



CANSO GLOBAL SAFETY CONFERENCE 2025

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STATE OF THE INDUSTRY REPORT: ANSP APPLICATION OF LLMS AND GENAI IN SMS AND SAFETY ANALYTICS

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ANSP USE OF LARGE LANGUAGE MODELS (LLMS)

State of the Practice Report

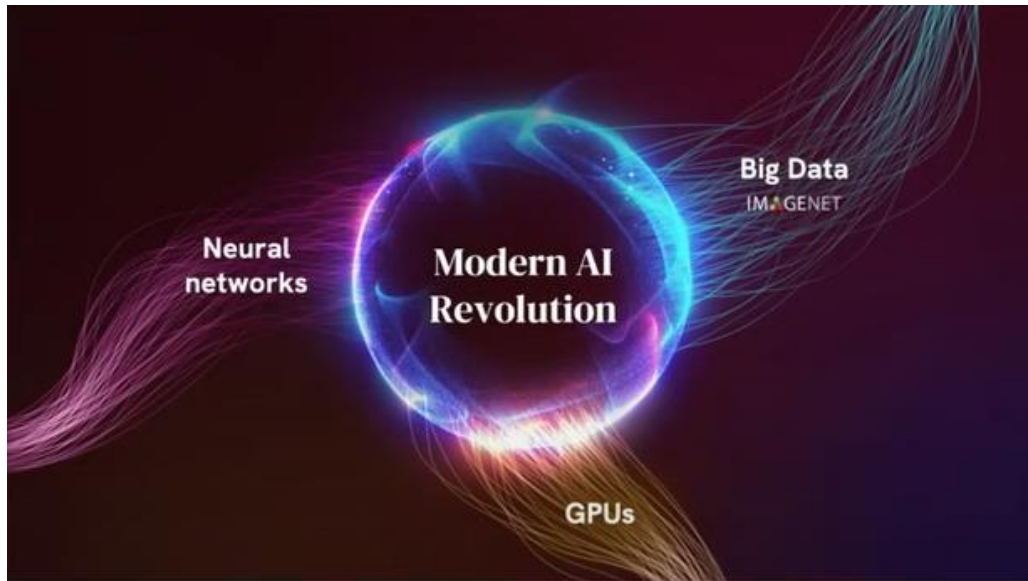
ACKNOWLEDGEMENT

MITRE

**SOLVING PROBLEMS
FOR A SAFER WORLD™**

MODERN AI REVOLUTION

Some 10 Years Ago



[Data + AI Summit Keynote Day 1 - Full](#)

Dr. Fei-Fei Li, Stanford University

The rise of LLMs

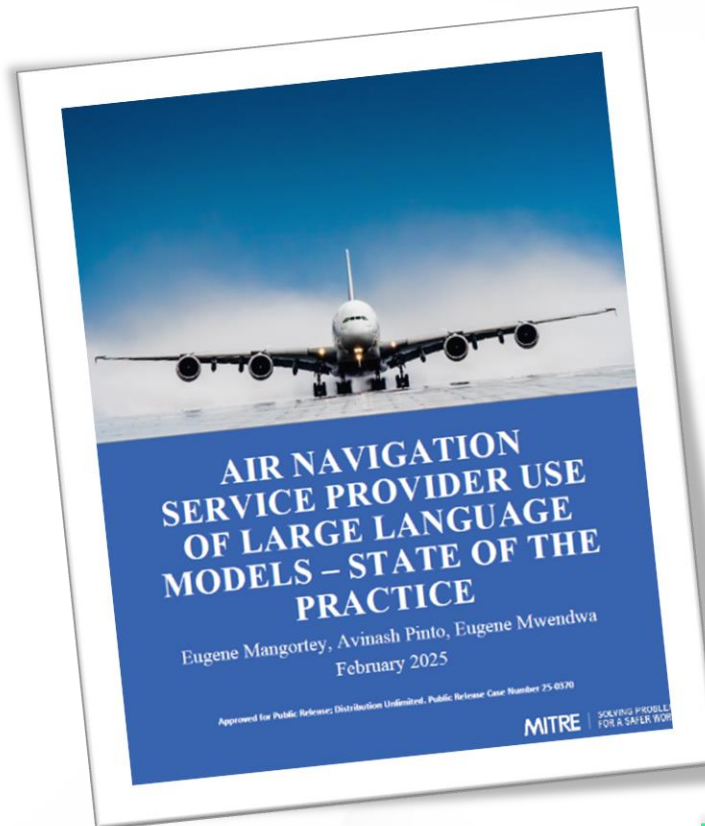
- 2017: “Attention is All You Need” Paper
- November 30, 2022: Chat Generative Pre-Trained Transformer (OpenAI’s ChatGPT)
- Today



CANSO SIWG 2024 INITIATIVE

Application of LLMs/GenAI in ANSP Safety Analytics/SMS

- 20+ ANSPs interviewed
- Existing applications
- Opportunities
- Constraints and Challenges
- Recommendations



FUTURE STATE OF LLM USAGE

Opportunities

- Safety Analysis and Reporting
 - ATC frequency transcription for analysis (comms errors, RPAS reports, PIREPs, etc.)
 - Analyse repository of safety reports (e.g., common mitigations to findings)
 - Arrange sequence of events
 - Assess completeness and quality of safety reports
- Operations and Compliance
 - Enhance ATS procedures: analysis of phraseology
 - Extract pertinent information from ATC transcripts
 - Confirm procedural conformance and compliance
- Documentation and Standardization
 - Generate reports and documents
 - Standardize documents and information
- Training and Decision support
 - Generate training scenarios
 - Develop decision support tool: advisory system with access to policy and regulatory documents

CURRENT STATE OF LLM USAGE

Limited Usage

- Most ANSPs are not leveraging LLMs
- Many ANSPs do not have AI Policies in place
- Current Applications
 - Document repository querying
 - Generate computer code
 - Write emails
 - Querying publicly available information without traditional internet search engines



CURRENT STATE OF LLM USAGE

Current Challenges



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policy



economic



technical

CURRENT STATE OF LLM USAGE

Current Challenges



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- **Skill Set Deficiency:** ANSPs lack the necessary skills to apply LLMs responsibly.
- **Rapid Evolution:** The fast-changing LLM ecosystem makes it hard to identify needed skills.
- **Retention Issues:** Competitive salaries are required to hire and retain skilled staff.
- **Language Barrier:** Some LLMs can't understand non-English documents, affecting non-English speaking ANSPs.
- **Lack of Understanding:** ANSPs are not fully aware of what LLMs are and how they work.
- **Low Trust:** ANSPs have low trust in LLMs due to their risks and vulnerabilities.
- **Resistance to Change:** Skepticism and fear of job replacement hinder LLM adoption.
- **Slow Adoption:** These factors collectively slow down the adoption of LLMs by ANSPs.



policy



economic



technical



CURRENT STATE OF LLM USAGE

Current Challenges



policy

- **Lack of Policy and Guidance:** Absence of clear policies and guidance on LLM use within ANSPs.
- **Governance Structures:** Lack of robust data and model governance structures.
- **Data Concerns:** Fear of proprietary data exposure or leakage.
- **International Policies:** Complications due to government policies requiring local data storage.
- **Proprietary Document Sensitivity:** Limits on using external vendor services due to document sensitivity.
- **Environmental Impact:** Concerns about the carbon footprint of LLM usage.



economic



technical



workforce



CURRENT STATE OF LLM USAGE

Current Challenges



economic

- **Lack of Business Case:** Absence of a clear business case for LLMs.
- **ROI Concerns:** Worries about potential low return on investment.
- **High Integration Costs:** Expenses related to purchasing and maintaining hardware and externally hosted models.



technical



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policy



CURRENT STATE OF LLM USAGE

Current Challenges



technical

- **Compatibility Issues:** Concerns about LLMs' compatibility with legacy infrastructure and systems.
- **Lack of AI Assurance:** Absence of robust AI assurance capabilities for responsible LLM use.
- **Model Insights:** Lack of insights into model explainability, biases, etc.



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policy

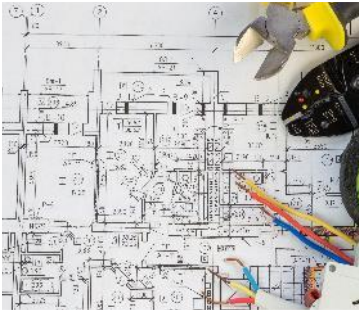


economic



RECOMMENDATIONS

Design



- Human-in-the-loop
- Use Cases
- Local Hosting
- LLM Evaluation
- Risk Awareness
- Risk Management
- Model Selection

Development



- Supply Chain Security
- Asset Management
- Documentation
- Tech Debt Management
- Deidentify Training Data
- Federated Learning
- Observability Platform
- Synthetic Datasets

Deployment



- Robust Security Principles
- Access Controls
- Pipeline Protection
- Cyber Best Practices
- Incident Management
- Security Evaluation
- Continuous Performance Evaluation

Monitoring



- Regular Logging and Monitoring
- Detection of Attacks
- Guardrails
- Behaviour Monitoring
- Performance Baseline
- Periodic Health Check
- Post-Deployment Plans
- Model Refinement
- User Guidance and Training





THANK YOU