Metadata Management Framework

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Metadata Management Framework

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Description: Defines the framework for managing metadata, including principles, architecture, standards, and governance.

Metadata Management Framework for adpa-enterprise-framework-automation

Aligned with DMBOK 2.0 Best Practices

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1. Introduction

Purpose and Scope

This framework defines standards, processes, roles, and technology for managing metadata throughout the lifecycle of the **adpa-enterprise-framework-automation** platform—a modular, enterprise-ready Node.js/TypeScript automation system supporting requirements, project, and data management. The framework ensures metadata is accurate, discoverable, secure, and aligned with enterprise objectives, supporting both business and technical stakeholders.

Alignment with Data Strategy

Metadata management is foundational to the project's data strategy, enabling:

- Regulatory and standards compliance (BABOK v3, PMBOK 7th, DMBOK 2.0)
- Data discoverability, lineage, and quality
- Secure, scalable, and maintainable automation
- Integration with external platforms (e.g., Azure, Adobe, SharePoint)

Key Drivers and Business Benefits

- **Improved Data Quality and Trust**
- **Regulatory Compliance and Auditability**
- **Accelerated Development and Automation**
- **Enhanced Collaboration and Knowledge Sharing**

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2. Metadata Principles and Policies

Core Principles

- **Accuracy:** Metadata must reflect the true state of assets.
- **Accessibility:** Metadata is available to authorized users and systems.

- **Consistency:** Standardized definitions and formats across the ecosystem.
- **Security & Privacy:** Metadata is managed according to enterprise security policies.
- **Lifecycle Management:** Metadata is managed from creation to retirement.

Policies

- **Creation:** All new data assets (templates, APIs, scripts, documents) must have associated metadata registered in the central repository.
- **Storage:** Metadata is stored in a centralized, version-controlled repository.
- **Access:** Role-based access control (RBAC) for metadata viewing and editing.
- **Stewardship:** Business and technical owners are assigned stewardship over their respective metadata domains.

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3. Metadata Architecture

Metadata Repository

- **Centralized metadata repository** (e.g., integrated with data catalog or database)
- **Supports business, technical, and operational metadata**

Integration

- **Automated harvesting** from code (TypeScript interfaces, OpenAPI/TypeSpec specs), configuration, and external APIs (Adobe, Azure, SharePoint).
- **APIs and CLI** for programmatic access and registration.
- **Synchronization** with external catalogs (Azure API Center, SharePoint Document Library).

Discovery & Harvesting

- **Automated scanning** of source code, scripts, and configuration.
- **Manual registration** for business metadata via UI/CLI.
- **Integration with continuous integration/continuous delivery** (CI/CD) pipelines for capturing operational metadata.

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4. Metadata Standards

Business Metadata

- **Data Dictionary:** Definitions, synonyms, business rules for terms used in requirements, templates, and documents.
- **Business Glossary:** Centralized repository of business terms and acronyms.
- **Ownership and Stewardship:** Mapped to business units/roles.

Technical Metadata

- **Schema Definitions:** TypeSpec/OpenAPI schemas, TypeScript interfaces.
- **Data Lineage:** Tracking data flow from source (Markdown, APIs) through transformation (Puppeteer, Adobe APIs) to output (PDF, InDesign, SharePoint).
- **Mappings:** ETL and API mapping specifications (field-level).

Operational Metadata

- **Job Execution Logs:** API/server execution, document generation runs, error logs.
- **Data Quality Metrics:** Validation results, completeness, accuracy, timeliness.
- **Versioning Information:** Script, template, and API version history.

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5. Roles and Responsibilities

- **Data Stewards:**
  Oversee metadata quality, coordinate with business and technical teams, approve changes.
- **Data Owners:**
  Accountable for accuracy and completeness of metadata for their assets (e.g., API, template, document).
- **Metadata Analysts:**
  Curate, enrich, and validate metadata. Perform gap analysis and quality checks.
- **IT and Data Management Teams:**
  Maintain metadata infrastructure, support integration/harvesting, enforce policies.
- **Developers/DevOps:**
  Ensure technical metadata is captured (schemas, mappings, operational logs).

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6. Processes and Workflows

Metadata Capture and Registration

- **Automated extraction** from codebase, OpenAPI/TypeSpec specs, CLI/API usage logs.
- **Manual entry** for business/semantic metadata via UI or CLI.

Metadata Curation and Enrichment

- **Review and validate** business glossary, data dictionary.
- **Enrich technical metadata** with business context and usage notes.

Change Management

- **Version control** for all metadata artifacts (e.g., Git, repository).
- **Approval workflow** for updates to business-critical metadata.
- **Impact analysis** for changes to schemas, APIs, or templates.

Metadata Quality Assurance

- **Periodic audits** for completeness, accuracy, and consistency.
- **Automated validation** (e.g., schema conformance, uniqueness, referential integrity).

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7. Tooling and Technology

Metadata Management Tools

- **Integrated data catalog** (e.g., Azure Purview, Collibra, or custom repository)
- **API and CLI interfaces** for metadata management
- **Version control** (e.g., Git) for tracking changes to metadata artifacts

Integration

- **APIs for external systems:** SharePoint, Adobe, Azure API Center, etc.
- **Plugins/scripts** for automated harvesting from TypeScript, OpenAPI, and CI/CD.

Repository Management

- **Tagging and classification** based on asset type, domain, or business process
- **Access controls** via RBAC

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8. Implementation Roadmap

Phase 1: Foundation

- Establish metadata repository and standards
- Define roles and onboarding/training for data stewards/owners
- Begin automated harvesting from codebase and APIs

Phase 2: Integration and Automation

- Integrate with external metadata sources (Azure, SharePoint, Adobe)
- Implement CI/CD hooks for operational metadata
- Develop dashboards for metadata quality and coverage

Phase 3: Optimization

- Refine processes and automate quality assurance
- Enable advanced lineage and impact analysis
- Expand business glossary and data dictionary
- Continuous training and communication

Key Milestones:

- Metadata repository live
- Automated harvesting operational
- Quality KPIs tracked and reported
- Full integration with business/technical workflows

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9. Governance and Monitoring

Metrics and KPIs

- **Metadata coverage:** % of assets with complete metadata
- **Data quality scores:** Completeness, accuracy, consistency
- **Usage metrics:** Frequency of metadata access/queries
- **Change approval turnaround time**

Auditing and Compliance

- **Regular audits** for policy compliance
- **Automated checks** for role-based access and sensitive metadata exposure

Continuous Improvement

- **Feedback loops** from users and stewards
- **Periodic review** of standards, processes, and tooling
- **Update roadmap** based on technology and business evolution

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10. Approval

This framework is to be reviewed and approved by the Data Governance Council, Data Stewards, and Project Sponsors. Regular updates will reflect new requirements, tools, or regulatory mandates.

Appendix:

- **Glossary of Terms**
- **Sample Metadata Templates**
- **Reference Standards:** DMBOK 2.0, BABOK v3, PMBOK 7th Edition

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This framework ensures metadata across adpa-enterprise-framework-automation is governed, discoverable, and fit for enterprise automation and compliance objectives.
