North-Central MEPDG User Group
February 19, 2008

MEPDG Overview & National Perspective
(My Perspective)

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APPLIED RESEARCH ASSOCIATES, INC.
An Employee-Owned Company

Outline

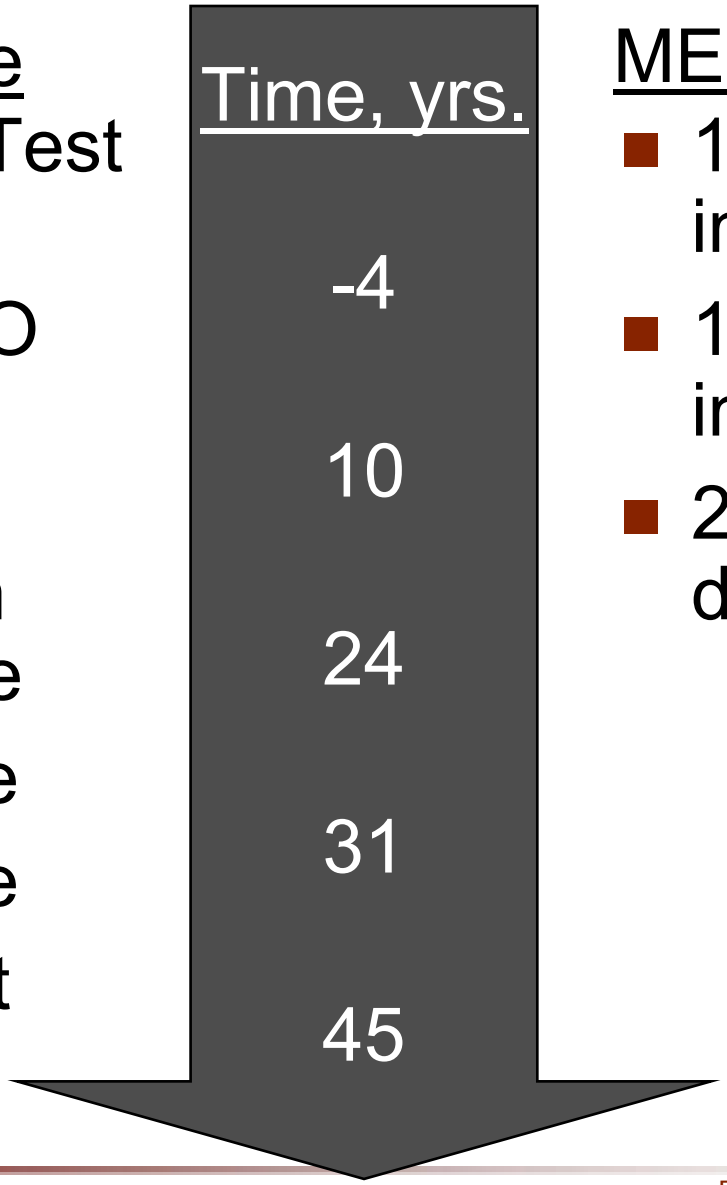
1. The Beginning
2. Local Implementation Efforts
3. Integration of MEPDG into Practice
4. Enhancements
5. Summary

April 2007 Irvine Workshop

Should we wait until its *PERFECT*?

AASHTO Guide

- 1958; Road Test initiated
- 1962; AASHO Road Test complete
- 1972; Interim Design Guide
- 1986; Update
- 1993; Update
- 2007; still not perfect.



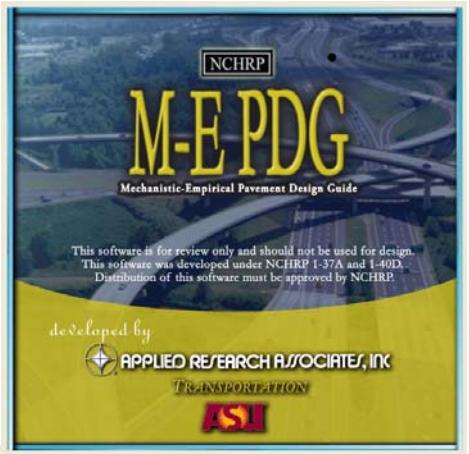
MEPDG

- 1989; LTPP initiated
- 1998; MEPDG initiated
- 2007; MEPDG delivered

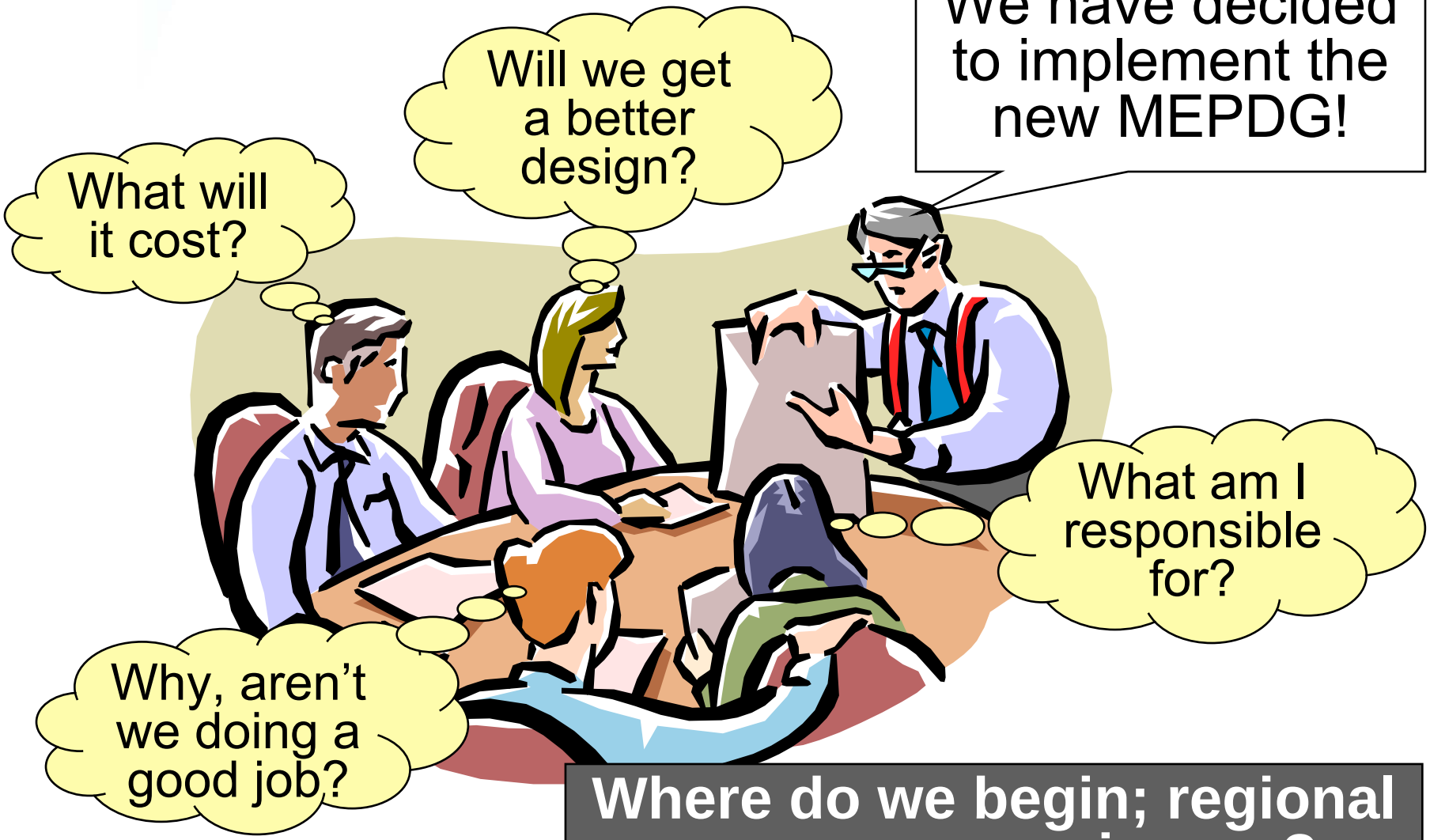
Should we wait until its *PERFECT*?

- If we wait until there are no more changes, *we will never use it*.
- If we wait for perfection, *it will be impractical and cost will restrict its use*.

There is ***NO*** perfect procedure & it will never be perfect!



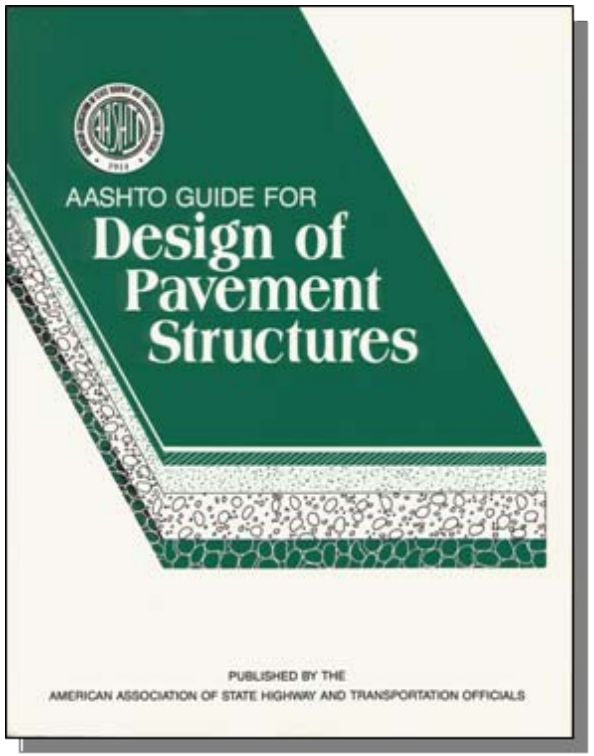
The Beginning



Where do we begin; regional versus agency issues?

Remember where we are coming from, as you use the MEPDG!

- Assumptions used in the Design Guides?
- Calibration of both Design Guides?
- Error in the service life predictions of both Design Guides?



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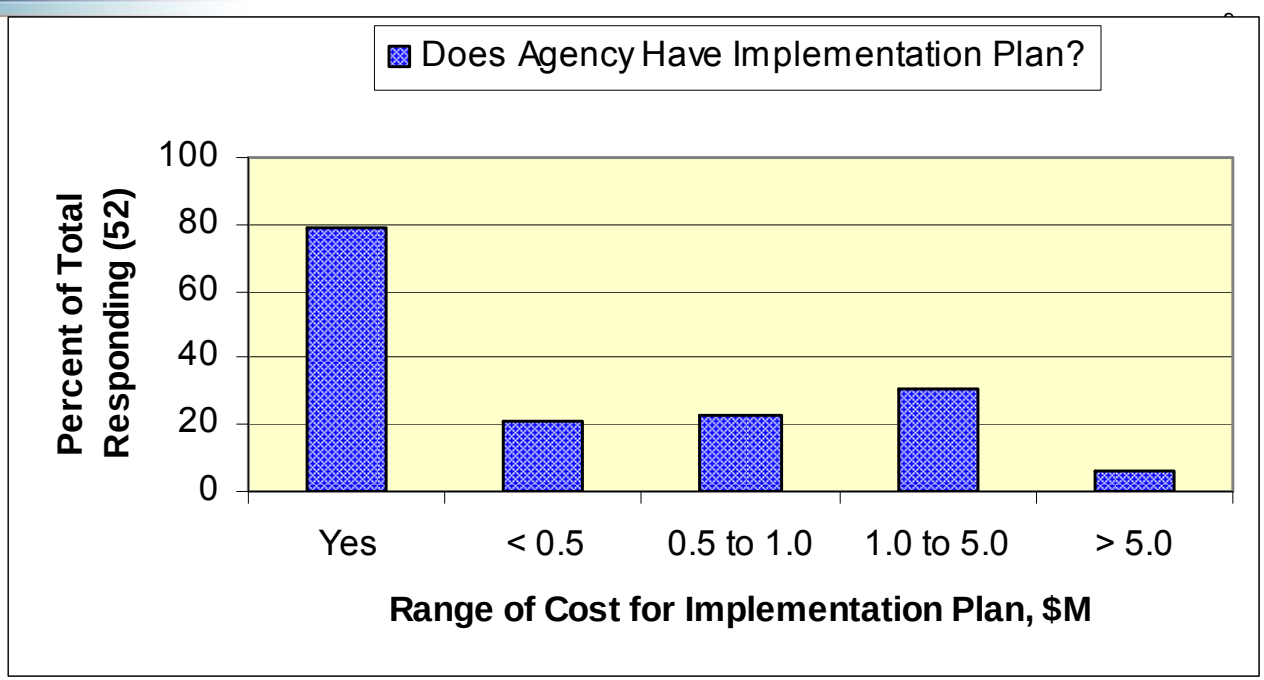
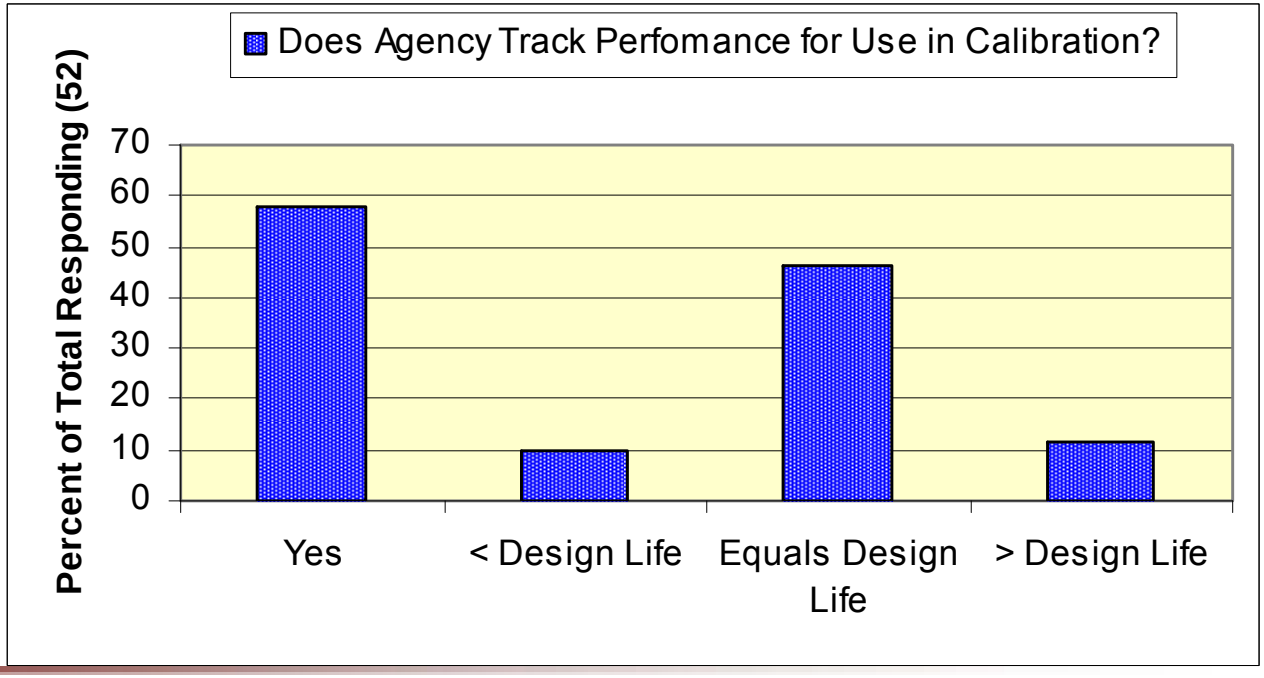
FHWA Summary of Agency Plans



Efforts to Implement MEPDG 2007



MEPDG Global Calibration

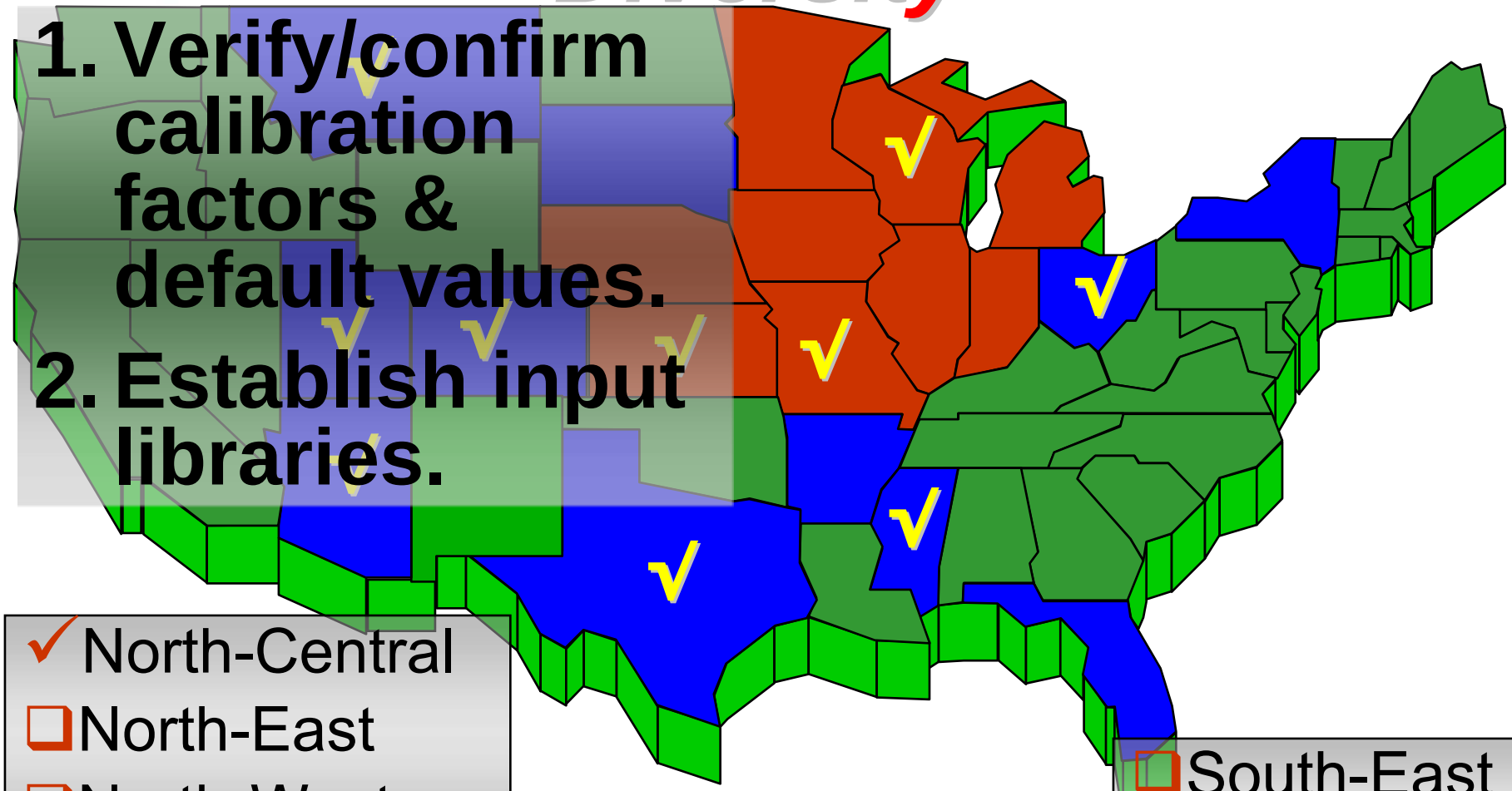
LTPP *GPS* Test Sections Used in Calibration of Distress Prediction Models; NCHRP Projects 1-37A & 1-40D

- Many assumptions used.
- Many inputs estimated.

Local Implementation Efforts—

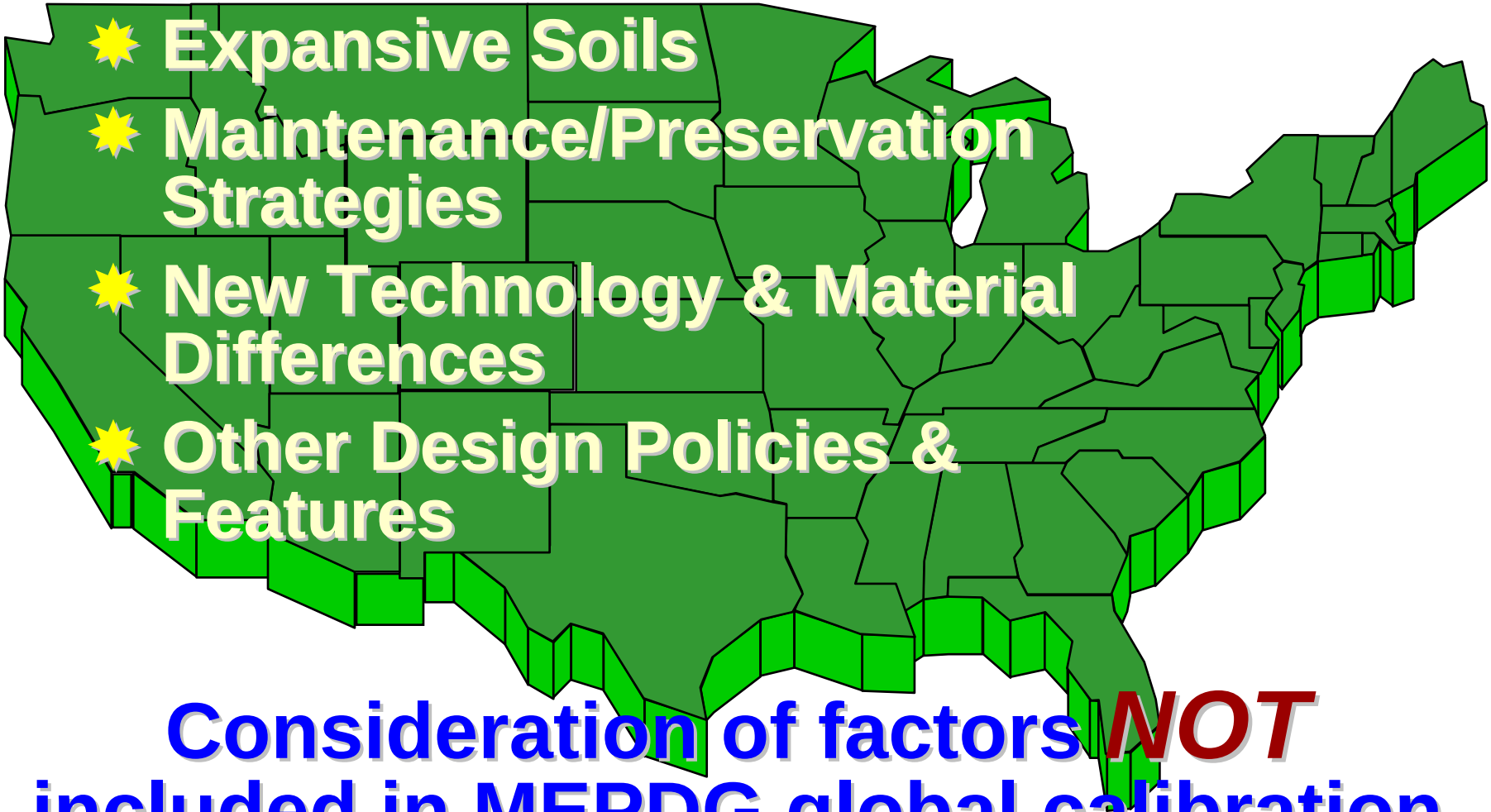
Diversity

1. Verify/confirm calibration factors & default values.
2. Establish input libraries.



- ✓ North-Central
- ❑ North-East
- ❑ North-West
- ❑ South-East
- ❑ South-West

Why Local Calibration?



- Expansive Soils
- Maintenance/Preservation Strategies
- New Technology & Material Differences
- Other Design Policies & Features

Consideration of factors *NOT* included in MEPDG global calibration process.

MEPDG – Local Validation/Calibration Tools

Manual of Recommended Practice for Calibration of M-E Based Models

1. Confirming or adjusting the global calibration factors.
2. Detailed and practical guide to complete local calibration.

MEPDG Software Itself

NCHRP Project 1-40B

Previous & On-Going Studies

1. **NCHRP 9-30** – *Experimental Plan for Calibration & Validation of HMA Performance Models for Mix & Structural Design*.
2. **NCHRP 9-30(001)** – *Conduct Pre-Implementation Studies & Database Enhancement*.
3. **NCHRP 1-40D** – *A review of the M-E PDG software & prediction methodology; & Correcting errors/blunders in the software*.
4. **NCHRP 1-40B** – *Local Calibration for the Recommended Guide for M-E Design of New and Rehabilitated Pavement Structures.*

Previous & On-Going Studies

- Calibration Documents:
  - **NCHRP Digest 284**, December 2003; *Refining the Calibration & Validation of HMA Performance Models: An Experimental Plan and Database*.
  - **NCHRP Digest 283**, December 2003; *Jackknife Testing – An Experimental Approach to Refine Model Calibration and Validation*.
- FHWA: Use of PMS data for local calibration.
- FHWA: Use of deflection basin data in the MEPDG.

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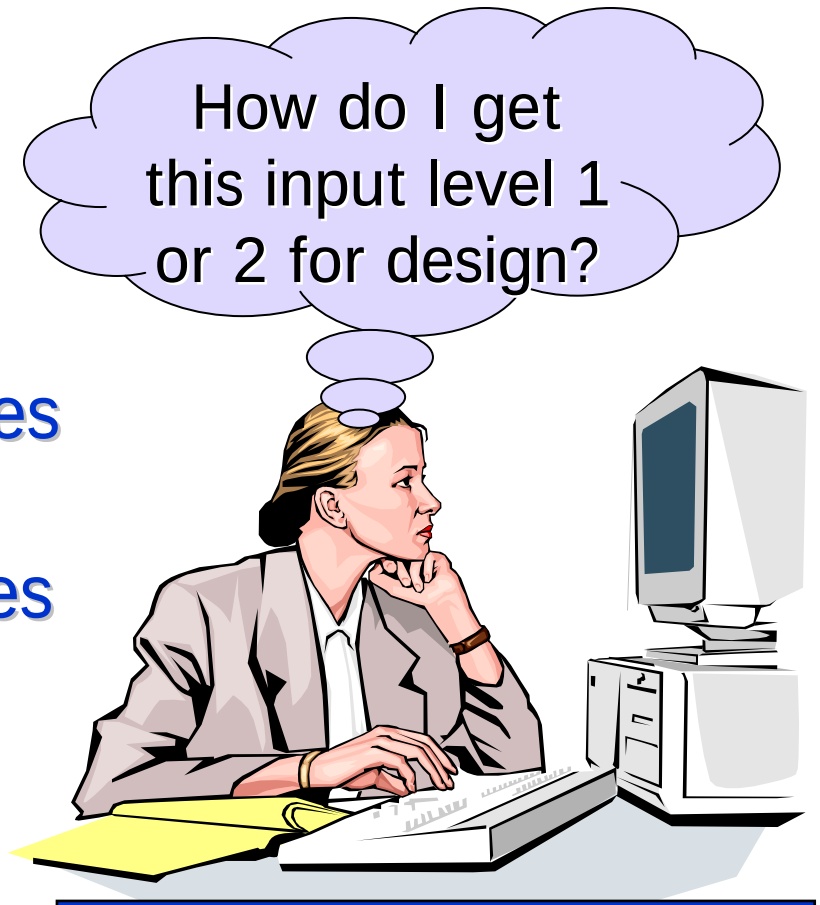
Integration into Practice

A Major Issue – The Unknowns!!

- Determination of properties & other inputs.
- Factors affecting properties needed for design!!!!
  - Source of Materials
  - Contractor
  - Construction Equipment



4-Day NHI Course for MEPDG Software Training

Data Integration: Effective use of available but limited local resources.

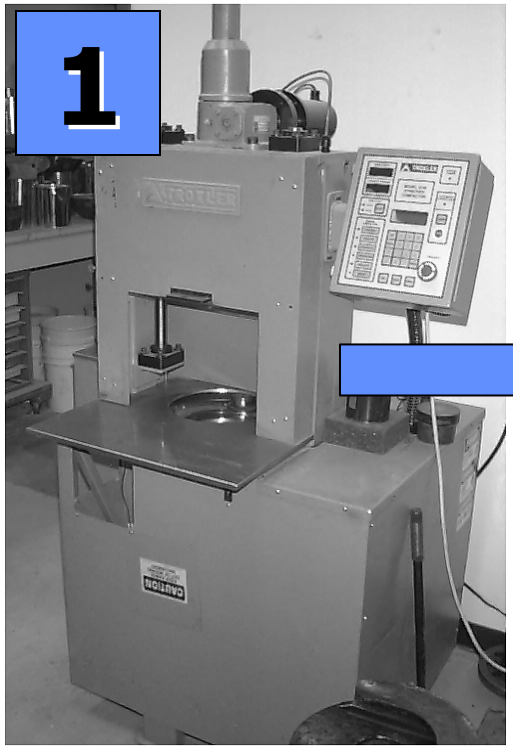
Data integration: an automated process?

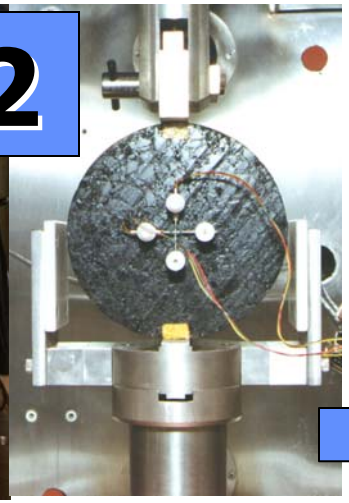
*Probably **NOT**!*

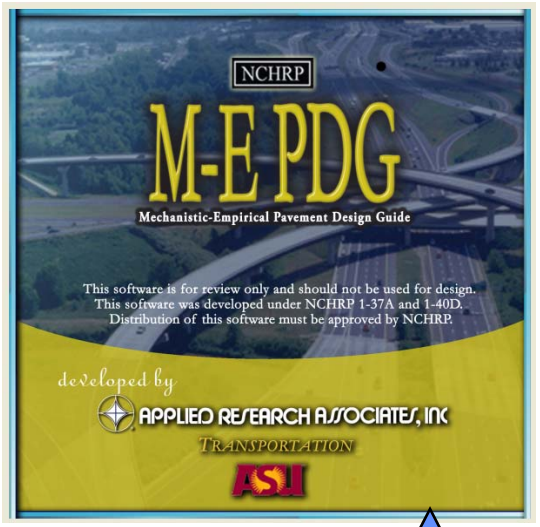
PMIS Database

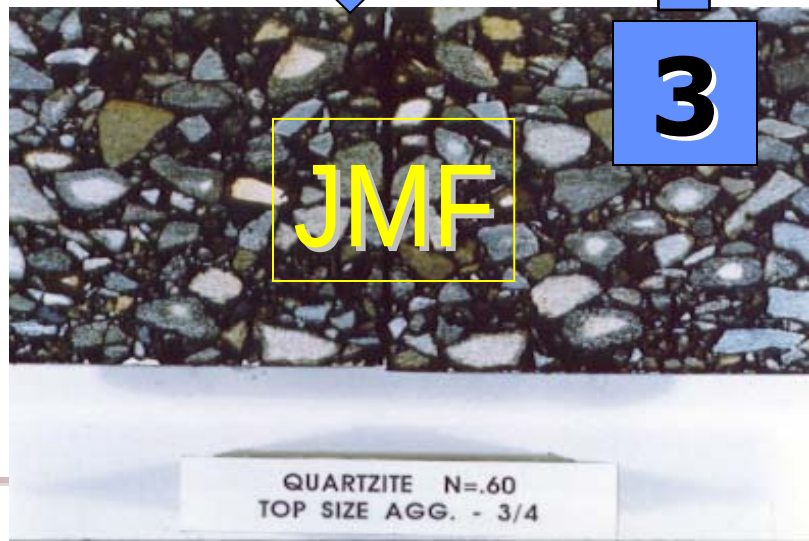
Project Level Data

Structural – Mix Design Compatibility









Mixture design & material specifications determine the inputs.

Data Integration into Practice

Develop Designs

- Low-bid; optimize on design features
- Alternate bids; establish equivalent designs
- Design-build & warranties; optimize on performance

Establish Specification Limits

- Quality Assurance
- Performance-Related
- End-Result

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Enhancements: Global & Local

Global

- √ Distress prediction equations or transfer functions
- √ Revisions to the software; functionality
- √ Add additional distresses

Local or Regional

- √ Revisions to the default values
- √ Revisions to the transfer function and calibration coefficients
- √ Build libraries of inputs

NCHRP Project 1-40B
Local Calibration Guide

Previous & On-Going Studies

1. **NCHRP 1-40A** – Independent Review, prioritize the modifications.
2. **NCHRP 9-30A** – *Calibration of Rutting Models for HMA Structural and Mix Design*.
3. **NCHRP 9-42** – *Top-Down Cracking of HMA.*
4. *Reflection Cracking of HMA Overlays*.
5. **NCHRP 9-44** – *Application of the Endurance Limit for HMA Mixes*.

New Construction Design Strategies

Included:

- Conventional flexible pavements
- Deep strength
- Full depth

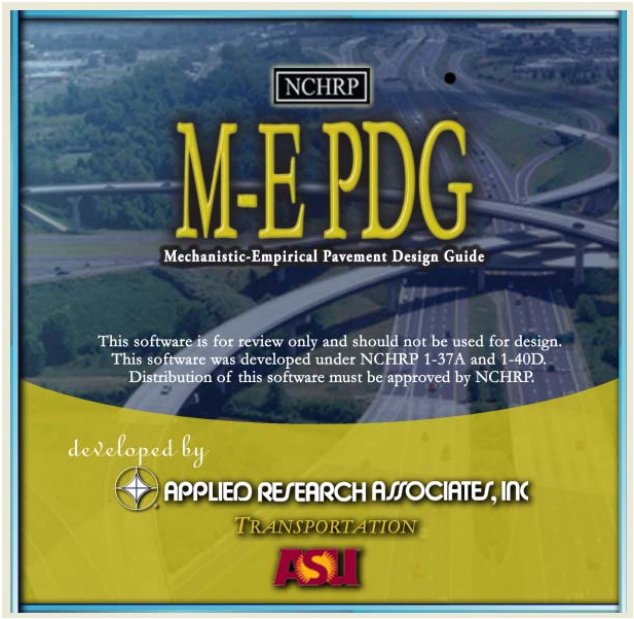
Excluded:

- Aggregate surfaced roadways
- Semi-rigid pavements
- Staged construction
- Asphalt treated permeable base
- Geogrids, fabrics, & other strengthening materials

Rehabilitation Strategies

Included:

- HMA overlays with & without milling



Excluded:

- Full depth reclamation
- Hot in place recycling
- Cold in place recycling
- Pavement preservation programs

Site Features Excluded from MEPDG

- Super single tires or single tires.
- Durability & mixture disintegration.
- Volume change in soils (frost heave or expansive soils).

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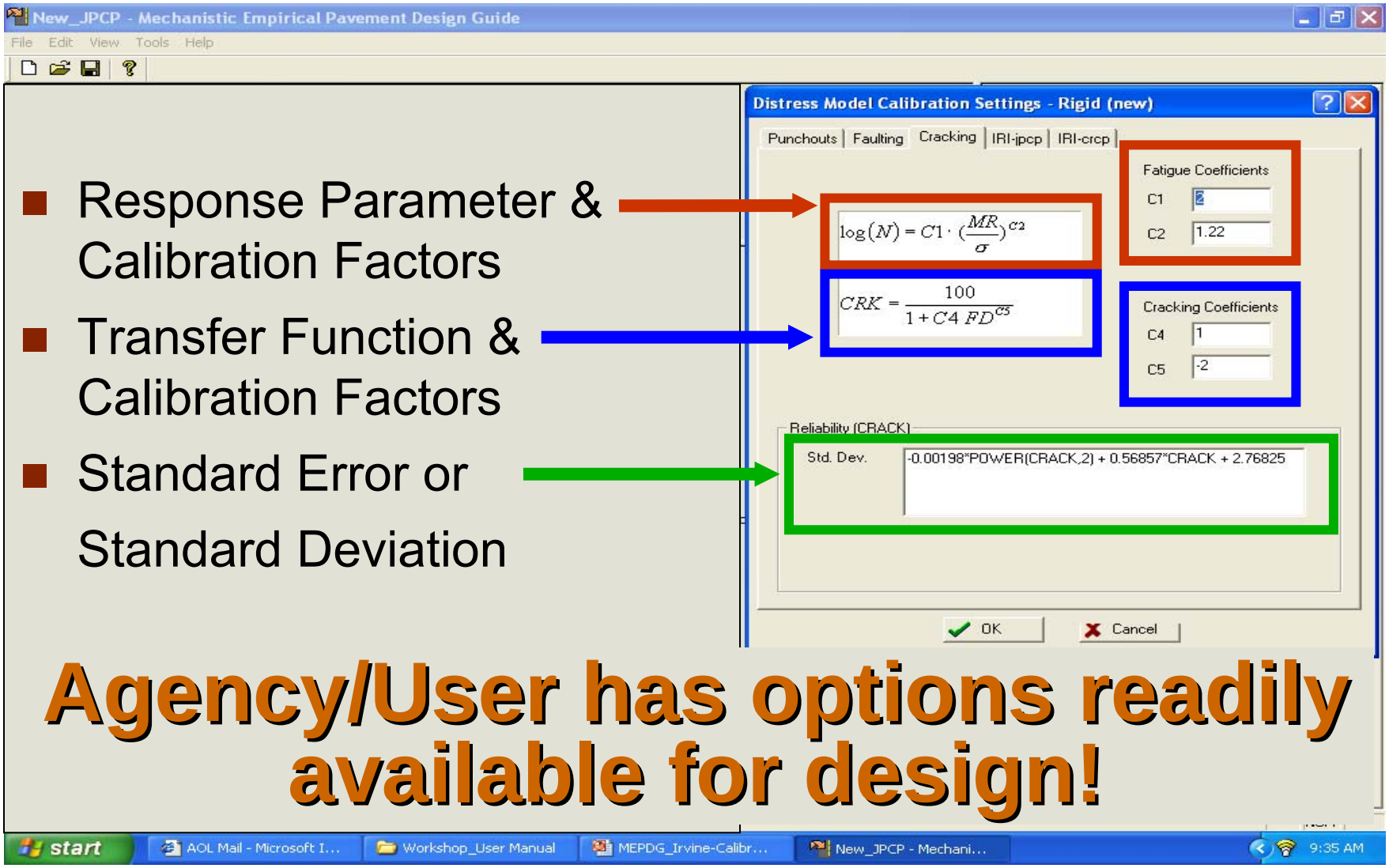
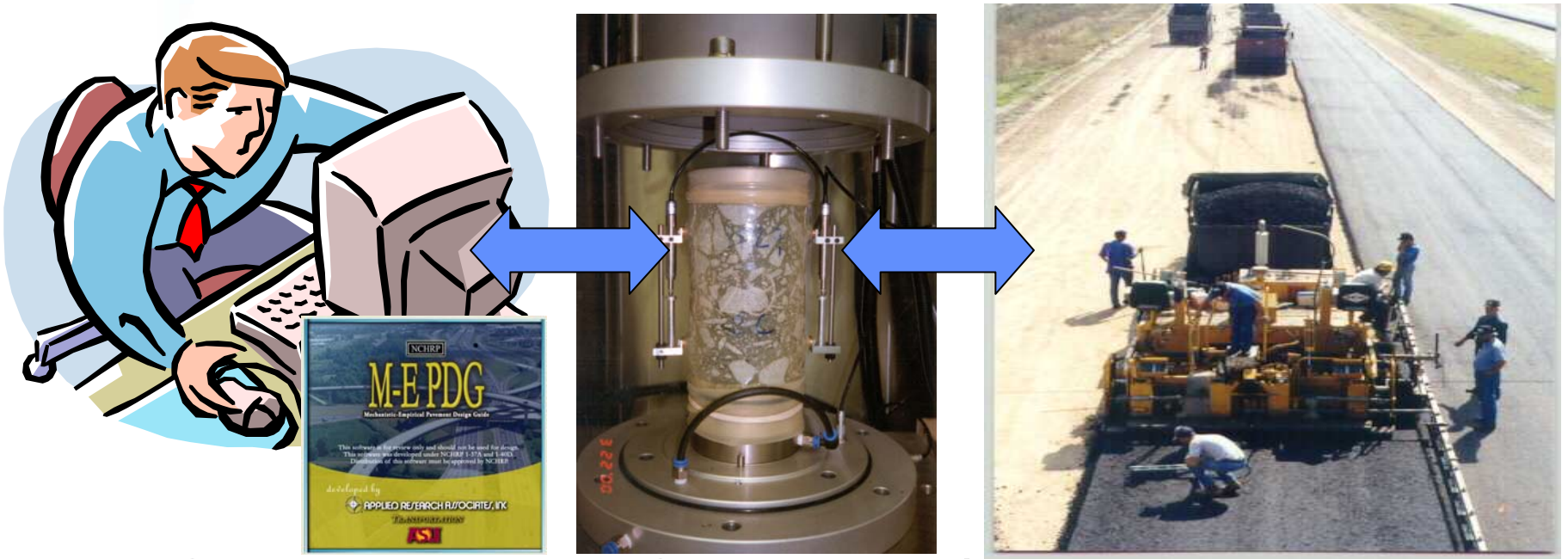
Summary

- Response Parameter & Calibration Factors
- Transfer Function & Calibration Factors
- Standard Error or Standard Deviation



Agency/User has options readily available for design!

Value of Increased Costs & Time?



If improved performance/longer lasting pavements & reduced life cycle costs;

Then it is worth the effort, time, and cost!!

Assuming enforcement of specifications.

Thank you.
Any Questions?

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Questions!