

Information Paper on AI Applications in Military Engineering

1. Purpose

To inform on the operational integration, shared use cases, implementation challenges, and strategic collaboration framework for Artificial Intelligence (AI) in military engineering.

2. Background

Department of Defense (DoD) installations face compounding challenges: significant civil service and military personnel attrition over the past two years, aging physical infrastructure, and rising operational demands. These constraints necessitate increased velocity in project scoping, technical reviews, and capital allocation. Successfully maintaining installations requires tight synchronization among action officers, engineering personnel, and contractors. Secure environments, such as GenAI.mil, provide an accredited baseline to bridge personnel gaps, streamline architectural and engineering workflows, and establish common operational standards across the defense architectural, engineering, and construction (A/E/C) ecosystem.

3. Key Points/Discussion

- **Cross-Sector Platform Capabilities:** Government personnel utilize accredited Large Language Models (LLMs) on GenAI.mil (i.e., OpenAI ChatGPT, Google Gemini, and Grok) to collaborate, review, and draft engineering products alongside commercial tools:
 - *ChatGPT:* Optimal for rapid drafting of staff documents, structured problem-solving, and comparative analysis of authoritative documents.
 - *Gemini:* Optimal for native multimodal processing (visuals, audio, drawings) and analyzing comprehensive technical libraries and project submittals.
 - *Grok:* Optimal for accelerated quantitative reasoning, mathematical analysis, and low-latency iterative querying.
- **(A/E/C) Operational Workflows:** Designers, project managers, and contractors can interface with AI across five primary workflow areas:
 - *Statements of Work (SOW):* Streamlining project requirements and scope definitions development to reduce contracting turnaround times.
 - *Design Reviews:* Validating designs against DoD criteria, building codes, and Space Launch Delta 45 (SLD 45) Installation Facility Standards (IFS).

- *Requests for Information (RFIs)*: Expediting government evaluations and contractor technical clarifications by cross-referencing inquiries against drawings and specifications.
- *Submittal Reviews*: Automated verification of contractor material submittals against project engineering packages to rapidly flag deficiencies and ensure quality assurance.
- *Code Compliance*: Sourcing exact section and paragraph citations within building codes to ensure regulatory compliance of designs and construction.
- Government-Industry-Academic Collaboration: Defense infrastructure resilience relies on joint technological innovation:
 - *Advanced Modeling and Digital Twins*: Academic research partnerships (e.g., Massachusetts Institute of Technology [MIT]) and industry solutions (e.g., Booz Allen Hamilton's digital twin development at Tyndall Air Force Base [AFB]) demonstrate the value of joint technology integration.
 - *Joint Delivery*: Industry partners provide commercial AI system capabilities and domain expertise to build scalable defense engineering solutions.
- Current Operational Initiatives: The 45th Civil Engineering Squadron (45 CES) conducts internal AI training workshops to upskill civil servants and military engineers. In parallel, SLD 45 is actively updating legacy infrastructure records (e.g., utility and waterline geospatial data) to provide authoritative baseline data for government and contractor operations.
- Shared Implementation Challenges:
 - *Security & Accreditation*: Navigating lengthy clearance cycles to deploy secure AI tools accessible to both government and contractor workflows.
 - *Data Quality & Modernization*: Mitigating inaccuracies caused by legacy or incomplete records through proactive digitization.
 - *Workforce Adaptation & Trust*: Cultivating trust across government and industry and maintaining mandatory human-in-the-loop oversight for engineering decisions.
- Strategic Recommendations for Joint Execution:
 - *Invest in Modernized Data Foundations*: Digitize baseline installation records and focus AI deployment on high-value joint use cases.

- *Establish Joint Delivery Teams:* Form integrated working groups comprising military personnel, civil servants, and contractor technical teams to co-develop solutions.
- *Define Shared Metrics and Iterate:* Track clear operational metrics across contracting, review times, and maintenance to continuously refine AI-driven engineering processes.
- **Strategic Impact:** Integrating AI across the DoD and industry serves as a critical force multiplier—optimizing resource allocation, accelerating project delivery, and safeguarding mission-essential infrastructure.