



2024 Trends in Enterprise Advanced Analytics

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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Technology Set

Big/Analytic/Vector/Mixed Data Management



Data Movement and APIs



Data Management

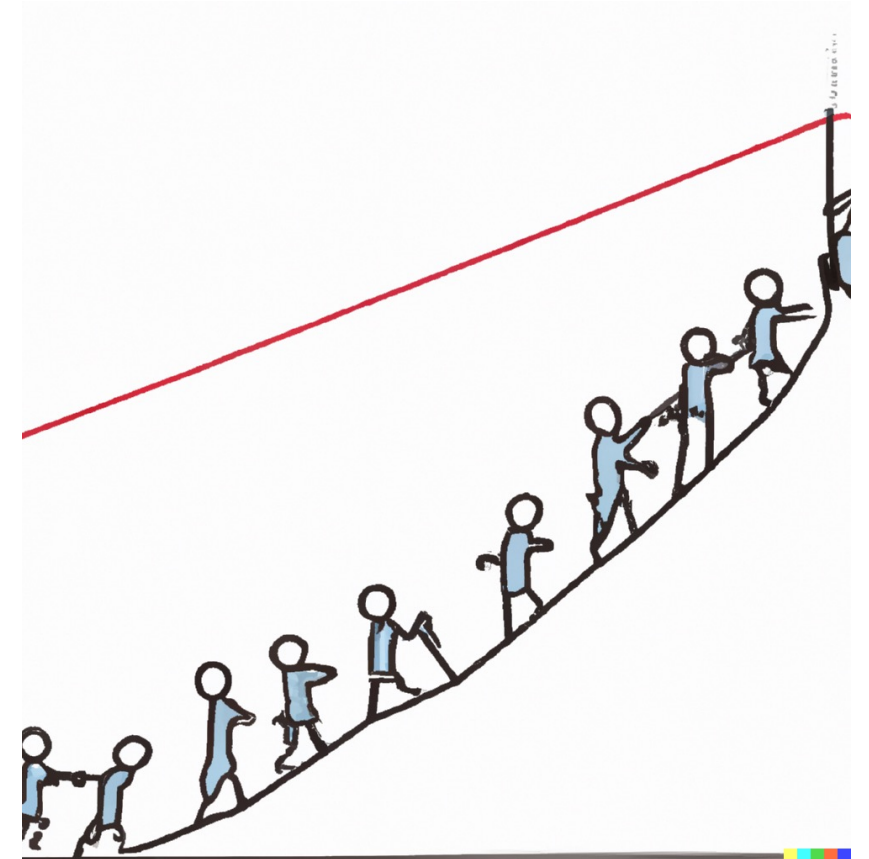


Operational/Transactional Data Management



Why Are Trends Important?

- It is imperative to see trends that affect your business to know how to respond
- Plan for and deal with change
- Better to be at the beginning of the trend rather than the end
- Wants, needs, and tastes of your customer changes
- Make you a leader, not a follower
- Grow your business ideas
- Give you ideas what to improve in your business



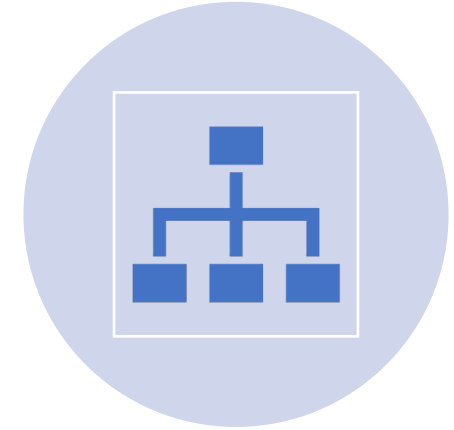
Information Management Leaders



INFORMATION MANAGEMENT LEADERS OF TOMORROW CAN ADVANCE MATURITY WHILE ALSO SOLVING BUSINESS ISSUES



THERE'S NO BUDGET FOR "STAYING ON TRENDS"



INFORMATION MANAGEMENT LEADERS MUST PICK THEIR WINNING (I.E., MULTI-YEAR SUSTAINABLE) APPROACHES AND GET ON BOARD

Last Year's Trends that Hit

- Data Democratization
- CDOs will Turn Their Focus to building a Data Culture
- Augmented Working
- Automation
- Data Fabric
- Multi-Model Databases
- Cloud-Native Technologies and Containerized Applications
- Low-code/No-code Data Apps
- Serverless Computing
- Comprehensive Data Protection
- Neural Network Machine Learning Model for Text
- Synthetic Data Used for Training AI Models
- AI Infusion



Last Year's Trends that Didn't Hit

- Data Governance and Regulation (More)
- Real-Time Data
- Data Observability
- Object Tagging Attribute-Based Access Control (OT-ABAC)





2024 Trends in Enterprise Advanced Analytics

Information Management

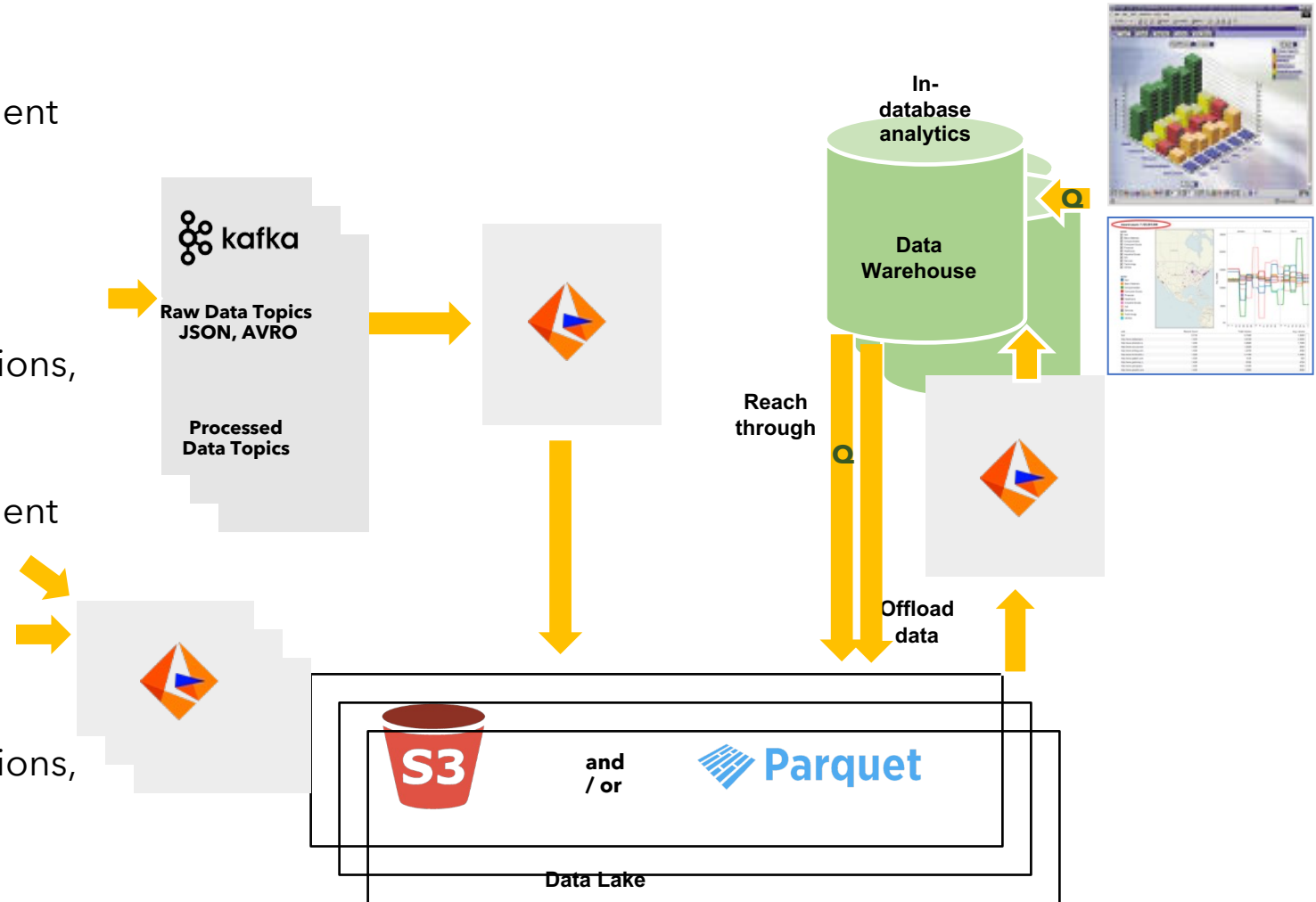


Companies Seek Safe Harbor in a Simplified Data Architecture

- Consolidation is essential for organizations to reduce operational costs and improve resilience
- It drives down costs while instilling architectural discipline, allowing focus on specific domains
- For security, CxOs are seeking a single solution for their hybrid cloud environment, ensuring visibility across the entire threat profile
- Consolidating tools allows for context sharing and greater efficiency, making consolidation a key strategy for businesses

Simplification of Data Security and Governance Through Data Mesh

- In 2024, data mesh will become a significant trend, focusing on distributed data management
- IT will play a crucial role in creating and distributing data products throughout the enterprise
- Organizations must enhance the end-user experience, offer personalized recommendations, and provide real-time queries
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Unstructured Data Almost at Parity with Structured Data

- Decentralized Architectures support all data
- Data Warehouses – best for data modeling, structured data, reporting
- Data Lakes – price-performance advantages for big data, best for data engineering/science, cold data
- With data formats like Apache Iceberg, Delta, and Apache Hudi, the data lakes start to resemble data warehouses
- Data warehouses can seamlessly bridge the gap with data lakes, enabling reliable access to files using open, ACID-compliant formats



Data FinOps

- Businesses must manage cloud data expenses effectively to maintain high-quality service and competitive performance
- By analyzing usage patterns, optimizing storage solutions, and adopting FinOps principles, businesses can balance cost savings and operational efficacy, with a rise in FinOps dashboards in 2024
- Businesses are facing a significant challenge in managing cloud data expenses, which are escalating unsustainably
- To maintain high-quality service and competitive performance, businesses must analyze cloud expenses, identify inefficiencies, and consider cost-effective storage options
- Adopting financial operations principles can help balance cost savings and operational efficacy
- Regular monitoring, forecasting, and implementing financial best practices in cloud management can help organizations balance cost savings and operational efficacy
- In 2024, FinOps dashboards will be increasingly used to manage cloud data charges

Data Privacy Affects Business Operations

- The AI explosion will speed the regulation of data privacy
- 2024 will be a pivotal year for balancing the potential of generative AI with protecting individuals' data and privacy worldwide
- Businesses need to be proactive in adapting their AI practices and data governance to comply with the rapidly evolving regulatory landscape
- Consequently, some will remove their operation from some geographic areas

Data Governance and Regulation (More)

- Digital resilience is becoming a crucial aspect of economic output, with regulators enacting strict governance and compliance frameworks to ensure businesses can prepare for adverse events
- The US announced the National Cybersecurity Strategy. Understanding and implementing resilience strategies is essential for enterprise success
- minimum standards for incident response plans, data security, supply chain diversification, risk assessment, disaster recovery plans, cyber hygiene practices, and reporting protocols
- Governments will offer tax breaks or subsidies to companies that invest in building and demonstrating strong resilience capabilities
- Cyber insurance mandates



2024 Trends in Enterprise Advanced Analytics

Artificial Intelligence



Gen AI and LLM Success



- Organizations will successfully implement GenAI and large language models without facing knockout challenges related to data quality, governance, ethical compliance, and cost management
- These challenges can be mitigated through robust data collection processes, stringent governance frameworks, and continuous monitoring of ethical guidelines
- Additionally, organizations can leverage advancements in cloud computing and AI infrastructure to optimize cost management while ensuring seamless implementation of GenAI and large language models
- Generative AI apps, like chatbots, will become commonplace in daily tasks, with large language models being a powerful and user-friendly form of AI
- Major data and compute platforms are integrating these APIs into the enterprise, fostering creativity and innovation in the future

AI Hardware Advancements

- Hardware that fine-tunes itself over time could lead to more efficient and intelligent machines
- Neuromorphic chips: Mimicking the human brain's architecture, these chips promise massive leaps in efficiency and adaptability for specific AI tasks
- Optical computing: Using light instead of electrons could lead to faster data processing and communication for complex AI models
- Increased investment in AI hardware startups: Venture capitalists and major tech companies are recognizing the potential of disruptive hardware innovations
- Government initiatives: Several countries are launching programs to fund and develop cutting-edge AI hardware technologies

Focus on Efficiency in ML Modeling

- Pre-trained models, AutoML , SageMaker, etc. can be expensive and not provide high-quality, accurate models
- New technologies aim to automate model deployment and optimize workload efficiency
- Training and deploying increasingly complex models require more efficient algorithms and architectures
- Development of new neural network architectures that achieve high accuracy with fewer parameters, reducing training time and resource consumption
- Techniques to transfer knowledge from large models to smaller ones, allowing efficient deployment and inference
- Tools and platforms that optimize model hyperparameters automatically, saving time and reducing manual effort

ESG and AI Ethics Stagnant

- The lack of ethical guardrails around past technological advancements, especially data privacy, should serve as a searing reminder: we must proactively shape safe and moral norms for future innovations
- The U.S. Senate held a private roundtable discussion in mid-September when executives from OpenAI, NVIDIA, Google, Meta, and other companies participated
- The industry will have to define "responsible AI"
- While it is true that organizations may prioritize ESG practices in their day-to-day operations, setting specific sustainability targets can provide a more focused and measurable approach towards achieving environmental and social goals

From ML to MLOps

- Many companies have built strong ML capabilities
- Few businesses have been successful in putting the majority of their ML models into production, leaving a sizable amount of value untapped
- Machine learning operations, also known as MLOps, are a set of standards, tools, and frameworks that are used to scale ML to reach its full potential
- Three main objectives of MLOps, which concentrates on the entire life cycle of ML model design, implementation, testing, monitoring, and management, are as follows:
 - To create a highly repeatable procedure for the entire life cycle of a model, from feature exploration to model deployment in production
 - Data scientists and analysts should be shielded from the complexity of the infrastructure so they can concentrate on their models and plans
 - Develop MLOps so that it scales without a horde of engineers, along with the number of models and modeling complexity

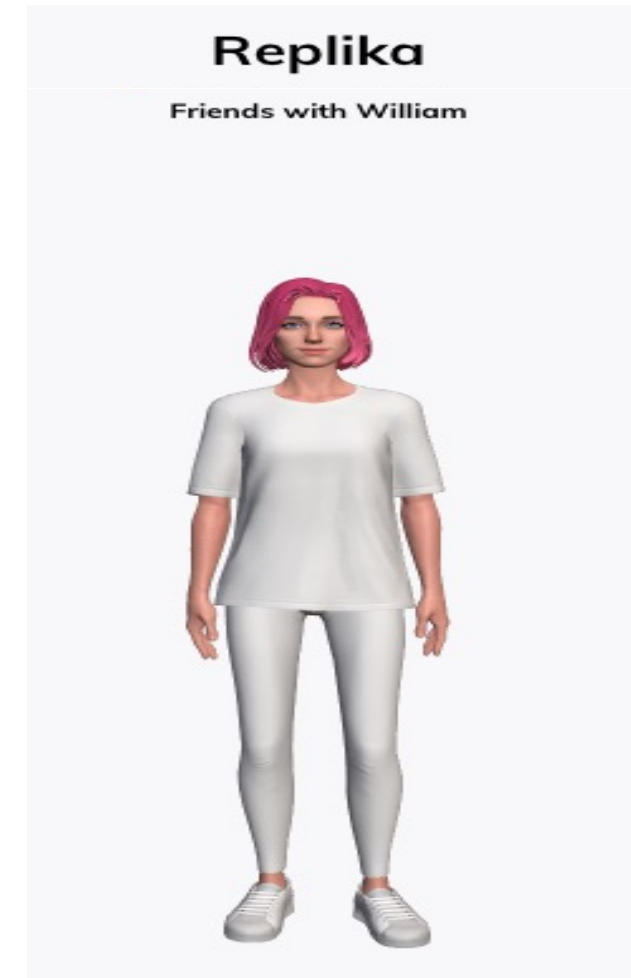
AI Agents

- Personalized assistant for data exploration: AI assistants guide users through complex data sets, recommend relevant analyses, and personalize the data discovery experience
- Proactive data-driven actions: AI agents autonomously monitor data, trigger actions based on pre-defined rules, and adapt to changing patterns, automating low-level tasks
- Explainable and transparent AI: Understandable decision-making mechanisms build trust and ensure accountability for AI actions within the data environment
- Collaborative human-AI partnerships: AI agents augment human expertise, freeing them from tedious tasks and enabling deeper, more strategic data analysis



AI Companions

- Natural Language Processing (NLP): Improved NLP capabilities will allow AI companions to hold more natural and engaging conversations, fostering closer connections
- Multimodal Sensing: Integration of vision, audio, and other sensor data will enable AI companions to better understand context and respond proactively
- Personalization and Adaptability: AI companions will learn user preferences and adjust their behavior, accordingly, creating a more personalized experience
- Changing Social Landscape

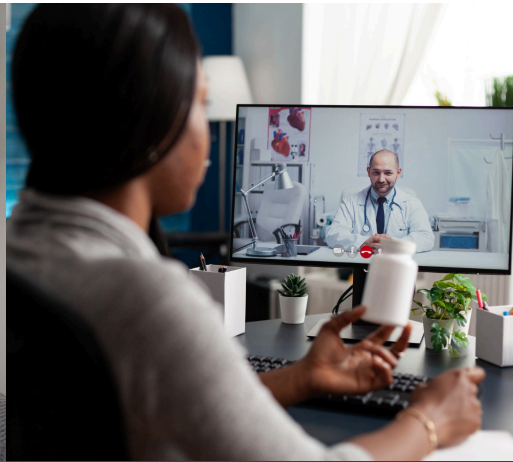


GPU Shortage

- The generative AI adoption wave may face a barrier this year: a potential chip shortage
- OpenAI CEO Sam Altman stated that there aren't enough GPUs, and cloud providers like Microsoft and AWS have warned about the issue
- CIOs are largely insulated from short-term fluctuations in chip availability by their cloud providers, but supply chain bottlenecks can have a downstream impact on the enterprise
- Hyperscalers AWS, Microsoft, Google Cloud, and Oracle have solidified partnerships with GPU supplier Nvidia to build out data center capacity with AI-optimized servers
- To forestall a shortfall, the three largest cloud providers began engineering AI-optimized processors prior to ChatGPT



Major Healthcare Advancements Driven by AI



Genomic
Medicine



Virtual Visits



Tele-health and AI
Triage



AI Diagnostics



Robotics
Automating Lab
Work

Major Education Advancements Driven by AI

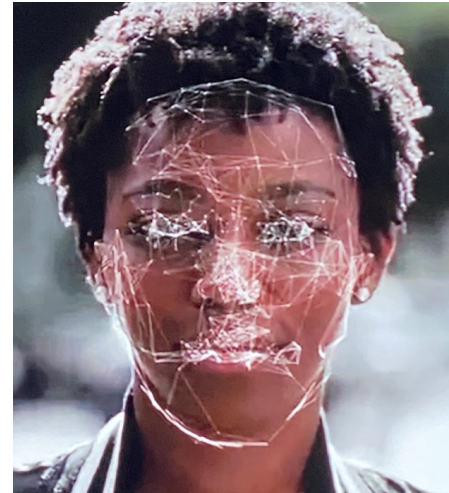
 Personalized Education

 Stimulating Learning Environments

 Global Lens



Unaware Population Impacted by AI





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Broader Environment



Cloud Native Approaches

- Microservices Architecture
- Containers
- Elasticity
- ContinuousDelivery with DevOps
- Infrastructure as Code (IaC)
- With Observability Added

The Future of Vendor Software

- Enterprise-level features, like security, partitioning, and parallelism, better instrumentation, troubleshooting tools, performance, and resilience options are added to closed source databases
- More unbalanced situations
- Vendors will provide a smaller subset of their features for free
- Enterprise features, like backups, scalability, and encryption come with a commercial license

The Register®

What is Google doing with its open source teams?

Nothing good – the recent layoffs hit its best and brightest leaders hard

[Steven J. Vaughan-Nichols](#)

Fri 27 Jan 2023 / 10:34 UTC

OPINION Remember when Google's motto was "Don't be Evil"? I do. Even though Google dumped that phrase from its code of conduct in 2018, many of us still thought Google was a bit better than other companies.

We were wrong. Those who were fired last week found out from emails, discovering they no longer had corporate access and their ID badges no longer worked. Class act, Google.

How were they chosen? Good question. It has been widely reported that some of the firing was done by an algorithm. Those fired included staffers who had just received high performance reviews or held top managerial positions with annual compensation packages of \$500,000 to \$1 million. But, as I looked at who was being fired, something struck me. Many of those shown the doors were the best of the best in Google's open

The Year of Observability

- Rise of Unified Observability Platforms
- Focus on Contextual Intelligence
- Collaboration & Shared Visibility
- Shift from MTTR to Proactive Prevention
- Democratization of Observability
- Openness and Interoperability

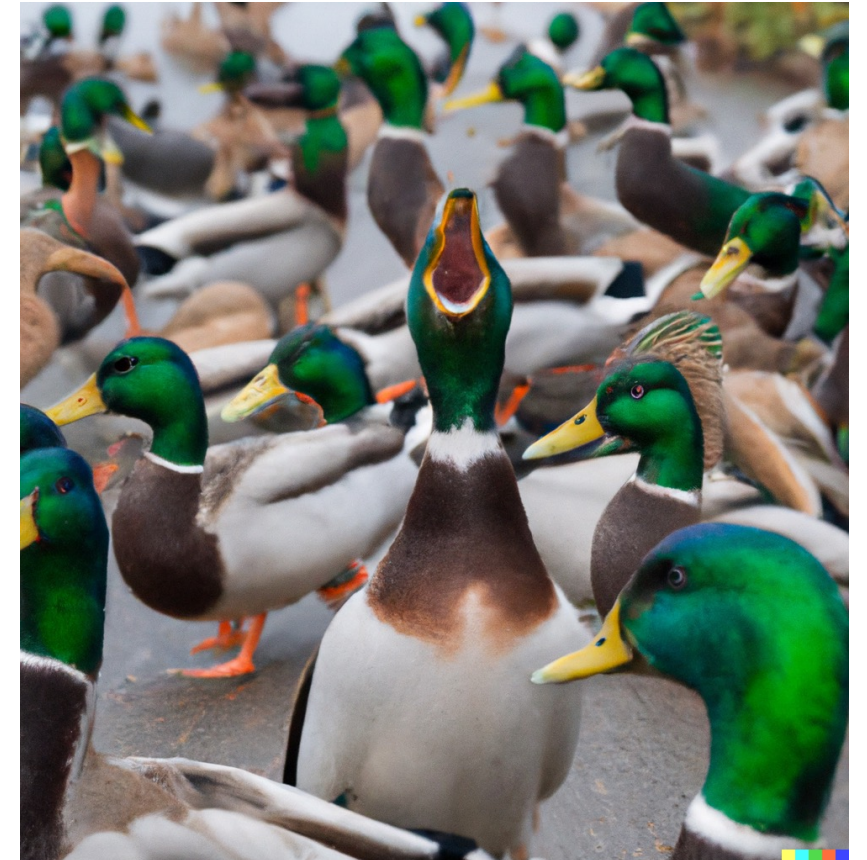
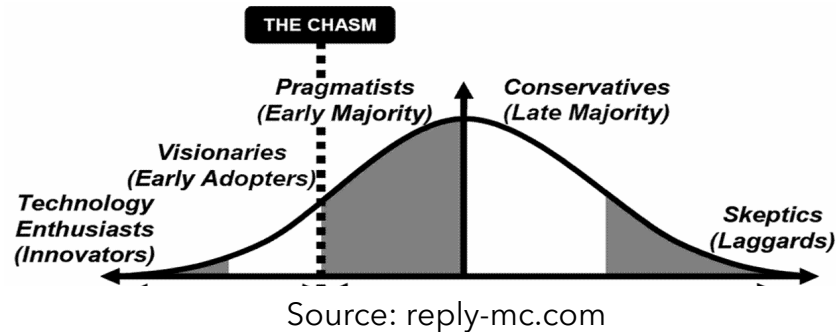


Hybrid Quantum Computing

- Hybrid systems combine the power of quantum processors with the flexibility and scalability of classical computers, tackling problems both sides struggle with alone
- This technology shows promise for various medical and other applications
- Hybrid algorithms could revolutionize areas like logistics, finance, and materials science by finding optimal solutions for complex problems much faster
- Quantum-assisted machine learning models could learn from vast datasets and uncover hidden patterns more effectively, leading to breakthroughs in areas like medical diagnosis and fraud detection
- Hybrid systems could provide unprecedented insights into complex systems like molecules and quantum fields, opening doors in chemistry, physics, and materials science

2024: The Year of Organizational Change Management

Organizational Change Management is the people side of change; it's how to facilitate people from current state to future state with high technology adoption and usage



Data Engineering Becomes the Highest Value Profession

- Data Engineer's knowledge of data will be more important than before, albeit in novel and inventive ways
- Data engineers will need to comprehend the value that generative AI brings in order to stay up to date with the changing scenario
- For companies looking to unlock value, the data pipelines constructed and overseen by data engineers may be the initial point of contact with language models
- The people who know how to use a model and plug it into a data pipeline in order to automate value extraction are the data engineers
- They will also be expected to supervise and comprehend the tasks related to AI





Summary

- Simplified Data Architectures
- Regulation around Privacy and AI
- Gen AI Success
- AI Agents and Companions
- Significant Industry Change: Healthcare, AI, Others
- The Year of Observability
- Data Engineering Rocks



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