

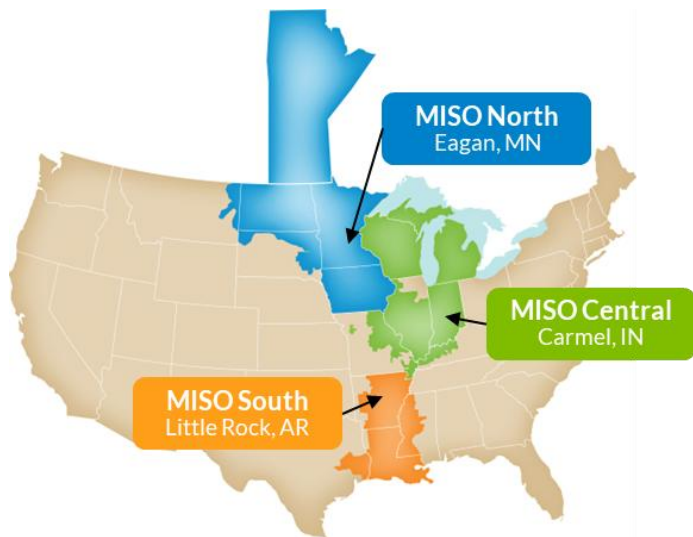


Building Trust in LLMs: A Journey, Not a Destination

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Grid R&D

MISO Overview

MISO is an independent, not-for-profit, member-based organization responsible for keeping the power flowing across 15 U.S. states and Manitoba reliably and cost-effectively.



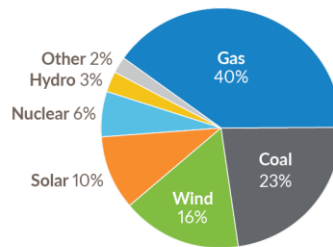
MISO's reliability footprint and regional control center locations

MISO Statistics

Population Served	45 Million
Transmission Line	79,000 Miles
Generating Units	1,460
Members	56 Transmission Owners
	174 Non-transmission Owners
Market Participants	> 550
Market Transactions	> \$33 billion in 2024
Carbon Reduction	Approximately 32% since 2014

INSTALLED CAPACITY

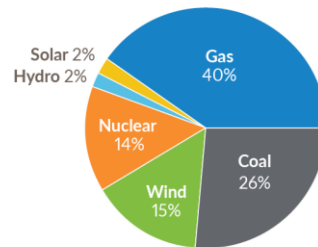
September 2025



207 GW

ENERGY PRODUCTION

January-December 2024



638 Million MWh

*Other: Diesel, Biomass, Storage, Demand Response Resources

MISO AI and ML Business Use Cases



Market Redefinition

- Predicting Net Uncertainty for Dynamic Reserves
- Using AI/ML to Improve Load and Renewable Forecasting



Operations of the Future

- AI/ML to Forecast Historical Unknowns
- AI to Support Control Room Operations
- AI to Automate Interconnection Case Creation



Transmission Evolution

- AI/ML to Driving Efficiency in the Economic Planning Processes
- AI/ML to Optimize Future Planning Studies
- AI/ML to Predict Future Grid Changes

Solving Knowledge Gaps In The Control Room



The problem

Time required for new operator proficiency with control room procedures and BES intricacies

When leaving, veteran operators take valuable knowledge with them

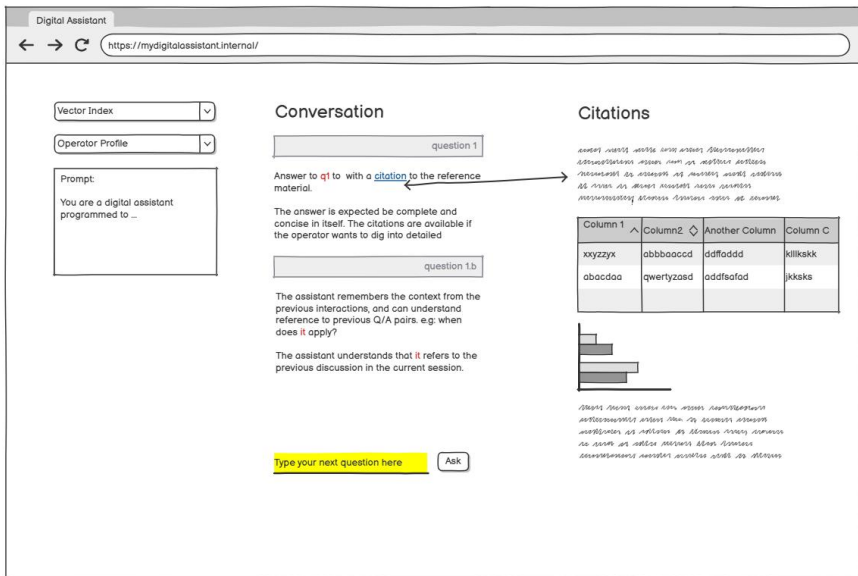


Our solution

Digital assistant that answers questions like a veteran operator

Bridges knowledge gaps for new hires and preserves expertise

What We Accomplished

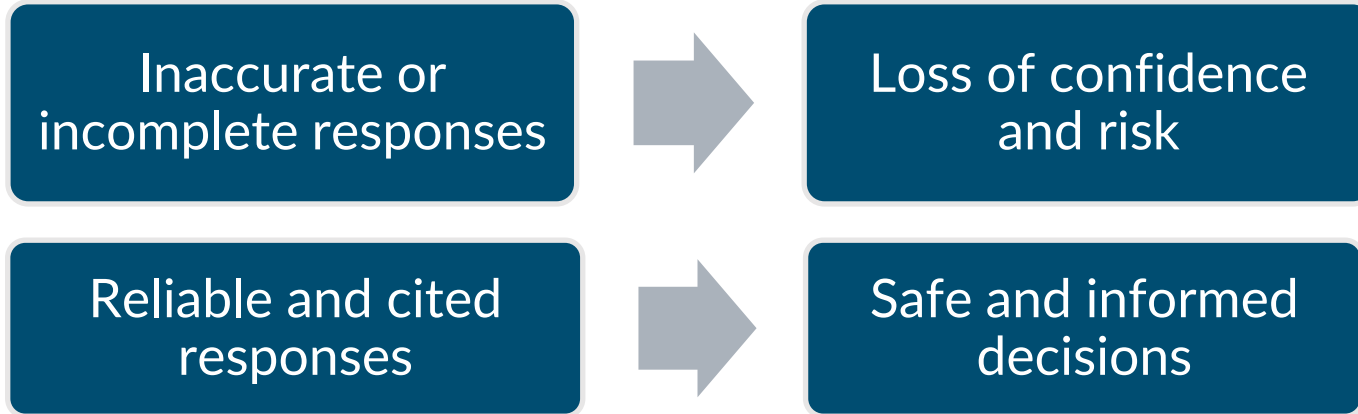


Digital Assistant

- Answers operator guide and procedure questions
- **Goal**
 - Advanced search capability going beyond keyword searches
 - Synthesizer of information contained across multiple sources

The Challenge

Building trust is **necessary**



“If it can’t answer questions right, why would I trust it to do anything else?”

Why This Is Difficult



Semantic complexity

Different wording can still mean the same thing



Document grounding

Answers must come from trusted procedures



Real questions needed

Operator input is essential for realistic tests

Navigating Known Obstacles

- Security posture
- Compliance and Legal concerns
- Data confidentiality
- Early technology adoption pains
- Obtaining buy-in from multiple stakeholders

Approach / Methodology

- Working with operators and operations
- Quantifiable metrics demonstrate **why** they can trust it
- Retrieval Augmented Generation
- Buy-in (legal, risk, compliance)
- **Consistent** and **automatic** ways to test these metrics



Measuring Trust

Metrics

Answer Correctness

Whether the answer's facts are true

Faithfulness

Whether the answer is justified by the provided citations

Answer Relevancy

How well the answer directly addresses the question and stays on topic

Context Precision with Reference

The fraction of retrieved pieces that are actually useful to produce the reference answer

Context Recall

Of the facts needed to answer correctly, how many are present in the retrieved context

Levers For Improvement

Semantic Content Extraction

Extract content to maximize machine readability

Context Engineering

Techniques and practices for shaping and managing the context

Prompt Optimization

LLMs yield better responses when prompts are optimized for the application

Large Language Models

Finding the best LLM for our application

Lessons Learned

AI Development
Environment

Deep User
Engagement

Managing
Expectations