CENTER FOR
INNOVATIVE
FINANCE SUPPORT

BUILD AMERICA
TRANSPORTATION INVESTMENT CENTER
UNITED STATES DEPARTMENT OF TRANSPORTATION

# Use of Performance Requirements in Design and Construction for Public Private Partnerships

Jagannath Mallela, Ph.D.

WSP | Parsons Brinckerhoff

# Presenter

Jagannath Mallela, Ph.D.

WSP | Parsons Brinckerhoff

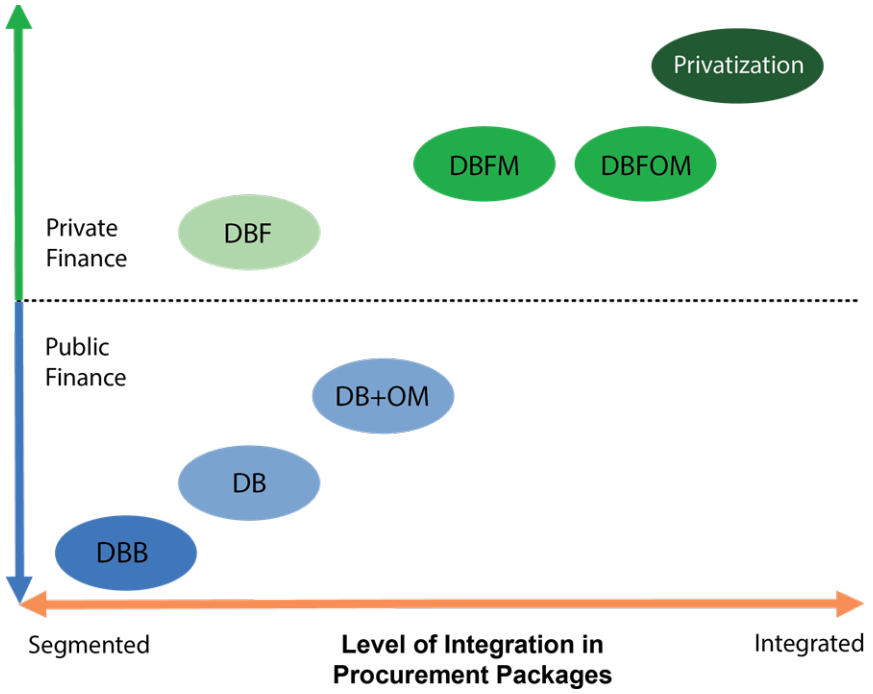
# Presentation Overview

- Why use performance requirements?
- Overview of performance requirements
- Writing performance requirements
- Role of Alternative Technical Concepts (ATC)
- Implementation Considerations

# Why Performance Requirements ?

# P3 Service Delivery

- Integrated delivery of assets and services
  - Design, construction, finance, operations, maintenance
- P3 partner is singly responsible
  - Both Design-Build (DB) and O&M contractors work for P3 Partner
- Better value for money
  - Cost certainty
  - Potential cost minimization
  - Potential for optimizing investment intervals



# Realizing P3 Opportunities

- Effective transfer of risks
  - Majority of DB and O&M risks transferred to P3 Partner
    - Asset and operational risks
    - Design-build risks
  - Risk retention with prescriptive requirements
- Potential for efficiency gains
  - Level of integration - More than sum of its parts
    - Larger contract size & increased coordination
    - Design-build efficiencies
  - Flexibility in making decisions
    - Innovations to maximize asset lifecycle and operational performance (e.g. safety, mobility, community impacts)

# Concerns with Prescriptive Design Requirements in P3s

- Lost opportunities for efficiency gains
  - Fewer opportunities are available when design decisions are already made
  - Limited potential for innovation and optimization due to over-specificity of design details
- Risks are shifted back to the owner

# An Example with Pavement Design

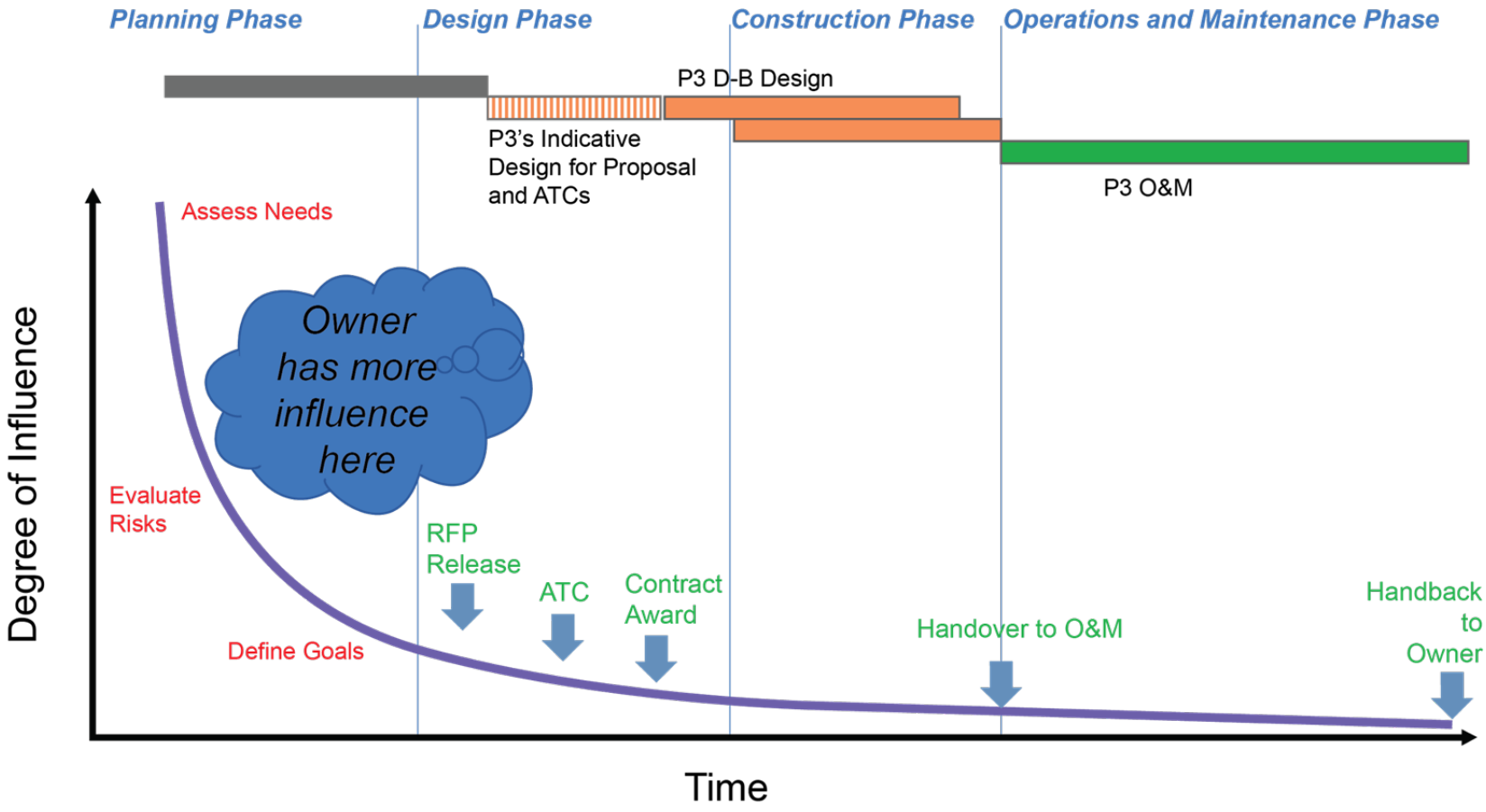
The P3 Developer shall use one of the following pavement types: hot mix asphalt (HMA) or Portland cement concrete (PCC) pavement. The P3 developer shall use pavement designs that meet the following requirements.

| HMA Pavement | PCC Pavement |
|---|---|
| Minimum HMA Thickness = 10 inches. Use stone mastic asphalt with PG 76-22 on the top two layers.<br>Minimum Thickness for Granular Base = 12 inches<br>The acceptance of HMA shall be in accordance with XYDOT Standards & Specifications | Minimum PCC Thickness = 12 inches<br>Transverse Joints = 15 feet<br>The acceptance of PCC shall be in accordance with XYDOT Standards & Specifications |

Any proposed changes to the above specified pavement sections requires approval by the Department.

# Where is scope for innovation and risk transfer ?

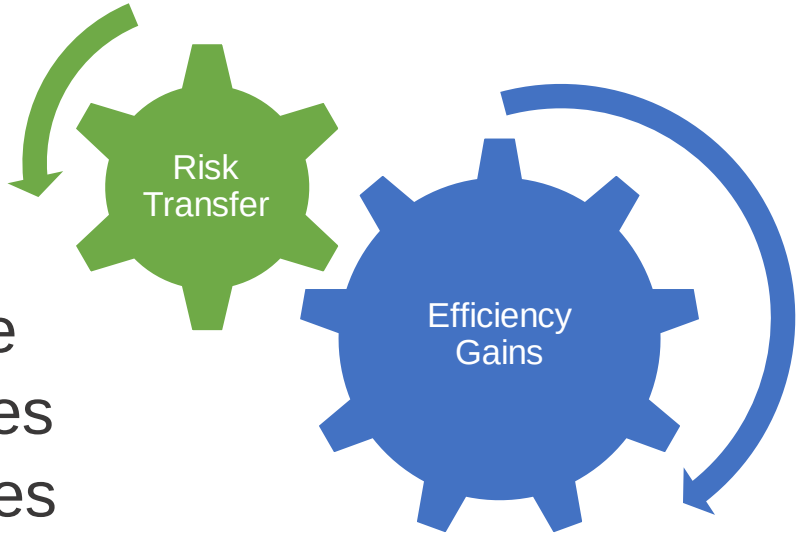
## Project Influence Curve




*Adopted from D.D. Gransberg, 2006*

# Business Case for Performance Requirements

- To ensure effective transfer of risks to P3 partner
- To maximize realization of efficiency gains
  - Remove constraints to innovate
  - Encourage lifecycle perspectives
  - Provide continuity across phases



# Questions?

Submit a question using the chat box

# Overview of Performance Requirements

# What are Performance Requirements ?

What are the expectations on how the facility should perform?

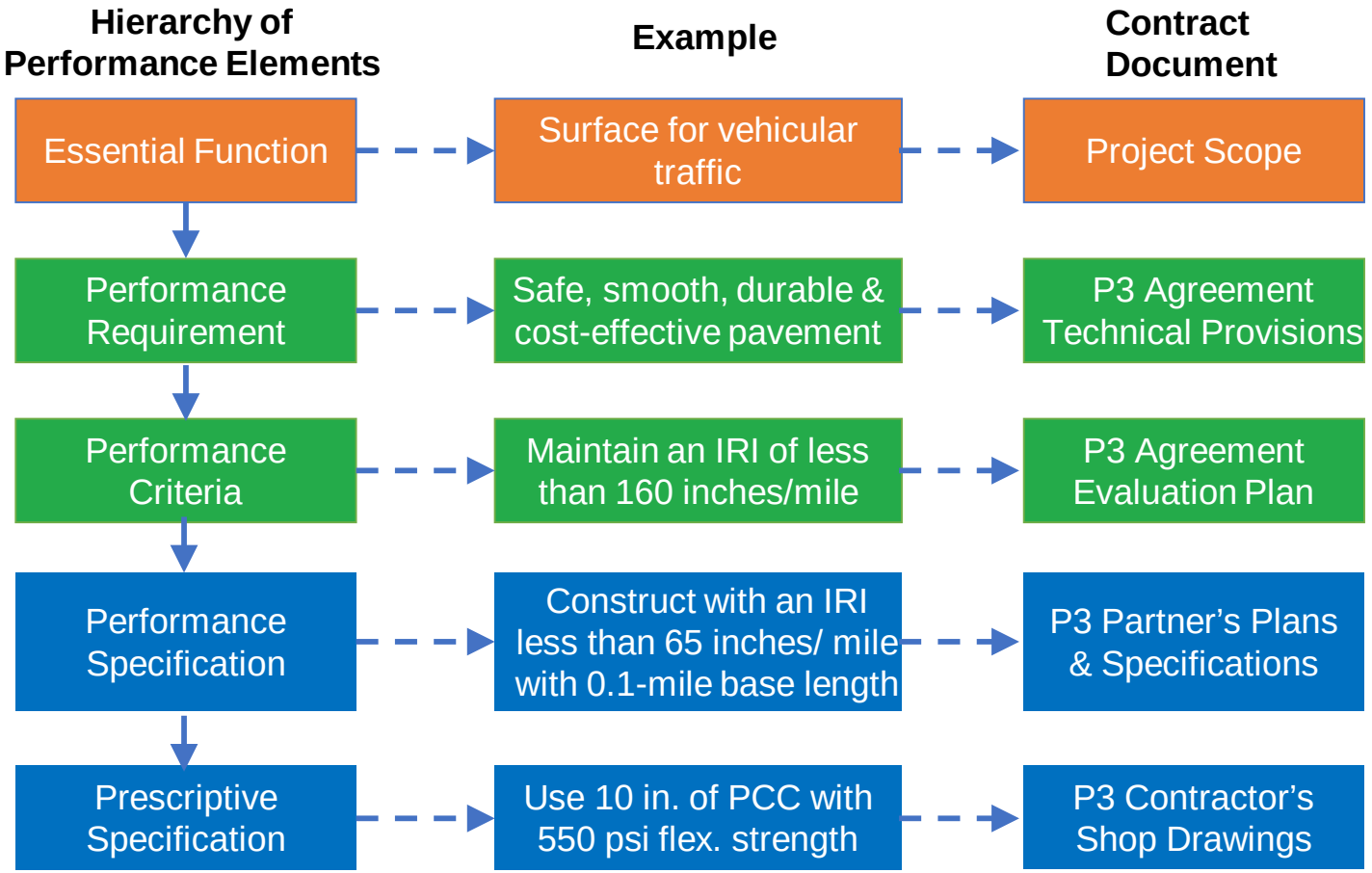
*Performance requirements define what is needed to be done to accomplish the objectives of the project*

Stakeholder Expectations → Essential Functions → Performance Requirements → Performance Criteria

*Essential Functions define how well the highway facility needs to perform as well as the objectives for a successful delivery of the facility.*

*Performance criteria are measures that demonstrate a specific owner requirement has been met*

# Hierarchy of Performance Elements




*Adopted from D.D. Gransberg, 2006*

# Current Practice: Use of Performance Requirements in Various Technical Areas

## Technical areas where an agency is more likely to be **flexible** in design requirements

- Geometric design
- Work zone management
- Ancillary assets
- Drainage/storm water management
- Landscaping and aesthetics

## Technical areas where an agency is more likely to be **prescriptive** in design details

- Pavements
- Bridges – types, structural elements & materials

# Questions?

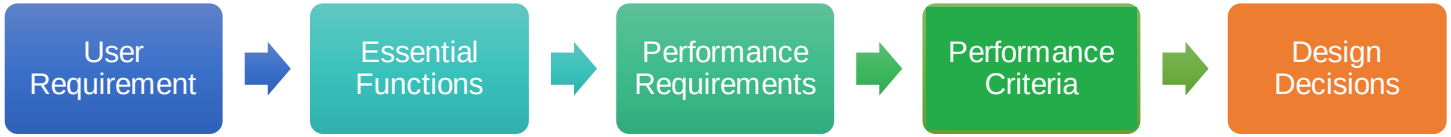
Submit a question using the chat box

# Writing Performance Requirements

# Writing Performance Requirements

- Beginning with project scoping, identify the needs:
  - User and stakeholder needs
  - P3 goals: Project delivery, operational and performance management
- Prepare a list of functional requirements
  - Must-haves, needs and project constraints
- Focus on project delivery as well as service delivery
  - Project delivery: Target cost, quality and schedule outcomes
  - Service delivery: Post-construction asset lifecycle and operational performance needs (life-cycle costs and levels of service targets)

# Identifying Performance Requirements/ Criteria





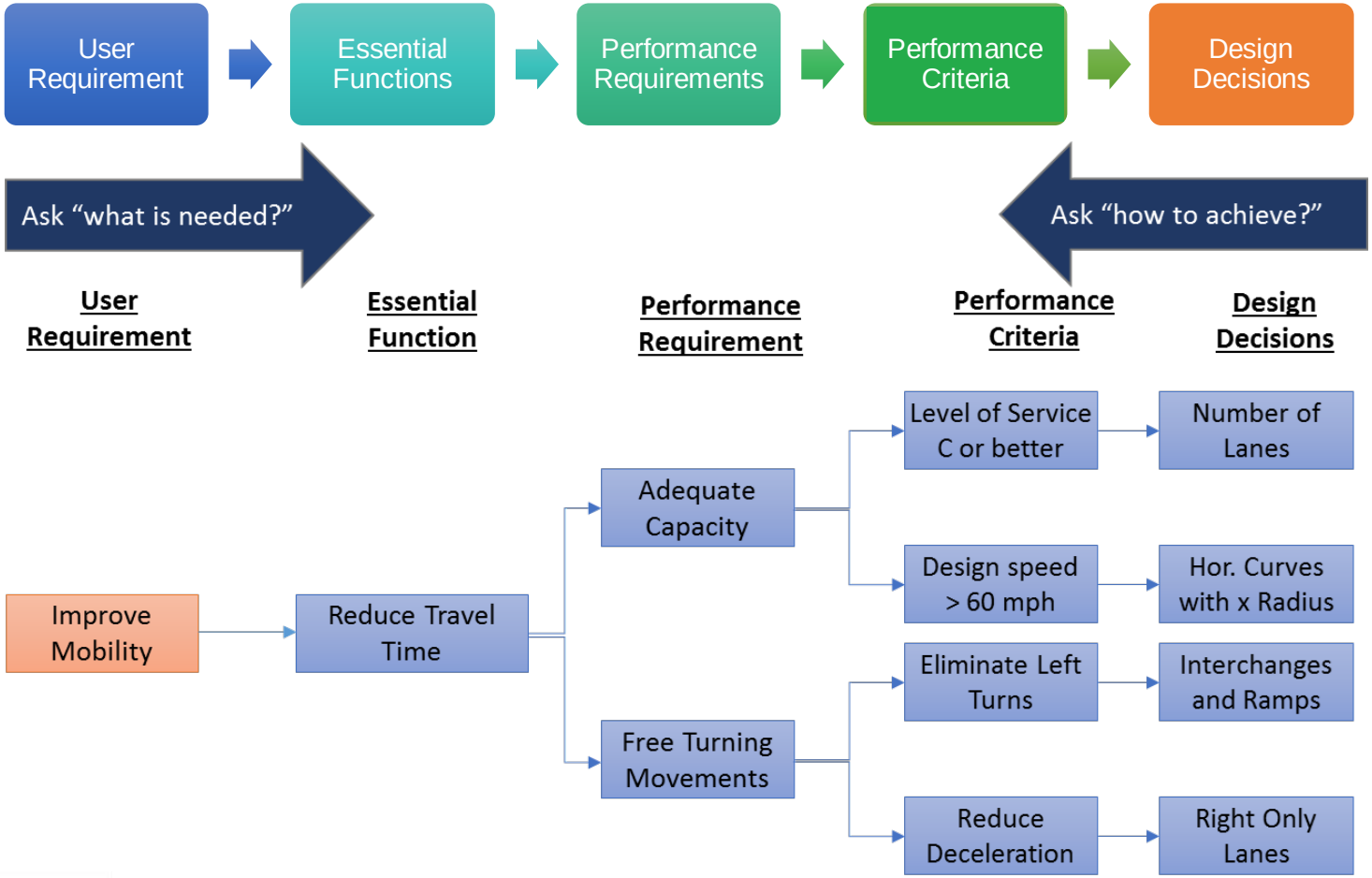
What is needed to meet the essential functions of a P3 project ?

- User and other stakeholder needs
- Operational goals
- Performance management goals
- Project delivery goals

How to achieve to ensure essential functions are met ?

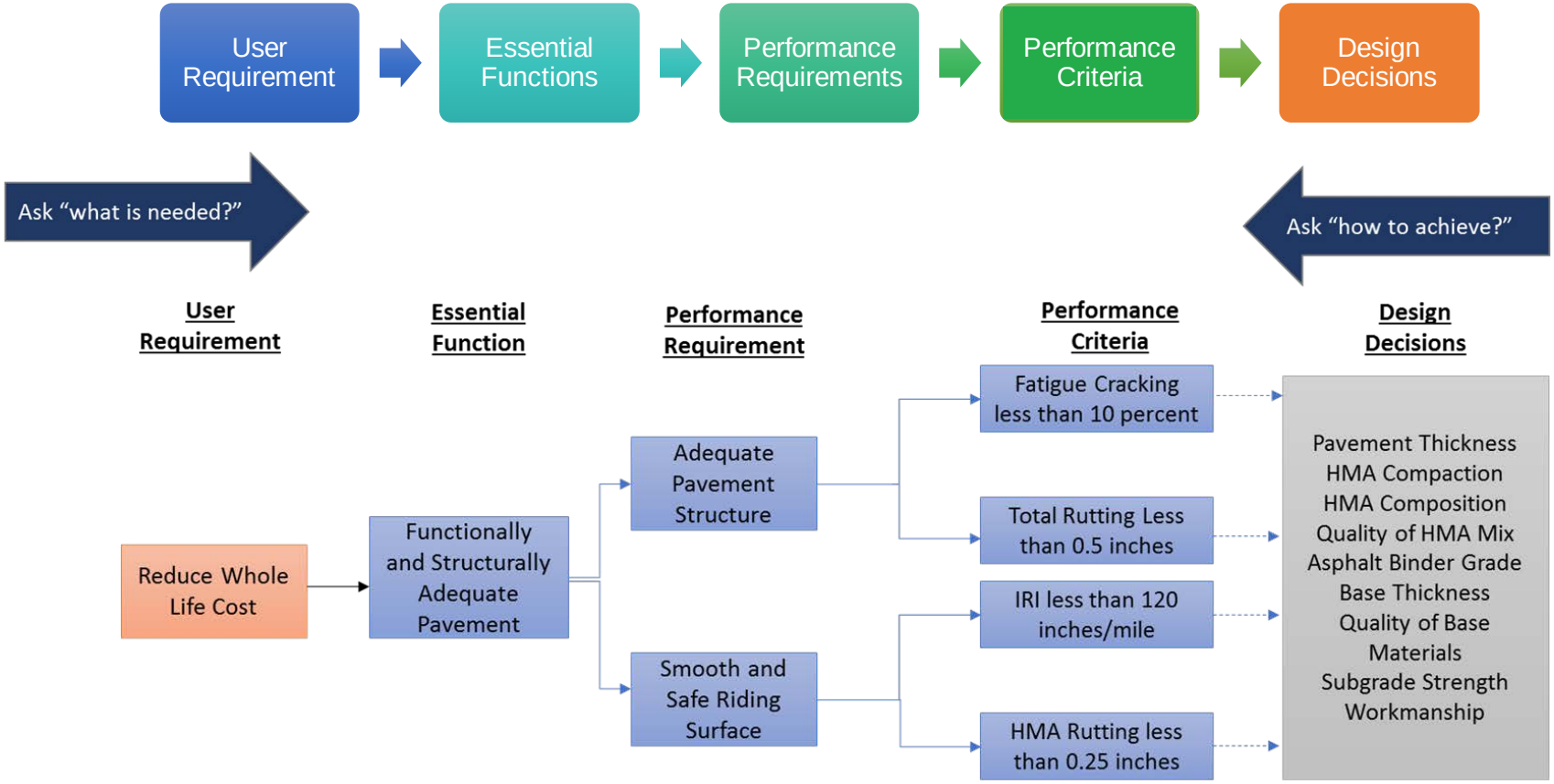
- Lifecycle perspective
- End-of-Term conditions
- Who bears the risk ?
- Consequences of cost, schedule, performance
- Enforcement vs Link to payments

# Identifying Performance Requirements/ Criteria: "Improve Mobility" Example




*Function Analysis System Technique is suggested*

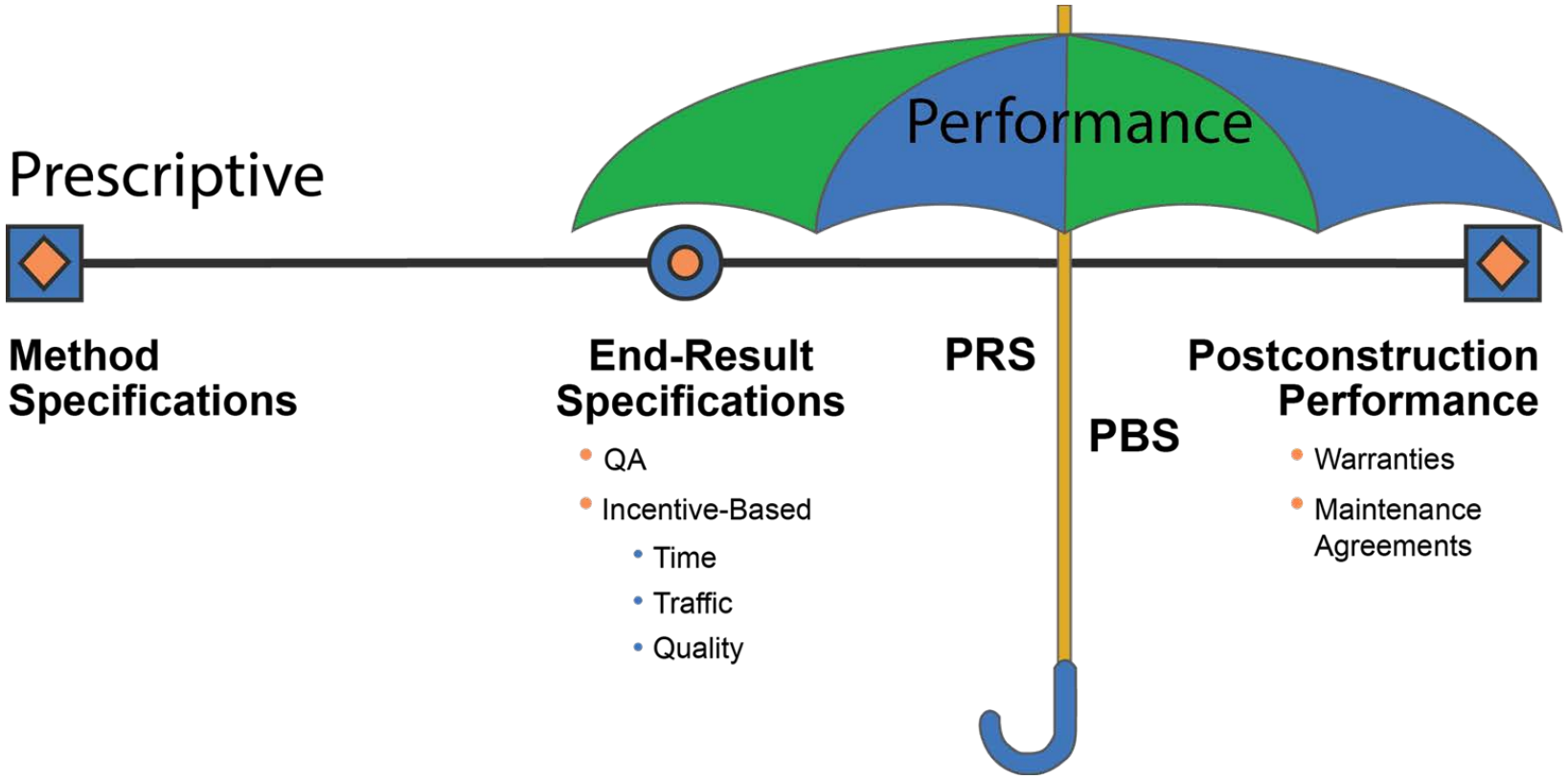
# Identifying Performance Requirements/ Criteria: “Reduce Cost” Example



# Writing Performance Requirements: Some Considerations

- Optimal risk allocation between contracting parties
- Whole life perspective
  - Use of performance analysis
- Need for re-evaluating environmental commitments
- Enforcement through non-compliance points and disincentives
- Use of performance specifications to relate construction quality with performance

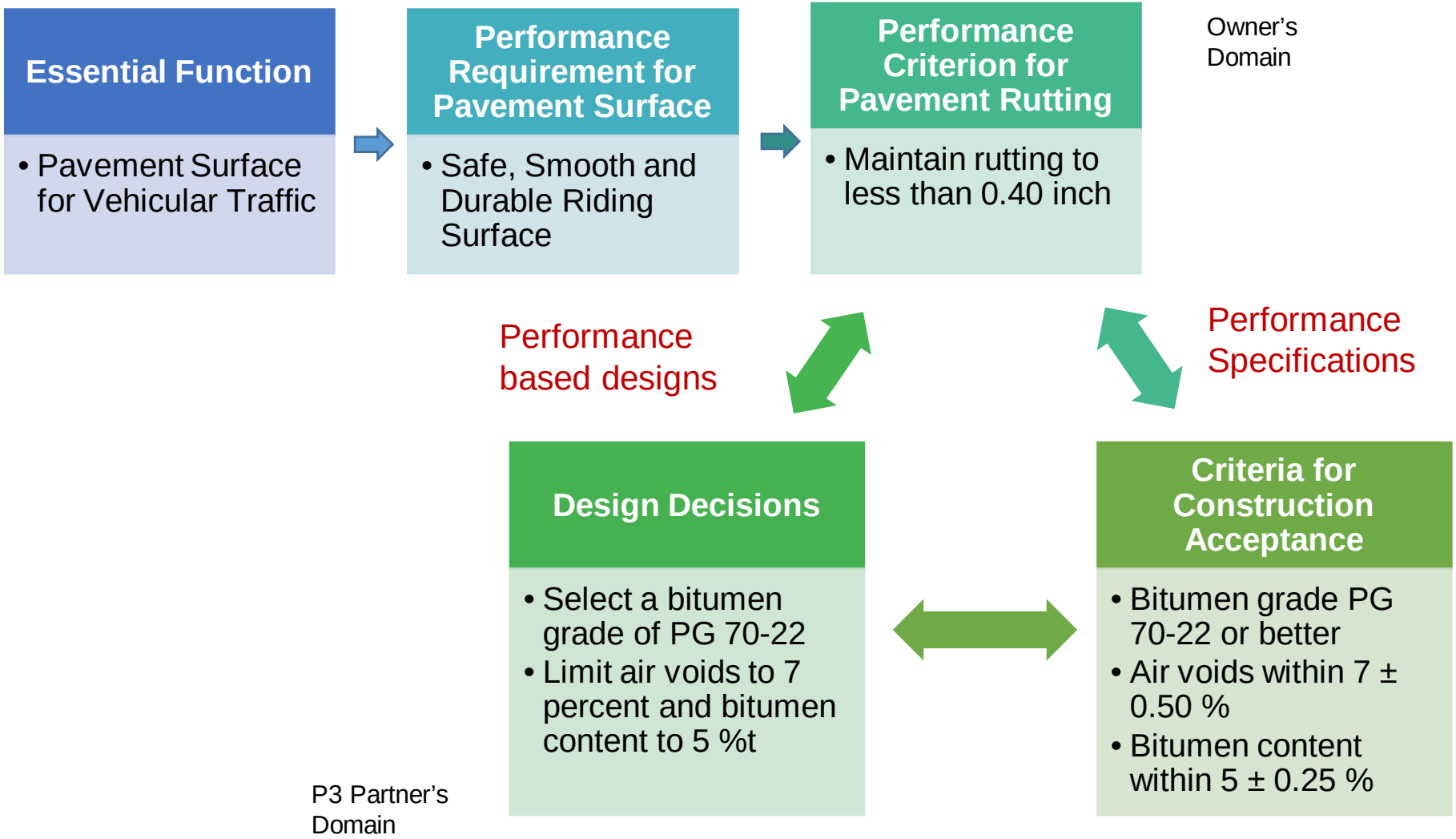
# Performance Specifications




Performance specifications provide the vital link between construction quality characteristics and performance

Source: SHRP2 R07, Scott et al, 2014

# Linking Construction Quality to Performance: An Example



# Implementing Performance Specifications

- Degree of readiness depends on technical areas:
  - Pavements & work zone management – more mature
  - Bridges & geotechnical – yet to mature
- Known challenges with performance specifications
  - Understanding factors influencing performance
  - Robustness of performance predictions - Need long-term data
  - Standardization – repeatability and reproducibility
  - Availability of technology and skills

# Questions?

Submit a question using the chat box

# Alternative Technical Concepts

# Alternative Technical Concepts

**ATCs** are suggested changes submitted by proposing teams to the contracting agency's supplied basic configurations, project scope, design or construction criteria.

An ATC is a request by a proposer to *modify a contract requirement*, specifically for that proposer's use in gaining *competitive benefit* during the bidding or proposal process. An ATC *must provide a solution that is equal to or better than* the requirements in the Invitation for Bid (IFB)/RFP document.

# ATCs to Foster Innovation

- Contract tool to attract innovative and alternative ideas from bidders
  - Proven & time-tested process
  - Risk transfer to P3 partner
- Rare need for ATCs when using performance requirements
- For P3s, ATCs contribute:
  - To evaluate bidders' ideas on case-by-case basis (both control and opportunity)
  - Re-evaluate agency's mandatory requirements and constraints

**ATCs - an Intermediate or Alternative Step to Performance Requirements**

# What qualifies as an ATC?

- Value: Must generate a cost, schedule or life cycle benefit
- Deviations with RFP requirements and agency standards (design criteria, specifications, etc.)
  - Design Exceptions vs Design Variances Approval
- “Cardinal Change” doctrine – Are the changes within the contract scope ?
  - Handling permitting and NEPA commitments

**Source: NCHRP 44-09**

# Interpreting “equal or better than” criteria

- Compare against the baseline concept (3-step process)
- Similar methodologies
  - Caltrans value analysis methodology
  - Performance-based practical design
- Other considerations
  - Unintentional NEPA/Permitting commitments
  - Divesting ownership rights


**Three Step Process for ATC Review & Decision-Making**

# Questions?

Submit a question using the chat box

# Implementation Considerations

# Drafting Performance Requirements

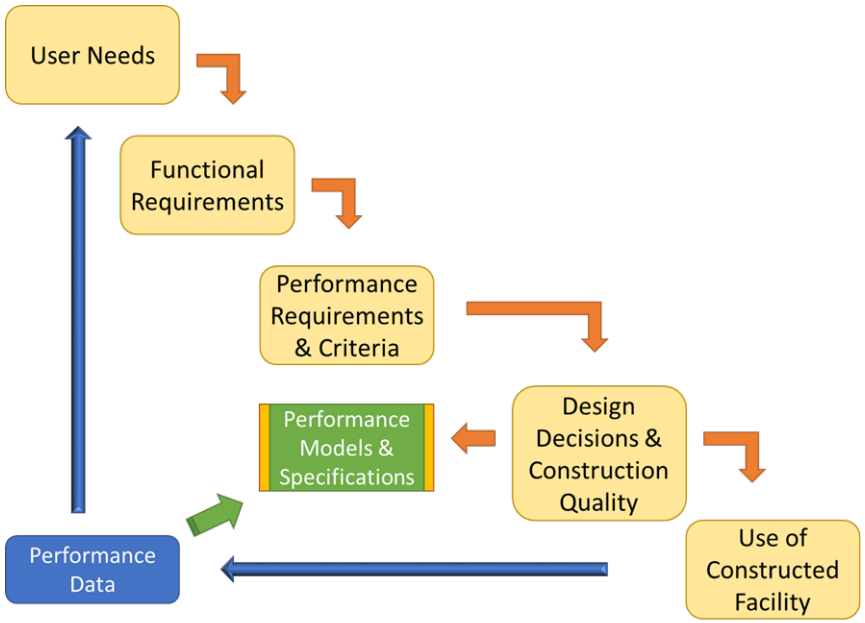
- Involve interdisciplinary teams in drafting requirements
  - e.g., environmental, maintenance, operations team
- Link performance standards to proposal evaluation criteria
- Determine the methodology and frequency of monitoring
- Consider future changes to service requirements and end-of-term conditions
- Allow sufficient time for drafting
- Consider involving independent advisors

# Organizational Cultural Change

- New demands, new skills and new perspectives
  - Understanding performance consequences of design decisions
  - Training needs, particularly on legal issues, dispute resolution, and risk management
  - Audit approach to oversight and quality acceptance
- Potential role of an independent engineer
  - Sharing the benefits of “duty of care”

# Performance-Based Decision Making

- Need for performance-based decision making
- Long-term performance data is foundational
  - Performance prediction models
  - Performance specifications
- Parallel FHWA study to capture performance metrics of P3 and non-P3 cohorts
- Need for more robust and integrated asset management systems



# Best Practices

- Capacity building and knowledge management
- Involving multi-disciplinary teams in drafting performance requirements
- Robust contract administration and support process
  - Re-engaging advisors who drafted performance requirements
  - Reducing propensity to micromanage
  - Hiring third-party consultants/specialists to support the delivery
- Enforcement mechanisms
  - Detection of early deficiencies
  - Linking performance to payments
- Robust asset and operational management process
  - Need for performance data
  - Continual update to performance models

# Legal Perspectives

- Spearin Doctrine: Who is responsible for defects in the plan, design, or specifications provided to the contractor ?
  - Developed for D-B-B
  - Less certain on contractor-provided designs
  - Basic principles apply – prescriptive requirement, differing site conditions, inaccurate information
- Prescriptive vs Performance Requirements
  - Focus NOT on words “design” and “performance”
  - Evaluates whether “instructive” or “outcome” based

# Legal Perspectives

- Differing site conditions
  - Provide an opportunity to P3 proposers to conduct their own investigations
  - Shared risks – use risk “allowance”
- Order of precedence
  - Likelihood of disputes when technical proposal is directly incorporated into P3 agreement
- “Brand name or equal” clause
  - Will be treated as a performance requirement
  - Should be a reasonable number of vendors

# Questions?

Submit a question using the chat box

# Upcoming P3 Webinar

- **February 16** P3 Projects in the U.S.

***To register for the webinar, please visit:***

http://www.fhwa.dot.gov/ipd/p3/toolkit/p3_value_webinars

# FHWA P3 Toolkit: https://www.fhwa.dot.gov/ipd/p3/toolkit/

| | | |
|---|---|---|
| **FACT SHEETS** | ▪ Ten concise single-sheet discussions of key P3 concepts for a non-technical audience | |
| **PRIMERS** | ▪ P3 Concessions for Highway Projects<br>▪ Risk Assessment<br>▪ Value for Money | ▪ Financial Structuring and Assessment<br>▪ Establishing a P3 Program |
| **GUIDES** | ▪ How FHWA Reviews P3s<br>▪ Model Toll Concession Contracts<br>▪ Model Availability Payment Contracts<br>▪ P3 Project Financing | ▪ Risk Assessment<br>▪ Value for Money<br>▪ Benefit–Cost Analysis |
| **DISCUSSION PAPERS** | ▪ Revenue Risk Sharing<br>▪ Performance Requirements for Design and Construction in P3s | |
| **ANALYTICAL TOOLS** | ▪ P3-SCREEN<br>▪ P3-VALUE | |
| **INFORMATIONAL REPORTS** | ▪ Successful Practices for P3s<br>▪ Highway P3 Projects in the U.S | |

# Contact Information

**Jagannath Mallela**

**Director, Research & Innovation Solutions**

**WSP Parsons Brinckerhoff**

mallelaj@pbworld.com

# Contact Information


## Patrick DeCorla-Souza

**P3 Program Manager**

**USDOT Build America Bureau**

& FHWA Center for Innovative Finance Support

(202) 366-4076

Patrick.DeCorla-Souza@dot.gov