.

Step 5
Develop protocols (maximum draw schedules, short term borrowing, contractor-financed phases, etc.) to manage cash balance shortfalls.

Slide 105



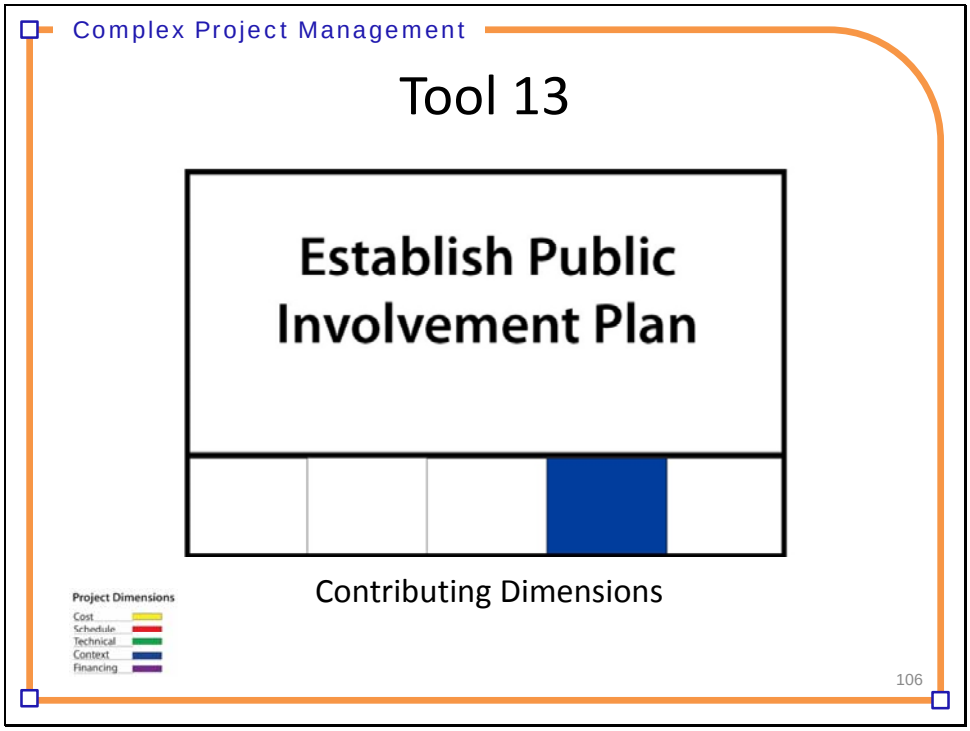
Key Message
Several examples of developing a finance expenditure model were found in the case study projects.

Background and Notes
Capital Beltway
Concession funded legislation, which means private partner gave money ($6M for VDOT development costs and $15M for traffic enhancements) in the project development phase and would generate revenue from toll later. How to use these funds (legislation) required lots of work to do. Based on general assembly appropriations, if money not received from private partner, VDOT cannot make the payment, had to get the money and hold it in a fund to make payments.

Intercounty Connector
Bond money was separated so it wasn't used on non-public projects. Ballpark estimates were utilized using in-house personnel and GEC consultants for private owner projects. Based on bond money and estimates, an expenditure model was developed. Some projects were charged based on the expenditure model.

North Carolina Tollway
The design-builder is required to have a cost-loaded CPM schedule. This is updated every two weeks. The activities within this schedule cannot exceed 20 days or $500,000 500,000 (with a few exceptions, i.e., a bridge deck pour). There are currently more than 3,000 activities, each with its own cost curve, and this is the basis of payment

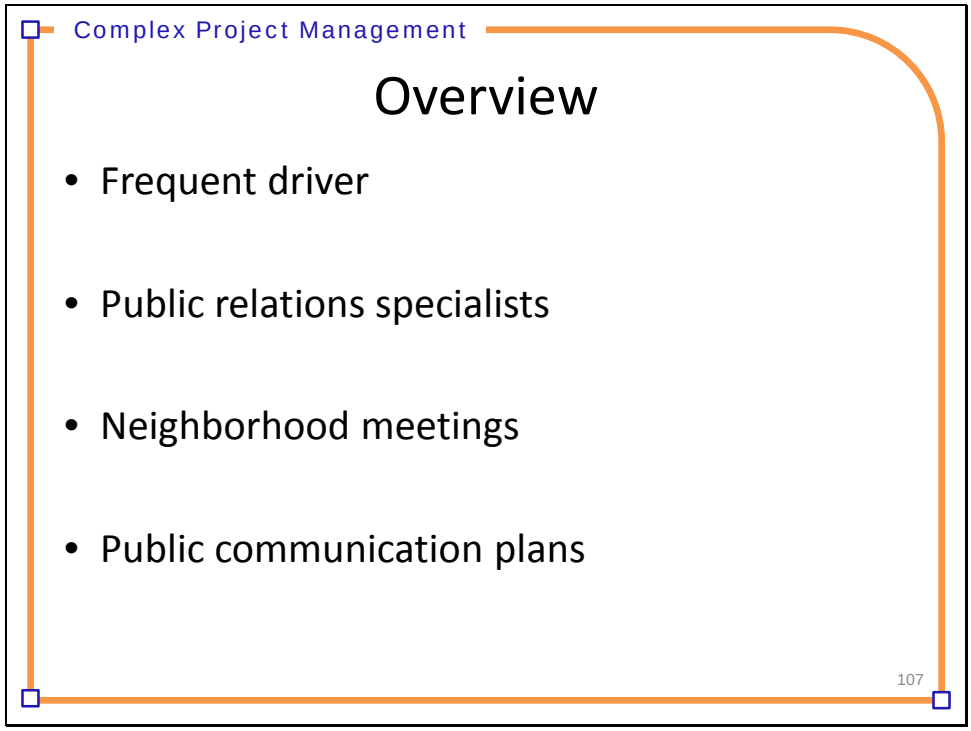
Slide 106



Key Message

The Context Dimension has an impact on the development of a public involvement plan.

Slide 107



Key Message
Stakeholder's needs and concerns are frequently the driver in developing design options and project delivery methods for some complex projects.

Background and Notes
Extensive public outreach is required for project success, especially for complex renewal projects. Public involvement early in the planning phase can be important in mitigating public disruption (such as with self-detour planning) and dissatisfaction. Public relations specialists can be retained to serve as points of contact. Neighborhood meetings with open agendas and mechanisms should be held to solicit feedback. Public communication plans must also be developed very early in the planning process.

Slide 108

Key Message
The identification and mapping of complexity along with the outcomes of Method 5 provide guidance for establishing the public involvement plan. In addition, development of the public involvement plan should be coordinated with risk analysis (Tool 3), critical permit issues, specifically 4(F) issues (Tool 4), and evaluation of off-site fabrication (Tool 5).

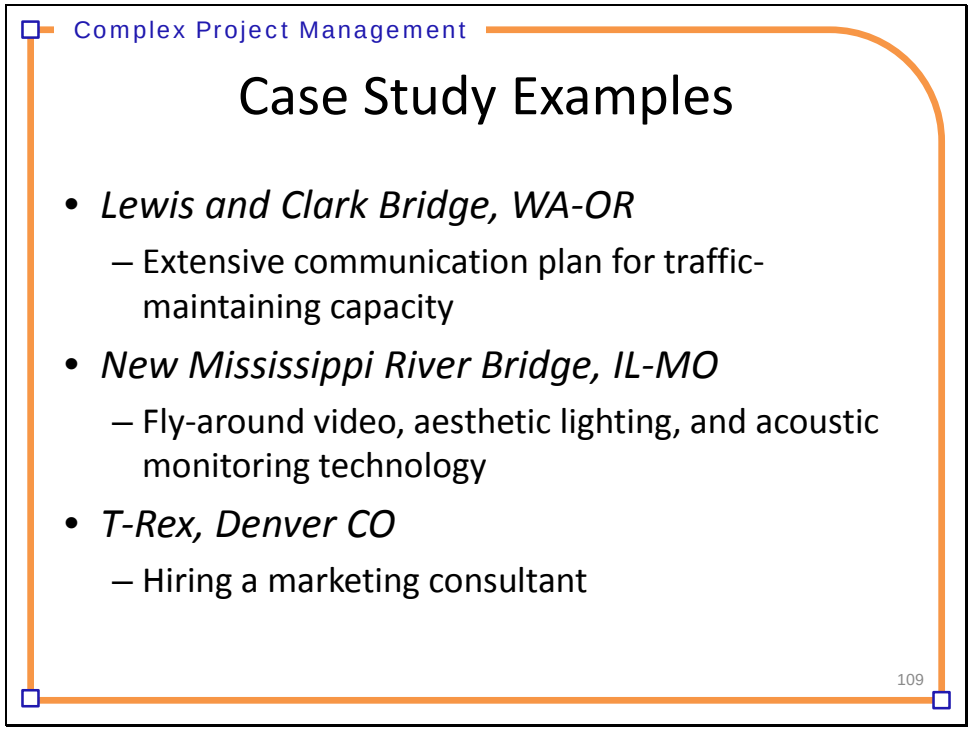
Background and Notes
Step 1
Identify key public stakeholders (from risk analysis) and road users who will be affected by the project.

Step 2
Set up communication and information sharing systems (public meetings, web sites, newsletters, web cams, 411 phone links, mobile alerts, dynamic message boards, etc.).

Step 3
Gather information on specific concerns of public stakeholders, and relay information to the project team (e.g. designers, builders, consultants).

Step 4
Report back! The key to a successful public involvement plan is frequent, targeted communication that is responsive to the concerns of public stakeholders. Follow-up communication must be designed to address concerns raised in step 3, or rationale (such as budget constraints, funding limits, etc.) must be relayed to explain why public concerns could not be addressed.

Slide 109



Key Message
Several examples of establishing a public involvement plan were found in the case study projects.

Background and Notes
Lewis and Clark Bridge
An extensive communication plan was accommodated (which is a planning decision made by the owner) for maintaining capacity, such as lane closures, detours, and time of construction activities (i.e. nighttime, weekends). The communication plan included: 1) Daily basis updated website 2) Live webcam 3) Local papers with weekly calendar 4) Phone line to public 5) Highway Advisory Radio (HAR), and 6) Email and text alert (sign-up basis).

New Mississippi River Bridge
To communicate project outcomes to the public and the media, the team developed a fly-around video showing construction stages and related work zones. The project team decided to add aesthetic lighting to the bridge, even though it was not required. They also implemented acoustic monitoring technology for remote monitoring of the cable stays, which is currently an unfunded improvement (came out of contingency).

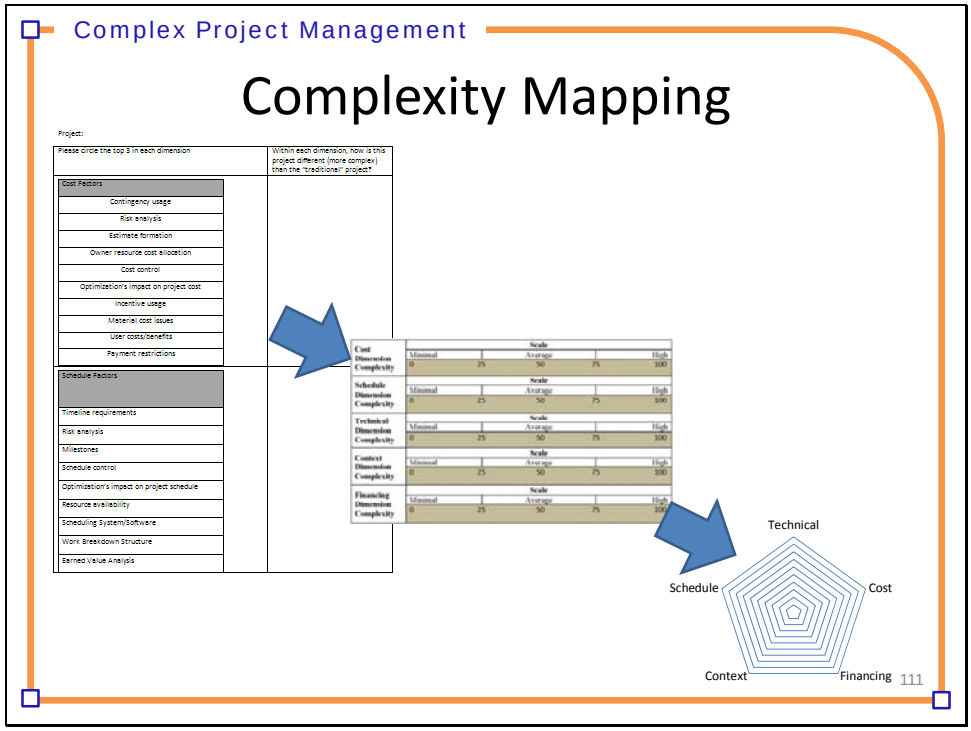
T-Rex
During the planning phase of the project, a marketing consultant was hired to develop an aggressive marketing campaign. The original name of the project, Southeast Corridor Project, was changed to T-Rex to increase name recognition. The project's public involvement program included four rounds of open houses as well as the opportunity to participate in the environmental planning process.

Slide 110

Key Message

Complexity maps are a great visual tool to communicate the priorities and needs of a project once the 5DPM dimensions have been established and rated against each other. They can be used to show progress over time that the project drivers are being identified and handled appropriately.

Slide 111



Key Message

A complexity map can help describe a project in terms of the five dimensions of 5DPM.

Background and Notes

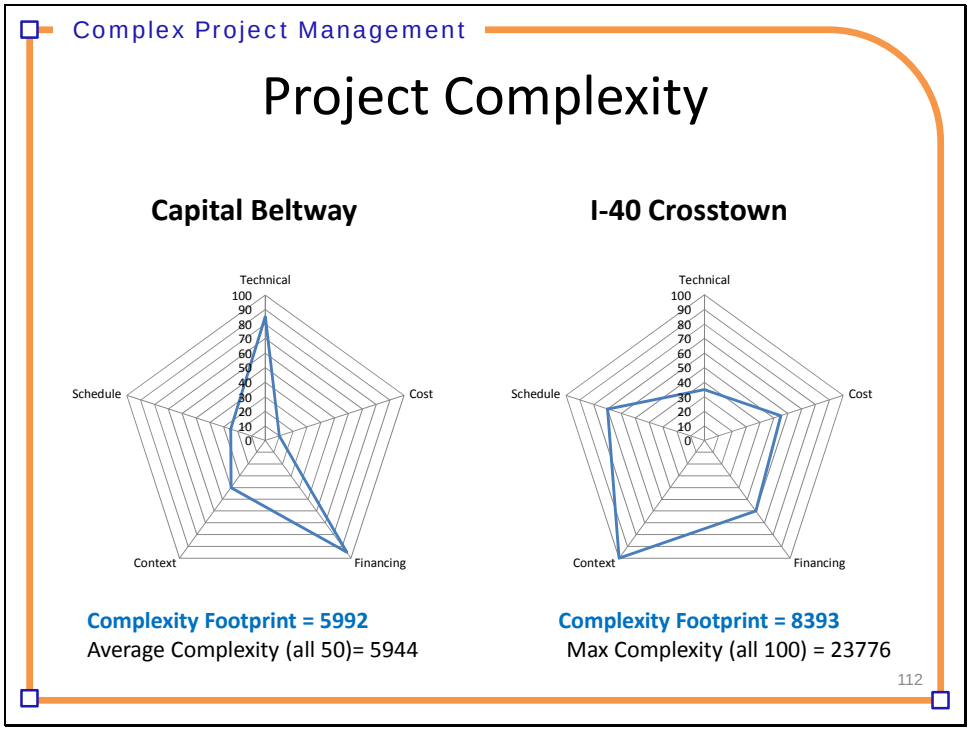
Steps in developing a complexity map:

- Consider factors that impact each dimension.
- Score each dimension on a scale of 0-100 (normal project is 50).
- Plot the project complexity.

Guidebook Location

Sections 2.2, 2.3, 2.4, and 2.5

Slide 112



Key Message

Complexity maps can take on different shapes, depending on the factors that are contributing to the complexity of the project.

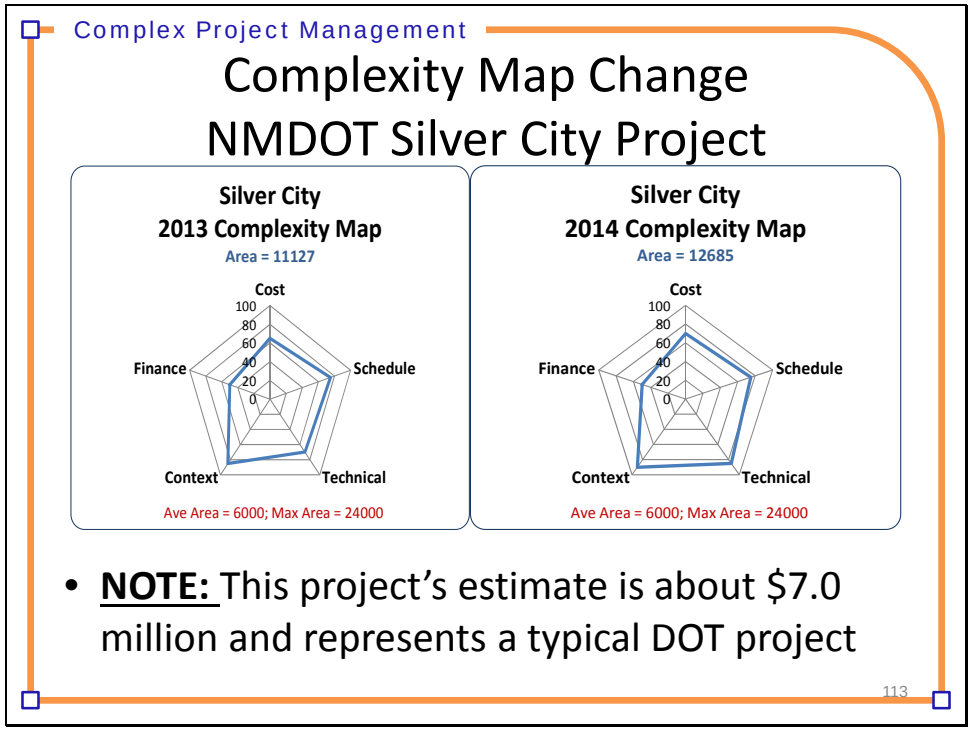
Background and Notes

The Capital Beltway project in northern Virginia consists of four high-occupancy vehicle/high-occupancy toll (HOV/HOT) lanes of 14 miles, lane connections, construction/reconstruction of 11 interchanges, and replacement/improvements of more than 50 bridges. The Capital Beltway HOV/HOT Lanes Project was delivered by PPP with design-build (DB).

The VDOT mega project team had previous experience with DB, but there was still some unfamiliarity. The unfamiliarity made the project delivery method more complex than a typical project. There are many technical factors for developing HOT/HOV lanes to consider, such as pass type (electronic pass, or not, or both), how to recognize the number of people in the vehicles, how to distinguish animals or “dummy” passengers from human passengers, and many other technical issues.

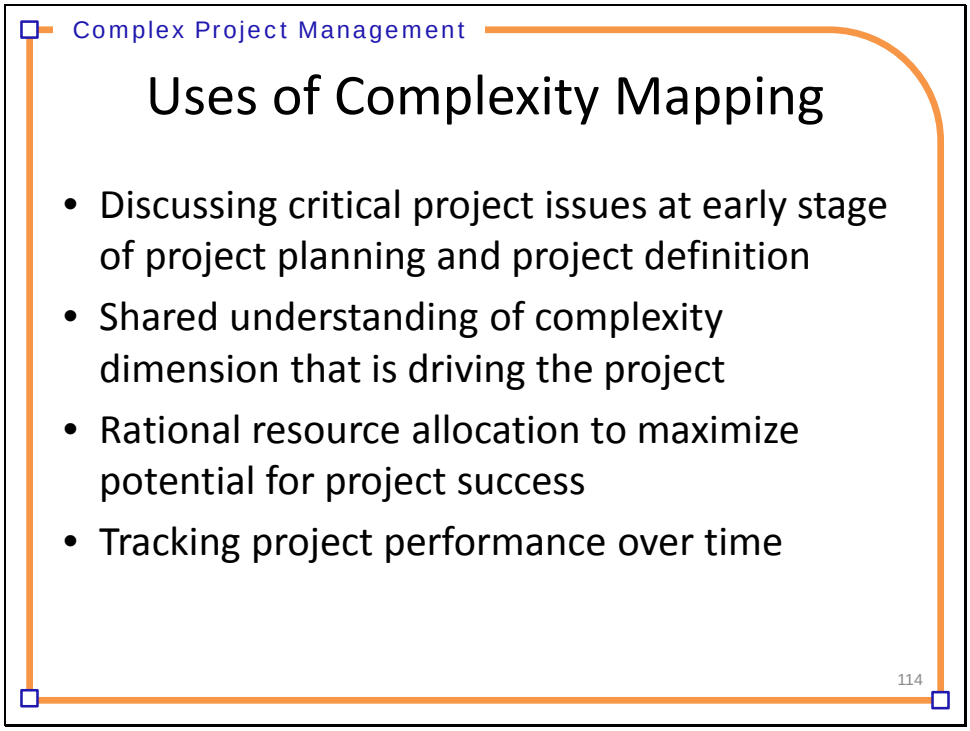
The I-40 Crosstown project consists of the relocation of 4.5 miles in Oklahoma City, Oklahoma and includes five major bridge structures. The project consists of 10 lanes designed to carry 173,000 vehicles per day at 70 mph. The project was complex because of the challenge of matching the capabilities of the local design and construction industry to the scale of the project. In addition, the availability of funding and stakeholder impact, including relations with the railroad and right-of-way, added to the complexity of the project.

Slide 113



The NMDOT Silver City Project is an example of how the complexity Map changes over time as issues are addressed and new priorities emerge. This was a $7M project that represents a typical DOT project and can still be complex.

Slide 114

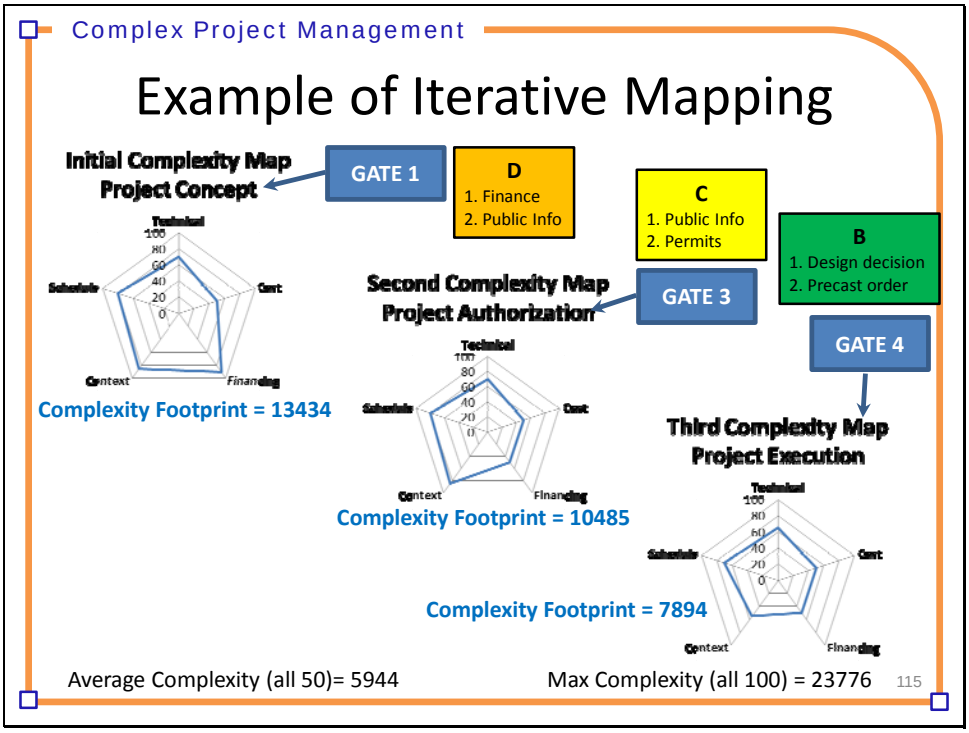


Key Message
The 5DPM complexity map helps users understand their project complexity and helps in resource allocation and tool selection.

Background and Notes
The project complexity maps are useful tools for organizational leaders to assign internal team members, develop effective procurement plans, advocate for project needs to state legislators and policy makers, and allocate financial resources in the most effective manner.

Guidebook Location
Sections 2.2, 2.3, 2.4, 2.5, 2.6, and 2.7

Slide 115



Key Message

The process of mapping the complexity of the project should happen, as a minimum, at each gate during the course of project development as the complexity or source of complexity may change.

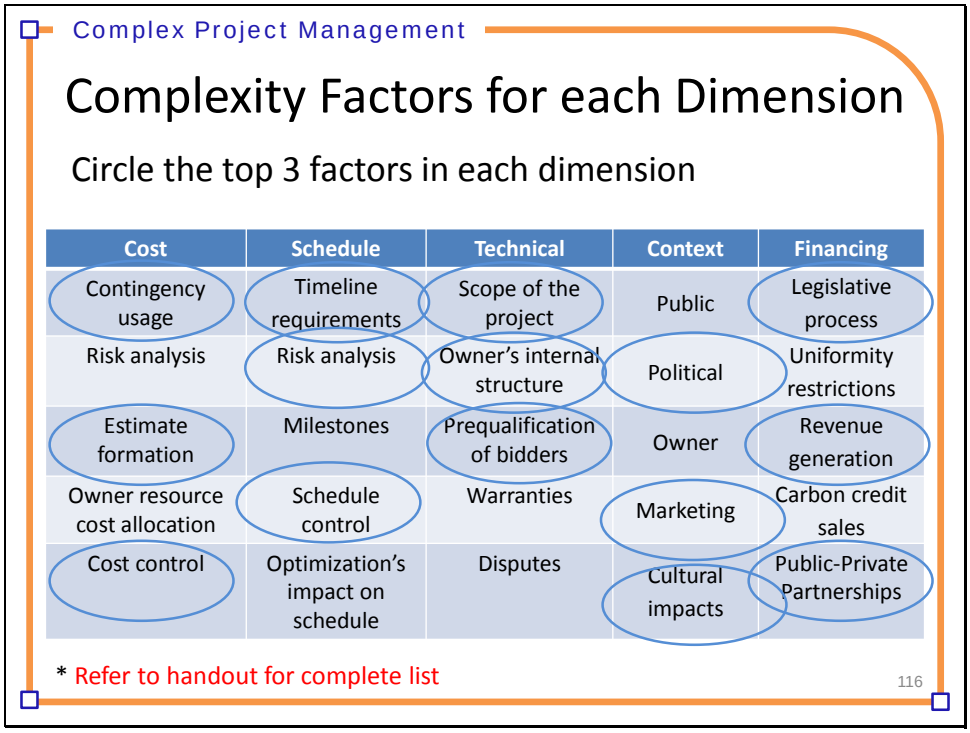
Background and Notes

As projects develop the dynamics of the project change, especially in complex projects. It may be helpful to re-map the complexity of the project several times throughout project duration to see where changes are occurring. This may shift the resources for the project.

Guidebook Location

Section 2.6

Slide 116



Key Message

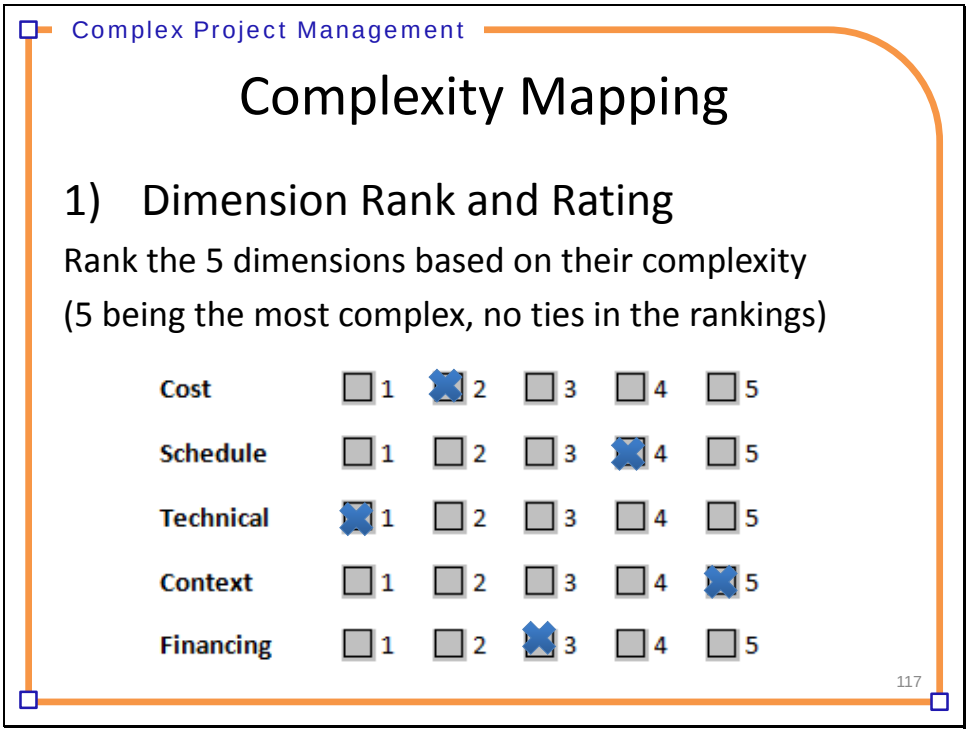
The Complexity Factors for each Dimension need to be considered as a means for assessing the relative ranking between Dimensions.

Background and Notes

Steps in developing a complexity map (this slide and next three):

- Consider factors that impact each dimension.
- Score each dimension on a scale of 0-100 (normal project is 50).
- Plot the project complexity

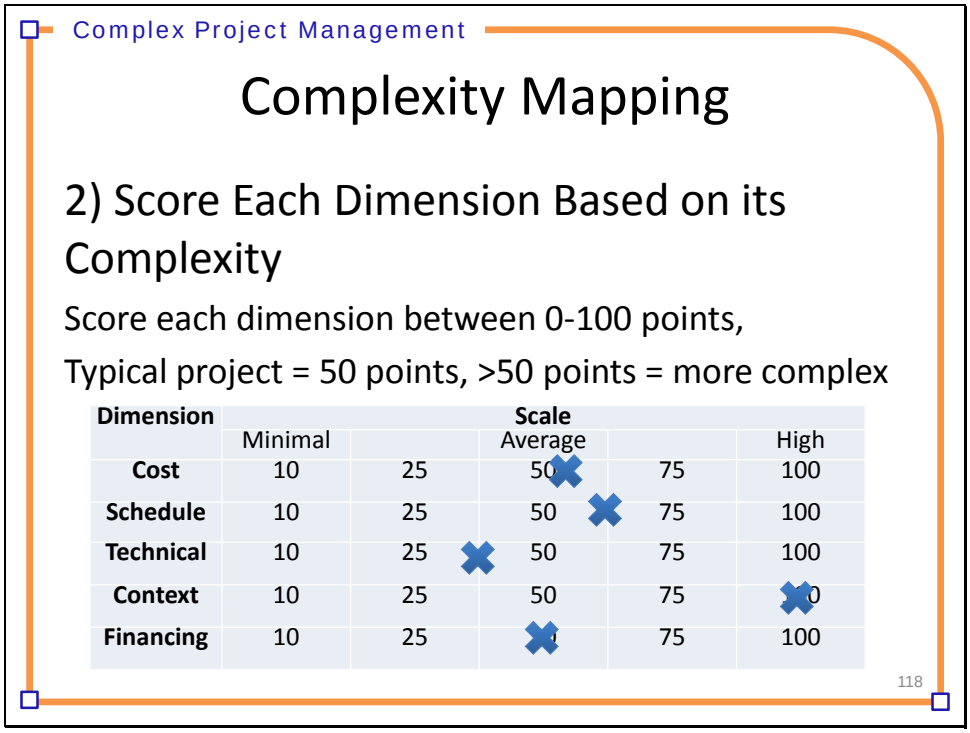
Slide 117



Key Message

When ranking the 5 dimensions against each other there can be no ties. It may be beneficial to compare the complexity factors between dimensions when there are close decisions to be made.

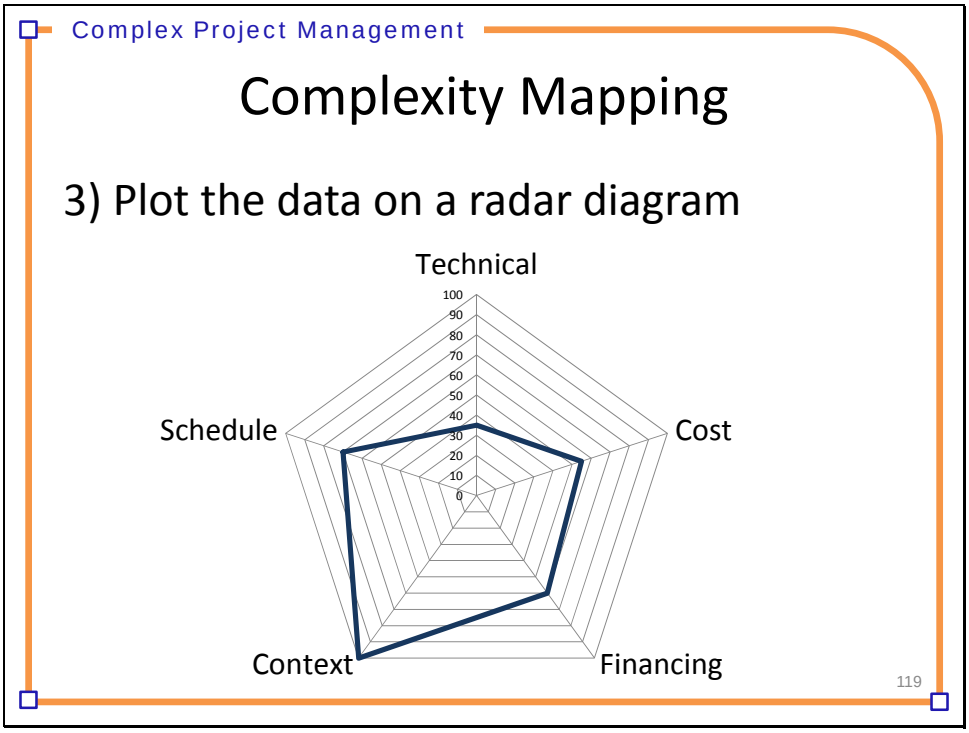
Slide 118



Key Message

The score of 50 needs to represent the typical project in everyone's mind. Keeping to this scale allows the ranges to be plotted on the complexity diagram with meaningful values.

Slide 119



Key Message
A complexity map can help describe a project in terms of the five dimensions of 5DPM.

Background and Notes
In Summary, the steps in developing a complexity map:

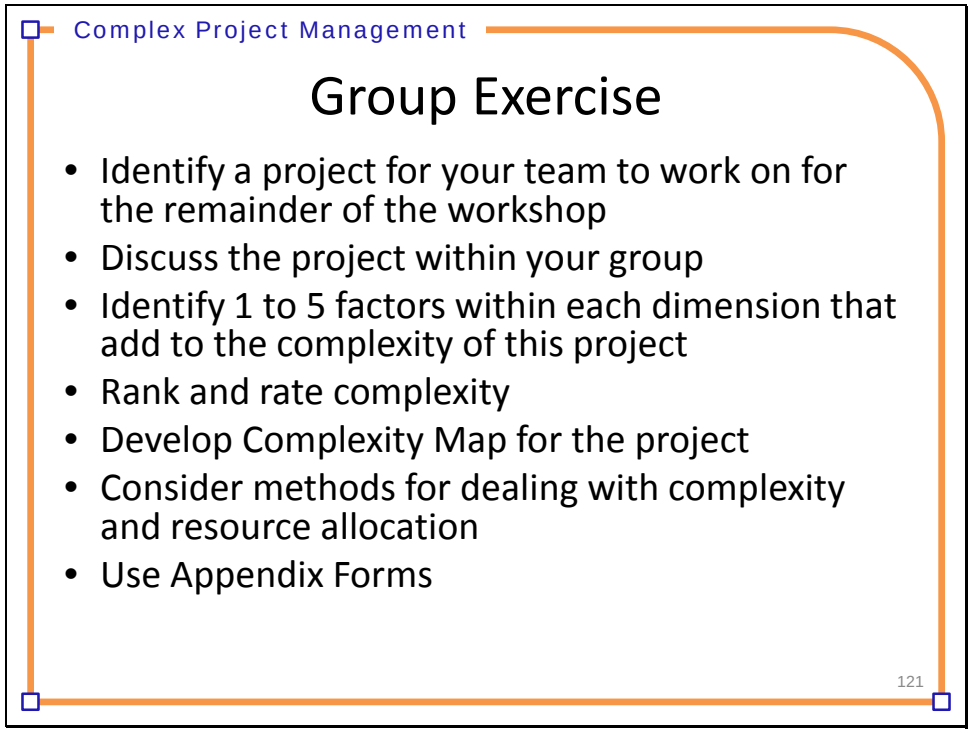
- Consider factors that impact each dimension.
- Score each dimension on a scale of 0-100 (normal project is 50).
- Plot the project complexity.

Guidebook Location
Sections 2.2, 2.3, 2.4, and 2.5

Slide 120

Key Message
Practice creating Complexity Maps for the selected projects.

Slide 121



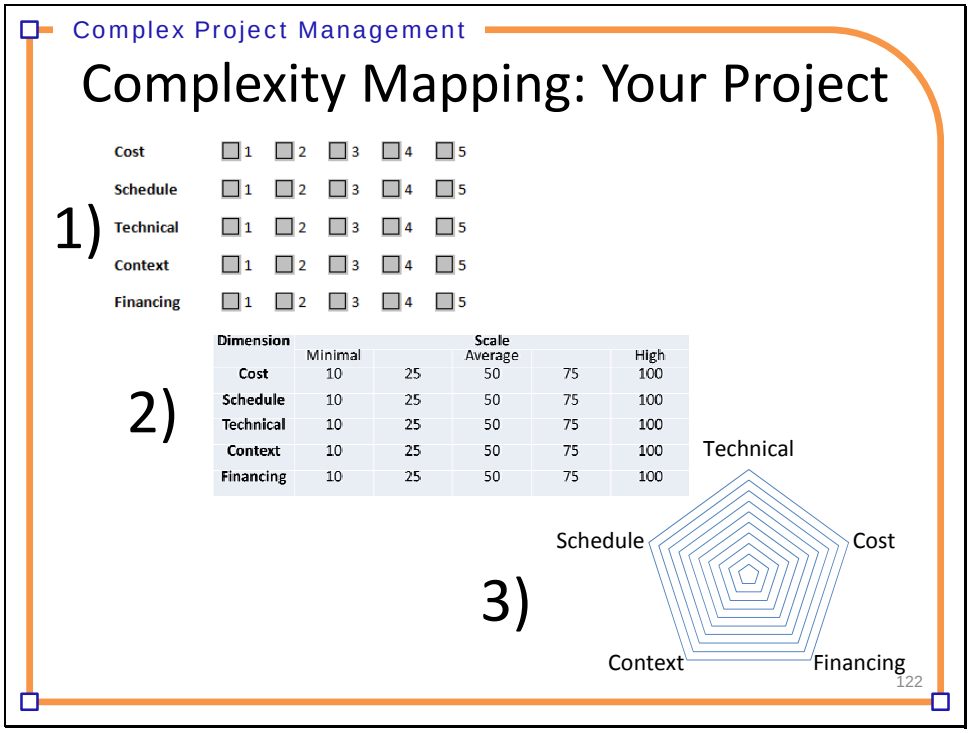
Key Message
Participants will select a project to use in the exercises for the remainder of the training. The exercises will help participants to understand the project and the process for complex project management.

Background and Notes
Participants should select a project that is upcoming or currently in the early stages of development and no later than early design. The exercises in the remainder of the training build on each other.

The objective is to understand the process and apply the process to a project. It is not anticipated that participants will do a full analysis on the project using the process but will conduct enough analysis that they will understand the process.

Location
Last tab in Training binder

Slide 122



Key Message

A complexity map can help describe a project in terms of the five dimensions of 5DPM.

Background and Notes

Steps in developing a complexity map:

- Consider factors that impact each dimension.
- Score each dimension on a scale of 0-100 (normal project is 50).
- Plot the project complexity.

Guidebook Location

Sections 2.2, 2.3, 2.4, and 2.5

Debrief

- Which factors did you identify for your project in each dimension?
- What does your complexity map look like?
- Does this make you think differently about your project?
  - Resources
  - Other aspects

Slide 124

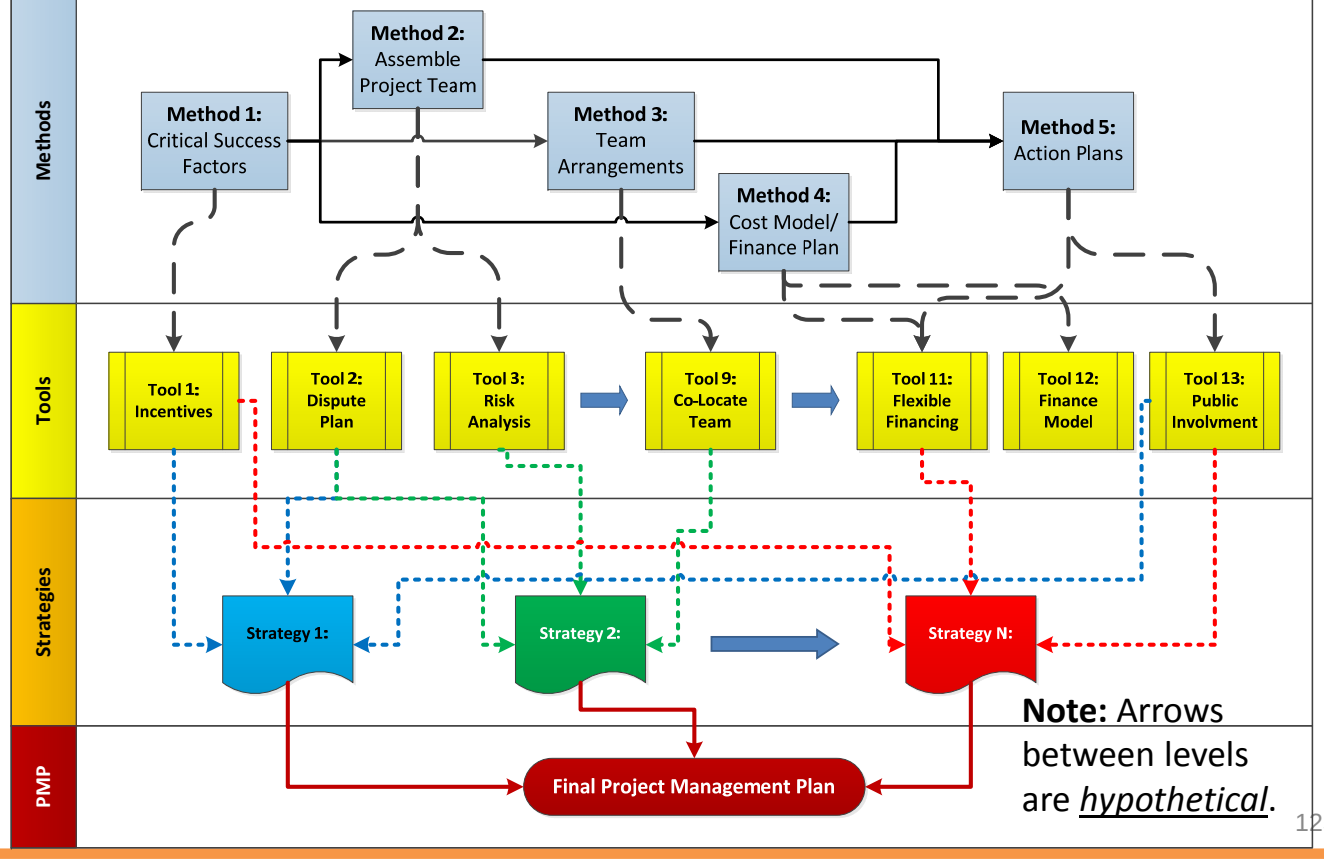
Key Message

This module focuses on an explaining 5DPM Method 1- Identifying Critical Success Factors

Slide 125

Complex Project Management

1. Synthesizing Methods and Tools into Strategies
2. Assembling the Strategies into the Project Management Plan

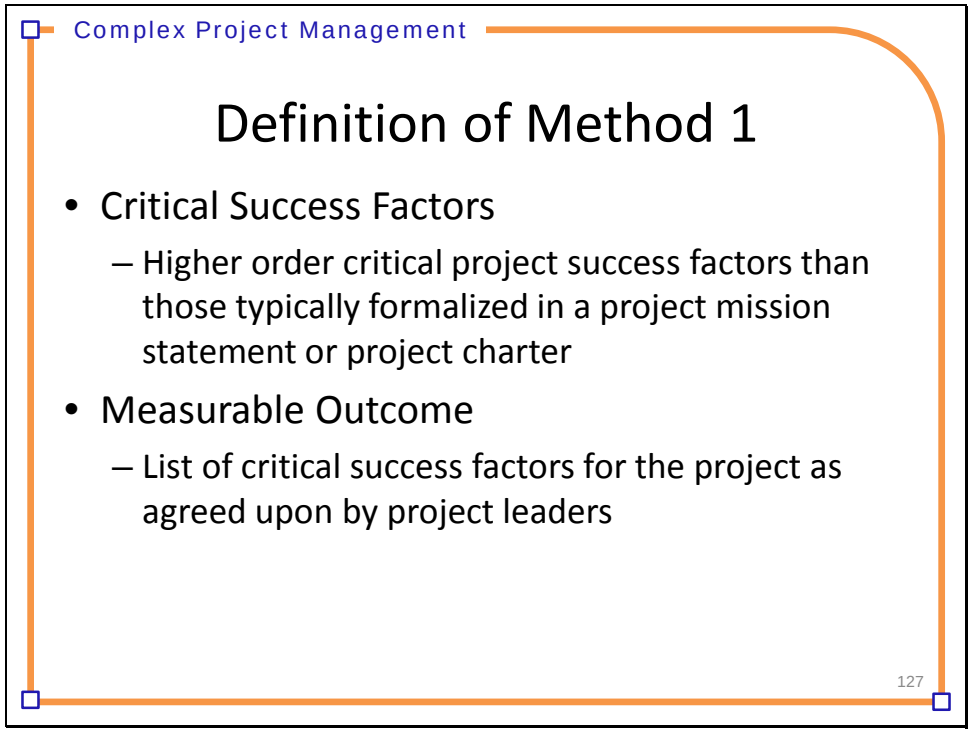


Note: Arrows between levels are *hypothetical*.

Planning Method 1: Critical Success Factors

- Ensure all project leaders have a common definition of project “success”
- Use agreement on critical success factors for:
  - Planning future resource utilization
  - Special authority, if any.
  - Project action plans (Method 5)
  - 5DPM implementation (Method 6)

Slide 127



Key Message
This is one of the most important aspects of successfully managing complex projects as it sets the basis for decision-making throughout the project lifecycle.

Background and Notes
Two of the outcomes of dynamic interactions, uncertainty and irregularity, can mean decision paralysis within the team or, at the very least, poorly-integrated decisions. On complex projects, the team needs a simplifying heuristic to guide decisions and analyses. The critical project success factors provide just such a simplifying heuristic.

The number of success factors should be relatively low, probably in the range of seven to 10 factors. If project "success" comes to include everything desired by everyone, the success factors will not serve to guide project decisions and actions.

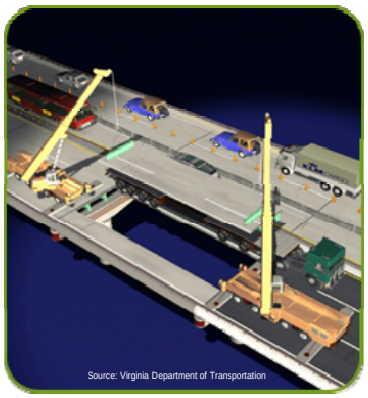
Guidebook Location
Section 3.2

Critical Project Success Factors

- When narrowing down the list of project success factors ask yourself if the success factor:
  - Is measurable?
  - Is justifiable (want vs. need)?
  - Is related to long-term success of the transportation asset (operation and public use)?
  - Is related to the short-term success of the transportation asset (design and construction)?
  - Is supported within the DOT/FHWA?
  - Is supported by important stakeholders outside the DOT/FHWA?
  - Is able to address a unique source of complexity on the project?

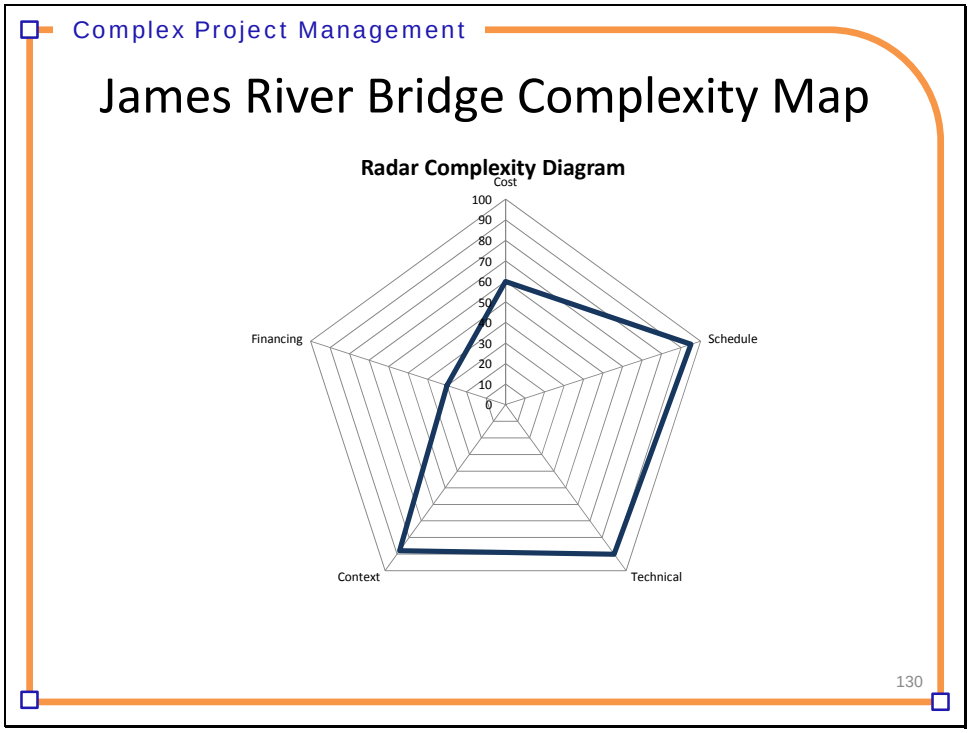
Slide 129

James River Bridge Virginia



Construction involved lifting prefabricated sections of bridge superstructure at night with two-way traffic in opposite span

Slide 130



Key Message

Since the Schedule, Context and Technical represent the key Dimensions it is expected that each of these dimensions will need to develop key critical success factors.

Slide 131

Complex Project Management

Success Factor Examples from James River Bridge Case Study (VDOT)

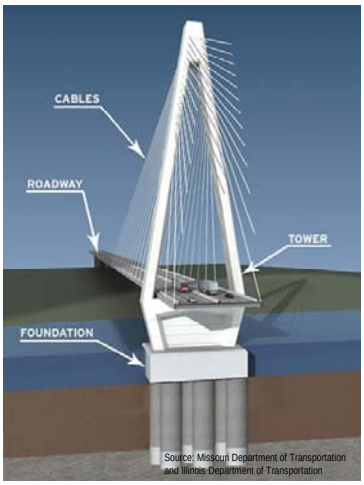
Most Complex →				Least Complex
Schedule	**Technical**	**Context**	**Cost**	**Financing**
Minimize traffic congestion and delays: maintain 40 mph through work zone; max traffic stoppage 10 minutes	**11-hour max closure:** use innovative construction means and methods	**Reduce traffic volume 50%:** Self-detour public info program - 90% awareness among public of traffic maintenance plan	**Account for "undiscovered-conditions (lead paint on beams):** Include 10% bridge rehab contingency	**None**: Federal-aid funded.

Bold font = Critical Success Factor

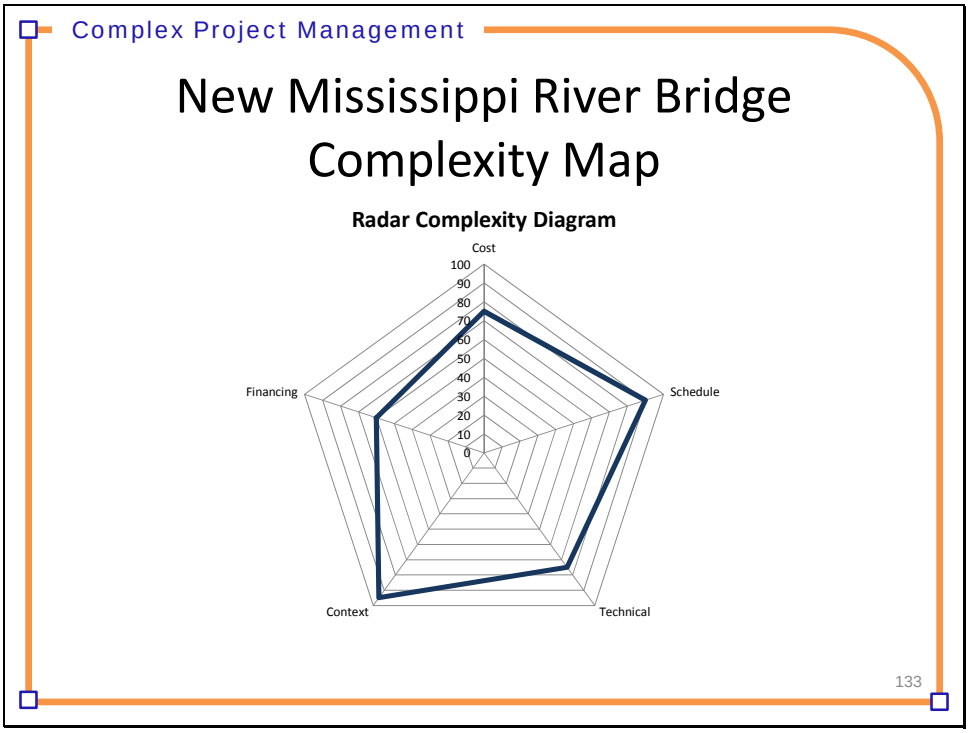
Slide 132

Complex Project Management

New Mississippi River Bridge



Slide 133



Key Message
Most complex dimension: Context

Slide 134

Success Factor Examples from New Mississippi River Bridge Case Study (MoDOT and IDOT)

Most Complex →				Least Complex
Context	**Schedule**	**Cost**	**Technical**	**Financing**
Maintain community support: Convene monthly community roundtable group to meet to discuss DBE participation and community outreach	**Major features under contract by end of 2009:** Coord. main span award with approach structures and interchange lettings to have entire project	**Main span ≤ $239 million:** expiring federal appropriation Design to budget	**Maintain dual barge traffic with bypass - no backwater rise:** 1,500-ft main span with two towers under 400 ft (FAA)	**Phase project and design to current funding:** Utilize $15 million in GARVEE bond efficiencies and $11 million in I-64 phasing to cover gap

Bold font = Critical Success Factor

Interactions Between Success Factors

- Not all of the success factors are mutually exclusive
  - Need to recognize interdependencies while understanding what is **driving** the project
  - Requires frequent communication at early stage of project
  - Achieving "greater" success in one critical factor may result in lower achievement in another
  - Project definition is the process of balancing these tradeoffs and managing interdependencies

Slide 136

Interaction Examples from I-15

	Most Complex →				Least Complex
Dimension:	**Schedule**	**Technical**	**Context**	**Cost**	**Financing**
Critical success factors	Complete the project on time or early (1/1/2002 in time for Olympics)	Manage scope creep and define scope critical aspects to allow early start	Minimize risk from railroad, utility, and ROW	Complete the project at or below cost (Total Cost < $1.7 billion)	Change cash flow models and federal aid waivers to allow use of design build
Interactions	**Driver**	Interacts with schedule	Interacts with cost and schedule	Interacts with context	Interacts with schedule

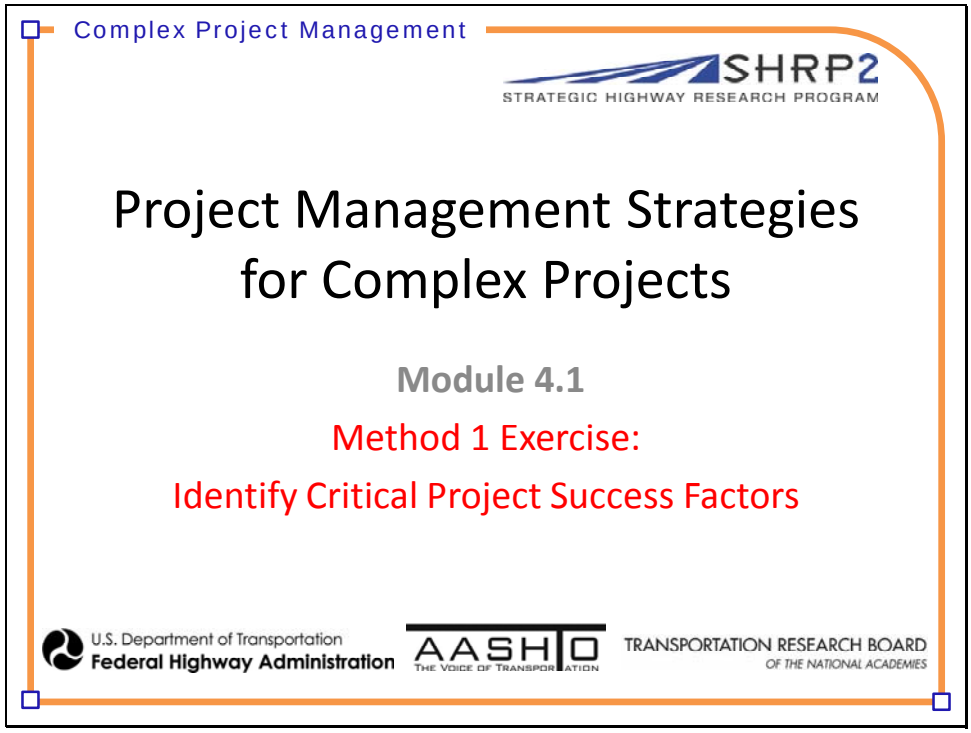
Project Management Plan (PMP)

- Critical success factors form the basis for **Section 2:** *Goals and Objectives* of the **Project Management Plan** for the complex project
- PMP includes specifics on responsibilities, schedules, actions, and interdependencies
- One of the outcomes of the PMP should be identification of resources to achieve success
  - Method 2: Assemble Project Team
  - Method 3: Select Project Arrangements
  - Method 4: Prepare Early Cost Model and Finance Plan
- Required resources can be acquired (e.g., consultants), shared (e.g., interagency agreement), or internally re-allocated (e.g., moving HQ personnel to district/field)

Resource Identification

- The critical success factors and Complex Project Management Plan are fined-tuned in subsequent modules
  - Human resources (Method 2)
  - Administrative resources (Method 3)
  - Financial resources (Method 4)
- If resources are too constrained to guarantee project success, constraints must be reduced or removed (Method 5)

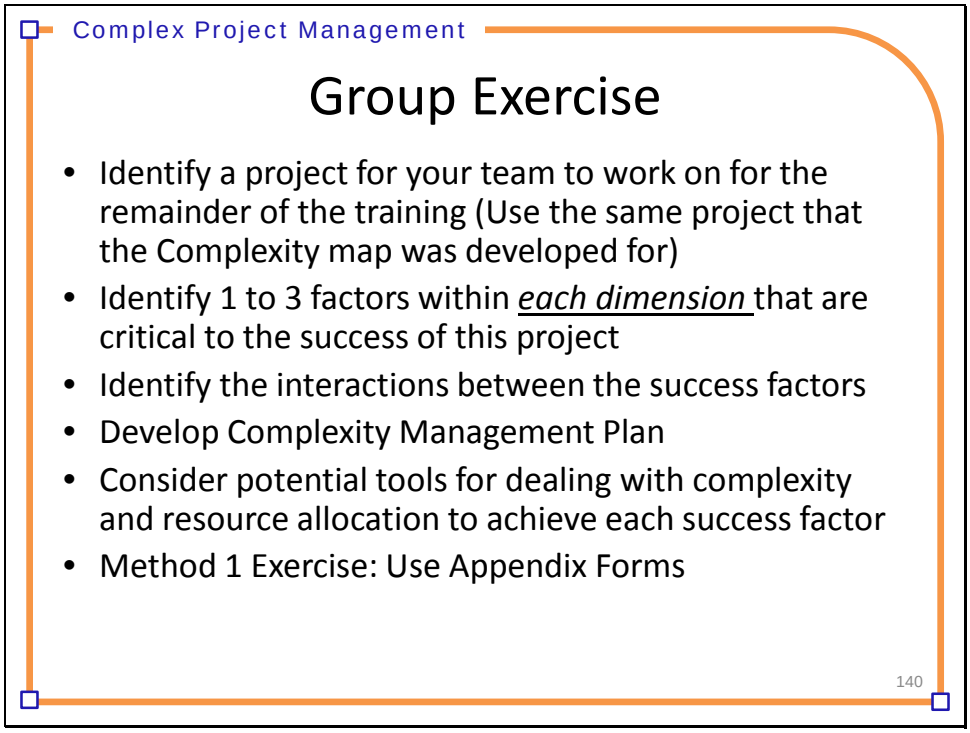
Slide 139



Key Message

This module focuses on learning how to identify Critical Success Factors to match the priority Dimensions of the project.

Slide 140



Key Message
Participants will select a project to use in the exercises for the remainder of the training. The exercises will help participants to understand the project and the process for complex project management.

Background and Notes
Participants should select a project that is upcoming or currently in the early stages of development and no later than early design. The exercises in the remainder of the training build on each other.

The objective is to understand the process and apply the process to a project. It is not anticipated that participants will do a full analysis on the project using the process but will conduct enough analysis that they will understand the process.

Location
Last tab in Training binder

Slide 141

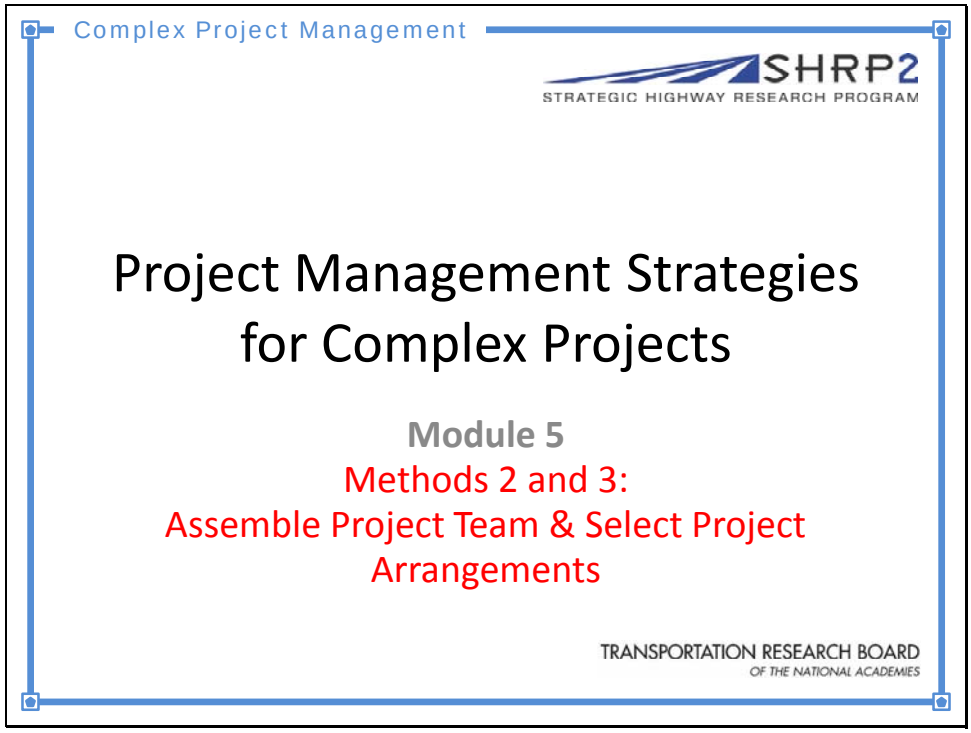
Group Exercise
Hypothetical Example

	Most Complex →				Least Complex
Dimension:	**Schedule**	**Technical**	**Context**	**Cost**	**Financing**
Critical success factors	Complete project by X/XX/20XX	Low maintenance bridge design	All permits, railroad, utility, and ROW before final design	Develop utility relocation allowance	Retire debt on schedule with toll revenue
Interactions	**Driver**	Interacts with schedule	Interacts with cost and schedule	Interacts with context	Interacts with schedule

Debrief

- What were your critical success factors?
- What interactions did you recognize?
- What were your measurable outcomes for each factor?
- Does your action plan require any innovations (are there constraints to be addressed?)
- Which 5DPM tools did you consider to help achieve success?

Slide 143



Key Message
When working on a complex project, one important activity is considering and assembling who is on the project team. This may be different than a normal project because of the specialized needs of the complex project.

Background and Notes
Methods 2, 3, and 4 are the resource allocation parts of 5DPM. Once complexity is understood and critical success factors defined, they guide the resource decisions made during Methods 2-4. Also, the numbering is somewhat arbitrary, and any of the three resource methods could be done first.

Guidebook Location
Section 3.3

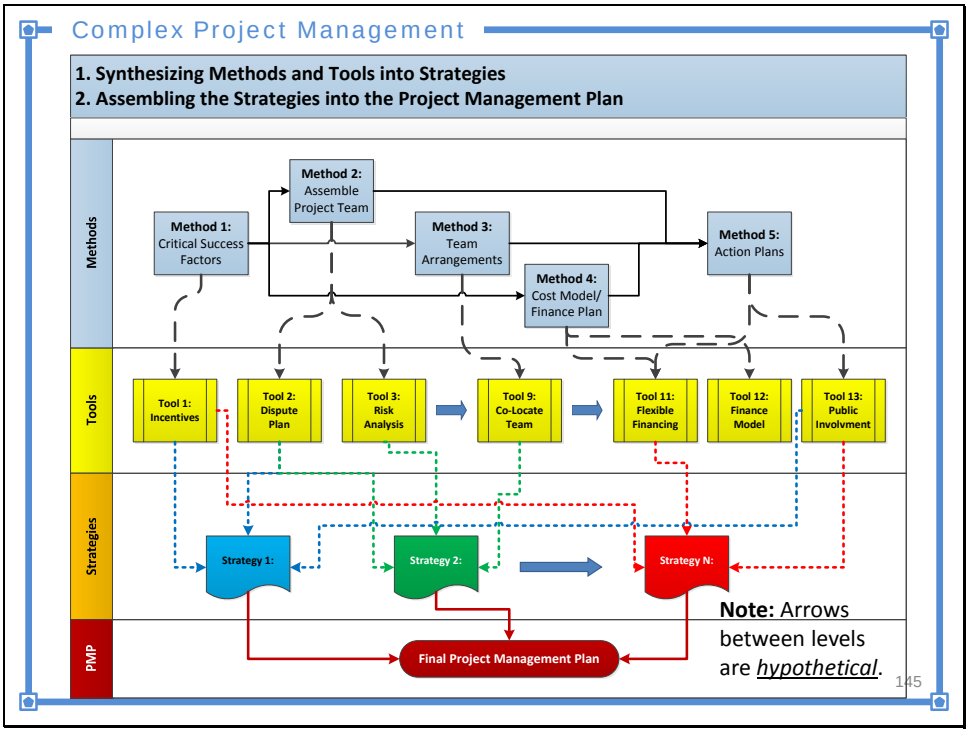
Slide 144

Key Message
When working on a complex project, one important activity is considering and assembling who is on the project team. This may be different than a normal project because of the specialized needs of the complex project.

Background and Notes
Methods 2, 3, and 4 are the resource allocation parts of 5DPM. Once complexity is understood and critical success factors defined, they guide the resource decisions made during Methods 2-4. Also, the numbering is somewhat arbitrary, and any of the three resource methods could be done first.

Guidebook Location
Section 3.3

Slide 145



Key Message

The shaded box indicates where Assemble Project Team fits into the different phases of the project development process.

Assembling the team may happen at many different points throughout project development but should start early. Assembling the team may also extend through project development as new/different qualities of team members will be needed at different points throughout the project. And the final member that will likely be added is the constructor of the project.

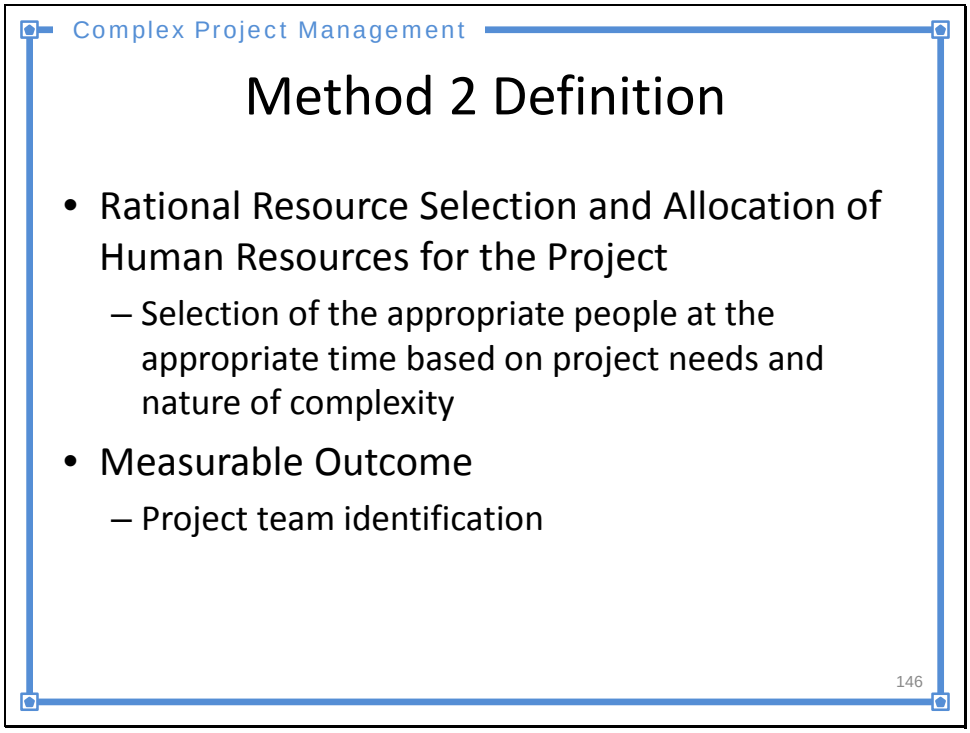
Background and Notes

The phases of the Project Development process are designed to be generic to try to fit the models of various state agencies. Note that your specific agency may use a slightly different order or terminology for the various phases. The major deliverables (i.e. The Highway Improvement Program (HIP), State Transportation Improvement Program (STIP), and procurement boxes) are included in the diagram as standard occurrences that each agency can base their specific project development schedule around.

Guidebook Location

Section 3.3

Slide 146



Key Message

The project team is the driver of the project. Selection of the appropriate people at the appropriate time is important in successfully delivering a complex project. This comes down to making sure that you have the right people involved with the project to make sure the project is successful. This includes people with skills that address the complexities of the project. This also includes getting buy-in from potential team members to ensure that they are supportive of the approach to delivering the complex project.

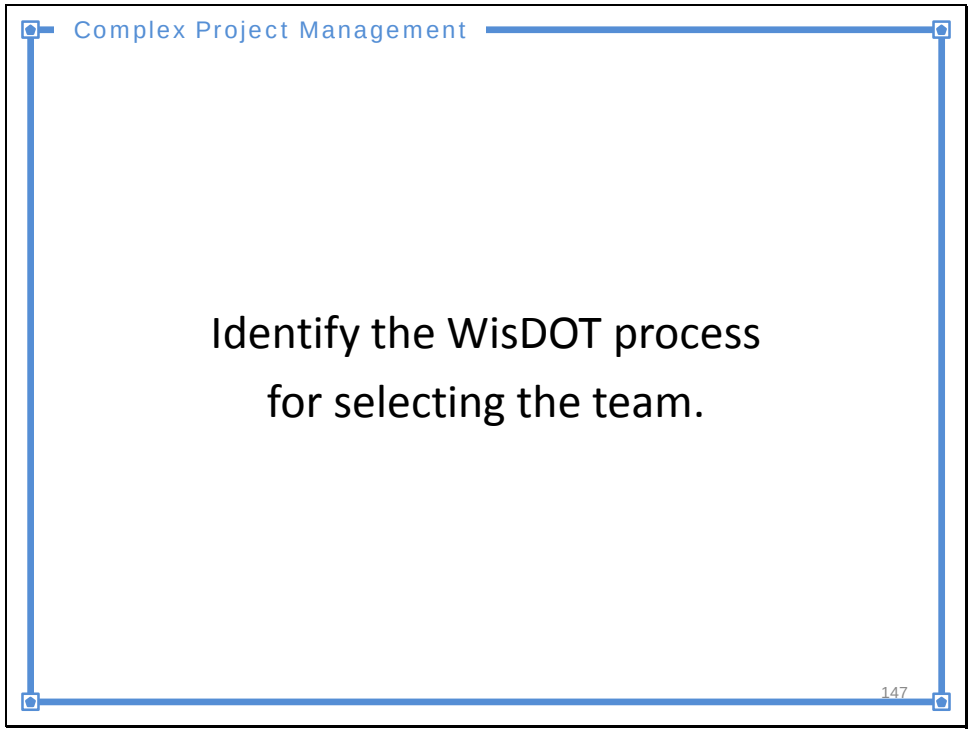
Background and Notes

Not only is having the right people important, but so is giving them the authority needed to effectively execute their responsibilities.

Guidebook Location

Section 3.3

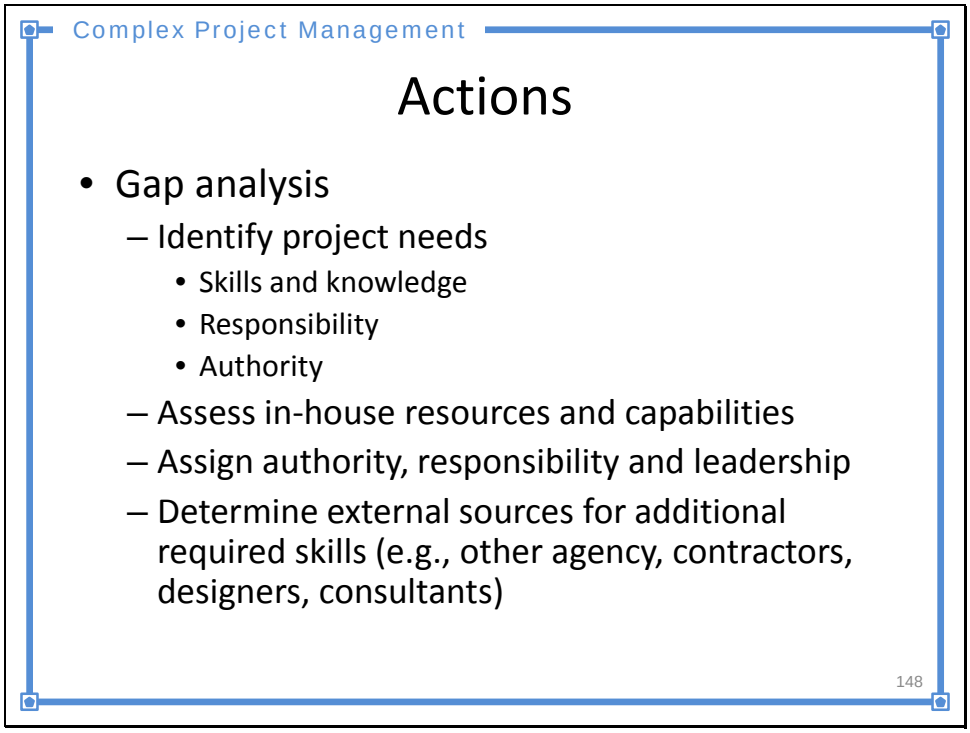
Slide 147



Key Message
Need to follow the WisDOT process for selecting a project team. If consultant resources are needed then time for consultant selection needs to be considered.

Background and Notes: This should be formalized to a degree such that the resources are identified, selected, communication occurs and responsibilities along with authority are all worked out.

Slide 148



Key Message
In order to identify who is needed on the project the requisite skills should be identified. For instance, a project that is tightly constrained financially may require someone who is fiscally responsible and understands money well -so maybe an MBA- and can say "no".

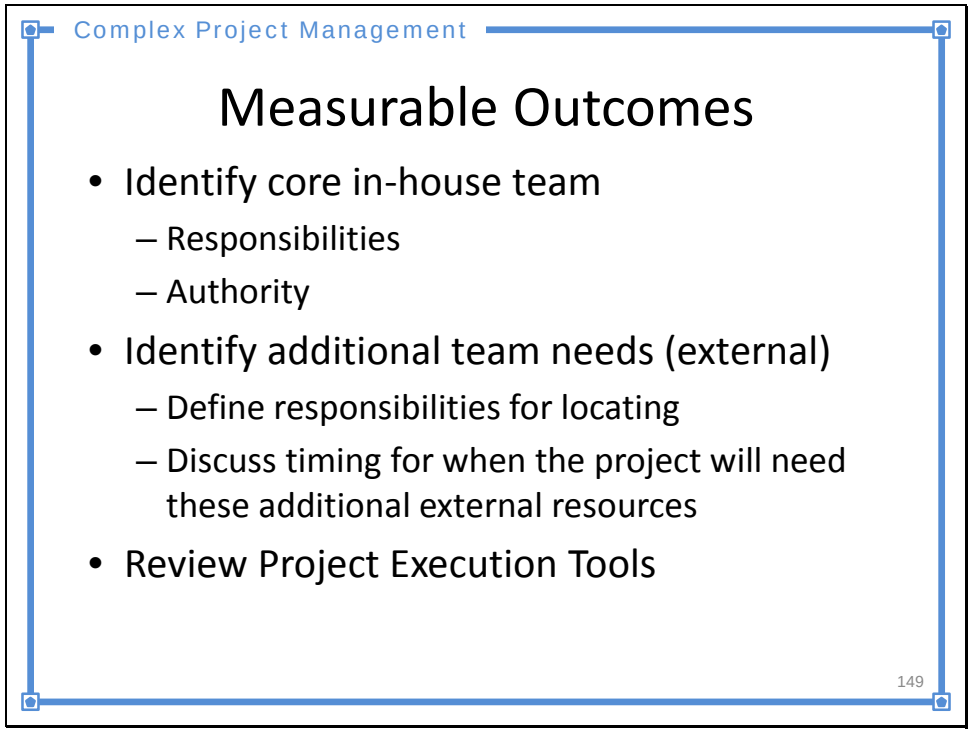
The complexity map/ complexity register and project success factors define the "ideal state", and the existing resource availability defines the current state. Methods 2 is intended to bridge the gap on the human resource (team members) part of the Project Management Plan.

Background and Notes
This gap analysis will inform the procurement plan described in Method 3, as any gaps in required skill or knowledge will need to be added to the team through contracts.

Gap analysis involves identifying your future needs and analyzing your current options to meet those needs. Once you have identified the "gap" between your current resources and what you will need in the future, you can identify what you need to do meet your needs.

Guidebook Location
Section 3.3

Slide 149



Key Message
The outcomes of this activity to start are at a minimum a list of desired skills. Once this is developed names or organizations need to start being filled in for who will fulfill that role/fill that skill need. While this is being done the responsibilities also need to be defined. Additionally, authority needs to be given to appropriate parties so that they can efficiently fulfill the role they are given.

Background and Notes
In addition to contracting, the project team needs to clearly assign risks and responsibilities for critical project outcomes. Finally, and perhaps most importantly, the project team needs to establish authentic authority for project decisions, including written support from top agency leaders.

Complex projects, especially those that are executed under accelerated schedules, can be very disruptive to standard human resource flows. For example, if an agency has a $500 million annual highway program, and launches a $500 million dollar project with a 2-year schedule, their staffing will be stretched very thin. Putting teams together for complex projects must be done with an understanding of the on-going program needs within the agency.

Guidebook Location
Section 3.3

Slide 150

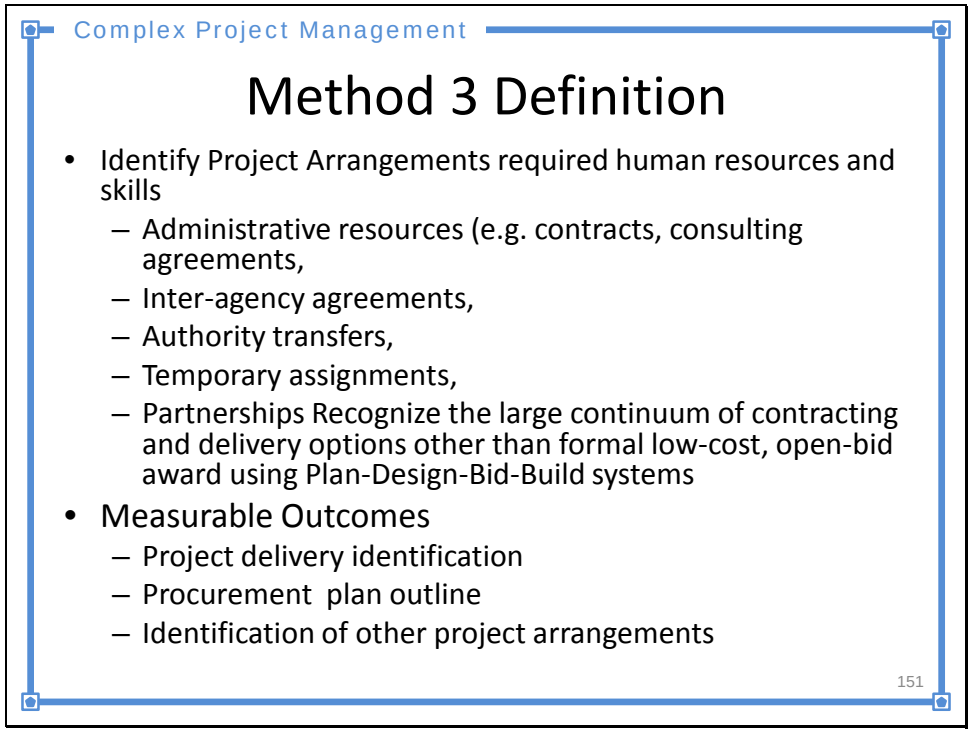
Key Message
Selecting project arrangements really works in parallel with assembling the project team, it is hard to do one without doing the other.

As the project team is assembled, different arrangements (contracts, MOU's, legislation, agency agreements, stakeholder reviews) will be needed for bringing required skill sets to the team or getting buy-in from key stakeholders.

Background and Notes
Methods 2, 3, and 4 are the resource allocation parts of 5DPM. Once complexity is understood and critical success factors defined, they guide the resource decisions made during Methods 2-4. Also, the numbering is somewhat arbitrary and any of the three resource methods could be done first.

Guidebook Location
Section 3.4

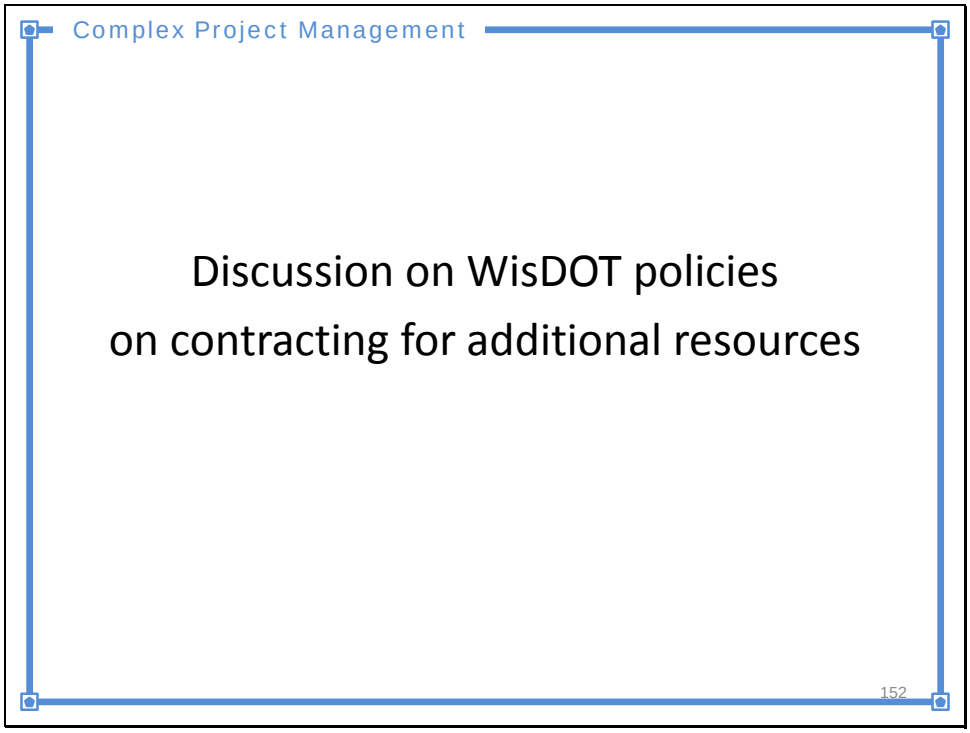
Slide 151



Key Message
Method 3 is one of three resource allocation methods in the complex management plan. Method 3 is intended to help the project team identify administrative resources **(primarily procurement and delivery methods)** that are best suited to the project and are most likely to facilitate project success.

Guidebook Location
Section 3.4

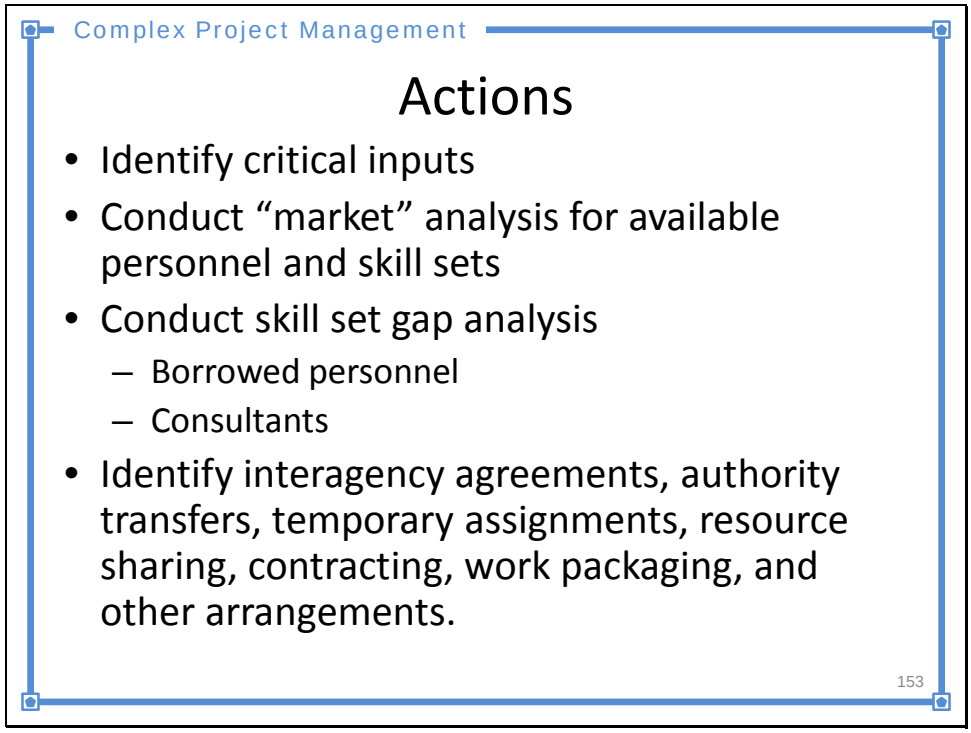
Slide 152



Key Message
Need to decide early on how the contract will be administered. Also, will this be for in-house delivery or consultant delivery?

Background and Notes
Typically, WisDOT projects are design, bid, build. However, other delivery systems are available if needed to meet the needs of the 5 dimensional analysis.

Slide 153



Key Message
Project arrangement selection is based on critical success factors from the first method and relating this to a needs analysis.

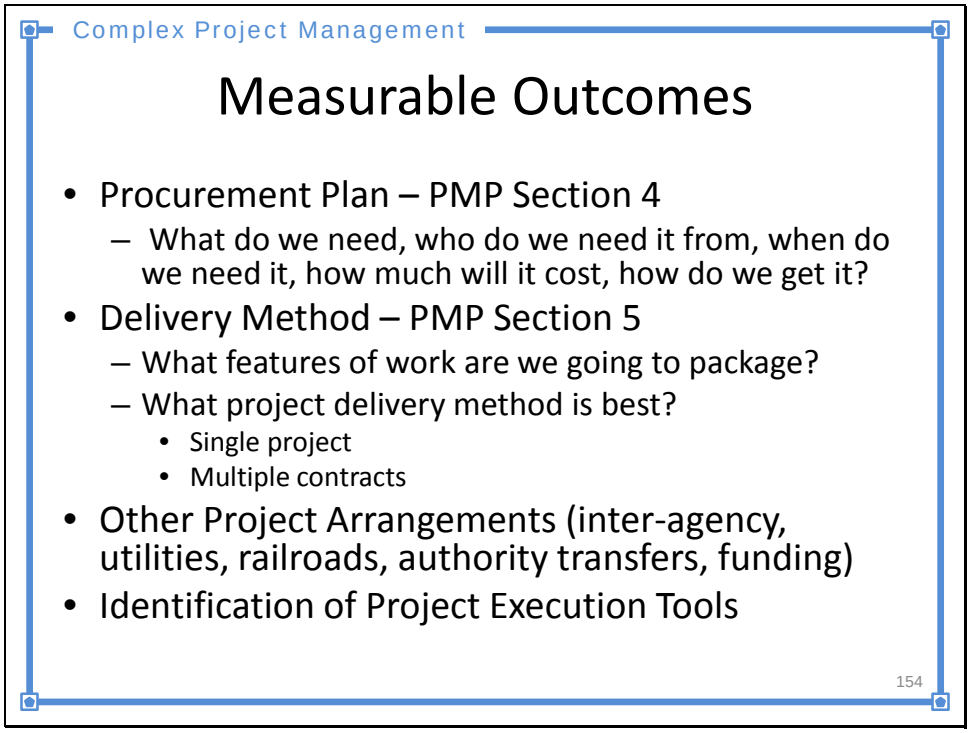
Market analysis is the first step in the procurement plan and involves identifying which organizations have the required skills and qualifications to handle the complexity of the project, determining the cost of acquiring that knowledge, skill or service, and understanding how bundling of work packages will affect the depth of the provider pool.

Background and Notes
The needs analysis should look at the scope of the project. The inputs are used to develop an overall procurement plan for the services (public relations, specialty consulting, financing, design, construction, etc.) needed to achieve project success. The inputs are also considered in "packaging" services into project-specific delivery methods, such as design-build, construction management general contracting, design-supply, design-build-operate-transfer, and public private partnerships.

A market analysis studies the attractiveness of a specific market within a specific industry. Key factors in a market analysis include the market size, market trends, market growth rate, market opportunity, market profitability, industry cost structure, distribution channels, key success factors, and key success details.

Guidebook Location
Section 3.4

Slide 154



Key Message
The outcomes of Method 3 are the selection of project execution tools that support project success.

Background and Notes
Once the service packages that best support project success have been defined, specific contracts and administrative systems can be developed. The outcomes of Method 3 are the selection of project execution tools that support project success.

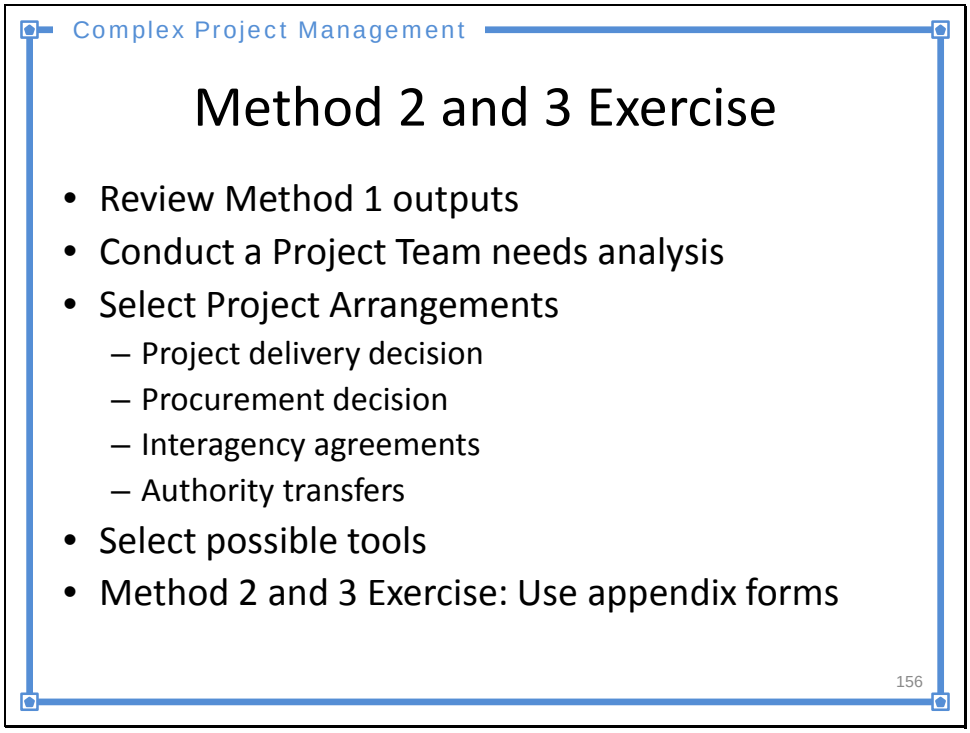
Guidebook Location
Section 3.4

Slide 155

Key Message

This module focuses on practicing how to identify the need for additional resources or the type of delivery systems to select to meet the critical dimensions.

Slide 156



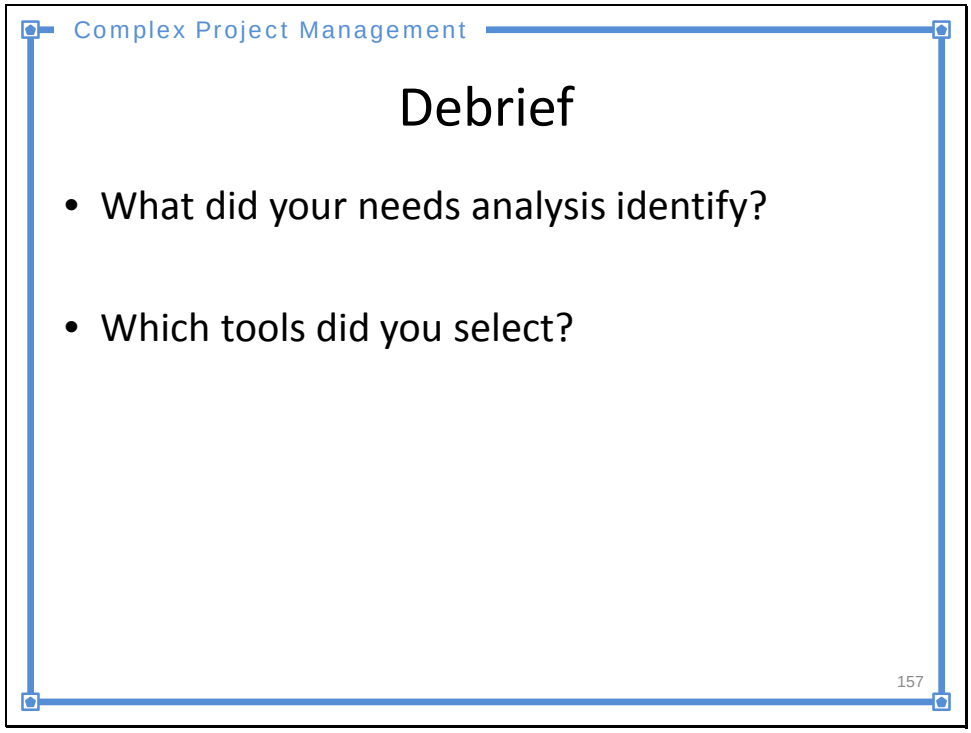
Key Message
The above bullet points show what needs to be done in order to move forward with the project and determine who will play critical roles during the life of the project.

Background and Notes
- Review Method 1 Outputs: what are your critical success factors?
- Conduct a project team needs analysis: who are the best people to be on your team? Do you need to consult with someone with specific technical expertise? Do you need to include political leaders?
- Select Project Arrangements: the delivery method and procurement decisions are critical to the project. You want to make sure that you use the best fitting methods for your specific needs. You may also need to bring in outside personnel from other agencies on this project.
- Look over the 13 tools to determine which tools apply to your project.

Guidebook Location
Section 3.3-3.4

Interactivity
Complete the Exercise for Method 2 and 3

Slide 157

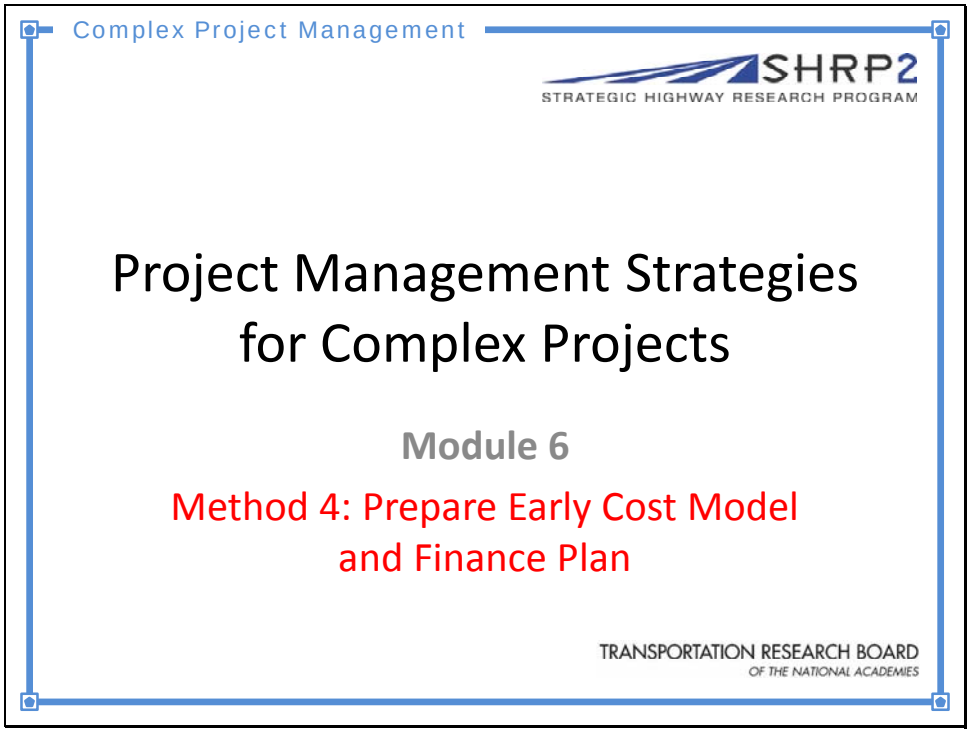


Key Message
Lead the team in a discussion of the questions listed above.

Background and Notes
Now that you have discussed Assembling Your Project Team and Selected your Project arrangements, you need to redraw a complexity map and re-configure your action plan. Have you discovered any new roadblocks or speed bumps? Who will you assign those tasks to? What is their plan solve the problems?

Guidebook Location
Section 3.4

Slide 158



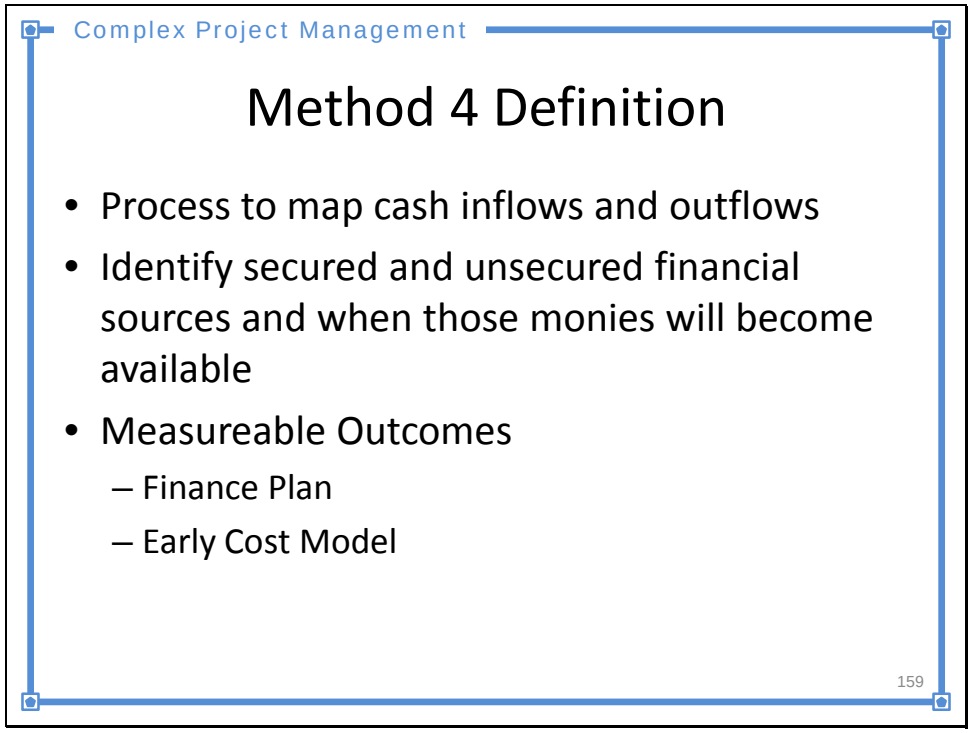
Background and Notes

Methods 2, 3, and 4 are the resource allocation parts of 5DPM. Once complexity is understood and critical success factors defined, they guide the resource decisions made during Methods 2-4. Also, the numbering is somewhat arbitrary and any of the three resource methods could be done first.

Guidebook Location

Section 3.5

Slide 159



Key Message
Understanding the financial model, where the monies are coming from, where costs are being expended, and the limitations on design and context flexibility imposed by financial resources are important to project success.

Background and Notes
The cost model will be built on a number of assumptions regarding the technical, financial, and schedule requirements of each major feature of work.

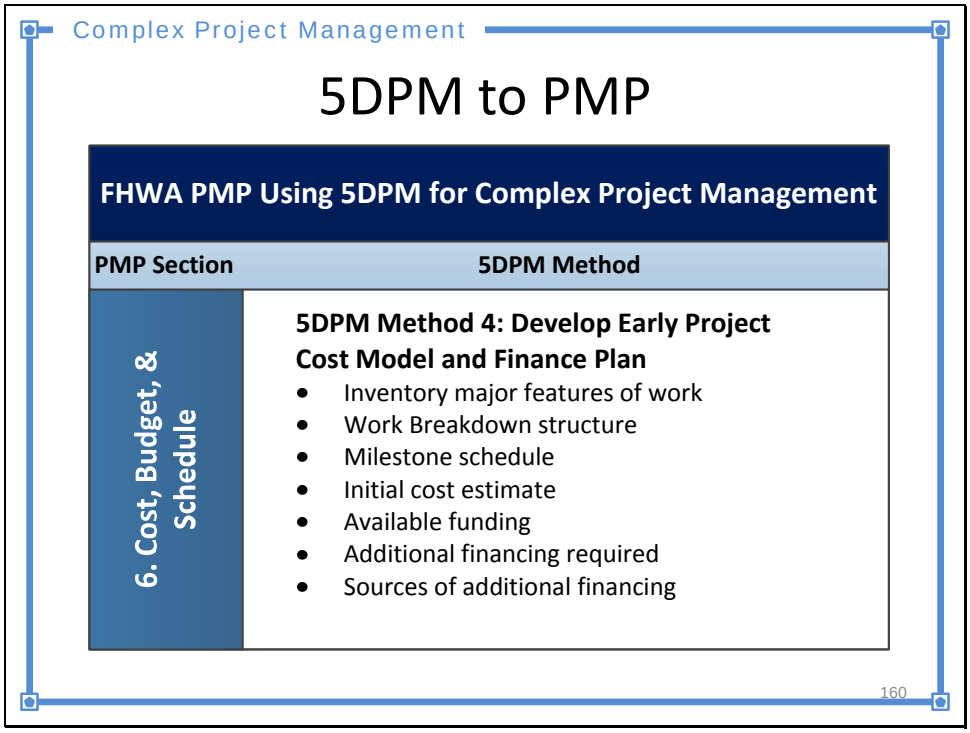
Quantifying cost and time allows the complex project manager to benchmark the assumptions made early in the process and, then, manage the project to realize those assumptions.

This acts as a project control tool during early stages of the project and creates a baseline against which progress can be measured.

Quantifying costs and time also acts to retard scope creep.

Guidebook Location
Section 3.5

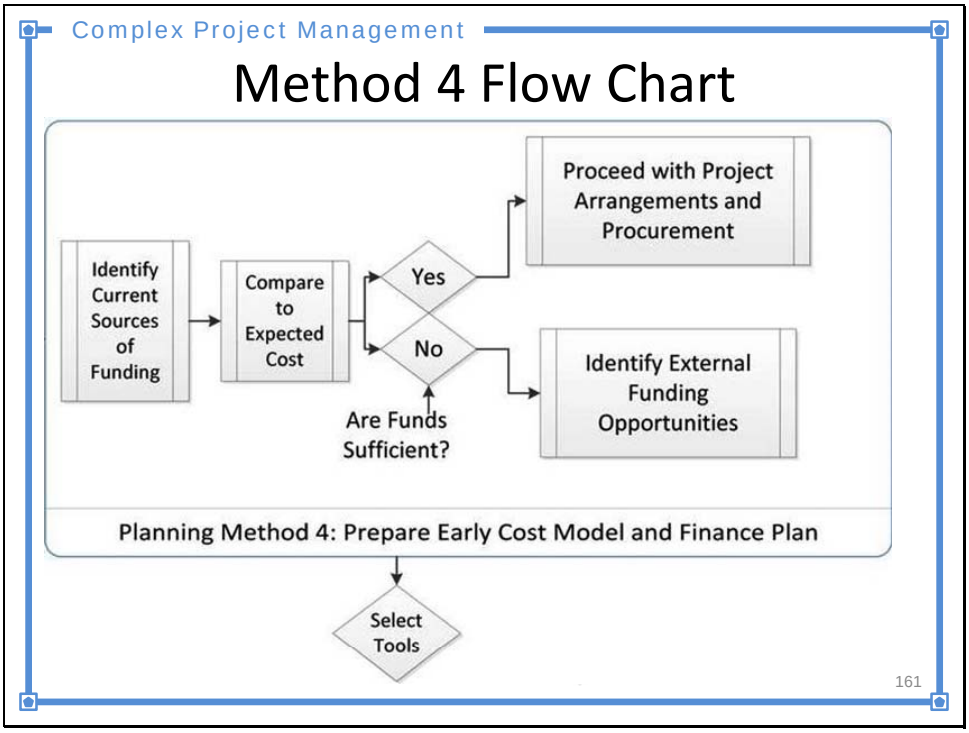
Slide 160



Background

The 5DPM method compares favorably with the FHWA PMP process utilized on Mega Projects over $500 Million. This sections breaks out the comparison of 5DPM to PMP on the cost budget and schedule aspects of a federal plan. The 5DPM process is adaptable to projects less than $500 million.

Slide 161



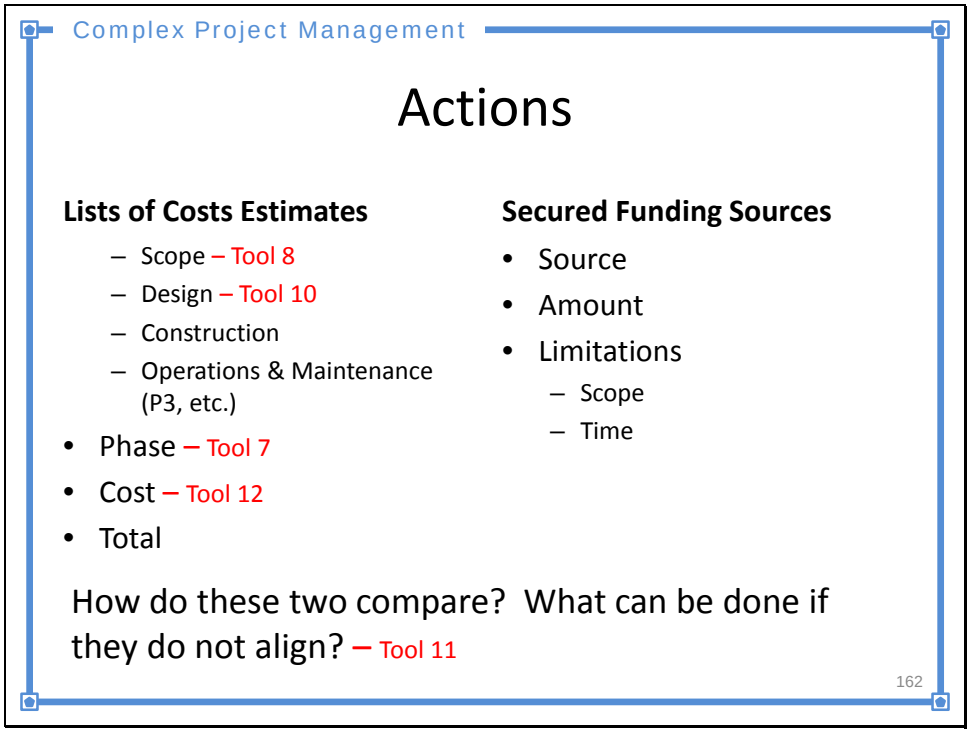
Key Message
The sufficient/insufficient funding available is the key link in the flow chart.

Background and Notes
When funds are not available in the proper amount or by the required time, complexity increases.

Major impact is scope of work
- Need to revisit
- Separate requirements from “desirements”

Guidebook Location
Section 3.5

Slide 162



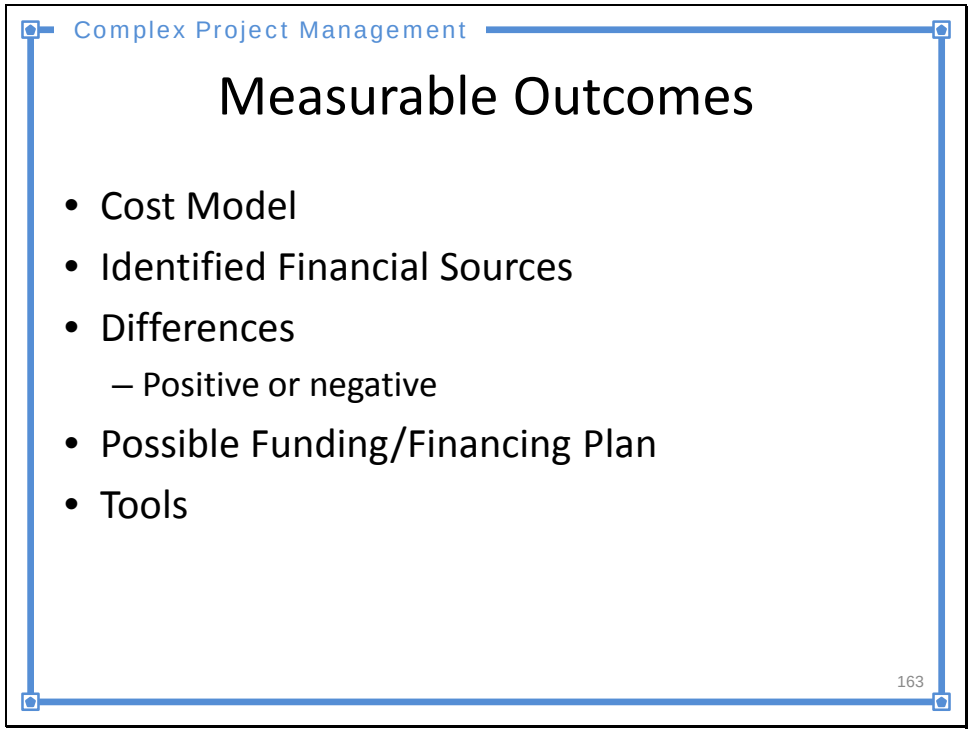
Key Message
The actions require comparing available funding to funding needs to determine gaps.

Background and Notes
The inputs are used to identify all current available sources of funding. These sources should have a high degree of certainty. The next step is to compare the available funding to the expected cost and scope of the project. If the available resources are sufficient, the project team can incorporate the funding flows into the procurement plan and develop a relatively straight-forward cost model using standard project management tools, such as resource-loaded CPM schedules, earned-value analysis, or cash-balance-linked project draw schedules. However, if available project funding is insufficient, the project team must look for additional external funding sources or adjust the project scope or develop a phased approach to fit available funds.

Tool Legend
Tool 7-Determine Work Packages and Sequencing
Tool 8- Design to Budget
Tool 10-Establish Flexible Design Criteria
Tool 11-Evaluate Flexible Financing
Tool 12- Develop Finance Expenditure Model

Guidebook Location
Section 3.5

Slide 163



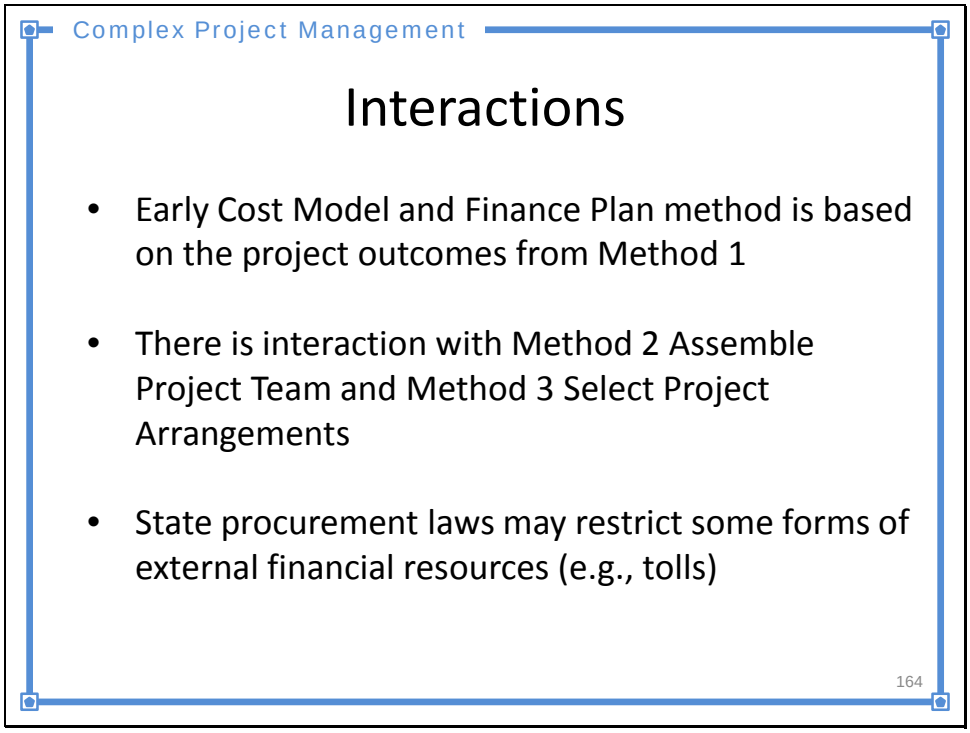
Key Message
The outcomes of Method 4 are the selection of project execution tools that support project success.

Background and Notes
The cost model must be developed against the assumed financing plan. If individual financial sources have constraints on their use, those items in the cost model must be developed to stand alone.

For example: A county contributes an amount of money to pay to upgrade the storm drainage on the project site. The model will need to identify the base costs and the cost to upgrade for future development.

Guidebook Location
Section 3.5

Slide 164



Key Message

The Prepared Early Cost Model and Finance Plan method is based on the project outcomes from Method 1, but there is also interaction with Method 2, Assemble Project Team, and Method 3, Select Project Arrangements. These interactions have an impact on both the inputs and outcomes of this method.

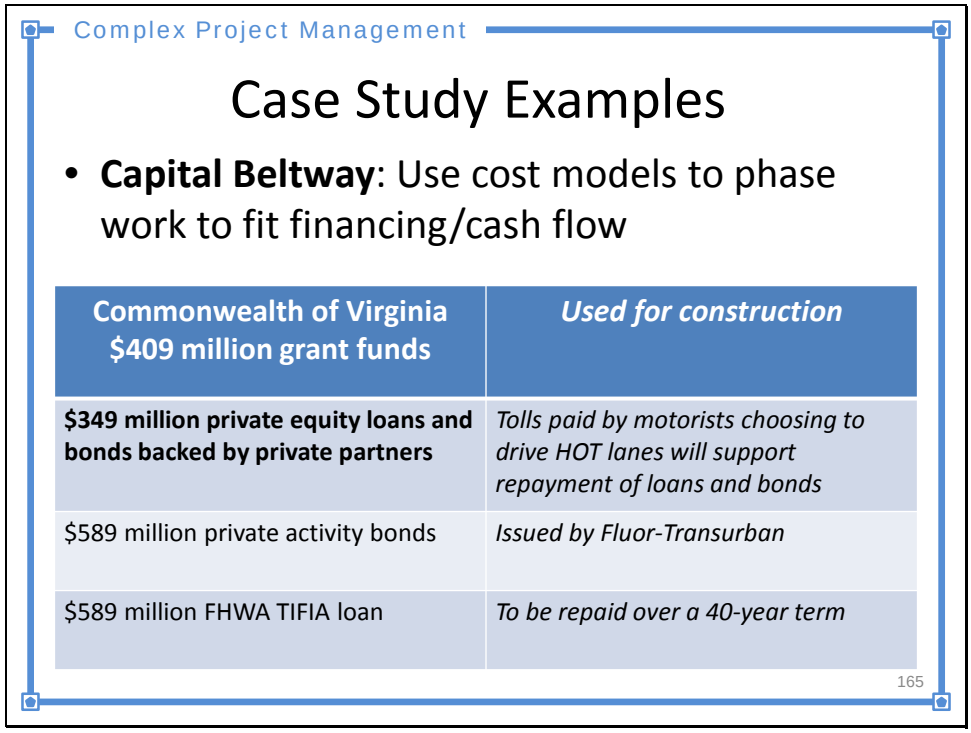
Background and Notes

Methods 2, 3, and 4 may all be considered at the same time, as there is some interaction between the three. The project arrangements may influence what the cost model and finance plan look like, and the cost model and finance plan may dictate to some extent the project arrangements. The cost model or finance plan may impact who is on the project team, and the cost model and finance plan needs to take into account all of the in-house resources, as well as the resources being hired. The methods are not mutually-exclusive and an iterative process may need to happen to get all the right pieces in the right place.

Guidebook Location

Section 3.5

Slide 165



Key Message
As can be seen from the table, this project used several different ways to finance the costs of the project. The cost of financing is also something that needs to be kept in mind on complex projects.

Background and Notes
When financing and design are included, the total awarded value of the project reaches $2.2 to 2.4 billion.

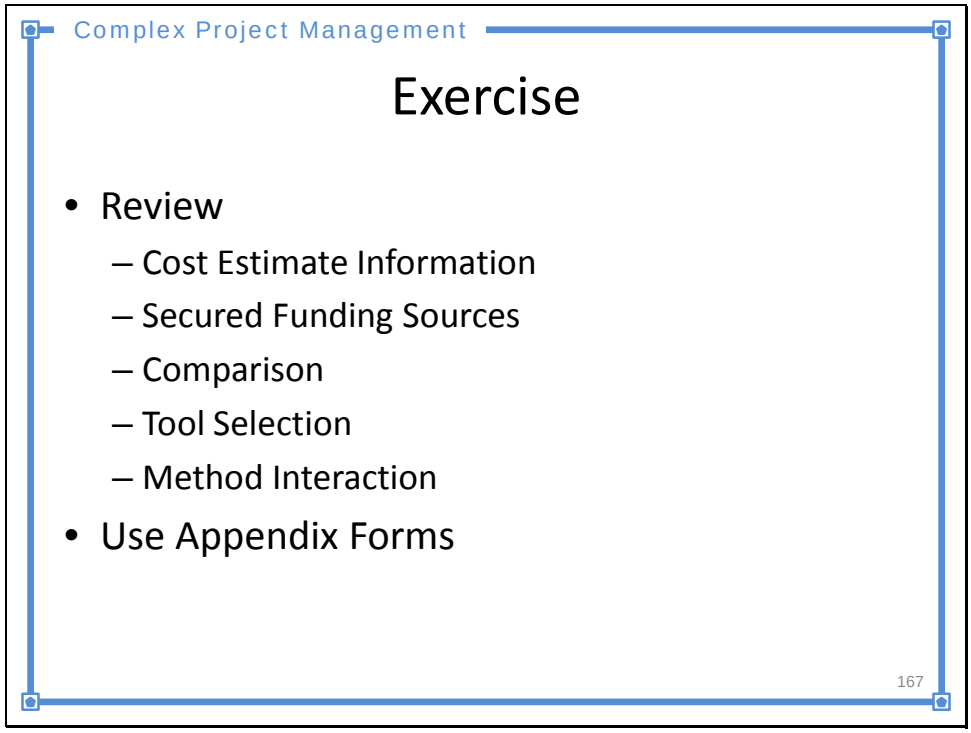
Guidebook Location
Section A.1

Slide 166

Key Message

This module will provide exercises on how the project financial picture impacts other dimensions that the project manager needs to consider especially if this area is a key dimension. Understanding how the financial dimension affects other project issues is necessary and often overlooked.

Slide 167



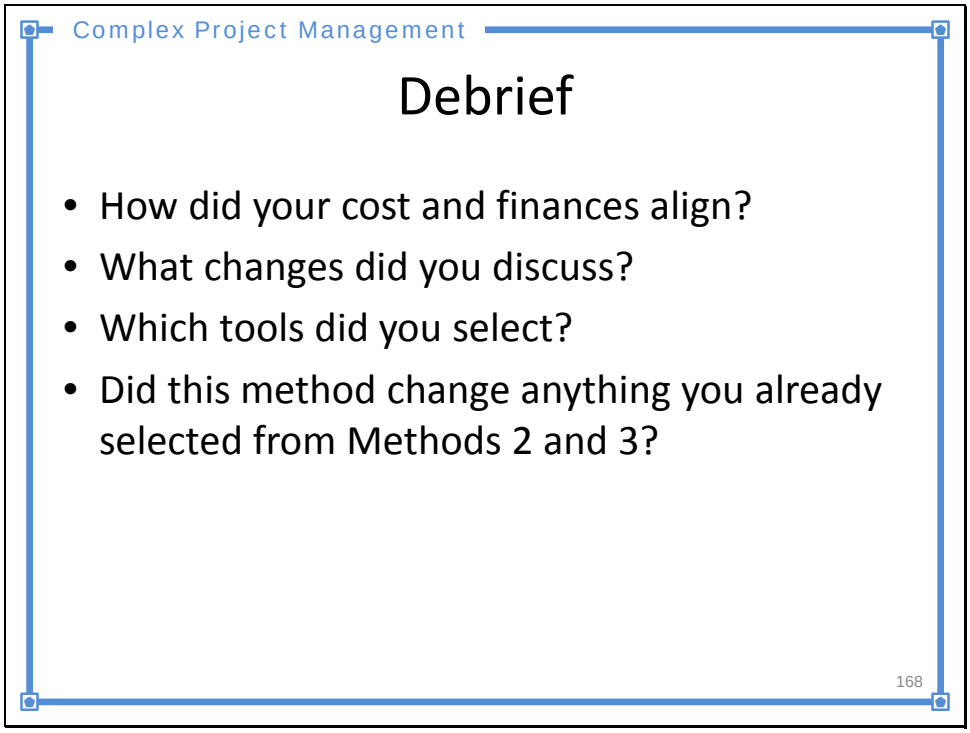
Key Message
The above bullet points show what needs to be done to ensure that your project can proceed with the assurance of enough financial resources to complete the project.

Background and Notes
On complex projects, it is important to first start with a realistic cost estimate.
Next, it is important that the agency can secure enough monies to pay for the entire project.
Next, the agency should compare the cost estimate to the financial resources that they have secured. If the agency doesn't have enough monies secured, they will need to find other sources of funding and/or financing.
The agency can use some of the tools to help ensure they have enough monies for the project.
It is also important to remember that Methods 2, 3, and 4 all interact with each other.

Guidebook Location
Section 3.5

Interactivity
Complete the Method 4 Exercise!

Slide 168

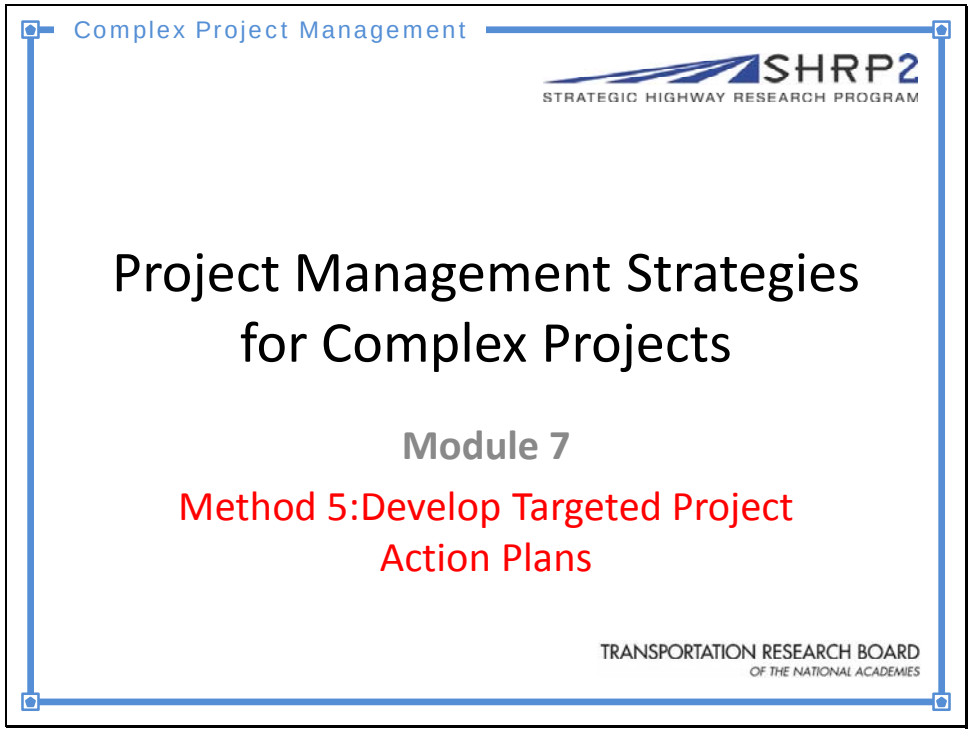


Key Message
Lead the team in a discussion of the questions listed above.

Background and Notes
Now that you have discussed your cost model and finance plan, you need to redraw a complexity map and re-configure your action plan. Have you discovered any new roadblocks or speed bumps? Who will you assign those tasks to? What is their plan solve the problems?

Guidebook Location
Section 3.5

Slide 169

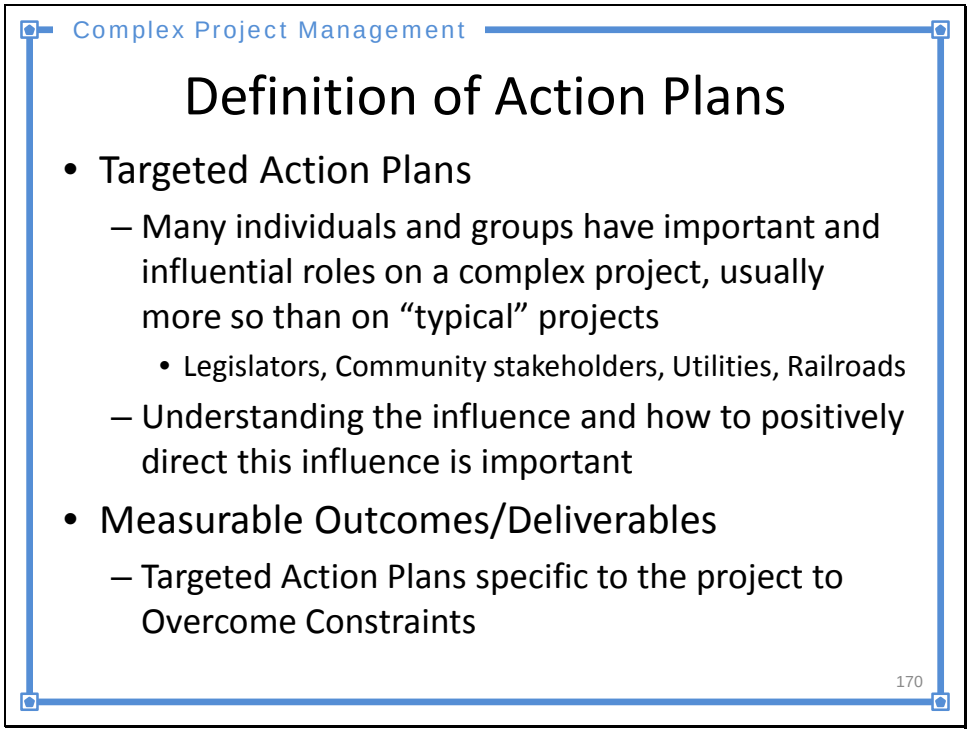


Key Message
The development of targeted action plans is the path to getting issues resolved that are identified throughout the process of project development. The outcome of this activity is to know what issues you have, who is responsible for following up on that issue, and any other critical bits of information.

Even though this module is labelled 5 (and last) action planning takes place throughout the 5DPM process. At the end of Module 5, however, there should be a written summary of the plan and required action items that can be developed into a formal Project Management Plan.

Guidebook Location
Section 3.6

Slide 170



Key Message
The specific targeted plans that are identified are needed to address specific critical measurable outcomes of success and will often stem from restrictions on resources.

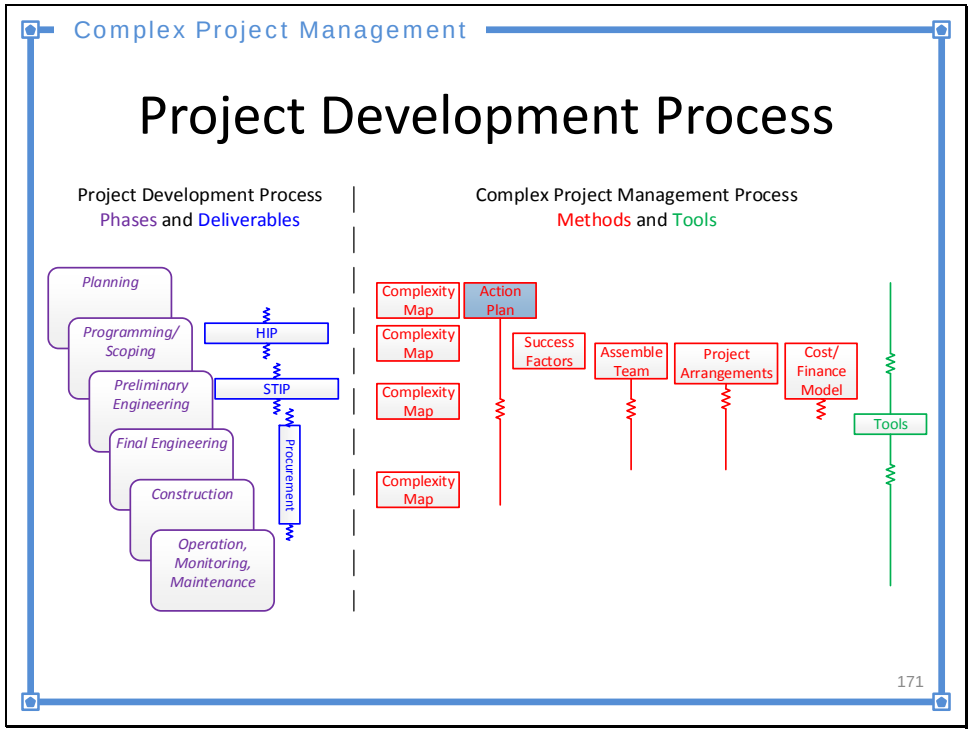
Within the overall Project Management Plan, there will be targeted action items that are critical to success, such as changes in legislation, development of new procurement procedures, agreements with utility companies and/or railroads, etc. These are not different than project management planning but are given special treatment in Module 5 because they are often key to project success

Background and Notes
The issues that can be identified are numerous but there should be an effort made to identify the issues that are the most important and may stop the project or severely limit the project in some way. Some examples are the Legislators, etc.

One of the project team objectives should be how to take what can sometimes be a negative influence, i.e. community stakeholders, and get them on board and on the project team so they can have a positive impact, rather than a negative impact.

Guidebook Location
Section 3.6

Slide 171



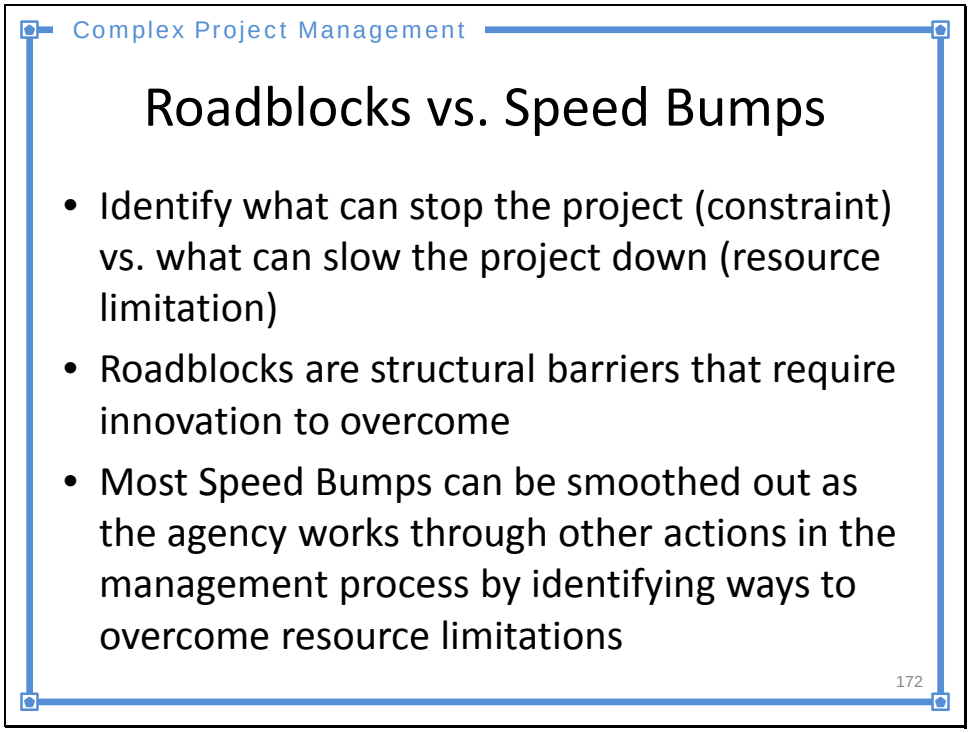
Key Message
The shaded box indicates where Action Plan(s) fits into the different phases of the project development process.
Remember, an Action Plan needs to be developed every time a complexity map is developed.

Background and Notes
The phases of the Project Development process are designed to be generic to try to fit the models of various state agencies. Note that your specific agency may use slightly different order or terminology for the various phases. The major deliverables (i.e. The Highway Improvement Program (HIP), State Transportation Improvement Program (STIP), and procurement boxes) are included in the diagram as standard occurrences that each agency can base their specific project development schedule around.

Walk through the project development process and note where the action plan box falls. Note that it is not only at one specific location, action plans can be identified throughout project development and can be executed throughout project development (the reason for the line). An effort should be made to identify as many of the constraints and develop the action plans early in the project development process. This can start with the first time the project complexity is mapped. Your project development process may look different, and complex project development may be handled differently in your agency, but the concepts should be transferable.

Guidebook Location
Section 3.6

Slide 172



Key Message
Once the constraints have been identified throughout the project development and management process they can be characterized. There are two different characterizations, 1. Roadblocks, and 2. Speed bumps.

Speed Bumps can be managed through creative approaches to resource limitations such as innovative financing, alternative delivery or procurement, or teaming arrangements, whereas roadblocks cannot be overcome with additional resources but instead require structural change.

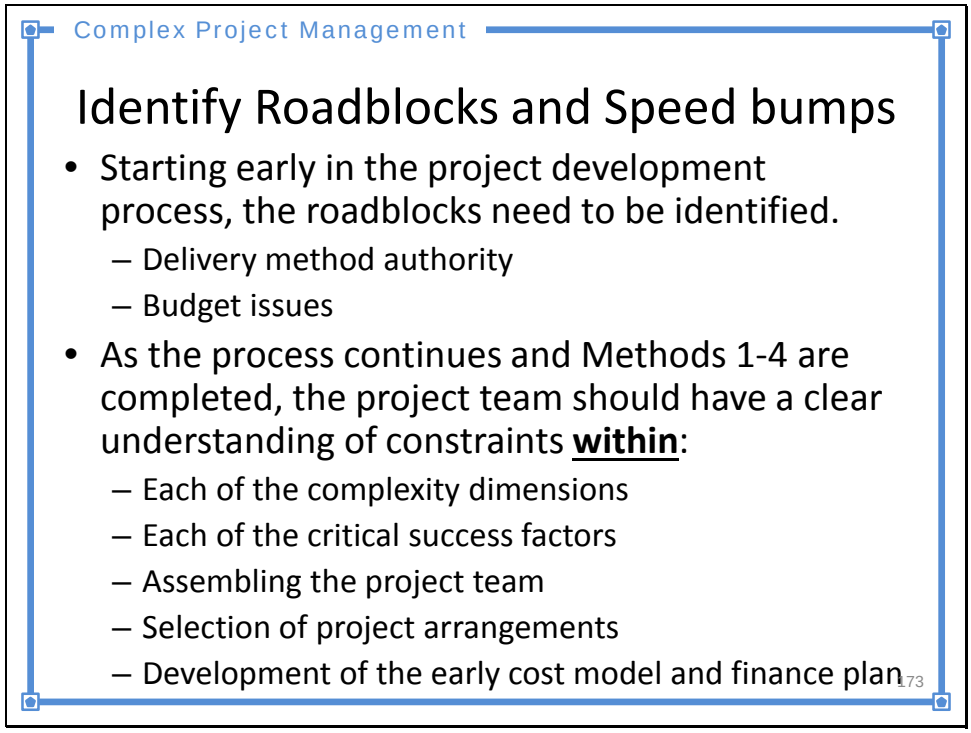
Managing the roadblocks and speed bumps is really risk management. The roadblocks and speed bumps should be entered into the project risk register.

Background and Notes
A roadblock is a constraint that can completely stop the project. These are issues that unless they are resolved the project is not moving forward, an example might be enabling legislation or a funding authorization.

Speed bumps are constraints but they do not stop the project and are more resource limitations to the project, for instance, having the right project manager. These issues, or speed bumps, may be smoothed over by the other actions in the management of the project.

Guidebook Location
Section 3.6

Slide 173

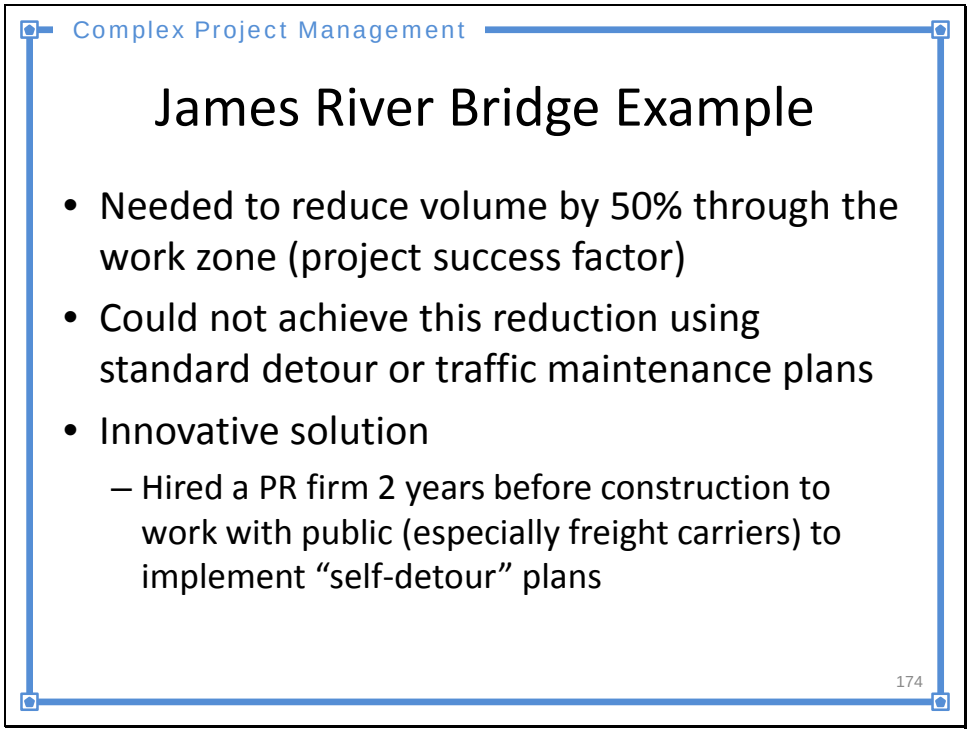


Key Message
Roadblocks and speed bumps need to be evaluated throughout the entire project development process in conjunction with the complexity map. This also needs to be completed after each of the 4 methods are completed.

Background and Notes
Background information relates to developing the complexity map and Methods 1-4.

Guidebook Location
Section 3.6

Slide 174



Key Message
By first identifying a project success factor, the agency was able to use an innovative solution to help obtain that goal.

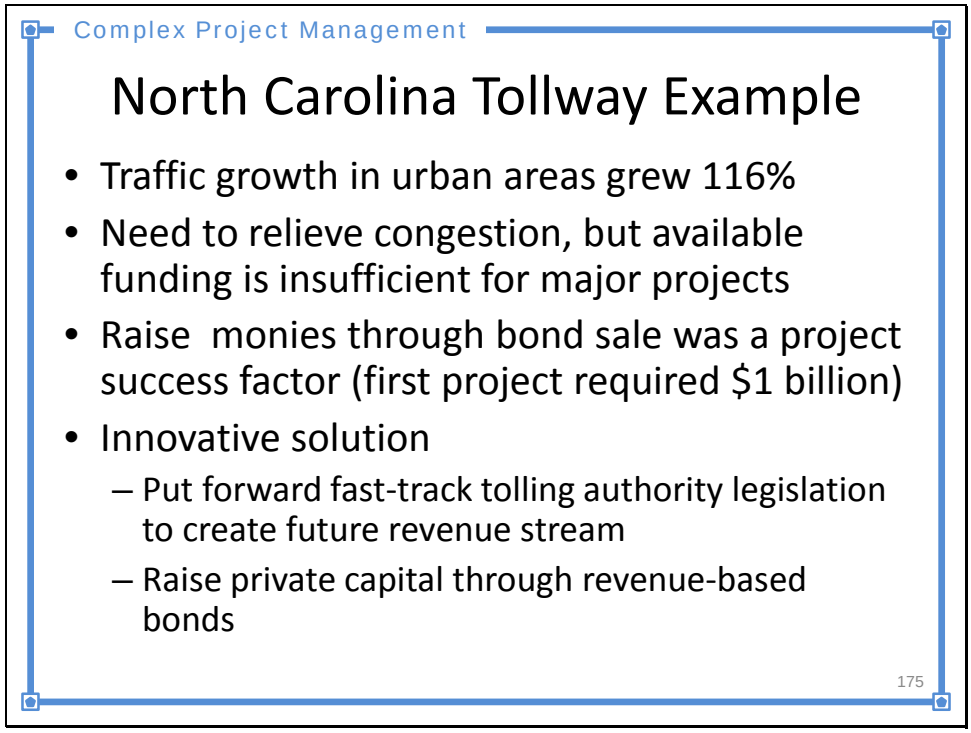
The key to success was early realization of the need to reduce traffic volumes as a "long-lead" item and treat it much like a material procurement. Find a source, get them on board early, and plan well ahead of time.

Background and Notes
Two years prior to construction, the public relations firm contacted interstate trucking firms that used this route and encouraged them to begin planning to reroute their trucks during the construction period.

One year prior to construction, message boards were placed throughout the corridor to announce the upcoming lane closures to the general public. Also, an article was released warning the commuters of the construction.

Guidebook Location
Section A.11

Slide 175



Key Message
The agency was able to use an innovative solution to ensure that they had an appropriate amount of money available.

Background and Notes
Funding for this project was a significant problem. It was identified that bonds would be sold in order to pay for the project. However, there was worry about how much to bond for and if not enough was bonded what would happen, would there be a partially completed project.

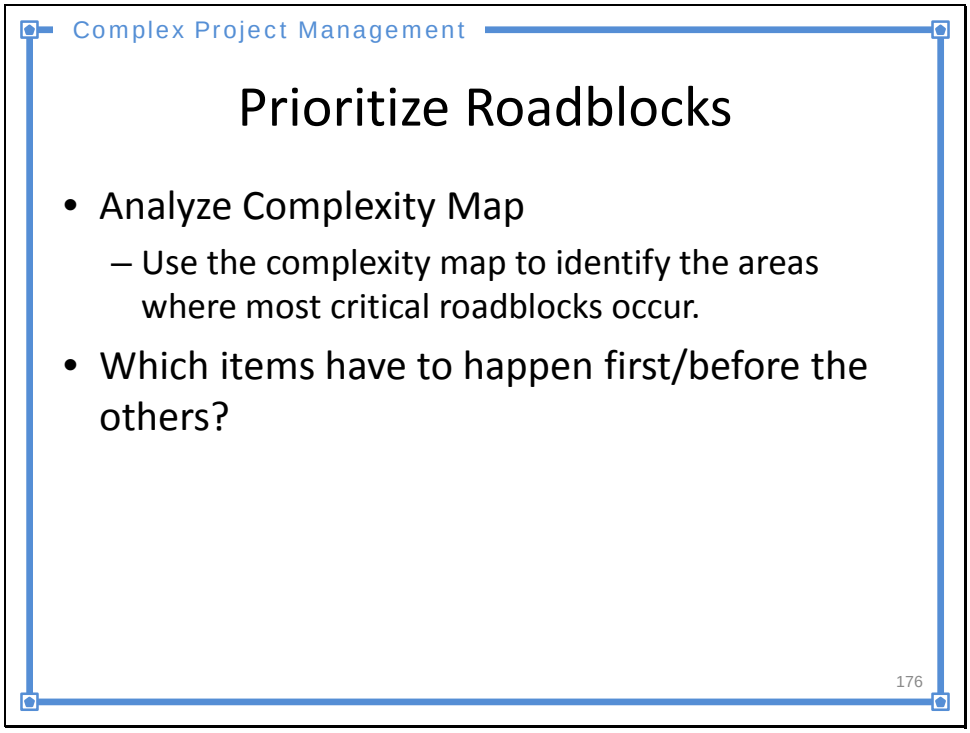
The solution for how much to bond was that the limit would not be set until the proposals where submitted, then there would be a fairly certain value.

The solution for what if the project went over was that the North Carolina Legislator agreed to pay for overruns on the project. This also enabled the bond rating to be better, which changed the interest.

The first solution, about not knowing the limit on the bonds while it makes since did cause another, unforeseen problem. Just as the proposals were due the bond market collapsed. To address this issue the authority worked with the winning bidder to hold their price for 1 year, rather than then normal 30 (or 60 days). A notice of award was issued so that it was agreed on who won and some work could start but the notice to proceed was not issued until later.

Guidebook Location
Section A.15

Slide 176



Key Message
Roadblocks should be identified and analyzed throughout the life of the project, preferably each time a complexity map is drawn. These “show stoppers” should be identified in the earliest stages of the project.

The roadblocks in the most critical complexity dimension will likely be the most important roadblocks. However, some roadblocks may need to happen prior to other road blocks being addressed, i.e., there may be no need to address a roadblock if another roadblock isn't cleared first.

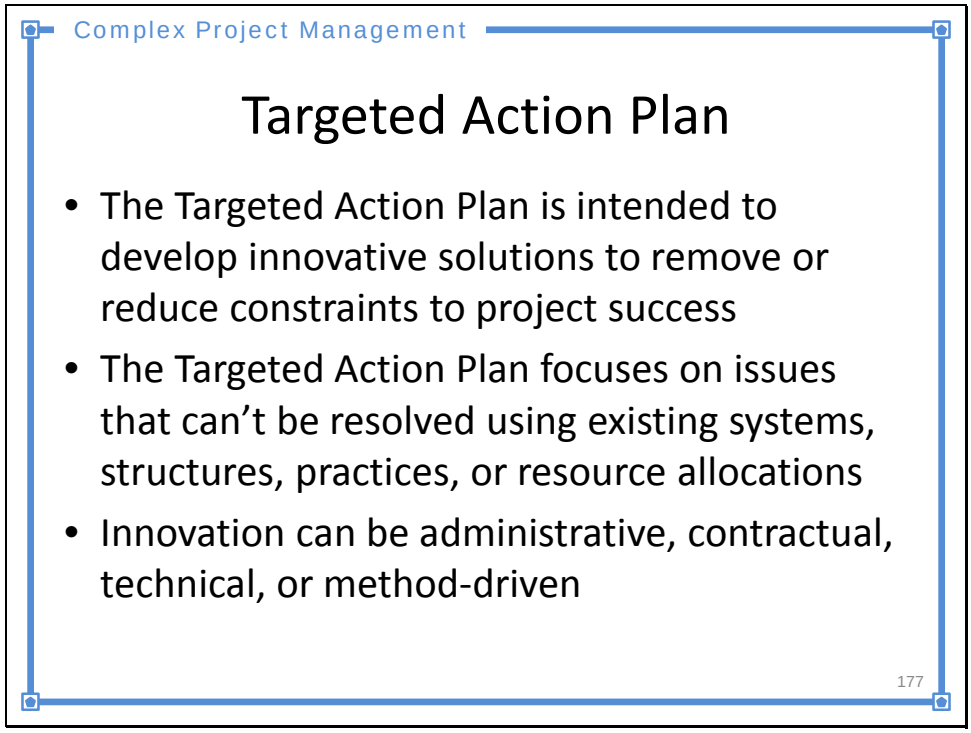
Prioritizing roadblocks is similar to creating a risk register. In the same manner that you have a list of risks in order of magnitude at the end of a risk register exercise, you will list all Roadblocks and assign a "criticality" rating (rather than a risk likelihood). Then, make sure the sequencing is correct.

Background and Notes
Emphasize that interactions drive decisions, not dimensions, and this is going to be iterative.
Circle your show stoppers.

Prioritize the roadblocks by filling out the most critical dimension first. This way you can ensure that your resources are being used to address the most critical aspects of the project.

Guidebook Location
Section 3.6

Slide 177



Key Message
The roadblocks and speed bumps with change throughout the life of the project as various issues are identified and overcome.
The targeted action plan the plan that the agency will use to address the various roadblocks and speed bumps.

Background and Notes
The targeted action is developed to address the roadblocks and speed bumps that were identified by the agency. Often times with complex project, innovative solutions will need to be developed since the issues have probably never been faced by the agency before.

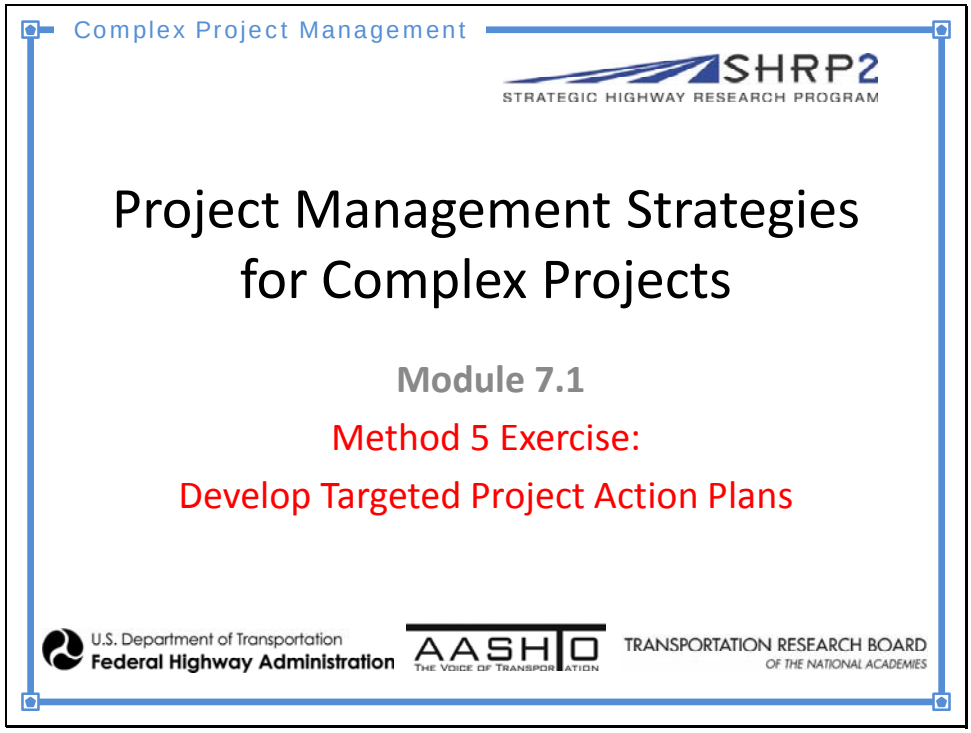
Note: any Roadblock requires a Targeted Action Plan, but a Speed bump may be managed through creative resource management as part of the general Project Management Plan.

Guidebook Location
Section 3.6

Summary

- 5DPM ***RESTRUCTURES*** the project team's thought process by:
  - Elevating context and finance to the same level as cost, schedule, and technical
  - Emphasizing parallel rather than linear project development
  - Early consideration of all factors that create complexity
- Planning ***methods*** and execution ***tools*** form the project delivery ***strategy*** for a given complex project's **PMP.**

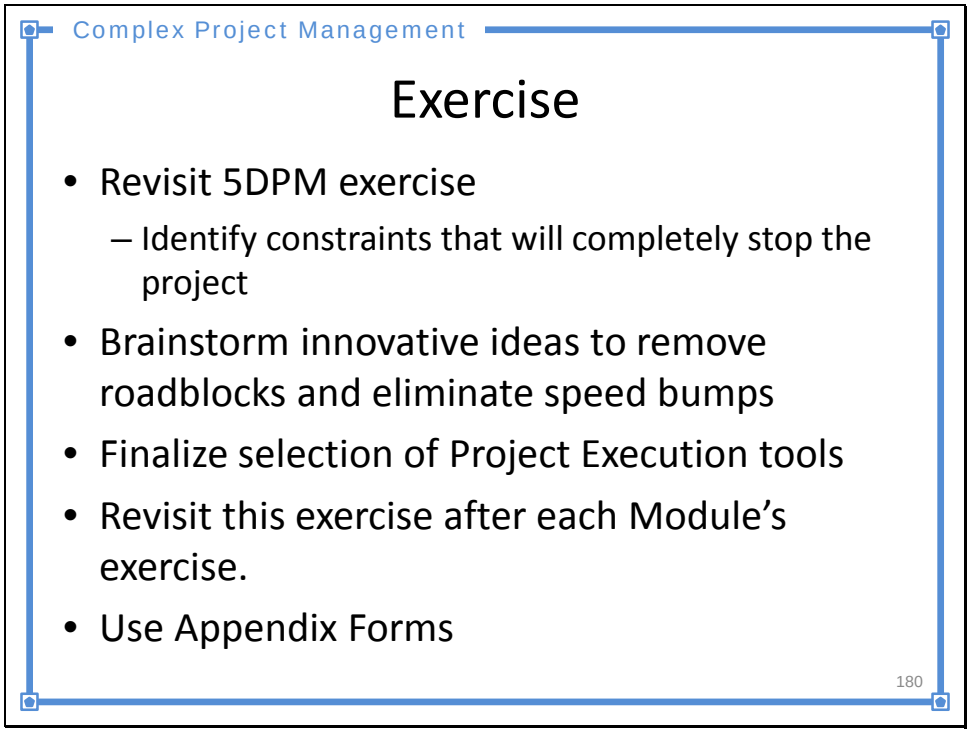
Slide 179



Key Message

This module provides an exercise on developing Targeted Action Plans according to the identified success factors and tools to solve complex issues in the priority dimensions of the project.

Slide 180



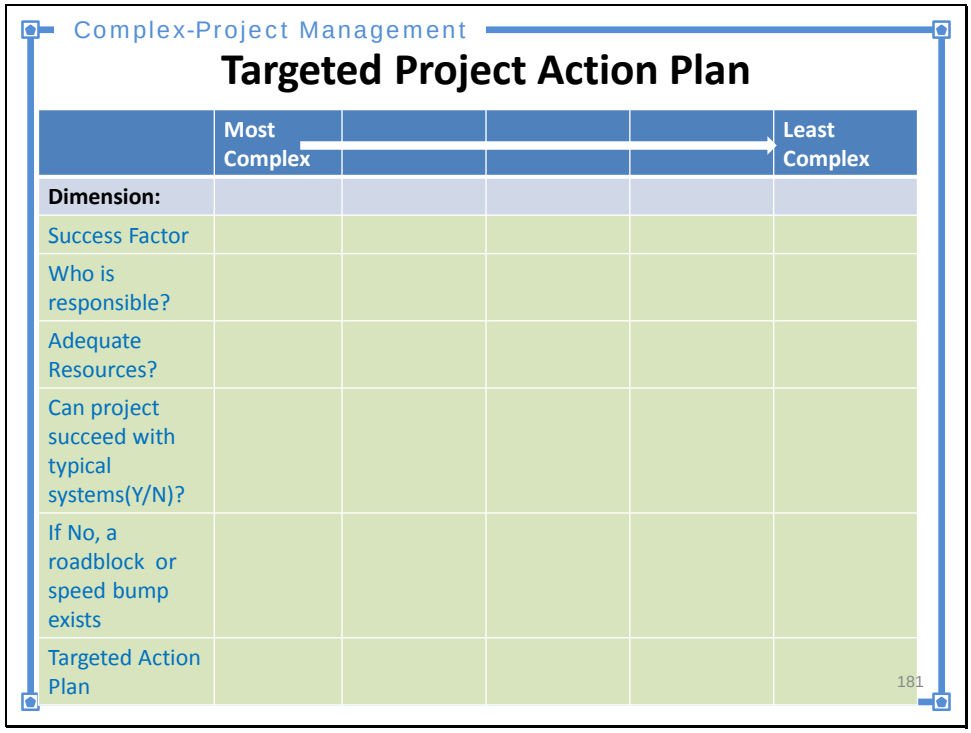
Key Message
The roadblocks and speed bumps need to be continually revisited until they are resolved.

Background and Notes
Use the complexity mapping exercise to identify where the highest amounts of complexity occur and what the roadblocks are. The complexity map will change as issues are resolved throughout the process.

Use the Modules 1-4 exercises to help determine where the roadblocks and speed bumps occur (if the exercise is being completed before completing Methods 1-4 base the discussion on the complexity map). Determine the actions needed to resolve these issues.
Remember, roadblocks need to be addressed early in the process so that the project can continue in a timely manner. Speed bumps may or may not need to be immediately addressed, but will need to be resolved at some point in time.

Guidebook Location
Section 3.6

Slide 181



Key Message

Use this table to determine what the targeted action plan for each roadblock or speed bump that exists. Remember, these will often need to be innovative solutions, so you will need to think outside of the box in order to overcome the obstacles in a complex project.
Remember that roadblocks are "showstoppers," and the project cannot continue until the roadblocks are resolved.

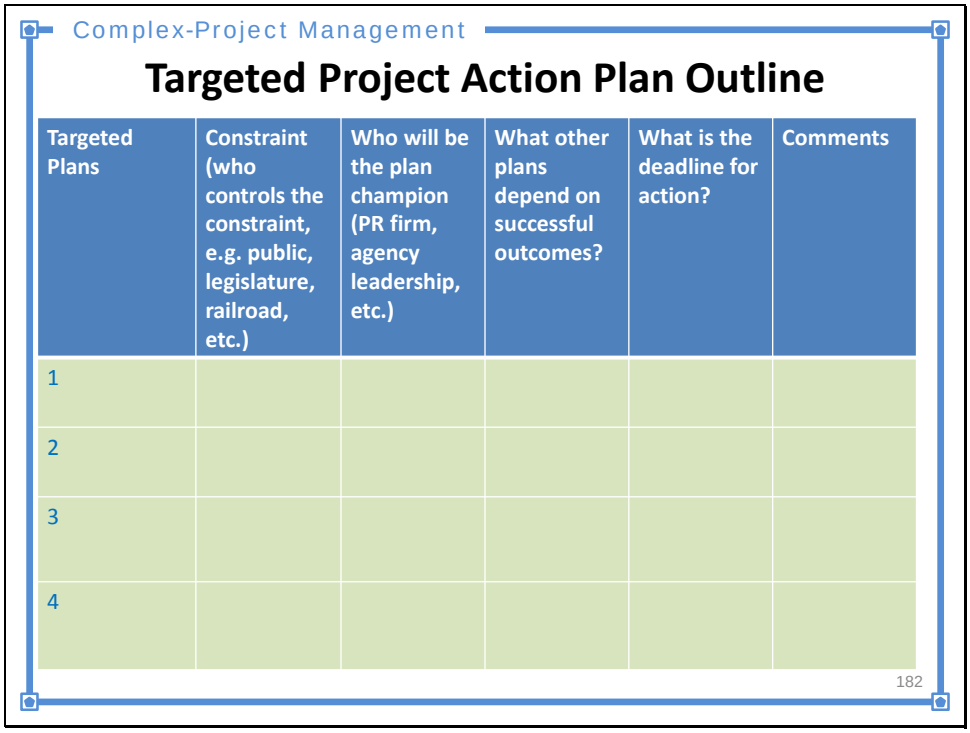
Background and Notes

Use this table to facilitate a brainstorming session, focusing on a specific project, to determine where the roadblocks exist. Use the complexity map to determine which dimensions are the most complex. Identify why the dimension was identified as the most complex.
DO you have adequate resources? Yes, continue. No, this is a roadblock.
IF the project cannot succeed with typical systems, an innovative solution needs to be developed.

Guidebook Location

Section 3.6

Slide 182



Key Message

Use this table to determine what the targeted action plan for each roadblock or speed bump that exists. Remember, these will often need to be innovative solutions, so you will need to think outside of the box in order to overcome the obstacles in a complex project.

Remember that roadblocks are "showstoppers," and the project cannot continue until the roadblocks are resolved.

Background and Notes

Use this table to facilitate a brainstorming session, focusing on a specific project, to determine where the roadblocks exist. Use the complexity map to determine which dimensions are the most complex. Identify why the dimension was identified as the most complex.

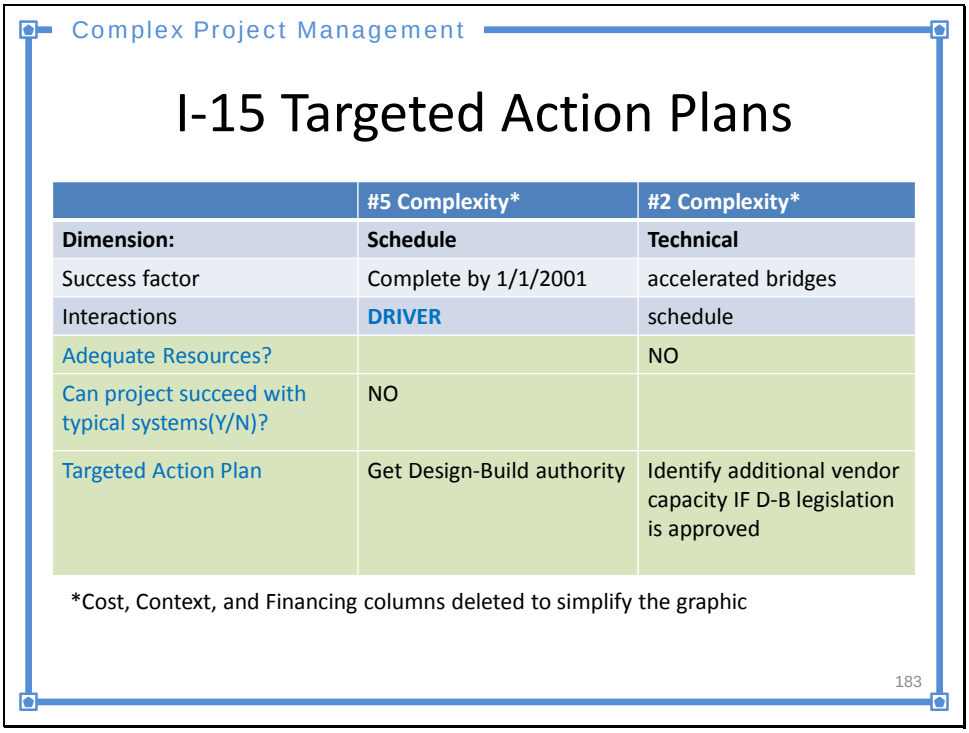
DO you have adequate resources? Yes, continue. No, this is a roadblock.

IF the project cannot succeed with typical systems, an innovative solution needs to be developed.

Guidebook Location

Section 3.6

Slide 183

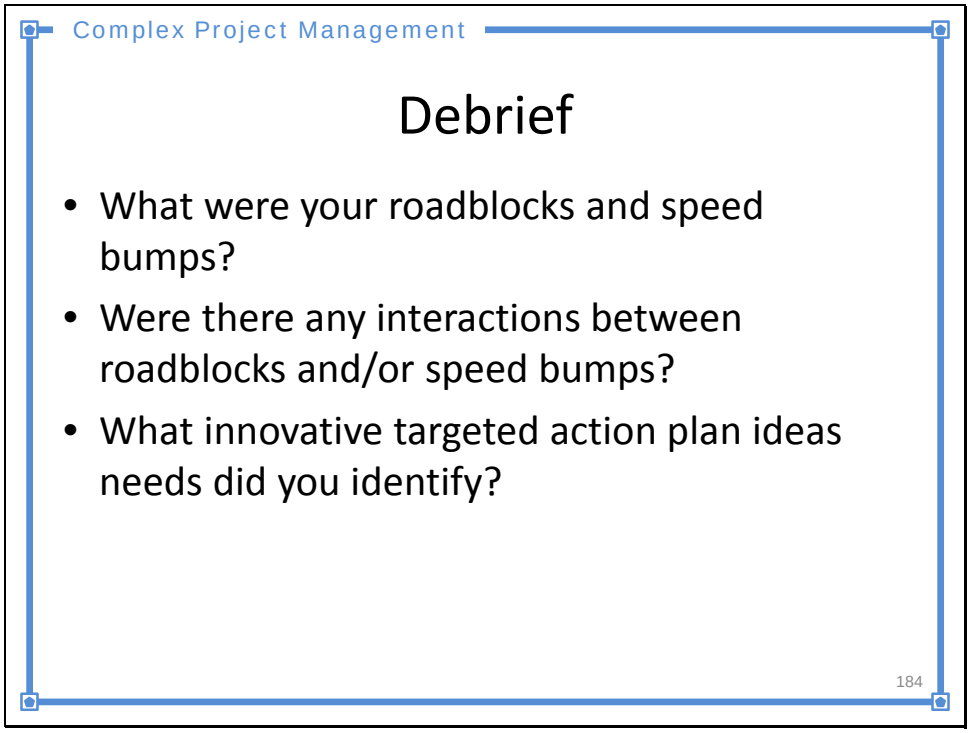


Key Message
In order for this project to proceed and be successful, innovative measures were taken.

Background and Notes
The Utah DOT used innovative ideas in order to complete this project on time. First, they needed to figure out a way to deliver the project faster than the typical DBB process, so they decided to use the innovative project delivery method of DB. In an effort to deliver the project even faster, they wanted to use an innovative way to construct all the bridges required in the corridor.

Guidebook Location
Not included in the Guidebook.

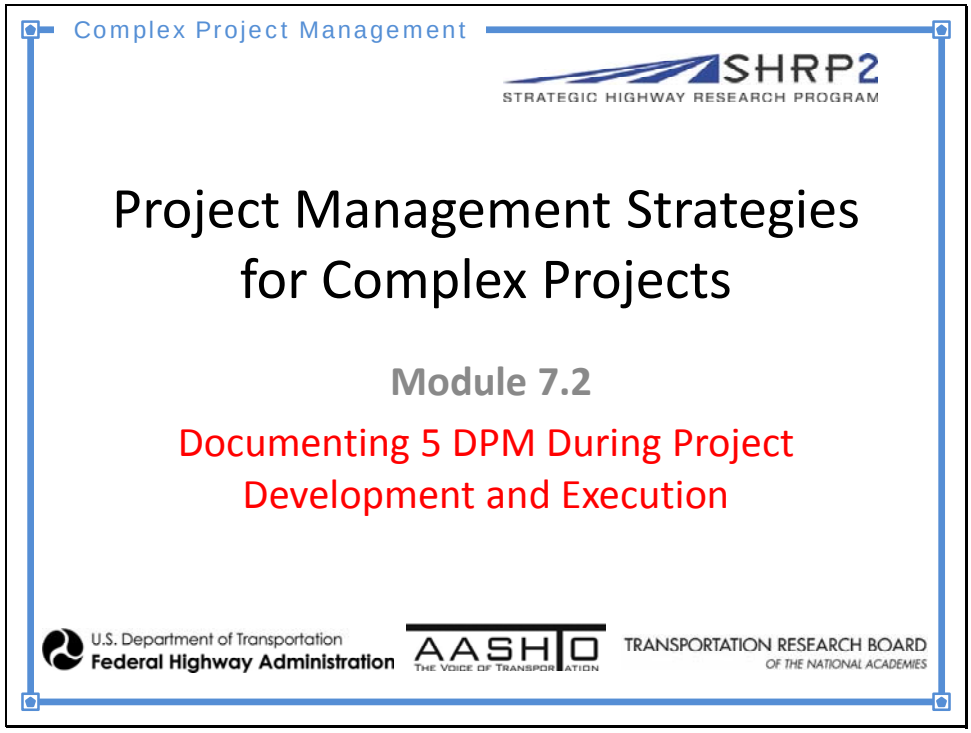
Slide 184



Key Message
What roadblocks and speed bumps were identified for your project?
After the group has completed the exercise, lead a group discussion about what issues were identified.
Begin to strategize how to overcome any obstacles that were identified.

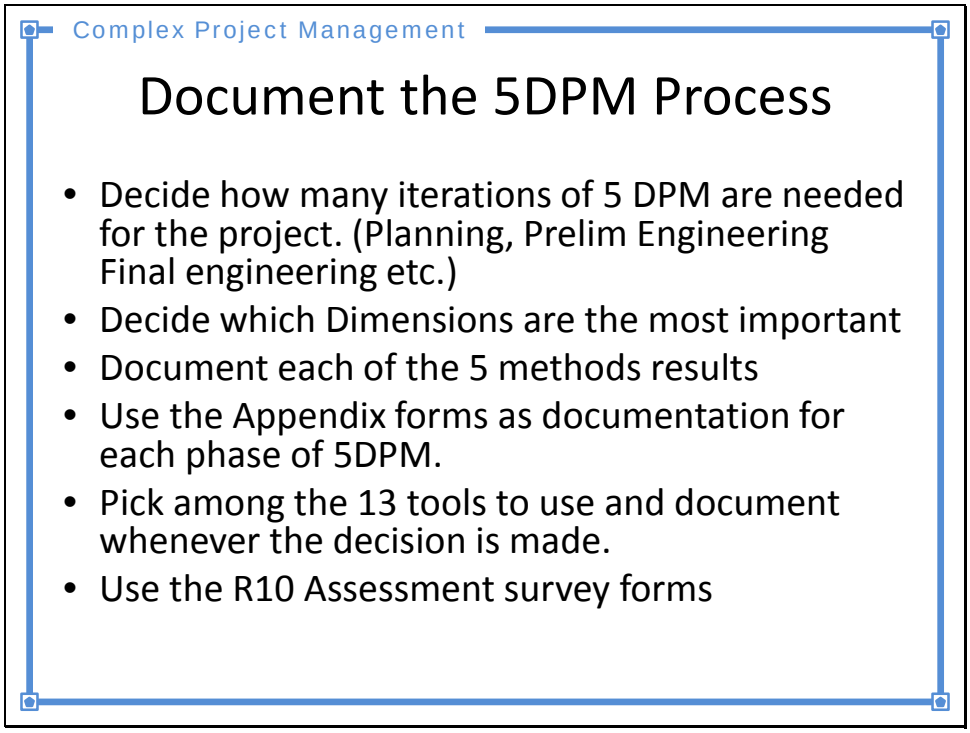
Background and Notes
Remember, roadblocks are showstoppers; and speed bumps still need to be addressed, but the project can continue while they are being addressed.
What innovative solutions were identified to address the project's roadblocks and speed bumps?

Slide 185



Key Message
This module discusses the need for documentation, when to document the process and what forms to utilize.

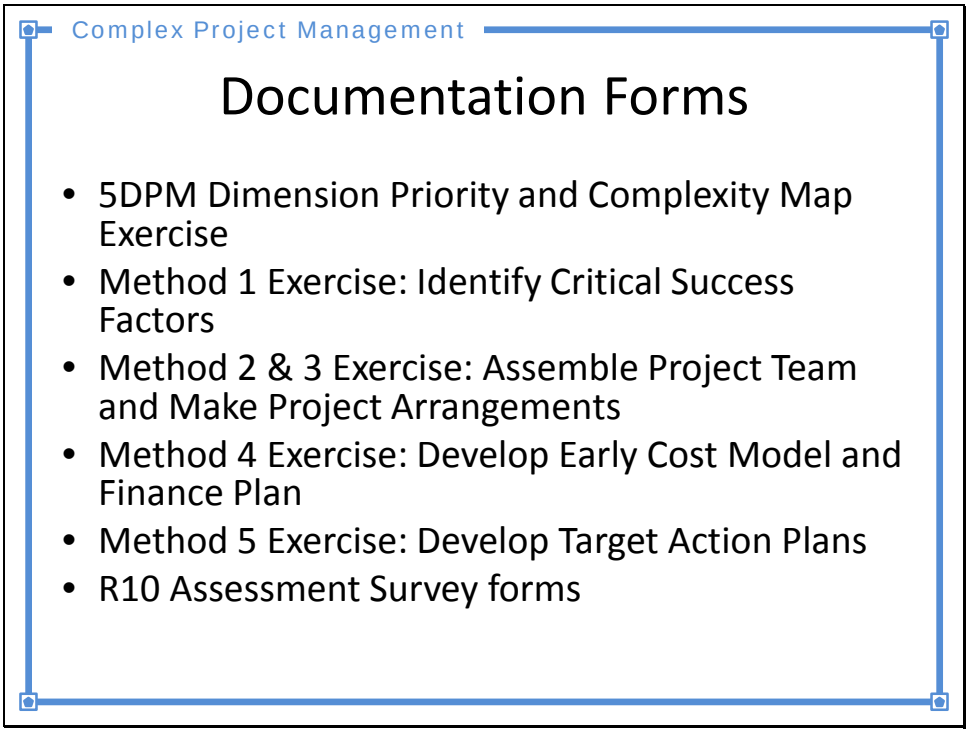
Slide 186



Key Message

It is important to use iterations of the 5DMP process to show how decisions and issues change over time. The R10 Assessment survey can be used as a performance measure over time for how an agency is progressing in adopting the 5DPM methodology.

Slide 187



Use the blank forms listed in the Appendix to document the various decision points.

Appendix

5 DPM Exercises

Glossary

Possible Tools based on Planning Methods 1 - 5 Output

1) Incentivize critical project outcomes

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

Members of the project team (including designers, builders, consultants, public relations, etc.) were incentivized to meet critical project goals. The incentives may range from traditional schedule, cost, and safety incentives to the performance areas from various external factors such as social, environmental, public involvement, and traffic mobility.

2) Develop dispute resolution plan

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team spent time developing a dispute resolution plan, including identification of high-impact dispute points such as those potentially arising from neighborhood groups, USDOT 4(f) signatories, and other indirect stakeholders. The dispute resolution plan stipulates and addresses scope agreement issues and incorporates all local jurisdictions and signatory agencies.

3) Perform comprehensive risk analysis

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team implemented a formal risk analysis and mitigation process at early stages of the project. The risk analysis included clear and concise assignment of responsibilities and assignment of designated resources. The risk analysis included not only traditional cost and schedule issues, but also context and financing issues, such as railroad, utilities, 4(f) issues, NEPA, appropriations/capital bill allocation (use it or lose it funding), effect of delays, and related items. The result of the risk analysis was an aggressive mitigation plan, which was integrated with critical project success factors.

4) Identify critical permit issues

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team developed timelines for environmental, USDOT 4(f), and other critical regulatory reviews, including flexible response mechanisms for permit issues as well as flexible planning and design for minimal impact where uncertainty is high (e.g., geotechnical and subsurface conditions, SHPO sites).

5) Evaluate applications of off-site Fabrication

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team considered off-site fabrication for schedule control, quality control, minimal public disruption, noise control, loss of access, and minimization of environmental impacts.

6) Determine required level of involvement in ROW/Utilities

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team determined the required level of involvement in ROW/utilities based on the project's critical success factors.

7) Determine work package/sequence

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team carefully designed work packages and construction sequencing to increase project success possibilities. Work packages and sequencing were determined based on consideration of available funding, available design resources, available contractor capabilities, and stakeholder concerns for the project's impact, including Road User Costs.

8) Design to budget

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team designed the project within an established budget while considering stakeholder expectations to the extent possible.

9) Co-locate team

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team was/is co-located with each critical partner placing a dedicated, empowered representative with the project team in a common location.

10) Establish flexible design criteria

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team established flexible design criteria to meet the project's cost, schedule, and quality performance requirements, as well as critical permit issues. Flexible design criteria may be used to minimize potential ROW takes, utility conflicts, or 4(f) issues. Flexible designs can be achieved through use of design exceptions, need-based reviews, performance specifications, mechanistic designs, innovative procurement mechanisms or other similar methods.

11) Evaluate flexible financing

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team evaluated alternative funding sources including GARVEE bonds, hybrid forms of contracting, such as Public-Private-Partnerships, and project phasing to leverage financing.

12) Develop finance expenditure model

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team developed project cash flow projections and integrated them into project phasing plans for planned expenditures, including the utilization of resource-loaded project plans and network schedules to track expenditures and project cash needs.

13) Establish public involvement plan

_____YES _____CONSIDERED BUT NOT USED ____ NOT CONSIDERED

The project team utilized extensive project outreach to address stakeholder needs and concerns, including choice of design options and project delivery methods. Public involvement was solicited early in the planning phase and a public communication plan was developed prior to the start of design/construction

Appendix A

Project Selection and Complexity Map Exercise

Project Selection and Complexity Map Exercise

Project:

Location:

Date:

Dimension Factors

Circle the top 3 in each dimension.			Within each dimension, how is this project different (more complex) than the "traditional" project?
	Cost Factors		
	Contingency usage		
	Risk analysis		
	Estimate formation		
	Owner resource cost allocation		
	Cost control		
	Optimization's impact on project cost		
	Incentive usage		
	Material cost issues		
	User costs/benefits		
	Payment restrictions		

List any other sources of cost complexity not discussed above:

Circle the top 3 in each dimension.			Within each dimension, how is this project different (more complex) than the "traditional" project?
	Schedule Factors		
	Timeline requirements		
	Risk analysis		
	Milestones		
	Schedule control		
	Optimization's impact on project schedule		
	Resource availability		
	Scheduling System/Software		
	Work Breakdown Structure		
	Earned Value Analysis		

List any other sources of schedule complexity not discussed above:

Circle the top 3 in each dimension.			Within each dimension, how is this project different (more complex) than the "traditional" project?
	Technical Factors		
	Scope of the project		
	Owner's internal structure		
	Prequalification of bidders		
	Warranties		
	Disputes		
	Delivery methods		
	Contract formation		
	Design method		
	Reviews/Analysis		
	Existing conditions		
	Construction quality		
	Safety/Health		
	Optimization impact construction quality		
	Typical climate		
	Technology usage		

List any other sources of technical complexity not discussed above:

Circle the top 3 in each dimension.		Within each dimension, how is this project different (more complex) than the "traditional" project?
Context Factors		
Public	Marketing	
Political	Cultural impacts	
Owner	Local workforce	
Jurisdictions	Utility coordination	
Designer(s)	Railroad Coordination	
Maintaining capacity	Resource availability	
Work zone visualization	Sustainability goals	
Intermodal	Environmental limitations	
Social equity	Procedural Law	
Demographics	Local acceptance	
Public emergency services	Global/National economics	
Land use impact	Global/National incidents	
Growth inducement	Unexpected weather	
Land acquisition	Force majeure events	
Local economics		

List any other sources of context complexity not discussed above:

Circle the top 3 in each dimension.		Within each dimension, how is this project different (more complex) than the "traditional" project?
Financing Factors		
Legislative process	Vehicle miles traveled fees	
Uniformity restrictions	Cordon/Congestion pricing	
Transition to alternate financing sources	Monetization of existing assets	
Project manager financial training	Franchising	
Federal funding	Carbon credit sales	
State funding	Public-Private Partnerships	
Bond funding	Use of commodity-based hedging	
Borrowing against future funding	Global participation	
Advance construction	Risk analysis	
Revenue generation	Financial management software	

List any other sources of financing complexity not discussed above:

Dimension Rank and Rating

Please rank (1 to 5) the complexity of the following dimensions (Cost, Schedule, Technical, Context, and Financing) with 5 being the most complex. Do NOT assign equal values to any dimension (no "ties" in the rankings).

Cost ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Schedule ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Technical ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Context ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

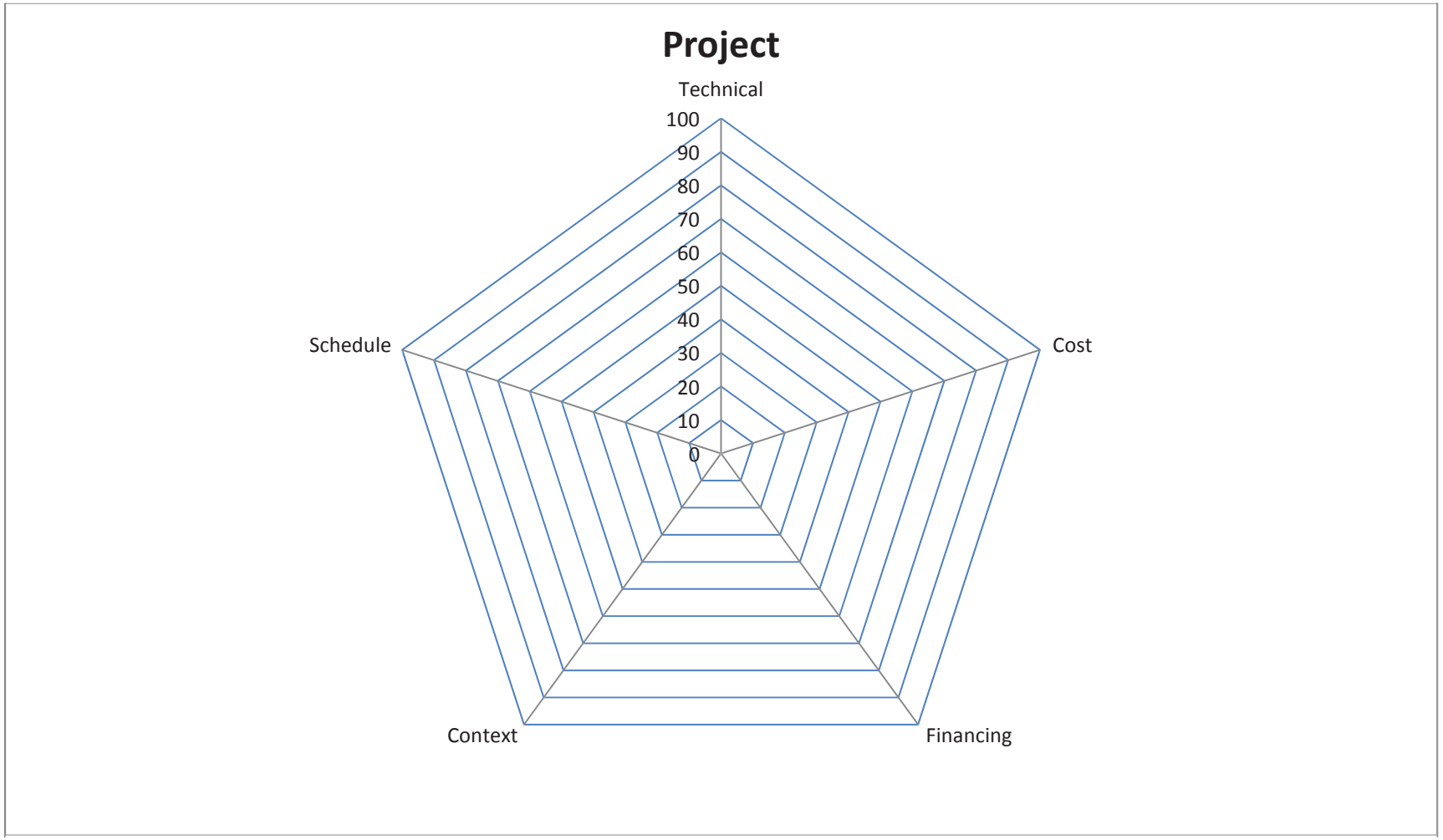
Financing ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Cost Dimension Complexity	**Scale**						
	Minimal			Average			High
	0	25	40	50	70	85	100
Schedule Dimension Complexity	**Scale**						
	Minimal			Average			High
	0	25	40	50	70	85	100
Technical Dimension Complexity	**Scale**						
	Minimal			Average			High
	0	25	40	50	70	85	100
Context Dimension Complexity	**Scale**						
	Minimal			Average			High
	0	25	40	50	70	85	100
Financing Dimension Complexity	**Scale**						
	Minimal			Average			High
	0	25	40	50	70	85	100

Do your ranks and relative scores correspond?

Complexity Map

Using your previously identified score for each dimension, graph your projects radar diagram.



Follow Up Questions

How are you going to address your most complex dimension?

What resource allocation issues need to be addressed as part of the project planning for each dimension?

When are you going to address these complexity factors (at normal place in project development, earlier, later)?

Appendix B

Method 1 Exercise: Identify Critical Success Factors

Method 1 Exercise: Identify Critical Success Factors

See PowerPoint slides for Examples of how to complete Method 1 Exercise

Identify Critical Success Factors in Each Dimension and Interactions Between Factors					
Dimension	**Complexity 5**	**Complexity 4**	**Complexity 3**	**Complexity 2**	**Complexity 1**
Success Factor A					
Success Factor B					
Success Factor C					

Success Factor D					
Success Factor E					
Interactions					

Note: The success factor does not have to be the same across all dimensions (e.g. Success Factor A does not have to be same success factor for Context and for Financing).

Preliminary Outline of Complexity Management Plan
Note: This preliminary action plan will be refined in later Methods (2,3,4) and summarized in the final action plan in Method 5.

	Complexity 5	Complexity 4	Complexity 3	Complexity 2	Complexity 1
Success Factor e.g. 5A, 3B,					
Who is Responsible					
Resources Needed					
Interim Milestones					
Actions to be Taken					
Can this success factor be achieved using existing systems, practices, structures, etc? (Y/N)					
Tools (see last pages for list)					

Appendix C

Method 2 & 3 Exercise:

Assemble Project team and

Make Project Arrangements

Method 2 & 3 Exercise: Assemble Project Team and Make Project Arrangements

Review

Review Complexity Map (5DPM Exercise)
Review Project Success Factors (Method 1 Exercise)

Conduct Gap Analysis

Success Factor	Team Member Need (Responsibility and authority) (Method 2)	In-house resource available (who if possible)	Project Arrangement for bringing onto the team (Method 3)	When is resource or skill needed?

Method Interactions

Do these outcomes impact or change anything from your Method 1 Exercise?

Appendix D

Method 4 Exercise:
Develop Early Cost Model
and Finance Plan

Method 4 Exercise: Develop Early Cost Model and Finance Plan

Review

Method 1 Outcomes

Method 2 Project team assignments, responsibilities, and authorities

Method 3 Project arrangements, including contracts, delivery methods and procurement decisions

Cost Estimate Information

Success Factor	Scope (including, planning, design, construction & operations maintenance, if applicable)	Phase	Estimated Cost

Secured Funding Sources

Funding Source	$ Amount	Funding Gap (Estimate cost minus $ Amount)	Limitations (scope, time, etc.)	What needs to be done to find out
Totals				

Comparison

How do the cost of scope and secured funding totals compare (is there enough funding for the cost of the project)?

If scope and funding to do not align, what are some possible ways to adjust (i.e., more funding, reduced scope, change timelines, see tools for other ideas)?

If seeking additional funding, identify possible funding sources.

Method Interactions

Do these outcomes impact or change anything from your Method 2 Exercise?

Do these outcomes impact or change anything from your Module 3 Exercise?

Appendix E

Method 5 Exercise: Develop Targeted Action Plans

Method 5 Exercise: Develop Targeted Action Plans

Revisit Chart from Exercise 1 and notes from Methods 2-4

STEP 1- Develop Complex Project Action Plan:

	#5 Complexity	#4 Complexity	#3 Complexity	#2 Complexity	#1 Complexity
Success factor					
Interactions					
Who is responsible?					
Adequate resources?					
Interim milestones?					
Actions?					
Can project succeed with typical systems(Y/N)?					
If "NO" to either question above- does a roadblock or speed bump exist?					
Isa Targeted Project Action Plan required?					

- Any "no" cells in the last row represent roadblocks and will require a targeted project action plan
- Any questions in resource cells may represent speed bumps and may also warrant a targeted project action plan
- Note interactions and whether the team has determined if the complexity issue warrants a targeted action plan, then move to step 2

Implementation Workshop 5DPM Exercises Critical Planning Methods

STEP 2: Targeted Action Plan outline

Targeted Plan #	Description of Action Plan	Constraint (who controls the constraint, e.g. public, legislature, railroad, etc.?)	Who will be the plan champion (PR firm, agency leadership, etc.)	What other plans depend on successful outcomes	What is the deadline	Required 5 DPM Tools
1						
2						
3						
4						
5						

After completing Method 5, review entire project plan to finalize Project Execution Tool checklist:

Appendix F

Glossary

ALPHABETICAL GLOSSARY

This alphabetical glossary provides definitions for factors that affect project complexity. Many of these definitions were adapted from other sources. A glossary that is alphabetical for each of the five dimensions follows this one.

advance construction. Similar to borrowing against future funding, but it allows states to independently raise the initial capital for a federally approved project and preserve their eligibility for future federal-aid reimbursement.

automation. The use of automated or robotic equipment for construction.

bond funding. The floating of bonds that public and private entities may invest in to earn a return on investment on the project.

borrowing against future funding. Methods that allow the owner to borrow against future federal funding in order to undertake current projects.

carbon credit sales. The carbon stored by trees and plants has a market value calculated as credits that can be sold to help finance the project.

construction quality. The value of the work that is being put in place by the contractors.

contingency usage. The reserve budget or budgets (either allocated or unallocated) that are added to the overall cost estimate to account for unknown risks.

contract formation. The development of the contract responsibilities and specifications.

cordon or congestion pricing. Reorienting traffic demand to less-congested areas and city centers. Entering the more-congested areas during certain hours requires some type of payment.

cost control. All the tools and methods used to control and manage costs throughout the project.

cultural impacts. The culture or cultures of the area and their possible impact on the project.

delivery methods. The type of contracting approach used and how it is set up.

demographics. Outline of the distribution of the population within an area. Alignment decisions may affect different demographics.

design method. The process and expectations stipulated by the owner for the project and the accuracy and quality required incrementally throughout the design phase. Also refers to considering the entire life of the project and the anticipated maintenance requirements over its lifespan.

disputes. Disagreements between the parties and how they are to be handled.

earned-value analysis. The tracking of scheduled work versus actual work performed.

environmental limitations. The type of environmental study that is necessary for the project, or any site-specific factors affecting the design and construction of the venture.

estimate formation. All the different kinds of estimates required and the susceptibility to those costs varying from initial to final estimates.

existing conditions. Any structural limitations already in place that need to be accounted for in the design to satisfy the solution required by the owner.

federal funding. Provided by the national government, it is standard across the nation and is derived from the annual transportation bill.

financial management software. Any software used for managing the financial aspects of a project.

force majeure events. Catastrophic events such as tornado, hurricane, or terrorism.

franchising. When private companies are offered the opportunity, they build and operate income-producing facilities such as rest areas or fuel stations on the public right-of-way in return for a portion of the profits.

global and national economics. National and global economics that may externally affect the project.

global and national incidents. Any recent events that have occurred nationally or globally that may have a positive or negative impact on the project.

global participation. The ability to take advantage of different procurement and capital project delivery cultures around the world. Each nation has its own set of business practices that create competition for financing of transportation projects.

growth inducement. A potential project may spur growth.

incentive usage. The use of incentives by the owner for early completion of the project.

intelligent transportation systems. Smart traffic systems for transportation projects for which user needs are analyzed and integrated into the implementation of a project.

intermodal. More than one mode of transportation, and a factor that must be recognized when planning projects that involve or affect other modes of transportation.

jurisdictions. An all-encompassing group that includes any local, state, or federal organizations, such as metropolitan planning organizations, the State Historic Preservation Office, or FHWA. These entities may become involved because of regulations and limitations encountered on the project.

land acquisition. Acquisitions may be hindered by the ability to acquire and the process of acquiring the portions of land necessary for the project.

land use impact. A potential project may alter potential land use or the zoning plan of the area.

legislative process. The legal limitations placed on financing methods.

local acceptance. The ability, experience, or willingness to use different delivery options if procedural law does not restrict the method by the local parties that are likely to be involved with the project.

local economics. Influenced by growth inducement, alterations to land use, rerouting of traffic away from business districts, and creation of jobs, directly or indirectly.

local workforce. The skill and ability of the workers and the number of qualified entities that can fulfill the project requirements.

maintaining capacity. Planning decisions made by the owner, such as lane closures, detours, and time of construction activities (e.g., nighttime, weekends).

marketing. Notification of the public of the project and its progress, particularly the aspects that have a direct impact on the public.

material cost issues. The probability of the material costs changing due to market volatility.

milestones. Important deadlines during the project life cycle and occurrence of these events in a timely manner.

monetization of existing assets. An existing asset (e.g., a road or bridge) will be brought up to some standard of quality; private entities are invited to take it over for a concession period, derive revenue from it, and then return it to the original standard before turning it over to the agency or another concessionaire.

optimization impact on construction quality. Trade-off between cost, schedule, and quality (e.g., increasing quality requirements may increase costs).

optimization impact on project cost. Trade-off between cost, schedule, and quality (e.g., reducing the duration of the project typically comes with a higher cost).

optimization impact on project schedule. Trade-off between cost, schedule, and quality (e.g., accelerating the schedule may affect quality).

owner. Implements the project based on a need. Owners run and manage the project and have the most to lose or gain from the project's failure or success.

owner resource cost allocation. The distribution of costs by the owner internally to make sure each area of project management has adequate finances to perform its operations.

owner's internal structure. How the owner is set up to effectively manage the project (e.g., traditional hierarchy, matrix with project teams).

payment restrictions. The ability of the owner to pay for performed work, such as accelerated work performed by the contractor.

politicians. May be involved during the financing and need stages, and are likely to be involved if the project is not perceived well by the public.

prequalification of bidders. The act of identifying and selecting qualified contractors and designers who are most capable of performing the requirements necessary for the project.

procedural law. The legal channels and limitations that should be followed for implementation of a transportation project such as permitting, zoning, and land acquisition. Procedural law is also the ability of an owner to use alternative delivery methods designated by law such as design-build or construction manager at risk.

project manager financial training. The education necessary for project managers to understand financial methods.

project scope. The purpose of the project and what is going to be built to satisfy that purpose.

public. Directly affected by and has the potential to affect the project from initial conception through completion and well after turnover. The transportation project is for the public and its interests.

public emergency services. Includes services that may need to be altered, such as emergency routes taken by fire and medical personnel.

public–private partnerships. Requires both public and private financing. The overall purpose for this category is to gain public access to private capital and create a situation in which the developers' capital is able to bridge the funding gap in a much-needed piece of infrastructure and thus accelerate the delivery of its service to the traveling public.

railroad coordination. The coordination between the railroad agencies and the project.

resource availability (context). Availability of materials, labor, and equipment because of external factors (affected not because of cost, but scarcity).

resource availability (schedule). The availability and uniformity of resources needed to maintain or alter the schedule.

revenue generation. Any type of financing that is paid for by a generation of revenue from the infrastructure over a specified time period.

reviews and analysis. Methods for maintaining accuracy and quality of the design that include tools such as value engineering and analysis and constructability reviews.

risk analysis (cost). Cost risk associated with a project that cannot be clearly identified and quantified through formal or informal analysis.

risk analysis (financing). Formal or informal analysis that the financing methods play on the project.

risk analysis (schedule). Schedule risk associated with a project that cannot be clearly identified and quantified through formal or informal methods.

safety and health. Maintaining a workplace (by all parties) where workers feel comfortable.

schedule control. All the tools and methods used to control and manage the schedule throughout the project.

scheduling system and software. The different types of systems and software available and mandated for the project, all with different capabilities.

social equity. Maintaining equality between all social classes that use and are affected by the project.

state funding. Independently financed through the particular state in which the project is taking place.

sustainability goals. Materials or requirements to use environmentally friendly construction materials or desires by the owner to use alternative materials or methods.

technology usage. The technology specified to be used for project communications, such as specific project management software, building information modeling, and others.

timeline requirements. The timeline of the project (e.g., accelerated).

transition toward alternative financing sources. The financing of complex projects compared to traditional project financing and the shift in financial planning.

typical climate. The typical climate where the project is located and the construction limitations presented by the area's typical climatic conditions.

unexpected weather. Unforeseen conditions that are abnormal to typical conditions and therefore cannot be planned around.

uniformity restrictions. The consistency seen between states in legislation and financing techniques.

use of commodity-based hedging. The ability to lock in the material price at the earliest point when the required quantity is known.

user costs and benefits. Cost trade-off between the transit user benefits of early completion with the increased construction costs required for accelerated construction of existing infrastructure.

utility coordination. All the services necessary that may need to be moved and coordinated (e.g., electricity, gas).

vehicle miles traveled fees. User fees that charge the driver a specific cost for using the infrastructure.

warranties. Provided by contractors who ensure the quality and guarantee that pieces of the project will remain adequate for a specified time period.

work breakdown structure. The breakdown of the roles and responsibilities delegated to project participants.

work zone visualization. Based on maintaining capacity decisions and involves using the appropriate means to alert the public of alterations to normal traffic routes and the presence of construction activity.

GLOSSARY BY DIMENSION

This glossary, which is alphabetical for each of the five dimensions, provides definitions for factors that affect project complexity. Many of these definitions were adapted from other sources.

CONTEXT DIMENSION

cultural impacts. The cultures of the area and their possible impacts on the project.

demographics. Outline of the distribution of the population within an area. Alignment decisions may affect different demographics.

environmental limitations. The type of environmental study that is necessary for the project, or any site-specific factors affecting the design and construction of the venture.

force majeure events. Catastrophic events such as tornado, hurricane, or terrorism.

global and national economics. National and global economics that may externally affect the project.

global and national incidents. Any recent events that have occurred nationally or globally that may have a positive or negative impact on the project.

growth inducement. A potential project may spur growth.

intermodal. More than one mode of transportation, and a factor that must be recognized when planning projects that involve or affect other modes of transportation.

jurisdictions. An all-encompassing group that includes any local, state, or federal organizations, such as metropolitan planning organizations, the State Historic Preservation Office, or FHWA. These entities may become involved because of regulations and limitations encountered on the project.

land acquisition. Acquisitions may be hindered by the ability to acquire and the process of acquiring the portions of land necessary for the project.

land use impact. A potential project may alter potential land use or the zoning plan of the area.

local acceptance. The ability, experience, or willingness to use different delivery options if procedural law does not restrict the method by the local parties that are likely to be involved with the project.

local economics. Influenced by growth inducement, alterations to land use, the rerouting of traffic away from business districts, and the creation of jobs, directly or indirectly.

local workforce. The skill and ability of the workers and the number of qualified entities that can fulfill the project requirements.

maintaining capacity. Planning decisions made by the owner, such as lane closures, detours, and time of construction activities (e.g., nighttime, weekends).

marketing. Notification of the public of the project and its progress, particularly the aspects that have a direct impact on the public.

owner. Implements the project based on a need. Owners run and manage the project and have the most to lose or gain from the project's failure or success.

politicians. May be involved during the financing and need stages, and are likely to be involved if the project is not perceived well by the public.

procedural law. The legal channels and limitations that should be followed for implementation of a transportation project such as permitting, zoning, and land acquisition. Procedural law is also the ability of an owner to use alternative delivery methods designated by law such as design-build or construction manager at risk.

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utility coordination. All the services necessary that may need to be moved and coordinated (e.g., electricity, gas).

work zone visualization. Based on maintaining capacity decisions and involves using the appropriate means to alert the public of alterations to normal traffic routes and the presence of construction activity.

COST DIMENSION

contingency usage. The reserve budget or budgets (either allocated or unallocated) that are added to the overall cost estimate to account for unknown risks.

cost control. All the tools and methods used to control and manage costs throughout the project.

estimate formation. All the different kinds of estimates required and the susceptibility to those costs varying from initial to final estimates.

incentive usage. The use of incentives by the owner for early completion of the project.

material cost issues. The probability of the material costs changing because of market volatility.

optimization impact on project cost. Trade-off between cost, schedule, and quality (e.g., reducing the duration of the project typically comes with a higher cost).

owner resource cost allocation. The distribution of costs by the owner internally to make sure each area of project management has adequate finances to perform its operations.

payment restrictions. The ability of the owner to pay for performed work, such as accelerated work performed by the contractor.

risk analysis. Cost risk associated with a project that cannot be clearly identified and quantified through formal or informal analysis.

user costs and benefits. Cost trade-off between the transit user benefits of early completion with the increased construction costs required for accelerated construction of existing infrastructure.

FINANCING DIMENSION

advance construction. Similar to borrowing against future funding, but it allows states to independently raise the initial capital for a federally approved project and preserve their eligibility for future federal-aid reimbursement.

bond funding. The floating of bonds that public and private entities may invest in to earn a return on investment on the project.

borrowing against future funding. Methods that allow the owner to borrow against future federal funding in order to undertake current projects.

carbon credit sales. The carbon stored by trees and plants has a market value calculated as credits that can be sold to help finance the project.

cordon or congestion pricing. Reorienting traffic demand to less-congested areas and city centers. Entering the more-congested areas during certain hours requires some type of payment.

federal funding. Provided by the national government, it is standard across the nation and is derived from the annual transportation bill.

financial management software. Any software used for managing the financial aspects of a project.

franchising. When private companies are offered the opportunity, they build and operate income-producing facilities such as rest areas or fuel stations on the public right-of-way in return for a portion of the profits.

global participation. The ability to take advantage of different procurement and capital project delivery cultures around the world. Each nation has its own set of business practices that create competition for financing of transportation projects.

legislative process. The legal limitations placed on financing methods.

monetization of existing assets. An existing asset (e.g., a road or bridge) will be brought up to some standard of quality; private entities are invited to take it over for a concession period, derive revenue from it, and then return it to the original standard before turning it over to the agency or another concessionaire.

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transition toward alternative financing sources. The financing of complex projects compared to traditional project financing and the shift in financial planning.

uniformity restrictions. The consistency seen between states in legislation and financing techniques.

use of commodity-based hedging. The ability to lock in the material price at the earliest point when the required quantity is known.

vehicle miles traveled fees. User fees that charge the driver a specific cost for using the infrastructure.

SCHEDULE DIMENSION

earned-value analysis. The tracking of scheduled work versus actual work performed.

milestones. Important deadlines during the project life cycle and occurrence of these events in a timely manner.

optimization impact on project schedule. Trade-off between cost, schedule, and quality (e.g., accelerating the schedule may affect quality).

resource availability. The availability and uniformity of resources needed to maintain or alter the schedule.

risk analysis. Schedule risk associated with a project that cannot be clearly identified and quantified through formal or informal methods.

schedule control. All the tools and methods used to control and manage the schedule throughout the project.

scheduling system and software. The different types of systems and software available and mandated for the project, all with different capabilities.

timeline requirements. The timeline of the project (e.g., accelerated).

work breakdown structure. The breakdown of the roles and responsibilities delegated to project participants.

TECHNICAL DIMENSION

automation. The use of automated or robotic equipment for construction.

construction quality. The value of the work that is being put in place by the contractors.

contract formation. The development of the contract responsibilities and specifications.

delivery methods. The type of contracting approach used and how it is set up.

design method. The process and expectations stipulated by the owner for the project and the accuracy and quality required incrementally throughout the design phase. Also refers to considering the entire life of the project and the anticipated maintenance requirements over its lifespan.

disputes. Disagreements between the parties and how they are to be handled.

existing conditions. Any structural limitations already in place that need to be accounted for in the design to satisfy the solution required by the owner.

intelligent transportation systems. Smart traffic systems for transportation projects for which user needs are analyzed and integrated into the implementation of a project.

optimization impact on construction quality. Trade-off between cost, schedule, and quality (e.g., increasing quality requirements may increase costs).

owner's internal structure. How the owner is set up to manage the project effectively (e.g., traditional hierarchy, matrix with project teams).

prequalification of bidders. The act of identifying and selecting qualified contractors and designers who are most capable of performing the requirements necessary for the project.

project scope. The purpose of the project and what is going to be built to satisfy that purpose.

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safety and health. Maintaining a workplace (by all parties) where workers feel comfortable.

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