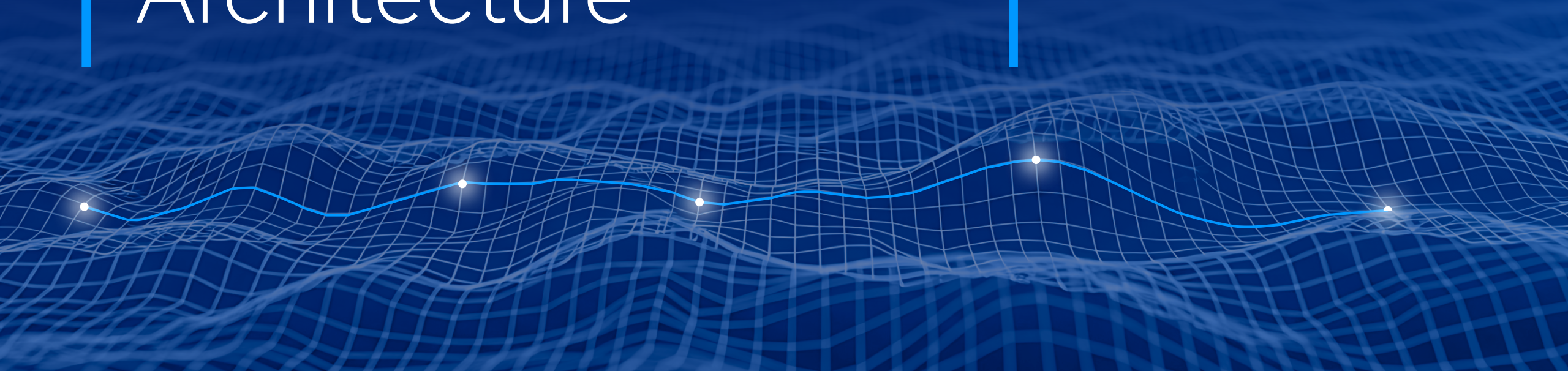




Data Fabric Roadmap

5 Steps to an AI-First Architecture



Why is modernizing data management with a data fabric critical for future business success?

As data and analytics demands grow, most organizations struggle with fragmented architectures, siloed data and manual processes that limit their ability to deliver trusted data at scale. Yet data and analytics leaders face a dual imperative: meeting today's demands for analytics and operational use cases while scaling to support AI-ready data and agentic AI. Legacy systems are widening the gap between ambition and execution, leaving metadata underutilized and automation out of reach. Building a data fabric addresses both challenges — enabling unified data access, intelligent automation and the agility needed to meet current and future demands.

Strategic roadmap for the data fabric architecture

Current state

- Multiple analytical and operational data silos that are poorly integrated.
- Lack of a consistent view of an organization’s data due to poor metadata management maturity.
- Data architectures plagued by point-to-point integration flows.
- Inability to access, integrate and curate unstructured data.
- Existing engineering resources struggling to keep up with demand for new data pipelines.
- Business teams remain frustrated due to slower turnaround times for integrated data.
- Business domains don’t get access to domain-centric data products.
- Rapid degradation of data engineering resource productivity due to the lack of active metadata-assisted augmentation and automation of data tasks.



Future state

- A future-ready data management architecture that enables both foundational and upcoming D&A use cases such as GenAI and unstructured data management, among others.
- Data fabric supports federated data management by enabling centralized data management but also supports the delivery of domain-centric data products in a governed manner.
- Passive metadata collection matures to active metadata analysis that supports the much-needed augmentation of data pipeline design, delivery, maintenance and support.
- In its most mature state, the data fabric starts to automate key data management and financial governance decisions through active metadata analysis.



Gap

- Most organizations are at nascent or adolescent stages of their metadata management maturity.
- Most organizations have not yet achieved a core logical data warehouse/lakehouse foundation to even think about fabric-based automation.
- Federated data management operating models are needed but not addressed strategically. Most organizations have yet to invest in data product managers or data product management as a discipline, for instance.
- Organizations have not invested in key enabling technologies and capabilities, including knowledge graphs, semantics, metadata activation, and data product and marketplace capabilities, among others, which are key enablers of the data fabric.



Migration plan

- Catalog your data: You can’t improve what you can’t find.
- Build knowledge graphs for multistructured and multirelationship data and enrich it with business semantics.
- Build a strong data integration platform that supports multiple data delivery styles and orchestration through DataOps.
- Support federated data management through data products and marketplaces but monitor for governance.
- Start “activating” metadata for alerts and insights, as well as data management design, delivery and maintenance augmentation and optimization.
- Decide between building or buying technology components to deliver your data fabric.

Source: Gartner

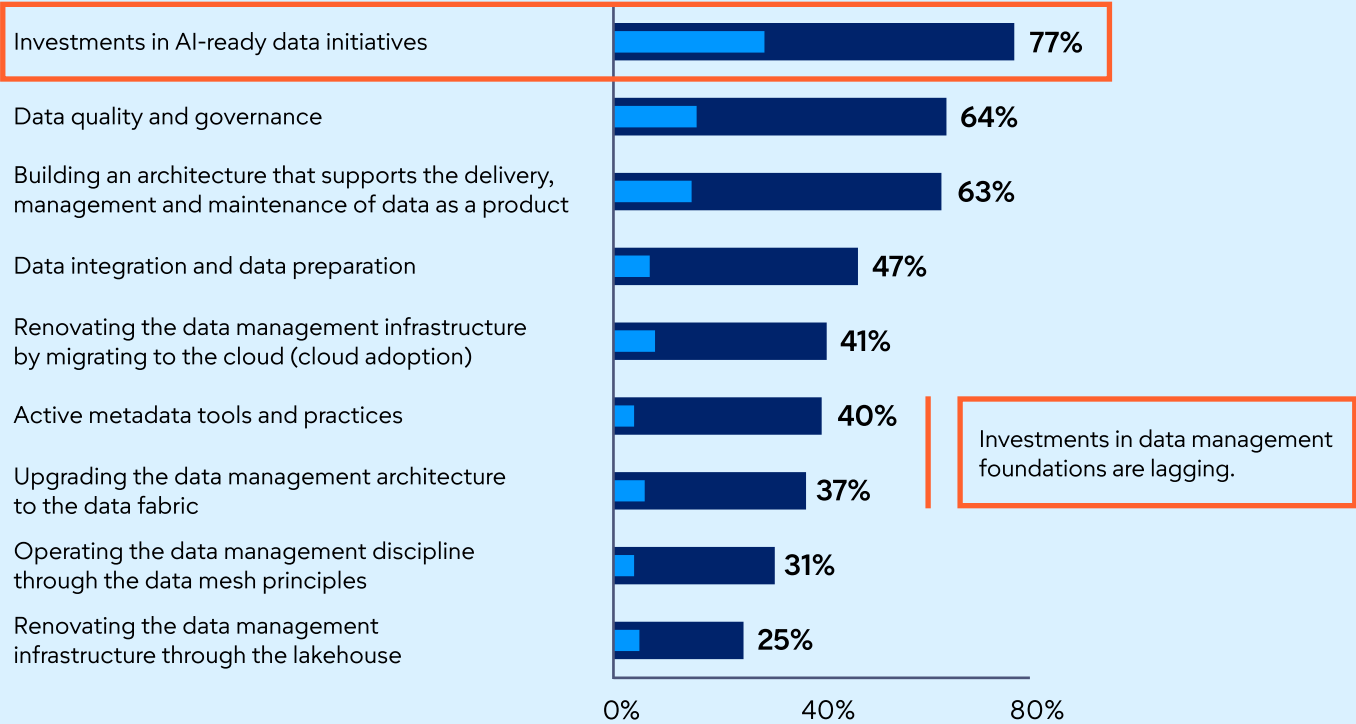
How can organizations build a future-ready data fabric?

Organizations can bridge the gap between current data management limitations and future needs by adopting a phased, strategic roadmap for data fabric architecture. This approach starts with cataloging and understanding distributed data assets. Then, it gradually integrates advanced capabilities such as active metadata, knowledge graphs and DataOps. By following the five steps outlined in this roadmap, leaders can ensure a smooth transition from legacy systems to a unified, automated and AI-ready data environment. This roadmap provides practical guidance to help organizations reduce complexity, improve data quality and enable innovation for long-term business value.

Architecture investments in data management significantly lag technology investments

Top 5 investment trends in the next 2-3 years

Sum of Top 5 First choice



Investments in data management foundations are lagging.

n = 247; all respondents, excluding "not sure"
Q: What do you think are the top 5 investment trends for data management leaders in the next two to three years?
Source: Gartner

Some of the top questions of data fabric initiatives are:

- 1 How can we build AI-ready data foundations using a phased, low-risk approach?
- 2 How do we unify metadata, semantics and integration to support both GenAI and automation?
- 3 How do we eliminate data silos to scale a flexible, augmented data fabric architecture?

What are the key stages?

This roadmap distills guidance from organizations that have successfully evolved from siloed data systems to AI-ready, actively augmented architectures. A few key milestones and associated Gartner resources are highlighted within, while the full roadmap includes detailed actions and guidance for each stage of the initiative.

Establish metadata intelligence



Build semantic context



Modernize data delivery



Enable domain self-service



Choose platforms and activate intelligence



Establish metadata intelligence

Establish strong metadata and cataloging capabilities to create visibility, trust and the data fabric base layer.

Actions to take:

Use augmented catalogs to scan high-value sources and unify technical, business and operational metadata.

Build a metadata practice that tracks lineage, sensitivity, trust scores and usage patterns.

Activate metadata so engineers get recommendations for pipeline design, quality checks and optimization.

Sample of associated Gartner resources include:

Insights

- Market Guide for Metadata Management Solutions
- Data and Analytics Essentials: Foundations of Metadata Management
- How D&A Leaders Can Use Metadata for Better Business Outcomes
- Quick Answer: What Is Active Metadata?
- Case Study: Answering Critical Business Questions With Graph Analytics (Jaguar Land Rover)

Tool

- Vendor Identification for Metadata Management Solutions

Analyst Consultation

- “How to establish a string metadata foundation to support agile and automated data management”

+ more

Establish metadata intelligence



Build semantic context



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Choose platforms and activate intelligence



Build semantic context

Develop knowledge graphs and semantic layers that preserve business meaning, relationships and context required for AI-ready data.

Actions to take:

Identify use cases where losing context breaks insight (fraud, customer 360, supply chain, RAG/GenAI).

Model entities, relationships and rules through ontologies and graph models enriched with business semantics.

Connect catalog metadata, graph insights and LLMs to support contextual AI, GraphRAG and advanced analytics.

Sample of associated Gartner resources include:

Insights

- How to Build Knowledge Graphs That Enable AI-Driven Enterprise Applications
- How to Evaluate the Applicability of Knowledge Graphs for Your Use Cases
- Pivot Your Data Engineering Discipline to Efficiently Support AI Use Cases

Analyst Consultation

- “Advice on how to design and develop ontology through knowledge graphs that capture business semantics for AI”

+ more

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Modernize data delivery

Move from fragile pipelines to a flexible, observable and multistyle data delivery system powered by DataOps.

Actions to take:

Enable ETL, CDC, virtualization, streaming and APIs. Orchestrate between them using metadata signals.

Implement DataOps practices including CI/CD, observability, testing and automated orchestration to reduce breakages.

Use performance metadata to determine when to switch between virtualization, replication or optimization of workloads.

Sample of associated Gartner resources include:

Insights

- Magic Quadrant for Data Integration Tools
- Critical Capabilities for Data Integration Tools
- How to Assess and Improve Your Data Integration Maturity
- Data and Analytics Essentials: What You Need to Know About DataOps
- Market Guide for DataOps Tools
- 5-Step Framework for DataOps in Data Engineering

Analyst Consultation

- “Guidance on designing a futuristic data integration pipeline as a backbone to support analytics, AI and operations”

+ more

Establish metadata intelligence



Build semantic context



Modernize data delivery



Enable domain self-service



Choose platforms and activate intelligence



Enable domain self-service

Empower business domains to shape and reuse data by providing governed self-service and scalable data product delivery.

Actions to take:

Provide low-code/no-code tools so analysts and SMEs can prepare and enrich data without engineering bottlenecks.

Promote high-value self-service flows to production when quality, lineage and usage thresholds are met.

Build and maintain domain data products with clear ownership, SLAs and metadata-based monitoring.

Sample of associated Gartner resources include:

Insights

- How to Overcome Data Preparation Challenges in Analytics
- Apply 5 Top Practices to Improve Data Engineering
- Quick Answer: What Do D&A Leaders Need to Know About Data Products?
- How Data Leaders Can Complement Fabric and Mesh Approaches
- Quick Answer: What Do D&A Leaders Need to Know About Data Products?
- Ignition Guide to Launching and Managing Data Products
- Quick Answer: The Benefits of a Federated Data Management Practice

Analyst Consultation

- “Guidance on enabling federated data management through self-service and central data management principles”

+ more

Establish metadata intelligence



Build semantic context



Modernize data delivery



Enable domain self-service



Choose platforms and activate intelligence



Choose platforms and activate intelligence

Make informed platform choices (build, buy, hybrid). Add inference engines that guide users and optimize system performance.

Actions to take:

Assess converged platforms and ISVs based on maturity across metadata, semantics, integration and DataOps.

Deploy inference engines that suggest relevant datasets, uncover relationships and guide business questions.

Use metadata-driven insights to optimize storage placement, performance tuning and cost-efficiency.

Sample of associated Gartner resources include:

Insights

- Emerging Tech: Data Management Evolves From Stand-Alone Tools to Converged Platforms
- How to Build Converged Data Management Platforms
- Secure a Competitive Edge With Data Ecosystems: A Comprehensive Guide
- State of Metadata Management: Aggressively Pursue Metadata to Enable AI

Case Studies

- Answering Critical Business Questions With Graph Analytics (Jaguar Land Rover)
- An Active Metadata Augmented Data Classification System to Boost Analytics Efficiency

Analyst Consultation

- “Justifying data management spend to automate complex data tasks and streamline operations”

+ more

Establish metadata intelligence



Build semantic context



Modernize data delivery



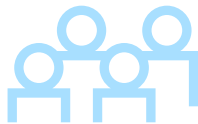
Enable domain self-service



Choose platforms and activate intelligence

Who needs to be involved?

Building cross-functional teams aligned with each step of the roadmap can maximize the value of your data fabric initiative. Discover the key roles and functions to include for a successful implementation.



 Mission-critical team members for data fabric initiatives				
CIO Creates a collaborative working structure with the CDAO, with clearly defined roles and responsibilities. The CIO partners on technology trends, architecture, infrastructure, platforms and tools.	CDAO and team Build the foundation for the management, measurement and monetization of D&A assets for AI-driven innovation and business transformation. The CDAO ensures value realization by building a data-driven, AI-literate culture, along with governance initiatives that mitigate risk and ensure trust.	CISO and team Engage with the CDAO and governance leaders to ensure risk management and information security implications are understood and addressed in governance initiatives. The CISO also guides planning activities for data asset management and governance, along with risk and compliance activities.	CFO Works with the CDAO to modernize value measurement, realization approaches and D&A budget processes. This ensures optimal allocation of resources and impact on enterprise value.	Data management leader Invests in a modern D&A ecosystem to deliver reusable data products that address enterprise-wide D&A requirements and innovation opportunities.
Enterprise application leaders Collaborate with the CDAO and enterprise architects to implement modern data management, analytical applications and composable solutions. They support and manage applications to achieve D&A strategy and governance objectives.	Data engineers Work closely with the CDAO and their teams to deliver an AI-ready data foundation.	Sourcing procurement and vendor management leader Works with the CDAO to identify, assess and select technology vendors and external service providers.	Data management architects Plan the D&A technical roadmap. Design and implement master data management policies, data pipelines and data stores. Select D&A tools and vendors. Architect and implement D&A solutions spanning application, infrastructure and security. Design data governance tools and procedures.	AI team Relies on the CDAO and their team to deliver AI-ready data and governance necessary for AI applications.

How Gartner supports your priorities

In addition to guidance on implementing a data fabric architecture, Gartner also supports the priorities of CIOs and CDAOs.

Gartner for Chief Information Officers

CIO Mission-Critical Priorities (MCPs)

Accelerate AI Enterprise Value Realization at Scale Only 20% of AI initiatives currently drive ROI and only 2% deliver disruptive value (Return on Future or ROF).	Manage Costs Strategically to Spend Smarter and Scale Faster Only 18% of CIOs currently rate themselves as effective at dynamic reorganization of resources which is a significant driver of their ability to derive business value from technology investments.	Build the Human-AI Workforce 45% more business value is driven by future-resilient talent strategies, yet only 34% of CIOs are effective at building them.	
Secure Growth in the Age of AI through Cybersecurity 77% of CIOs rate security and risk-related factors as top challenges to successfully implementing autonomous technologies at scale in their enterprise.	Modernize Enterprise Platforms to Enhance Agility and Performance Only 54% (1 in 2) of CIOs rate their IT organization as effective at equipping their enterprise with the required platforms and tools needed.	Redesign IT Operating Model for Effectiveness in Turbulent Times Only 24% of CIOs report they have been highly effective at establishing an IT operating model that flexes with changing business needs.	Architect the Next-Generation Enterprise for a Tech-Intensive Future Only 31% of CIOs rate themselves as effective at fostering ongoing enterprise-wide, technology-enabled innovation.

With Gartner for CIOs, you can confidently navigate complex technological environments, make smarter decisions and deliver stronger results. Our insights, guidance and tools are designed to focus specifically on the mission-critical priorities of CIOs and their teams.

Whether you’re looking to unlock better value with AI, optimize costs or lead organizational change, Gartner for CIOs can help you act fast and demonstrate value — from strategy to execution.

Gartner for Chief Data & Analytics Officers

CDAO Mission-Critical Priorities (MCPs)

Lead D&A for an AI-Native Future 87% of D&A leaders cite managing stakeholder expectations as their greatest stress factor.	Generate Foundational Value with D&A High-performing D&A functions can boost financial performance by as much as 30%.	Rethink Analytics and AI Through Agentic Transformation 53% of D&A leaders expect AI agents to have a significant impact on productivity but believe it may not be transformative.	Evolve the AI Ready Data and Analytics Architecture The top quartile of AI-ready organizations report 26% higher performance on business outcomes.	Redefine D&A and AI Governance Only 15% of organizations currently operate under comprehensive governance for AI.
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Gartner for Data & Analytics Leaders helps CDAOs and their teams make stronger, faster decisions. Our insights, guidance and tools focus on the imperatives that matter most to your business and stakeholders.

From transforming D&A for an AI-native future to architecture redesigning and governance evolution, Gartner empowers CDAOs with best-in-class insights and step-by-step guidance to help you drive growth, mitigate risk and reduce costs.

Actionable, objective insights

Explore these additional complimentary resources and tools on AI governance or for data and analytics:

 Roadmap Data, Analytics & AI Roadmap Explore this Gartner data, analytics and AI roadmap to align all stakeholders and drive business value. Download Now	 Webinar The Gartner 100+ Data, Analytics & AI Predictions Through 2031 Discover 100+ predictions shaping data, analytics and AI through 2031. Watch Now	 Roadmap Turn Data, Analytics and AI Into Strategic Growth Drivers Make data, analytics and AI central drivers of transformational growth. Download Now	 Conferences Gartner Data and Analytics Summits Join us at our premier event covering the latest in trends in data, AI and governance. Register Now
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