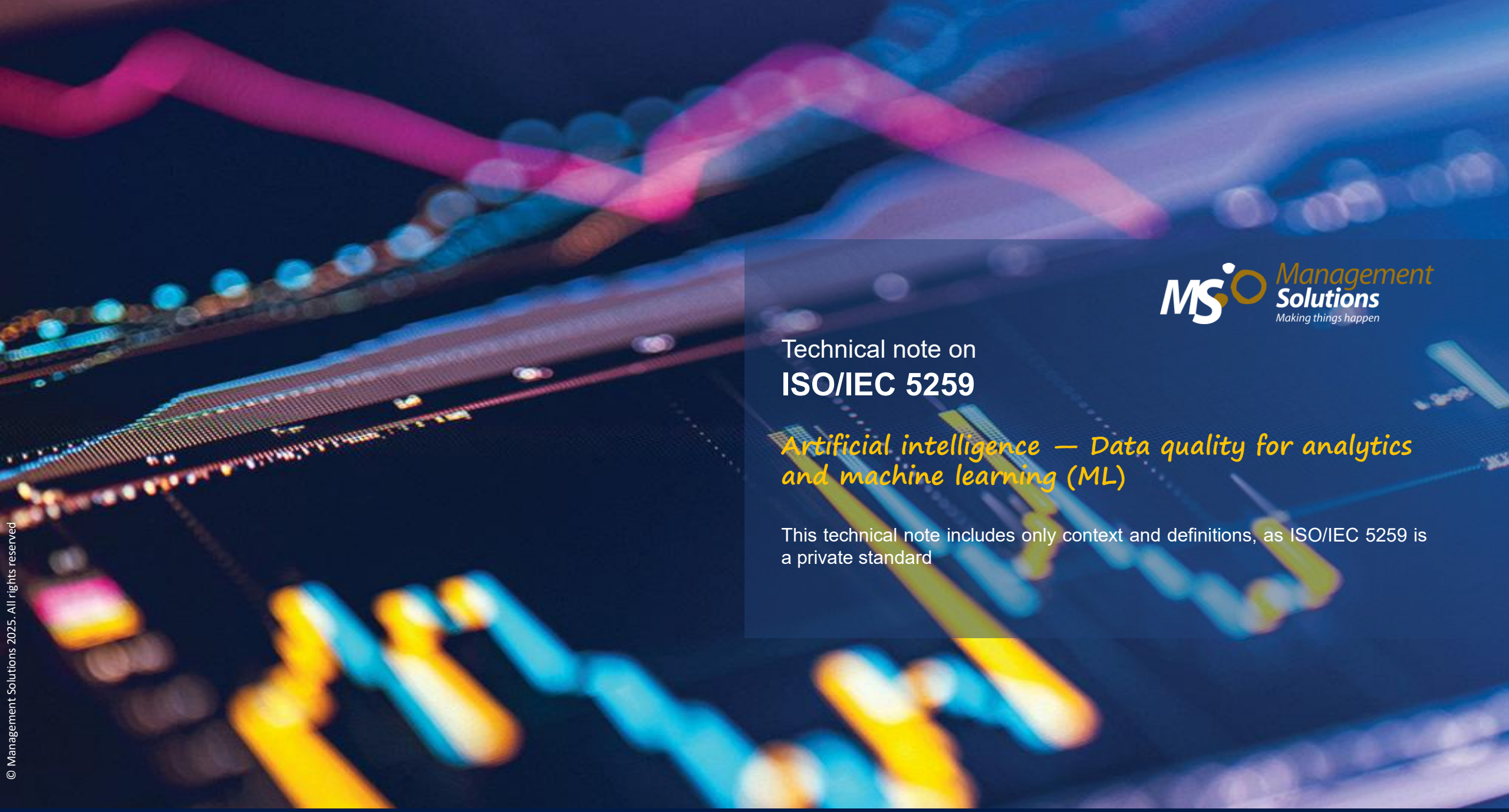

Management Solutions
Making things happen

Technical note on

ISO/IEC 5259

Artificial intelligence — Data quality for analytics and machine learning (ML)

This technical note includes only context and definitions, as ISO/IEC 5259 is a private standard

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1 Executive summary
General overview

ISO/IEC 5259 on Artificial Intelligence (Parts 1-5), released from 2024 to 2025, is designed to enhance the governance and management of data quality in analytics and machine learning (ML)

Main contents: this ISO provides guidance on...

Part 1: Establishes the **essential concepts and terminology** needed to understand **data quality** in **analytics and machine learning**. It explains how **data quality** directly affects the **reliability and accuracy** of analytical outcomes and model predictions. The section introduces fundamental **principles** such as **accuracy, completeness, consistency, and timeliness**.

Part 2: Defines a **comprehensive model** that standardizes how **data quality is measured and evaluated**. It specifies the key **dimensions, indicators, and metrics** that organizations can use to assess the quality of their data. This part also offers **guidance on reporting practices** to ensure that data quality results are **transparent, consistent, and comparable**.

Part 3: Provides detailed **requirements and practical guidelines** for managing **data quality throughout its lifecycle**. It emphasizes the importance of **planning, implementing, monitoring, and improving** data quality processes within an organization. Altogether, this part supports the development of a **sustainable and well-governed data quality management system**.

Part 4: Presents a **structured process framework** tailored to **data quality in analytics and machine learning**. It defines the main **activities and steps** involved in ensuring quality across **data acquisition, preparation, modeling, and deployment**. Ultimately, this part promotes **consistency and reliability** across all stages of the **data and model lifecycle**.

Part 5: Defines a **governance framework** to ensure **effective oversight** of data quality initiatives. It establishes **roles, responsibilities, and accountability** for managing data quality. The section promotes **alignment with organizational goals** and **regulatory compliance**. It encourages **collaboration** between business, technical, and governance teams.

Objectives

- **Specify requirements and guidance** for establishing, implementing, maintaining and continually improving a Data Quality Management System (DQMS) for analytics/ML.
- **Support organizations** in managing data-quality risks, enhancing accountability, building trust in ML/analytics outcomes and aligning with governance frameworks.

Who can use it?

Any organisation that uses data for analytics or ML, whether public or private, large or small, commercial or non-profit — which wants a structured, verifiable approach to data-quality assurance.

It is especially valuable for:

- Data controllers, analytics/ML teams, data service providers
- Organizations subject to regulatory, ethical or trust requirements for AI/ML outcomes
- Groups wishing to integrate data-quality into broader management systems (e.g., governance, security, AI-management)

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2 ISO/IEC 5259 - Artificial intelligence
Part 1 - Overview, terminology, and examples

ISO/IEC 5259-1:2024 defines the core concepts, terminology, and illustrative examples that underpin the implementation of data quality principles within analytics and ML

Purpose

Defines the **objectives and scope** of the agreed guideline, advising how organizations should approach data quality in AI and ML

- **Establish a standardized vocabulary** for data quality in AI/ML.
- Define **foundational principles** for managing and assessing data quality.
- Offer **practical examples** to help organizations apply these principles to practical use cases. to support real-world application.
- **Serve as an entry point** for the rest of the ISO/IEC 5259 series, enabling alignment across its later parts (Parts 2–5).

Benefits

Highlights the **value and impact** of adopting standardized data quality practices for more reliable analytics and ML outcomes

- Builds **trust and reliability** in ML outcomes.
- Improves **decision-making** through quality data.
- **Enhances model performance and transparency** through higher-quality, well-managed data.
- **Supports regulatory compliance and ethical AI practices** by ensuring data integrity and traceability.

Practical Implementation

- **Applies data quality principles** to real-world analytics and ML environments.
- **Identifies and addresses quality issues** across data pipelines and model lifecycles.
- **Integrates measurable quality metrics** into governance and MLOps processes.
- **Enables comparison and transparency** across datasets and analytical workflows.

Key Definitions

- **Data life cycle** – Stages in the process of data usage from idea conception to its discontinuation
- **Data originator** – Party that creates the data and that can have rights
- **Data holder** – Party that has legal control to authorize data processing of the data by other parties
- **Data user** – Party that is authorized to perform processing of data under the legal control of a data holder
- **Data quality** – Characteristic of data that the data meet the organization's data requirements for a specified context
- **Data governance** – System by which the current and future use of data is governed
- **Data provenance** – Information on the place and time of origin, derivation or generation of a dataset, proof of authenticity of the dataset, or a record of past and present ownership of the dataset
- **Analytics** – Composite concept consisting of data acquisition, data collection, data validation, data processing, including data quantification, data visualization, data documentation and data interpretation
- **Metadata** – Data that define and describe other data
- **Data architecture** – Description of the structure and interaction of the enterprise's major types and sources of data, logical data assets, physical data assets and data management resources

Complete list of definitions

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2 ISO/IEC 5259 - Artificial intelligence
Part 2 - Data quality measures

ISO/IEC 5259-2:2024 specifies a data quality model, measurement framework, and reporting guidance to support the evaluation, comparison, and communication of data quality in analytics and ML

Purpose

Defines the **structure and objectives** of the data quality model, ensuring consistent evaluation and transparent communication of data quality results

- Establishes a **standardized data quality model** for analytics and ML contexts.
- Defines **quantitative and qualitative measures** for assessing data quality dimensions.
- Provides **guidance on data quality reporting**, ensuring clear communication to stakeholders.
- Supports **alignment and comparability** across datasets and analytical systems.

Benefits

Highlights the **value and impact** of structured data quality assessment and reporting

- Enables **objective and repeatable evaluation** of data quality.
- Promotes **transparency and comparability** between datasets and organizations.
- Improves **trust and accountability** in data-driven processes.
- Provides a **foundation for monitoring and continuous improvement** of data quality performance.

Practical Implementation

- Defines and applies **data quality metrics** across analytics and ML environments.
- Supports **consistent quality reporting** to management and regulatory bodies.
- Enables **benchmarking and comparison** of data quality across systems or organizations.
- Integrates **data quality measurement** into governance, analytics, and ML pipelines.

Key Definitions

- **Data** – Re-interpretable representation of information in a formalized manner suitable for communication, interpretation, or processing
- **Data frame** – Set of data records represented by a specific domain or purpose, with a shared structure of data items
- **Data type** – Categorization of an abstract set of possible values, characteristics, and set of operations for an attribute
- **Raw data** – Data in its originally acquired, direct form from its source before subsequent processing
- **Entity** – Concrete or abstract thing in the domain under consideration
- **Measure** – Variable to which a value is assigned as the result of measurement
- **Measurement result** – Set of quantity values being attributed to a measurand together with any other available relevant information
- **Cluster** – Automatically induced category of elements that are part of the dataset and that share common attributes
- **Overfitting** – Creating a model which fits the training data too precisely and fails to generalize on new data
- **Validity** – Extent to which an assessment achieves its aim by measuring what it is supposed to measure and producing results which can be used for their intended purpose

Complete list of definitions

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2 ISO/IEC 5259 - Artificial intelligence

Part 3 - Data quality management requirements and guidelines

ISO/IEC 5259-3:2024 provides requirements and guidelines for establishing, implementing, maintaining, and improving data quality management systems to ensure reliable and effective data use in analytics and machine learning (ML)

Purpose

Defines the **framework and objectives** for managing data quality throughout its lifecycle in analytics and ML

- Establishes a **systematic approach** for managing and controlling data quality processes.
- Defines **roles, responsibilities, and governance structures** for data quality management.
- Ensures **alignment with organizational goals** and data governance strategies.
- Provides **guidance for continuous improvement** of data quality performance.

Benefits

Highlights the **organizational value** of adopting structured data quality management practices

- Ensures **consistency and accountability** in data handling and analytics processes.
- Strengthens **trust and reliability** in analytical and ML outcomes.
- Promotes **integration with broader data governance** and quality management systems.
- Enables **sustained improvement** and adaptability to evolving data needs.

Practical Implementation

- Implements **data quality management processes** across analytics and ML workflows.
- Establishes **roles and accountability** for data quality oversight.
- Integrates **monitoring and control mechanisms** for ongoing quality assurance.
- Supports **continuous improvement** through periodic assessment and feedback loops.

Key Definitions

- **Data quality claim** – Statement to what degree data satisfy a data quality requirement
- **Data quality plan** – Specification of practices, processes and allocation of resources to achieve data quality objectives as the outcome of data quality planning
- **Data quality planning** – Part of data quality management focused on setting data quality objectives and specifying necessary operational processes and related resources to achieve the quality objectives
- **Development interface agreement (DIA)** – Agreement between customer and supplier in which the responsibilities for activities to be performed, evidence to be reviewed, or work products to be exchanged by each party related to the development of items or elements are specified

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2 ISO/IEC 5259 - Artificial intelligence

Part 4 - Data quality process framework

ISO/IEC 5259-4:2024 outlines a data quality process framework, providing guidance on establishing and managing data quality processes for different types of analytics and machine learning (ML) activities

Purpose

Defines the **structure and intent** of the data quality process framework to ensure systematic and consistent data quality operations

- Establishes a **standardized process model** for managing data quality in AI and ML environments.
- Describes **key activities and workflows** for maintaining data quality.
- Ensures **integration of data quality processes** throughout the data lifecycle.
- Supports **adaptation to various ML types** and analytical use cases

Benefits

Highlights the **operational and organizational advantages** of using a standardized data quality process

- Ensures **consistent implementation** of data quality activities across ML systems.
- Enhances **efficiency and traceability** in data processing workflows.
- Facilitates **collaboration between data, analytics, and governance teams.**
- Promotes **flexibility and scalability** across diverse ML and data environments.

Practical Implementation

- Applies **structured data quality processes** to different stages of ML pipelines.
- Defines **repeatable workflows** for data validation, correction, and monitoring.
- Supports **process automation and integration** with MLOps and governance tools.
- Enables **process evaluation and optimization** for improved data quality outcomes.

Key Definitions

- **Outsourcing** – Subcontracting of an activity by an organization to an external organization
- **Stand-off annotation** – Annotation layered over primary data and serialized in a document separate from that containing the primary data
- **Cloud service** – One or more capabilities offered via cloud computing invoked using a defined interface
- **Data originator** – Party that created the data and that can have rights
- **Bounding box** – Rectangular region enclosing annotated object
- **Segmentation** – Process of separating the objects of interest from their surroundings
- **Key-point** – Point of interest on an object

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2 ISO/IEC 5259 - Artificial intelligence

Part 5 - Data quality governance framework

ISO/IEC 5259-5:2024 provides a data quality governance framework that enables organizations to direct, oversee, and sustain effective data quality management and improvement across analytics and machine learning (ML) environments

Purpose

Defines the **governance structure and responsibilities** required to ensure strategic oversight and accountability for data quality.

- Establishes a **framework for leadership and decision-making** in data quality management.
- Defines **roles, policies, and responsibilities** for governance of data quality activities.
- Aligns **data quality objectives** with organizational strategy and compliance requirements.
- Ensures **long-term sustainability and continuous improvement** of data quality programs.

Benefits

Highlights the **strategic and organizational** impact of strong data quality governance

- Strengthens **organizational accountability** for data quality outcomes.
- Promotes **alignment between data strategy and business objectives.**
- Improves **transparency and trust** in analytics and ML processes.
- Ensures **sustained data quality improvement** through structured oversight.

Practical Implementation

- Implements **governance frameworks** to direct and oversee data quality management.
- Establishes **reporting and escalation mechanisms** for data quality issues.
- Integrates **governance with enterprise data and AI strategies.**
- Supports **compliance and audit readiness** through accountable data quality oversight.

Key Definitions

- **Data creator** – Role within an organization responsible for generating, collecting and curating data from data sources
- **Data owner** – Organization that is in the position to obtain, create, and have significant control over the content, access and distribution of data
- **Data steward** – Role within an organization responsible for ensuring that data-related work is performed according to policies and practices as established through data governance
- **Direct** – Communicate desired purposes and outcomes
- **Executive manager** – Person who has authority delegated from the governing body for implementation of strategies and policies to fulfil the purpose of the organization
- **Governance** – Human-based system comprising directing, overseeing and accountability
- **Governing body** – Person or group of people who have ultimate accountability for the whole organization
- **Monitor** – Review as a basis for appropriate decisions and adjustments
- **Principle** – Fundamental truth, proposition or assumption that serves as foundations for a set of beliefs or behaviours or for a chain of reasoning
- **Strategy** – Organization's overall plan of development, describing the effective use of resources in support of the organization in its future activities

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A Annex
Abbreviations

Abbreviation	Meaning
AI	Artificial Intelligence
ML	Machine Learning
ISO/IEC	Internacional Organization for Standarization/ International Electrotechnical Commission
DQMS	Data Quality Management System
DQM	Data Quality Management
MLOps	Machine Learning Operations
DIA	Development Interface Agreement
KPI	Key Performance Indicator
E2E	End to End
MRM	Model Risk Management
IT	Information Technologgy
ICT	Information and Communication Technology
CISO	Chief Information Security Officer
BISO	Business Information Security Officer
PMO	Project Management Office

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