

**R10: Project Management Strategies for
Complex Projects**

SUMMARY REPORT

Peer Exchange Workshop

*May 3 and 4, 2016
Des Moines, Iowa*

Notice

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16. Abstract This report documents the proceedings of the 2.0-day SHRP2 R10 Peer Exchange Workshop held in Des Moines, Iowa, on May 3 and 4, 2016. This report includes an abstract of topics presented in the workshop and captures the discussion of participants. The Peer Exchange also shared Best Management Practices from the participating States.			
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INTRODUCTION

The SHRP2 R10 product, Project Management Strategies for Complex Projects, focuses on a five-dimensional project management (5DPM) approach using tools and techniques designed to be immediately beneficial to transportation agencies and professionals. The five project development methods are used as a structured process to select specific execution tools for inclusion in the project management plan.

The 5DPM methods include:

1. Define Critical Project Success Factors
2. Assemble the Project Team
3. Select Project Arrangements
4. Prepare Early Project Cost Model and Finance Plan
5. Develop Project Action Plans

The primary purpose of the R10 Demonstration workshops for State departments of transportation (State DOTs)—executed by the Federal Highway Administration (FHWA)—is to facilitate an open dialogue among agency participants working on a complex project. The objectives are to develop tools that help DOTs “get in, get out, and stay out”; encourage project management practices that use innovative strategies for complex projects; develop and deploy effective management tools; and facilitate fundamental change in the approach to rehabilitating transportation infrastructure.

A peer exchange workshop was conducted in Des Moines, Iowa with DOTs that have previously participated in the R10 demonstration workshops and were implementing R10 on a project.

The workshop focused on lessons learned and the objectives included:

- Provide information about project management integration into DOTs project delivery strategies/culture
- Share R10 implementation efforts to date
- Present/document R10 best practices and lessons learned
- Formally establish a community of practice among participating DOTs to help each other and provide ideas for other DOTs interested in applying R10

WORKSHOP SUMMARY

Dr. Doug Gransberg and Mr. Kevin Chesnik facilitated the workshop, held at the Sheraton West Des Moines Hotel in Des Moines, IA. Iowa DOT, Massachusetts DOT, Georgia DOT, Michigan DOT, New Mexico DOT, FHWA, and AASHTO were on hand to show their support and to take part in the workshop. Two other DOTs, Wisconsin (R10 User Incentive DOT) and Minnesota (R09- *Managing Risk on Rapid Renewal Projects*, Lead Adopter DOT), participated during the peer exchange. Mr. Carlos F. Figueroa of FHWA and Pam Sutton of AASHTO provided opening remarks and Mr. John Selmer, Iowa DOT host agency, welcomed all participants. They communicated that the lead adopters were the centerpiece of the research project and implementation. See Appendix A for the list of the workshop participants.

IOWA DOT - INTEGRATING PROJECT MANAGEMENT FOR SUCCESSFUL PROJECT DELIVERY

Ms. Deanna Mayfield, Iowa DOT kicked off the peer exchange by presenting what project management looks like within the Department of Transportation in Iowa. Iowa DOT communicated how project managers were assigned and detailed the project management framework within the department. They discussed project management topics such as:

- How to identify and create a project
- Scheduling
- Tracking and Communication
- Budget
- Decision Making
- Construction

Iowa DOT is exploring how to implement project management within the agency. The Iowa DOT finds itself in a similar position as other State DOTs with changing employee demographics, projects with increasing complexity (be it infrastructure projects, Information Technology (IT) projects, or strategic initiatives) and static or diminishing resources. Many senior employees are retiring or eligible and the workforce replacing them has less experience and will likely be transient in nature. The Iowa DOT visualizes itself as transitioning from doing the work itself to managing a greater portion with increasing reliance on external partners. The DOT's desire is for project management to not only help in managing future projects successfully, but to allow it to use the processes to "capture" the knowledge and experience gained from each successive project, thus providing a wealth of knowledge to newer employees. The department is also interested in using project management as a vehicle to expose employees to an environment that requires leadership skills, thus increasing the pool of future leaders.

Iowa DOT conducted a breakout session for each table group comprised of the R10 Lead Adopter DOTs (Michigan, New Mexico, Georgia, Massachusetts and FHWA Federal Lands) and the two other peer exchange participating DOTs (Minnesota and Wisconsin), to collaborate and report on one of the three following project management topics:

1. PMO Structure, Role Organizational Integration
 - a. Location, role, authority of office
 - b. Staffing and tools
 - c. Infrastructure focus on broader (IT, strategic initiatives)
 - d. Human Resource (HR) Implications – knowledge management, leadership development

2. Project Identification, Classification, Prioritization
 - a. How are projects identified/classified/prioritized
 - b. Level of project management effort on high risk/high exposure vs. “run of the mill”
 - c. Number of priority projects
 - d. Resource allocation, internal and/or external, level of detail (down to individual)
 - e. Integration with asset management and program

3. Portfolio Management
 - a. Decision pathways; who has what authority in adjusting targets, resources
 - b. Communication framework for decisions, coordination of respective offices
 - c. One PM identification through construction
 - d. Field/central office roles

Details of the Iowa DOT report on the peer exchange workshop on Project Management Strategies for Complex Projects, may be found at the [InTrans website](#) and at the [T2 site](#).

Additional information including the presentations from the participating states (Michigan, Massachusetts, Iowa, New Mexico and Georgia) is available to the Peer exchange participants on the **following site**: <https://drive.google.com/drive/folders/0B7uc-w39AbE3VWw5Y1hNb0lsSFk>. This material includes the MassDOT program documents that were discussed as well as some additional slide material added to the presentations.

Following the table topics session, Dr. Gransberg and Mr. Chesnik facilitated a discussion with the entire peer group to identify what key factors contributed to the R10 implementation success. The following is a list of responses from the various different peer DOTs participating in the peer exchange workshop.

Table 1- Key Factors to R10 (5DPM) Implementation Success

Key Factors Contributing to R10 Implementation Project Success
Independent reporting of project’s status on a monthly basis
Evolution of what project management is. The agency originally “forced” PM’s to use specific scheduling tools, but they eventually asked the PM what they needed to do their job. The agency realized they are too focused on the PM tool.
Need to define what a project manager is and what you want from them.
Biggest component of PM is communication and systems to improve communication. The need to break down the silos approach.
PM should deliver to what the desired program delivery is, should be empowered on how best to deliver. Prioritize the schedule and budget as needed.
Priority of projects is identified in the asset management program. Once the projects have been assigned, work on the process of resource needs.
Need to identify areas of career development opportunities for employees. Process to structure the organization infrastructure in a way that the next person in line will “pick up the flag” if/when it is dropped and continue to the end.
How do we setup systems framework to where we’re no longer keeping all the information in people’s heads.

MASSACHUSETTS DOT APPLICATION OF R10

Representatives from Massachusetts DOT (MassDOT) presented on their experience with 5DPM. Some of the main points communicated during the presentation were:

1. What 5DPM is and what benefits it brings to complex project management.
 - a. 5DPM merely restructures the project team’s thought process by:
 - i. Elevating context and finance to the same level as cost, schedule, and technical dimensions
 - ii. Emphasizing parallel rather than linear project development
 - iii. Early consideration of all factors that create complexity for each of the five dimensions
2. How the 5DPM planning methods and execution tools/process were incorporated with the project delivery strategy:
 - a. 5 planning methods
 - b. At least the 13 recommended execution tools/processes

MassDOT defined attributes of a complex project to be projects that:

- Standard practices do not apply
 - Design
 - Funding
 - Contracting

- Uncertainty is high with regard to:
 - Objectives
 - Implementation
- There is significant community interest or controversy
- Typically \$15M or above considered complex

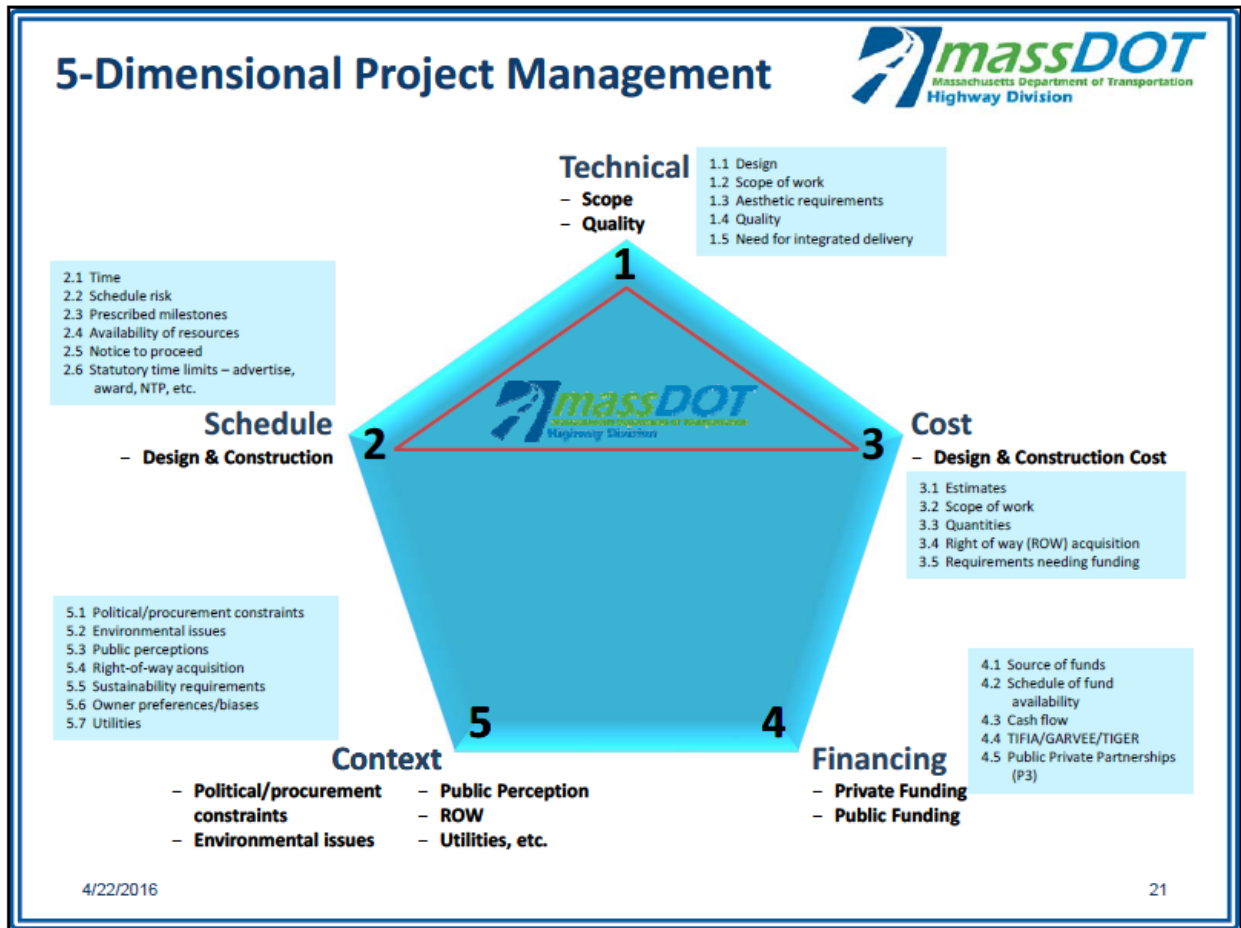


Figure 1: MassDOT’s 5DPM Integration
(Figure provided by MassDOT on what 5DPM looks like)

MassDOT has identified they are currently implementing 5DPM tools 1-7, 9, 10, and 13. The 5DPM Tools 8, 11, and 12 were not clear as to how they were currently being implemented within MassDOT’s current project management structure. See Appendix C with the 5DPM Components including the list of recommended execution tools/strategies. However the overall assessment by MassDOT is their practice is largely consistent with 5DPM. They currently use all 13 project management tools by;

- Standard Operating Procedures (SOPs)
- Formal and informal guidance to staff
- State and agency prioritization tools
- Habits of excellence

Their goal is to train all MassDOT staff to adhere to the guidelines to deliver the project on time and on budget. MassDOT has applied 5DPM from the Accelerated Bridge Program perspective. Their current challenge is to apply it to the rest of their program, as much applicable and possible.

Following the presentation, Dr. Gransberg and Mr. Chesnik facilitated a discussion focusing on what would MassDOT’s recommended steps for non-implementation states to take while developing their complex project management structure and what are the top 2-3 things they would be willing to share with other states.

Table 2- MassDOT’s recommended steps for 5DPM Implementation

Recommended Steps for Non-R10 Implementation States	Top 2-3 Things to Share with Other States
Discussion with PM’s on importance of 5DPM and the need to do it. Buy-in is important.	SOP’s, charts, risk registers
Staffing, having the project management own the project, take it from beginning to end.	Templates on claims dispute process, tough change orders, etc.
	Legislative language for Owner’s reps hired for mega-projects

GEORGIA DOT APPLICATION OF R10

Georgia DOT (GDOT) shared their experience with 5DPM through the management of the I-285/SR-400 Interchange Reconstruction project. The case study project was rated high in the dimensions of finance, context, and schedule by the project team with a high degree of overall project complexity.

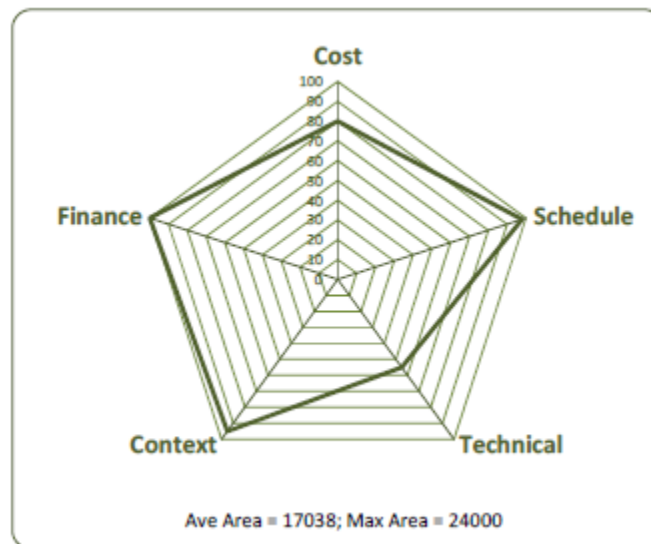


Figure 2: GDOT I-285/SR-400 Complexity Map
(Figure provided by GDOT)

GDOT identified a high degree of complexity in the finance dimension and as a result GDOT developed an action plan incorporating finance as one of the critical dimensions of their action plan. One of the action plan items in the finance dimension was budget compliance and financial close. The specific action was to monitor costs vs. expenditures to create a master cost tracking plan. This aligned with 5DPM Tool 8, Design to Budget. A **program-level cash flow** was made to create a control panel to track costs for setting phases, schedule, and related costs. The benefits of this program-level financing tool were identified as:

- Enhances coordination between the Office of Planning, Finance Division, and the Office of Innovative Delivery
 - Consistency of project expenditure profile with the TIP/STIP program
- Serves as an easy-to-understand platform to communicate project financing and funding decisions to policy makers and the public
- Supports decision-making about the prioritization of project funding
- Helps the agency analyze several funding scenarios and project schedule options
- Enables tracking project’s estimated costs vs. actual expenditures

Dr. Gransberg and Mr. Chesnik facilitated discussion with GDOT and the peer exchange group to identify key factors contributing to R10 implementation success and the top 2-3 things GDOT would be willing to share with other states. The table outlines the results of the discussion.

Table 3- GDOT’s recommended steps for 5DPM Implementation

Key Factors Contributing to R10 Implementation Success	Top 2-3 Things to Share with Other States
Executive leadership needs to empower the right leader in the staff in the right unit to implement. Also, the Executive leadership needs to provide high level markers (success factors) to help define success.	Financial Spreadsheet Template (Program-Level Cash Flow)
The leader needs to be delivery oriented, strategic, open minded, and critically focused on success, not simply focused on doing the same things the same way but faster.	Draft Request for Proposal (RFP) and Alternative Technical Concepts (ATC) Process Manual procedure to expedite the technical review prior to the official Final RFP.
Implementation approach needs to be adopted seamlessly with the customized delivery approaches in thinking, like another tool that is neatly in the toolbox ready to use, and not being presented as another process to follow.	Enhanced Design-Build Manual with completed 5DPM integration.

MICHIGAN DOT APPLICATION OF R10

Michigan DOT (MDOT) presented their experience with 5DPM through the project management of the I-94 and the I-75 Modernization Projects in Detroit, Michigan. Complexity maps were developed for both projects and each project scored high in the contextual dimension. The finance dimension is also a very important dimension as funding and financing drive the length of the project durations. MDOT identified some specific areas of improvement from the R10 process to include;

- Develop feasible and reasonable funding plans for mega-projects
- Identify and ensure context was identified, acknowledged, and addressed with a plan
- Emphasized risk management planning
- Keyed on early preparation of cost modeling and financial plan development

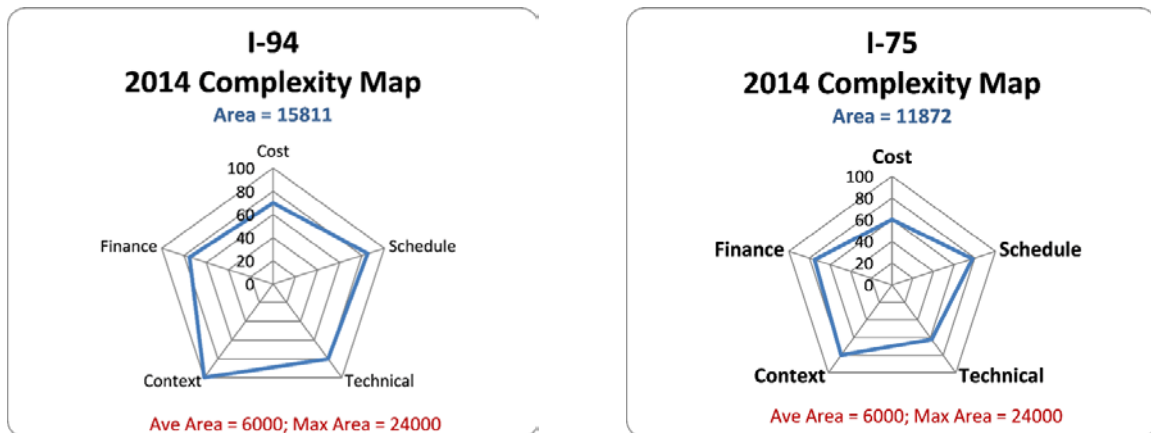


Figure 3: MDOT Complexity Maps for I-94 and I-75

Maintaining public and community satisfaction was of high priority for MDOT with development of the I-94 project, which was a component of the context dimension. A goal was developed to achieve a 90% success rating on the public engagement process by engaging 100% of stakeholders so they know MDOT is listening to their concerns. The figure below was presented by MDOT illustrating this goal and how it was achieved.

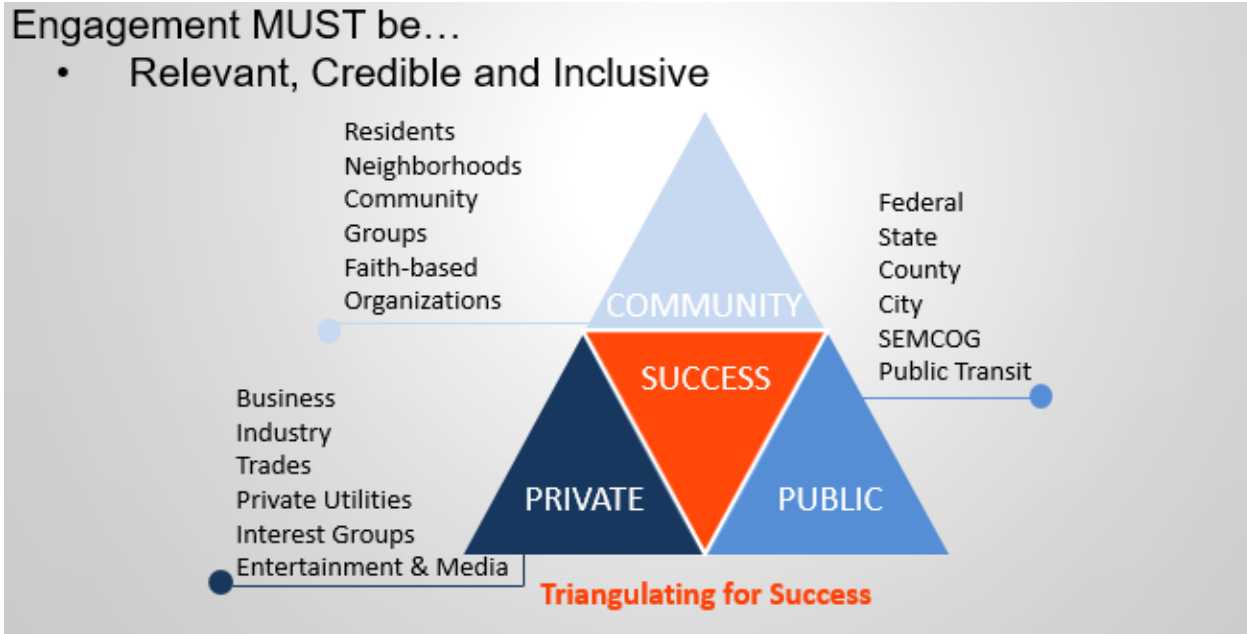


Figure 4: I-94 Context – Stakeholder Engagement Overview (MDOT)

MDOT believes R10 is best used on complex project and has identified 11 factors for **successful implementation or lessons learned of R10** on complex projects which are as follows:

1. Complex project management is usually on the verge of chaos.
2. Use R10 to execute innovative strategies and fundamental change.
3. Key to managing schedule is to be adept at predicting delay.
4. Treat a complex project like an emergency, make decisions quickly.
5. Complex project management is not business as usual.
6. Use a risk register to proactively identify roadblocks and develop a plan to address them.
7. Gain and keep public support.
8. Communicate both internally and externally, as communication can be enhanced by co-locating staff in a dedicated space.
9. Contextual factors influence the project and are amplified on complex mega-projects.
10. Complex mega-projects must be planned, managed, and staffed differently.
11. Complex projects are not necessarily linear. Things are done differently and decisions are taken quicker.

FHWA FEDERAL LANDS HIGHWAY DIVISION APPLICATION OF R10

FHWA Federal Lands Highway Division presented their experience with R10 through two projects developed in California; 1) Truckee River Bridge, and 2) Dollar Creek Shared Use Path. These projects were located in the Lake Tahoe area of eastern California. Federal Lands' role in project development does not involve owning, maintaining, or operating any roads. They are involved with the project management oversight of a project. They get involved at the planning

phase and assign a project manager. Before the construction phase begins a construction manager is assigned.

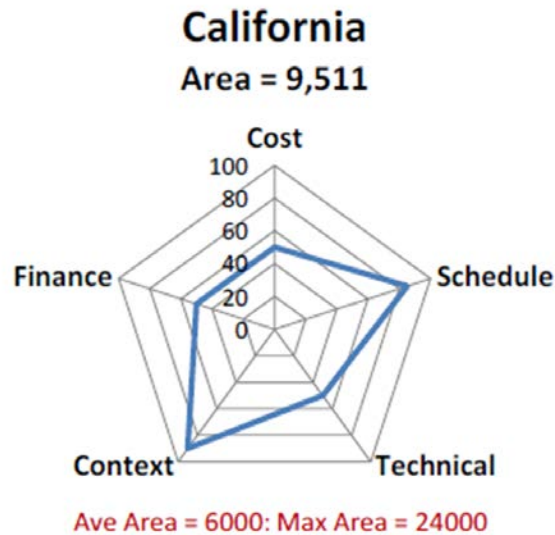


Figure 5: Project Complexity Map for FHWA Federal Lands California Project
(Figure provided by FHWA Federal Lands)

Federal Lands was able to determine a list of project implementation/recommendations and lessons learned/benefits of the R10 workshop through implementation of the 5DPM process on these selected projects. The table below shows the list of these implementation/recommendations and lessons learned/benefits.

Table 4- FHWA Federal Lands’ recommended steps for 5DPM Implementation

Project Implementation and Recommendations of 5DPM	Lessons Learned and Benefits of R10 Training
2 Week review periods for submittals	Must have stakeholder buy-in to this process and be willing to take risks for sake of project success
Expedited decision making	“Living” Financial Plan was key due to limited matching funds (design to budget)
Develop Financial Plan	Agency unwilling to commit to shorter review durations impacted overall schedule by 1.5 months
Dedicated public outreach and media person	Bi-annual completion of complexity map by CFLHD project manager illustrated immediate risk areas as project evolved
Update the FLHD Project Development Manual in order to establish R10 as a standard practice across FLHD	Empowered stakeholders to ensure they were involved in project decisions and how their needs impacted other stakeholders

NEW MEXICO DOT APPLICATION OF R10

New Mexico Department of Transportation (NMDOT) shared two case study projects, 1) Paseo del Norte Interchange Project in Albuquerque and 2) NM 15 Pinos Altos Road Improvement Project in Silver City. The NM 15 Pinos Altos Road Improvement Project was unique in many of the other projects presented during the workshop due to the fact it was not considered as a mega-project. The total cost of the project was in the vicinity of \$8 Million for design and construction. Although, not classified as a mega-project, the 5DPM method was found to be an advantageous application to use on this project as well. One of the major benefits found in use of the 5DPM method on this project was that it provided a structured approach to use as a project management training tool with the less experienced project managers within the NMDOT organization.

Dr. Gransberg and Mr. Chesnik facilitated a discussion with NMDOT and the peer exchange group to identify some benefits of using 5DPM to enhance the success of management of projects for other DOTs. The table below lists the different benefits that were identified through this discussion.

Table 5- 5DPM Project Benefits for NMDOT

Benefits of 5DPM in Project Implementation
Use 5DPM as a structured training tool for less experienced engineers.
Can use the 5 dimensions and 13 recommended tools on all projects as a communication tool for teams to speed up the learning curve and vet out project issues earlier in the process.
Able to get all the major people together to go through the process together (design, construction, maintenance). It gets everyone in the same room and gets the right communication going.
5DPM works well on D-B projects.
5DPM is very applicable in daily design development, especially in upfront preliminary engineering.
5DPM is very adaptable in terms of project size and complexity. Its application and effort is adaptable (hours vs. weeks).

LESSONS LEARNED

Dr. Gransberg and Mr. Chesnik facilitated a final discussion to summarize the overall lessons learned that were communicated during the two day peer exchange workshop. Some of the lessons learned summarized during this session included:

- 5DPM is a communications exercise. It facilitates a way to get all the project stakeholders communicated and understanding the project in a holistic perspective.
- There is value to using early co-location. Many DOTs and project teams identified this tool as a major benefit to the project. However, to avoid any potential conflict of interest there needs to be a discussion on safeguard mechanisms for this option.
- Being willing to do something different. Complex projects must be managed differently than routine projects within DOTs.

- Many of the DOTs are institutionalizing this process. Many of the methods and tools recommended by 5DPM have become part of the standard process of complex project management within the different departments.
- The effective use of a finance plan. Georgia DOT utilized a program cash flow finance plan to help maintain the financial health of their complex projects they were developing.
- Identifying Standard Operating Procedures (SOPs) from the tools of 5DPM. MassDOT was able to either correlate existing SOPs to tools of 5DPM or in some cases have developed new SOPs based on the tools of 5DPM.
- When implementing R10, do not focus on it being a new process to follow, but use it as a tool to use.
- Empower project team with adequate authority to expedite project delivery.
- 5DPM promotes early planning, estimating, and risk analysis.
- Provide 5DPM training to PMs and other staff on a regular basis.

NEXT STEPS

Carlos Figueroa, FHWA R10 Program Manager, discussed the next steps of the R10 implementation, which include the completion of a peer exchange summary report (this report) and a case study. The implementation also includes remaining technical assistance such as several demonstration workshops, training sessions and other technical assistance to complete the integration and adoption of 5DPM into the DOT's project management processes and procedures. Finally, Carlos talked about continuing the 5DPM Community of Practice to promote resource sharing and assistance within the DOTs participating of the R10 implementation. Carlos presented several ideas to contribute to the community of practice, by reaching to peers, sharing best practices, resources, accessing and using the R10 resources in the [FHWA Go SHRP2 website](#), hosting training sessions, and participating in conferences and panels, among other ways.

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Peer Exchange - Des Moines, Iowa

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Peer Exchange - Des Moines, Iowa



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APPENDIX B—AGENDA

SHRP2 R10 Peer Exchange Workshop Des Moines, Iowa

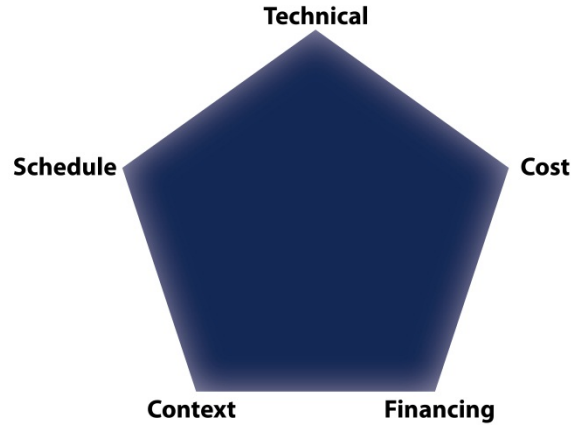
AGENDA May 3-4, 2016

Des Moines, Iowa

DAY 1		
Time	Topic	Remarks
8:00-8:15	Opening Remarks – FHWA, AASHTO	
8:15-10:00	Iowa DOT – Integrating Project Management for Successful Project Delivery	
10:00-10:15	BREAK	
10:15-12:00	Table Break Out Session – Applications for Integrating PM Strategies	Group Exercise
12:00-1:00	LUNCH	
1:00-2:30	Summary of R10 Complex Project Management	
2:30-2:45	BREAK	
2:45-4:00	Massachusetts DOT Application of R10	
4:00-4:30	Participants Lessons Learned and Day 1 Closing Remarks	
DAY 2		
8:00-8:15	Day 1 Recap	
8:15-9:30	Georgia DOT Application of R10	
9:30-9:45	BREAK	
9:45-11:00	Michigan DOT Application of R10	
11:15-12:00	FHWA Federal Lands Hwy Application of R10	
12:00-1:00	LUNCH	
1:00-2:45	New Mexico DOT Application of R10	
2:45-3:15	Peer Exchange Summary	Summary of Lessons Learned
3:15-3:45	Next Steps and Closing Remarks	

APPENDIX C—5DPM COMPONENTS

5 Dimensions of Managing Complex Projects



DIMENSION 1	DIMENSION 2	DIMENSION 3	DIMENSION 4	DIMENSION 5
Project estimates Uncertainty Contingency Project-related costs Project cost drivers and constraints	Time Schedule risk Prescribed milestones Availability of resources	Scope of Work Internal structure Contract Design Construction Technology Nature of constraints	Stakeholders Project-specific issues Local issues Environmental Legal/legislative Global/national Unexpected occurrences	Public funding Stakeholders Project-specific issues Local issues Environmental Legal/legislative Global/national Unexpected occurrences

5 Methods to Effectively Manage Complex Projects

Method 1, *Define Critical Project Success Factors* is influenced by factors from all five dimensions.

Method 2, *Assemble Project Team* and **Method 3**, *Select Project Arrangements* can be influenced by any of the dimensions, but are most often influenced by factors in the Schedule, Context, and Technical Dimensions.

Method 4, *Prepare Early Cost Model and Finance Plan* is likely to be guided by factors of the Cost and Financing Dimensions.

Method 5, *Develop Project Action Plans*, responds to factors typically defined within the Context Dimension, but could be impacted by the Schedule Dimension.

13 PROJECT EXECUTION TOOLS BASED ON PLANNING METHODS 1 - 5 OUTPUT

1) Incentivize critical project outcomes

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

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

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

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

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

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

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

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

9) Co-locate team

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

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

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

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

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.