NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: Strategic AI Implementation and Developing Agency Policies

March 12, 2025

3:00PM – 4:30 PM

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

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AICP Credit Information

1.5 American Institute of Certified Planners Certification Maintenance Credits

You must attend the entire webinar

Log into the American Planning Association website to claim your credits

Contact AICP, not TRB, with questions

Purpose Statement

This webinar will provide guidance on effectively integrating AI into transportation institutions. Presenters will focus on identifying high-impact areas for adoption while avoiding less impactful AI applications.

Learning Objectives

At the end of this webinar, you will be able to:

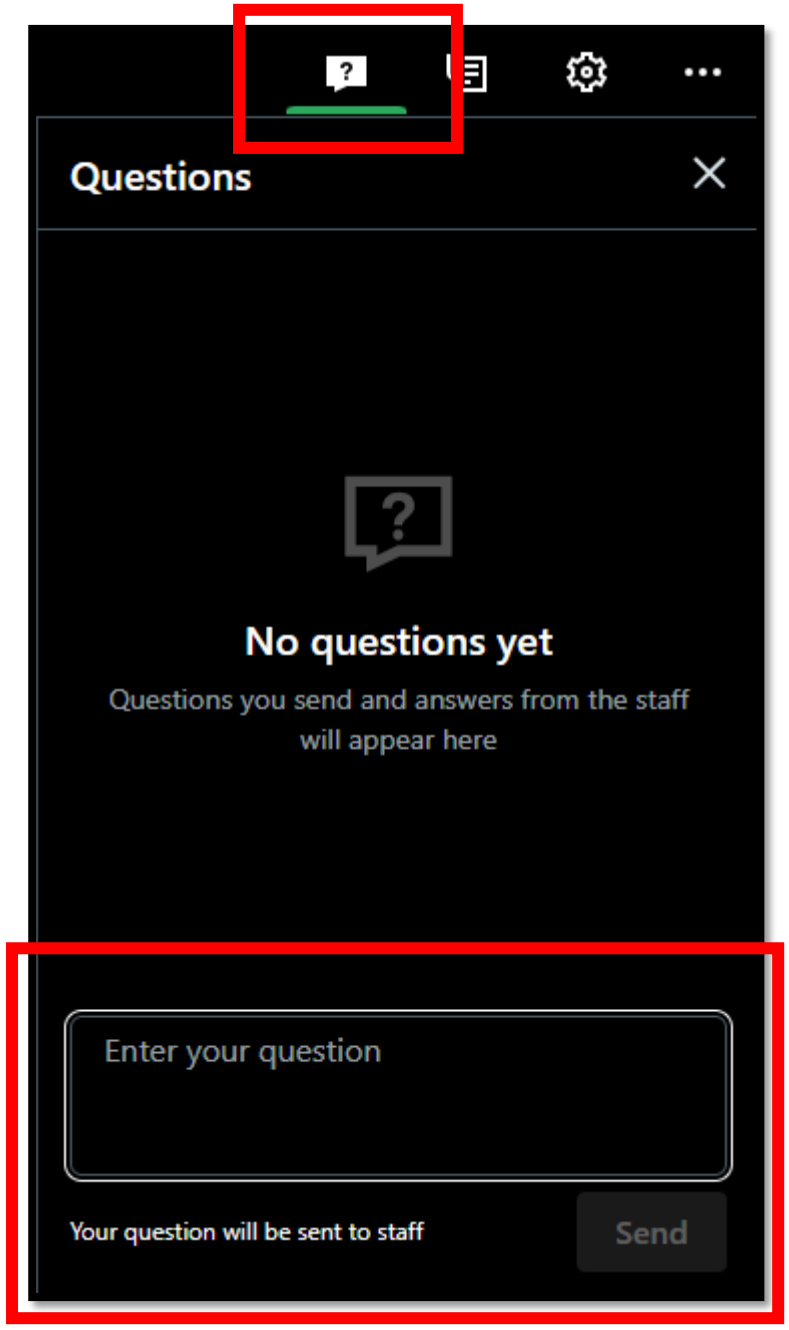
(1) Identify key areas where AI can enhance strategic decision-making and resource management in transportation agencies

(2) Develop protocols and policies for integrating AI for practical and scalable use

(3) Identify areas where AI may be a distraction or unnecessary, and avoid over-extending policies

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



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AI Opportunity & Trends

Patt Talvanna, Partner & Associate Director

TRB WEBINAR - STRATEGIC AI IMPLEMENTATION AND DEVELOPING AGENCY POLICIES, MARCH 2025

What is artificial intelligence?

Artificial Intelligence (AI) refers to a set of algorithms and techniques to program computers to perform human tasks – AI applications continue to advance in complexity

Machine Learning

Ability to integrate, analyze and discover new patterns from data using algorithms that learn independently

Domain experts required to prepare data for training; on-premise deployment

Deep Learning & Natural Language Processing

Branch of ML inspired by neural network connections; ability to understand human language

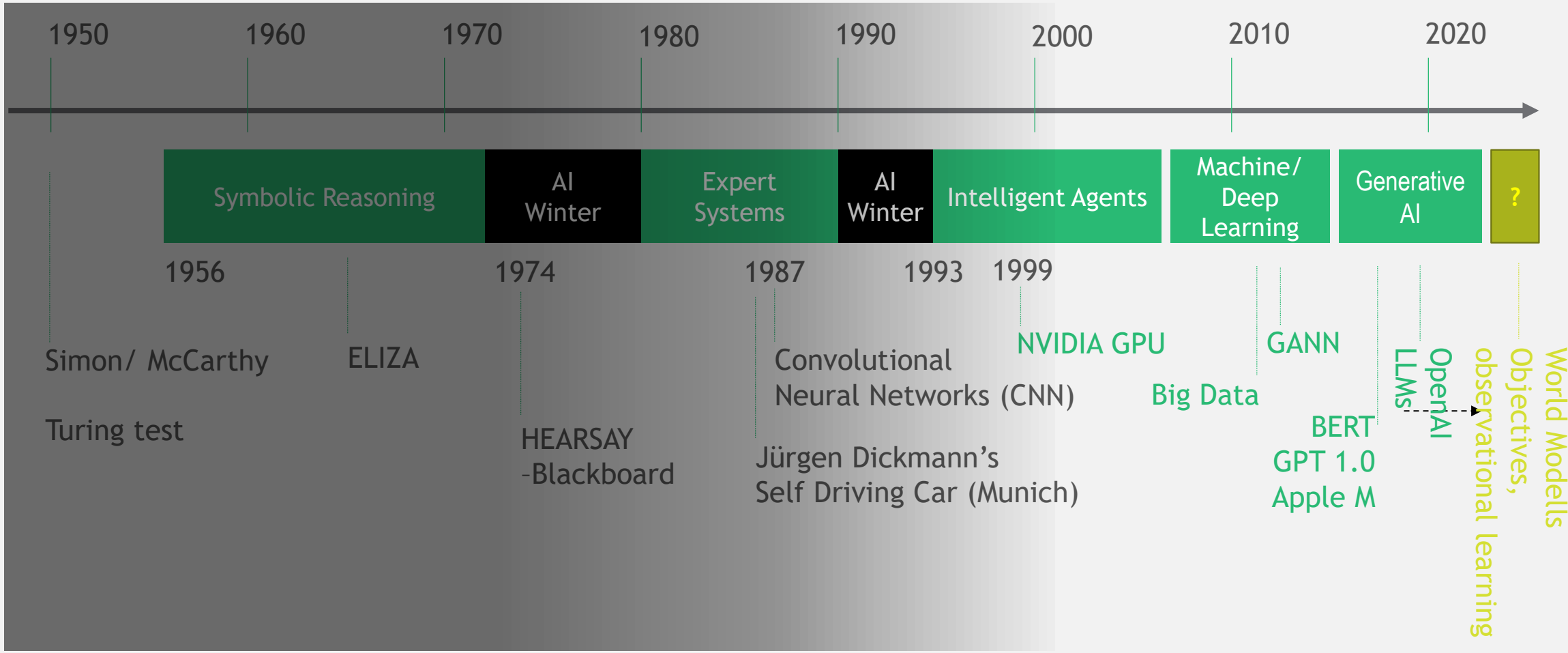
Can be trained on raw data; one model per task; on premise deployment

Generative AI & Large Language Models (LLMs)

Large pre trained models that can generate original content and transfer learning between tasks

Minimal human need for training, single model for multiple tasks, cloud-based

AI has a long history, but developments sped up in recent years



AI is a part of our daily life, most familiar revolve around natural language processing and location services …

Natural language focus

Google Maps (2005)

Real time traffic tracking and route suggestion, will soon allow for AI-enabled step-by-step guides overlay

Uber (2009)[2] and Lyft (2012)

Ride-hailing service, uses ML for pricing, ride ETAs, computing optimal pickup locations, as well as fraud detection

Apple Siri (2011)[1]

Voice Personal Assistant (VPA) using natural language user interface, adaptive to user preference and individual speech patterns

Microsoft Cortana (2014)

VPA by Microsoft based on natural voice recognition, answers questions using information gathered by the Bing search engine [Video]

Amazon Alexa (2015)

VPA by Amazon, first introduced through the Amazon Echo smart speaker, growing popularity is solidifying voice assistants as a household staple

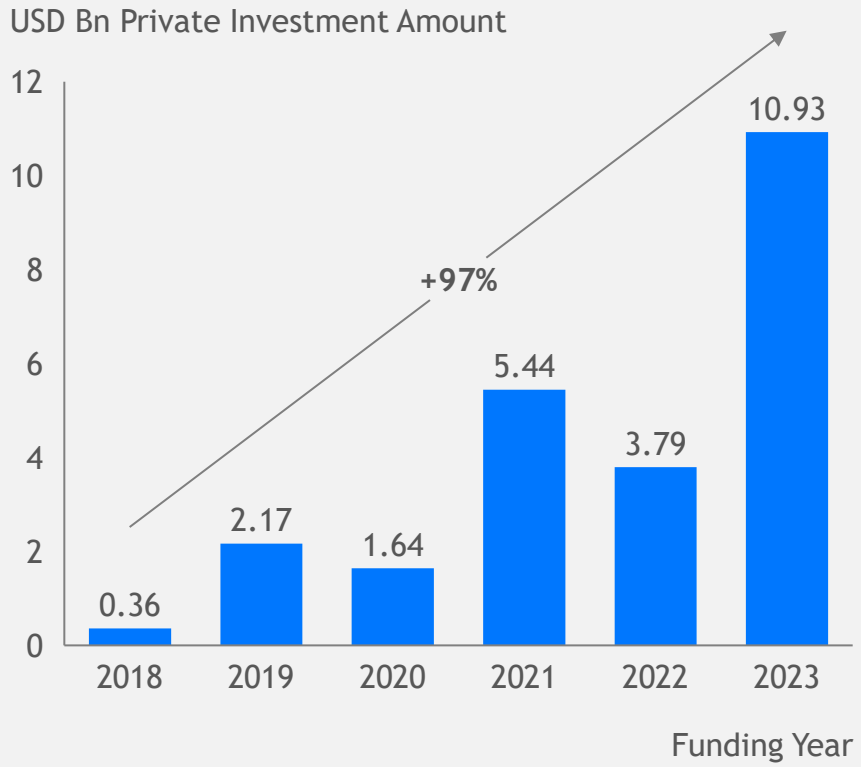
ChatGPT (2022)

ChatGPT, from OpenAI, uses advanced NLP to enable fluid, two-way conversations, surpassing earlier GPT models

1. The voice assistant was released as an app for iOS in February 2010, acquired by Apple and integrated into IPhone 4S in Oct 2011 2. Formerly UberCab (2009–2011) Source: Company Websites; TechCrunch—Voice assistants in use to triple to 8B by 2023—Feb 2019; BCG Center for Sensing and Mining the Future

Generative AI has attracted $24Bn investments for the last 5 years

Generative AI has attracted $24Bn over the last five years, and growing at a CAGR of 97%,



Hyperscalers, but also software companies are investing heavily in the space

Selected examples

Microsoft has made a USD 10Bn investment into OpenAI for a reported 49% stake in the company

NVIDIA made a USD 6.9 Bn investment into the Mellanox mainly to drive Generative AI capabilities

Salesforce Ventures, the company's global investment arm, has launched a new USD 250Mn generative AI fund

Source: BCG analysis

Select & Relevant AI Trends

Multimodal AI: Beyond text to holistic insights
AI systems that process multiple data types—text, images, audio, video—simultaneously to provide richer analysis.

Enhances decision-making in areas like urban planning or disaster response. For instance, the Hawaii Department of Transportation uses Google Earth Engine's multimodal AI to analyze climate data and imagery for resilience planning.

Tech Integration: Embedding AI in core systems (e.g. automotive OEMs or logistics firms investing in AI to stay competitive or partnerships with tech firms specializing the AI

Seamlessly blending AI into existing public sector tech, like transportation or energy grids. AI optimizes traffic flow in smart cities (e.g., AI optimizing signal timing) or predicts energy demand, as seen in some US municipalities.

Regulatory Sandboxes: Controlled environments where AI solutions are tested under regulatory oversight before full deployment.

Controlled environments where AI solutions are tested under regulatory oversight before full deployment. E.g. 2018 Arizona FinTech Sandbox; 2021 Utah General Purpose Sandbox, 2024 Texas AI Regulatory Sandbox Program (under review 89th legislative session); and similarly in California AI testing frameworks (more regulatory than experimental)

Venture Capital Investment: Fueling smart infrastructure and mobility solutions

Private funding pouring into AI, especially for smart infrastructure like autonomous transit or climate tech. The VC investment in AI e.g., $50B+ in 2023, with startups developing tools governments can adopt—like AI for flood prediction or waste management.

Top questions to ask when implementing AI in your organization

Strategy	Is the use clearly defined?
Governance	Who’s responsible for AI decision?
Processes	Do we pilot in one unit first, then scale?
Technology	Who owns the data or algorithms?
Culture	How do we convince people AI helps?

Future DOT: AI workforce & talent opportunity

Supply growth less than…

Number of job postings versus job searches for data science roles

3x

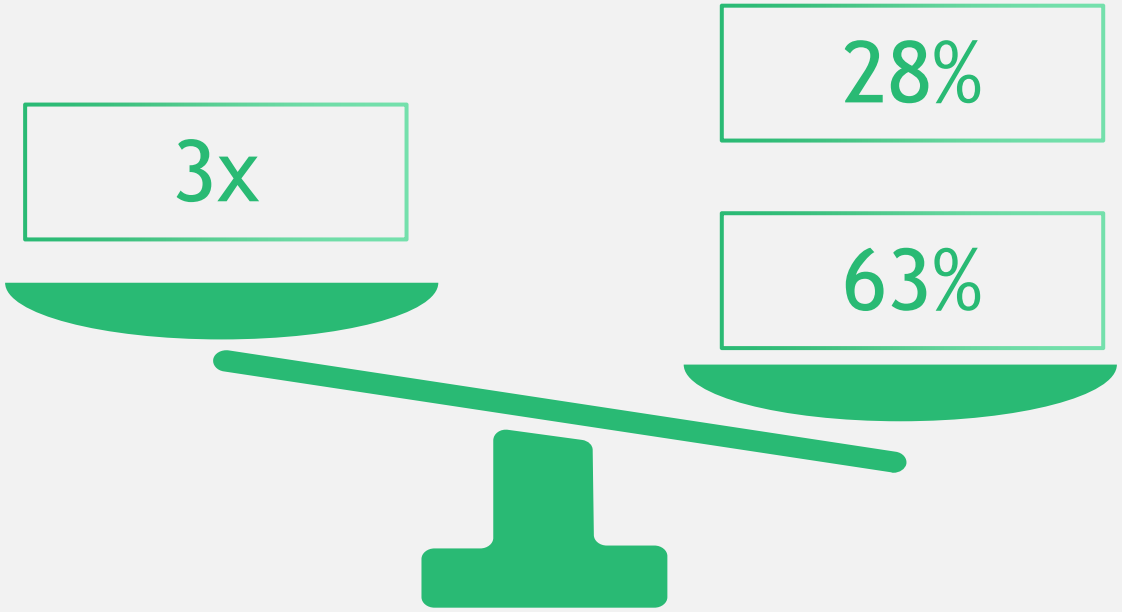
…demand growth

28%

AI-related hiring growth 2026

63%

Of decision makers claim their largest skills shortages are in AI and machine learning



Projected global tech shortage of **85m roles** by 2030

Source: Quant Hub "Data Scientist Shortage", U.S. Bureau of Labor Statistics

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DARA WHEELER

Caltrans GenAI Lead
Chief, Division of Research, Innovation, and System Information

AI at Caltrans

GenAI IN CALIFORNIA

- September 2023: State of California **Executive Order N-12-23 on Generative Artificial Intelligence (GenAI)**
- March 2024: California Department of Technology implements **GenAI directives, policies, and guidelines for inventory, procurement, and risk assessment**
- September 2024: State of California invites developers to **create innovative AI solutions for five identified challenges** – two in Transportation
- February 2025: California Department of Technology implement updated and new **policies, processes, procedures, forms, and contract language for GenAI**

California is home to 32 of the world's 50 leading GenAI companies, research, and education institutions.

2 Transportation Proofs of Concept:

- **Vulnerable Roadway User Safety**
- **Traffic Mobility Sights**

GenAI.CA.Gov

GenAI AT CALTRANS

Strategy & Governance:

- Policy & Processes Development
- Data Readiness
- Chief Data & AI Officer Role
- IT Governance Committee
  AI Subcommittee

Traffic Operations Proofs of Concept Projects:

- Vulnerable Roadway User Safety
- Traffic Mobility Insights

IT Proofs of Concept Projects:

- Intranet Chatbot
- Microsoft Copilot

AI IN STATE DOTs PEER EXCHANGE

February 2025 | Hosted by Caltrans

- **Key Topics:**
  - AI Strategy & Governance
  - Workforce AI Readiness & Education
  - AI Ethics, Risks, & Security
  - AI & Data
  - AI Use Cases & Opportunities

- **Calls to Action:**
  - Leverage existing resources
  - Share AI/data resources
  - Develop research problem statements (TPF)
  - Share lessons learned
  - Continue the discussion

Participants:
10 State DOTs & FHWA

IMPACT OF AI ON THE WORKFORCE

Awareness, Training, & Adoption

In 2020, the World Economic Forum's Future of Jobs report predicted that **AI has the potential to replace 85 million jobs** globally by 2025, but it can **also generate 97 million new roles.**

Future skills needed

New strategies to leverage AI

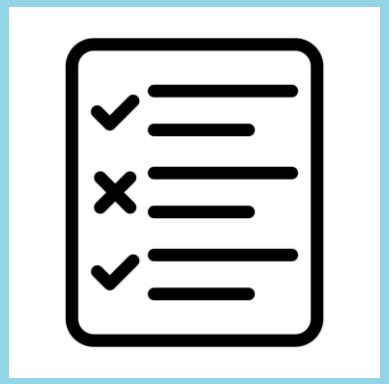
RECOMMENDATIONS FOR READINESS

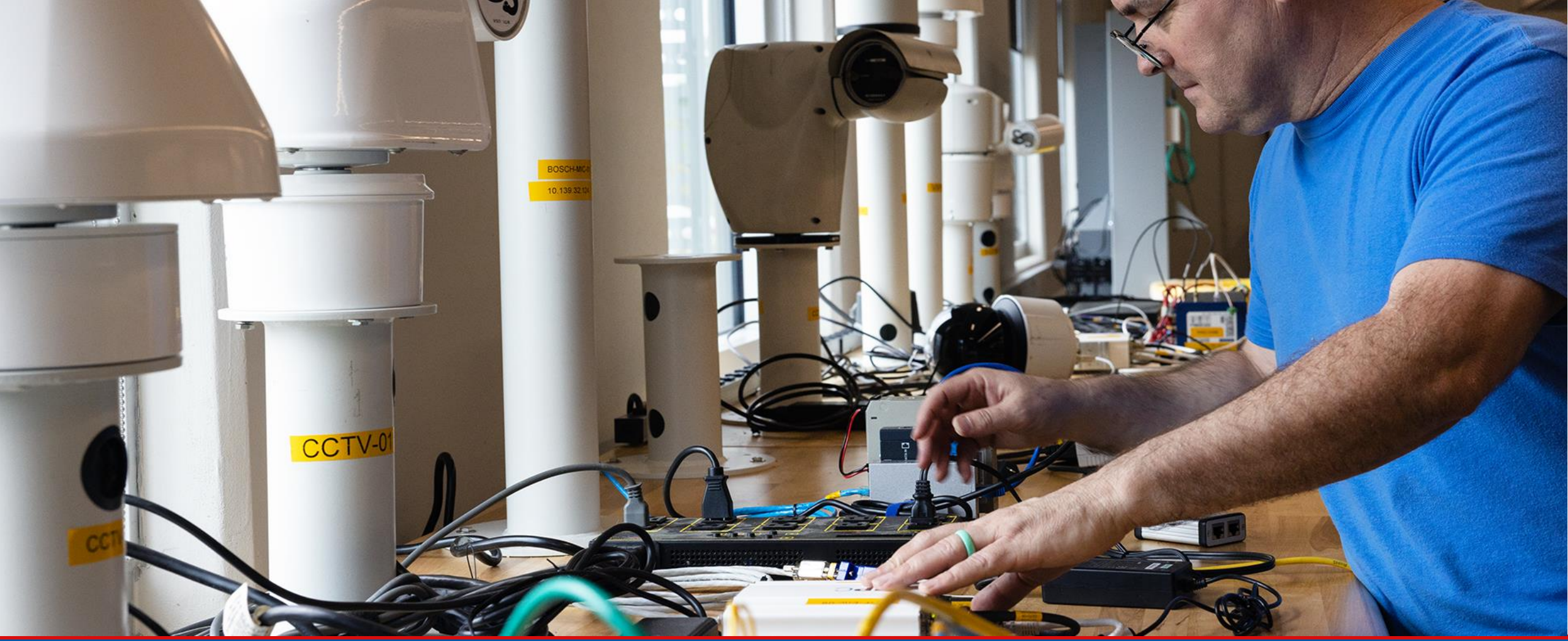
AI in Transportation

AI Policy Development

Practical Use Cases

Guidance for Transportation Institutions





Sailing in an Ocean of Data:

A Texas Perspective

Texas Department of Transportation

March 14, 2025

What is AI?

It is in a note in 10 US Code § 2358

An artificial system developed in computer software, physical hardware, or other context that solves tasks requiring human-like perception, cognition, planning, learning, communication, or physical action. An artificial system designed to think or act like a human, including cognitive architectures and neural networks.

- AI has been around since the 50's but it is three waves. We are in the 3rd wave when Generative AI has made huge progress in such a short amount of time.
- AI is a broad term that encompasses Machine Learning, Generative AI, Knowledge based systems, object detection, etc.

Difference between AI types

- Machine Learning: Massive amounts of data points, making correlations and/or predictions. Can get better over time.
    - Predicting bid item prices on projects
- Object Detection: Trained on images, video, or LiDAR data. Learns to recognize shapes, size, or color and makes educates guesses on what it sees.
    - Detecting traffic signs, categorizing them.
- Generative AI: Trained on massive amounts of text from the internet to form large language models (LLMs). Produces text from what it learns by basically predicting what the next word should be. Sometimes it does great. Other times it gets you utter nonsense.

Is Generative AI lying to me?

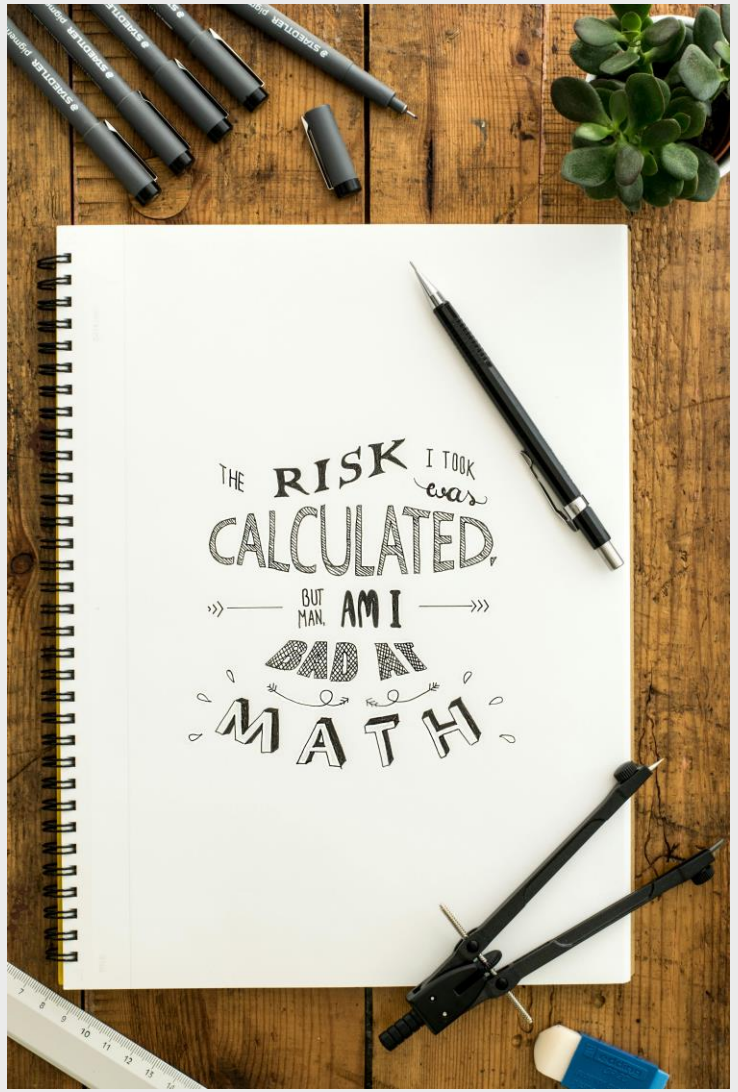
- The short answer is maybe.
- Generative AI will make its best guess on what you are looking for, but most current models will not tell you it doesn’t know or doesn’t understand your question.
- It is called AI Hallucinations. It could make up legal cases that don’t exist but sound really convincing.

TxDOT AI and Data Science Strategic Plan

- AI Strategic Plan has been published on TxDOT's website. Use QR Code.
- Developed by holding 14 focus groups for over 90 participants across the agency.
- Developed over 224 use cases that helped shape the direction for the strategic plan.
- Answers three main questions: Where are we now, where do we want to be, and how do we get there?

How do you measure risk?

- Not all AI has the same risk level to implement.
- Asset Extraction from Video and LiDAR (Low Risk)
- Signal Optimization in Real Time (Medium Risk)
- Generative Design for Structures like Bridges (High Risk)
- Using AI to make hiring, disciplinary, and promotion decisions (High Risk)



Implementing AI

- Need policies around acceptable use.
  - Whitelist and blacklist tools and technologies are very helpful.
- Training on both data literacy and AI literacy.
- Training on Ethical use of AI.
- Governance around what data is allowed to be used in AI.
- AI is already in use but most of us don’t know it. It has already changed the world.

Today's presenters

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March 18, 2025

TRB Webinar: Tort Implications for Flexibility and Engineering Judgment

March 21, 2025

TRB Webinar: Maritime Work in the Industrial Revolution 5.0

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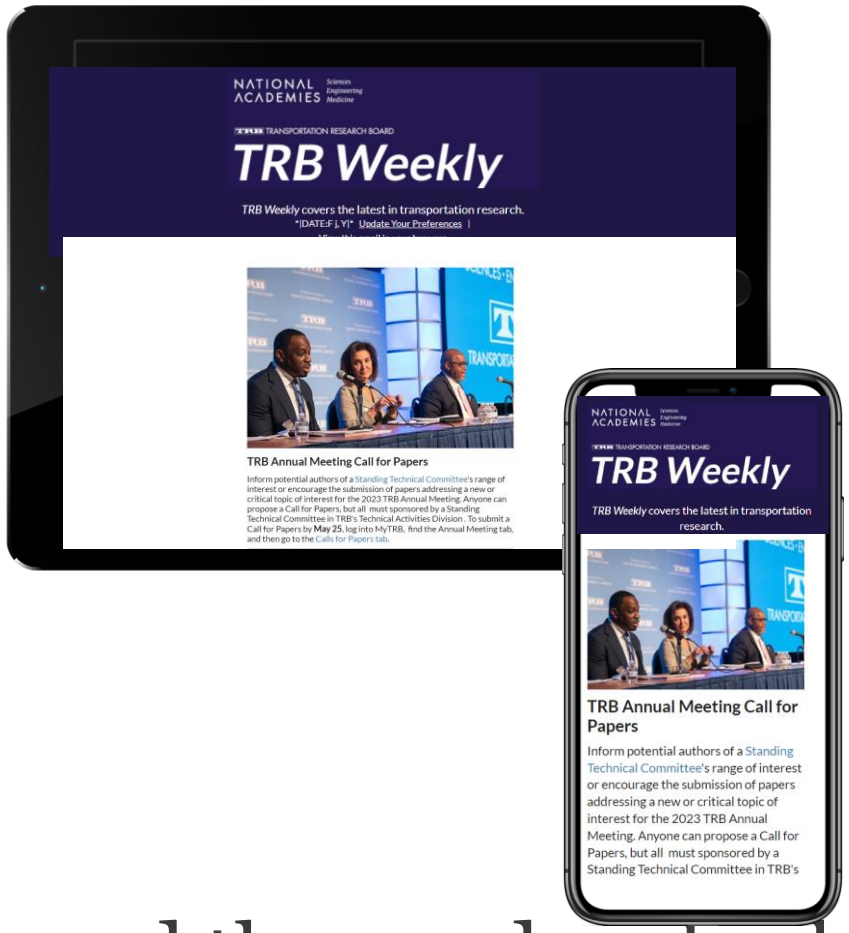

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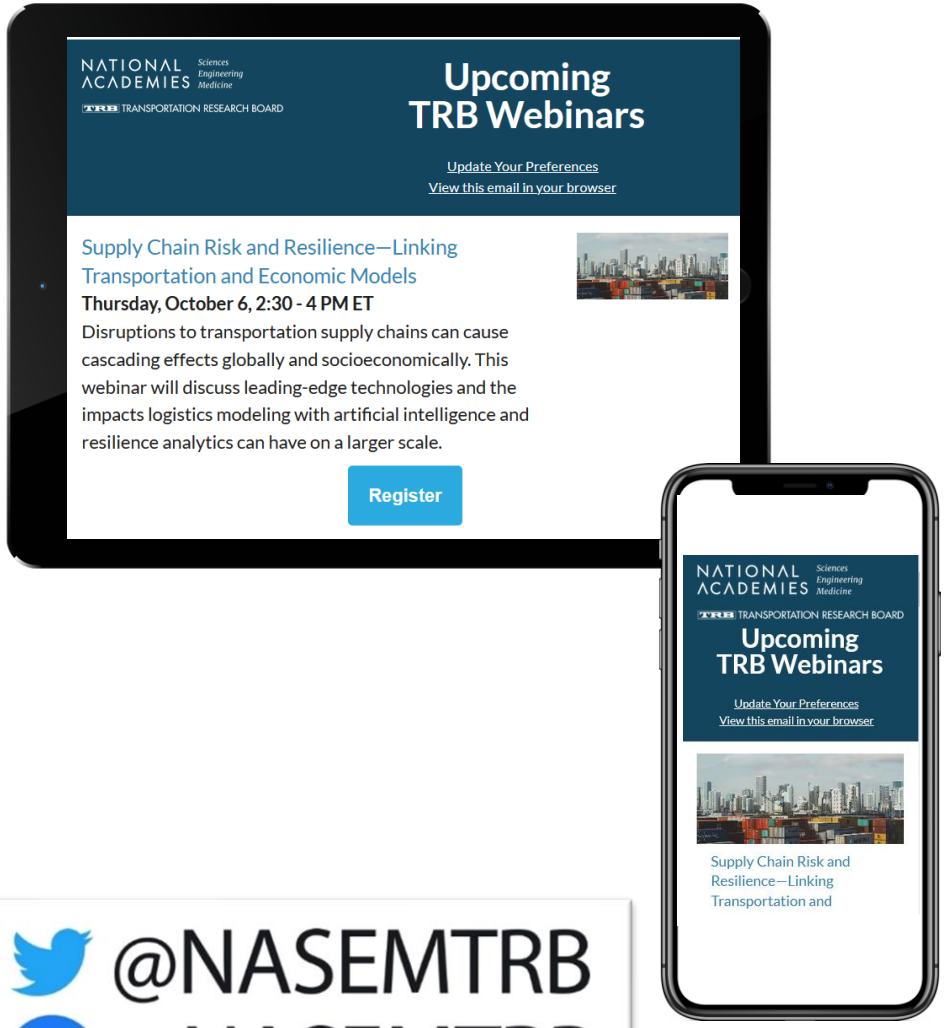

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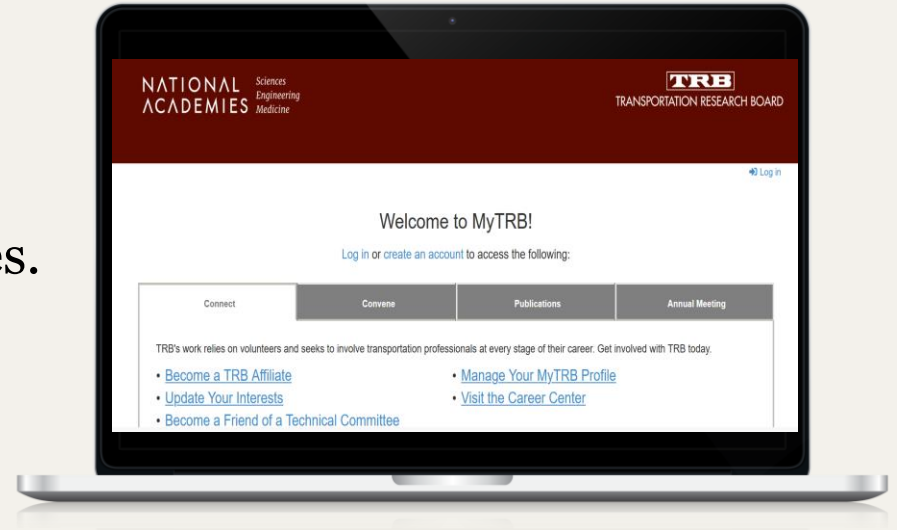

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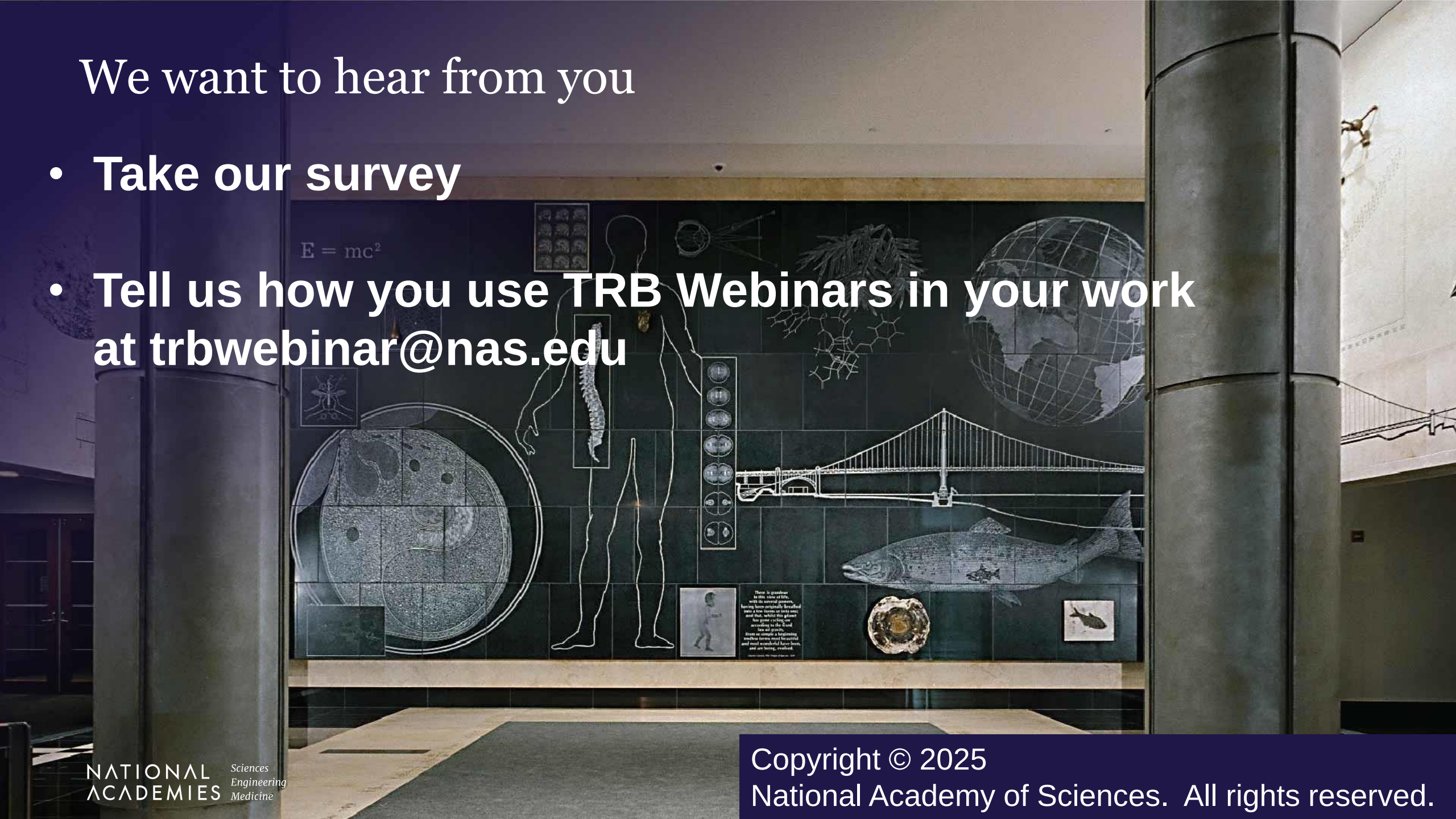

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