



FHWA Long-Term Bridge Performance Program

“A Flagship Initiative”

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Outline

- Highlights
- Vision
- Methodology
- Focus Group Meetings
- Pilot Study
- Conclusions



Long-Term Bridge Performance Program (LTBP Program)

- Designated in the "SAFETEA-LU" surface transportation authorization legislation (August 2005)
- Anticipated to be a **long-term research effort** to improve our knowledge of bridge performance
- **Funding** was authorized through FY-2009



LTBP Program Activities (January 2006 – Present)

- Outreach (i.e., Conferences, Workshops, Meetings)
- Draft Framework (U. of Delaware)
- **Workshop in January 2007 (Las Vegas, NV)**
 - Participants: FHWA, AASHTO, Other Government Institutions, Academia, Industry, International Bridge Experts
 - Short-Term and Long-Term Goals
 - Specific Data to be Collected
 - Sample Bridges to Test, Evaluate and Monitor



LTBP Program Activities (January 2006 – Present)

- FHWA Bridge Management Information Systems Laboratory
 - Synthesis Report on Bridge Performance
 - Sampling Methodology
 - Data Gaps
 - Deterioration Model



LTBP Program Activities (January 2006 – Present)

- July 2007 (Solicitation)
- April 2008 (Contract Was Awarded to CAIT/Rutgers University)
- May 2008 – Present (Developmental Phase)



MOVING THE
**AMERICAN
ECONOMY**

U.S. Department of Transportation
Office of Public Affairs
Washington, D.C.
www.dot.gov/affairs/briefing.htm



News

Friday, May 2, 2008

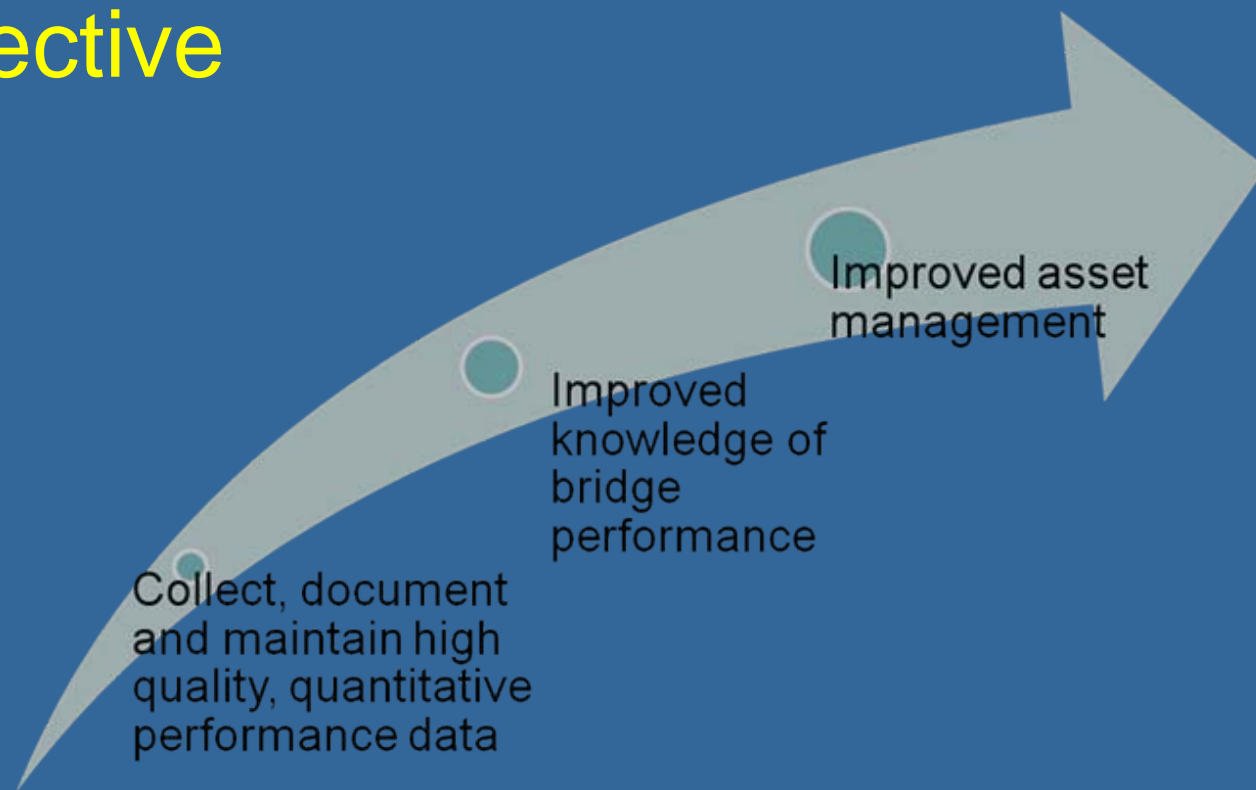
“Acting Federal Highway Administrator Jim Ray”

FHWA Launches *Flagship* Initiative to Collect Nationwide Data on Highway Bridges - A 20-year research effort to collect data on bridges nationwide will lead to better investment decisions on bridges





Objective





LTBP program **is not intended** to become a repository of vast amounts of bridge data **without consideration** of the value of the data in assessing bridge performance

~~Data
Warehouse~~



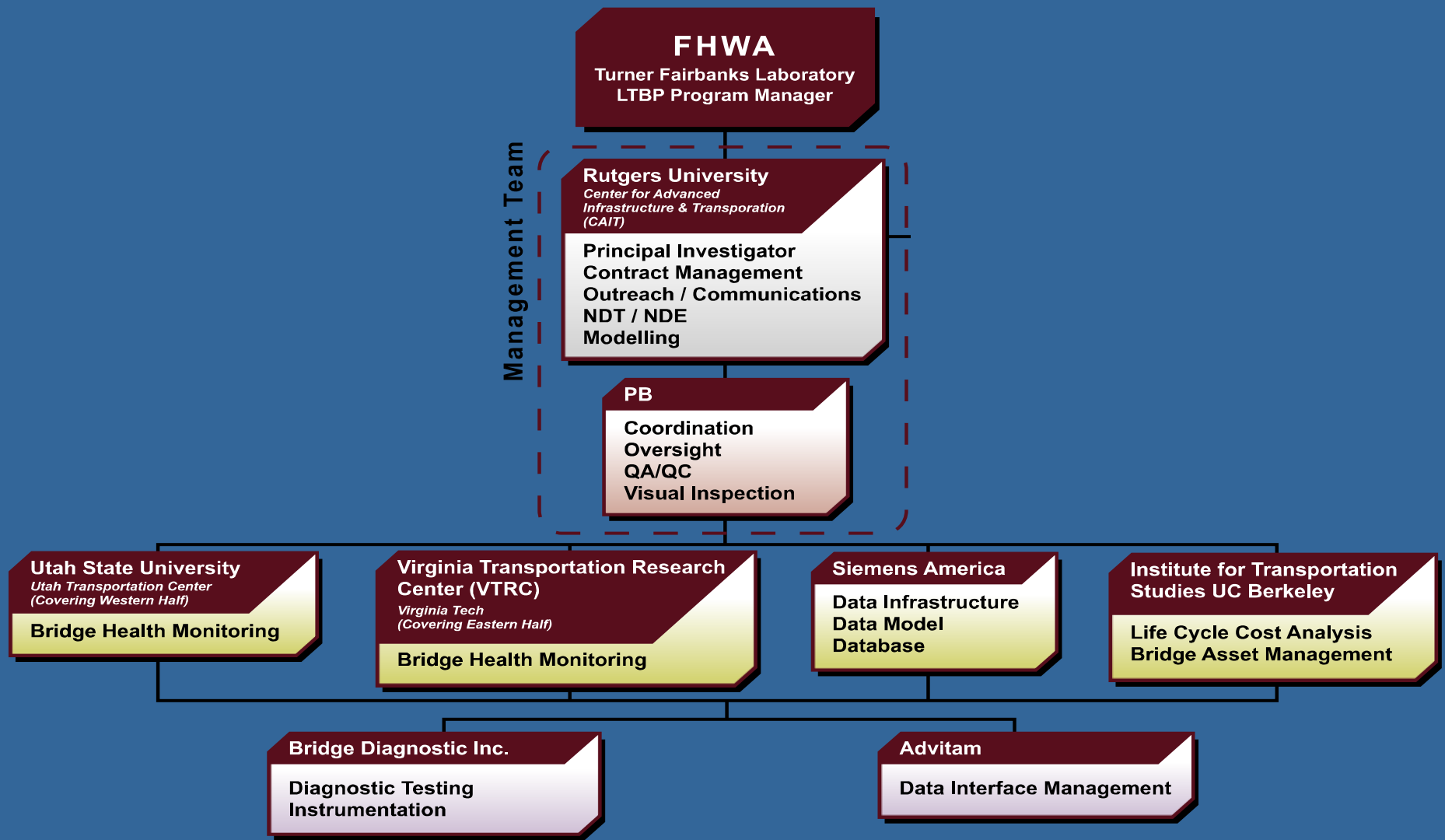
Anticipated Impacts of the LTBP Program

- Advances in deterioration and predictive models
- Effective use of Life-Cycle Cost Analysis
- Improved inspection/condition information thru NDE and SHM
- Support improved design standards
- Improved maintenance practices
- Help foster the next generation of bridge and asset management systems

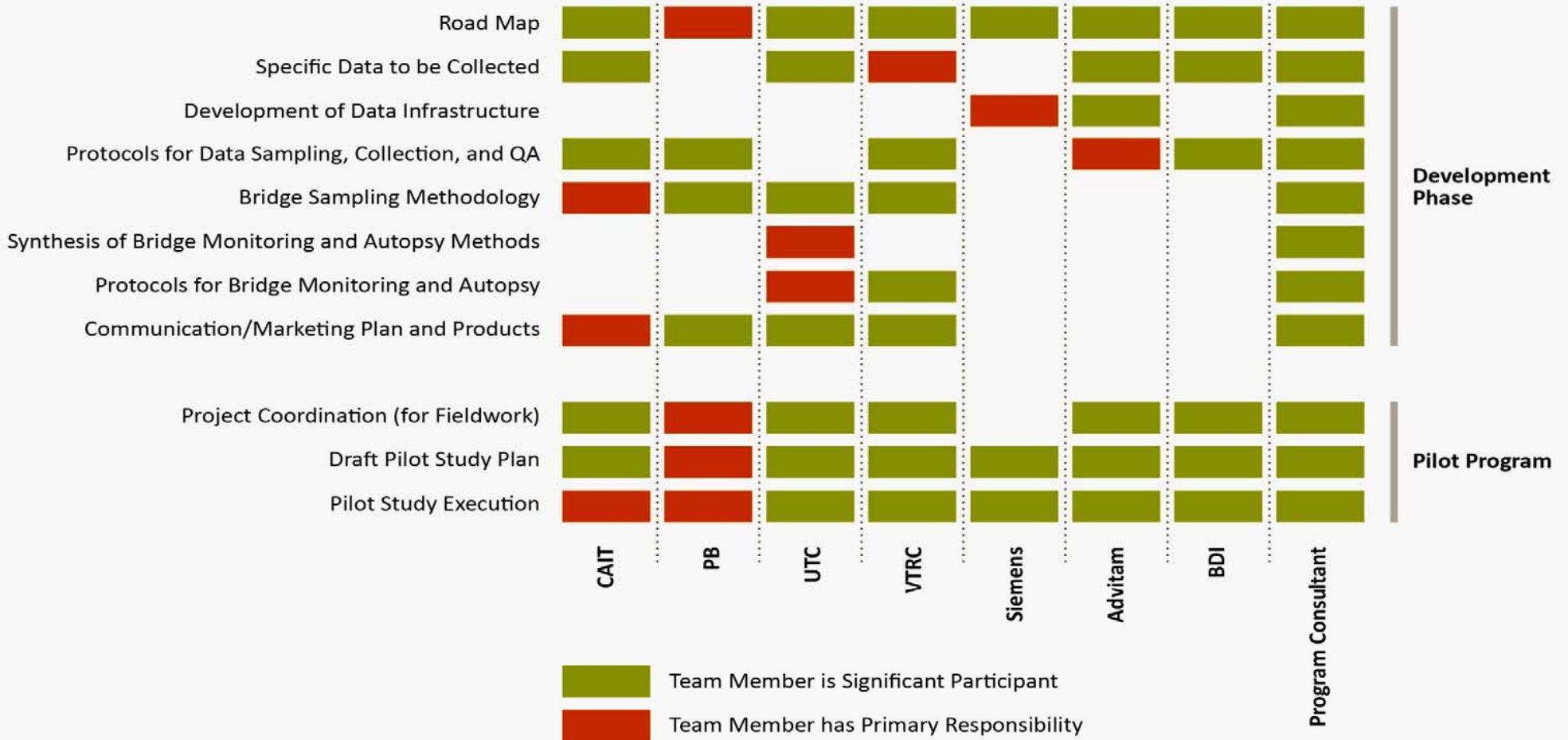


Approach

- Detailed inspection, *periodic* objective evaluation and monitoring (from a representative sample of bridges, excluding long-span bridges)
- Forensic autopsies of decommissioned bridges
- Accelerated Testing



Primary Tasks and Responsibilities





Methodology

- Systems Approach
- Top-Down/Heuristic Approach



Systems Approach

- Collect scientific quality performance data from the nation's highway bridges, as representing critical node-points of the highway transportation network.
- The data and information to be collected is expected to advance our knowledge of how our highway transportation, together with its linkages to other infrastructures, performs as a complex multi-domain system, governed by dynamic interactions between human, natural and engineering systems and elements.



Top-Down/Heuristic Approach

Step 1

Defining Bridge Performance



Step 4

Design the Experimental Program



Step 2

Data to be Collected



Step 3

Data Management System



Step 5

Data Collection



Program Outcome



Strategic Action Plan

Step 6

Data Analysis & Modeling



Step 7

Dissemination of Findings



Step 1

Defining Bridge Performance

Step 4

Design the Experimental Program



Step 2

Data to be Collected



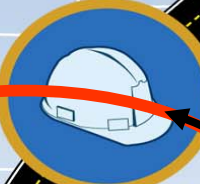
Step 3

Data Management System



Step 5

Data Collection



Contractor

Advitam
Siemens

Contractor

Program Outcome



Step 7

Dissemination of Findings



Step 6

Data Analysis & Modeling



Data QA/QC



Performance Measure, Category, or Indicators

?????



Bridge Performance ?

- National Survey
 - Number of bridges needing work
 - Structural deficiencies and posting
 - Condition rating, sufficiency rating and health index
 - Deficiencies and load carrying capacity
 - Customer satisfaction



Performance Categories

All Limit States

- Serviceability
- Operation
- Scour and Floods
- Wind
- Hurricane
- Earthquakes
- Overloads
- Vessel Collisions
- Fire
- Fatigue
- Terrorism



Which Performance Category is More Critical?









Challenges in Measuring Bridge Performance

- It is not well defined and understood or documented
- Relies too heavily on expert opinion
- Based on significant assumption or generalization
- Uncertainties
 - Subjectivity of current condition ratings
 - Lack of proper documentation (i.e., records of actions and costs, **deferring the action**)
 - Incomplete data (i.e., cost, maintenance)
 - Many hidden deterioration and damage escape visual inspection

Step 1

Defining Bridge Performance



Step 4

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FOCUS GROUP Meetings

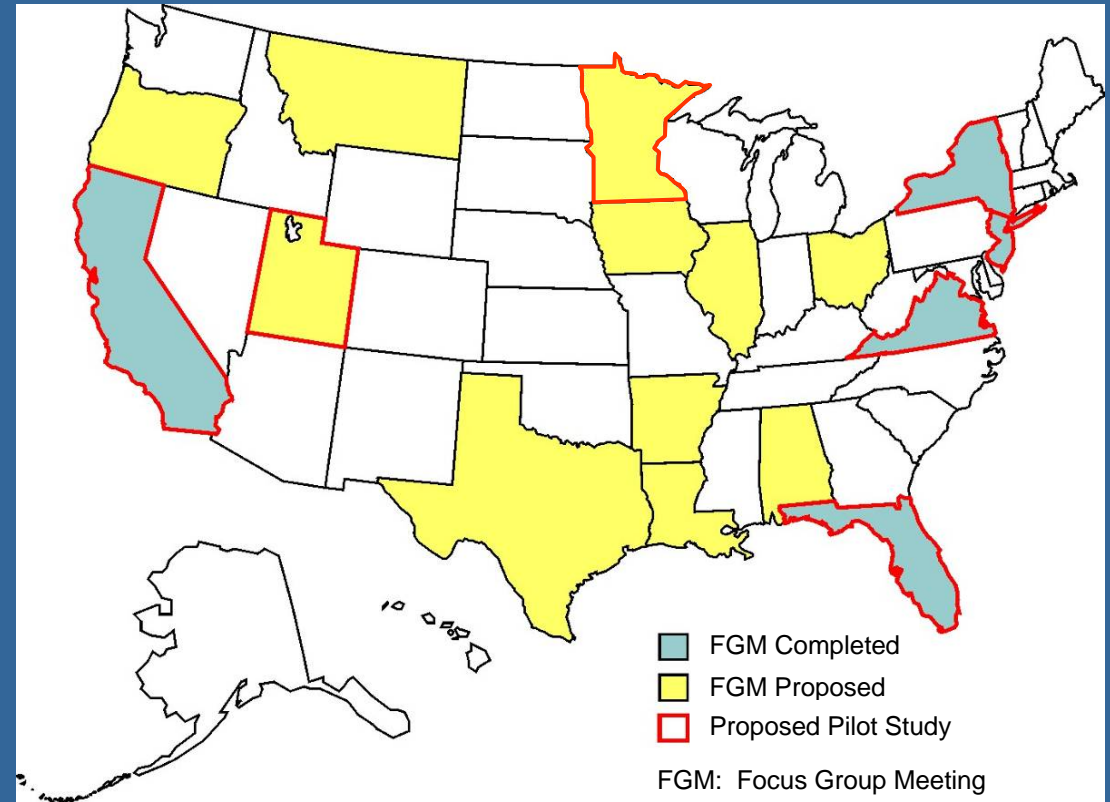
- Focus group meetings across a number of geographically distributed locations initiated
- Partnering with practitioners in order to get the information and data that is needed to improve the long-term performance of our bridge systems
- The program cannot be a one size fits all approach, and should not place additional burdens on highway agencies



FGM and Pilot Study

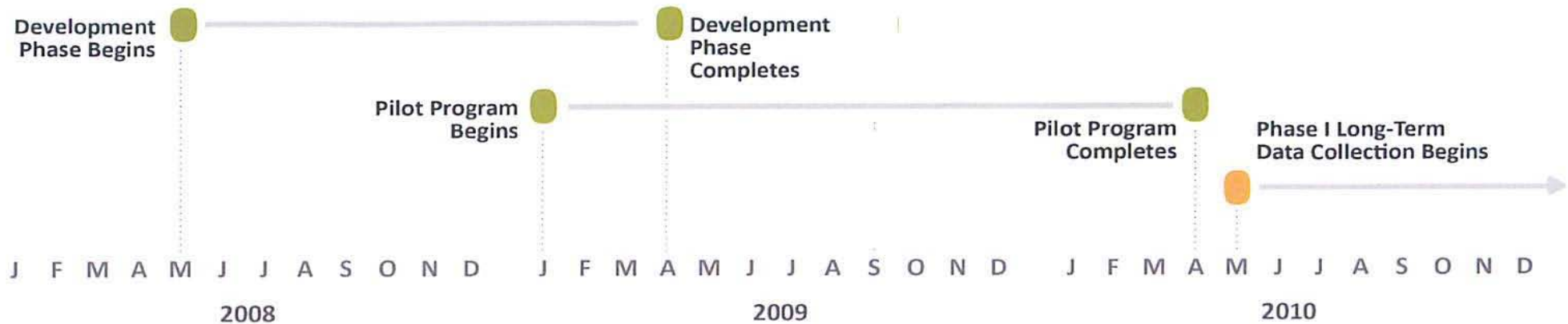
- Summer 2009
- Detailed inspection and Monitoring of 7 bridges
- Validate protocols and processes
- Viability of the data infrastructure
- Efficacy of sensor technology

John Penrod:
Pilot Study Program manager



Draft Roadmap

Phase I & II Data Collection



Phase I Tasks & Objectives

- › Review and determine lessons learned in pilot phase I; make appropriate adjustments and improvements to program approach
- › Broaden data collection to additional bridges
- › Enhance data infrastructure and coordination with existing bridge databases (NBI, PONTIS, BMSL)

Phase I Deliverables

- › Final report on pilot study outcomes
- › User-friendly, high-quality database of information collected to date
- › Implementation plan for phase II data collection

Phase I Final Result

- › Validated work to date, data infrastructure, and methods for gathering data
- › Clear vision and plan for phase II data collection



Oversight

- Internal Expert Task Group
- External Expert Task Group



Outreach

- AASHTO Subcommittees on Bridges
- Organized a Workshop at TRB
- Presentation at AASHTO Annual Meeting
- SHRP-2 Initiation
- NIST and NSF
- International community
- Plan for Industry Involvement



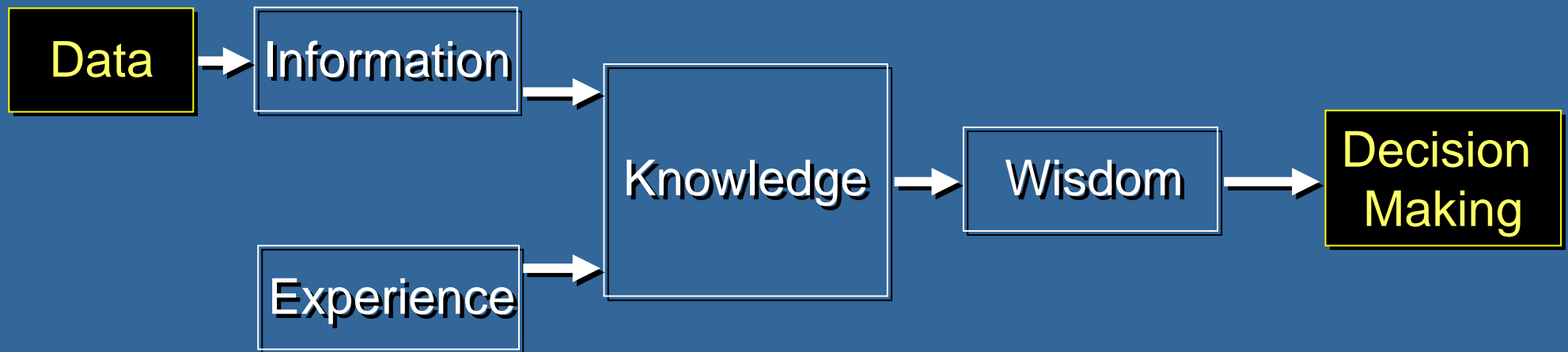
Conclusions

- A dynamic program
- Not a one-size fit all program
- Not a data-warehouse
- Synergy among the FHWA, stakeholders, industry, academia, international bridge community
- Consider lessons learned from the LTPP
- Successful outreach strategy
- Take advantage of in-house expertise



Conclusions

- Be cognizant of program's limitations





Web-Site and Contact Information

<http://www.tfhrc.gov/ltbp>

ltbp@dot.gov



Thank You!