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Data Stewardship Models for Enterprise Data Trust: A Systematic Evidence Mapping

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Abstract — Data stewardship has become a fundamental component of enterprise data governance, enabling organizations to establish trusted, accurate, and well-managed data assets that support operational efficiency, regulatory compliance, and strategic decision-making. As enterprises increasingly adopt cloud computing, artificial intelligence, big data analytics, and distributed information systems, the volume, variety, and complexity of organizational data have grown substantially, making effective stewardship essential for maintaining enterprise data trust. While technological advancements have improved data management capabilities, sustainable data trust depends on well-defined stewardship models that clearly assign accountability, promote cross-functional collaboration, enforce governance policies, and ensure continuous improvement in data quality. This study presents a systematic evidence mapping of data stewardship models for enterprise data trust by synthesizing existing research on stewardship frameworks, governance structures, organizational roles, leadership practices, metadata management, data quality management, compliance strategies, and technology-enabled stewardship approaches. The evidence mapping systematically classifies published literature according to stewardship models, governance adoption, organizational responsibilities, implementation methodologies, enabling technologies, industry applications, evaluation metrics, and research methodologies. The analysis reveals that successful enterprise data stewardship programs are characterized by strong executive sponsorship, clearly defined stewardship roles, standardized governance policies, effective metadata management, continuous data quality monitoring, stakeholder engagement, and collaborative decision-making across business and technology functions. Furthermore, the findings demonstrate that data stewardship significantly improves enterprise data consistency, transparency, regulatory compliance, operational efficiency, and organizational trust by ensuring that critical business information remains accurate, complete, secure, and accessible throughout its lifecycle. The study also highlights the increasing integration of artificial intelligence, machine learning, cloud-native data platforms, metadata automation, knowledge graphs, intelligent data catalogs, and analytics-driven governance into modern stewardship programs. Despite these advancements, organizations continue to encounter challenges including fragmented data ownership, organizational resistance to governance adoption, legacy system integration, inconsistent stewardship practices, evolving regulatory requirements, scalability limitations, and shortages of skilled data governance professionals. The evidence mapping identifies several promising directions for future research, including autonomous data stewardship, AI-assisted governance, explainable artificial intelligence for stewardship decision-making, semantic knowledge graph–based governance, real-time data quality monitoring, intelligent compliance automation, and adaptive governance frameworks. Overall, this study provides researchers, enterprise architects, governance professionals, and organizational leaders with a comprehensive understanding of data stewardship models that enhance enterprise data trust and offers practical guidance for designing scalable, governance-driven, technology-enabled stewardship programs that support sustainable digital transformation, trusted enterprise information, and long-term organizational value.

Keywords— Data Stewardship, Enterprise Data Stewardship, Data Stewardship Models, Enterprise Data Trust, Trusted Data, Data Trust, Enterprise Data Governance, Data Governance, Information Governance, Governance Adoption, Governance Frameworks, Governance Maturity, Data Governance Maturity, Data Governance Strategy, Data Governance Policies, Data Governance Programs, Enterprise Information Management, Enterprise Information Systems, Enterprise Data Management,

Enterprise Data Architecture, Information Architecture, Data Leadership, Chief Data Officer (CDO), Data Owners, Data Ownership, Data Custodianship, Data Steward Roles, Data Stewardship Frameworks, Business Data Steward, Technical Data Steward, Operational Data Steward, Executive Sponsorship, Organizational Leadership, Cross-Functional Collaboration, Stakeholder Engagement, Organizational Change Management, Strategic Data Management, Master Data Management (MDM), Reference Data Management (RDM), Metadata Management, Metadata Governance, Metadata Repository, Business Glossary, Enterprise Data Catalog, Intelligent Data Catalog, Data Lineage, Data Provenance, Data Discovery, Data Classification, Data Modeling, Data Standards, Data Standardization, Data Harmonization, Data Integration, Enterprise Data Integration, Data Interoperability, Data Synchronization, Data Consolidation, Data Migration, ETL, ELT, API Integration, Data Pipelines, Data Warehousing, Data Lakes, Data Lakehouse, Cloud Computing, Cloud Data Governance, Hybrid Cloud, Multi-Cloud Data Management, Digital Transformation, Business Transformation, Information Quality, Data Quality Management, Data Quality Assessment, Data Quality Improvement, Data Accuracy, Data Consistency, Data Completeness, Data Integrity, Data Validity, Data Timeliness, Duplicate Data Management, Data Cleansing, Data Profiling, Data Validation, Data Monitoring, Continuous Data Quality, Data Lifecycle Management, Enterprise Analytics, Business Intelligence, Data-Driven Decision Making, Decision Support Systems, Artificial Intelligence (AI), Machine Learning (ML), AI-Assisted Data Stewardship, Intelligent Data Governance, Metadata Automation, Knowledge Graphs, Semantic Data Models, Predictive Analytics, Data Observability, Data Reliability, Data Transparency, Data Accountability, Compliance Management, Regulatory Compliance, Governance Risk and Compliance (GRC), Audit Readiness, Data Privacy, Data Security, Personally Identifiable Information (PII), General Data Protection Regulation (GDPR), Health Insurance Portability and Accountability Act (HIPAA), Sarbanes–Oxley Act (SOX), Payment Card Industry Data Security Standard (PCI DSS), ISO/IEC 27001, ISO 8000, DAMA-DMBOK, Enterprise Architecture, Business Process Management, Performance Measurement, Key Performance Indicators (KPIs), Governance Metrics, Risk Management, Data Value Management, Enterprise Data Excellence, Intelligent Enterprise Governance, Autonomous Data Stewardship, Explainable Artificial Intelligence (XAI), Real-Time Data Governance, Intelligent Compliance Automation, Sustainable Data Governance, Digital Governance, Enterprise Information Consistency, Evidence Mapping, Systematic Evidence Mapping, Evidence-Based Research.

I. INTRODUCTION

1. Background

Data has become one of the most valuable strategic assets for modern enterprises, driving business operations, customer engagement, regulatory compliance, innovation, and competitive advantage. Organizations increasingly depend on high-quality, trustworthy information to support critical business processes, advanced analytics, artificial intelligence (AI), digital transformation initiatives, and evidence-based decision-making. However, the rapid growth of enterprise data generated from cloud platforms, Internet of Things (IoT) devices, enterprise applications, social media, and distributed information systems has introduced significant challenges in maintaining data quality, consistency, ownership, accountability, and governance. Inaccurate, incomplete, duplicated, or poorly managed data can lead to operational inefficiencies, regulatory violations, financial losses, and reduced organizational trust. Consequently, data stewardship has emerged as a critical organizational capability that ensures enterprise data remains accurate, consistent, secure, accessible, and reliable throughout its lifecycle.

Data stewardship extends beyond technical data management by establishing clearly defined organizational responsibilities, governance policies, business processes, and accountability mechanisms for managing enterprise information assets. Effective stewardship integrates people, processes, technology, and governance frameworks to improve data quality, facilitate collaboration among stakeholders, and promote a culture of data-driven decision-making. As organizations continue to modernize their information ecosystems through cloud computing, big data platforms, artificial intelligence, and intelligent automation, data stewardship has become an essential pillar of enterprise data trust and sustainable information governance.

2. Data Stewardship

Data stewardship refers to the organizational practice of assigning responsibility for managing, maintaining, protecting, and improving enterprise data assets. Data stewards ensure that information complies with established governance policies, business standards, quality requirements, security controls, and regulatory obligations throughout the data lifecycle.

Typical responsibilities of data stewards include:

- Data quality monitoring
- Metadata management
- Business glossary maintenance
- Data validation
- Policy enforcement

- Issue resolution
- Stakeholder coordination
- Compliance support

These responsibilities help organizations establish trusted enterprise data that supports operational excellence and strategic business objectives.

3. Enterprise Data Trust

Enterprise data trust represents the confidence that organizational stakeholders place in enterprise information regarding its accuracy, completeness, consistency, reliability, timeliness, security, and fitness for business use. Trusted data enables executives, analysts, regulators, customers, and business users to make informed decisions without questioning the integrity of organizational information.

Building enterprise data trust requires comprehensive governance frameworks, standardized business definitions, continuous quality monitoring, metadata management, accountability structures, and transparent stewardship processes.

4. Need for Systematic Evidence Mapping

Research related to data stewardship spans multiple disciplines including information systems, enterprise architecture, data governance, organizational leadership, business analytics, cloud computing, cybersecurity, and digital transformation. Existing studies often focus on specific stewardship frameworks, governance practices, technologies, or organizational case studies, making it difficult to obtain a comprehensive understanding of stewardship models that contribute to enterprise data trust.

Systematic evidence mapping provides a structured methodology for identifying, classifying, and synthesizing published research according to predefined criteria. Unlike traditional literature reviews, evidence mapping emphasizes research trends, stewardship models, governance practices, implementation strategies, enabling technologies, organizational outcomes, and research gaps. This approach provides researchers and practitioners with a broad understanding of the current research landscape while identifying promising directions for future investigation.

II. FOUNDATIONS OF DATA STEWARDSHIP

1. Concept of Data Stewardship

Data stewardship is a governance function responsible for ensuring that enterprise data remains accurate, standardized, secure, and compliant with organizational policies throughout its lifecycle. It bridges business and technical domains by coordinating governance activities, resolving data quality issues, defining business terminology, and facilitating collaboration among stakeholders.

Effective stewardship transforms enterprise information into a trusted organizational asset that supports business operations, regulatory compliance, and strategic decision-making.

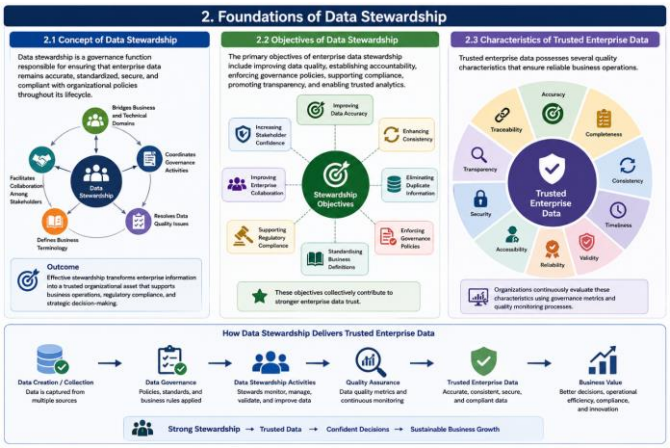
2. Objectives of Data Stewardship

The primary objectives of enterprise data stewardship include improving data quality, establishing accountability, enforcing governance policies, supporting compliance, promoting transparency, and enabling trusted analytics.

Major stewardship objectives include:

- Improving data accuracy
- Enhancing consistency
- Eliminating duplicate information
- Standardizing business definitions
- Supporting regulatory compliance
- Improving enterprise collaboration
- Increasing stakeholder confidence

These objectives collectively contribute to stronger enterprise data trust.



3. Characteristics of Trusted Enterprise Data

Trusted enterprise data possesses several quality characteristics that ensure reliable business operations.

Key characteristics include:

- Accuracy
- Completeness
- Consistency
- Timeliness
- Validity

- Reliability
- Accessibility
- Security
- Transparency
- Traceability

Organizations continuously evaluate these characteristics using governance metrics and quality monitoring processes.

III. DATA STEWARDSHIP MODELS

1. Centralized Data Stewardship
Centralized stewardship assigns governance responsibilities to a dedicated enterprise data management team responsible for maintaining standards, policies, metadata, and quality controls across the organization.

This model promotes consistency, standardized governance, and enterprise-wide accountability while reducing duplication of governance efforts.

2. Decentralized Data Stewardship
Decentralized stewardship distributes governance responsibilities among business units, allowing departments to manage their own information assets while adhering to enterprise governance policies.

This approach improves responsiveness to domain-specific requirements while maintaining organizational flexibility.

3. Federated Data Stewardship
Federated stewardship combines centralized governance with decentralized operational responsibilities. Enterprise governance teams establish policies, standards, and oversight, while business units implement stewardship activities according to organizational guidelines.

Federated models balance governance consistency with operational flexibility and are widely adopted in large enterprises.

4. Hybrid Data Stewardship
Hybrid stewardship integrates multiple governance approaches to address complex organizational structures, mergers, acquisitions, hybrid cloud environments, and distributed enterprise ecosystems.

Organizations adopting hybrid stewardship benefit from scalable governance while accommodating diverse operational requirements.

IV. GOVERNANCE FRAMEWORKS SUPPORTING DATA STEWARDSHIP

1. Data Governance Policies
Governance policies define enterprise standards, procedures, responsibilities, and decision-making processes governing organizational information assets.

Comprehensive governance policies establish accountability while promoting consistency throughout enterprise information systems.

2. Data Ownership
Data ownership assigns accountability for enterprise information to designated business leaders responsible for approving standards, monitoring quality, authorizing access, and supporting governance objectives.

Clearly defined ownership strengthens organizational accountability while improving stewardship effectiveness.

3. Metadata Management
Metadata management enables organizations to maintain standardized business definitions, technical specifications, ownership information, transformation rules, quality metrics, and regulatory classifications.

Comprehensive metadata repositories improve enterprise data discovery, governance transparency, interoperability, and business understanding.

4. Data Quality Management
Continuous data quality management evaluates enterprise information against predefined quality dimensions including accuracy, consistency, completeness, validity, uniqueness, and timeliness.

Automated profiling, cleansing, validation, and monitoring technologies enable organizations to maintain trusted enterprise information while supporting reliable analytics and decision-making.

V. ORGANIZATIONAL ROLES IN DATA STEWARDSHIP

1. Chief Data Officer (CDO)
The Chief Data Officer provides strategic leadership for enterprise data governance and stewardship initiatives. The CDO develops enterprise data strategies, establishes

governance frameworks, coordinates cross-functional collaboration, allocates resources, and ensures alignment between organizational objectives and information management practices.

2. Business Data Stewards

Business data stewards are responsible for defining business rules, maintaining business glossaries, resolving data quality issues, validating master data, and ensuring that enterprise information accurately reflects organizational operations. They act as the primary liaison between business users and technical teams.

3. Technical Data Stewards

Technical data stewards focus on the implementation and maintenance of data management technologies, metadata repositories, integration platforms, and data quality tools. They collaborate with system architects, database administrators, and software engineers to ensure that governance policies are consistently enforced across enterprise systems.

4. Data Governance Committee

A Data Governance Committee provides organizational oversight by establishing governance policies, approving standards, resolving stewardship conflicts, monitoring compliance, and evaluating governance performance. The committee typically includes executive leaders, business managers, compliance officers, IT specialists, and domain experts to ensure enterprise-wide alignment and accountability.

VI. TECHNOLOGY ENABLERS FOR ENTERPRISE DATA STEWARDSHIP

1. Artificial Intelligence for Data Stewardship

Artificial Intelligence (AI) is transforming enterprise data stewardship by automating data quality management, metadata generation, entity resolution, anomaly detection, policy enforcement, and governance decision support. AI-driven stewardship platforms continuously analyze enterprise data to identify inconsistencies, recommend corrective actions, and improve governance efficiency with minimal human intervention. Machine learning algorithms also enhance data matching accuracy and enable predictive monitoring of data quality trends, allowing organizations to proactively address governance issues before they affect business operations.

2. Metadata-Driven Stewardship

Metadata serves as the foundation of modern data stewardship by providing standardized descriptions of enterprise data assets, including business definitions, ownership information, quality metrics, lineage, and regulatory classifications. Metadata-driven stewardship enables organizations to automate governance processes, improve data discovery, facilitate impact analysis, and strengthen transparency across enterprise information systems. Comprehensive metadata repositories also support collaboration among business users, technical teams, and governance professionals.

3. Cloud-Based Data Governance Platforms

Cloud computing has significantly modernized enterprise data stewardship by enabling centralized governance across geographically distributed environments. Cloud-based governance platforms provide scalable infrastructure for metadata management, master data synchronization, policy enforcement, security monitoring, and compliance reporting. These platforms simplify integration with Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and hybrid cloud environments while supporting real-time collaboration and enterprise-wide data accessibility.

4. Data Catalogs and Knowledge Graphs

Enterprise data catalogs provide centralized inventories of organizational data assets, allowing users to discover, understand, and access trusted information efficiently. When integrated with knowledge graph technologies, data catalogs establish semantic relationships among business entities, governance policies, metadata, and organizational processes. These intelligent technologies improve contextual understanding, facilitate advanced analytics, and strengthen

enterprise data trust by making information more discoverable, understandable, and reusable.

Governance Adoption Strategies

Executive Sponsorship

Successful adoption of enterprise data stewardship requires strong executive sponsorship that provides strategic direction, financial investment, organizational authority, and long-term commitment. Executive leaders communicate the business value of trusted data, establish governance priorities, allocate resources, and promote enterprise-wide participation. Active executive involvement significantly improves stakeholder engagement and increases the likelihood of successful governance adoption.

Organizational Change Management

Implementing data stewardship often requires substantial organizational transformation involving revised business processes, new governance policies, updated technologies, and clearly defined responsibilities. Effective change management includes stakeholder communication, employee training, governance awareness programs, and continuous feedback mechanisms that encourage organizational acceptance and reduce resistance to governance initiatives.

Cross-Functional Collaboration

Enterprise data stewardship requires close collaboration among business users, data stewards, IT professionals, compliance officers, security teams, and executive management. Cross-functional collaboration ensures consistent business definitions, shared governance objectives, coordinated policy implementation, and collective ownership of enterprise information assets. Collaborative governance models also improve organizational transparency and trust.

Continuous Governance Improvement

Data stewardship should evolve continuously in response to changing business requirements, regulatory expectations, and technological advancements. Organizations should establish governance maturity assessments, periodic policy reviews, performance monitoring, and continuous improvement initiatives to ensure that stewardship programs remain effective, scalable, and aligned with organizational objectives.

Challenges in Enterprise Data Stewardship

Organizational Resistance

Resistance to organizational change remains one of the most significant barriers to successful data stewardship implementation. Employees may be reluctant to adopt new governance processes, standardized data practices, or additional stewardship responsibilities. Leadership must foster a culture of collaboration, accountability, and continuous learning to overcome these challenges.

Fragmented Data Ownership

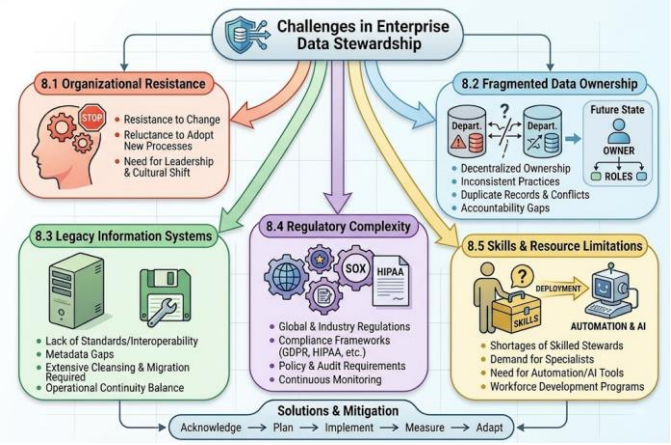
Many organizations maintain decentralized ownership of enterprise information across multiple departments, resulting in inconsistent governance practices, duplicate records, conflicting business definitions, and accountability gaps. Clearly defined ownership models and stewardship responsibilities are essential for maintaining trusted enterprise data.

Legacy Information Systems

Legacy enterprise applications frequently lack standardized data models, metadata management capabilities, and interoperability mechanisms. Integrating these systems into modern governance environments requires extensive data cleansing, transformation, migration, and synchronization efforts. Organizations must carefully balance modernization initiatives with operational continuity.

Regulatory Complexity

Organizations operating across multiple industries and geographical regions must comply with diverse privacy, security, and governance regulations. Maintaining compliance with frameworks such as GDPR, HIPAA, SOX, PCI DSS, and ISO standards requires comprehensive governance policies, audit capabilities, metadata management, and continuous compliance monitoring.



Skills and Resource Limitations

The growing demand for experienced data governance professionals has created shortages of skilled data stewards, governance specialists, enterprise architects, and metadata managers. Organizations increasingly invest in automation, AI-

assisted governance tools, and workforce development programs to address these resource constraints while improving governance effectiveness.

Future Research Directions

Autonomous Data Stewardship

Future enterprise governance platforms are expected to leverage autonomous AI agents capable of continuously monitoring data quality, enforcing governance policies, resolving stewardship issues, generating metadata, and recommending governance improvements with minimal human intervention. Autonomous stewardship will improve scalability while reducing operational workloads.

Explainable Artificial Intelligence

As AI increasingly supports governance decision-making, explainability becomes essential for maintaining stakeholder trust, regulatory compliance, and organizational accountability. Explainable Artificial Intelligence (XAI) enables users to understand how governance recommendations, data classifications, and quality assessments are generated, thereby improving transparency and confidence in AI-assisted stewardship.

Semantic Knowledge Graphs

Knowledge graph technologies will continue to evolve as foundational components of enterprise data stewardship. Future research will focus on developing semantic governance frameworks that automatically identify relationships among business entities, metadata, policies, and organizational processes. These capabilities will improve enterprise search, contextual analytics, and intelligent decision support.

Real-Time Data Observability

Emerging data observability platforms continuously monitor enterprise data pipelines, quality metrics, metadata changes, and governance policy compliance. Integrating observability with stewardship frameworks enables organizations to detect anomalies, resolve issues proactively, and maintain trusted enterprise data in real time.

Intelligent Governance Automation

Future stewardship platforms will increasingly automate compliance reporting, metadata maintenance, governance policy enforcement, risk assessment, and audit preparation using AI, robotic process automation (RPA), and advanced analytics. Intelligent automation will improve governance efficiency while enabling organizations to adapt rapidly to evolving regulatory and business requirements.

VII. DISCUSSION

The systematic evidence mapping indicates that data stewardship is a critical organizational capability for establishing and maintaining enterprise data trust. Across the reviewed studies, successful stewardship programs consistently emphasize clearly defined organizational roles, executive sponsorship, standardized governance frameworks, metadata management, continuous data quality improvement, and strong collaboration between business and technical stakeholders. These elements collectively enable organizations to create reliable, consistent, and trustworthy information assets that support strategic decision-making, operational efficiency, and regulatory compliance.

The evidence also demonstrates that technological advancements—including artificial intelligence, machine learning, cloud-native governance platforms, metadata automation, enterprise data catalogs, and knowledge graph technologies—are significantly enhancing the effectiveness of modern data stewardship programs. These innovations improve governance automation, reduce manual effort, strengthen metadata management, and enable proactive monitoring of enterprise information assets. However, organizations continue to encounter challenges related to fragmented data ownership, organizational resistance, legacy system integration, regulatory complexity, and shortages of skilled governance professionals. Addressing these challenges requires sustained leadership commitment, organizational collaboration, governance maturity, and continuous investment in people, processes, and technology.

Furthermore, the evidence mapping identifies promising opportunities for future research involving autonomous stewardship, explainable AI, semantic governance, intelligent metadata management, real-time data observability, adaptive governance frameworks, and AI-driven compliance automation. These research areas are expected to redefine enterprise data stewardship and strengthen enterprise data trust in increasingly complex digital ecosystems.

VIII. CONCLUSION

Data stewardship has evolved into a strategic organizational function that enables enterprises to establish trusted, high-quality, and well-governed information assets capable of supporting digital transformation, regulatory compliance, operational excellence, and data-driven decision-making. This systematic evidence mapping synthesizes existing research on data stewardship models by examining governance

frameworks, stewardship roles, organizational structures, enabling technologies, implementation strategies, governance adoption practices, and emerging trends. The findings demonstrate that successful stewardship initiatives require clearly defined accountability, executive leadership, standardized governance policies, effective metadata management, continuous data quality monitoring, and strong collaboration among business, technical, and governance stakeholders.

The study further highlights the transformative role of emerging technologies such as artificial intelligence, machine learning, cloud computing, metadata automation, enterprise data catalogs, knowledge graphs, and intelligent governance platforms in modernizing enterprise data stewardship. These technologies enhance governance efficiency, improve data quality, automate routine stewardship activities, and strengthen enterprise data trust while enabling organizations to respond effectively to evolving business and regulatory requirements. Despite these advancements, important challenges remain, including fragmented data ownership, organizational resistance, legacy infrastructure, governance scalability, and increasing regulatory complexity.

The evidence mapping also identifies several promising directions for future research, including autonomous data stewardship, explainable artificial intelligence, semantic governance, real-time data observability, intelligent metadata management, and AI-driven compliance automation. These innovations are expected to enhance governance maturity, strengthen organizational resilience, and support the development of adaptive, scalable, and trustworthy enterprise data ecosystems. Overall, this study provides researchers, practitioners, enterprise architects, and governance leaders with a comprehensive understanding of data stewardship models that foster enterprise data trust and offers practical guidance for designing sustainable, governance-driven, and technology-enabled stewardship programs that maximize long-term organizational value.

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