



The ROI of AI Is (Usually) There - Let's Run the Numbers

Presented by: William McKnight

"#1 Global Influencer in Big Data" Thinkers360

President, McKnight Consulting Group

3 X Inc 5000



 /in/wmcknight

www.mcknightcg.com
(214) 514-1444



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Dataversity Analytics Architecture with William McKnight 2025

1. 2025 Trends in Analytic Architecture
2. Standardizing Data Collaboration: The Role of Open Table Formats in Data Architecture
3. From Models to Data: How Gen AI is Changing the Game for Data Scientists and Data Teams
4. The Rise of Automated MDM: How AI and Machine Learning are Revolutionizing Master Data Management
5. The Data Observability Advantage: Unlocking the Secrets to Reliable, High-Quality Big Data
6. Promising AI Use Cases for the Enterprise in 2025
7. Edge Computing Evolved: Introducing the Zero-DBA, Zero-ETL Embedded Database
8. **The ROI of AI is (usually) there – Let's Run the Numbers**
9. Translytical Databases: A Framework for Evaluation and Use Case Analysis
10. From Pre-Trained to Fine-Tuned: How to Get the Most Out of Vector, RAG, and Small Language Models
11. Designing a Data Platform for the Future: Principles, Patterns, and Best Practices for Data Fabrics and Data Meshes
12. AIOps: Applying DevOps to Competitive Advantage

McKnight Consulting Group Partial Technology Implementation Expertise

Big/Analytic/Vector/Mixed Data Management



Data Movement and APIs



Data Management

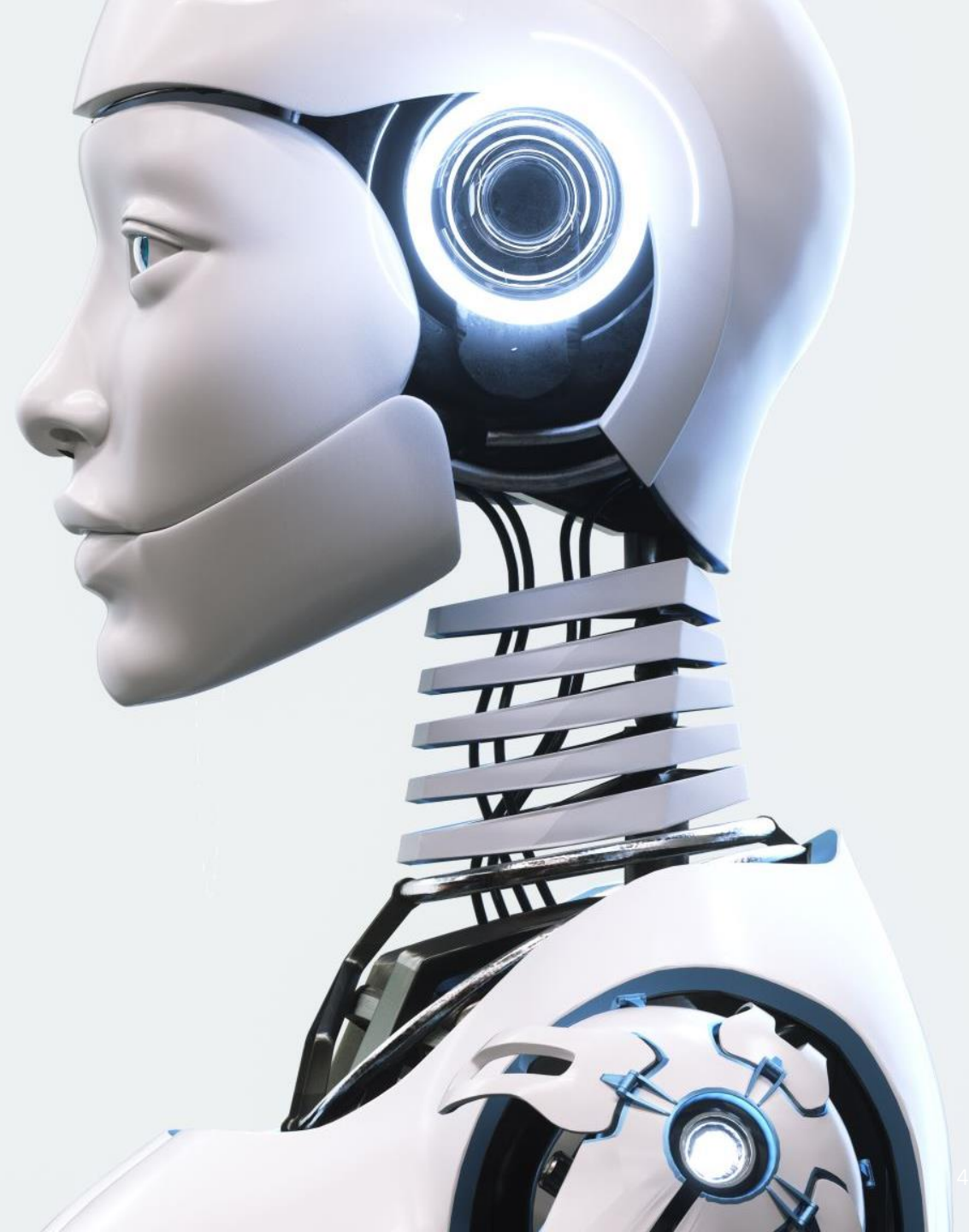


Operational/Transactional Data Management



AI in the last 12 months

- Agentic AI
- Enhanced Intelligence and Reasoning Capabilities
- Multimodality
- Industry-Specific Applications
- Increased Transparency
- Hardware Innovation
- Staff Acceptance
- Categories of implementation haven't changed much



Categories of AI Implementations and Use Cases include

- Drug Discovery
- Financial Research
- Automated Customer Service
- Predictive Maintenance in Manufacturing
- Fraud Detection in Finance
- Personalized Marketing
- Supply Chain and Inventory Management
- AI in Healthcare for Diagnosis and Treatment
- Content Creation and Management
- Cybersecurity and Risk Management



Promising AI use cases for the enterprise in 2025 1/3

- **Drug Discovery:** AI is revolutionizing this field by **accelerating the identification of potential candidates**, improving accuracy, and streamlining data analysis. It helps predict drug efficacy and safety, reducing costly failures by analyzing genomic, chemical, and clinical data to identify patterns.
- **AtomWise** uses **Agentic AI** and convolutional neural networks to identify potential drug candidates, leading to more "hits than misses" and reducing the need for extensive experimental screening.
- **Moderna** employs AI to accelerate therapeutic development, aiding in genetic and protein data analysis, drug target identification, mRNA therapeutic design, vaccine efficacy prediction, and manufacturing optimization.
- **Financial Research:** AI transforms the financial industry by **unlocking insights from vast amounts of data**, predicting market movements, and optimizing investment decisions. It analyzes financial news and reports to identify risks and opportunities, enabling data-driven decisions.
- **Bloomberg** has integrated **AI-powered earnings call summaries** into its terminal platform, enhancing efficiency for financial analysts and investors.
- **Moody's** utilizes an **AI-powered research assistant** to help analysts research companies, industries, and market trends.
- **Automated Customer Service:** AI-powered chatbots and virtual assistants are crucial for businesses, leading to increased engagement and conversion rates. The integration of **generative AI** is seen as a strategic imperative for innovation, efficiency, and sustainability.
- **Brings Home** reported a boost in average direct-to-consumer (DTC) package size and revenue through their AI-driven program.
- **Osopecta** (a GRC company) uses AI in compliance software to analyze documents for adherence to regulations, improving efficiency and reducing the likelihood of failures.
- **Zurich Insurance's** chatbot, "Zara," which understands 12 languages, has led to a **20% increase in customer engagement**, an **80% resolution rate for policy inquiries**, and a **four-times return on investment within one year**.
- **Predictive Maintenance in Manufacturing:** AI algorithms develop maintenance plans, **increase production uptime**, and optimize asset performance. This often involves using **digital twins**—virtual replicas of machines, assembly lines, or entire factories—for optimization and troubleshooting, allowing for testing maintenance scenarios

Promising AI use cases for the enterprise in 2025 2/3

- **Supply Chain and Inventory Management:** AI improves logistics by **predicting demand, optimizing inventory**, and identifying efficient delivery routes and mechanisms. It anticipates fluctuations, assesses risks, and optimizes the overall supply chain structure.
- **Nordstrom** uses its analytical platform to analyze sales data, customer behavior, and external factors (like weather) to determine optimal product placement across stores and distribution centers.
- **H&M** employs AI to analyze historical sales data, market trends, and external factors to predict customer demand, minimizing overstocking and ensuring high-demand items are in stock and optimally placed.
- **Healthcare for Diagnosis and Treatment:** AI solutions are transforming the delivery of medical services by **enhancing patient care, diagnosis, and treatment**. AI can assist with triage, X-ray analysis, and chart review.
- **Freome**, a startup, uses AI to **detect cancer with 93% sensitivity**, surpassing current pancreatic cancer tests, and helps in tailoring treatments based on individual genetic makeup.
- **Cybersecurity and Risk Management:** AI systems provide real-time threat detection, enable swift incident response, continuously assess and mitigate risks, enhance identity verification, prevent fraud, and automate security operations.
- **Netflix** employs AI to monitor systems, detect inefficiencies, identify looming threats, and prevent disruptions, with algorithms monitoring network traffic and user behavior.
- **Uber** uses AI algorithms to analyze vast amounts of data to identify fraudulent rides, payments, and driver accounts, ensuring safety and monitoring for emerging threats.
- **Content Creation and Management**

Promising AI use cases for the enterprise in 2025 3/3

- **X Shami Oo** operates a "dark factory" in China, a **fully autonomous manufacturing facility** that produces smartphones 24/7 without human intervention, leveraging AI and robotics for unparalleled efficiency.
- **GE** monitors aircraft engines using numerous sensors and AI to detect potential failures based on factors like vibration, temperature, and pressure.
- **Rockwell Automation** uses AI to streamline manufacturing by analyzing sensor data to predict equipment failures and recommend preventative maintenance.
- **Fraud Detection in Finance:** AI systems are crucial for analyzing transactions and identifying anomalies to **prevent fraudulent activities in real time**. This involves machine learning, anomaly detection, real-time monitoring, and identity verification.
- **JP Morgan Chase** employs hundreds of data scientists and machine learning models for credit risk assessment, fraud detection, assessing credit risk and managing market volatility.
- **EnTrust** (formerly OnFIDO) uses AI to analyze documents for authentication, such as matching a selfie to an ID photo, significantly helping with authorization and authentication.
- **Personalized Marketing:** AI revolutionizes customer interaction by enabling hyper-targeted **marketing experiences**. It can consider factors like location, age, or income for pricing strategies while helping companies remain compliant with regulations.
- **Spotify** uses AI for popular features like "Discover Weekly" and "Release Radar" to curate personalized music lists based on user preferences.
- **Starbucks** utilizes "Deep Brew," a system that employs machine learning to analyze customer behavior, sales patterns, and market trends, enabling data-driven decisions for targeted promotions and menu recommendations.

For more, go to
<http://tiny.cc/mcknightai>

Difficulty of AI Strategy and Showing ROI is Choking IT Spend

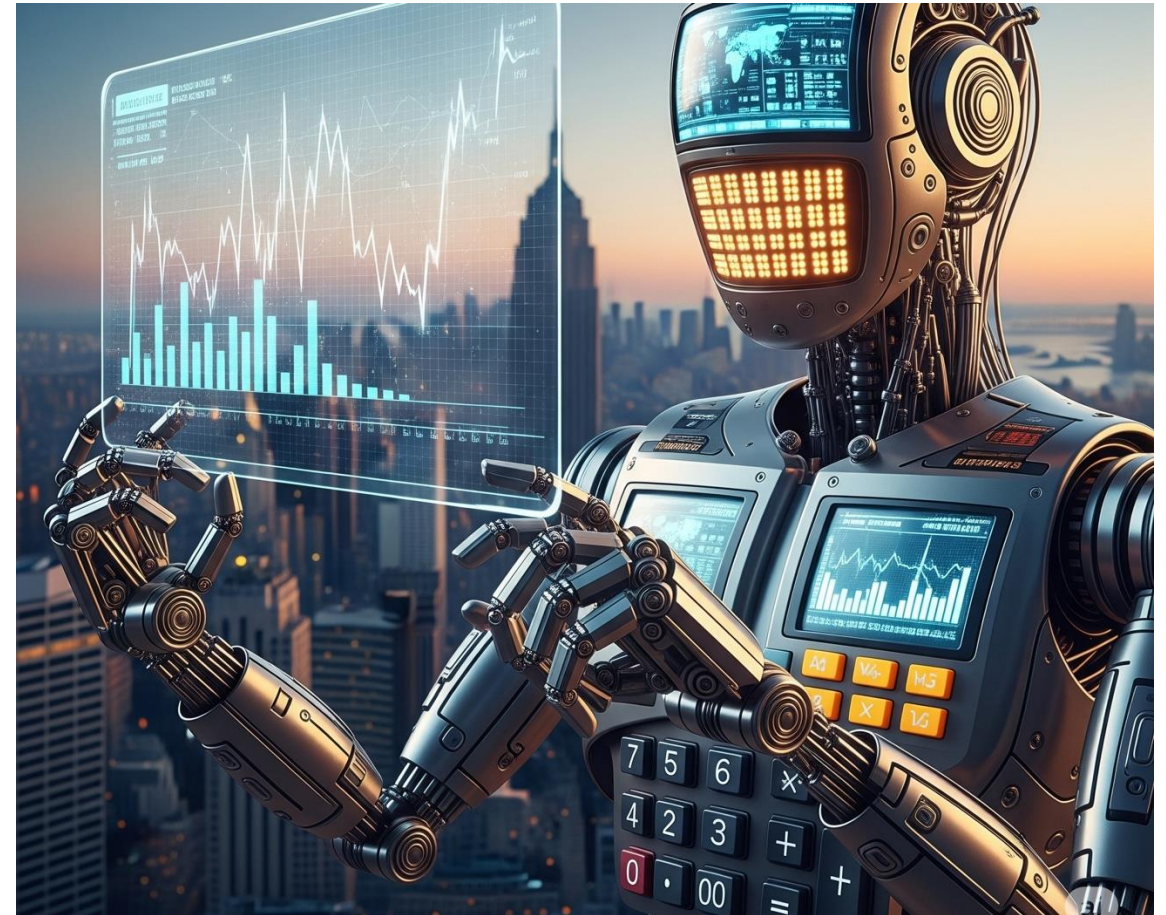
- Cautious outlook for IT spending for the remainder of the year and into 2026, with economic uncertainty and the need to “figure out what to do with AI” slowing the pace of spend.
- Technology companies report results flat or behind plan, with economic volatility and the complexity of defining an AI strategy in a rapidly evolving market driving slower spend.
- The majority of companies have yet to build out a coherent AI strategy
 - Need to get their data estates in order
- AI Investment is “limited and cautious”
 - With many “dipping their toes in” to find value that justifies the cost



A Return on Investment Foundation

Acknowledging the Strategic

- To gain a competitive advantage
- To increase market share
- To develop new products or services
- To enter new markets
- To increase brand recognition
- To increase customer loyalty
- To increase efficiency
- To improve customer service
- To develop new technologies



Workloads

- Divide and conquer
- Different objectives
- Not overlapping
- No gaps



Ordered Benefits: What Makes it Difficult

Benefits can be direct or indirect

- First order benefits have a direct relationship to the bottom line
- Second order benefits have an indirect relationship
 - The system will enable an activity that in turn provides the benefit
- Third order benefits have a transitive relationship
 - The system enables an activity that allows performance of another activity which actually provides the benefit

The Current State of Justification



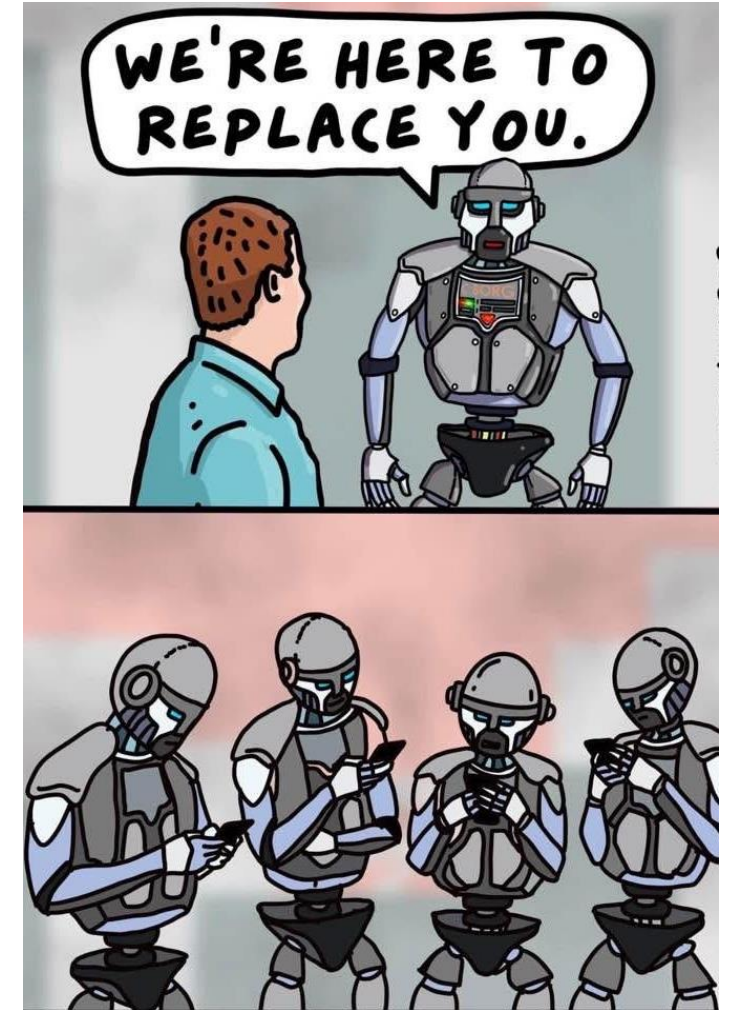
- We're good at
 - Tasks and activities
- We're not so good at
 - Realistic returns (overconfidence)
 - Risk
 - Costs
 - Timelines

Programs and Projects

- Justifying a Project
 - Seen as a stand-alone project
 - Built for one application
- Justifying a Program
 - Enterprise data
 - Inclusion based on governance
 - The goal of the program is to enable the data component of the projects it supports

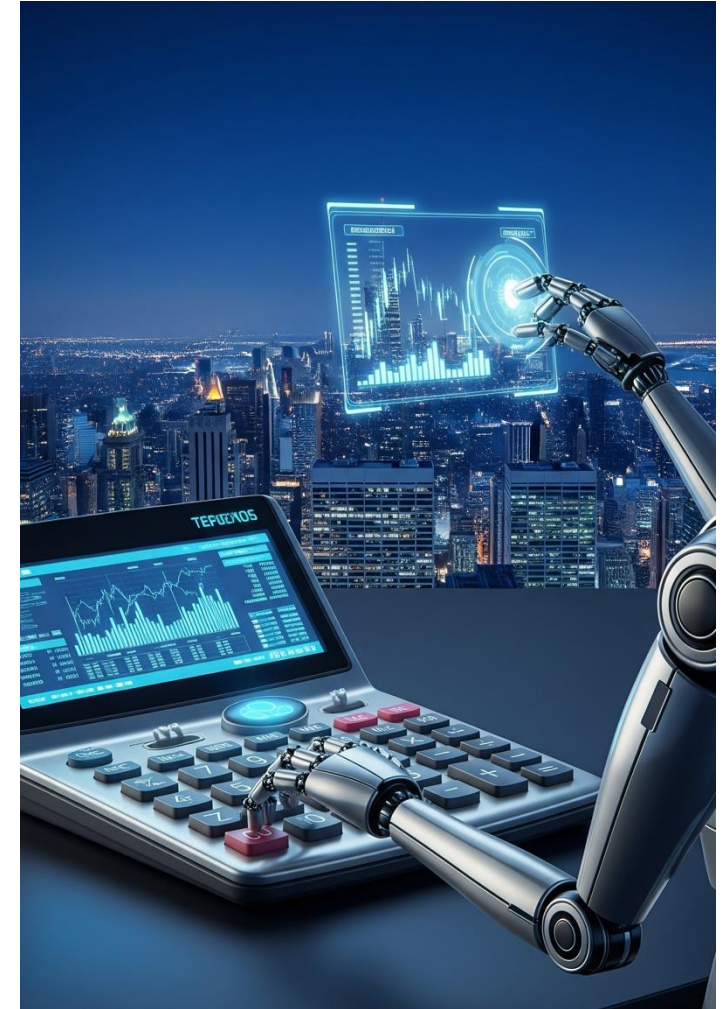
Return on Investment (ROI)

- $(\text{Returns} - \text{Investment}) / \text{Investment}$
- ROI should always be supported with a time period (i.e. 132% return in 3 years)
- ROI should be presented with assumptions and risks and be itemized
- Used for Predicting and Measuring



Tangible versus Intangible Returns

- Tangible Returns - Returns you decide to measure
 - More activities have a measurable return than you may think
 - Usually 1-2 returns are reasonable to measure for each phase
- Intangible Returns - Returns you decide not to measure
 - These will (probably) not justify AI efforts



Need to Know



- **Discount Rate**
- **Duration**
 - **2-4 Years**
- **Time Blocks**
 - **Minimum: Quarter**
 - **Suggestion: Half-Year**

ROI Sample

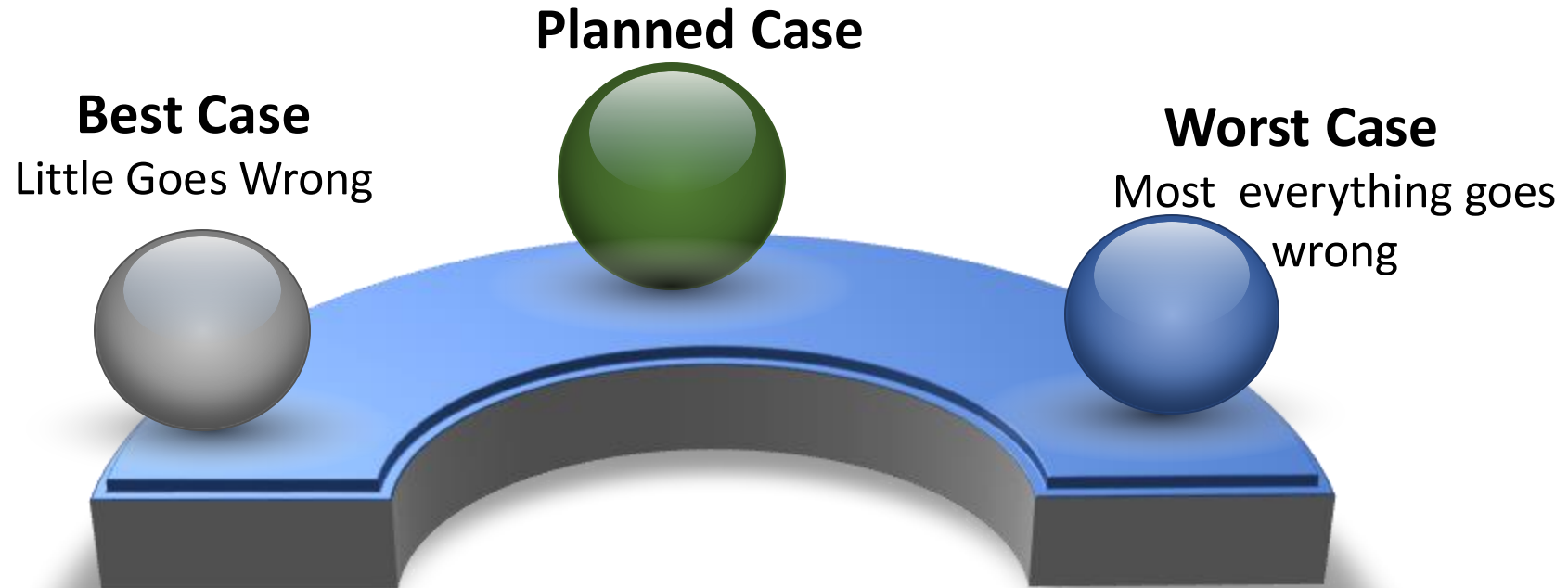
	Total	Year 1	Year 2	Year 3
Cost savings	\$140,000.00	\$0.00	\$60,000.00	\$80,000.00
Financial Return	\$140,000.00	\$0.00	\$60,000.00	\$80,000.00
Infrastructure	\$120,000.00	\$100,000.00	\$10,000.00	\$10,000.00
Investment	\$120,000.00	\$100,000.00	\$10,000.00	\$10,000.00
ROI		-100.00%	-45.45%	16.67%

Break Even, IRR and NPV

	Year 1	Year 2	Year 3
ROI	-100.00%	-45.45%	16.67%
Cash Flow	-\$100,000.00	\$50,000.00	\$70,000.00
Cumulative Cash Flow (Break Even)	\$100,000.00	-\$50,000.00	\$20,000.00
IRR	0%	-50%	12%
NPV @ 4% Discount Rate	(\$96,153.85)	(\$49,926.04)	\$12,303.71

Presenting the Possibilities

For each suggested project, present multiple possible scenarios along with the odds of that scenario happening, forming a probability distribution





AI Return on Investment

AI Automated Customer Service ROI Model

- The goal of automated customer service, often powered by AI chatbots and virtual assistants, is to improve efficiency, enhance customer experience, and ultimately drive business value.
- The integration of generative AI is viewed as a "strategic imperative" for innovation, efficiency, and sustainability in this domain.
- Theoretical ROI Model: AI for Automated Customer Service
- Let's assume a hypothetical mid-sized enterprise implementing an AI-powered customer service chatbot over a one-year period, similar to the timeframe Zurich Insurance reported their returns.

Estimated Costs (Year 1)

1. AI Platform & Software Licensing:

- This includes the core chatbot platform, access to Large Language Models (LLMs), and necessary data management tools.
- Informatica, for example, offers an intelligent data management cloud that leverages AI co-pilots and agents for data orchestration, quality, and governance, which would be crucial for a robust AI customer service system.
 - **Estimated Cost: \$150,000** (This is a hypothetical figure for platform and core software licenses).

2. Development & Integration (Talent & Services):

- Building, customizing, and integrating the AI chatbot with existing enterprise systems (e.g., CRM, knowledge bases, ERP).
- This requires skilled personnel like data scientists, machine learning engineers, and developers.
- Projects of this nature can take "5 months" on average to develop, test, validate, deploy, and scale an analytical model.
- The current talent pool for AI is "insufficient and highly valued," implying higher labor costs.
 - **Estimated Cost: \$400,000** (This hypothetical figure accounts for the salaries of specialized talent and potential external consultancy fees for a ~5-month project).

Estimated Costs (Year 1)

3. Data Preparation & Governance:

- AI models are only as good as the data they consume.
- Costs are incurred for cleaning, standardizing, securing, and governing the vast amounts of enterprise data that the chatbot will access to provide relevant and accurate responses.
- This includes ensuring data quality, accuracy, and adherence to governance rules (e.g., not exposing sensitive financial data to marketing personnel).
 - **Estimated Cost: \$75,000** (This hypothetical figure covers efforts in data quality, metadata management, and establishing governance frameworks).

4. Hardware & Infrastructure (Cloud Computing):

- The computational power and storage needed for AI models, especially those handling high volumes of customer interactions.
- Cloud-based solutions offer benefits like "automatic scaling" and "serverless scaling," which can optimize costs, but still represent an expense.
 - **Estimated Cost: \$50,000** (This is a hypothetical annual cloud infrastructure cost).

Estimated Costs (Year 1)

5. Training & Change Management:

- Training existing customer service staff to work alongside AI, manage AI agents, and handle escalated queries. Organizational change management is crucial for "staff acceptance" of AI.
 - **Estimated Cost: \$30,000** (This hypothetical figure covers training programs and change management initiatives).

6. Ongoing Maintenance & Human Oversight:

- Continuous monitoring, fine-tuning, and updating of the AI model. While AI aims for automation, a "human in the middle approach" is essential for the "foreseeable future," particularly for complex or sensitive interactions.
 - **Estimated Cost: \$145,000** (This hypothetical figure covers technical support, model retraining, and partial human oversight for escalations).
- **Total Estimated Costs for Year 1: \$150,000 + \$400,000 + \$75,000 + \$50,000 + \$30,000 + \$145,000 = \$850,000**

Estimated Benefits (Quantifiable for Year 1)

1. Labor Cost Savings (Reduced Call Center Volume):

- AI chatbots can handle a significant portion of routine inquiries, reducing the need for human agents. Zurich Insurance's chatbot "Zara" achieved an "80% resolution rate for policy inquiries" without human involvement, leading to "saved labor".
- *Hypothetical Scenario:* An enterprise receives 1,000,000 customer inquiries annually. If the AI resolves 80% (800,000) of these inquiries, and the average cost per human-handled inquiry is \$4.00
 - **Estimated Benefit:** $800,000 \text{ inquiries} * \$4.00/\text{inquiry} = \mathbf{\$3,200,000}$

2. Increased Revenue (Customer Engagement & Acquisition):

- AI-powered personalization and efficient service can lead to higher customer engagement and conversion rates.
- Brinks Home, a security company, reported a "boost in average DTC package size and revenue" through their AI-driven program. Zurich experienced a "20% increase in customer engagement" and claimed they "upsized customers" and "got new customers".
- *Hypothetical Scenario:* Assume a 2% increase in overall revenue due to improved customer engagement, personalized promotions, and enhanced acquisition efforts.
- If the enterprise's annual revenue is \$50,000,000 (This is a hypothetical figure *not provided in the sources*), then:
 - **Estimated Benefit:** $\$50,000,000 * 2\% = \mathbf{\$1,000,000}$

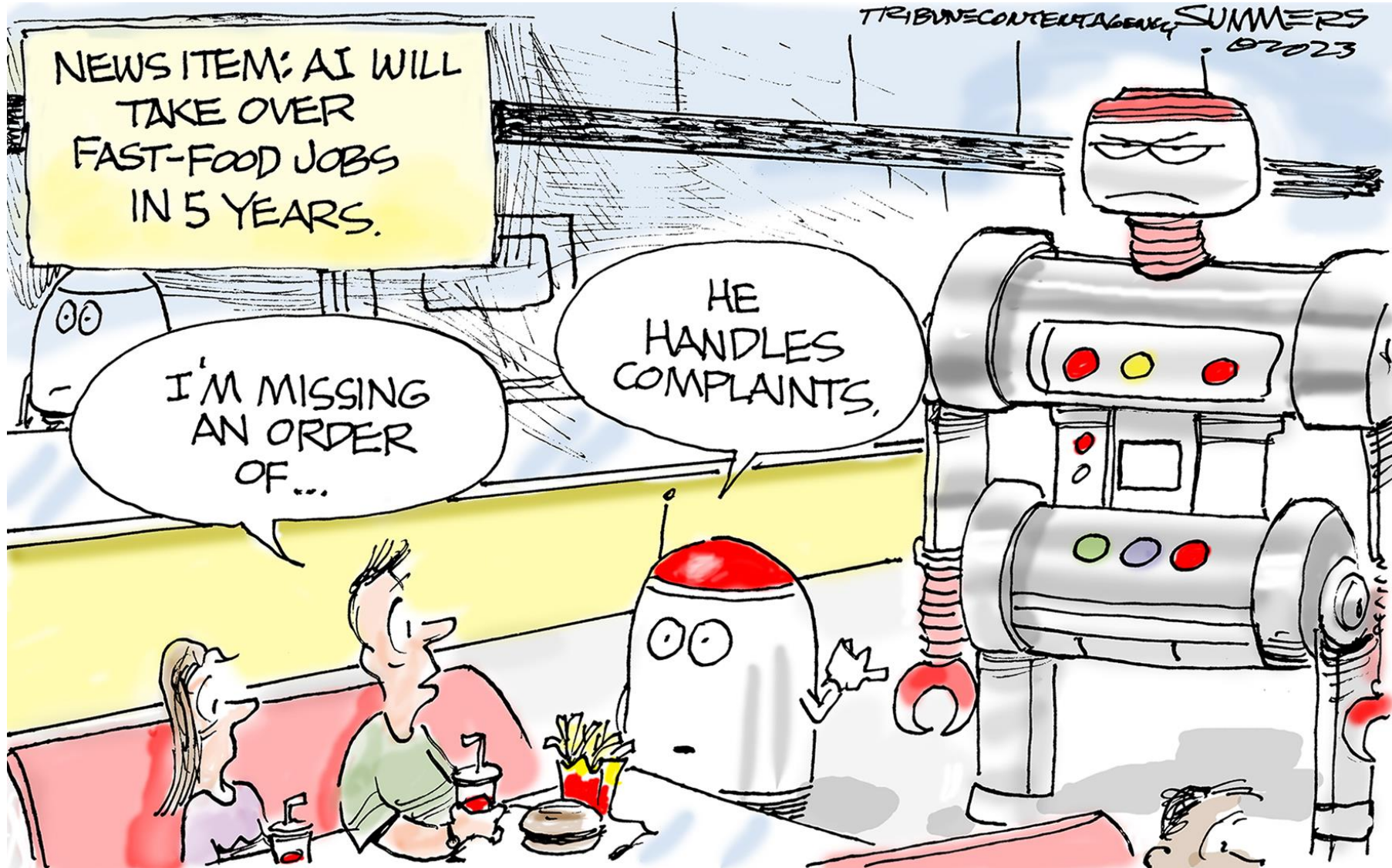
Estimated Benefits (Quantifiable for Year 1)

3. Improved Customer Retention & Satisfaction:

- Faster response times, 24/7 availability, and consistent service improve overall customer satisfaction, which indirectly leads to higher retention and lifetime value.
- Zurich also stated they "retained customers". While harder to quantify directly, it can translate into reduced churn and increased loyalty.
- *Hypothetical Scenario:* Assume a small quantifiable benefit from reduced customer churn due to improved service, perhaps 0.5% reduction in churn on a customer base valued at \$10,000,000 annually (This is a hypothetical figure *not provided in the sources*).
 - **Estimated Benefit:** $\$10,000,000 * 0.5\% = \$50,000$
- **Total Estimated Quantifiable Benefits for Year 1: \$3,200,000 (Labor Savings) + \$1,000,000 (Increased Revenue) + \$50,000 (Improved Retention) = \$4,250,000**

Calculate Theoretical ROI

- **ROI = (\$4,250,000 - \$850,000) / \$850,000 * 100% ROI = \$3,400,000 / \$850,000 * 100% ROI = 4 * 100% = 400%**
- **Important Considerations and Caveats:**
 - **Data Foundation Maturity:** A strong data foundation, including quality, governance, and accessibility, is crucial for the success of AI initiatives and impacts costs and returns significantly.
 - **Project Management:** Effective project management is paramount to achieving the desired ROI.
 - **Evolving AI Landscape:** The rapid evolution of Agentic AI, where AI agents autonomously complete complex tasks, could further accelerate deployment and potentially reduce project thereby impacting the cost side of the ROI equation in the future.
 - **Non-Quantifiable Benefits:** This model focuses on quantifiable financial returns. However, AI also provides non-quantifiable benefits such as enhanced decision-making capabilities, improved security, and a competitive advantage ("creating a moat"), which contribute to long-term business success.



Estimated Costs (Year 1)

1. AI Platform & Software Licensing:

- This encompasses the core AI/machine learning platform, specialized fraud detection software, and potentially access to large language models (LLMs) for analyzing unstructured data relevant to fraud.
- Informatica's Intelligent Data Management Cloud (IDMC) is an example of a platform that leverages AI co-pilots and agents for robust data orchestration, quality, and governance, which are crucial for such a system.
 - **Estimated Cost: \$500,000** (This is a hypothetical figure for platform and core software licenses for a large enterprise, not directly from sources).

2. Development & Integration (Talent & Services):

- Building, customizing, and integrating the AI system with existing financial infrastructure (e.g., transaction systems, customer databases, identity verification tools).
- This requires a highly valued and often "insufficient" talent pool of data scientists and machine learning engineers. JP Morgan Chase, for instance, employs over 200 such professionals dedicated to security and fraud detection. AI projects typically take "5 months" on average to develop, test, validate, deploy, and scale analytical models.
 - **Estimated Cost: \$1,500,000** (This hypothetical figure accounts for the salaries of specialized talent and potential external consultancy fees for a complex, large-scale integration, not directly from sources).

3. Data Preparation & Governance:

- The efficacy of AI models is directly tied to the quality and governance of the data they consume. Costs include cleaning, standardizing, securing, and governing vast volumes of sensitive financial transaction data and customer information. This ensures data accuracy and adherence to "governance rules," such as preventing unauthorized access to sensitive finance data.
 - **Estimated Cost: \$300,000** (This hypothetical figure covers extensive efforts in data quality, metadata management, and establishing robust governance frameworks for sensitive financial data, not directly from sources).

Estimated Costs (Year 1)

4. Hardware & Infrastructure (Cloud Computing):

- The computational resources and storage necessary for processing massive amounts of data in real-time and running complex AI algorithms. Cloud-based solutions are advantageous for their "automatic scaling" and "serverless scaling" capabilities, which efficiently handle fluctuating transaction volumes.
 - **Estimated Cost: \$200,000** (This is a hypothetical annual cloud infrastructure cost for a high-volume system, not directly from sources).

5. Training & Change Management:

- Training existing fraud analysts, security personnel, and customer service teams to effectively utilize the new AI system, interpret its outputs, and manage escalated cases. "Staff acceptance" of AI is a key reality requiring organizational change management.
 - **Estimated Cost: \$100,000** (This hypothetical figure covers training programs and change management initiatives for a large team, not directly from sources).

6. Ongoing Maintenance, Model Retraining & Human Oversight:

- Continuous monitoring, fine-tuning, and updating of the AI model are crucial as "fraudsters are constantly evolving their tactics". An "AI fraud detection system can learn and adapt to new fraud patterns".
 - **Estimated Cost: \$400,000** (This hypothetical figure covers technical support, significant model retraining, and human oversight for investigations, not directly from sources).
- **Total Estimated Costs for Year 1: \$500,000 + \$1,500,000 + \$300,000 + \$200,000 + \$100,000 + \$400,000 = \$3,000,000**

Estimated Benefits (Quantifiable for Year 1)

1. Reduced Financial Losses from Fraud:

- AI systems "analyze transaction patterns to identify and prevent fraudulent activities in real time". They are used by companies like JP Morgan Chase to "detect fraudulent activities, assess credit risk, and manage market volatility".
- *Hypothetical Scenario:* A large financial institution experiences \$100 million in annual fraud losses. With a robust AI system, it's hypothetically able to prevent 15% of these losses that might have gone undetected or unprevented by traditional methods (This is an assumption *not provided in the sources* and would vary widely).
 - **Estimated Benefit:** $\$100,000,000 * 15\% = \mathbf{\$15,000,000}$

2. Increased Operational Efficiency / Labor Cost Savings:

- AI automates real-time risk assessment, transaction authorization, network analysis, and identity verification. This significantly reduces the manual effort required for reviewing suspicious transactions and managing incidents. Entrust's technology, for example, verifies customers "in seconds" by comparing a selfie to an ID document. Uber's algorithms analyze data to "automate incident response tasks".
- *Hypothetical Scenario:* Assume a 20% reduction in the person-hours dedicated to manual fraud review and incident response due to AI automation. If the annual cost of the fraud detection department's labor is \$5,000,000 (This is an assumption *not provided in the sources*), then:
 - **Estimated Benefit:** $\$5,000,000 * 20\% = \mathbf{\$1,000,000}$

Estimated Benefits (Quantifiable for Year 1)

3. Improved Identity Verification and Authentication:

- AI enhances "identity verification, access control, and authentication". This can lead to a smoother customer experience, faster onboarding for new accounts, and ultimately higher conversion rates due to reduced friction.
- *Hypothetical Scenario:* Assume this leads to a 1% improvement in customer conversion rates for new accounts or services due to a smoother verification process. If annual revenue from new accounts is \$50,000,000 (This is an assumption *not provided in the sources*), then:
 - **Estimated Benefit:** $\$50,000,000 * 1\% = \$500,000$
- **Total Estimated Quantifiable Benefits for Year 1: \$15,000,000 (Reduced Fraud Losses) + \$1,000,000 (Operational Efficiency) + \$500,000 (Improved Identity Verification) = \$16,500,000**

Calculate Theoretical ROI

- **ROI = (\$16,500,000 - \$3,000,000) / \$3,000,000 * 100% ROI = \$13,500,000 / \$3,000,000 * 100% ROI = 4.5 * 100% = 450%**
- **Important Considerations and Caveats:**
 - **Data Foundation Maturity:** The success of AI in fraud detection critically depends on a mature "data foundation" that is "ready to support AI". Issues with data quality, governance, and accessibility can greatly impact implementation costs and the ability to realize projected returns.
 - **Project Management:** AI projects can "take longer than expected" and are sometimes "poorly run". Effective project management with clear objectives is crucial for achieving the desired ROI.
 - **Evolving Threat Landscape:** Fraudsters are constantly evolving their tactics, necessitating continuous adaptation and retraining of AI models.
 - **Non-Quantifiable Benefits:** Beyond direct financial savings, AI in fraud detection offers crucial non-quantifiable benefits such as enhanced organizational reputation, increased customer trust, and improved compliance posture. These contribute significantly to long-term business sustainability
 - **Human in the Loop:** Despite the increasing automation, a "human in the middle approach" remains "true for the foreseeable future" in AI, especially for complex or nuanced fraud cases, to ensure accuracy, prevent false positives, and continuously improve the AI system's performance.

Summary

ROI

- ROI has become essential for getting AI projects justified in organizations.

Workloads

- Workloads provide ROI

Transforming

- AI is transforming drug discovery, financial research, automated customer service, predictive maintenance, supply chain management, healthcare diagnosis, cybersecurity, content management, fraud detection, and personalized marketing.

ROI Concepts

- ROI Concepts and Measurement: ROI is calculated as $(\text{Returns} - \text{Investment}) / \text{Investment}$ over a defined period with assumptions and risks.

Examples

- A hypothetical mid-sized enterprise investing \$850,000 in AI-powered customer service can achieve \$4.25 million in quantifiable benefits from labor savings, increased revenue, and improved retention, yielding a 400% ROI.
- A large financial institution investing \$3 million in AI fraud detection can realize \$16.5 million in benefits from reduced fraud losses, operational efficiency, and improved identity verification, resulting in a 450% ROI.
- ROI is essential for justifying AI projects, with workloads providing measurable returns. Effective AI strategies and data readiness are crucial for realizing AI's financial and strategic benefits.



The ROI of AI Is (Usually) There - Let's Run the Numbers

Questions on data & AI strategy, architecture, evaluating products or formulating projects?

Email:
wmcknight@mcknightcg.com

Call/Text: 214-514-1444

 /in/wmcknight

www.mcknightcg.com

