MCAA 24
Enrich
Engage
Enchant

Applying AI in Construction

Alice Leung, Jake Olsen,
Sean McGuire

MONDAY, MARCH 18, 2024
1:30PM – 3:00PM

Please let us know what you thought of this session

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Applying AI in Construction

Sean McGuire, MCAA
Alice Leung, Brick & Mortar
Jake Olsen, GTP Software

Applying AI in Construction

Sean McGuire, MCAA

Alice Leung, Brick & Mortar

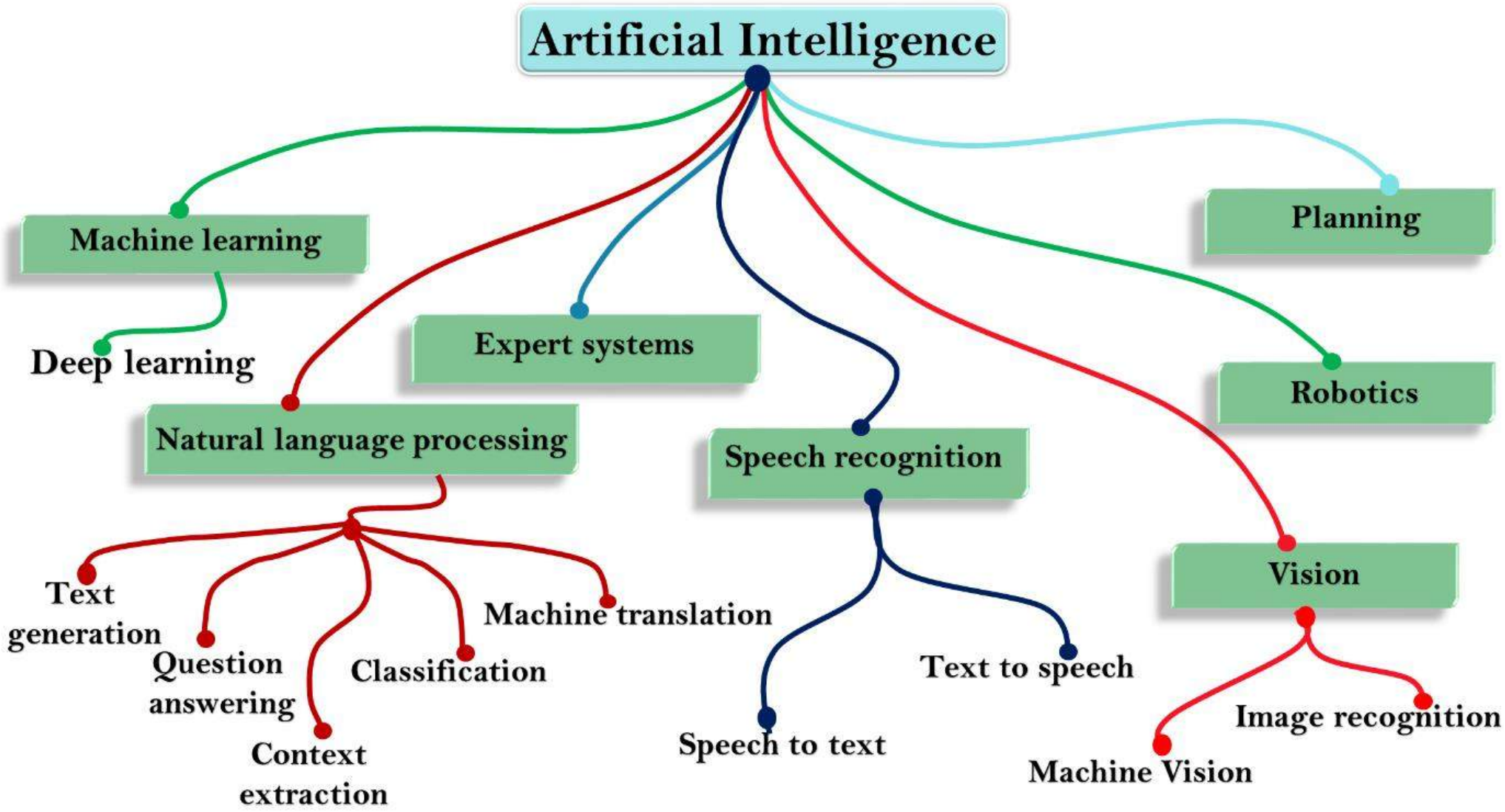
Jake Olsen, GTP Software

Artificial Intelligence may not put you out of business….

… but a contractor using AI just might.

Outline

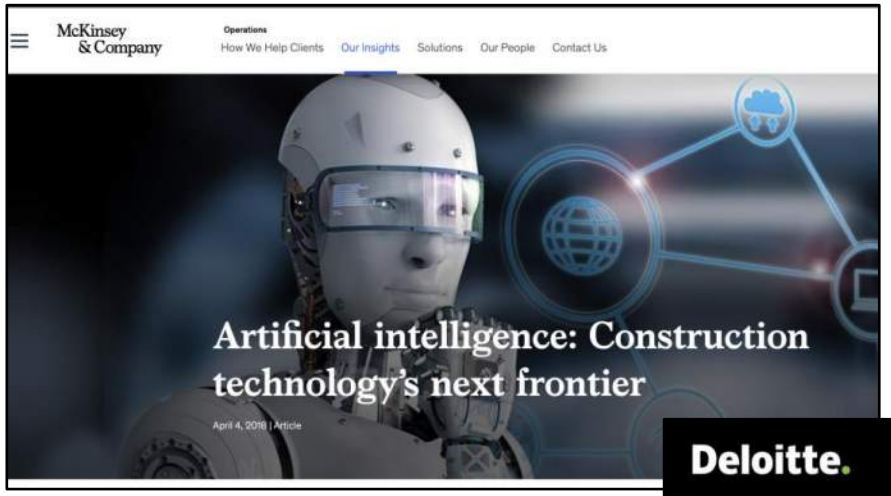
- Overview of AI
- Why this is important to you
- Off the shelf AI Tools you can use today as a mechanical contractor
- Construction specific stuff
- Cool/crazy stuff
- Bloopers
- The future

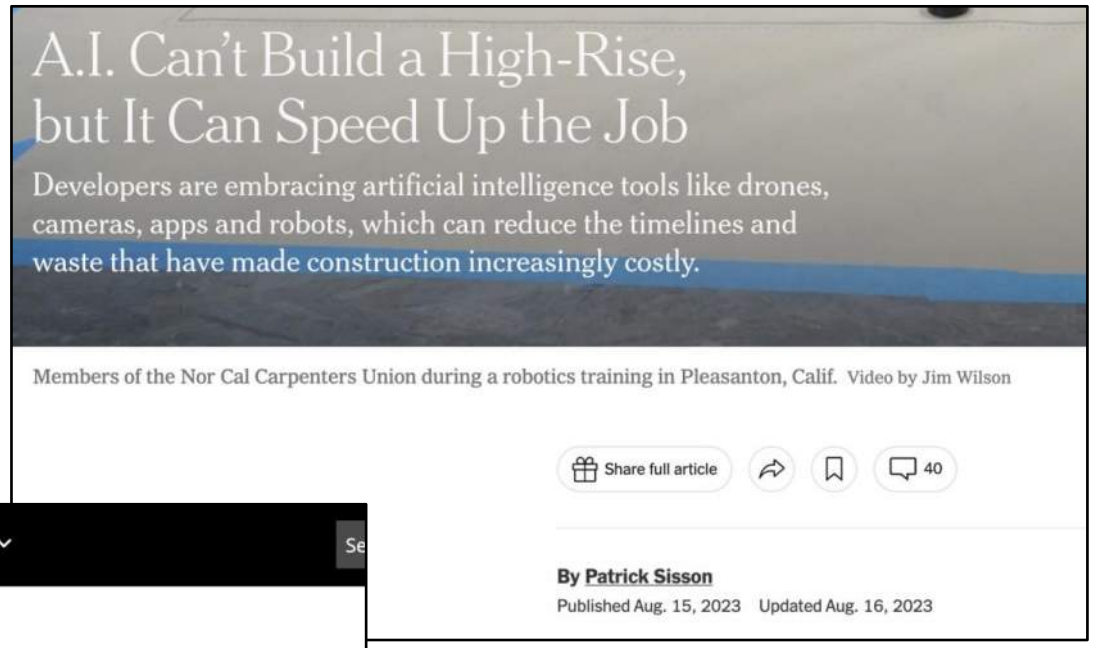


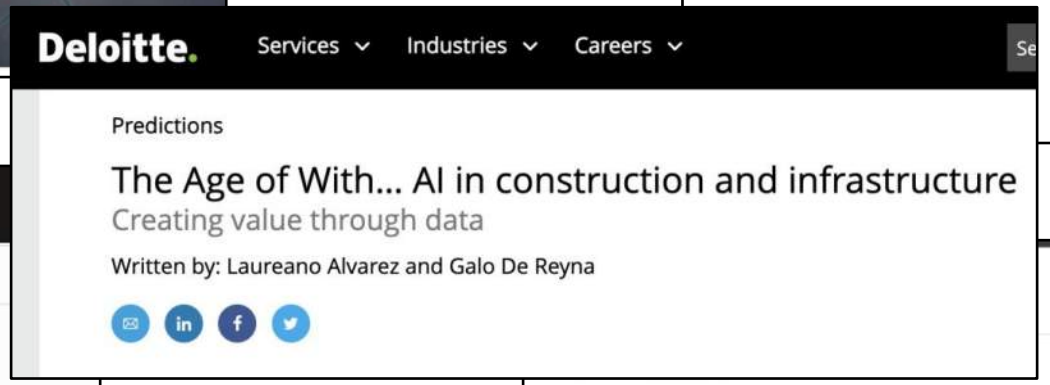
https://www.javatpoint.com/subsets-of-ai

Why this is important

New York Times

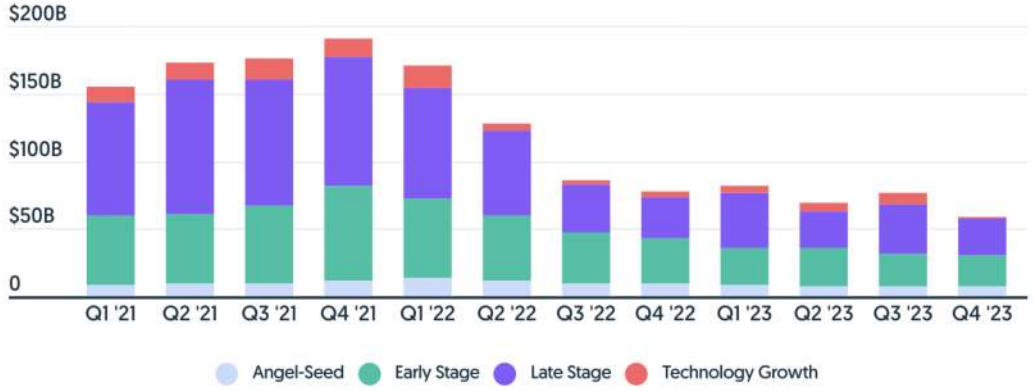






General Venture Capital Funding Trends: Slow 12 Months

Global Venture Dollar Volume Through Q4 2023



	QoQ Change [%]	YoY Change [%]
Overall Dollar Volume	-24%	-25%

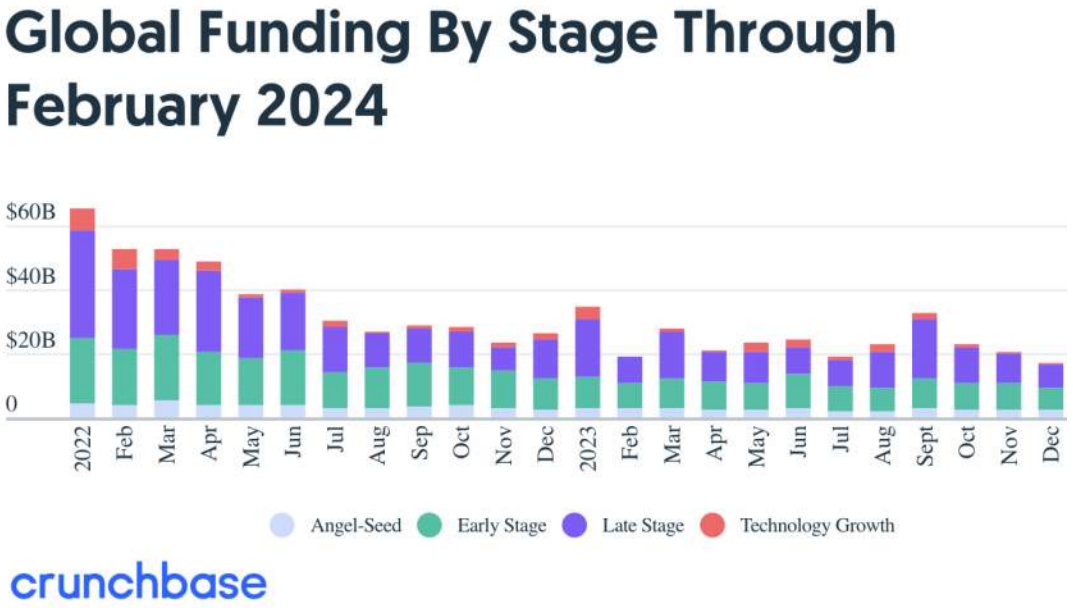
crunchbase

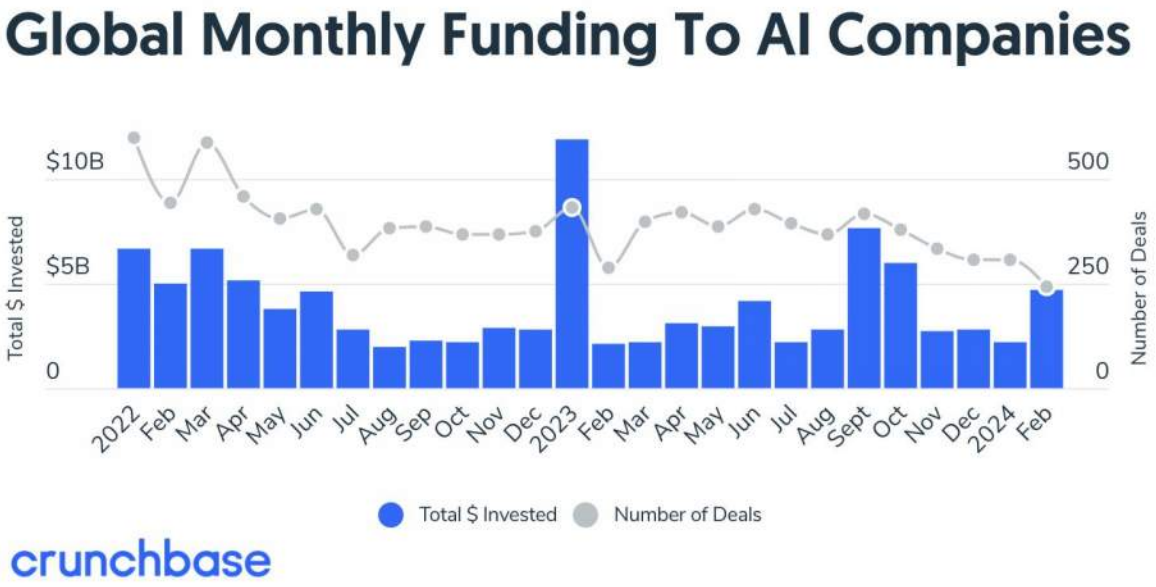
Global Early-Stage Investment Through Q4 2023

crunchbase

https://news.crunchbase.com/venture/global-funding-data-analysis-ai-eoy-2023/

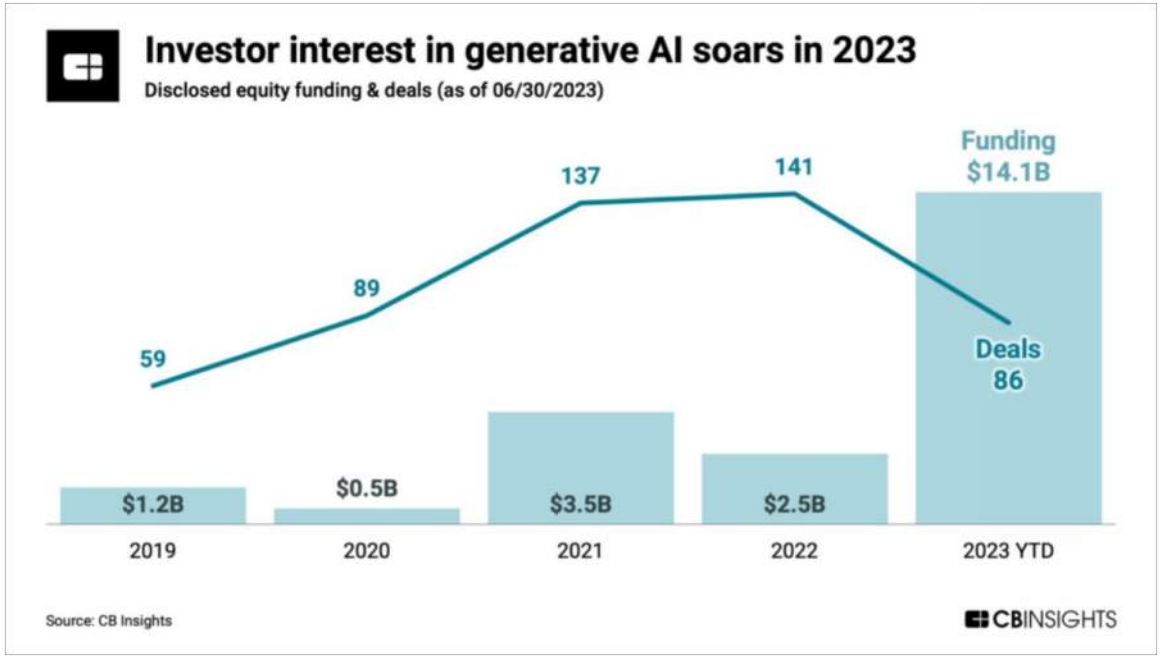
AI Funding is a large portion of funding in Feb 2024, more than 20%

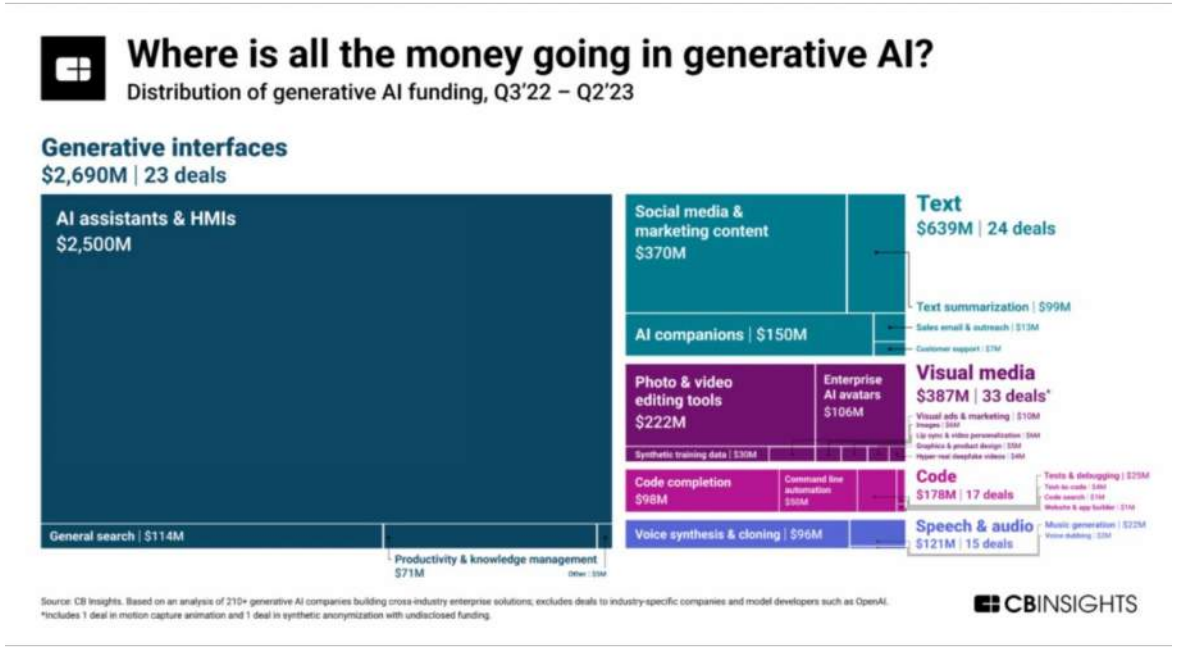




https://news.crunchbase.com/venture/monthly-global-funding-recap-february-2024/

Funding for Generative AI Companies



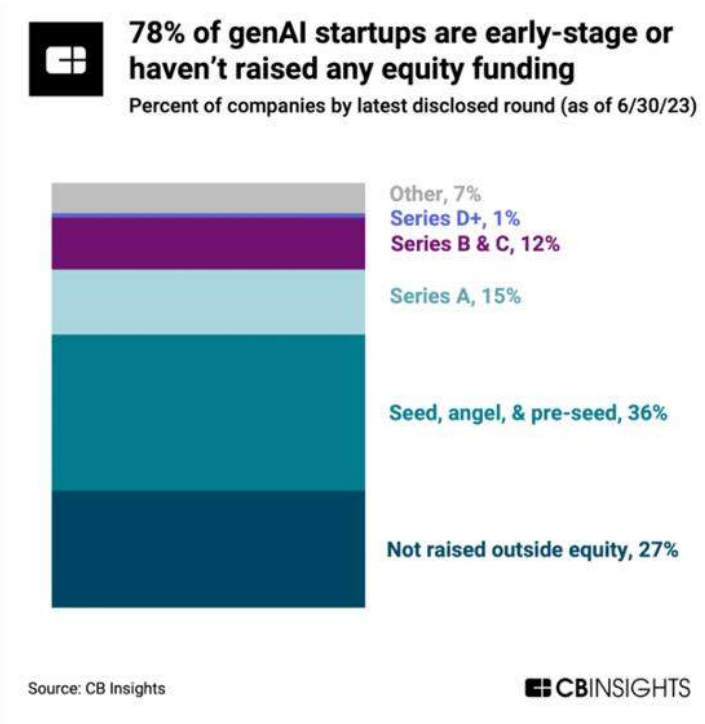


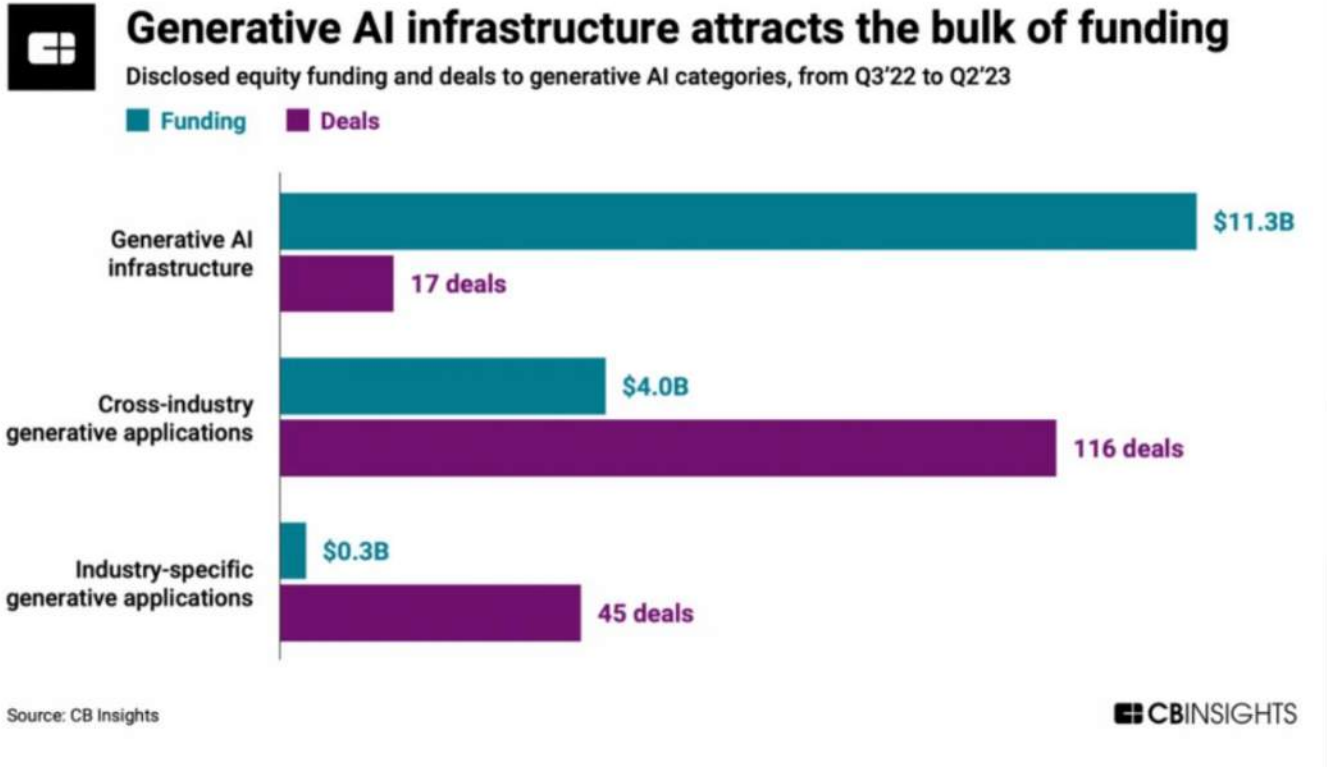
https://www.cbinsights.com/research/generative-ai-funding-top-startups-investors-2023/

LLM

LARGE LANGUAGE MODEL

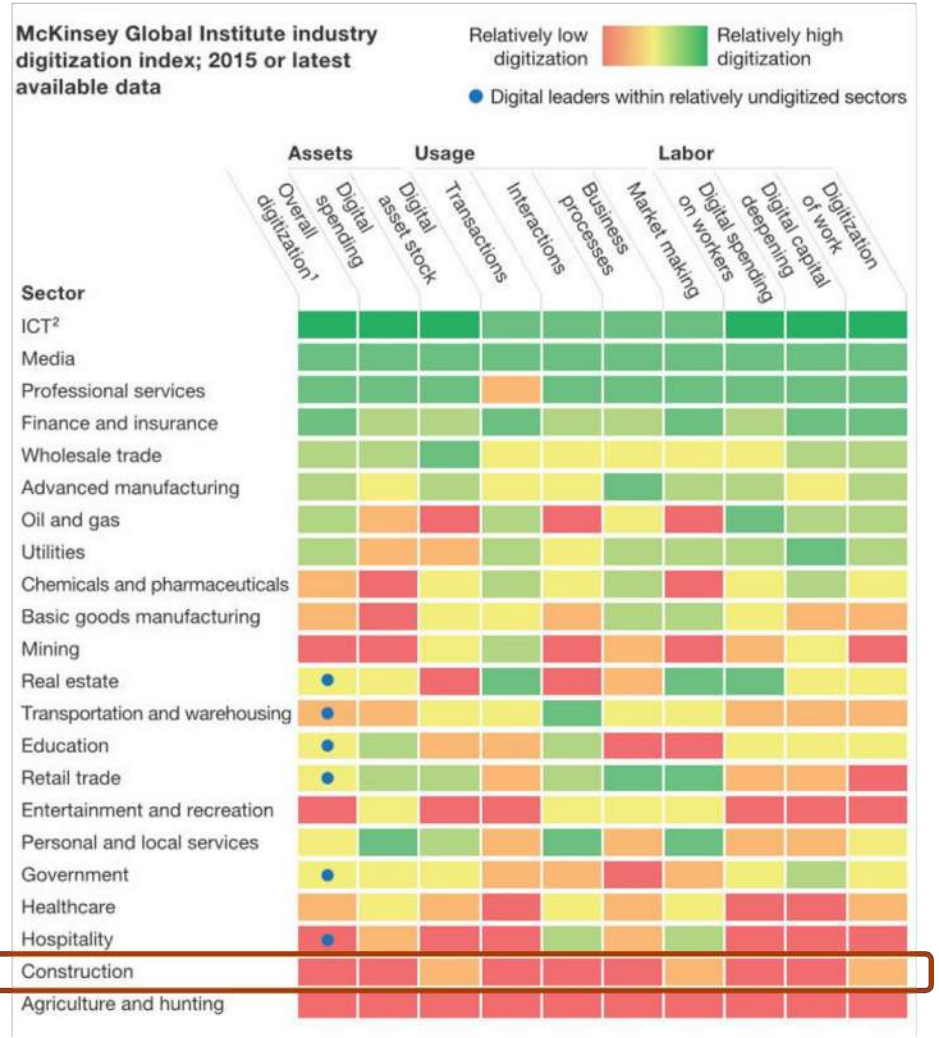
Funding for Generative AI Companies

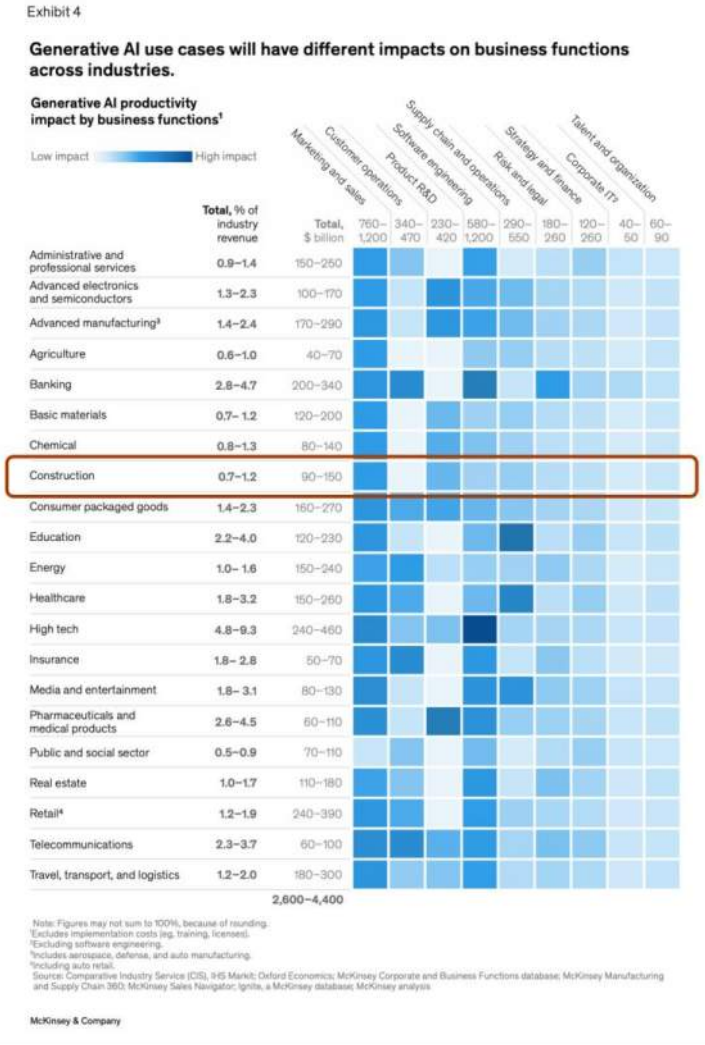




https://www.cbinsights.com/research/generative-ai-funding-top-startups-investors-2023/

Another McKinsey Chart: Generative AI





https://www.mckinsey.com/~/media/mckinsey/industries/technology%20media%20and%20telecommunications/high%20tech/our%20insights/digital%20america%20a%20tale%20of%20the%20haves%20and%20have%20mores/digital%20america%20full%20report%20december%202015.pdf

https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

Sort based on highest impact to least impact

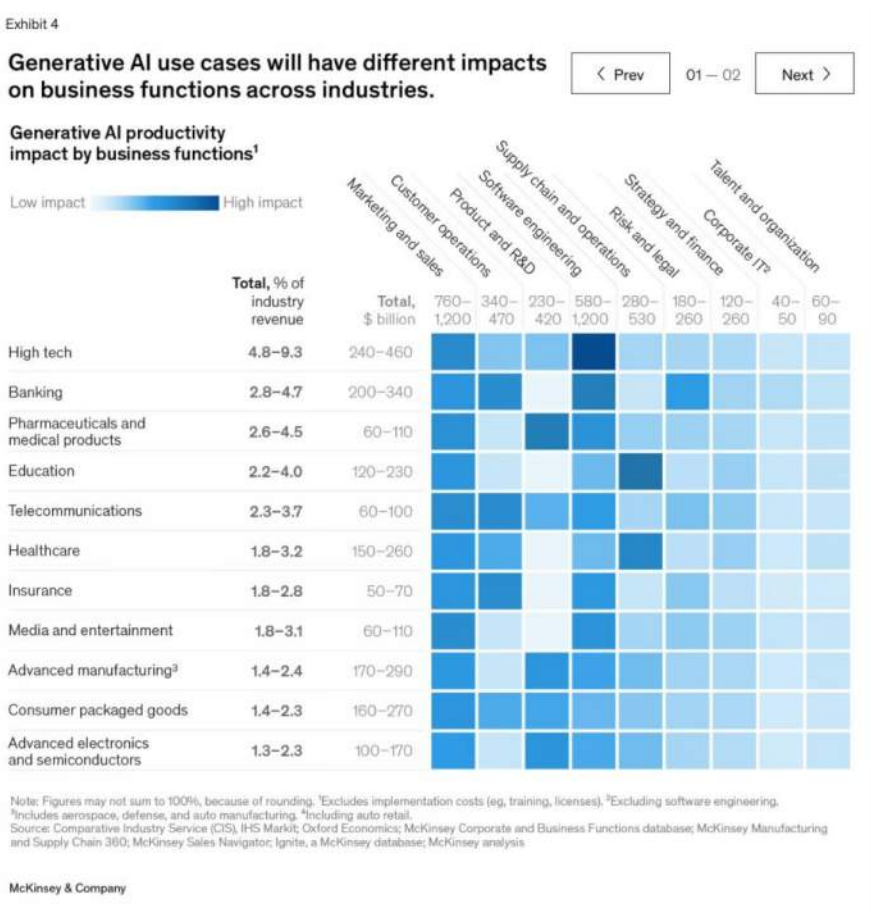


Exhibit 4

Generative AI use cases will have different impacts on business functions across industries.

< Prev 01 — 02 Next >

Generative AI productivity impact by business functions[1]

Low impact — High impact

	Total, % of industry revenue	Total, $ billion	Marketing and sales	Customer operations	Product and R&D	Software engineering	Supply chain and operations	Risk and legal	Strategy and finance	Corporate IT[2]	Talent and organization
			760–1,200	340–470	230–420	580–1,200	280–530	180–260	120–260	40–50	60–90
High tech	4.8–9.3	240–460									
Banking	2.8–4.7	200–340									
Pharmaceuticals and medical products	2.6–4.5	60–110									
Education	2.2–4.0	120–230									
Telecommunications	2.3–3.7	60–100									
Healthcare	1.8–3.2	150–260									
Insurance	1.8–2.8	50–70									
Media and entertainment	1.8–3.1	60–110									
Advanced manufacturing[3]	1.4–2.4	170–290									
Consumer packaged goods	1.4–2.3	160–270									
Advanced electronics and semiconductors	1.3–2.3	100–170									

Note: Figures may not sum to 100%, because of rounding. [1]Excludes implementation costs (eg, training, licenses). [2]Excluding software engineering. [3]Includes aerospace, defense, and auto manufacturing. [4]Including auto retail.
Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

McKinsey & Company

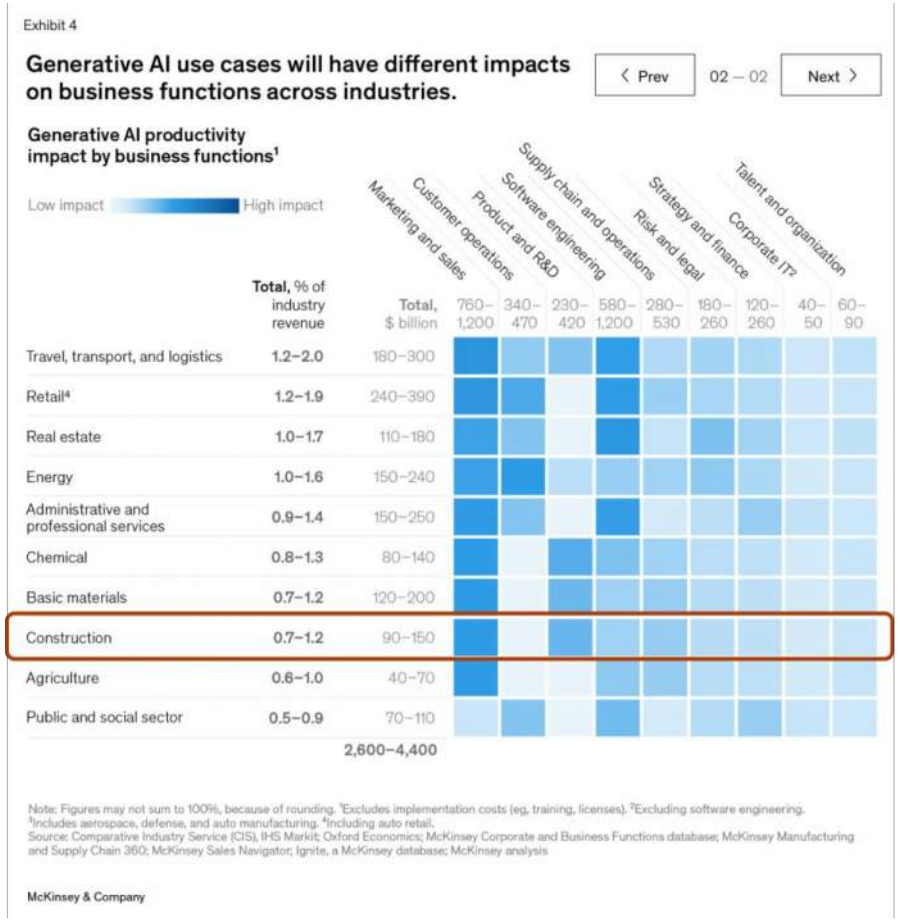


Exhibit 4

Generative AI use cases will have different impacts on business functions across industries.

< Prev 02 — 02 Next >

Generative AI productivity impact by business functions[1]

Low impact — High impact

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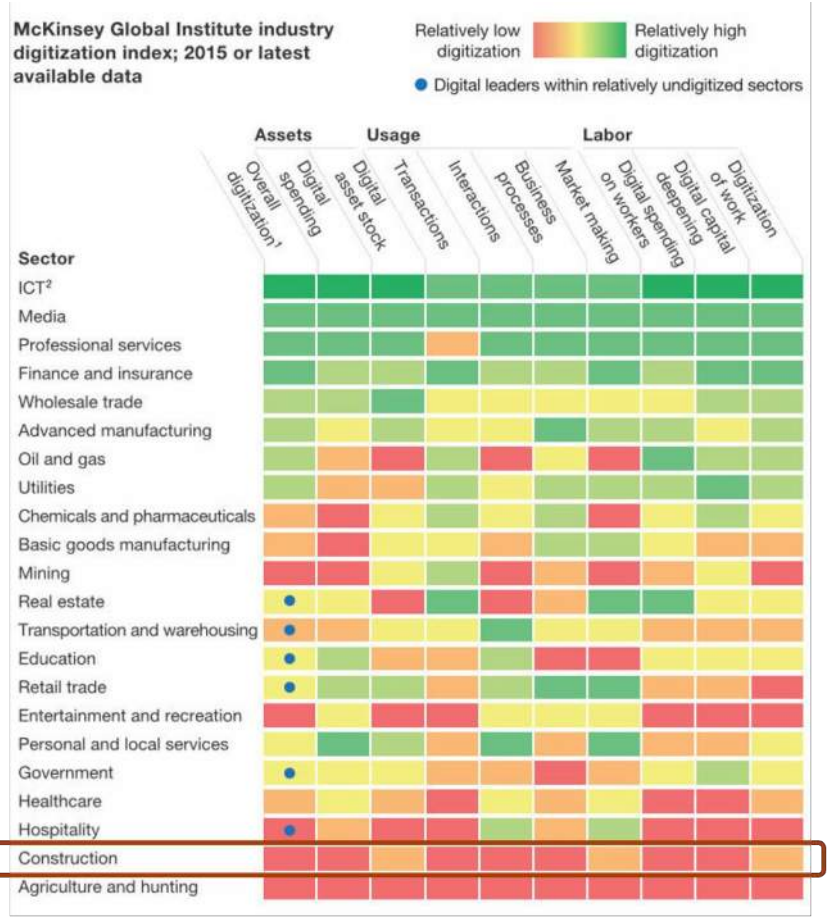
			760–1,200	340–470	230–420	580–1,200	280–530	180–260	120–260	40–50	60–90
Travel, transport, and logistics	1.2–2.0	180–300									
Retail[4]	1.2–1.9	240–390									
Real estate	1.0–1.7	110–180									
Energy	1.0–1.6	150–240									
Administrative and professional services	0.9–1.4	150–250									
Chemical	0.8–1.3	80–140									
Basic materials	0.7–1.2	120–200									
Construction	0.7–1.2	90–150									
Agriculture	0.6–1.0	40–70									
Public and social sector	0.5–0.9	70–110									
		2,600–4,400									

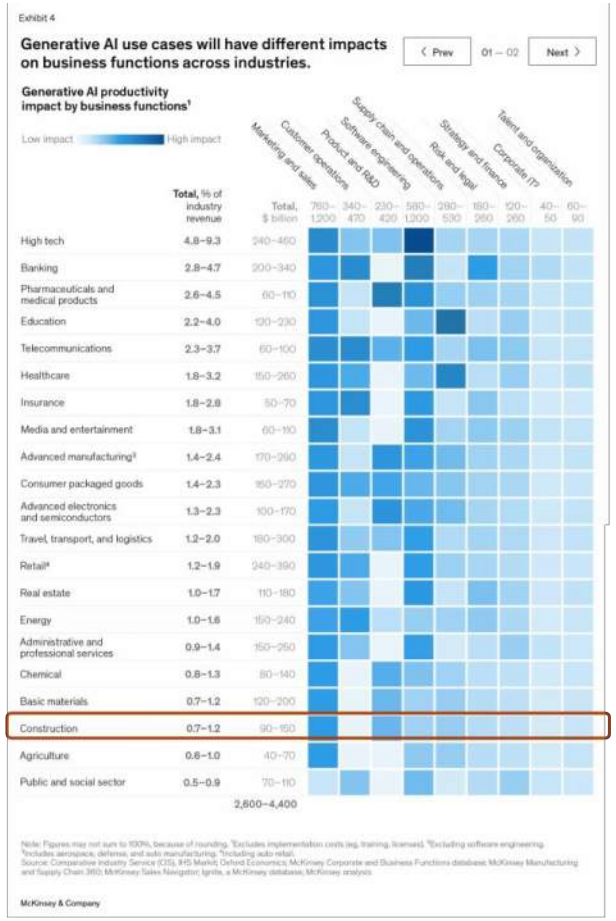
Note: Figures may not sum to 100%, because of rounding. [1]Excludes implementation costs (eg, training, licenses). [2]Excluding software engineering. [3]Includes aerospace, defense, and auto manufacturing. [4]Including auto retail.
Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

McKinsey & Company

https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

Digitization vs Generative AI





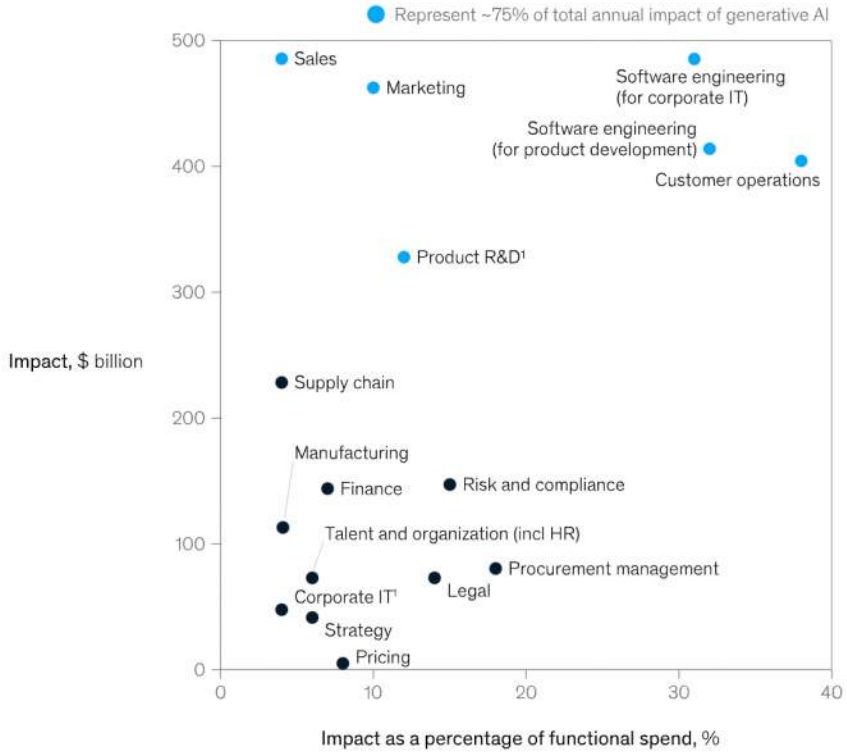
https://www.mckinsey.com/~/media/mckinsey/industries/technology%20media%20and%20telecommunications/high%20tech/our%20insights/digital%20america%20a%20tale%20of%20the%20haves%20and%20have%20mores/digital%20america%20full%20report%20december%202015.pdf

https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

GenAI mostly impacting sales and marketing

Exhibit 3

Using generative AI in just a few functions could drive most of the technology's impact across potential corporate use cases.



Note: Impact is averaged.
¹Excluding software engineering.
Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

McKinsey & Company

https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

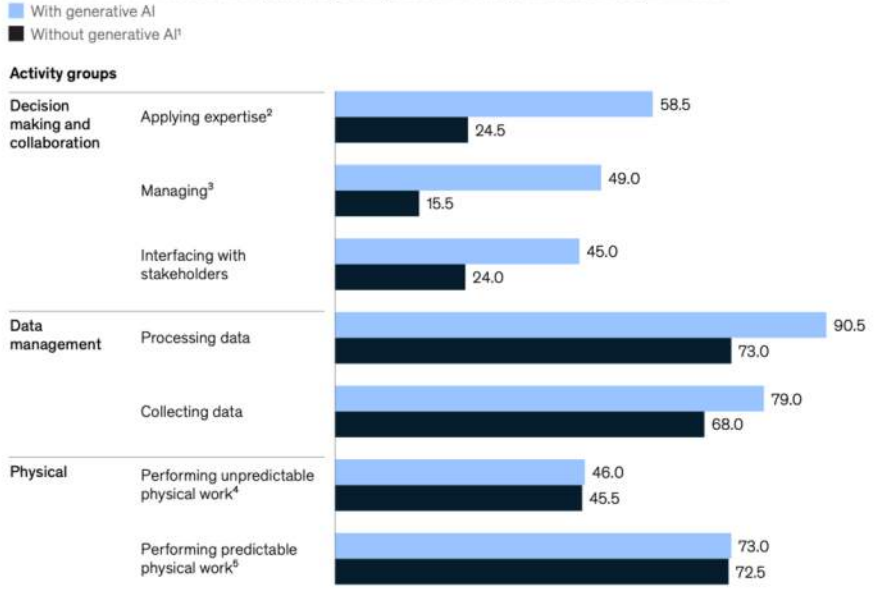
https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

GenAI not very applicable to physical work

Exhibit 10

Generative AI could have the biggest impact on collaboration and the application of expertise, activities that previously had a lower potential for automation.

Overall technical automation potential, comparison in midpoint scenarios, % in 2023



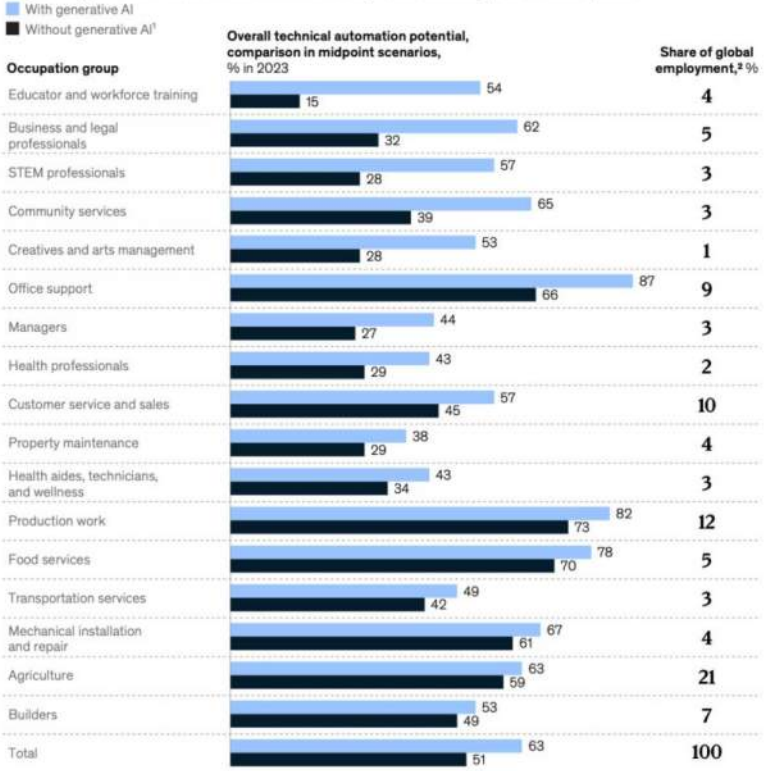
Note: Figures may not sum, because of rounding.
[1]Previous assessment of work automation before the rise of generative AI.
[2]Applying expertise to decision making, planning, and creative tasks.
[3]Managing and developing people.
[4]Performing physical activities and operating machinery in unpredictable environments.
[5]Performing physical activities and operating machinery in predictable environments.
Source: McKinsey Global Institute analysis

McKinsey & Company

Exhibit 11

Advances in technical capabilities could have the most impact on activities performed by educators, professionals, and creatives.

Impact of generative AI on technical automation potential in midpoint scenario, 2023

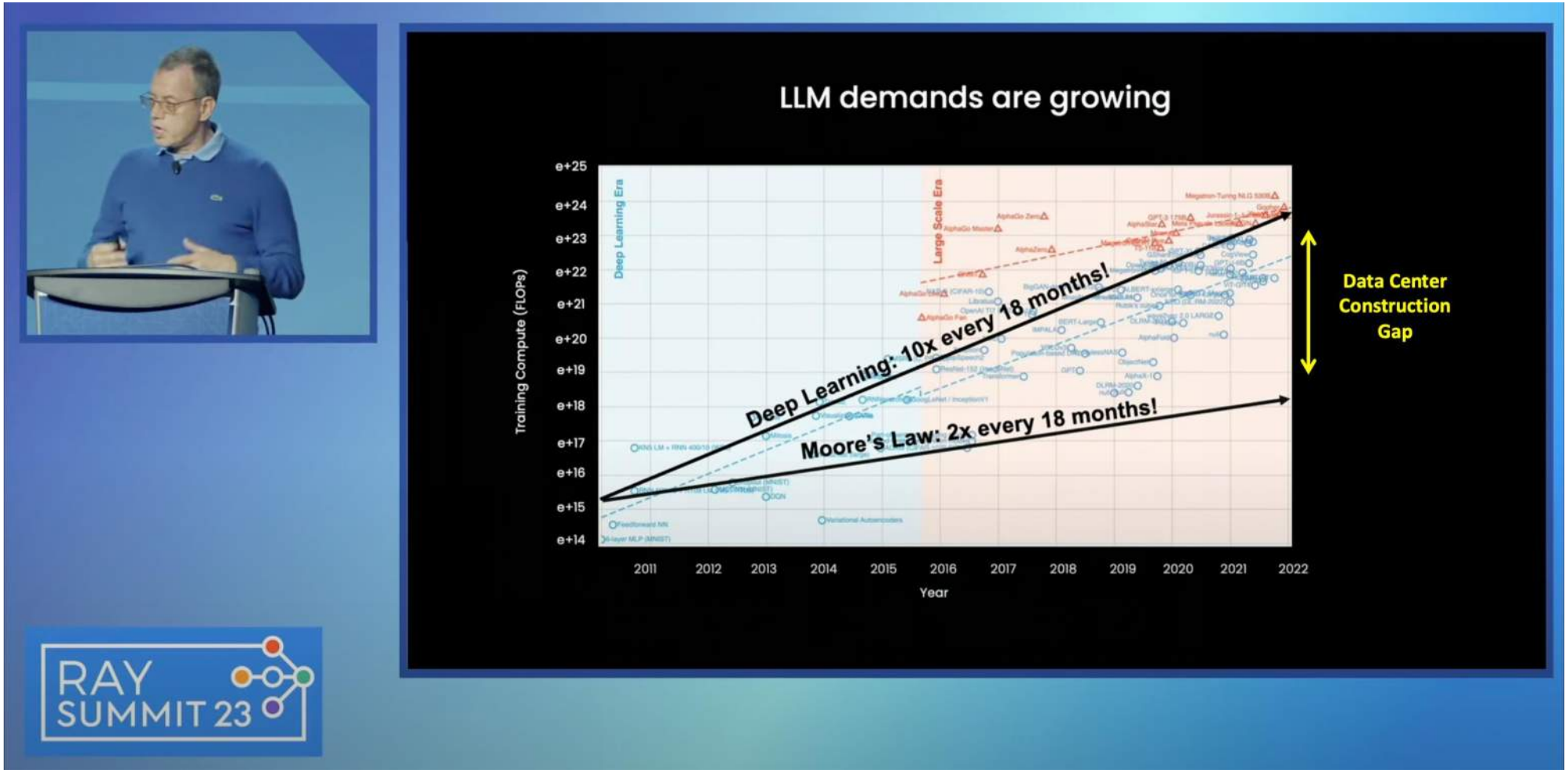


Note: Figures may not sum, because of rounding.
[1]Previous assessment of work automation before the rise of generative AI.
[2]Includes data from 47 countries, representing about 80% of employment across the world.
Source: McKinsey Global Institute analysis

McKinsey & Company

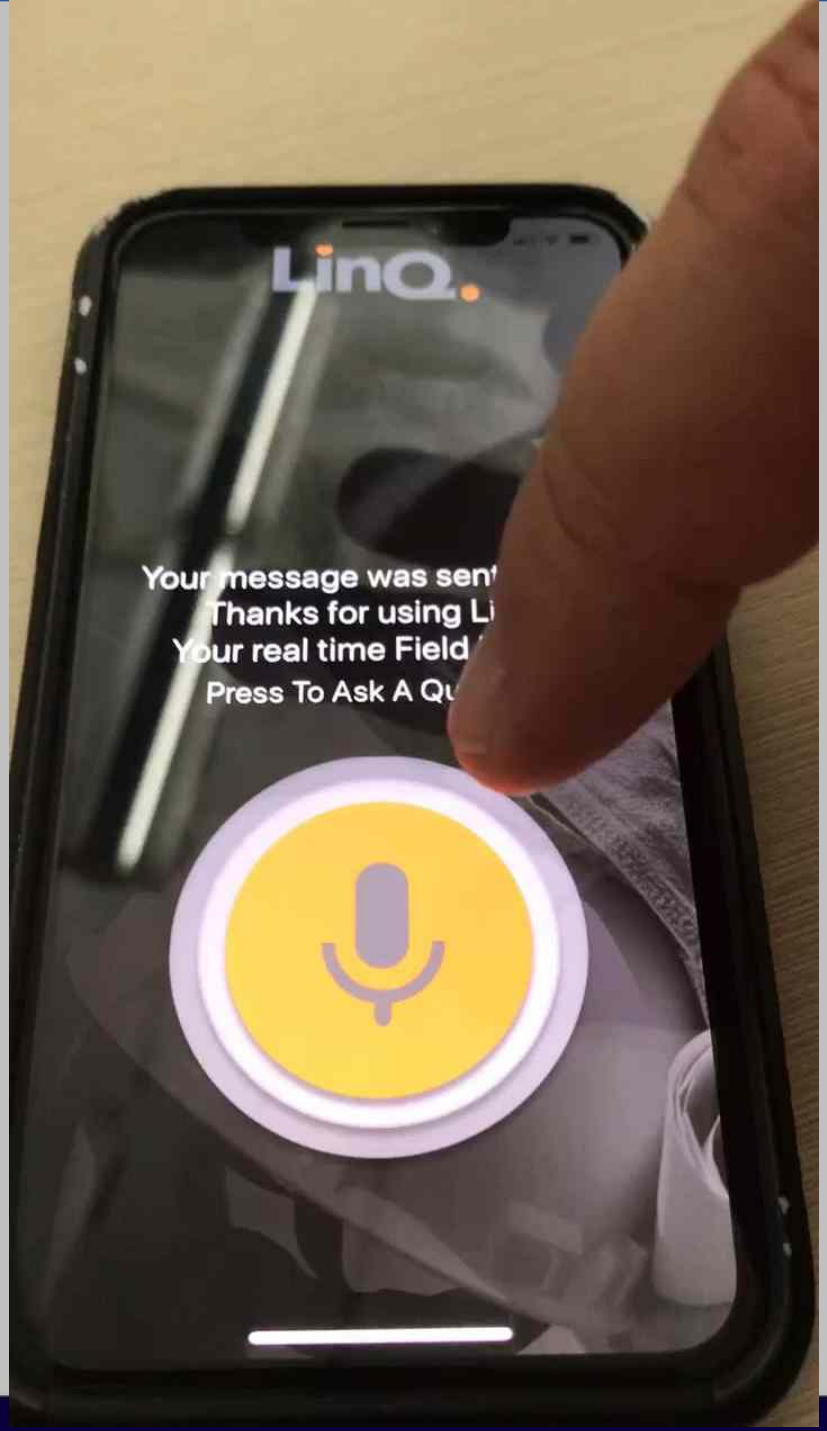
https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#industry-impacts

How GenAI is impacting construction industry directly

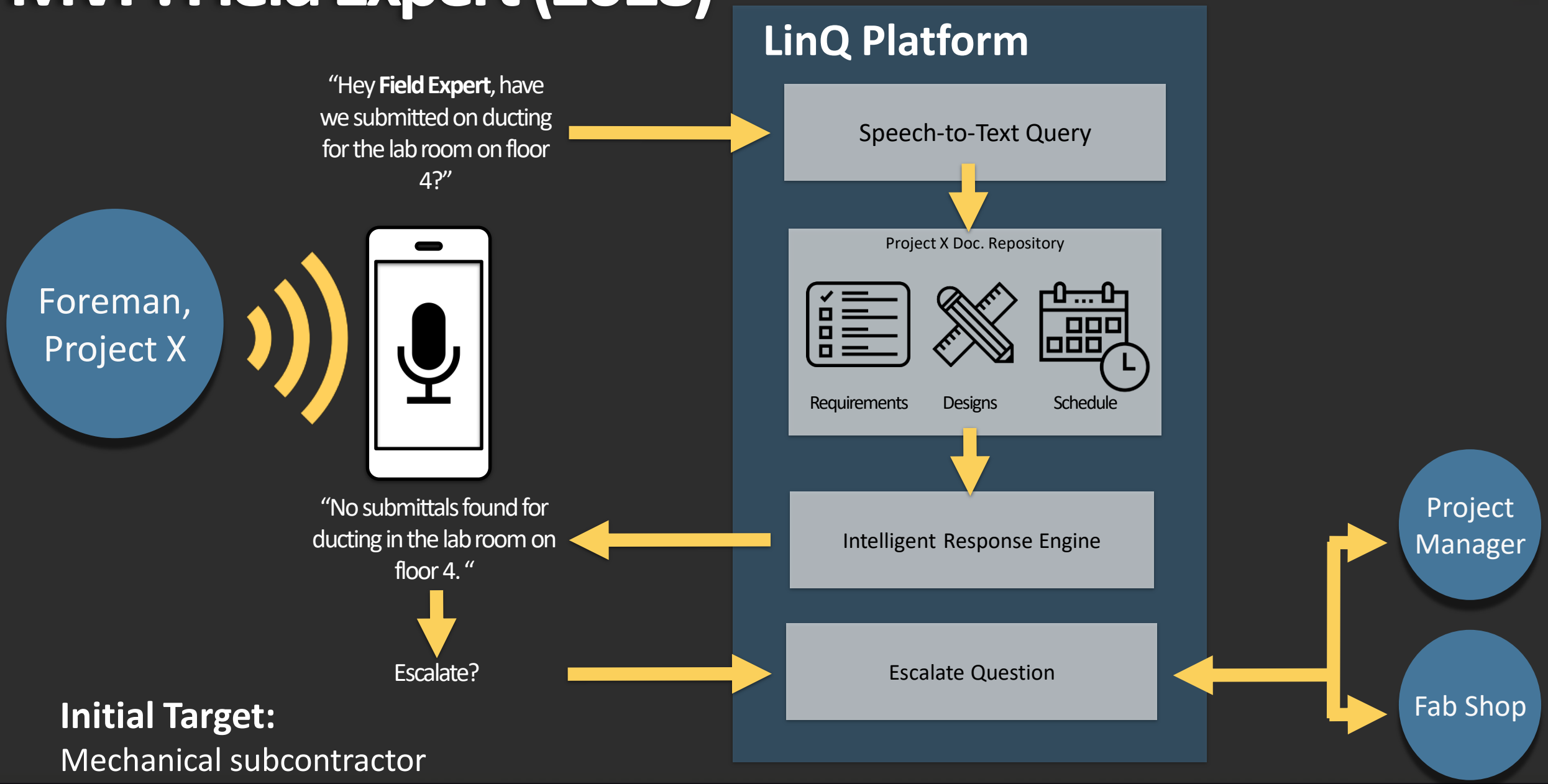


https://www.youtube.com/watch?v=r-NYSeAXCko&t=4935s

Off the shelf AI you can use today

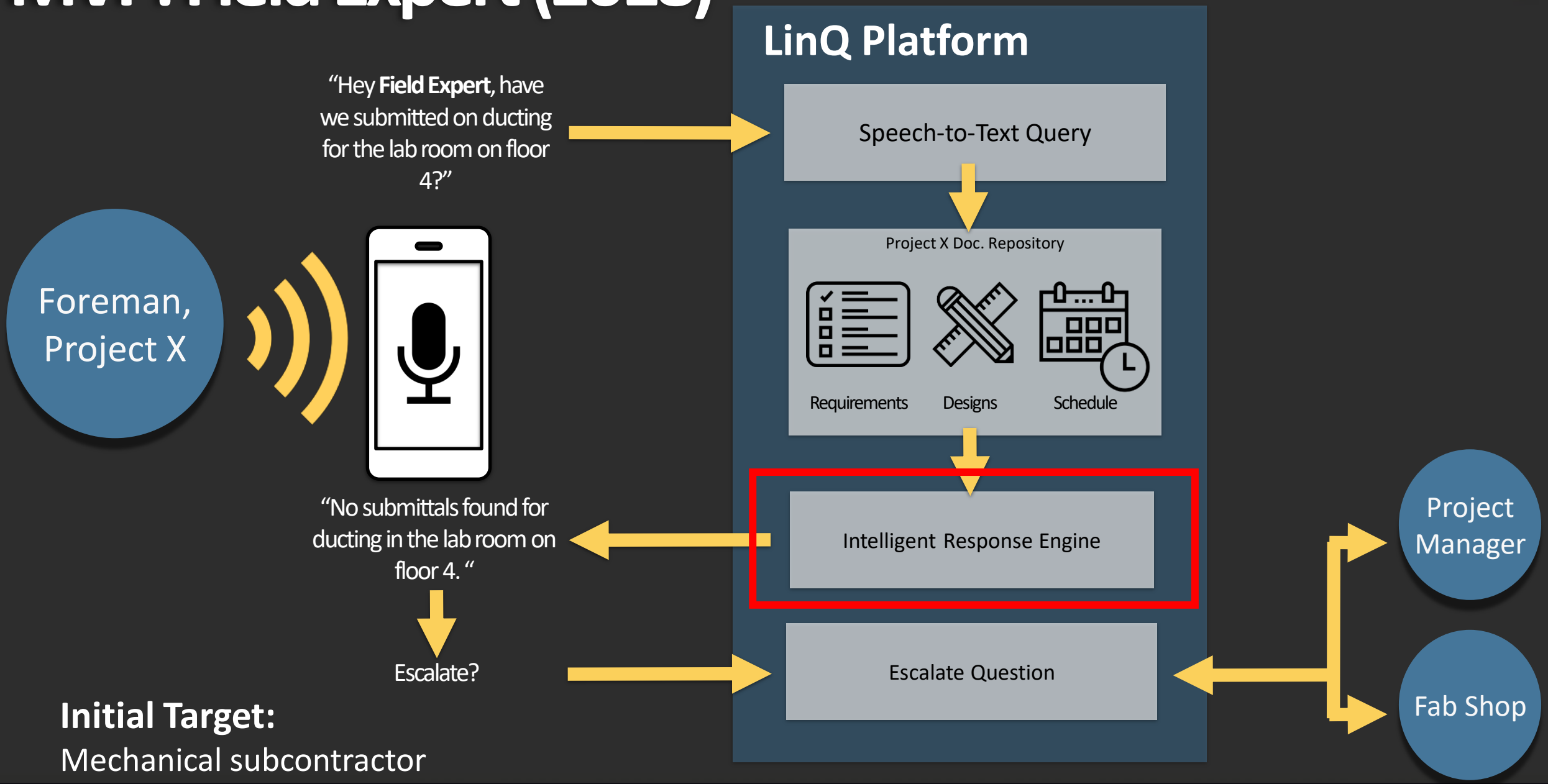

LinQ.
Your message was sent
Thanks for using Li
Your real time Field
Press To Ask A Qu

MVP: Field Expert (2018)



Initial Target:
Mechanical subcontractor

MVP: Field Expert (2018)

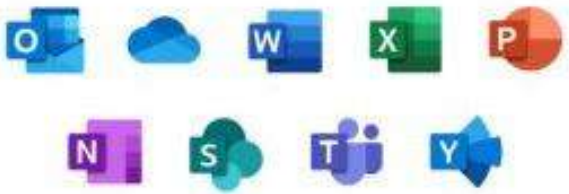


Initial Target:
Mechanical subcontractor

Copilot

ChatGPT

Microsoft 365 Apps



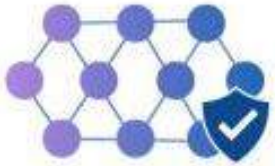
Microsoft 365 Copilot

User prompt

Grounding

Large Language Model

Microsoft Graph



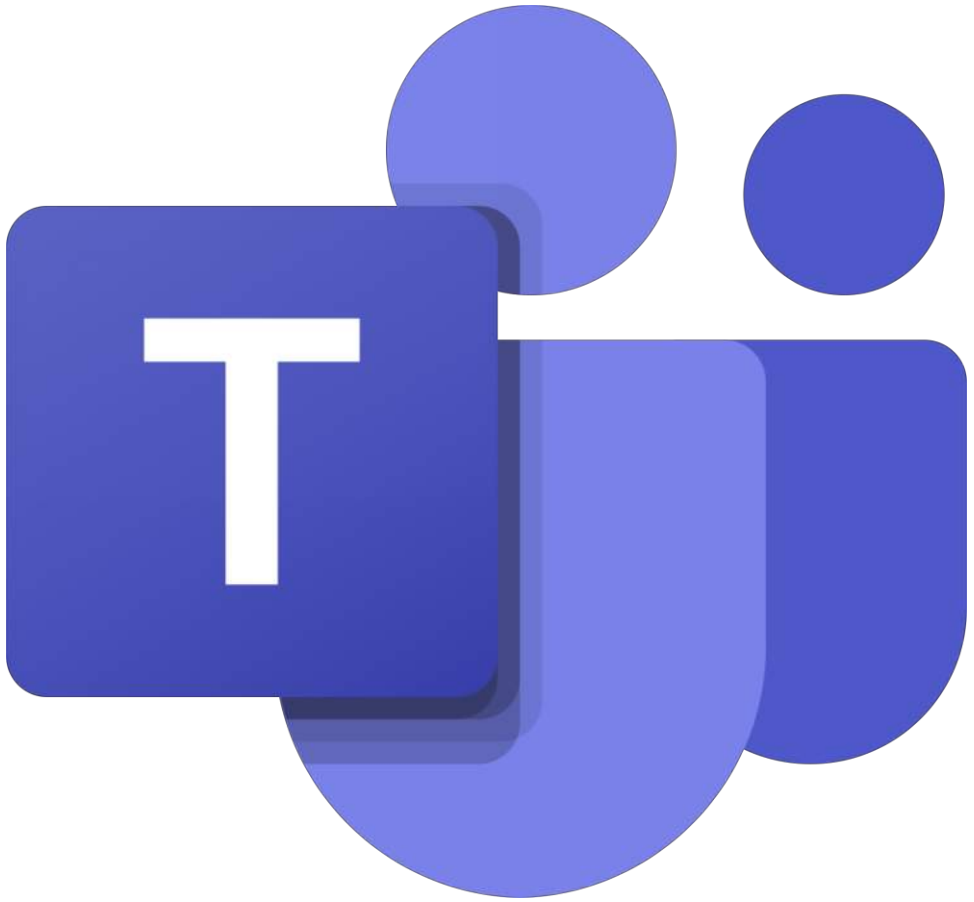
Your data:
emails, files, meetings, chats, calendars, and contacts

Pre-processing

Automatically create and edit slides inside a Powerpoint Presentation

Top uses of Microsoft Copilot for Mechanical Contractors

- Automated review and suggestions for better document quality
- AI-powered assistance for faster and easier document creation
- AI-assisted summarization for easy knowledge sharing
- Customizable GPTs for improved contract review and project management
- GTP Software knowledge base for internal use case



Summarize conversations, search across multiple platforms, find meeting conflicts and recommend changes

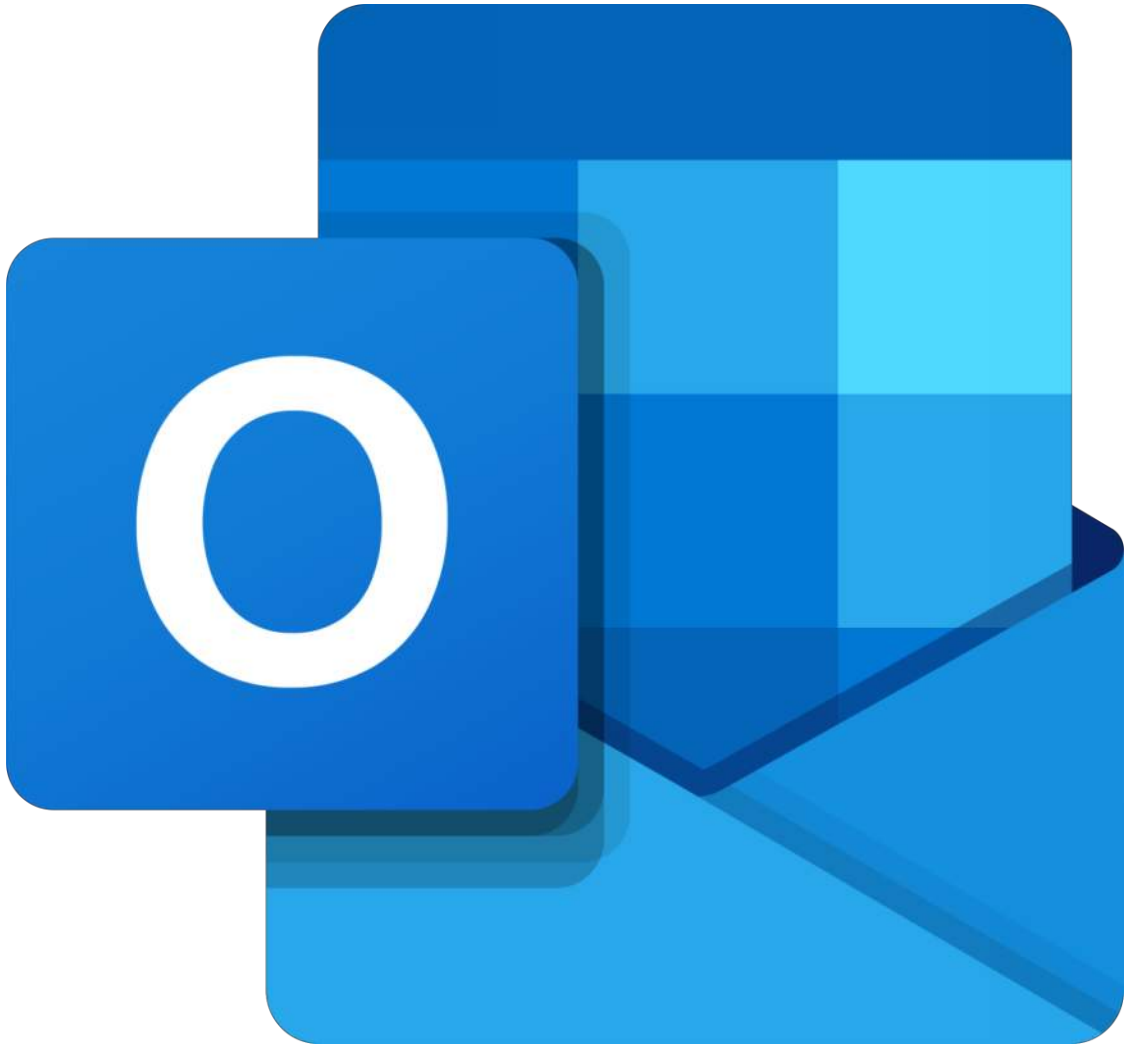
Copilot
I was traveling most of the da...

February 20, 2024 at 06:17 PM

I was traveling most of the day - provide me a summary of the most viewed and interacted with messages, and also highlight anything I need to be aware of

summarize any schedule conflicts I have in the next 2 weeks and make suggestions on how to resolve these

Based on the information I have, you have a total of over 50 meetings scheduled for the next 2 weeks. Here is a detailed overview of the first 10 meetings:



Summarize long email threads and suggest reply automatically

Transforming Email Inboxes with AI

AI-powered solutions that magically transform email inboxes

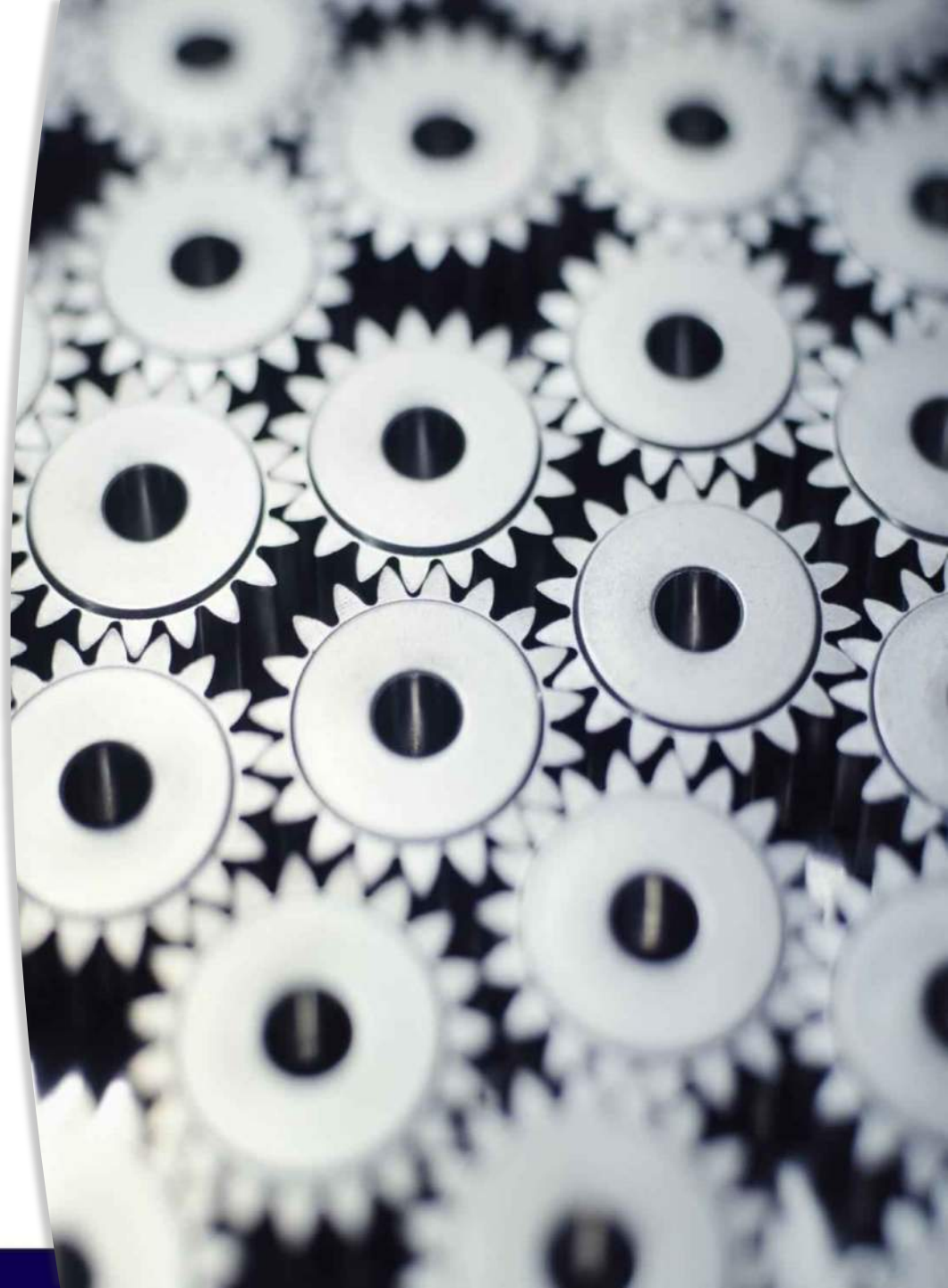
Powerful data analysis, insights and automatic creation of pivot tables and visuals

Draft documents – example
SOP for quality inspection

ChatGPT

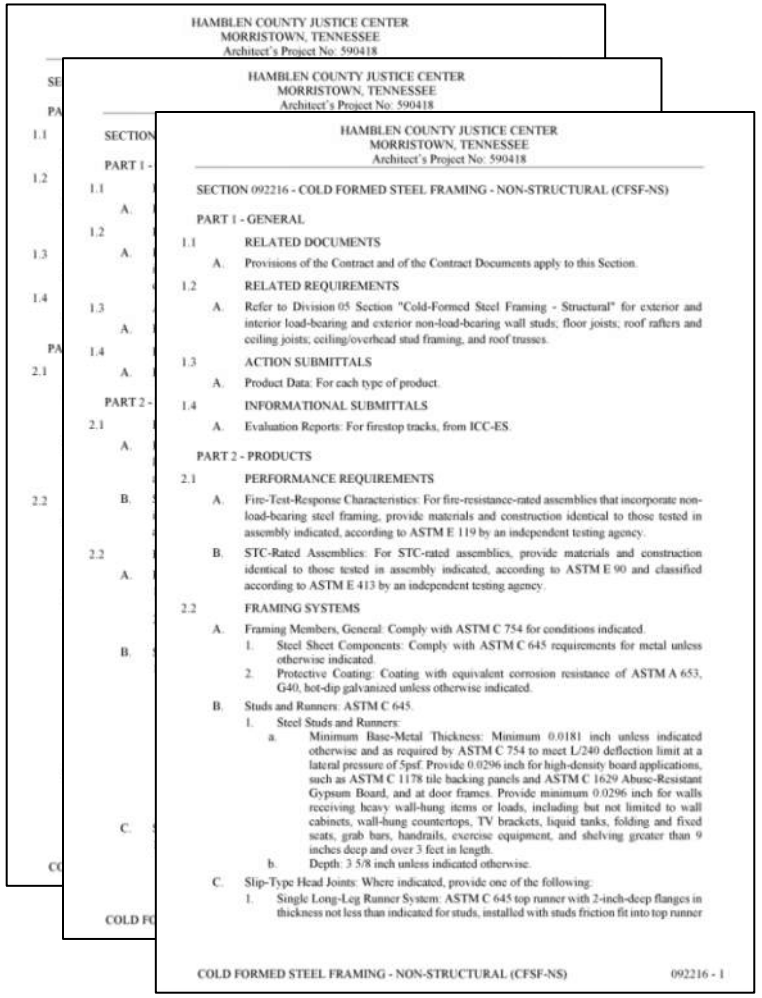
Top Uses of ChatGPT for Mechanical Contractors

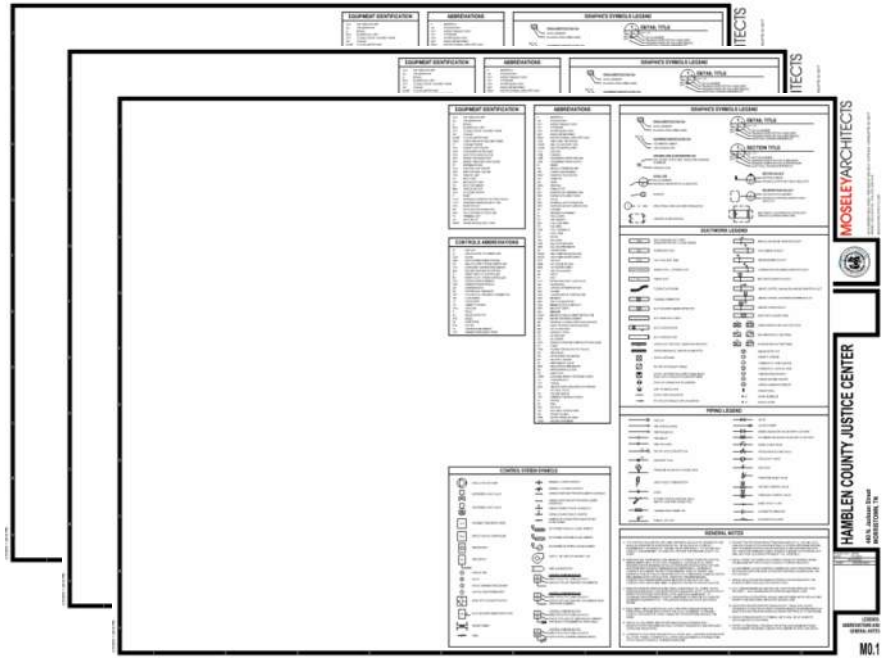
- Creation
  - Create a job offer for a project manager
  - Formal communication, announcements
- Editing
  - “Edit this for grammar and spelling”
  - “Make this sound more professional”
- Summary
  - Summarize this document
  - Condense this to 50 words or less
  - Read a whole bunch of crap and be an expert on it



Virtual Project Engineer

ChatGPT


HAMBLEN COUNTY JUSTICE CENTER
MORRISTOWN, TENNESSEE
Architect's Project No: 590418
SECTION 092216 - COLD FORMED STEEL FRAMING - NON-STRUCTURAL (CFSF-NS)
PART 1 - GENERAL
1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.
1.2 RELATED REQUIREMENTS
A. Refer to Division 05 Section "Cold-Formed Steel Framing - Structural" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; ceiling/overhead stud framing, and roof trusses.
1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
1.4 INFORMATIONAL SUBMITTALS
A. Evaluation Reports: For firestop tracks, from ICC-ES.
PART 2 - PRODUCTS
2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
2.2 FRAMING SYSTEMS
A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653, G40, hot-dip galvanized unless otherwise indicated.
B. Studs and Runners: ASTM C 645.
1. Steel Studs and Runners:
a. Minimum Base-Metal Thickness: Minimum 0.0181 inch unless indicated otherwise and as required by ASTM C 754 to meet L/240 deflection limit at a lateral pressure of 5psf. Provide 0.0296 inch for high-density board applications, such as ASTM C 1178 tile backing panels and ASTM C 1629 Abuse-Resistant Gypsum Board, and at door frames. Provide minimum 0.0296 inch for walls receiving heavy wall-hung items or loads, including but not limited to wall cabinets, wall-hung countertops, TV brackets, liquid tanks, folding and fixed seats, grab bars, handrails, exercise equipment, and shelving greater than 9 inches deep and over 3 feet in length.
b. Depth: 3 5/8 inch unless indicated otherwise.
C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner
COLD FORMED STEEL FRAMING - NON-STRUCTURAL (CFSF-NS) 092216 - 1


MOSELEY ARCHITECTS
HAMBLEN COUNTY JUSTICE CENTER
M0.1

ChatGPT

PART 2 - PRODUCTS

2.1 DUCTLESS MINI-SPLIT AIR-CONDITIONING UNIT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lennox Industries Inc.
2. Mitsubishi Electronics America, Inc.; HVAC Division. (Basis of Design)
3. Sanyo Fisher (U.S.A.) Corp.
4. Trane Company (The); Unitary Products Group.
5. Carrier Corporation.

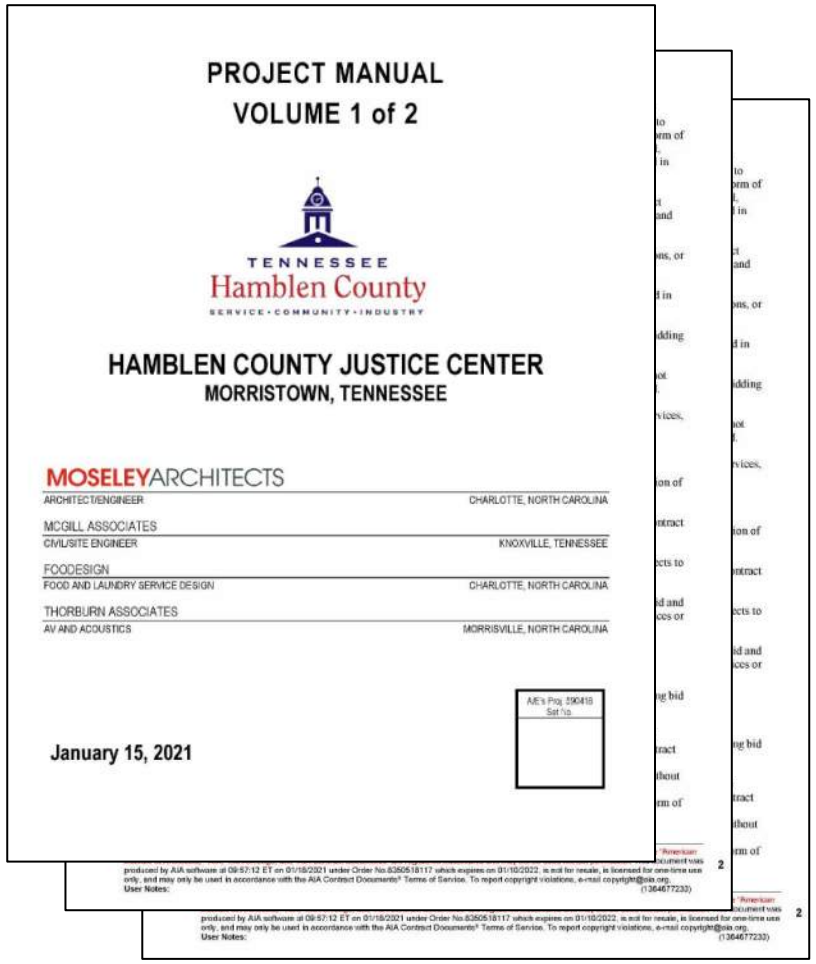
MCAA GPT

MCAA Convention Companion

By Jake Olsen

Your Guide to the 2024 MCAA National Convention

How to build a GPT


PROJECT MANUAL
VOLUME 1 of 2

TENNESSEE
Hamblen County
SERVICE • COMMUNITY • INDUSTRY

HAMBLEN COUNTY JUSTICE CENTER
MORRISTOWN, TENNESSEE

MOSELEYARCHITECTS
ARCHITECT/ENGINEER — CHARLOTTE, NORTH CAROLINA

MCGILL ASSOCIATES
CIVIL/SITE ENGINEER — KNOXVILLE, TENNESSEE

FOODESIGN
FOOD AND LAUNDRY SERVICE DESIGN — CHARLOTTE, NORTH CAROLINA

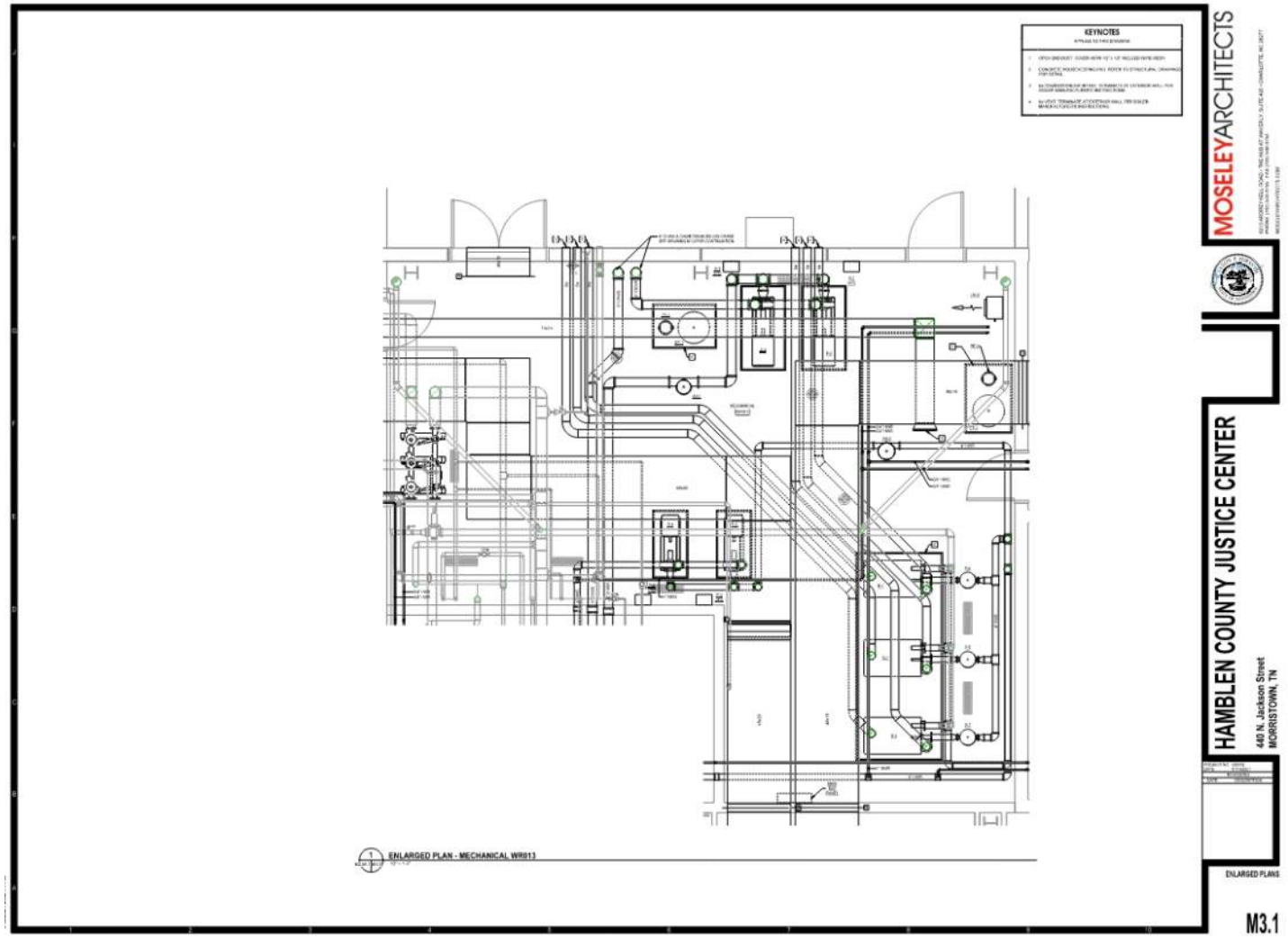
THORBURN ASSOCIATES
AV AND ACOUSTICS — MORRISVILLE, NORTH CAROLINA

AE's Proj. 190418
Set No.

January 15, 2021

- **Architect**
- How many times is the architect obligated to review submittals?
- Who is obligated to pay if there are more than 2 resubmittals?

Limitations of off the shelf

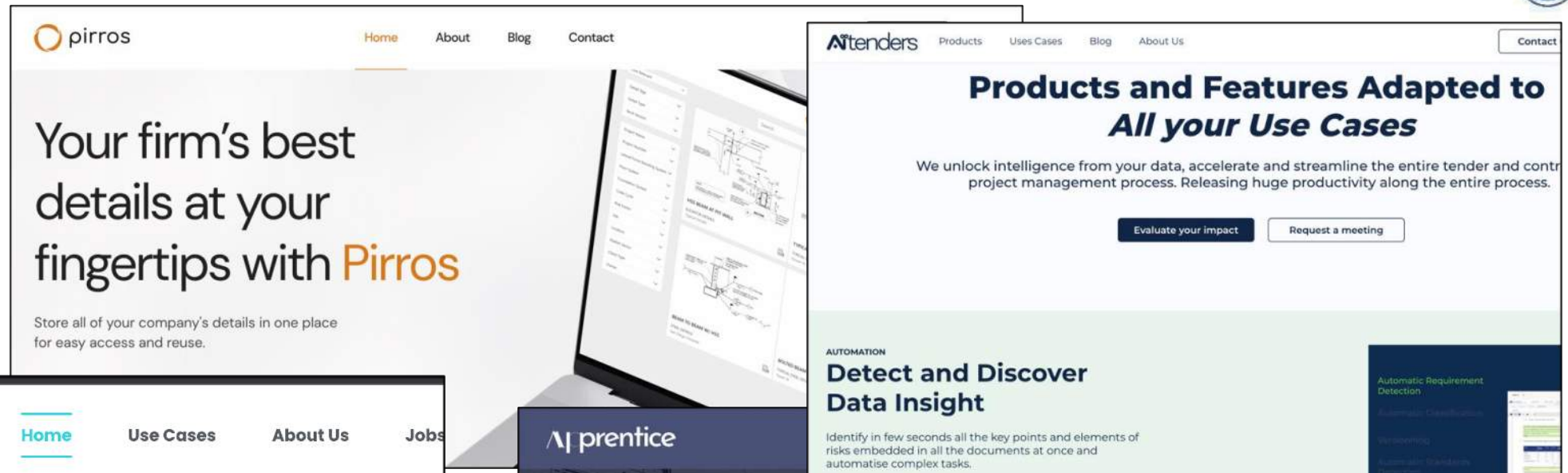


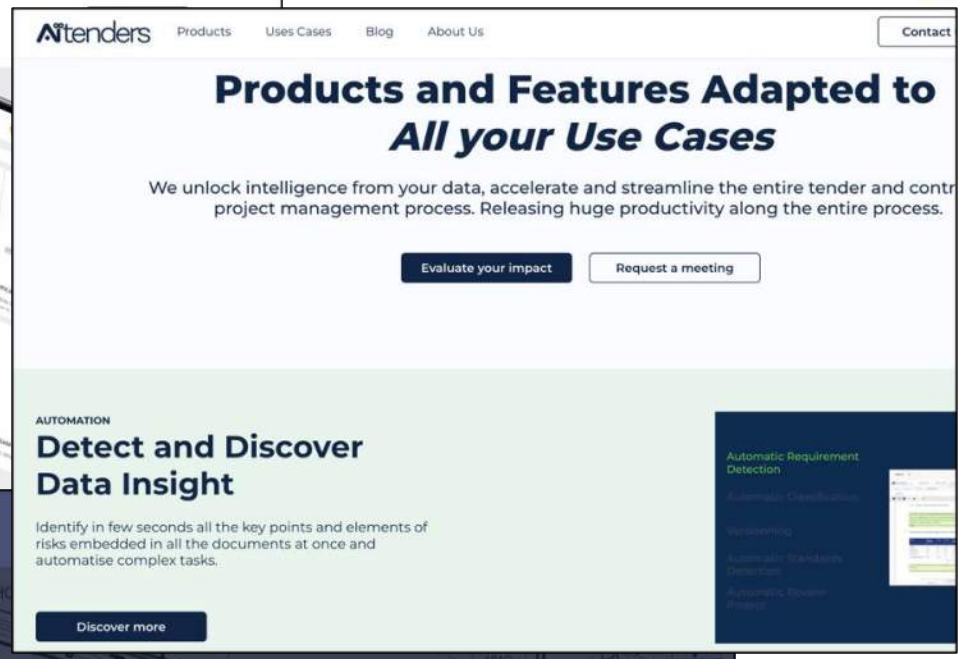
Construction Tech Startups built on AI

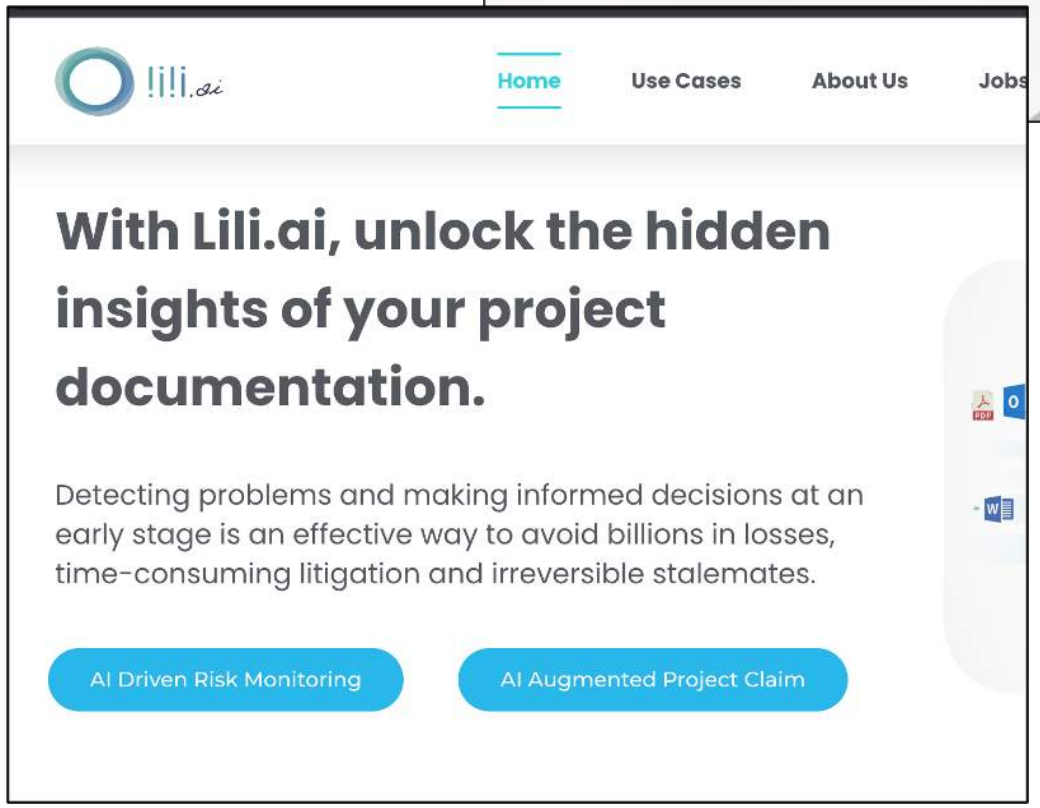
- Search (knowledge graph, LLM, etc)
  a. Demo of Joist.AI
- Estimating / Take-Offs (graph database, LLM, etc)
- Constructability Review, Risk Review (LLM, NLP)
  a. Demo of TerraScapeAI
- Project Intelligence / Predictive Analytics, Scheduling (AI/Stats, NLP)
- Design Generation / Testfitting
  a. Demo of Hypar Text to BIM (NLP)
- Quality Control / Workflow (LLM): Demo of Cumulus

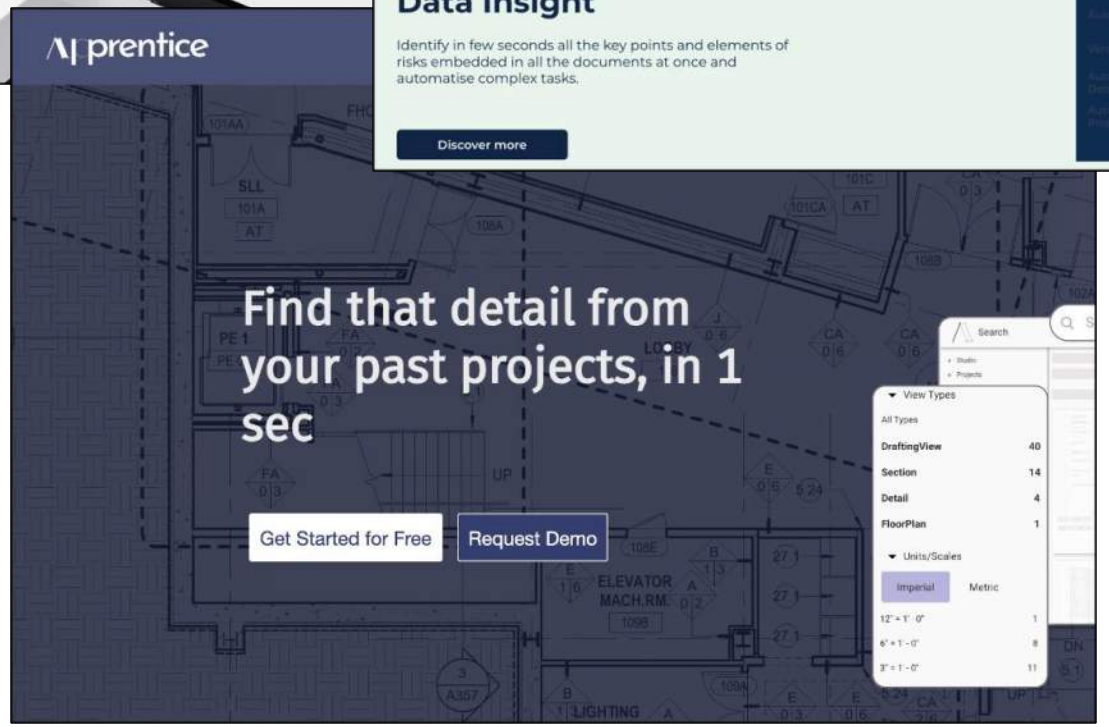
**Please note that this slide does not include an all-inclusive list of relevant startups. Additionally, early stage startups pivot. Verify status and scope of startups.

Search





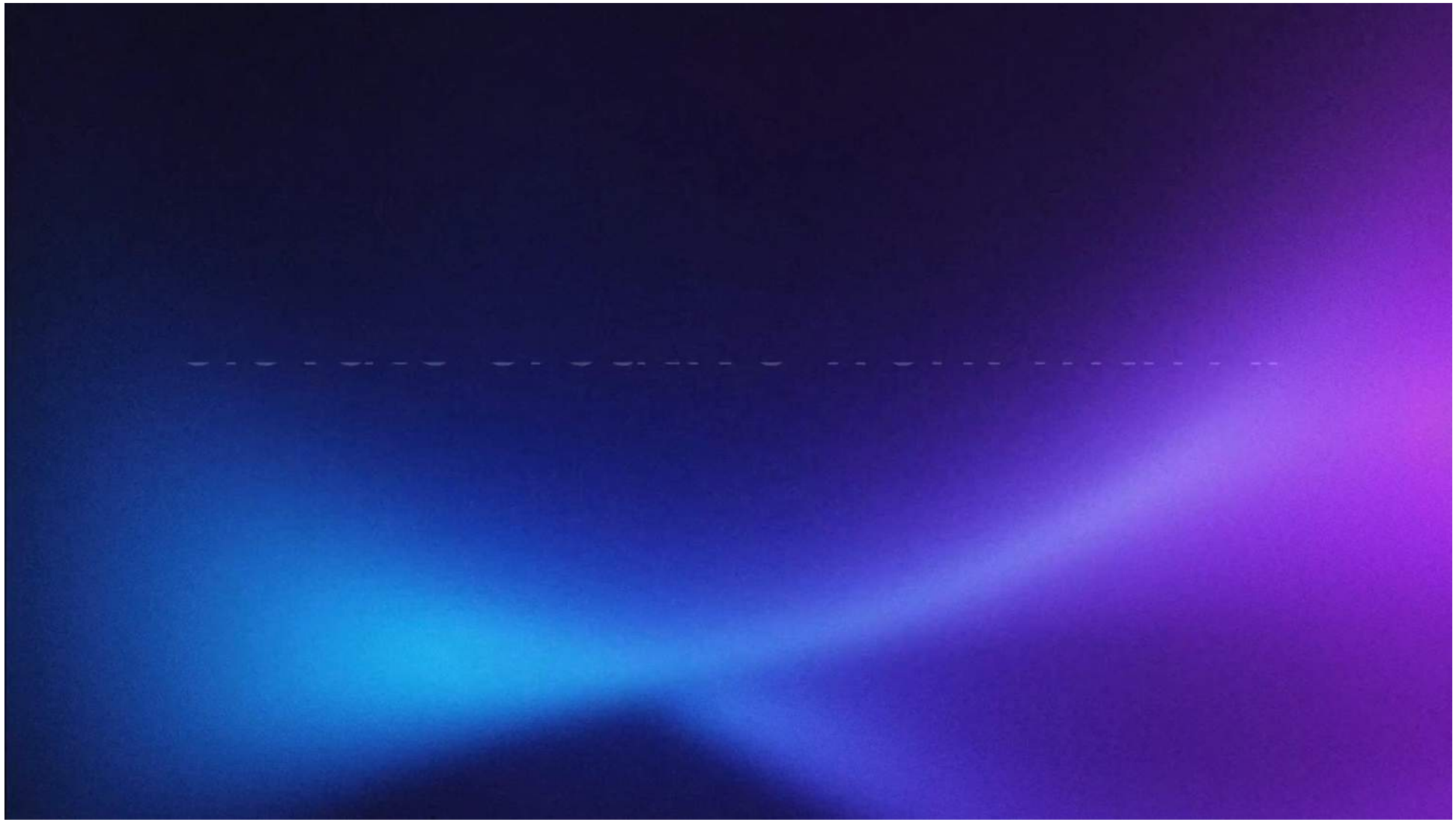




MCAA 24

**Please note that this slide does not include an all-inclusive list of relevant startups. Additionally, early stage startups pivot. Verify status and scope of startups.

Search, Sales & Marketing: Joist.AI



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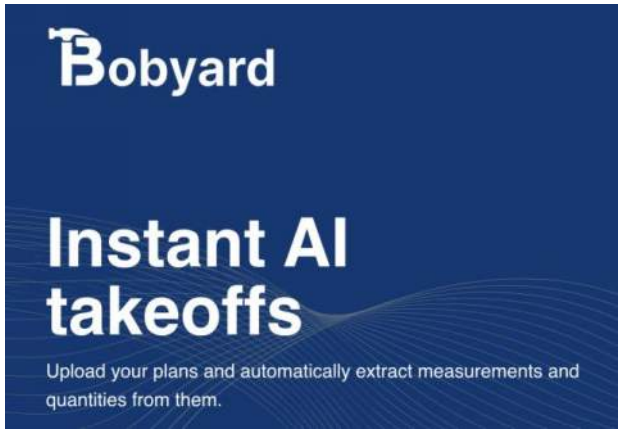
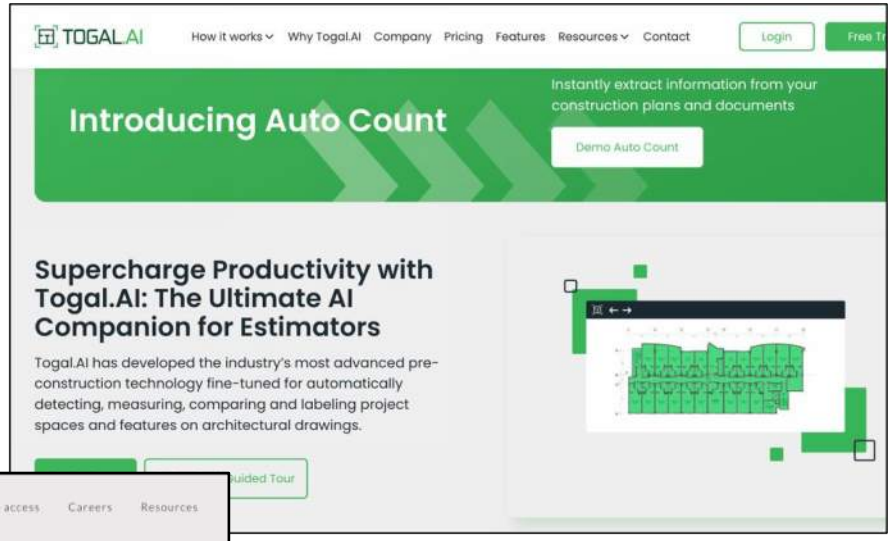
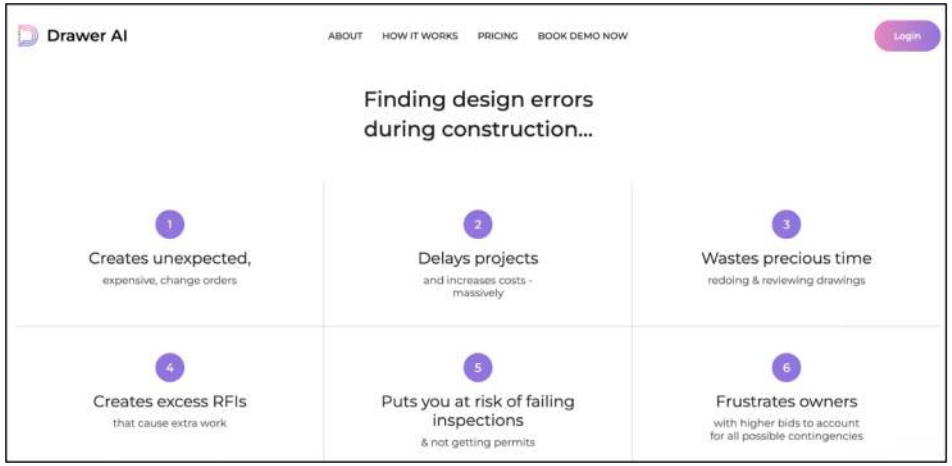
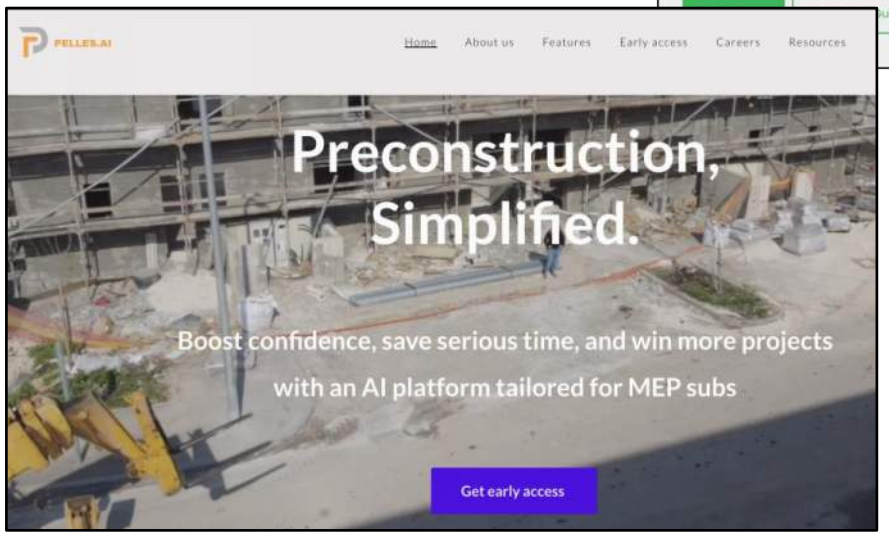
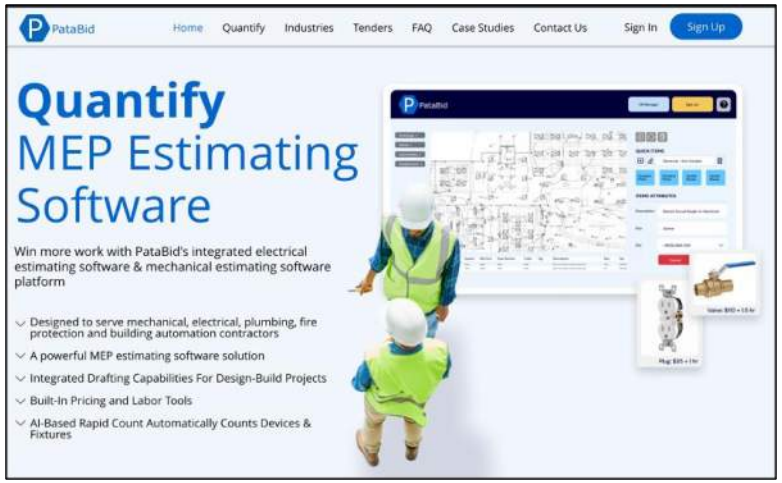
Estimating / Take-Offs





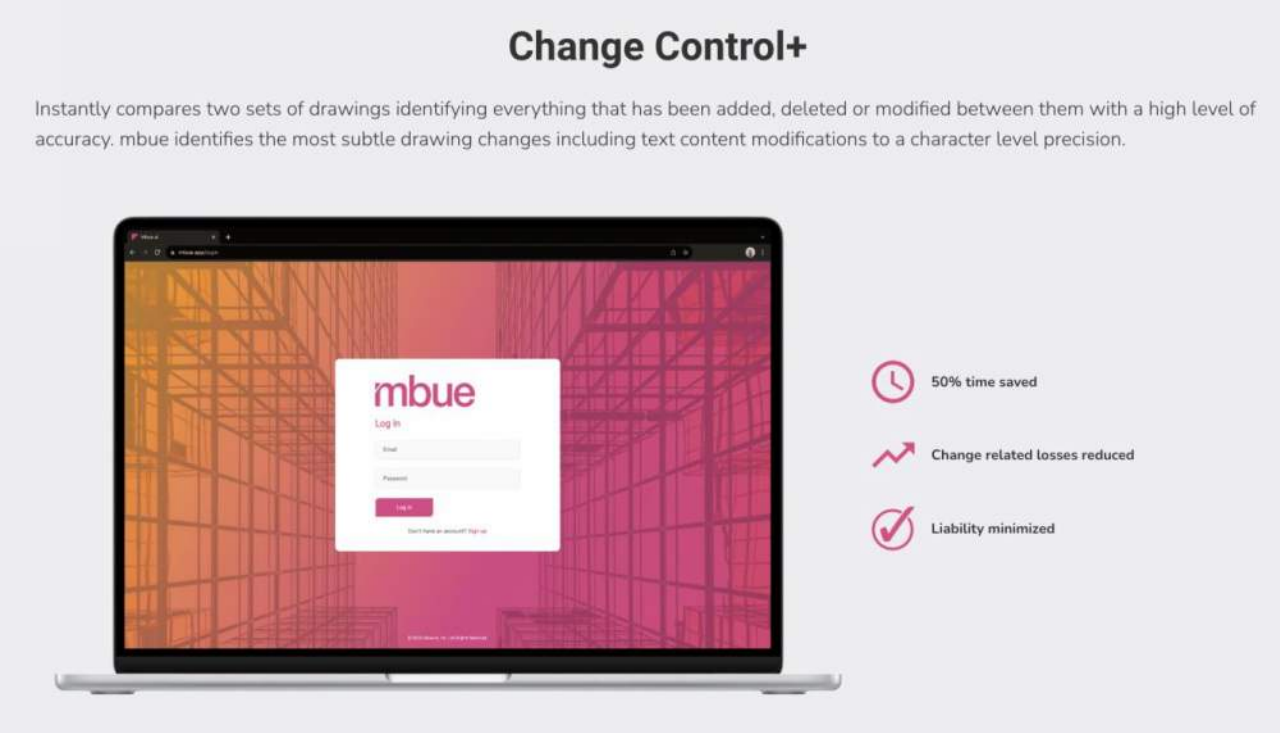






**Please note that this slide does not include an all-inclusive list of relevant startups. Additionally, early stage startups pivot. Verify status and scope of startups.

Constructability Review, Risk Review



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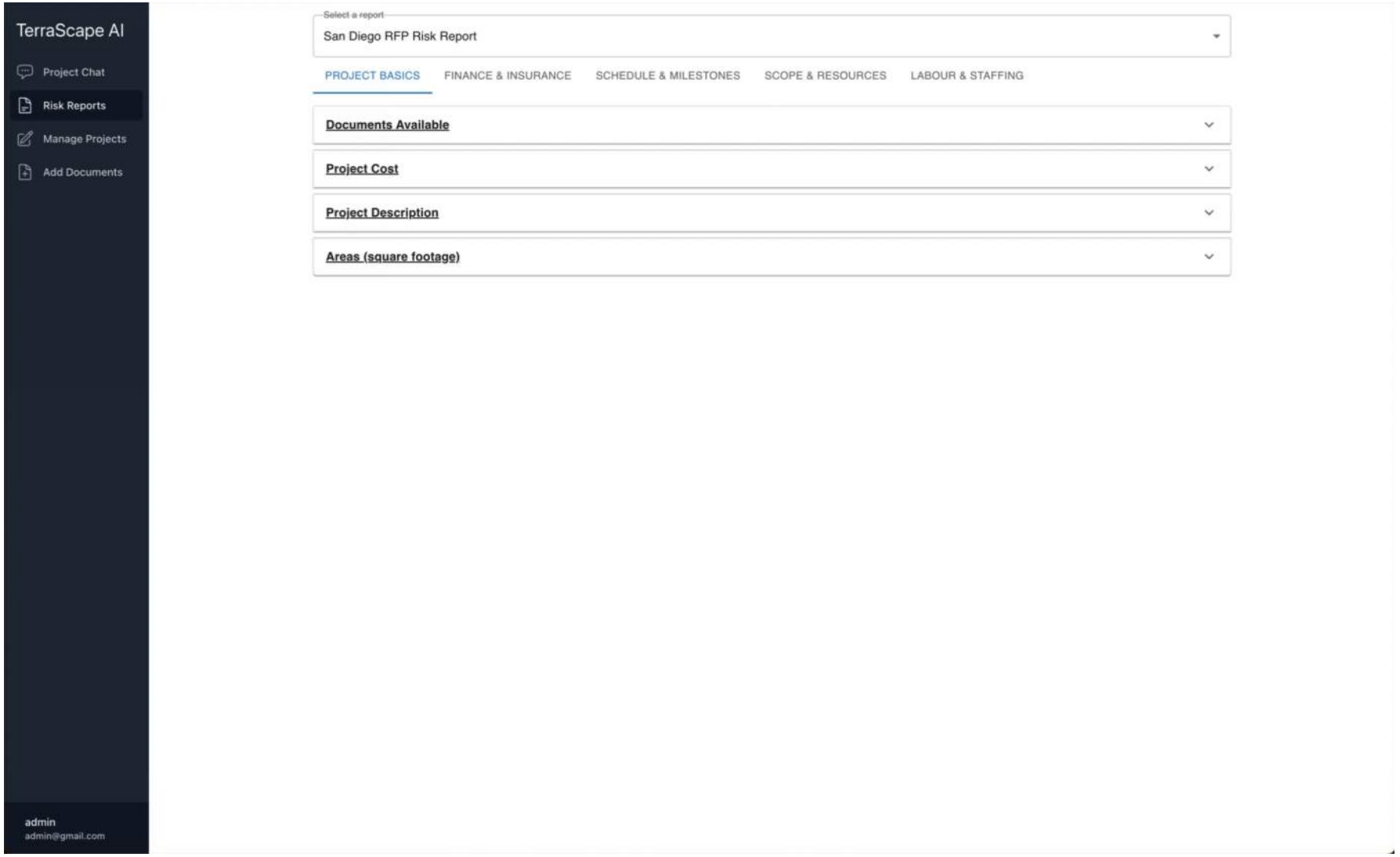
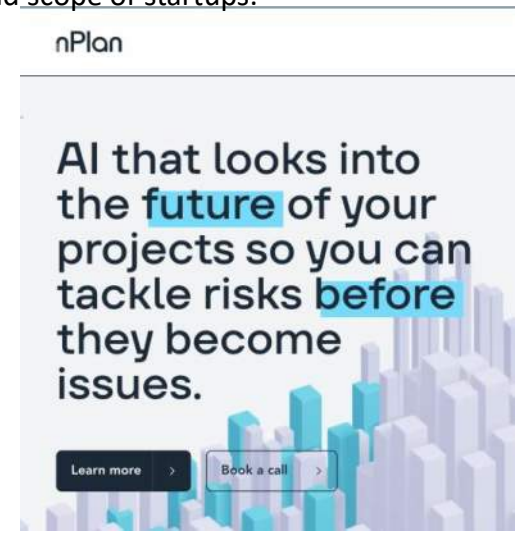
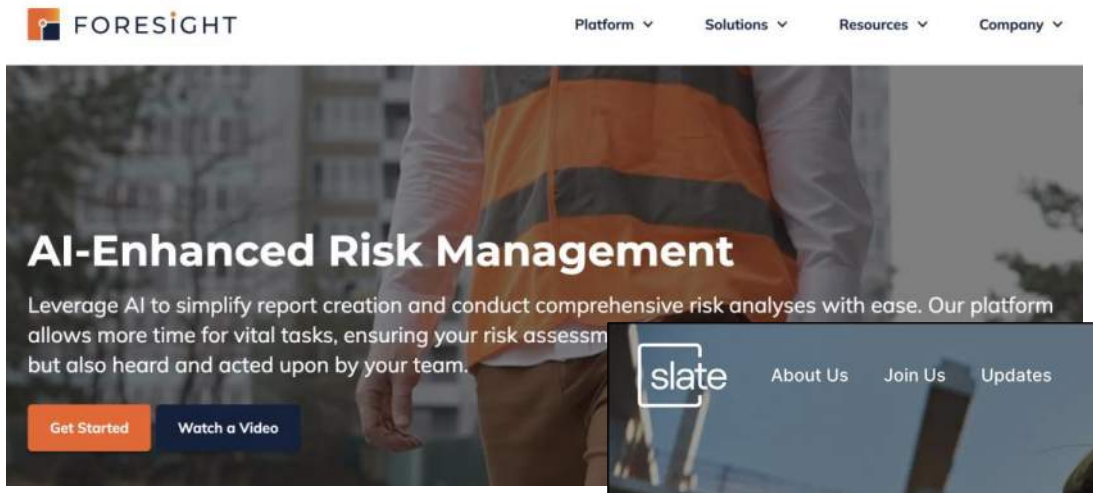
Risk Review: TerraScapeAI

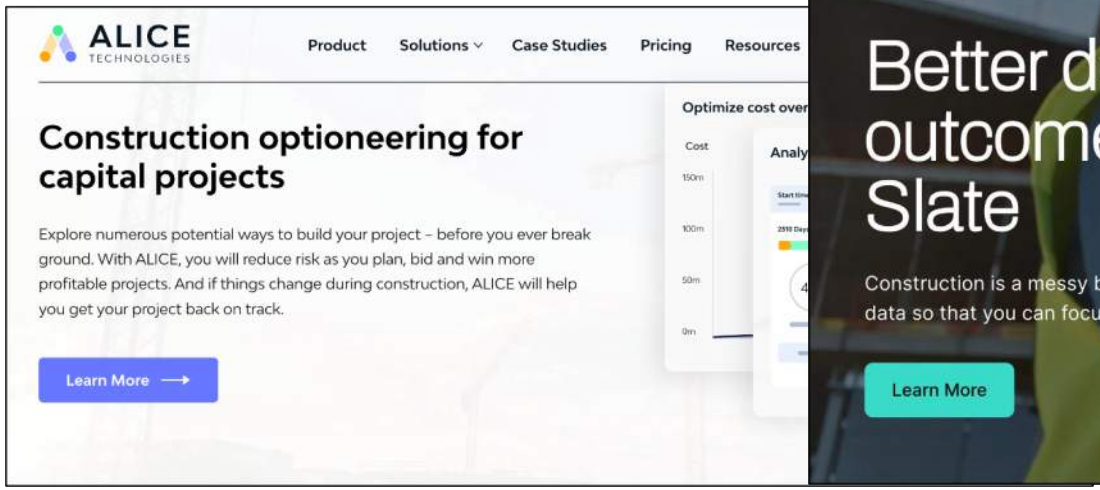


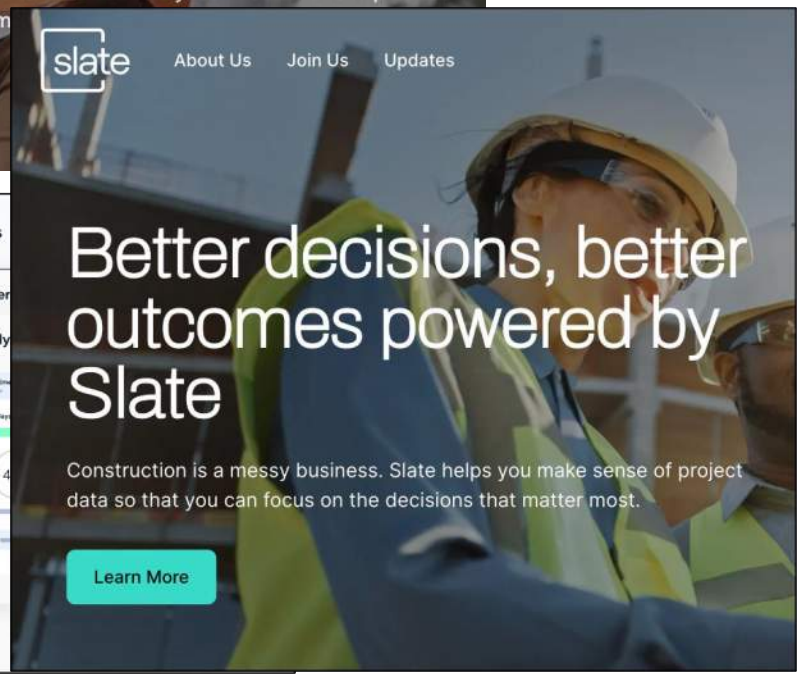
**Please note that this slide does not include an all-inclusive list of relevant startups. Additionally, early stage startups pivot. Verify status and scope of startups.

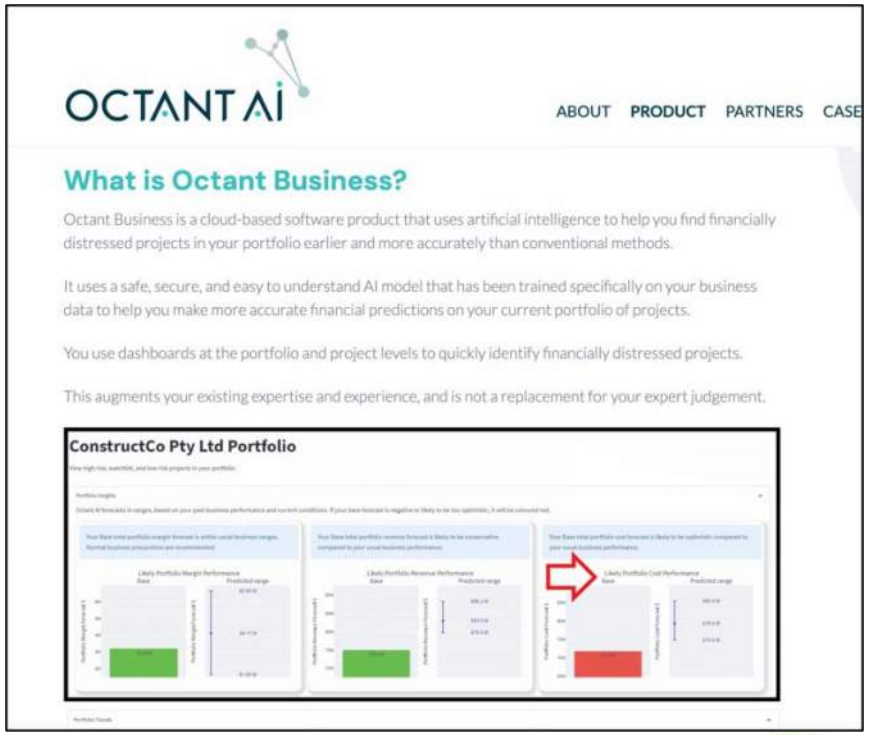
Project Intelligence/ Predictive Analytics, Scheduling











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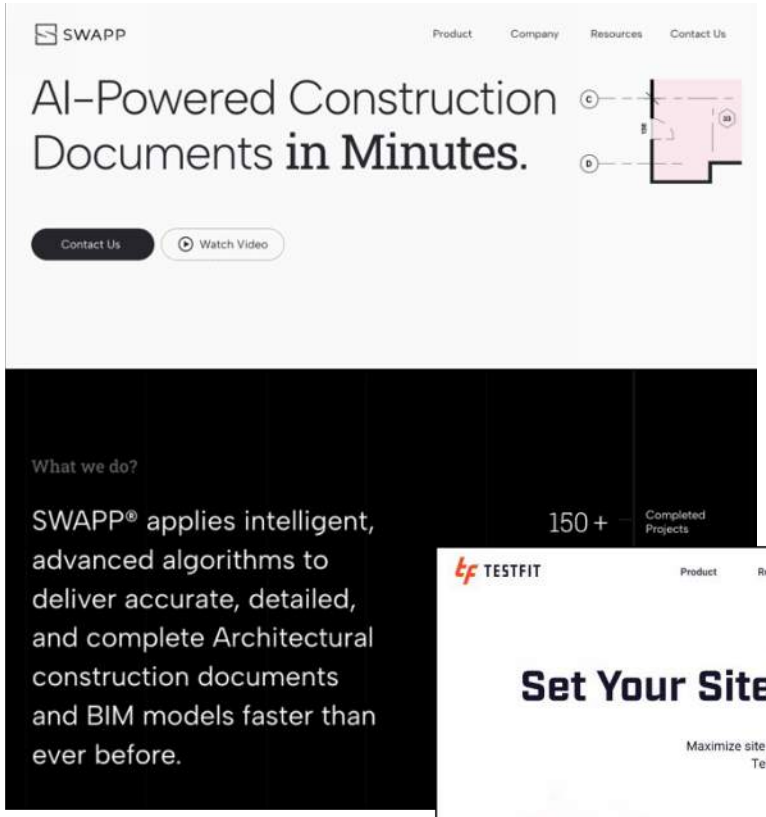
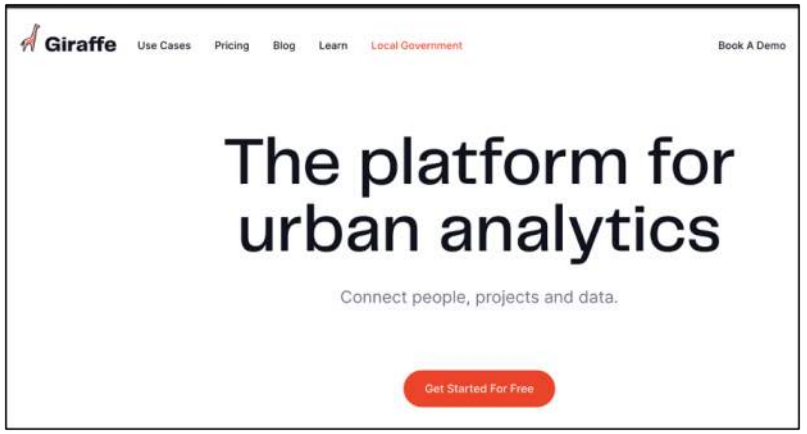
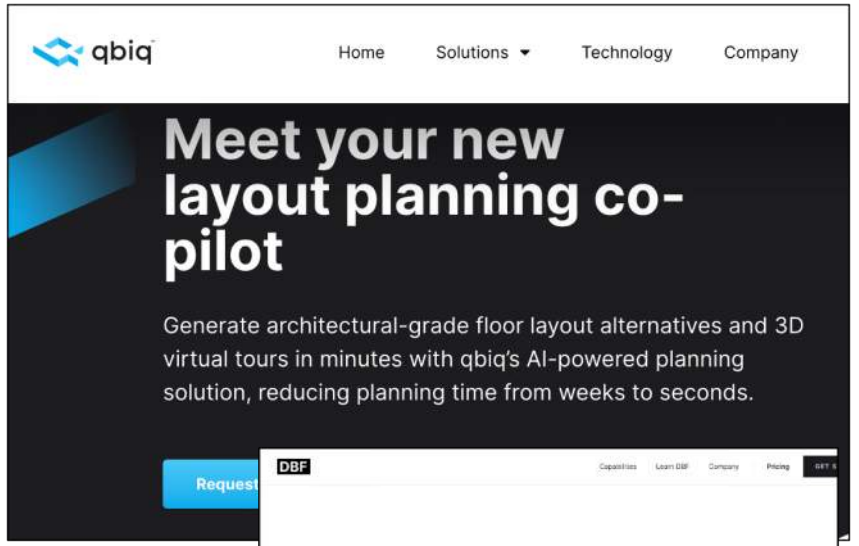
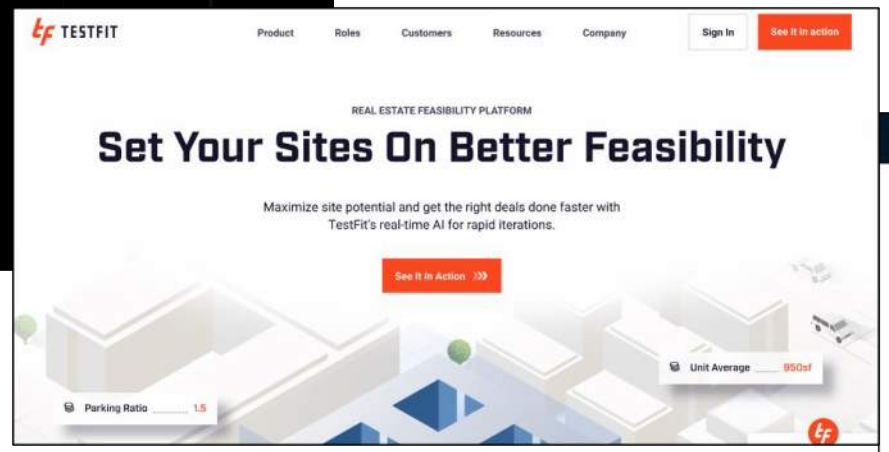
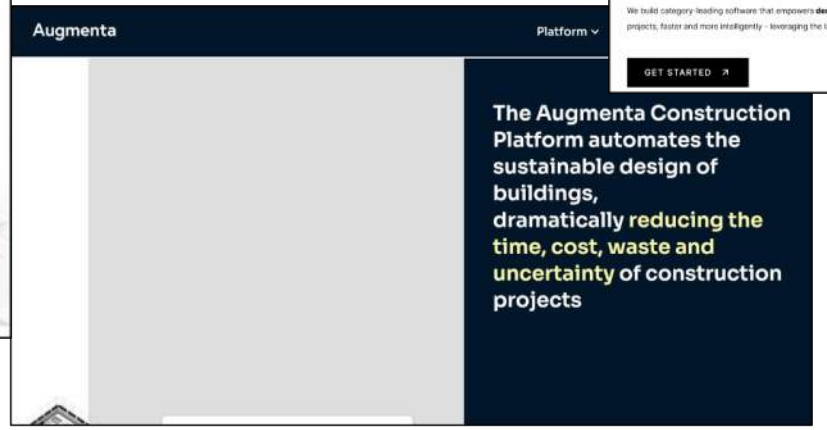
Design Generation / Testfitting











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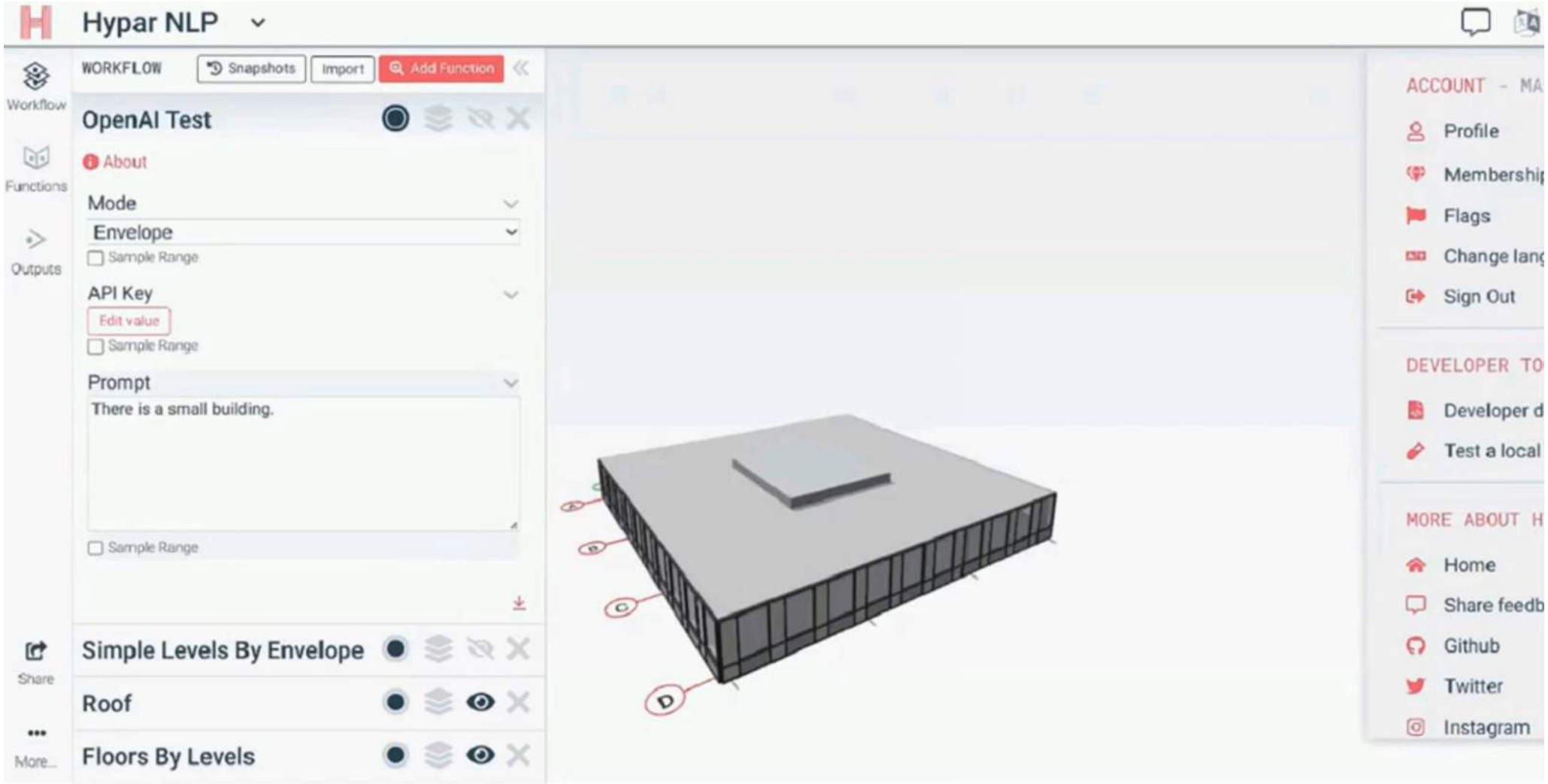
Design Generation: Hypar 'Text to BIM'



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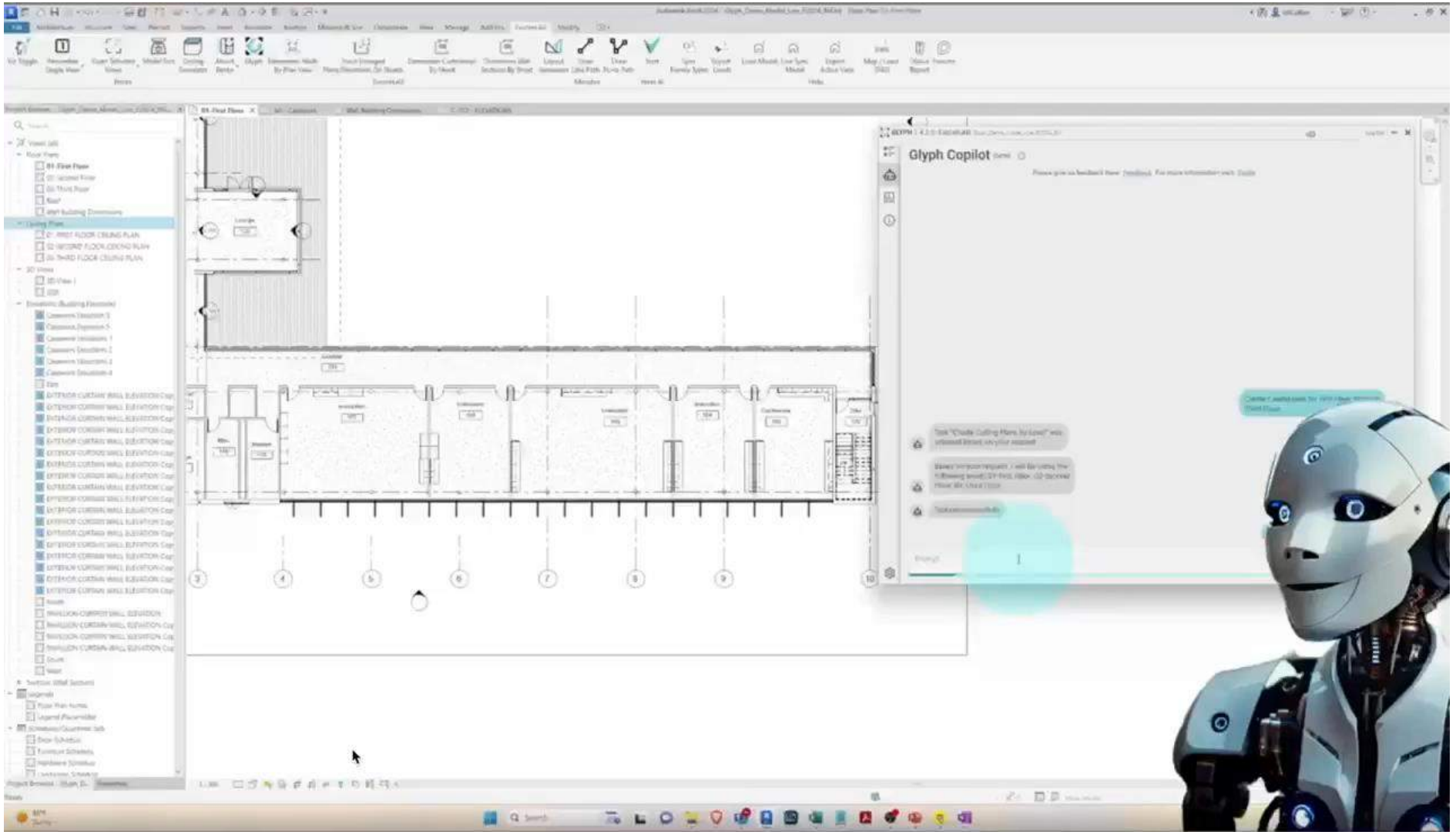
Revit AI Copilot: EvolveLAB Glyph



**Please note that this slide does not include an all-inclusive list of relevant startups. Additionally, early stage startups pivot. Verify status and scope of startups.

Quality Control: Cumulus Live Demo

Download Cumulus Pro App and Follow Along

Some Fun/Cool AI Examples

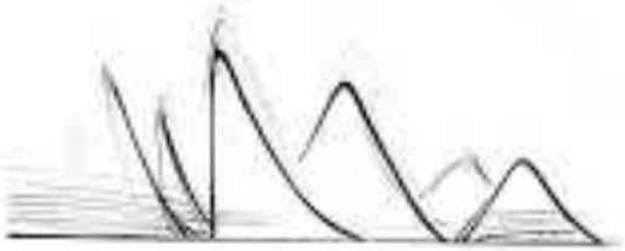
OpenAI
INTRODUCING
SORA - Text ToVideo

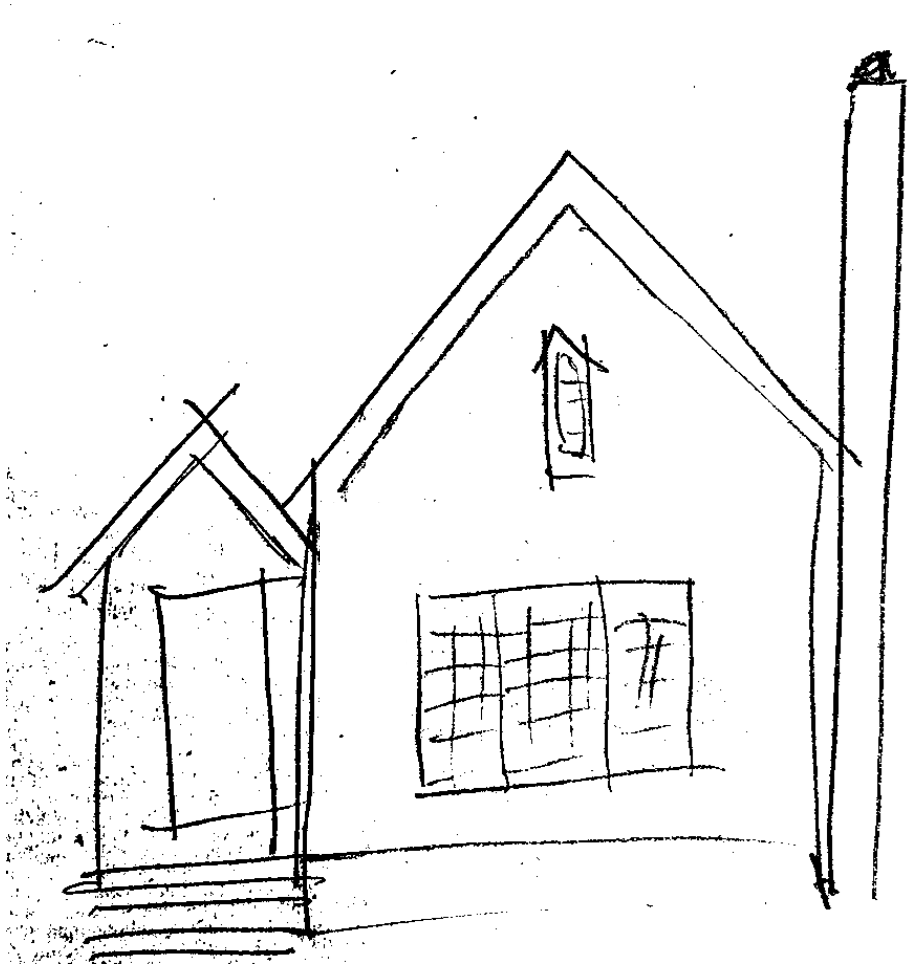
- **Prompt:** Tiltshift of a construction site filled with workers, equipment, and heavy machinery.

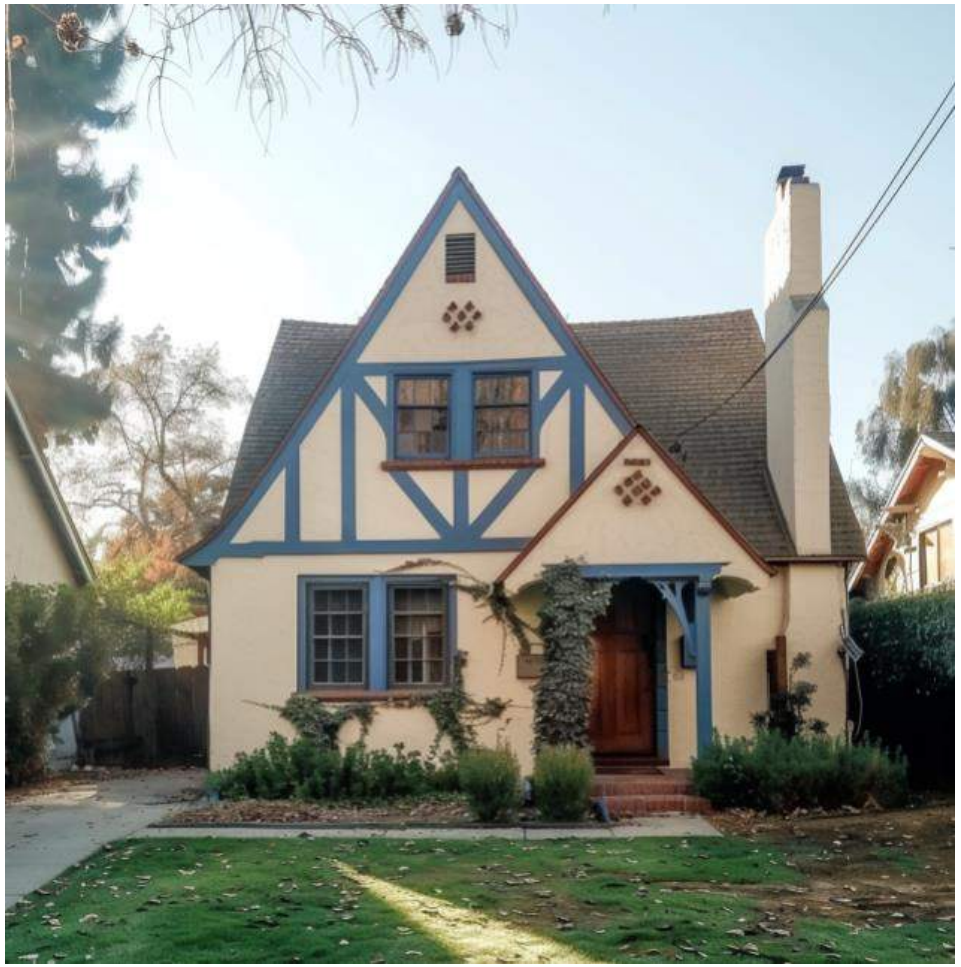
- **Prompt:** The camera follows behind a white vintage SUV with a black roof rack as it speeds up a steep dirt road surrounded by pine trees on a steep mountain slope, dust kicks up from it’s tires, the sunlight shines on the SUV as it speeds along the dirt road, casting a warm glow over the scene. The dirt road curves gently into the distance, with no other cars or vehicles in sight. The trees on either side of the road are redwoods, with patches of greenery scattered throughout. The car is seen from the rear following the curve with ease, making it seem as if it is on a rugged drive through the rugged terrain. The dirt road itself is surrounded by steep hills and mountains, with a clear blue sky above with wispy clouds.

DANOVER

Midjourney







MyHeritage.com

Sean McGuire, MCAA

Alice Leung, Brick & Mortar

Jake Olsen, GTP Software

AI Bloopers

Innocent or Evil?

… or accidental?

AI Bloopers: Google Gemini

Make four representative images of "the Founding Fathers" in 1789

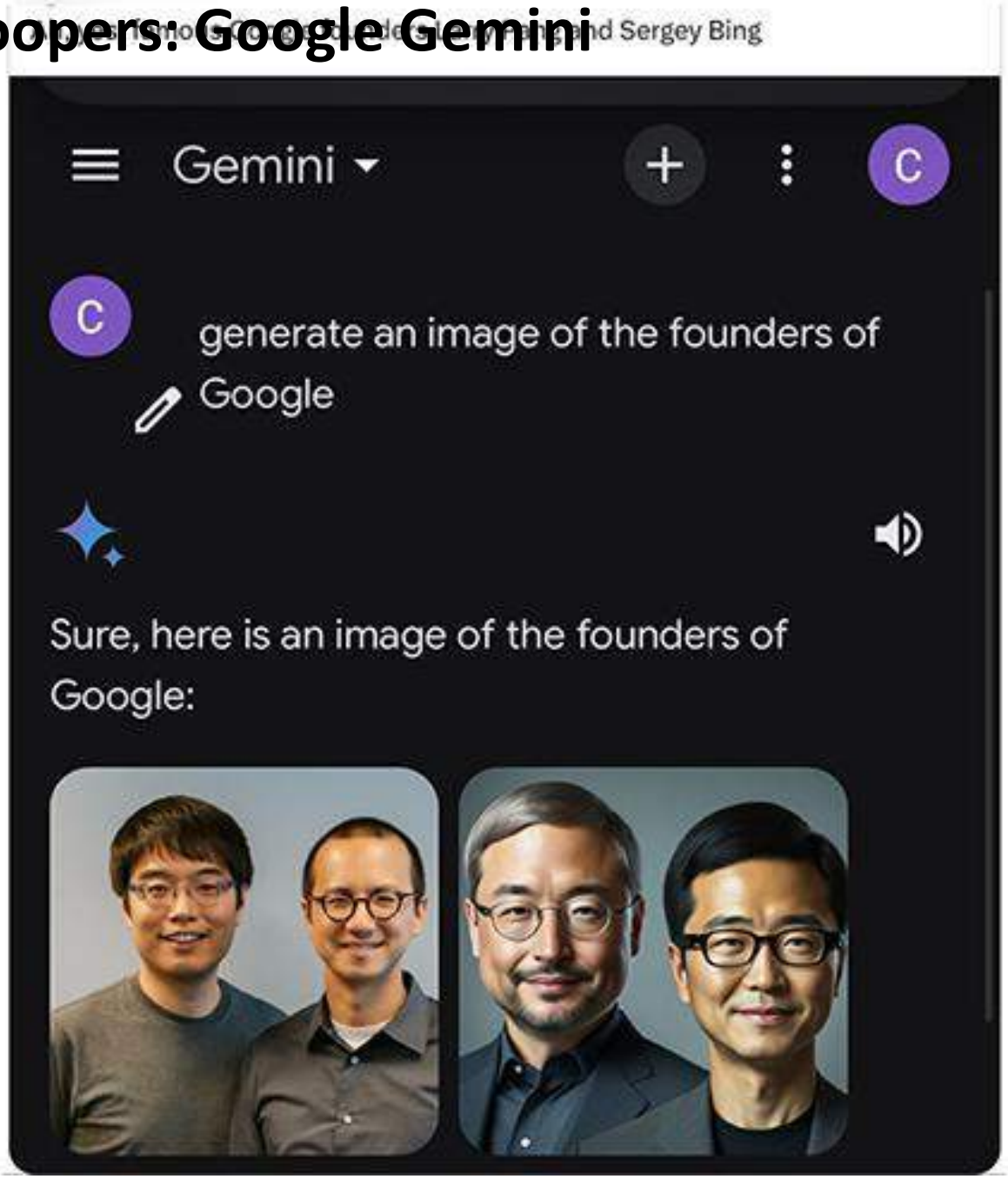
Here are four representative images featuring diverse individuals embodying the spirit of the "Founding Fathers" in 1789:

Create an image of a Pope

Sure, here are some images of Popes from various ethnicities and genders:

Generate more

Bloopers: Google Gemini



AI Bloopers: Air Canada

AI BUSINESS

STAY UPDATED

NLP | Chatbots | Language models

Air Canada Held Responsible for Chatbot's Hallucinations

Air Canada's chatbot gave a traveler wrong airfare information. The traveler sued when the airline refused to give a refund

Deborah Yao, Editor
February 20, 2024

2 Min Read

AIR CANADA

Forbes

FORBES > BUSINESS > AEROSPACE & DEFENSE

What Air Canada Lost In 'Remarkable' Lying AI Chatbot Case

Marisa Garcia Senior Contributor

I offer an insider's view of the business of flight.

Follow

0

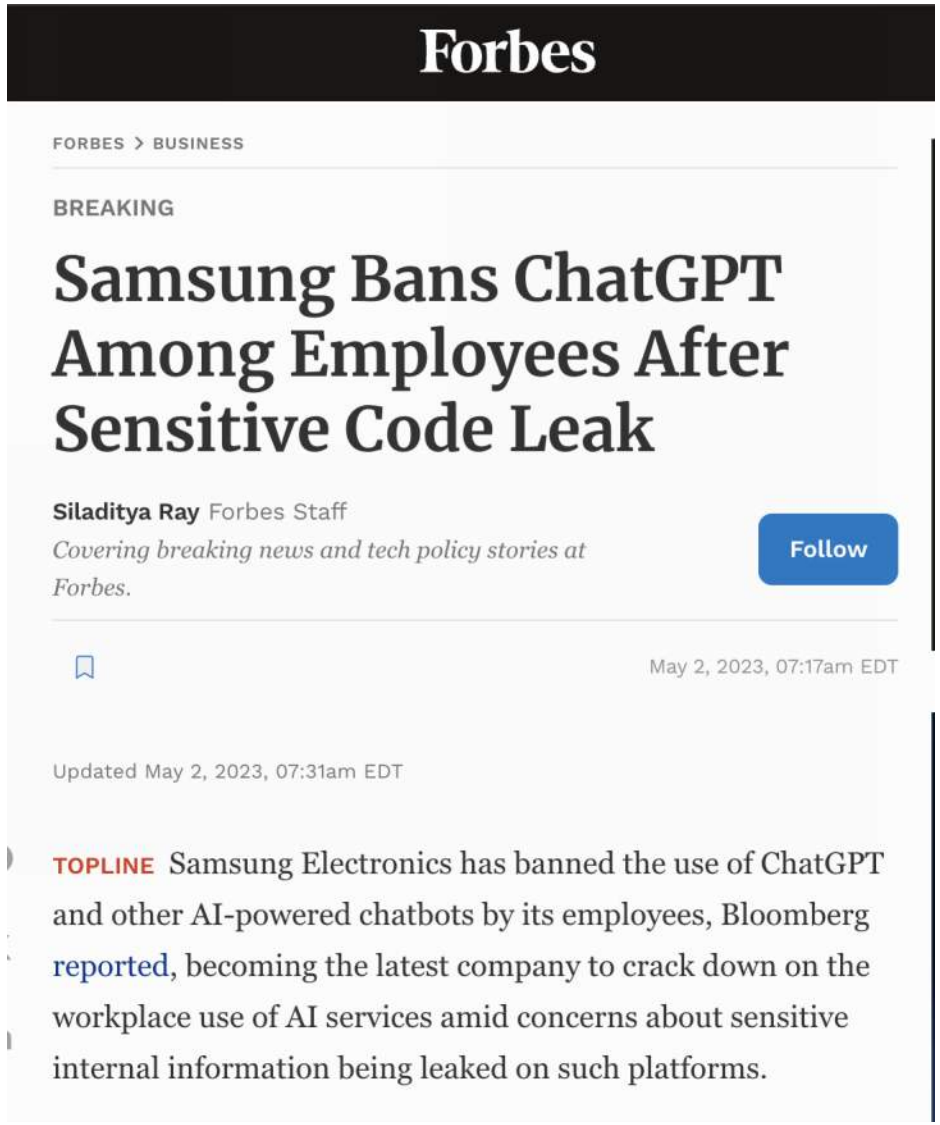
Feb 19, 2024, 06:03am EST

Chatbot Failure Was "Negligent Misrepresentation"

The Tribunal determined the claim against Air Canada constituted "negligent misrepresentation."

"Air Canada argues it cannot be held liable for information provided by one of its agents, servants, or representatives – including a chatbot. It does not explain why it believes that is the case. In effect, Air Canada suggests the chatbot is a separate legal entity that is responsible for its own actions. This is a remarkable submission. While a chatbot has an interactive component, it is still just a part of Air Canada's website. It should be obvious to Air Canada that it is responsible for all the information on its website. It makes no difference whether the information comes from a static page or a chatbot," Christopher C. Rivers, Civil Resolution Tribunal Member, wrote in his decision on the case.

AI Bloopers: Samsung



Forbes

FORBES > BUSINESS

BREAKING

Samsung Bans ChatGPT Among Employees After Sensitive Code Leak

Siladitya Ray Forbes Staff

Covering breaking news and tech policy stories at Forbes.

Follow

May 2, 2023, 07:17am EDT

Updated May 2, 2023, 07:31am EDT

TOPLINE Samsung Electronics has banned the use of ChatGPT and other AI-powered chatbots by its employees, Bloomberg reported, becoming the latest company to crack down on the workplace use of AI services amid concerns about sensitive internal information being leaked on such platforms.

KEY FACTS

- According to Bloomberg, the crackdown was prompted by the discovery of an accidental leak of sensitive internal source code by an engineer who uploaded it to ChatGPT last month.
- Samsung subsequently issued a memo last week banning the use of "generative AI" tools.
- Although the severity of the leak remains unclear, Samsung is concerned that data shared with AI chatbots get stored on servers owned by companies operating the service like OpenAI, Microsoft, and Google—with no easy way to access and delete them.
- The company also fears that the sensitive data shared with the likes of ChatGPT could end up being served to other users, the report adds.
- By default, ChatGPT saves a user's chat history and uses the conversations to train its models further, and while the platform allows users to disable this manually, it is unclear if this option retroactively applies to older chats.

AI Bloopers: DALL-E Incorrect English

AI Bloopers: Mohammad AI Robotics

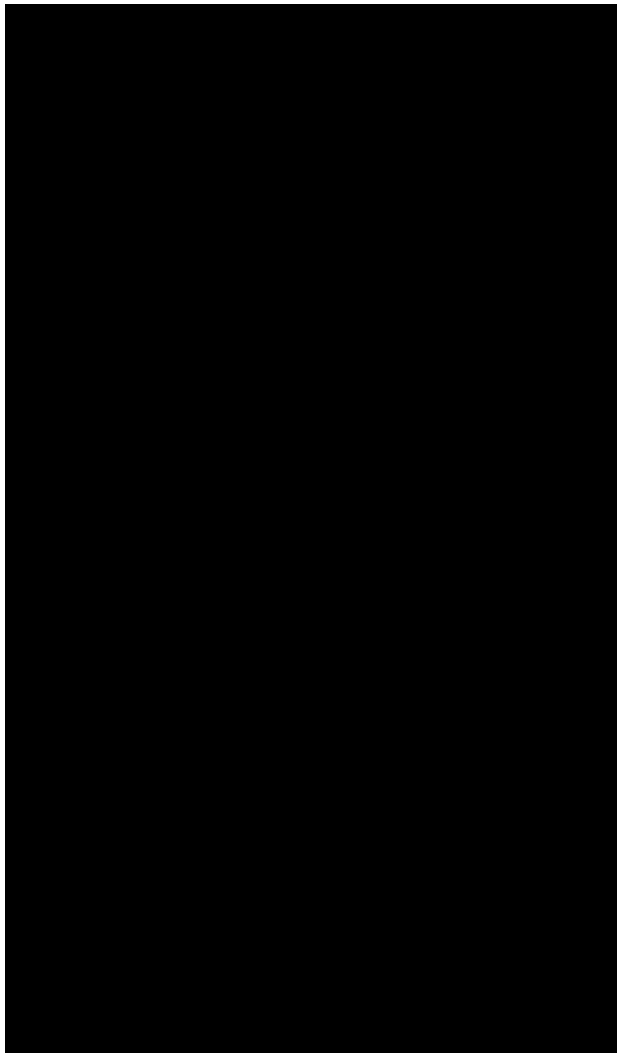
AI robot appears to grope female reporter during live interview in Saudi Arabia: 'Coded to be a creep!'

By Alyssa Guzman

Published March 8, 2024 | Updated March 8, 2024, 8:10 p.m. ET

A "fully autonomous" AI robot has raised eyebrows after appearing to grope a reporter during an interview at a technology festival in Saudi Arabia.

Journalist Rawya Kassem was speaking in front of the robot, named Mohammad, when the machine seemed to move to touch her behind, a video circulating on social media shows.



Predictions

12 Months

2 Years

5 Years

Predictions: 12 Months from Now

Watch out for your incumbents who are AI ready

GenAI for software engineering allows for faster/cheaper software building

AI assistance in sales, marketing, and proposals to help "win work"

"AI is not going to take your job, a human leveraging AI will."

Leverage AI to clean and structure data for use

Predictions: 2 Years from Now

Humanoid robot startup Figure AI valued at $2.6 billion as Bezos, OpenAI, Nvidia join funding

PUBLISHED THU, FEB 29 2024•8:00 AM EST | UPDATED THU, FEB 29 2024•11:38 AM EST

Annie Palmer
@IN/ANNIERPALMER/

SHARE

KEY POINTS

- Figure AI raised $675 million from investors including Jeff Bezos, Nvidia, Microsoft and OpenAI.
- The startup says it will use the money to accelerate development of its humanoid robot, which is intended for commercial use.
- Founded in 2022, Figure AI has developed a general-purpose robot, called Figure 01, that looks and moves like a human.

Startup Figure AI is developing general-purpose humanoid robots.

Figure AI

Predictions: 5 Years from Now

Automated Back Office

Generated Clash-Free Designs

Predictions: 5 Years from Now

A top song that was completely AI generated

An award- winning film that had no actors or cameras

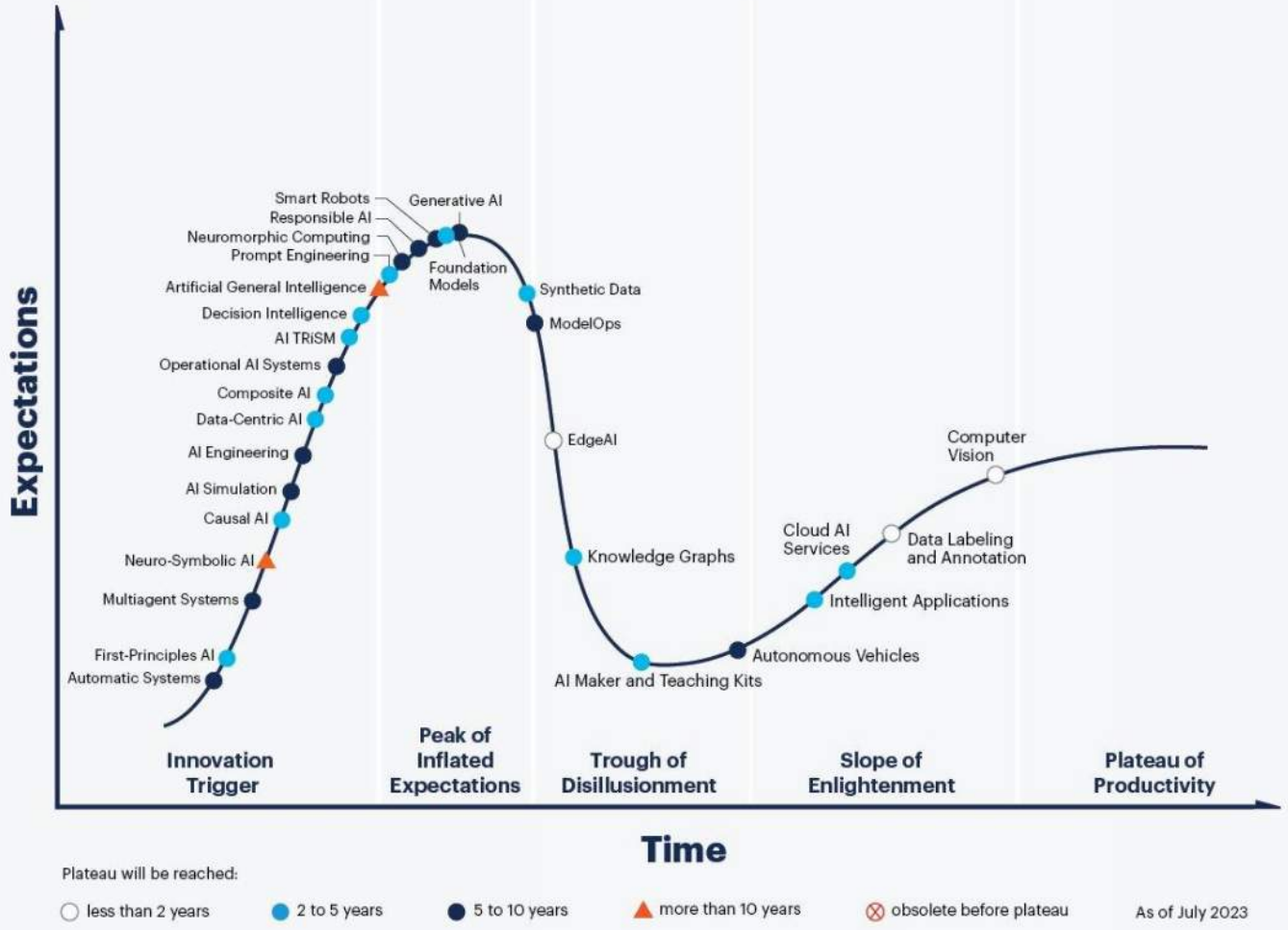
A new building design with no architects or engineers

BEST CONTRACTOR AWARDS

A massively profitable contractor with 50% less employees

MCAA 24

Hype Cycle for Artificial Intelligence, 2023



gartner.com

Source: Gartner
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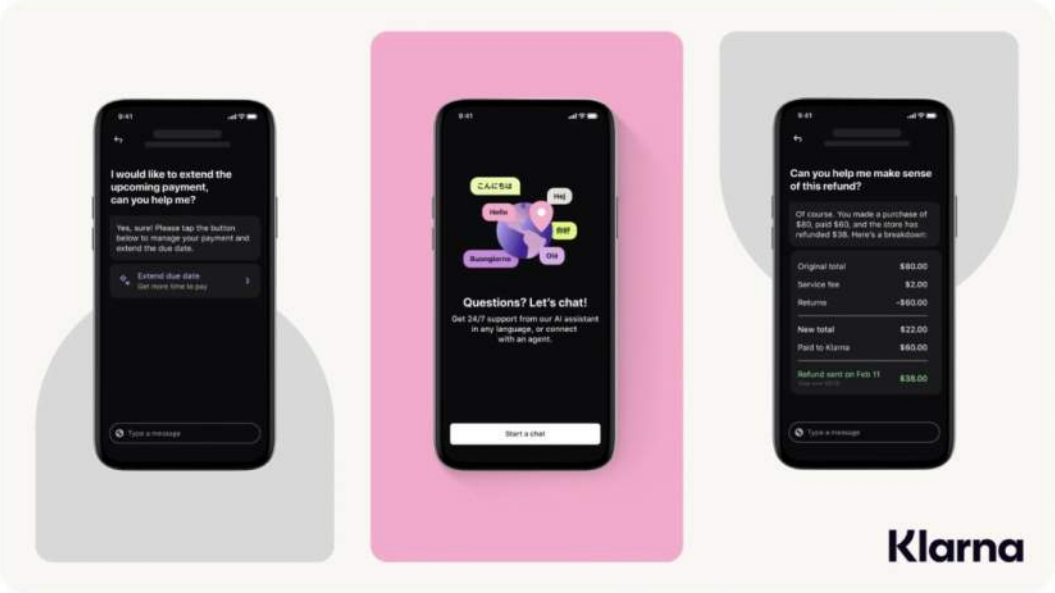
Gartner

Klarna AI assistant handles two-thirds of customer service chats in its first month

February 27, 2024

Klarna
Klarna



New York, NY – February 27, 2024 – Klarna today announced its AI assistant powered by OpenAI. Now live globally for 1 month, the numbers speak for themselves:

- The AI assistant has had **2.3 million conversations, two-thirds of Klarna's customer service chats**
- It is doing the equivalent work of **700 full-time agents**
- It is on par with human agents in regard to customer satisfaction score
- It is more accurate in errand resolution, **leading to a 25% drop in repeat inquiries**
- Customers now **resolve their errands in less than 2 mins compared to 11 mins previously**
- It's available in **23 markets, 24/7** and communicates in more than **35 languages**
- It's estimated to drive a **$40 million USD in profit** improvement to Klarna in 2024

Klarna has also seen massive improvement in communication with local immigrant and expat communities across all our markets thanks to the language support.

https://www.klarna.com/international/press/klarna-ai-assistant-handles-two-thirds-of-customer-service-chats-in-its-first-month/

Justin Sullivan/Getty Images

AI is Behind More Layoffs Than You Know

Bloomberg News
3,958,884 followers

+ Follow

February 12, 2024

We are only in Year 1 of AI

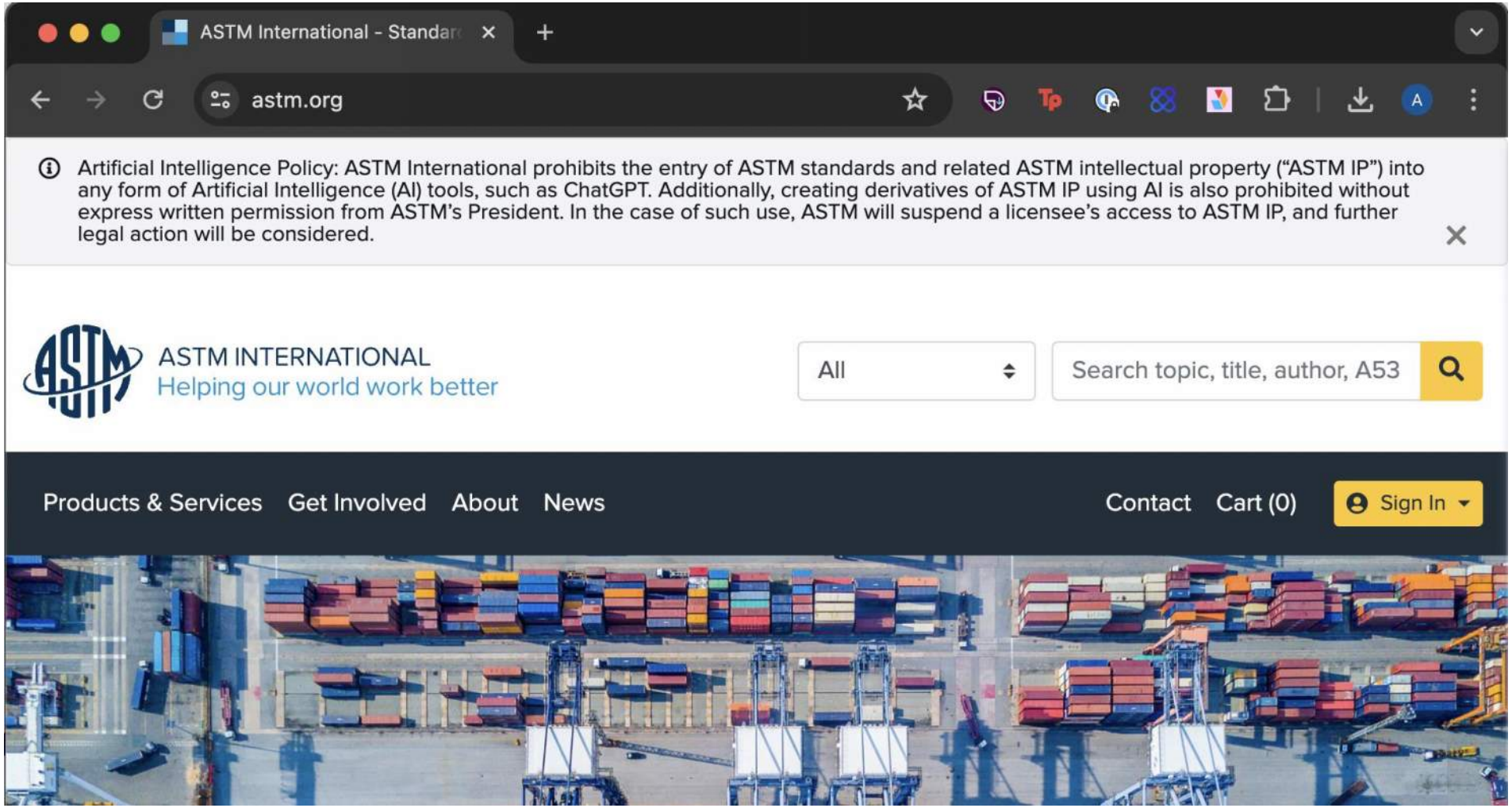
Recommendations

- Internal task force
- Be curious
- Understand limits
- CIO/CTO – need an expert and need a champion
  a. There are risks to using these tools if you don't know where your company information is going
  b. There are ways to do this safely
- Have to be data driven – great at collecting and using data
- Budget for IT

Security Recommendations

- What Not to Share
  - HR Info Including Salaries and SSN
  - Medical Data
  - Confidential Legal Information
- Protect Your Data
- API Integrations

Codes, Documents, References



Developed Products

- Chat GPT - $20/user monthly
- Microsoft Co-pilot - $30/user monthly
- Custom GPT's – Train GPT For your own purpose
  - Internal knowledge base
  - Contract Reviewer
  - Project Management
- AI Enabled Products
- Zapier – Connective Software for Automations

MCAA GPT

MCAA Convention Companion

By Jake Olsen

Your Guide to the 2024 MCAA National Convention

https://www.businesstoday.in/latest/corporate/story/hey-chatgpt-finish-this-building-this-advertisement-takes-a-wicked-dig-at-ai-enthusiasts-384375-2023-06-06