BUILDING INNOVATION
Conference

How Can Generative AI (GenAI) Accelerate Building Information Management at Federal Agencies and Private Enterprises

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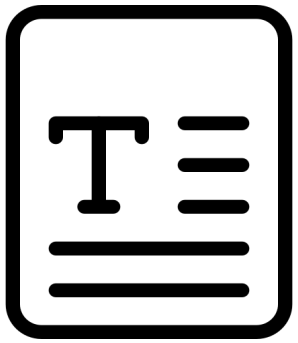
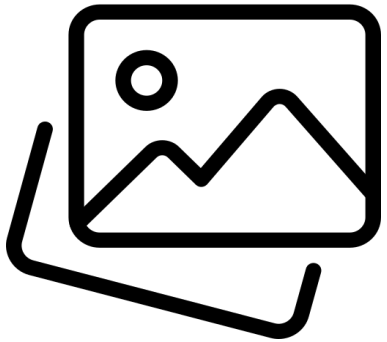
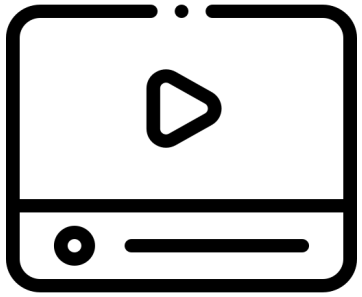
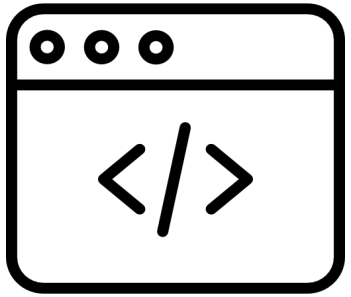
Generative AI Definition

Generative AI is a type of AI that is trained on data. It can create new content and ideas including text, images, videos, and code.



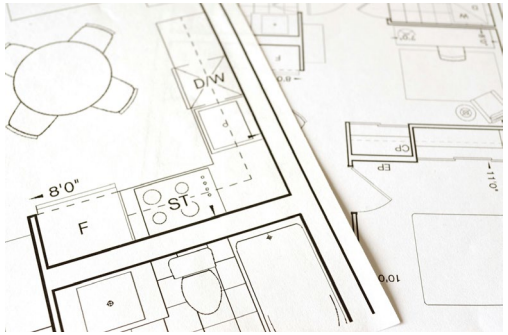


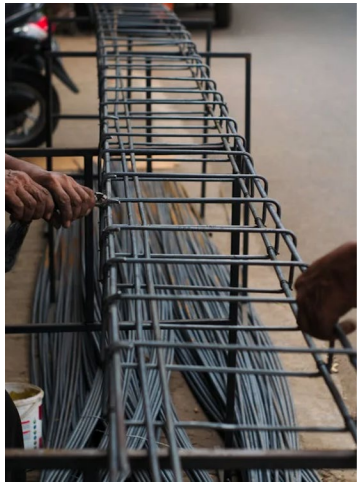


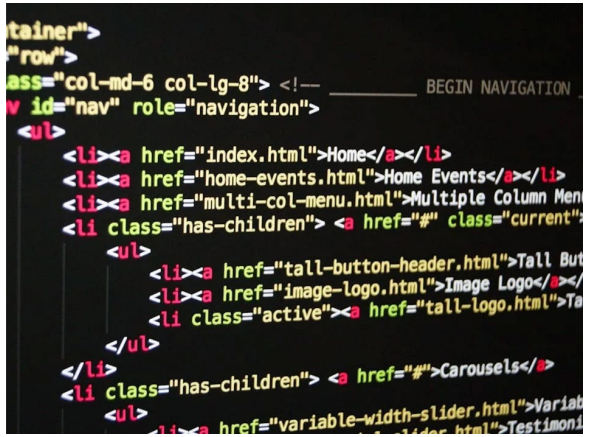


Building Information Generation

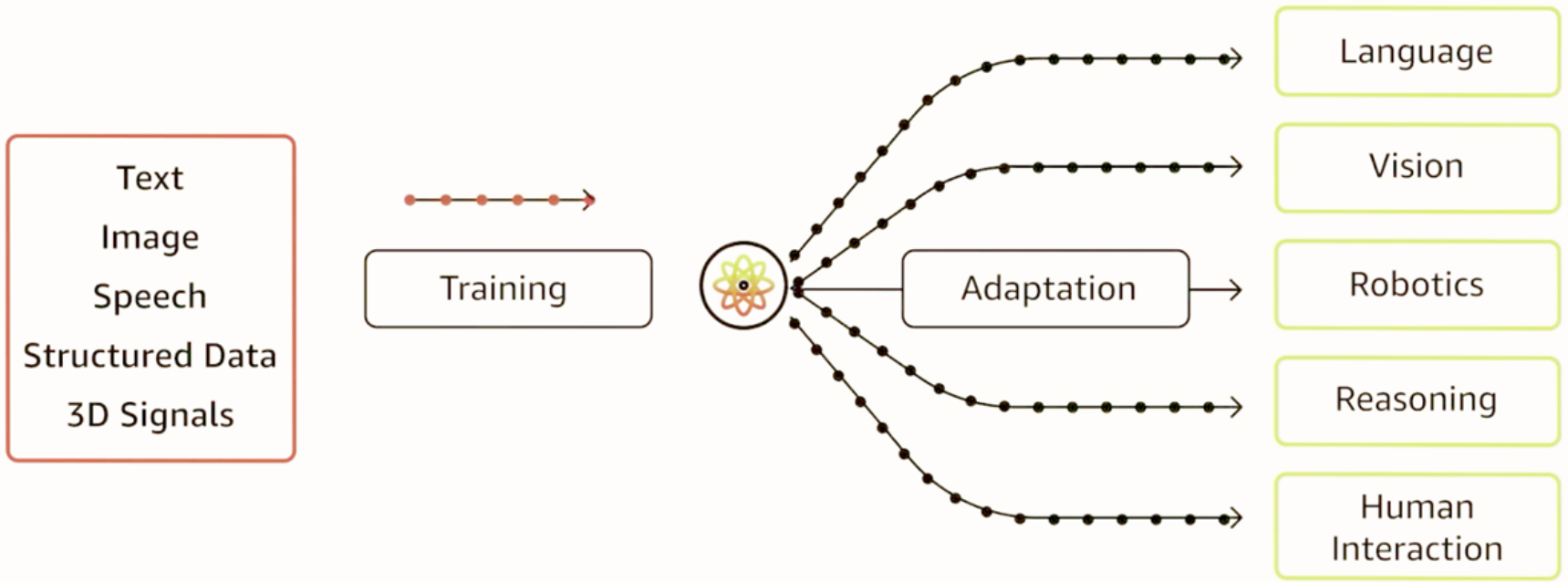
Digital representation of physical and functional characteristics of a built asset. Shared knowledge resource for information about a built asset forming a reliable basis for decisions from earliest conception to demolition.







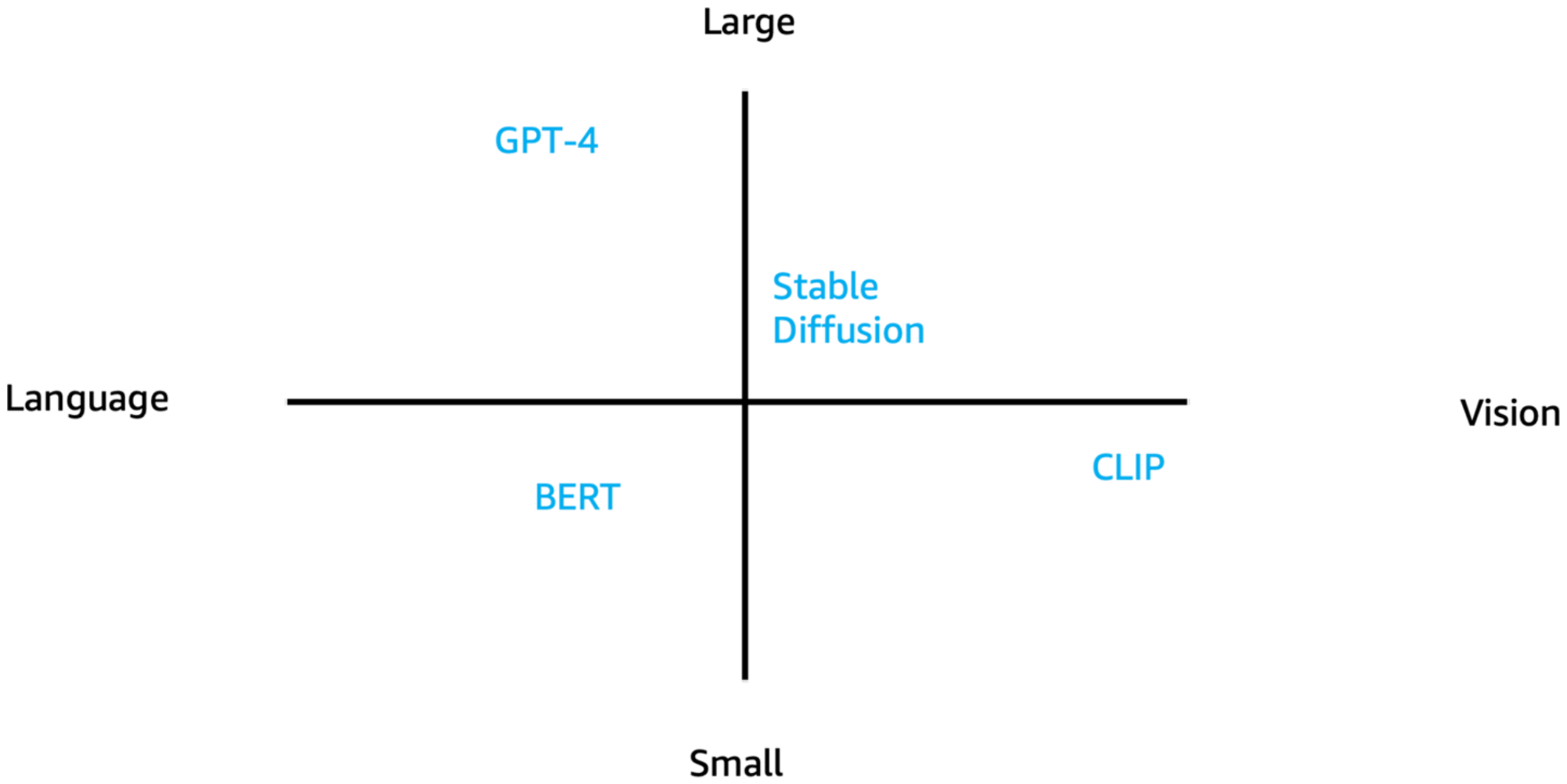
Data for Foundation Models



Foundation Model

Large models that are pre-trained on vast amounts of data. Foundation models provide a base, or foundation, on which more specific models can be built, and are trained on large sets of broad and general data.

Types of Foundation Models

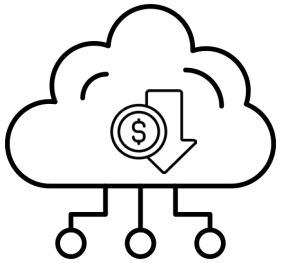


Large Language Models - LLMs

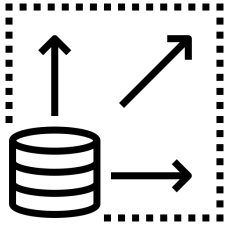
Foundation models are trained on human language.

LLMs form the basis of text-based generative AI applications such as OpenAI's ChatGPT.

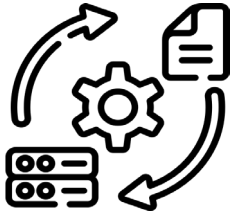
Why is Now the Best Time to Embrace Generative AI?



Lower cost and accessibility of compute



Availability of large-scale data sets



Development of the Transformer model architecture in 2017

Why is Now the Best Time to Embrace Generative AI in AEC?

41%

of Construction Professionals Will Retire by 2031

*National Center for Construction Education & Research

35%

of Time Professionals Spent on Non-optimal Activities

*FMI Research

40%

of Direct or Indirect Global CO2 Emissions Result from Construction

*McKinsey Estimates

Competitive Differentiation using GenAI

“The reality that’s going to hit home in the next six to 12 months is Generative AI is just as difficult as ‘traditional’ AI.

“Shaping generative AI systems created from existing models and services will deliver applications most likely to offer competitive differentiation.”

- Eric Lamarre, Senior Partner leading McKinsey Digital

“Over-leveraging a general-purpose AI platform is unlikely to confer competitive advantage.”

- Michael Carbin, Associate Professor, MIT

Fundamental Capabilities of Generative AI

Text generation

Q&A

Text summarization

Text extraction

Paraphrase rephrase

Search

Code generation

Image generation

Image classification

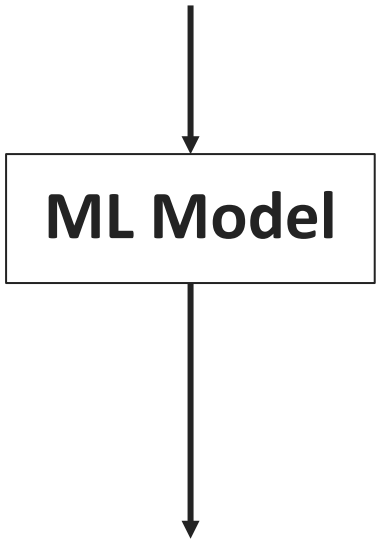
Audio generation

Video generation

Many traditional Machine Learning algorithms can be reformulated as Generative

Traditional classification

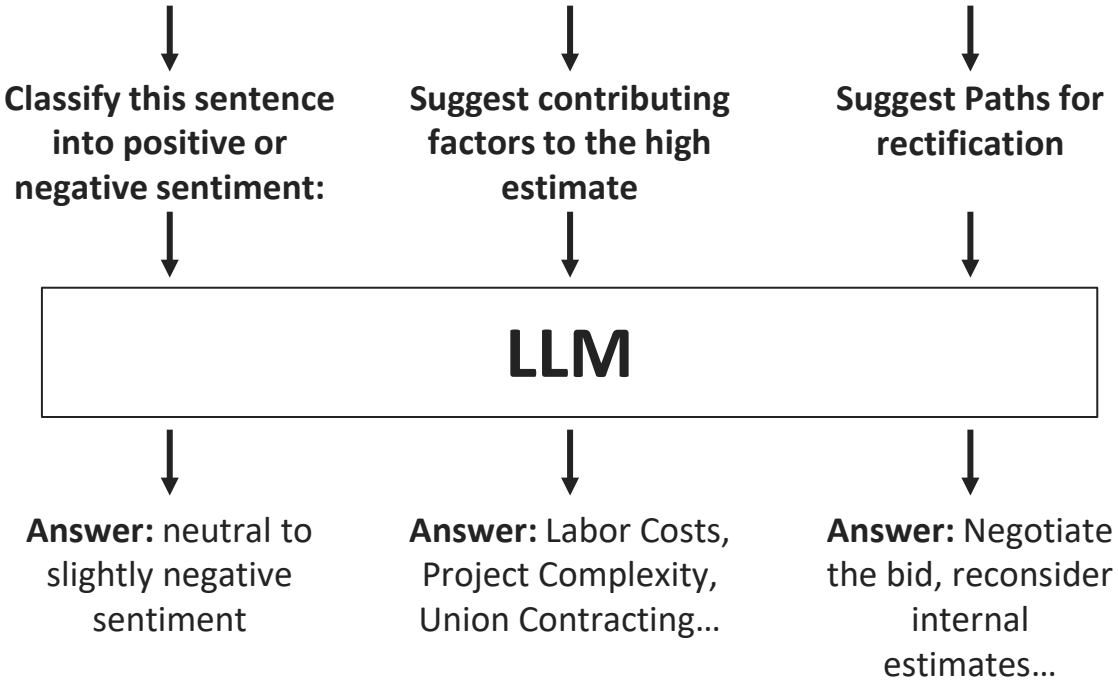
Text: This subcontractor bid meets the schedule but is above our internal estimates.



Sentiment: Negative

Using generation to classify text

Text: This subcontractor bid meets the schedule but is above our internal estimates.



Enterprise Use Cases in AEC

Planning, Design, and Engineering

Get design suggestions based on past projects
Generate construction product specifications
Validate submissions for building code compliance

Environmental, Health and Safety (EHS)

Identify EHS risk from project documents, real time or historical data
Generate project-specific EHS plans
Extract insights from EHS reports

Skills and Knowledge Development

Extract knowledge from drawings, BIM, specs
Create micro-learnings from training plans
Interpret complex compliance and standards documents

Construction and Handover

Optimize supply chain dependencies
Compile handover documentation
Generate bid documents based on past projects
Data cleaning, processing, classification, tagging

Current Challenges of Implementing GenAI

Accuracy

Hallucination
Factually incorrect statements
Misleading information

Currentness

Outdated information
Keep content up to date
Time-aware answers

Safety

Ensure outputs don’t pose risks to users
Avoid generating harmful or biased content
Mitigate data leakage or privacy breaches

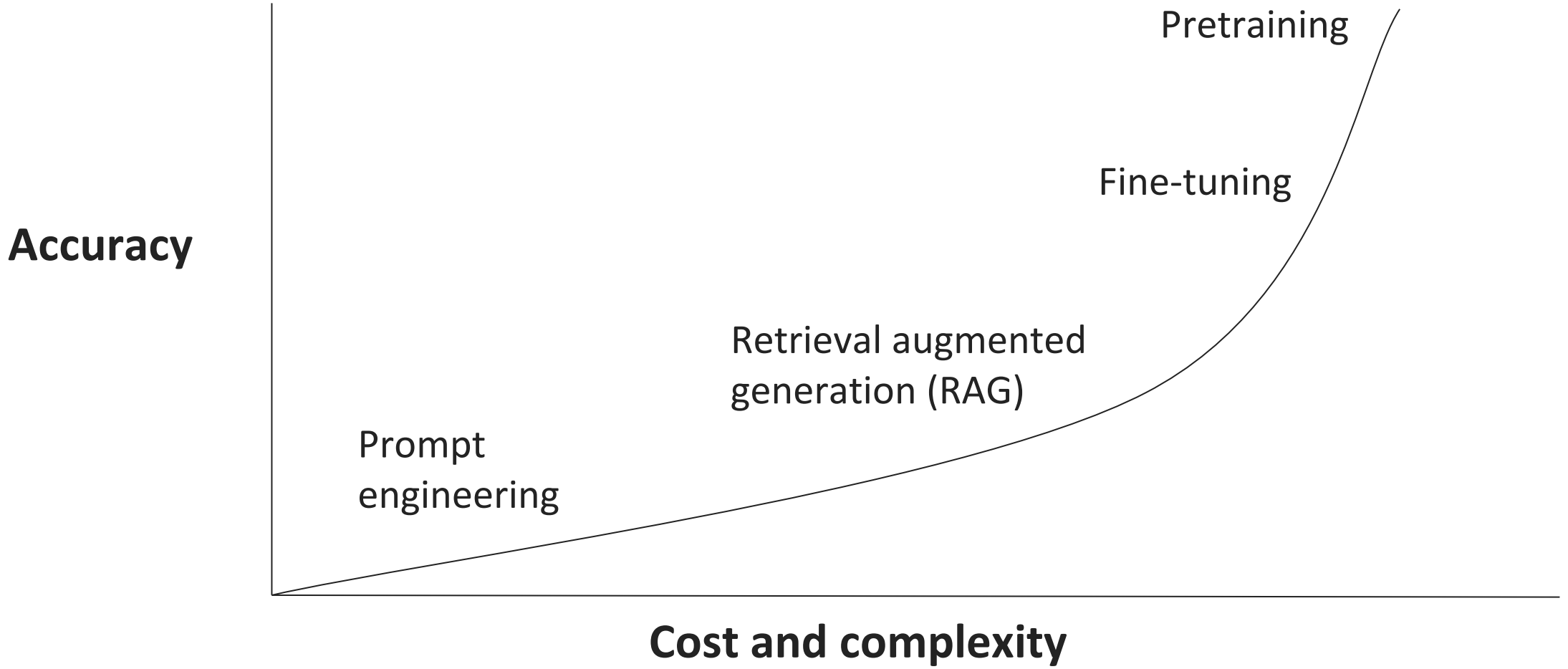
Enterprise Context Awareness

Company-specific data
Unique processes
Requirements

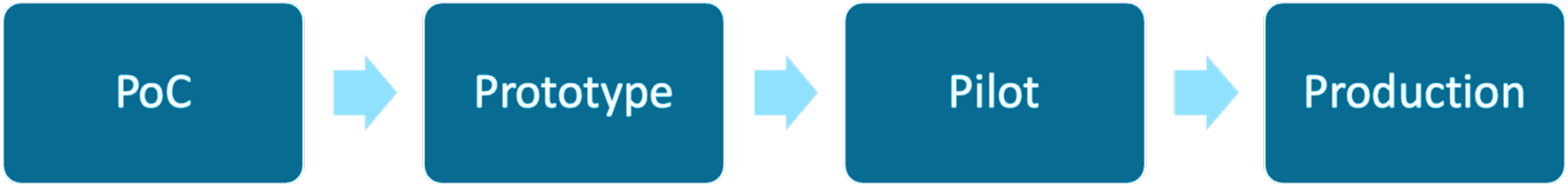
Cost Efficiency

Deployment costs
Maintaining enterprise data
Higher relative cost for smaller firms

There are many ways to customize a model for government agencies and AEC firms



How to deploy GenAI at agencies and AEC firms



Define the scope

Does the internal customer want this?

Can your organization do this?

Should your organization do this?

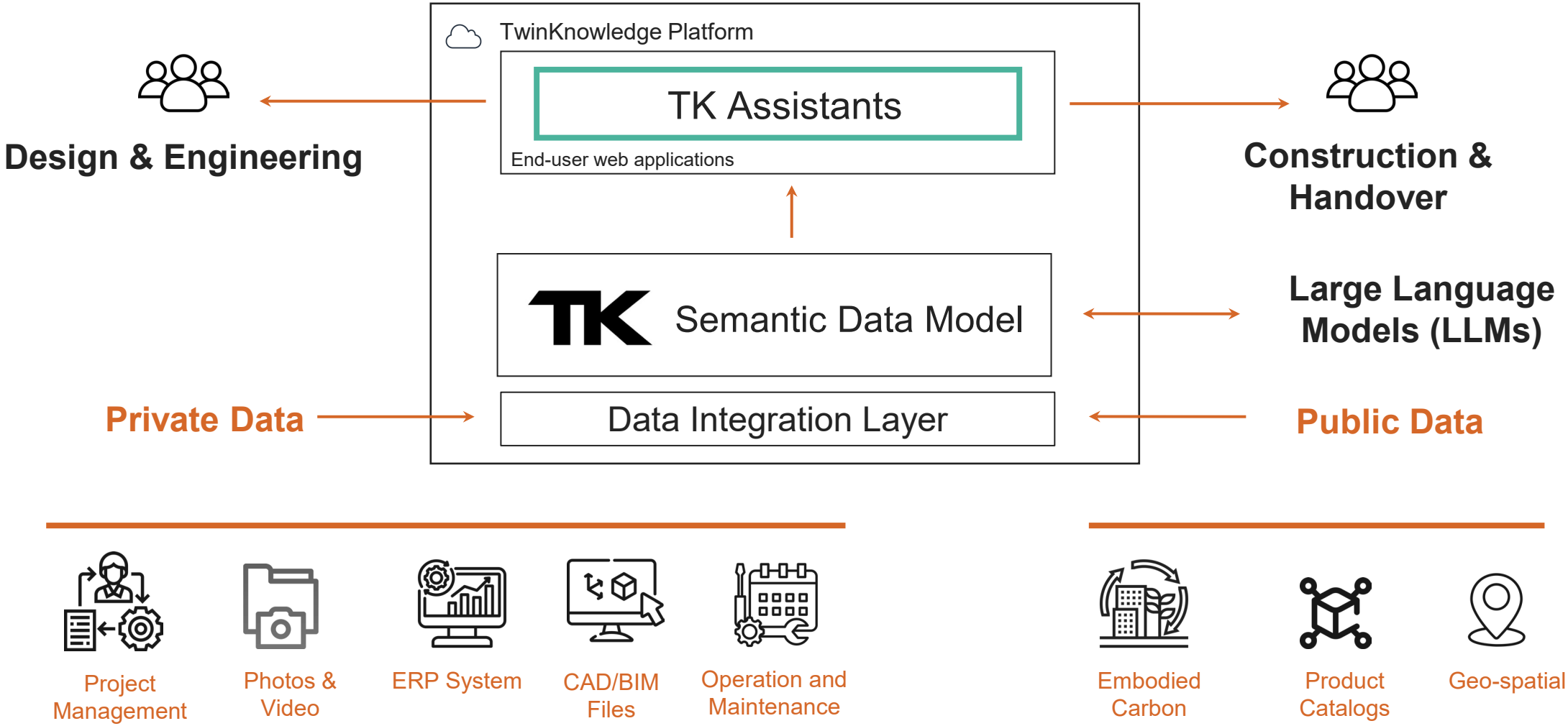
Evaluate the use of GenAI

Understand accuracy

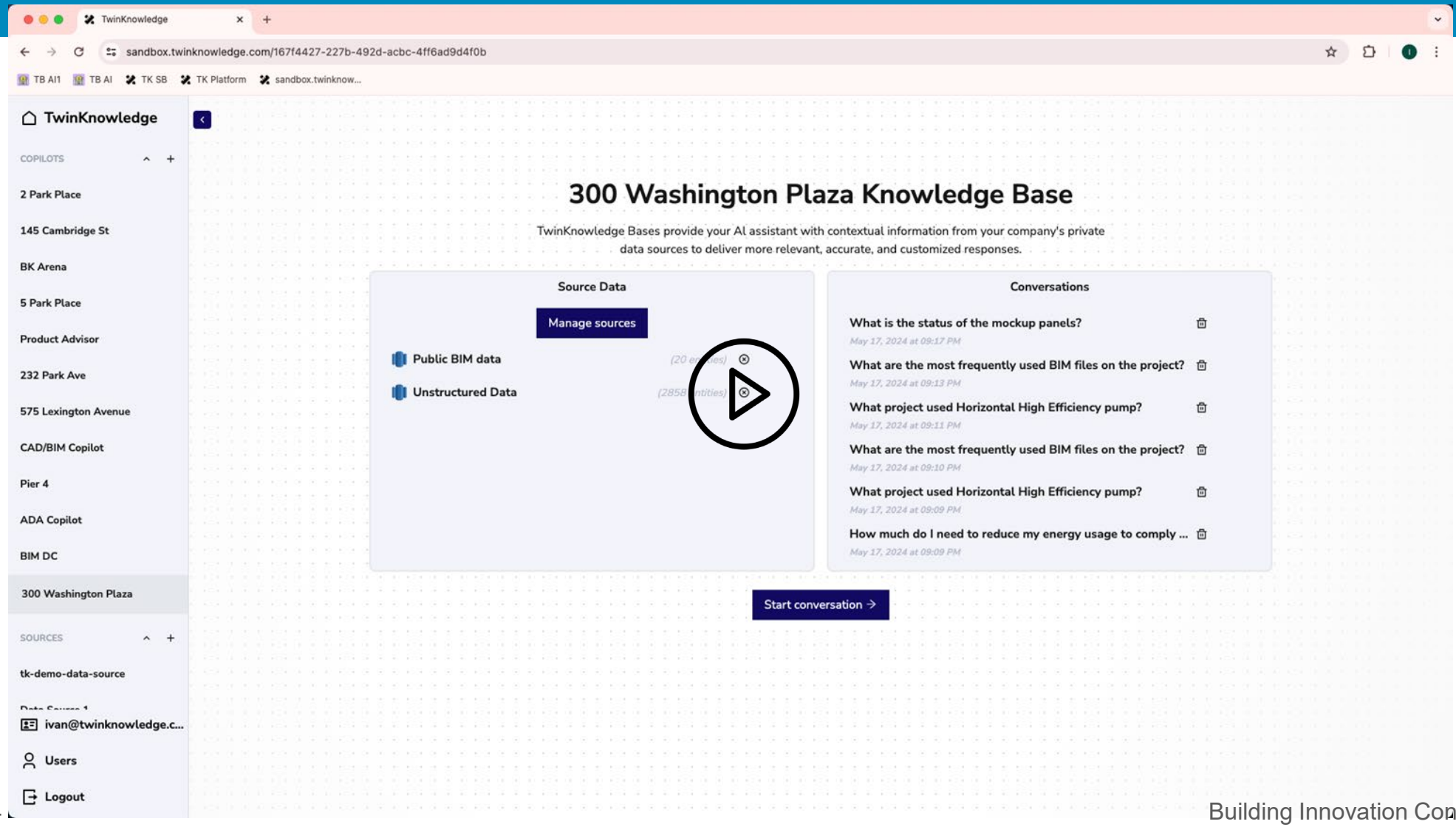
Intellectual property

Disruption of common workflows

GenAI @ TwinKnowledge: How it works



TwinKnowledge: How does it really work?



BIM Maturity Challenges

How Can Generative AI (GenAI) Accelerate Building Information Management (BIM) Maturity at Federal Agencies and Private Enterprises?

BIM Maturity Challenges

How Can Generative AI (GenAI) Accelerate Building Information Management (BIM) Maturity at Federal Agencies and Private Enterprises?

- Lack of Unified Standards
- Data Management Resourcing
- Barrier to Entry
- Fragmentation

BIM Maturity Challenges

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Lack of Unified Standards

"We do it differently and need different standards"

Data Management Resourcing

Resource challenge for large portfolio owners to manage datasets to enough of a critical mass to realize measurable and perceived benefits

Barrier to Entry

More data and technology takes more investment, small stakeholders less willing and less able

Fragmentation

Data Handover, Model Handover, Continuity challenge (especially at agencies)

BIM Maturity Challenges and Gen AI

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BIM Maturity Challenges and Gen AI

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Lack of Unified Standards

Data Mgmt Resourcing

Barrier to Entry

Fragmen-tation

Standards Analysis
Cross-Standard Auditing
Potential for faster NBIMS generation, dissemination, & digestion/adoption

BIM Maturity Challenges and Gen AI

How Can GenAI Accelerate BIM Maturity at Federal Agencies and Private Enterprises?

Lack of Unified Standards

Data Mgmt Resourcing

Barrier to Entry

Fragmen-tation

Source data maintenance
Source data seeding - accessing and reading existing documentation (visual or data)
Data enrichment
Rapid, highly accessible data search and report on portfolio data
Anomaly detection
Rapid data quality checking (compliance check automation)

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(same)

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Barrier to Entry

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Knowledge management
Knowledge gap analysis
Change Analysis

In Summary

Technical foundations and terminology related to Generative AI

Traditional AI/ML Tasks can be reformulated as Generative AI

Steps to planning a Generative AI project

Evaluation of the challenges and benefits of using generative AI for BIM

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