



# AI-powered Cognitive Digital Twins for Facilities to Ensure Mission Success for the Space Force

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# Operational Challenges in Public and Defense Facilities

## Complex Systems of Assets

Diverse and dispersed facilities and equipment.  
Critical reliance on cooling, power, and HVAC systems.

## Need for Real-Time Monitoring

Importance of predicting maintenance needs and potential failures.  
Ensuring uninterrupted mission-critical operations.

## Data Silos

Facilities information scattered across various systems and formats.  
Difficulty in accessing actionable insights quickly.

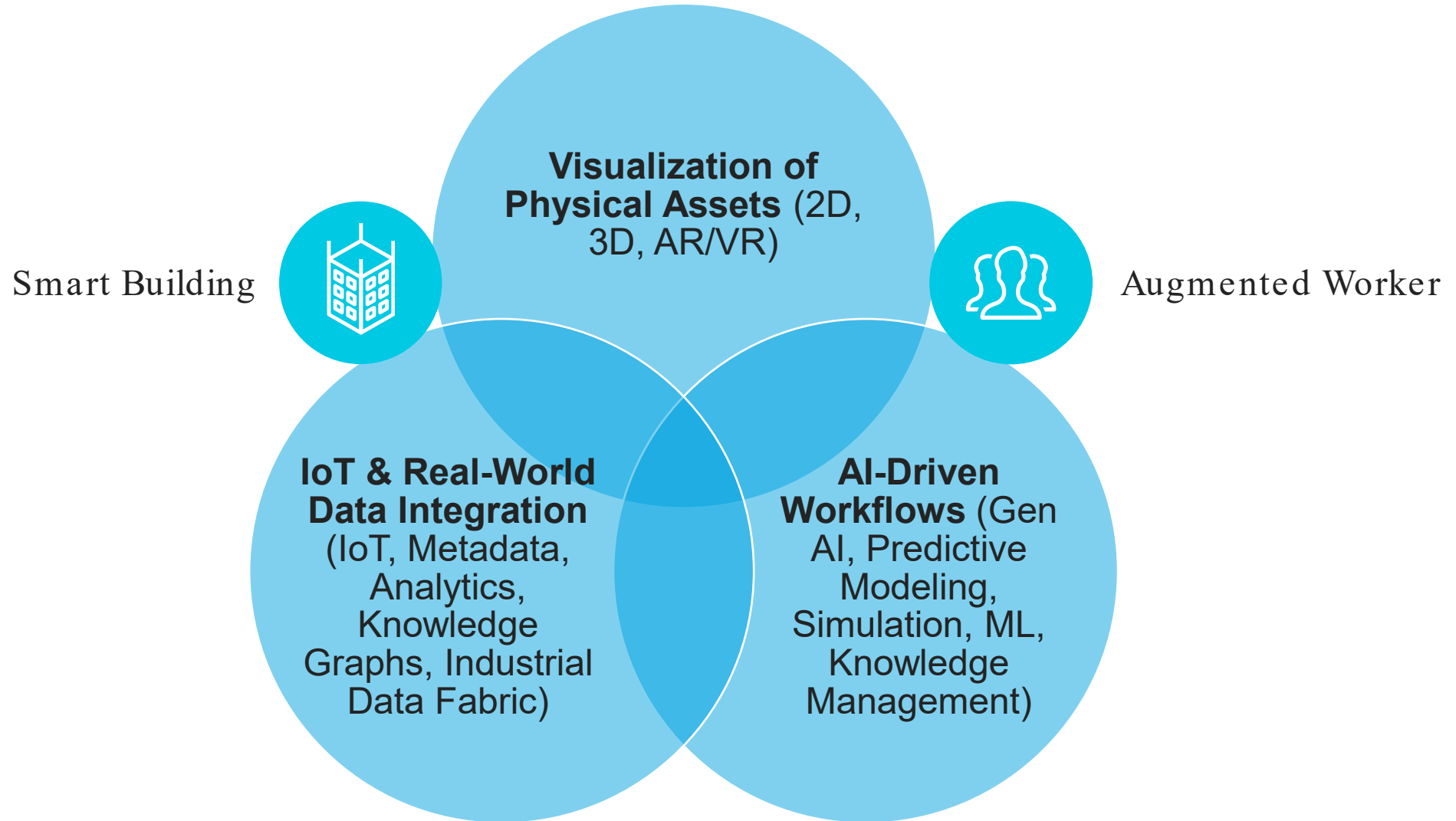
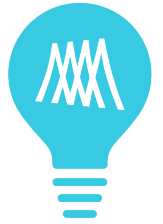
# Space Operations Command (SpOC) Goals

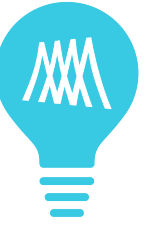


1. Develop digital representation of physical assets
  - Accelerate facility planning
  - Perform what-if analyses
  - Apply SOPs (Standard Operating Procedures) consistently
2. Enhance existing BAS/BMS
  - Instrument HVAC and electrical equipment to enable smart monitoring
  - Detect anomalies before failures
  - Feed data into predictive maintenance models
3. Develop an AI-augmented situational awareness and decision tool for Civil Engineering Squadrons to command-and-control smart base infrastructure



# Cognitive Digital Twin Components





Do you use Generative AI tools at work ?

A. I don't use AI tools

B. I use company-provided AI tools

C. I bring my own AI tools

slido

Please download and install the Slido app on all computers you use

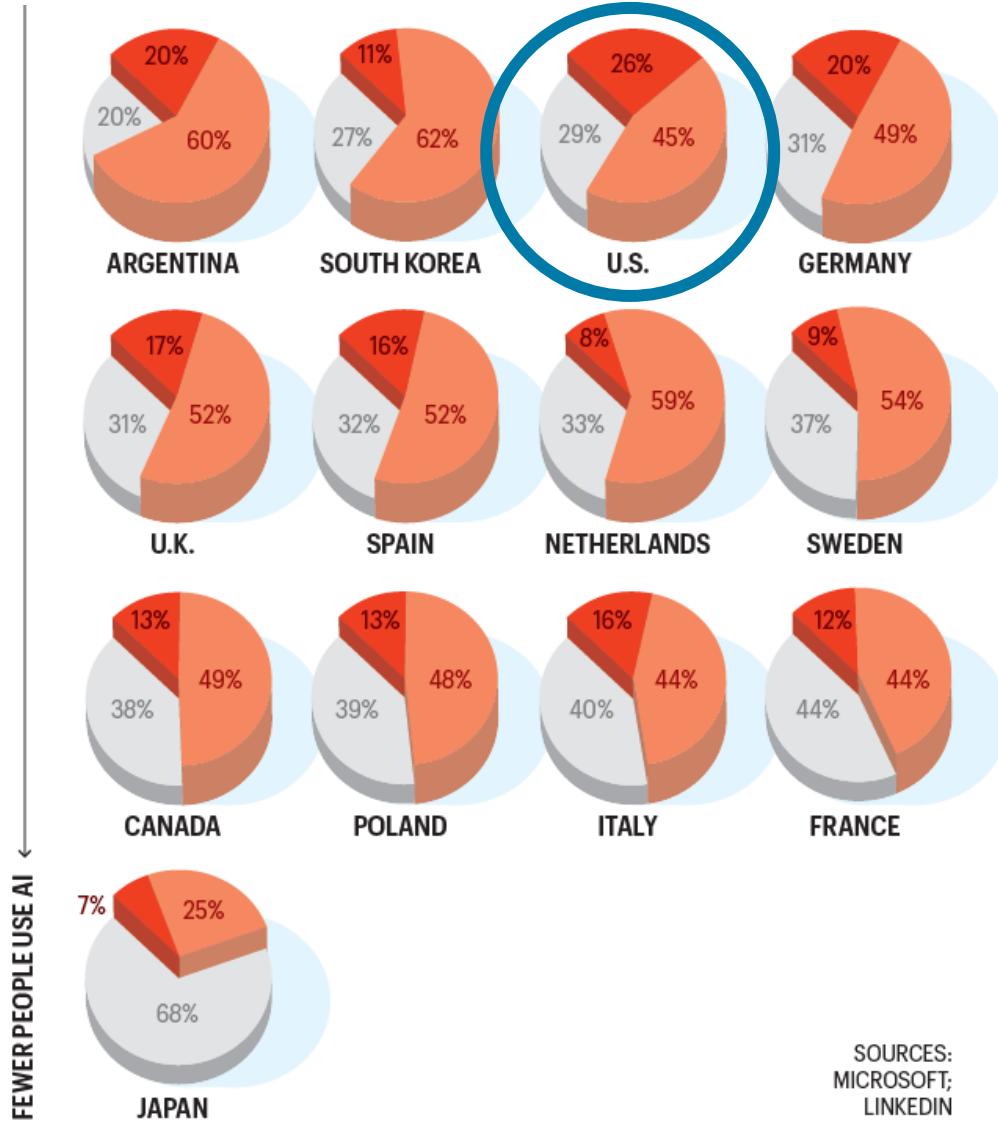
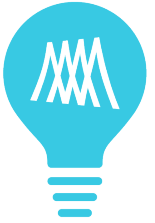


Do you use **Generative AI tools** at work?

① Start presenting to display the poll results on this slide.

# USE OF GENERATIVE AI BY KNOWLEDGE WORKERS

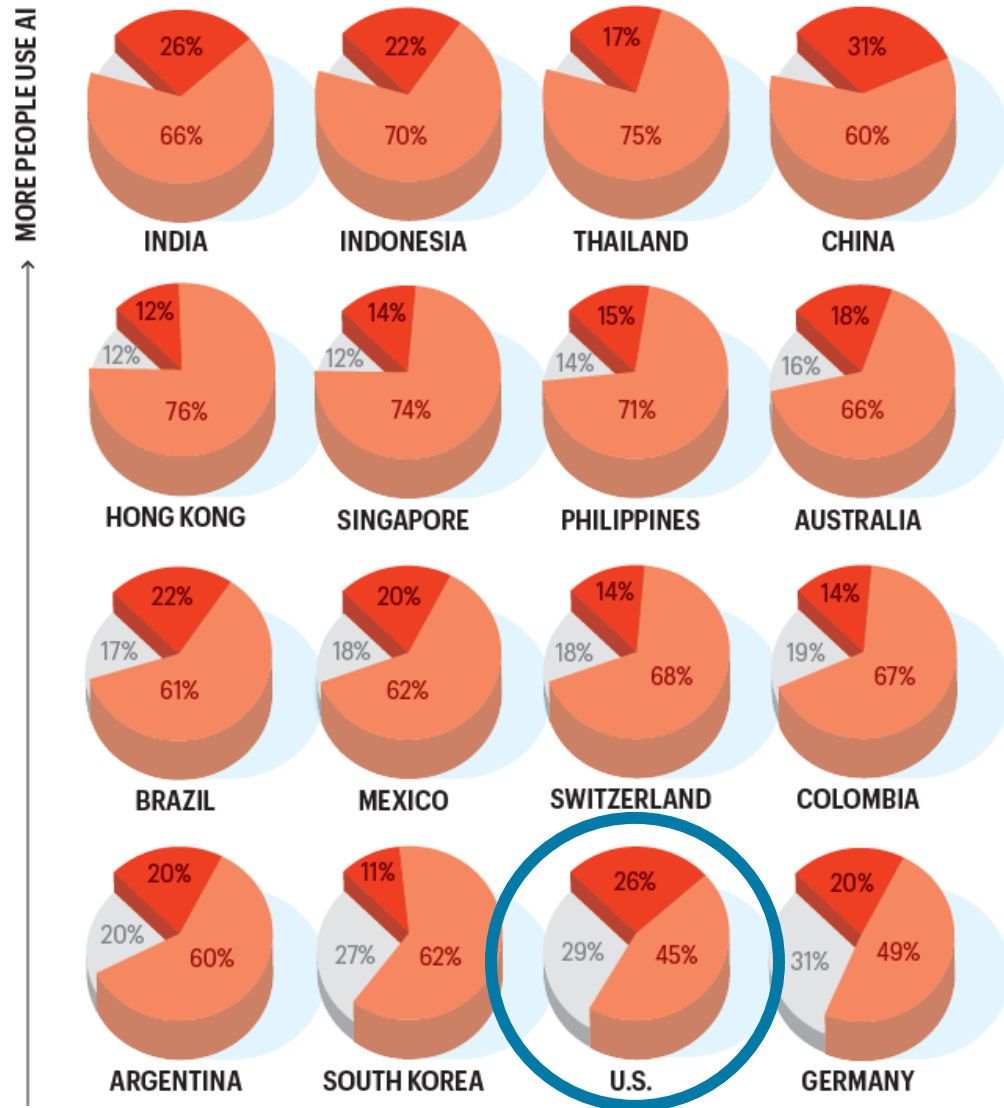
- EMPLOYEES WHO DO NOT USE AI
- EMPLOYEES USING COMPANY-PROVIDED AI TOOLS
- EMPLOYEES BRINGING THEIR OWN AI TOOLS TO WORK



SOURCES:  
MICROSOFT;  
LINKEDIN

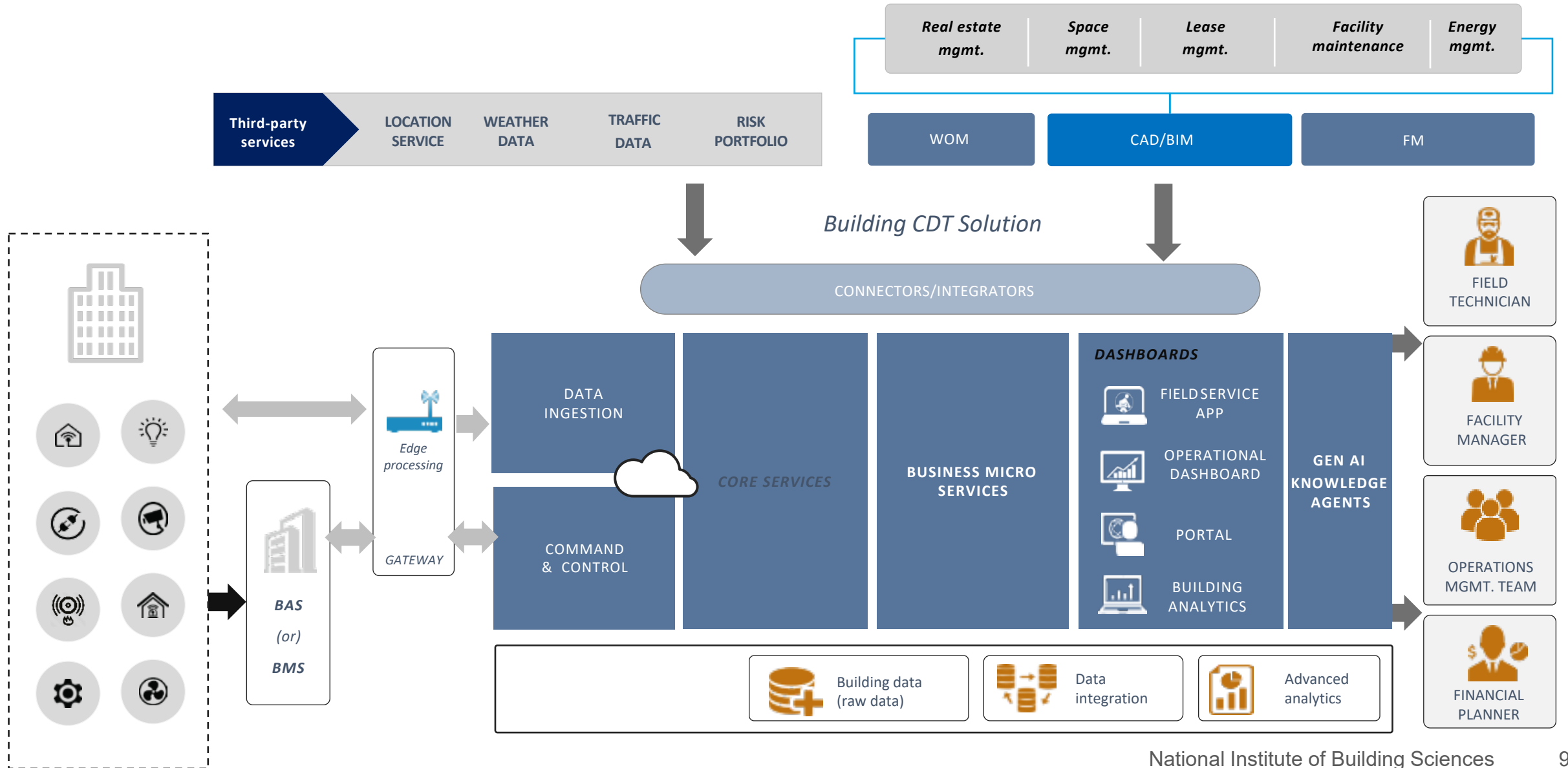
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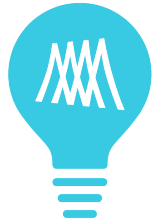




# Cognitive Digital Twin System Architecture



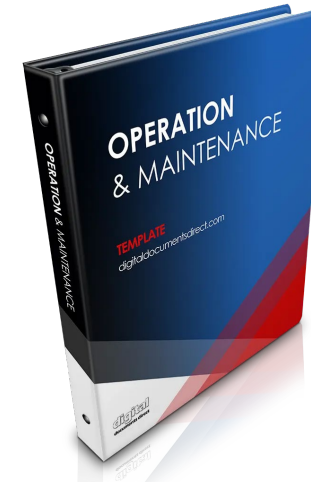
# AI-Driven Workflows: Knowledge Extraction



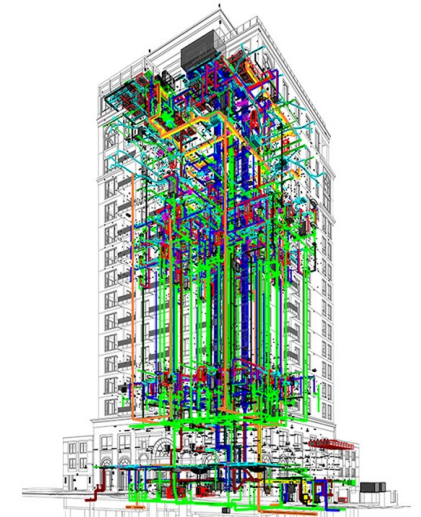
Design and Construction Documents



Ownership and Financial Documents

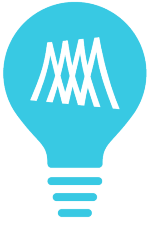


Operation & Maintenance Documents



Technology and Systems Information

# AI-Driven Workflows: Knowledge Extraction



Ask Questions, Get Answers – as if Asking a Senior Team Member



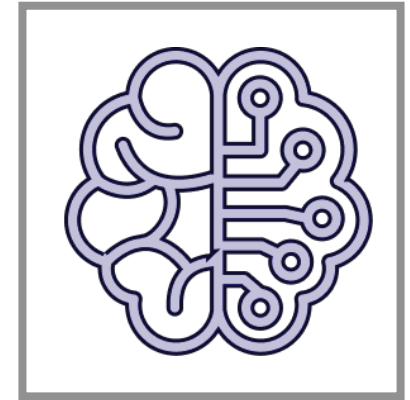
**Connect**  
relevant  
information



**Create** unified  
Knowledge

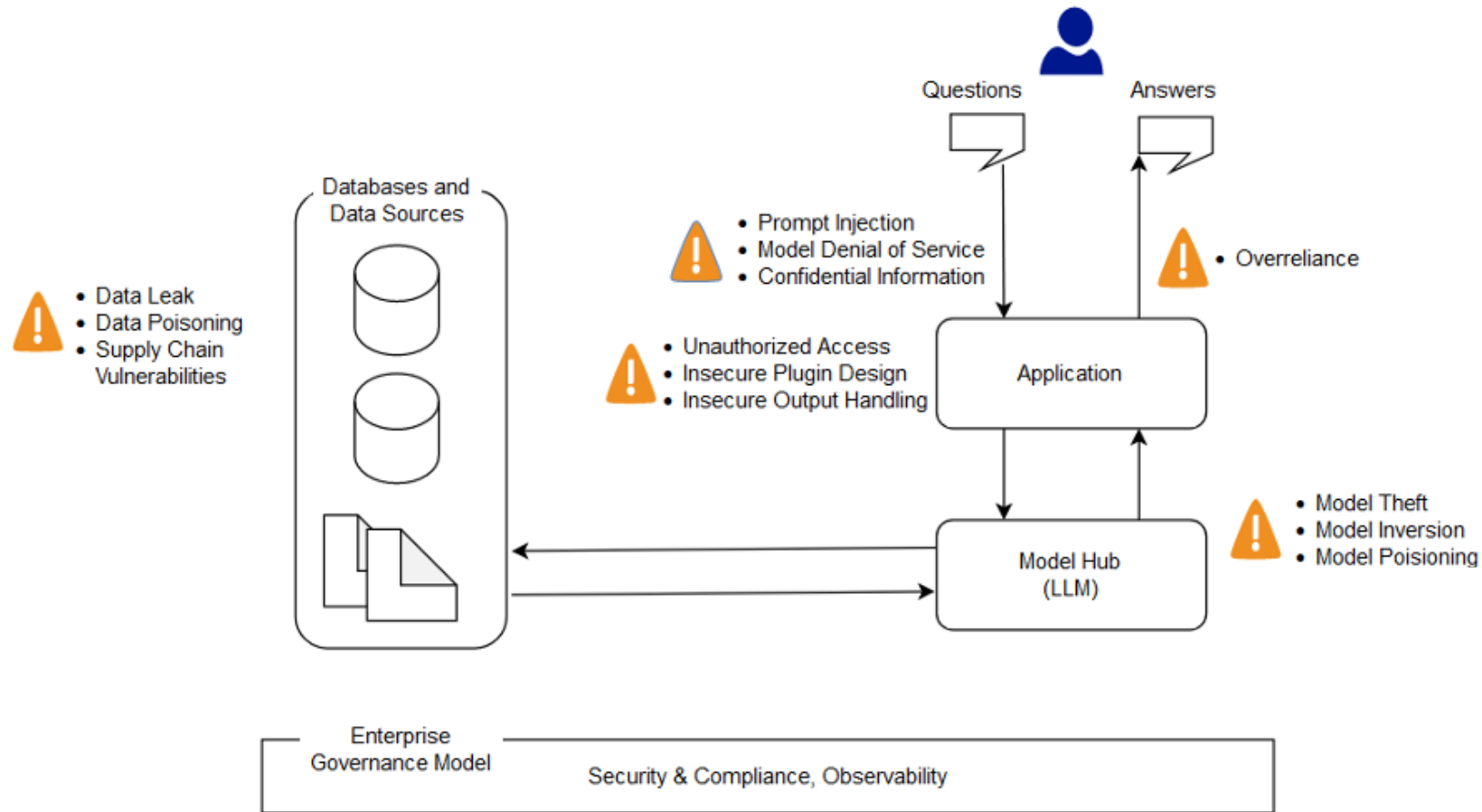
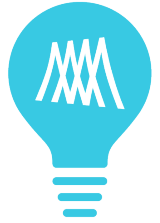



**Staff AI**  
Assistants on  
projects



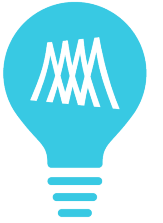
**Access**  
expertise at  
your fingertips

# Gen AI Treats & Mitigation Tactics



 Most Common Threats

# Design to NIST 800-207 Zero Trust Architecture



1. All data sources and computing services are considered resources.
2. All communication is secured regardless of network location.
3. Access to individual enterprise resources is granted on a per-session basis.
4. Access to resources is determined by dynamic policy—including the observable state of client identity, application/service, and the requesting asset—and may include other behavioral and environmental attributes.
5. The enterprise monitors and measures the integrity and security posture of all owned and associated assets.
6. All resource authentication and authorization are dynamic and strictly enforced before access is allowed.
7. The enterprise collects as much information as possible about the current state of assets, network infrastructure and communications and uses it to improve its security posture.



# Thank You

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