

# AI in Real Estate

JLL Risk Advisory

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# What is AI

Artificial Intelligence is the term used to describe machines autonomously performing tasks that would normally require human intelligence by giving them the ability to perceive, learn from, abstract, and act using data.



## Artificial Intelligence

### Machine & Deep Learning

- Supervised ML → labeled of data
- Unsupervised ML → unlabeled data

“Core” Machine Learning

Computer Vision

Natural Language Processing & Generation

## Broad AI use-cases

- **Predictive:** Discern cause-and-effect.
- **Optimizing:** Highest value outcome.
- **Generative:** AI that receives, interprets, and generates context-appropriate content.

# What can AI do well today?



## WHAT AI CAN DO WELL TODAY

- Perform some simple, well-defined tasks that requires little or no context as well as or better than humans
- Find and act on patterns in data - including patterns invisible to humans
- Get better at performing a given task when given lots of labeled, well organized data from which to learn
- Better results when leveraged in a static environment or one with little uncertainty



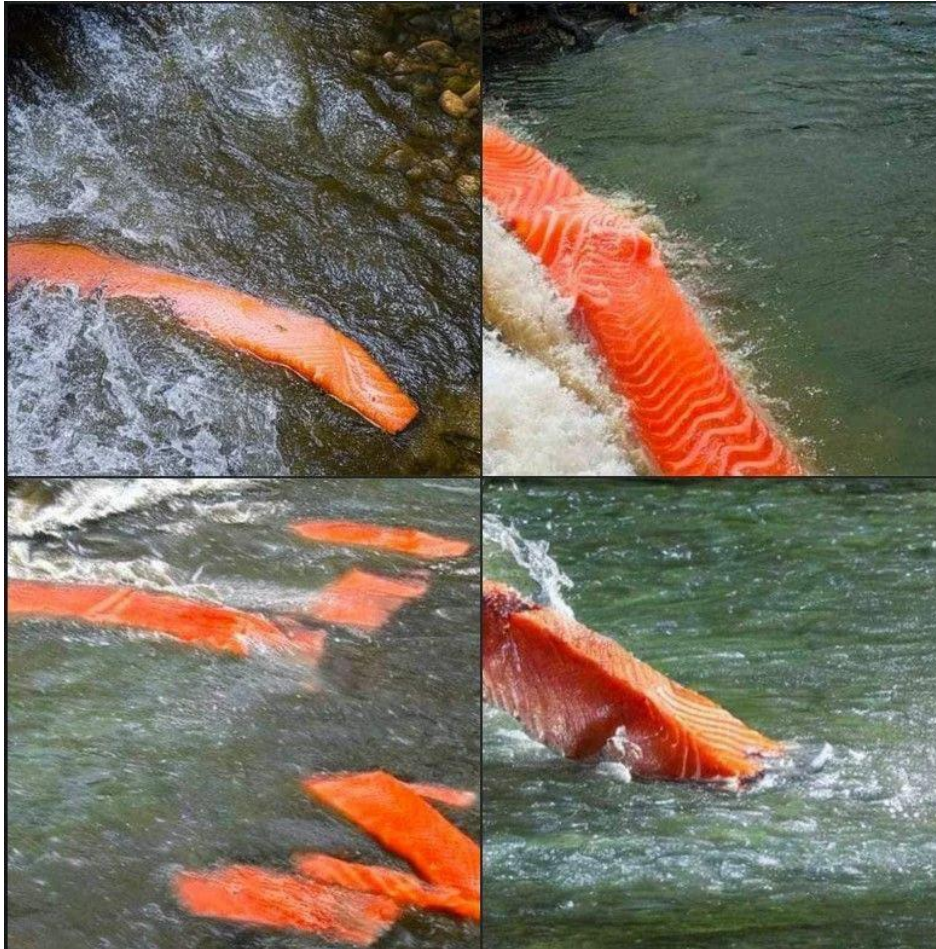
## WHAT AI CANNOT DO WELL TODAY

- Perform any entire job better than humans can. AI replaces tasks and not roles
- Explain its mechanism for finding patterns in information or what those patterns mean - beyond giving them a label
- Understand the context that surrounds a given task
- Learn from unorganized, unlabeled, or small amounts of data
- Perform tasks that require creativity, empathy, or complex judgment
- Struggles in a dynamic environment with lots of uncertainty

AI won't replace people, but people who use AI will replace people who don't

# What can AI do well today?

Problem and challenge of inference



GenAI showing a salmon swimming upstream.  
Perhaps how a bear sees it?

TECHNOLOGY | ARTIFICIAL INTELLIGENCE

## Catholic Org 'Defrocks' AI Priest 'Fr. Justin' After It Ok's Baptizing a Baby in Gatorade

AI Priest "Defrocked," Now a Lay Theologian

By Vinay Patel  
X @VinayPatelBlogs  
04/30/24 AT 10:10 AM BST

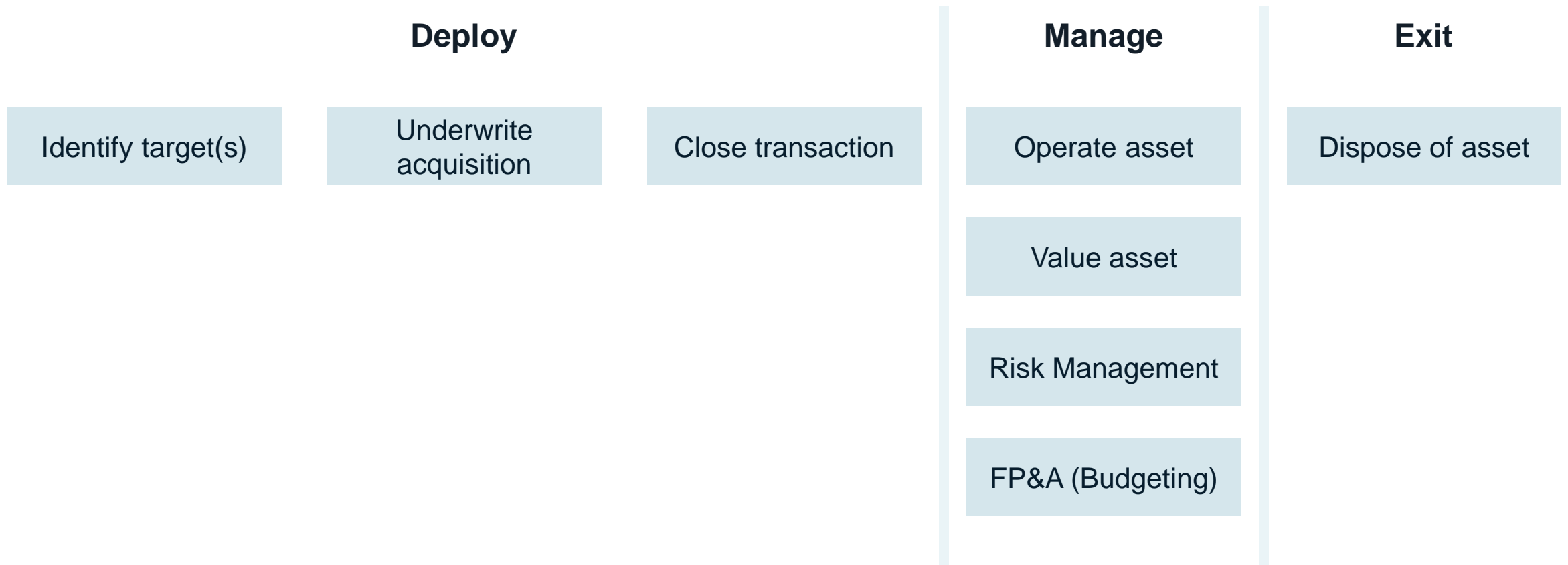
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AI priest "Father Justin" defrocked for wrong advice. (PHOTO: ANTHONY SIDER / TWITTER)

Google and GPT wouldn't let me produce  
an image

# A simplified real estate lifecycle



AI will enhance, reduce costs, and make teams more efficient in all areas of the real estate lifecycle

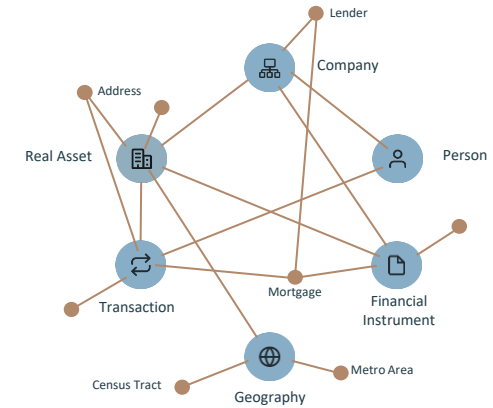


# Opportunity & Risk Identification

## Lender & Owner – Use Case

### The challenge

Identify potential areas for investment based on market over-under valuation, liquidity, and market risk in a way that complemented their existing investment management processes.



### Solution: Unlocking the power of data



**Automated Valuation & Risk Analytics - overvalued and undervalued markets**



**Bespoke Risk Metrics & Third-party data**



**Query data using natural language - produce text, charts, and outputs**

### The Result: Clarity, Insight, and Cost Savings at scale



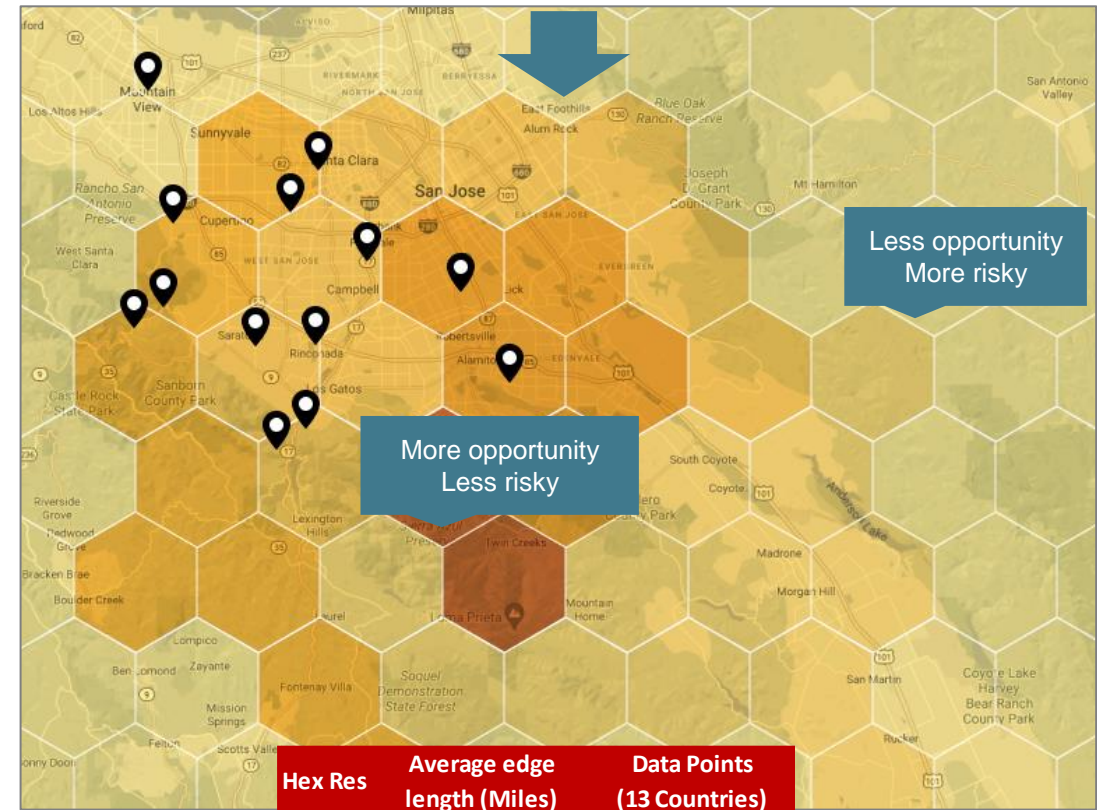
**Identify geographies** for further review based on AVM & comparable sales and liquidity



**Understanding unknown markets or sectors** when expanding globally



**Annual cost and time savings** from targeted data-driven approach



Hex Res	Average edge length (Miles)	Data Points (13 Countries)
3	42.86	4,318.00
4	16.20	26,725
5	6.12	165,407
6	2.31	1,023,736

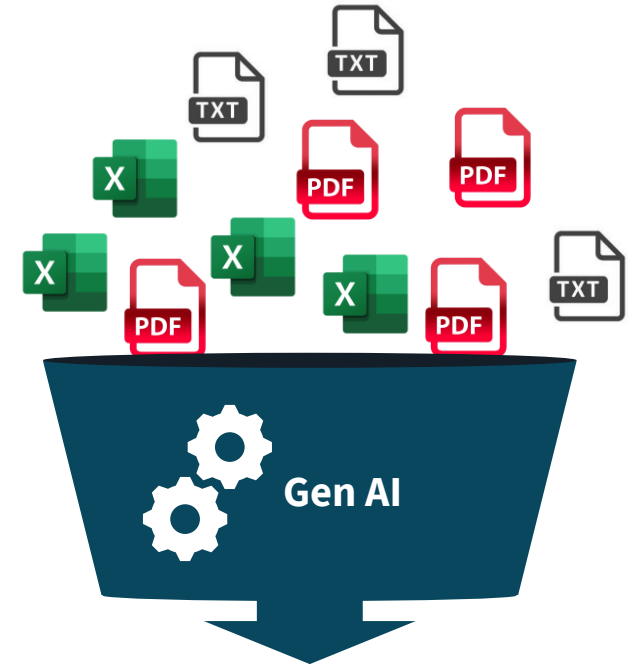
# Data Extraction & Ingestion

## Lender & Owner – Use Case

### The challenge

Extract, organize, and clean data needed for valuation – rent roll, income and expense.

Optimize and manage risk around tenants for probability of default to increase portfolio value.



### Solution: Unlocking the power of data



Extract and organize disorganized data – PDFs, rent rolls, I&E, lease



Find, organize, and correct bad data – rent roll, I&E, etc...



Optimize tenant mix to minimize portfolio risk

### The Result: Clarity, Insight, and Cost Savings at scale



Identify tenants for further review if probable for default



Understanding and Optimize tenant mix



Annual cost and time savings by streamlining data extraction, aggregation and cleaning

Lease Expiration Report														
BULLPEN CRE (Amounts in USD, Measures in SF)														
Tenants	Suite	Lease Period	Lease Status	Expiration Date	Remaining Term	Expiring Area	Building Share %	Base Rent	Base Rent/SF	Market Rent/SF	Rent vs. Market Rent	Effective Rent/SF	Effective Market/SF	Effective Rent vs. Effective Market Rent
<b>FY 2021 Expirations</b>														
2. Thomas Capital	D-325	Base	Contract	5/31/2020	3 Months	1,799.00	1.92%	53,070.50	29.50	29.50	100.00%	29.50	30.12	97.94%
4. Wireless Holdings	D-240	Base	Contract	12/31/2020	10 Months	4,311.00	4.59%	1,448,496.00	336.00	29.50	1138.98%	337.71	251.37	134.35%
5. TNY LLC	D-235	Base	Contract	3/31/2020	1 Month	2,016.00	2.15%	677,376.00	336.00	29.50	1138.98%	336.00	251.11	133.81%
6. Capital Management	D-233	Base	Contract	2/28/2021	1 Year	1,069.00	1.14%	372,012.00	348.00	29.50	1179.66%	348.00	260.09	133.80%
13. True Street Capital	C-220	Base	Contract	11/30/2020	9 Months	1,107.00	1.18%	33,210.00	30.00	29.50	101.69%	30.00	30.48	98.43%
15. Strategy Risk	C-210	Base	Contract	11/30/2020	9 Months	4,108.00	4.38%	121,186.00	29.50	29.50	100.00%	29.50	30.12	97.94%
Total FY 2021 Expirations						14,410.00	15.35%	2,705,350.50	187.74	29.50	636.41%	188.25	144.32	130.45%
<b>FY 2022 Expirations</b>														
3. Super Cuts	D-320	Base	Contract	4/30/2021	1 Year 2 Months	2,152.00	2.29%	62,408.00	29.00	30.39	95.44%	29.50	30.52	96.67%
7. One Mortgage	D-230	Base	Contract	3/1/2021	1 Year 1 Day	1,000.00	1.07%	372,000.00	372.00	30.39	1224.29%	372.00	277.39	134.11%
14. Thomas Homes	C-215	Base	Contract	6/30/2021	1 Year 4 Months	1,350.00	1.44%	37,125.00	27.50	30.39	90.51%	28.00	29.50	94.91%
19. Verizon Group	PAD 1	Base	Contract	9/30/2021	1 Year 7 Months	187.00	0.20%	12,160.56	65.03	66.95	97.13%	66.98	66.95	100.00%
20. TOTR LLC	C-105	Base	Contract	11/30/2021	1 Year 9 Months	2,630.00	2.80%	69,695.00	26.50	30.39	87.21%	34.28	28.95	118.44%
27. Pharma	A-100	Base	Contract	4/30/2021	1 Year 2 Months	8,311.00	8.85%	232,708.00	28.00	30.39	92.15%	28.50	29.80	95.65%
Total FY 2022 Expirations						15,630.00	16.65%	786,096.56	50.29	30.82	163.17%	52.01	46.01	113.02%
<b>FY 2023 Expirations</b>														
1. Rent	D-380	Base	Contract	10/31/2022	2 Years 6 Months	4,327.00	4.61%	114,665.50	26.50	31.30	84.67%	28.26	29.80	94.82%
11. Smart Rent	C-300	Base	Contract	11/30/2022	2 Years 9 Months	11,476.00	12.22%	304,114.00	26.50	31.30	84.67%	28.29	29.83	94.85%
12. Wealth Management	C-225	Base	Contract	10/31/2022	2 Years 8 Months	1,490.00	1.59%	42,837.00	28.75	31.30	91.86%	29.98	31.43	95.39%
23. Company ABC	B-250	Base	Contract	6/30/2022	2 Years 4 Months	9,746.00	10.38%	238,777.00	24.50	31.30	78.28%	25.57	27.91	91.63%
Total FY 2023 Expirations						27,039.00	28.80%	700,393.50	25.90	31.30	82.77%	27.40	29.22	93.77%
<b>FY 2024 Expirations</b>														
9. LA Fitness	D-102	Base	Contract	9/30/2023	3 Years 7 Months	1,675.00	1.78%	58,206.25	34.75	32.24	107.80%	44.69	36.52	122.38%
21. True Wine Bistro	C-102	Base	Contract	4/30/2023	3 Years 2 Months	2,744.00	2.92%	80,948.00	29.50	32.24	91.51%	32.50	33.18	97.95%
Total FY 2024 Expirations						4,419.00	4.71%	139,154.25	31.49	32.24	97.69%	37.12	34.44	107.77%
<b>FY 2025 Expirations</b>														
16. Expansion LLC	C-204	Base	Speculative	3/31/2024		937.00	1.00%	28,578.50	30.50	33.20	91.86%	33.37	33.63	99.21%
17. Farmers Insurance	C-200	Base	Contract	5/31/2024	4 Years 3 Months	1,804.00	1.92%	51,414.00	28.50	33.20	85.84%	31.72	32.77	96.79%
18. Sprint Group	PAD 2	Base	Contract	8/31/2024	4 Years 6 Months	211.00	0.22%	13,911.12	65.93	73.16	90.12%	74.20	73.16	101.43%
25. Leverage LLC	B-200	Base	Contract	3/31/2024	4 Years 1 Month	3,376.00	3.60%	93,684.00	27.75	33.20	83.58%	29.73	31.47	94.46%
26. Fire Company	B-100	Base	Contract	3/31/2024	4 Years 1 Month	15,181.00	16.17%	402,296.50	26.50	33.20	79.81%	28.80	30.57	94.23%
Total FY 2025 Expirations						21,509.00	22.91%	589,884.12	27.42	33.59	81.64%	29.84	31.44	94.89%

# Underwrite & Risk Analytics

## Lender & Owner – Use Case



### The Challenges

An international lender with **1,000 property loan book (\$7bn)** wants to monitor their loan portfolio's property value, liquidity, and market risk every quarter.

An institutional owner with **300 properties** wants a more frequent monitoring of their portfolio that complements their existing investment management processes.

### Solution: Unlocking the power of data



Due Diligence assist persona



Automated Valuation, Risk Analytics & Liquidity Risk – Owner & Competitor

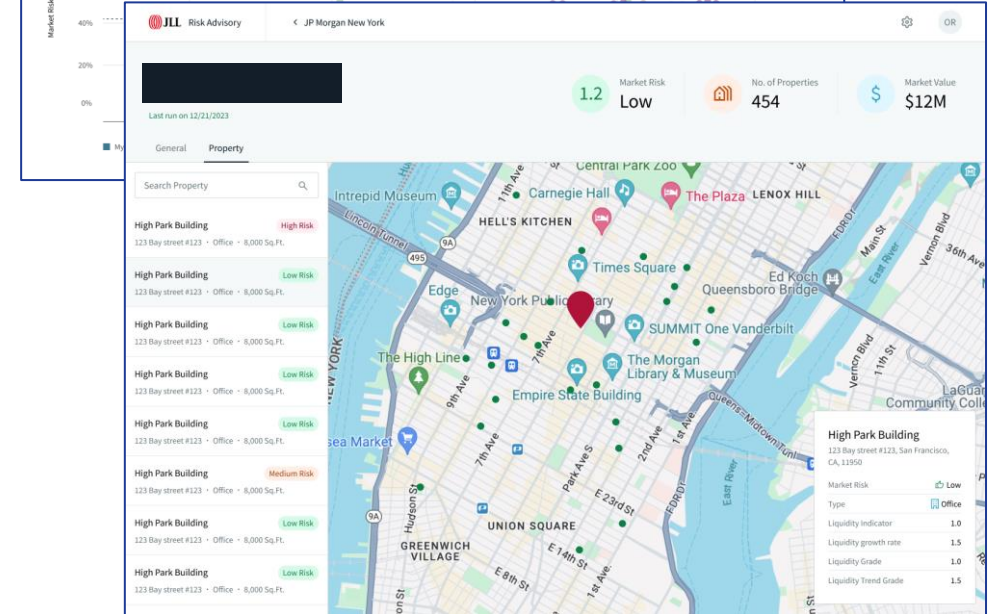
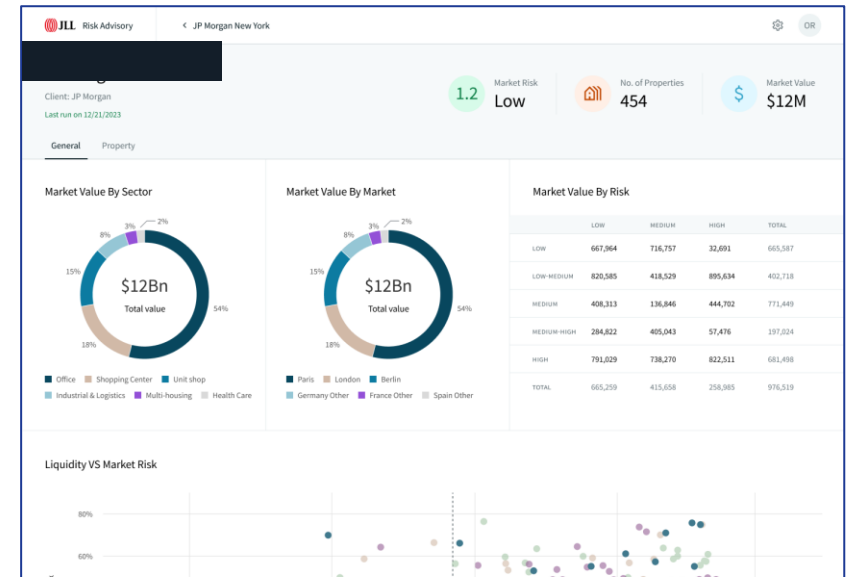


Predict relevant sales comps, market rent, MLA, discount rate, cap rate,...

### The Results: Clarity, Insight, and Cost Savings at scale

- **10-15% identified** for further review
- **Didn't refinance 2-5% of assets** after review
- Reduced further exposure in **2 sectors**
- Estimated 1 FTE in annual **cost savings of USD \$100k**
- Met **climate risk reporting standards** set by regulators

- **Identify assets** for further review based on declining value or increasing risks
- **Exit & Reposition assets** after review
- **Reduce additional exposure** in challenged sectors & geographies
- Annual **cost savings** from targeted data-driven approach
- Understand **how values and risks have changed** since last valuation



# Valuation & Risk Outputs

## Answering CRE Questions, Faster and Easier with Generative AI

### Dashboards

*monitor and manage performance*



### DRAWBACK

*Spend time searching for the answer to your specific question*



#### PERFORMANCE REPORTING

Assessments of desired vs actual performance, and performance drivers



#### PUBLISHED REPORTING

Regularly updated for specific audiences

### Generative AI

*ask specific, tailored questions*



### BENEFIT

*Ask the question the way you want, get an immediate answer, share and collaborate with colleagues*



#### ACCELERATED INSIGHTS

Faster, more tailored analytical experiences



#### QUICKER OUTPUTS

Generate text, charts, and summaries of data.

## Gen AI Outcomes and Benefits

### *Faster Time to Insight*

Accelerate discovery of opportunities and risks.

### *Lower Cost of Insight*

Focus the effort of analysts on well-defined questions

## Prediction

**Dashboards are dead in 18 months?**

# Types of CRE Questions Gen AI Could Answer

*How many properties are in my portfolio?*

*What is my total SF for EMEA?*

*How many leases are expiring in Q1 2025?*

*What is my total cost of occupancy for the Houston Market?*

*Show me the service provider and description for a specific invoice ID*

*What is my total cost of vacancy for office locations?*

*What is my portfolio budget vs spend variance from 2021 to 2023?*

*How many active leases are missing data?*

*Show me the cost categories with the highest increase in spend from 2021 to 2023*

*Show number and average cost per work order for reactive work orders for each property in in 2023.*

*How many active leases are missing data?*

*What is my total cost of vacancy for office locations*

*What is the average cost / area for industrial leases in the United States?*

*What is my available capacity if I change my sharing ratio heads per seat?*

*Show the annual ratio of invoices taking longer than 60 days to be approved vs total number of invoices received from 2020 to 2023*

*How might I optimize my office portfolio for locations in Texas?*

## **Examples Trending:**

- Portfolio Optimization
- Maintenance Benchmarking
- Vendor Spend Optimization
- Facilities Management Budget Health-Check
- Preferred Supplier Managed Spend
- Procurement Cost Savings
- Analysis (e.g., Incident Trends, Leases, Work Order Costs, etc.)
- Data Validation and Health Checks (e.g., Portfolio Strategy, Asset Management, etc.)

# Risk Analytics Journey

Today & Tomorrow – Faster, stronger, and better.

**Data**



**Insight**



**Action**

	<b>Data</b>	<b>Insight</b>	<b>Action</b>
<b>Today</b>	<ul style="list-style-type: none"> <li>• Structured only</li> <li>• Fragmented</li> <li>• Limited</li> <li>• Isolated</li> </ul>	<ul style="list-style-type: none"> <li>• Descriptive &amp; diagnostic (dashboards)</li> <li>• Basic CRE Risk Models (AVMs)</li> <li>• Deterministic - \$5m</li> </ul>	<p>Elementary Predictive</p> <ul style="list-style-type: none"> <li>• What has happened?</li> <li>• Why did it happen?</li> <li>• What might happen?</li> </ul>
<b>Tomorrow</b>	<ul style="list-style-type: none"> <li>• AI to structure unstructured data</li> <li>• AI to connect data</li> <li>• Deeper &amp; broader data sources               <ul style="list-style-type: none"> <li>○ Property</li> <li>○ Tenant</li> <li>○ Financial</li> <li>○ Bids</li> <li>○ Images</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Descriptive, diagnostic, predictive, and prescriptive (Generative AI)</li> <li>• Advanced CRE Risk models with cascade               <ul style="list-style-type: none"> <li>○ Explain-ability &amp; scenario analysis</li> <li>○ Better data</li> <li>○ Sentiment analysis</li> <li>○ Image analysis</li> </ul> </li> <li>• Statistical outputs - Stochastic/monte-carlo – 90% probability between \$4.5-5.5m</li> </ul>	<p>Predictive and prescriptive</p> <ul style="list-style-type: none"> <li>• What is likely to happen?</li> <li>• What action should be taken?</li> </ul>

Proprietary data and ability to blend data sources will be a differentiating asset and create sustainable advantage. AI needs to overcome ‘inference’ challenges to make prescriptive recommendations, so people are still needed.

# Risks created by AI and mitigations

Risk	<h2>Reliability</h2> <p>AI systems might not produce the same results from the same inputs</p> <hr/> <p>Robust QA practices, including human review before critical actions are taken</p>	<h2>Systemic bias</h2> <p>AI systems may embed systemic bias – Availability and Sampling</p> <hr/> <p>Use representative datasets. Continually Monitor and remediate bias.</p>	<h2>Data privacy</h2> <p>AI (Gen AI especially) can leak data across systems.</p> <hr/> <p>General privacy best practices. Ensure separation of data between training and inferencing.</p>	<h2>Regulation</h2> <p>Regulation of AI is rapidly evolving across jurisdictions.</p> <hr/> <p>Establish AI governance practices. Regularly review for compliance.</p>	<h2>Cost &amp; Data</h2> <p>AI systems can be expensive to implement and maintain and get needed data.</p> <hr/> <p>Plan and budget for AI initiatives. Conduct cost-benefit analyses for viability and explore partnerships</p>
Mitigation					

# Appendix

# JLL's unrivalled real-time data

## Make informed decisions, efficiently, and with confidence

JLL strategic risk advice is based on a globally connected data platform. Risk Advisory's decision-making tools leverage best-in-class market data from JLL's Capital Markets, Value and Risk Advisory, and Research teams.

**70+ / 400+**

Countries / Markets Tracked

**\$32T+**

Institutional RE Stock

**300+**

Data sources

**3,000+**

Price indices

**1.4M+**

Monitored Properties

## Access to transaction data

**\$3.2 T+** Bid Volume (Last 3 years)

**\$16T+** Transactions Volume (Last 5 years)

**5,000+** RE Funds Tracked

**35,000+** Bids (Last 3 years)

**1.5M+** Historical Sales Transactions (20+ years)

**\$35T+** Total Deal Value

# The Power of AI Today

With 40+ projects underway, JLL is developing game-changing AI applications for commercial real estate

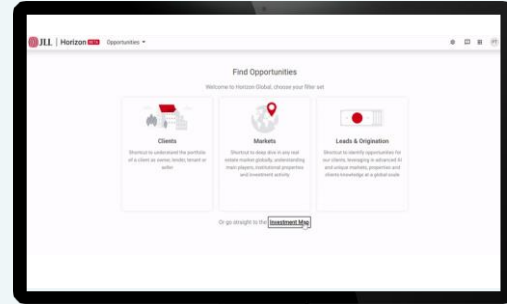
## JLL GPT



### CRE's first-ever large language learning model

Deliver faster and smarter insights to clients and increase efficiency with over 100,000+ JLL team members accessing the tool

## Horizon



### Predict CRE opportunities before they occur

Identify buy/sell opportunities, analyze portfolios and generate strategic off market transactions with more than 25 trillion data points

## Hank



### Optimize energy efficiency to reduce annual energy costs 20-30%

Make real-time micro-adjustments that continuously optimize all HVAC equipment in a building – helping to reduce energy consumption, maximize tenant comfort, and exceed indoor air quality standards.

## 3D Viz



### Visualize the potential of any current or future office space

Create 3D virtual tours using by simply using a floorplan or a CAD. The video can be shared and customized to suit the client's design preferences and building specs.

# We are just getting started

Our approach is built on data, technology, and continuous innovation

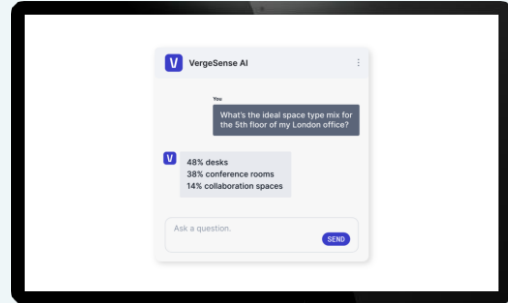
## OpenSpace



### AI 360° Project Updates

Artificial intelligence is used to automatically create navigable, 360° photo representations of job sites

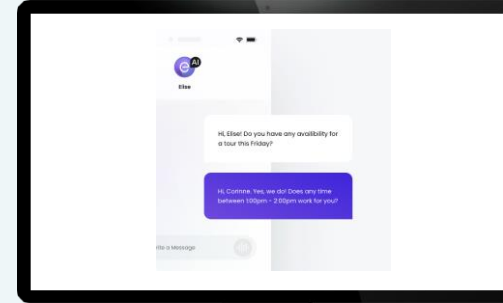
## VergeSense



### A chat interface for clients to generate portfolio insights

A chat interface super charged with ChatGPT for clients to get answers about how to best optimize their spaces and portfolio

## EliseAI



### Manage hundreds of conversations and operational processes

All-in-one AI platform that enables owners and property managers to manage prospects and residents with conversational AI to answer emails, texts, chat, and phone calls — all within minutes.

## JLL Hackathon



### A key part of JLL's culture of innovation and technology

The JLL Global Hackathon's company-wide competition has an exclusive focus on Generative AI innovation to fuel new ideas.



## *Disclaimer*

For over 200 years, JLL (NYSE: JLL), a leading global commercial real estate and investment management company, has helped clients buy, build, occupy and invest in a variety of commercial, industrial, hotel, residential and retail properties. A Fortune 500 company with annual revenue of \$20.9 billion and operations in over 80 countries around the world, our more than 103,000 employees bring the power of a global platform combined with local expertise. Driven by our purpose to shape the future of real estate for a better world, we help our clients, people and communities SEE A BRIGHTER WAY. JLL is the brand name, and a registered trademark, of Jones Lang LaSalle Incorporated. For further information, visit [jll.com](https://www.jll.com).

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