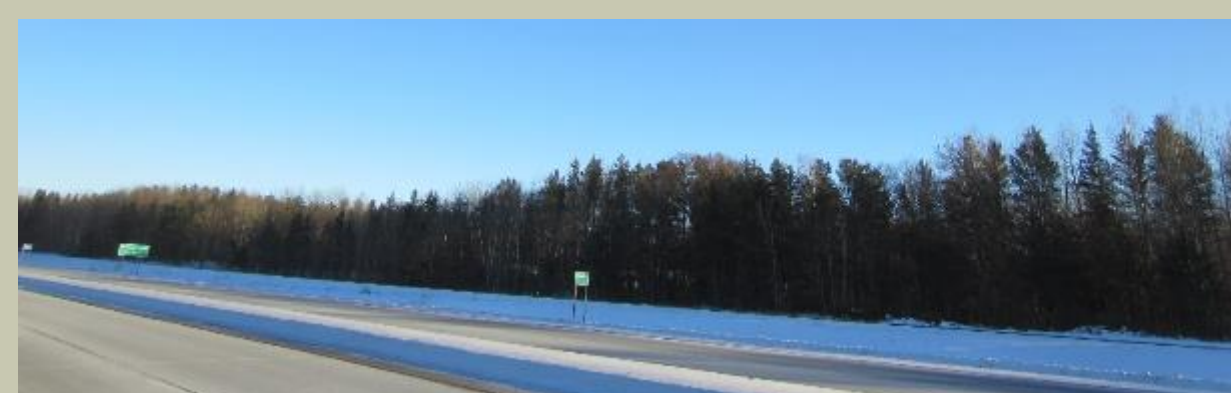




## Research Motivation and Need

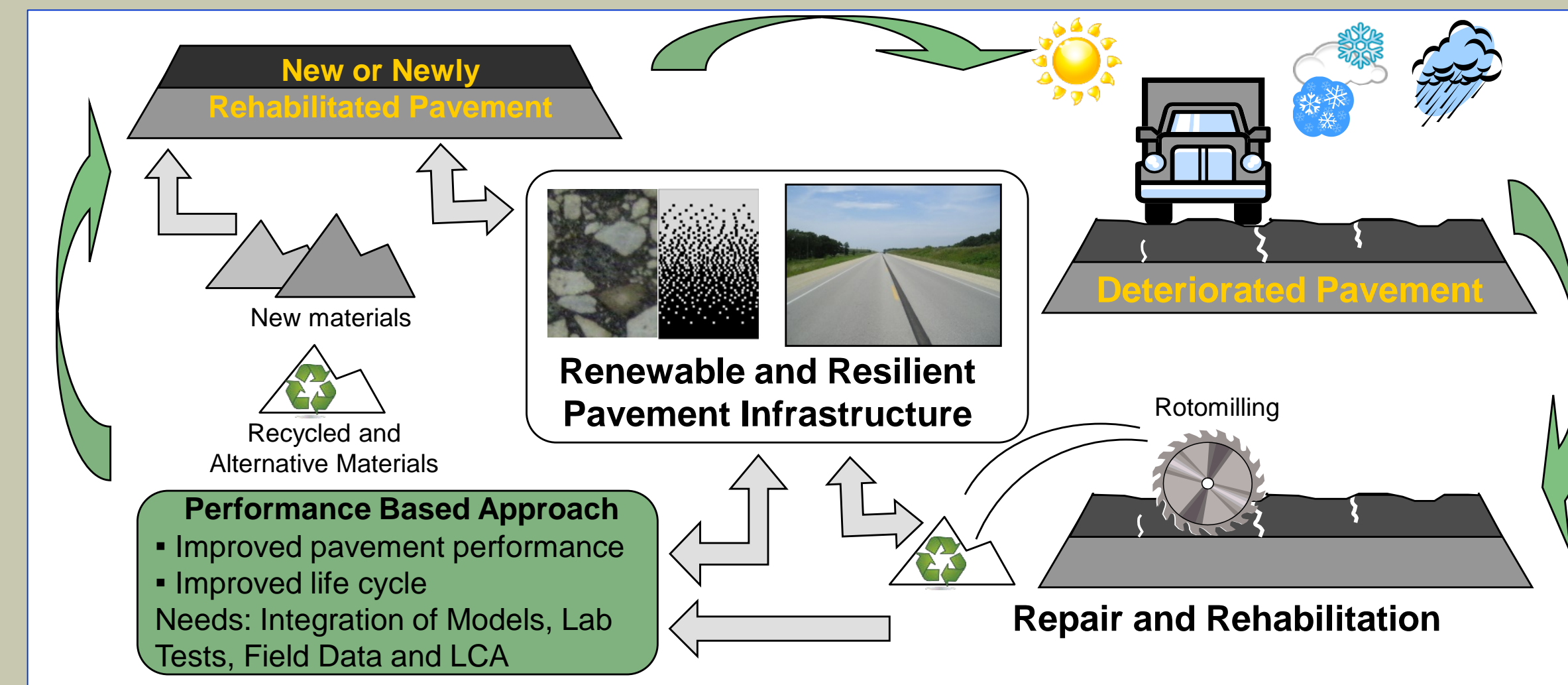
- Transportation = 18% of Gross National Product
  - \$2.72 trillion, 10% of workforce
- Roadways:
  - 4 million miles of public roads
  - 3 trillion veh. miles/year
  - 169 billion gallons of fuel consumption/year
- ASCE Grade for Roads: D (\$101 billion wasted)
- Urgent need for improvement:
  - Replacement Cost > \$3.5 trillion
  - Current level of investment into roadways = \$91 billion
  - Cost to improve conditions and performance: \$170 billion/year (FHWA)



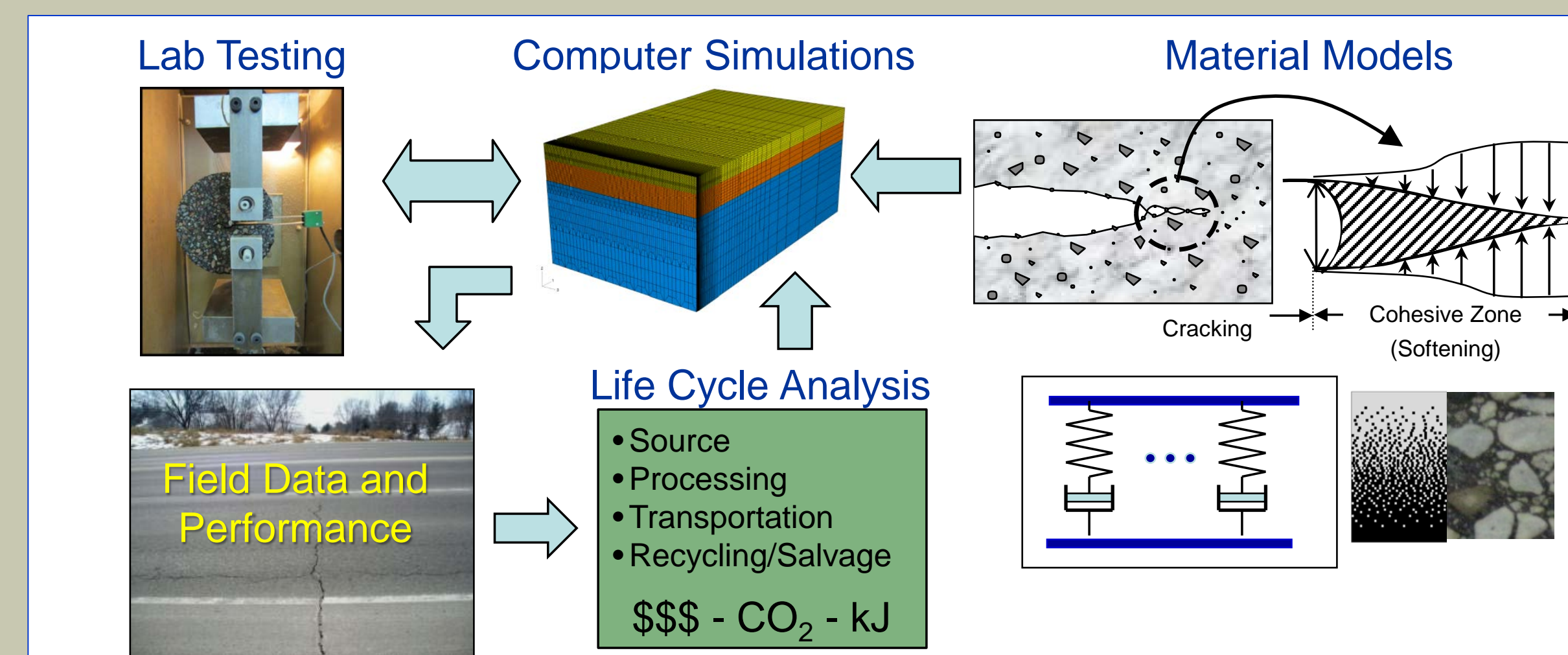
## Research Challenges and Opportunities

- Lack of reliable performance predictions models for comprehensive pavement life-cycle assessment (LCA)
- Increased propensity of extreme climate events and their adverse impacts on transportation infrastructure
- Need for engineered pavement maintenance, repair and rehabilitation methods
- Lack of validated laboratory tests for material truly performance based specification
- Requisite for substantial renewability and sustainability improvements of infrastructure materials
- Deficiency of performance based criteria for assessment of newer material and construction technologies

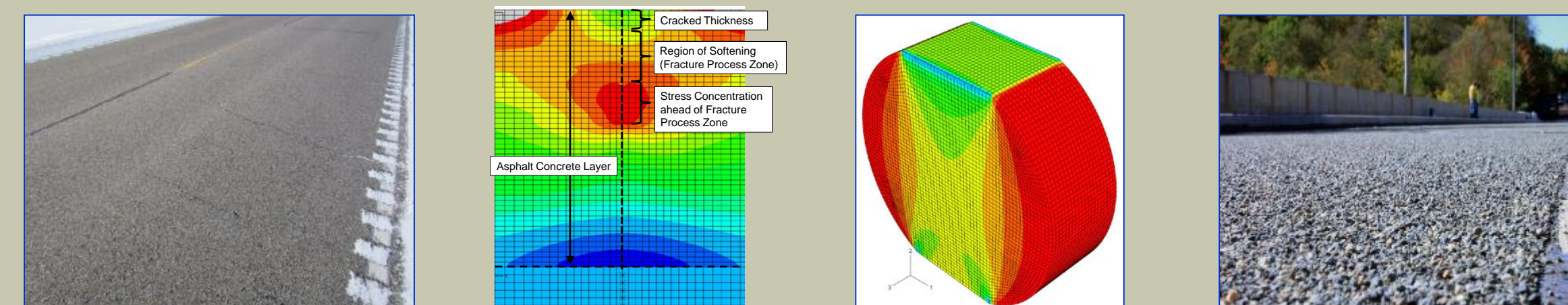
## Pavement Life-Cycle



## Performance-Based Integrated Research Approach Adopted by TMRC@UNH



- For design of sustainable and resilient pavement infrastructure it is necessary to integrate:
  - Models (Mechanics and Physics)
  - Laboratory Testing (Material Properties)
  - Life Cycle Analysis (Comprehensive evaluation)
  - Field Data and Performance (Calibration and Validation)



## Laboratory Facilities

### Material Processing and Specimen Fabrication



### State of the Art Mechanical Testing Equipment



## On-going Research

- Group size: 2 faculty members, 7 graduate students and 2 undergraduate students
- Ongoing studies:
  - Performance based specifications for asphalt concrete
  - Evaluation of recycled asphalt on pavement performance
  - Flooded pavement evaluation
  - Effects of climate change on pavement longevity
  - Regionalization of QA processes