NATIONAL PAVEMENT MANAGEMENT CONFERENCE

Pavement Management Systems

Meeting the Needs of Today and the Challenges of Tomorrow

Education And Training Needs

VirginiaTech
Invent the Future

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VirginiaTech TRANSPORTATION INSTITUTE

Overview

1. What education and training opportunities are available?
2. What knowledge and skill are needed?
3. Are there any gaps?
4. Who do we bridge these gaps?


1. What is available?

What is available?

- **Undergraduate Civil Engineering Programs**
  - Very limited (if any) coverage in the *Introduction to Transportation* courses
  - Several optional *Pavement Design* (& Management) courses
  - Few optional Pavement (Infrastructure/ Asset) Management courses
  - No identified required class

Project-Level

What is available?

- **Graduate Civil Engineering Programs**
  - **More options at selected Universities**
    - **Infrastructure Management / Pavement Rehabilitation / Advanced Pavement Design …**
  - **Limited funding for research PMS thesis/ dissertations**
  - **No long-term research agenda**
  - **Not enough students interested in PM/ IM**

What is available?

- **Continuing Professional Development Programs**
  - **National Highway Institute**
    - **2-3 Day courses**
      - **131106 Transportation Asset Management**
      - **13135 Pavement Management Systems**
    - **Web-based seminars**
  - **Local Technical Assistance Program / T²**
  - **ASCE Continuing Education**

  …

Infrastructure Management Research and Education Workshops

- **Objective:**
  - **"to strengthen infrastructure management research and education and increase the visibility and awareness of the field in both academic and professional communities."**
- **Initially funded by NSF**
- **More Volunteers from *Industry* Needed!!!**


What is Needed?

What is Needed?

- **Civil Engineers that:**
  - **Can properly manage pavement today**
  - **Will be able to understand and solve the problems of tomorrow.**
- **Opportunities to teach/ transfer current knowledge**
- **New knowledge & innovation**
- **Opportunities to teach these innovations**

Example of Contents for an Infrastructure Management Course

- Introduction to infrastructure and infrastructure types
- Levels of operation/ management
- Databases/ Quality management of data
- Geographic Information Systems
- Modeling
- Economic analysis
- Introduction to operations research
- Statistics
- Condition assessment
- Generic levels of service
- Life-cycle cost analysis (including very long LCCA)
- System preservation
- Supply chain of infrastructure
- Infrastructure financing (where money comes from)
- Accounting principles
- Contracts and contract management
- Decision-making support
- Risk analysis
- Institutional issues
- Tools (including their transitory nature)
- How to evaluate new tools/ technologies

2nd Infrastructure Management Research and Education Workshop

Areas of Teaching and Training with Lasting Effectiveness

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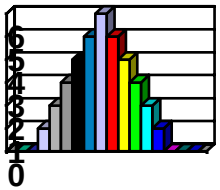
- Design of Experiments
- Probability and Statistics



- Performance Modelling
- Integrative Thinking

- Accounting and Business Practices

- Risk and Reliability
- Communication
- Legal Issues

- Knowledge Management

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3. Are there any gaps?

Are there any gaps?

- **"Exiting university curricula at the undergraduate and graduate levels are generally inadequate to provide the necessary integrated and cross-disciplinary training required for ~~infrastructure~~ professionals"**

Richard Little, National Research Council, Educating the Infrastructure Professional Public Works Management And policy, Oct 1999

pavement management

What are these gaps?

- **Need to educate our CEE students on PMS** (BMS/ IMS/ AMS/ PP)
- **Not enough professional/ continuing education opportunities**
- **Limited number of graduate programs focused on PM**
- **No Long-term Agenda** → ***PMS Roadmap?***

Gaps - Curriculum Issues

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Undergraduate vs. Graduate level Courses

One class vs. Set of Classes

Engineering vs. Planning/ Policy

Depth vs. Breath

Short PE Courses vs. Long PE Courses

Gaps - A Vision of the Future

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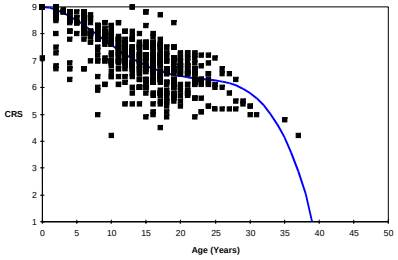
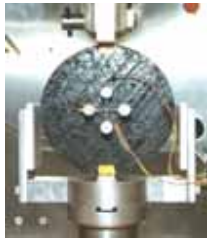
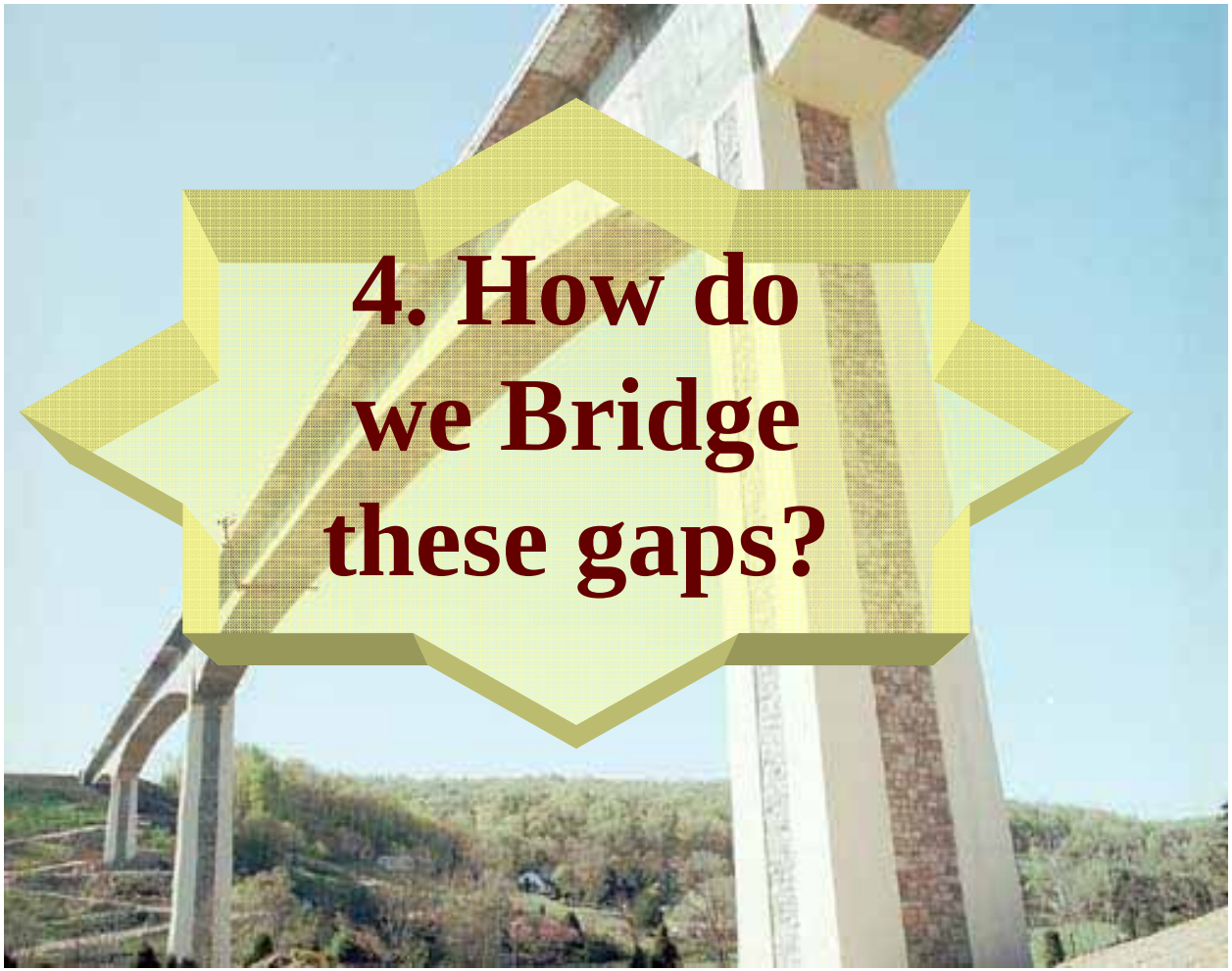
- Condition Assessment
- Databases
- Analytical Tools
- Design Tools
- "Super" Materials
- Contracting Practices
- Impacts (triple bottom line)
- Delivery, QA/QC, …





LCA


4. How do we Bridge these gaps?

How do we Bridge these gaps?

- **A strategic PM Agenda / Plan**
- **Community of "aware" practitioners**
- **Academic research programs**
- **Professional education training programs**
- **Students (graduate, undergraduate, professionals)**
- **Funding (medium- and high-risk initiatives)**
- **Networks (scientists, practitioners, and educators)**

Baby Steps in the Right Direction

- AM Community of practice
- AASHTO free educational licensing program
- ASCE LTPP Completion
- Conferences/ Workshops
- “Challenge” competitions
- ASCE Report Card

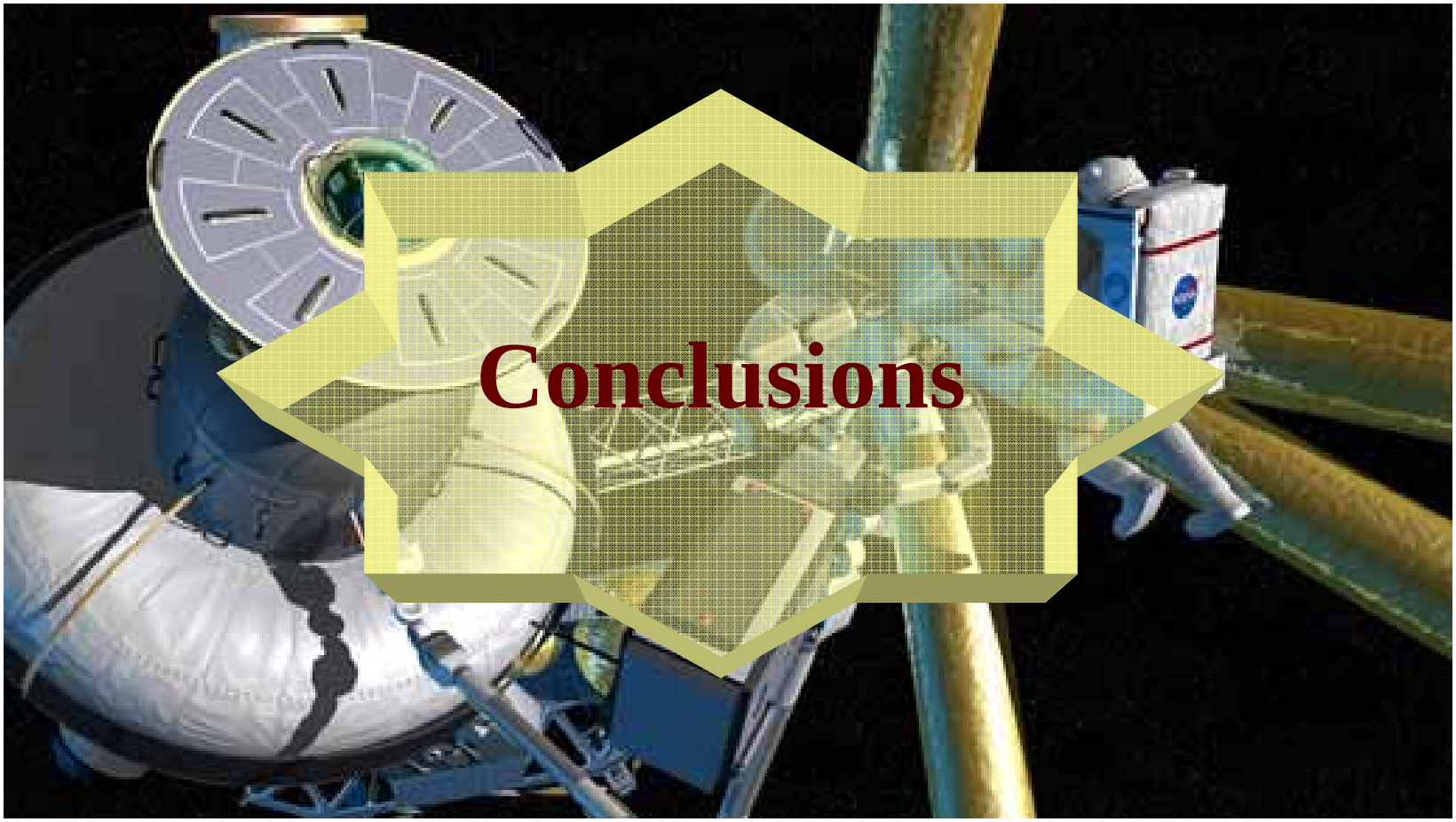
But, are these enough?

Possible High-Impact Actions

- **Promote the incorporation of PM/ IM concepts/ ideas into CEE curriculum**
- **Develop "remedial" Cont. Ed. courses**
  - **Long "academic-like"**
  - **30 states in FHWA survey indicated that they need Advance PMS training**
- **Develop avenues to pursue longer-term research projects**
  - **Support graduate students ⇨ feed PM Workforce**

Challenges and Opportunities

- **Innovation**
- **Sustainability**
- **Technological changes**


Conclusions

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- **There does not seem to be enough opportunities for formal Pavement Management education and training**
  - **Academic Programs**
  - **Continuing Education**

Conclusions (cont.)

- **Therefore, we need:**
  - **More PM/ IM in the CEE curriculum**
  - **More professional education courses**
  - **Longer-term PM research projects**
    - **Thesis and Dissertations**
  - **Strategic PM Research and Educational Agenda/ Roadmap**

QUESTIONS?