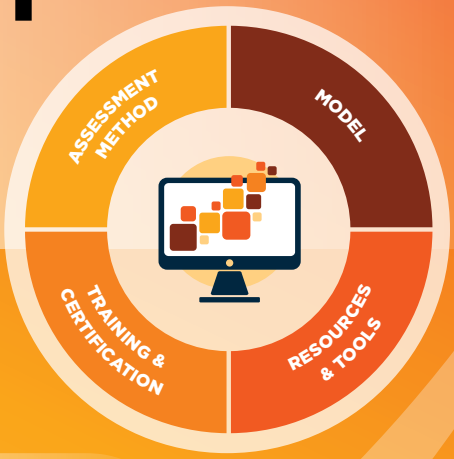
DATA MANAGEMENT MATURITY (DMM)℠ MODEL



AT-A-GLANCE

CMMI® Institute
AN ISACA ENTERPRISE

DATA MANAGEMENT MATURITY (DMM)℠ MODEL

Designed to meet the challenges of the changing global business landscape, the DMM model and integrated product suite are designed to help organizations leverage their data assets to improve business performance.

MODEL	• Clear pathway to performance improvement • Designed for accelerated adoption
ASSESSMENT METHOD	• Understand where you are today and provide a path to improve enterprise data management capability
TRAINING & CERTIFICATION	• Modular training components • A focus on learner objectives • Virtual and in-person options
RESOURCES & TOOLS	• Dig deeper into the DMM with white papers, case studies, and more.

What is the Data Management Maturity (DMM)℠ Model?

The Data Management Maturity (DMM) Model provides the best practices to help organizations build, improve, and measure their enterprise data management capability allowing for timely, accurate and accessible data across your entire organization.

The DMM is a comprehensive reference model for state-of-the-practice process improvement. The DMM defines the fundamental business processes of data management and specific capabilities that constitute a gradated path to maturity. It is a framework of data management best practices in six key categories that helps organizations benchmark their capabilities, identify strengths and gaps, and leverage their data assets to improve business performance.

While the DMM defines the requirements and activities for effective data management, it is not prescriptive about how an organization should achieve these capabilities. The DMM is structured such that it can be used by organizations to not only assess their current state of capabilities, but also to build a customized roadmap to improve enterprise data management capability.

DMM At-A-Glance

The DMM Model At-A-Glance booklet includes a summary of DMM categories, process areas, and functional practices. This summary will provide a helpful overview of the model content areas, but users should read and refer to the complete model content to ensure full understanding and accurate interpretation of the model. The DMM model is available for purchase at: **https://cmmiinstitute.com/dmm.**

DMM Architecture and Process Area Organization

The model is comprised of 20 data management process areas as well as 5 supporting process areas that are organized into five categories, as illustrated in **Figure 1**. Each category contains a number of process areas, as shown in **Table 1**. These process areas serve as the principal means to communicate the themes, goals, practices, and example work products of the model. Accomplishment of process area practices allows an organization to build capabilities and, in conjunction with the infrastructure support practices, accomplish maturity in data management.

Figure 1

Categories

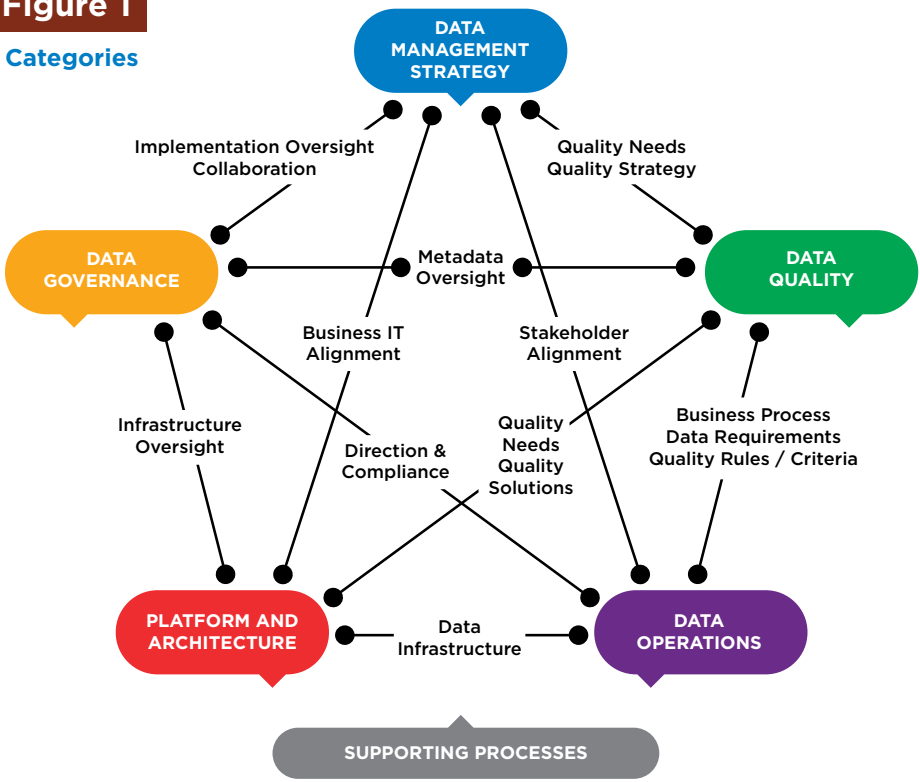
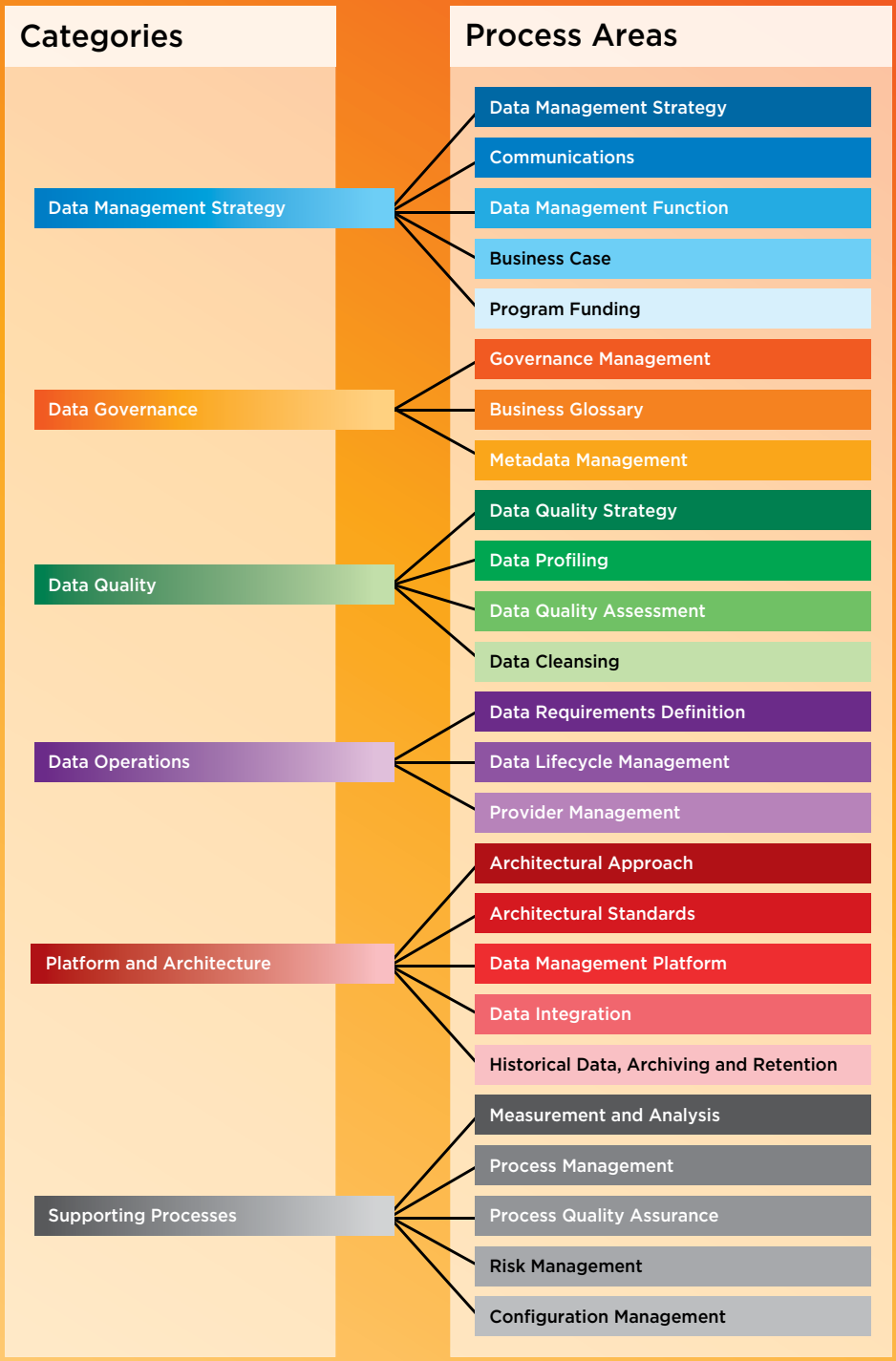


Table 1


Categories
Process Areas
Data Management Strategy
Data Governance
Data Quality
Data Operations
Platform and Architecture
Supporting Processes
Data Management Strategy
Communications
Data Management Function
Business Case
Program Funding
Governance Management
Business Glossary
Metadata Management
Data Quality Strategy
Data Profiling
Data Quality Assessment
Data Cleansing
Data Requirements Definition
Data Lifecycle Management
Provider Management
Architectural Approach
Architectural Standards
Data Management Platform
Data Integration
Historical Data, Archiving and Retention
Measurement and Analysis
Process Management
Process Quality Assurance
Risk Management
Configuration Management

The DMM presents five levels of functional capability and maturity. Each process area level is characterized by increasing achievements for process improvement of best practices. **Table 2** provides a summary description and perspective for each level.

Table 2 **Capability and Maturity Level Definitions**

	DESCRIPTION	PERSPECTIVE
LEVEL 1 Performed	Processes are performed ad hoc, primarily at the project level. Processes are typically not applied across business areas. Process discipline is primarily reactive; for example, data quality processes emphasize repair over prevention. Foundational improvements may exist, but improvements are not yet extended within the organization or maintained.	Data is managed as a requirement for the implementation of projects.
LEVEL 2 Managed	Processes are planned and executed in accordance with policy; employ skilled people with adequate resources to produce controlled outputs; involve relevant stakeholders; are monitored and controlled and evaluated for adherence to the defined process.	There is awareness of the importance of managing data as a critical infrastructure asset.
LEVEL 3 Defined	Set of standard processes is employed and consistently followed. Processes to meet specific needs are tailored from the set of standard processes according to the organization's guidelines.	Data is treated at the organizational level as critical for successful mission performance.
LEVEL 4 Managed	Process metrics have been defined and are used for data management. These include management of variance, prediction, and analysis using statistical and other quantitative techniques. Process performance is managed across the life of the process.	Data is treated as a source of competitive advantage.
LEVEL 5 Optimized	Process performance is optimized through applying Level 4 analysis for target identification of improvement opportunities. Best practices are shared with peers and industry.	Data is seen as critical for survival in a dynamic and competitive market.

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DATA MANAGEMENT STRATEGY

Purpose

Defines the vision, goals, and objectives for the data management program, and ensures that all relevant stakeholders are aligned on priorities and the program's implementation and management.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data management objectives, priorities, and scope reflect stakeholder business objectives for at least one project.

LEVEL 2: MANAGED

2.1 Data management objectives, priorities, and scope are defined and approved.

2.2 Data management objectives and priorities are aligned with business objectives.

2.3 A process for prioritizing projects across a business unit from a data perspective, as well as traceability to business objectives, is established and followed.

2.4 A tactical plan for addressing data management objectives and priorities across the business unit is established and maintained.

2.5 Metrics are used to assess the achievement of objectives for data management.

LEVEL 3: DEFINED

3.1 A data management strategy representing an organization-wide scope is established, approved, promulgated, and maintained.

3.2 Data management objectives for the organization are

DATA MANAGEMENT STRATEGY

evaluated and prioritized against business drivers and goals, and aligned with the business strategy.

3.3 Business and technology collaboratively develop the organization's data management strategy.

3.4 The sequence plan for implementation of the data management strategy is monitored and updated, based upon progress reviews.

3.5 The organization's data management strategy is documented, maintained, reviewed, and communicated according to the organization's defined standard process.

3.6 The organization's data management strategy is consistent with data management policies.

3.7 Metrics are used to assess and monitor achievement of data management objectives.

LEVEL 4: MEASURED

4.1 Statistical and other quantitative techniques are used to evaluate the effectiveness of strategic data management objectives in achieving business objectives, and modifications are made based on metrics.

4.2 The organization researches innovative business processes and emerging regulatory requirements to ensure that the data management program is compatible with future business needs.

LEVEL 5: OPTIMIZED

5.1 The organization researches and adopts selected industry best practices for strategy and objectives development.

5.2 Contributions are made to industry best practices for data management strategy development and implementation.

DATA MANAGEMENT STRATEGY

COMMUNICATIONS

Purpose

Ensure that policies, standards, processes, progress announcements, and other data management communications are published, enacted, understood, and adjusted based on feedback.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Communications related to data assets are managed within at least one project.

LEVEL 2: MANAGED

2.1 The communications plan for data management is defined, documented, approved by stakeholders, and scheduled.

2.2 Data management standards, policies, and processes are communicated and adjusted based upon feedback.

LEVEL 3: DEFINED

3.1 The communications policy establishes criteria for the dissemination or promulgation of different types of data management communications.

3.2 The communications strategy is guided by an organization-wide policy and reflects the data management strategy.

3.3 Standards, policies, and processes are promulgated across the organization and adjusted based upon feedback.

3.4 Metrics are developed and used to measure effectiveness of the data management communications.

3.5 Communications are reviewed by stakeholder peers according to a process that is required by defined

standards, and processes.

3.6 Metrics are employed to improve data management communications effectiveness.

LEVEL 4: MEASURED

4.1 Data management communications with external stakeholders are planned and conducted according to the communications strategy.

4.2 Statistical and other quantitative techniques are employed to improve data management communications.

LEVEL 5: OPTIMIZED

5.1 External data management communications are made with the purpose of influencing public policies and industry best practices that impact data.

DATA MANAGEMENT FUNCTION

Purpose

Provides guidance for data management leadership and staff to ensure that data is managed as a corporate asset. Executive oversight is critical to establish and maintain data management principles, facilitate adoption, and ensure alignment across the organization.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data management roles are established for at least one project.

LEVEL 2: MANAGED

2.1 An approved interaction and engagement model ensures that stakeholders engage with the data management organization.

2.2 Principles are defined and followed to guide the consistency of practices related to data management.

2.3 Roles and responsibilities are specified to support the governance of data management and the interaction between governance and the data management function.

2.4 Agreements are in place that provide explicit expectation for the use of shared staff resources with responsibilities for data management.

2.5 A mechanism exists and is followed to identify and apply needed changes to enhance or redesign the data management function.

LEVEL 3: DEFINED

3.1 A data management function is established with

responsibility for managing activities that support data management objectives.

3.2 The interaction model for the data management function ensures the involvement of data governance for projects that use shared data.

3.3 A data management organization and specified structure are defined and periodically reviewed to ensure that they meet the needs of the organization.

3.4 Data management processes are established and maintained by the data management function with governance approval.

3.5 Data management is an explicitly recognized business function and is leveraged across the organization.

LEVEL 4: MEASURED

4.1 The data management function has defined tasks that are measured and assessed using statistical and other quantitative techniques.

4.2 Modifications of the data management function and its practices are based on an analysis of indicators using statistical and other quantitative techniques.

LEVEL 5: OPTIMIZED

5.1 The operational plan for the continuous improvement of data management activities must be prioritized.

5.2 Analysis using statistical and other quantitative techniques as well as the use of process performance models leverages data to improve operational efficiency.

BUSINESS CASE

Purpose

Provides a rationale for determining which data management initiatives should be funded, and ensures the sustainability of data management by making decisions based on financial considerations and benefits to the organization.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 A business case is developed for project initiatives.

1.2 The benefits and costs of data management are documented and used in local funding decisions.

LEVEL 2: MANAGED

2.1 The business case methodology is defined and followed.

2.2 Standard business cases support approval decisions for funding data management.

2.3 The data management business case for new initiatives aligns with business objectives and data management objectives.

LEVEL 3: DEFINED

3.1 The data management business case is developed according to the organization's standard methodology.

3.2 The business case reflects analysis of the data management program's total cost of ownership, and allocates cost elements to organizations, programs, and projects in accordance with the organization's financial accounting methods.

3.3 Data management business cases require executive sponsorship.

3.4 Cost factors comprising data management TCO are managed and tracked across the data management lifecycle.

3.5 Cost and benefit metrics guide data management priorities.

LEVEL 4: MEASURED

4.1 Data management TCO is employed to measure, evaluate, and fund changes to data management initiatives and infrastructure.

4.2 Statistical and other quantitative techniques are used to analyze data management cost metrics to assess data management TCO and collection methods.

4.3 Data management program performance scorecards include TCO metrics.

4.4 The organization's data management TCO model is validated, checked for accuracy, and enhanced through regular reviews and analysis.

LEVEL 5: OPTIMIZED

5.1 Statistical results and stakeholder feedback guide continuous improvement of TCO for data management.

5.2 The organization shares TCO best practices to contribute to industry maturity through publications or conference sessions.

5.3 Optimization techniques and predictive models are employed to anticipate results of proposed changes prior to implementation.

PROGRAM FUNDING

Purpose

Ensure the availability of adequate and sustainable financing to support the data management program.

Functional Practice Statements

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 At least one data management project has been funded based on cost-benefit analyses.

LEVEL 2: MANAGED

2.1 Data management initiatives are financed based upon funding criteria addressed by the business case.

2.2 Stakeholders participate in and support data management program funding.

2.3 Data management costs are mapped to business areas, operational functions, and IT.

2.4 Governance of the funding process is defined and implemented.

LEVEL 3: DEFINED

3.1 Data management program funding aligns with investment decision-making standards that are consistently employed across the organization.

3.2 Program funding priorities align with the objectives and priorities of data management.

3.3 Defined measures determine the effectiveness of program funding with respect to its objectives and expected benefits.

LEVEL 4: MEASURED

4.1 Metrics are defined and statistically analyzed to evaluate the effectiveness and accuracy of program funding in

meeting organizational objectives.

LEVEL 5: OPTIMIZED

5.1 Lessons learned from organization-wide program funding for data management are shared with industry peers.

5.2 Optimization techniques and predictive models are employed for analysis of the anticipated results of proposed modifications to program funding methods prior to implementation.

GOVERNANCE MANAGEMENT

Purpose

Develop the ownership, stewardship, and operational structure needed to ensure that corporate data is managed as a critical asset and implemented in an effective and sustainable manner.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data governance functions are performed for at least one project.

1.2 Ownership, stewardship, and accountability for data sets are primarily project-based assignments.

LEVEL 2: MANAGED

2.1 A defined and documented data governance structure is in place.

2.2 Governance roles, responsibilities, and accountabilities are established for data subject area by priority, as stated in the business or data strategy.

2.3 Data subject area representatives participate in data governance and associated processes.

2.4 Data governance follows defined policies, processes, and standards.

2.5 A review process is established and followed to evaluate and improve data governance.

LEVEL 3: DEFINED

3.1 An organization-wide data governance structure and rollout plan is established with executive sponsorship.

3.2 Executive level organization-wide data governance is operational for the organization's high-priority subject areas.

3.3 Data governance includes representatives from all business units, which are suppliers or consumers of high-priority data subject areas.

3.4 Standard data governance policies and processes are followed.

3.5 Data governance determines and approves appropriate metrics to evaluate effectiveness of governance activities.

3.6 An evaluation process is established for refining data governance to align with changing business priorities and to expand as needed to encompass new functions and domains.

3.7 Classroom, mentoring, e-learning, or on-the-job training in data governance processes is required for new governance members and other stakeholders.

3.8 Data governance activities and results are analyzed against objectives periodically and reported to executive management.

LEVEL 4: MEASURED

4.1 Statistical and other quantitative techniques are applied to determine if governance efforts are changing organizational behaviors appropriately.

4.2 Adjustments to data governance activities and structure are made based on analysis results.

LEVEL 5: OPTIMIZED

5.1 External governance structures and industry case studies are evaluated for best practices and lessons learned, providing ideas for improvements.

5.2 The data governance structure is communicated to the peer industry as a model of best practice.

5.3 Data governance processes are continually refined and improved.

BUSINESS GLOSSARY

Purpose

Supports a common understanding of terms and definitions about structured and unstructured data supporting business processes for all stakeholders.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Business terms are defined for a particular purpose.

1.2 Logical data models are created with reference to defined and approved business terms.

LEVEL 2: MANAGED

2.1 A process is established, documented, and followed to define, manage, use, and maintain the business glossary.

2.2 Standard business terms are readily available and promulgated to relevant stakeholders.

2.3 Each business term added to the business glossary has a unique name and unique definition.

2.4 New development, data integration, and data consolidation efforts apply standard business terms as part of the data requirements definition process.

LEVEL 3: DEFINED

3.1 The organization uses the approved business glossary in the development of shared repositories, data transfer standards (e.g., XML), ontologies, semantic models, and similar initiatives involving corporate data.

3.2 Organization-wide data governance for compliance with the business glossary process is implemented and followed.

3.3 The organization has implemented a mechanism to facilitate transformation by mapping between business

terms, attributes, and physical data element names or synonyms.

3.4 Impact assessments are conducted, and governance approval is obtained, prior to implementing changes to business terms.

3.5 Metrics are captured and used to evaluate the organization's progress toward a comprehensive business glossary.

3.6 Compliance monitoring processes are used to verify correct use of business terms, highlight exceptions, and ensure they are addressed.

LEVEL 4: MEASURED

4.1 Statistical and other quantitative techniques are used to manage the process and develop reporting and projections on business glossary integration for senior management.

4.2 The business glossary is integrated into the organization's metadata repository with appropriate access permissions.

4.3 The business glossary uses standard industry business terms and definitions as appropriate.

LEVEL 5: OPTIMIZED

5.1 The business glossary is enhanced to contain associated business rules and ontology structures, and is consistent throughout the organization.

5.2 Optimization techniques are employed to improve the process of developing taxonomies, ontologies, or semantic representations leveraging the business glossary.

5.3 The organization publishes white papers and case studies addressing effective management of business terms.

METADATA MANAGEMENT

Purpose

Establish the processes and infrastructure for specifying and extending clear and organized information about the structured and unstructured data assets under management, fostering and supporting data sharing, ensuring compliant use of data, improving responsiveness to business changes, and reducing data-related risks.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Metadata documentation is developed, stored, and accessible.

LEVEL 2: MANAGED

2.1 A metadata management process is established and followed.

2.2 Metadata documentation captures data interdependencies.

2.3 Metadata is developed and used to perform impact analysis on potential data changes.

2.4 Metadata categories, properties, and standards are established and followed.

LEVEL 3: DEFINED

3.1 A metadata management strategy for the organization is established, promulgated, and maintained by data governance with input from relevant stakeholders.

3.2 The organization's metadata repository is populated with additional categories and classifications of metadata according to a phased implementation plan, and is linked to architecture layers.

3.3 The data management function centralizes metadata management efforts and is overseen by data governance.

3.4 Data governance approves metadata additions and changes.

3.5 Measures and metrics are used to evaluate the accuracy and adoption of metadata.

3.6 Metadata, and any changes to metadata, are validated against the existing architecture.

LEVEL 4: MEASURED

4.1 The organization has developed an integrated meta-model deployed across all platforms.

4.2 Metadata types and data definitions support consistent import, subscription, and consumption practices.

4.3 The metadata repository extensions include exchange data representation standards used by the organization.

4.4 New metadata management activities are guided by metadata metrics and historical information about metadata.

4.5 Quantitative objectives guide metadata management and support process performance.

4.6 Statistical analysis reports for process, reporting, and performance are included in the metadata repository and employed to support fact-based decision making for new metadata management initiatives.

LEVEL 5: OPTIMIZED

5.1 Root cause analysis is conducted to reduce the variations between the repository information and the data it describes.

5.2 Performance prediction models guide changes in metadata management processes.

5.3 Quantitative metadata improvement objectives are derived from the metadata strategy.

5.4 Planned data changes are evaluated for impact on the metadata repository; and metadata capture, change, and refinement processes are continuously improved.

DATA QUALITY STRATEGY

Purpose

Defines an integrated, organization-wide strategy to achieve and maintain the level of data quality required to support the business goals and objectives.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data quality objectives, rules, and criteria are documented.

1.2 Business stakeholders participate in setting data quality criteria and objectives.

1.3 Data quality plans are followed; rules are implemented; criteria are monitored.

LEVEL 2: MANAGED

2.1 A data quality strategy is defined, approved, and managed.

2.2 Business stakeholders participate in creating the data quality strategy.

2.3 The organization has established policies, processes, and guidelines to implement the data quality strategy.

2.4 Data quality requirements are articulated employing data quality dimensions selected by the organization.

2.5 The data quality strategy is created with reference to business objectives and plans, and is approved by executive management.

2.6 Plans to meet the goals and objectives of the data quality strategy are monitored to evaluate progress.

LEVEL 3: DEFINED

3.1 The data quality strategy is followed across the organization and is accompanied by corresponding policies, processes, and guidelines.

3.2 Roles and responsibilities for governance, implementation, and management of data quality practices are defined.

3.3 A defined process for defining benefits and costs for data quality initiatives is employed to guide data quality strategy implementation.

3.4 The policies, processes, and governance contained in the data quality strategy are anchored across the data lifecycle, and corresponding processes are mandated in the system development lifecycle methodology.

3.5 Data quality projects, such as data profiling, data assessments, data cleansing, and risk assessments are aligned with the business needs identified in the data quality strategy and the cost-benefit analysis.

3.6 A sequence plan for data quality improvement efforts across the organization is developed, monitored, and maintained.

LEVEL 4: MEASURED

4.1 Data quality metrics are employed to analyze proposed changes to the data quality strategy.

4.2 Prioritizing data quality issues for remediation or prevention is evaluated quantitatively. Priorities are regularly reviewed and adjusted to address changing business objectives.

4.3 Stakeholder reports of data quality issues are systematically collected. Their expectations for improving data quality are included in the data quality strategy, and are measured and monitored.

4.4 The performance of policies, processes, and guidelines, which are defined to support the data quality strategy, are adjusted based on performance metrics analysis results.

LEVEL 5: OPTIMIZED

5.1 Data quality program milestones and metrics are regularly reviewed by executives, and continuous improvements are implemented.

5.2 The organization shares best practices and successful approaches to improving data quality with industry peers.

DATA PROFILING

Purpose

Develops an understanding of the content, quality, and rules of a specified set of data under management.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Basic profiling is performed for a data store(s).

LEVEL 2: MANAGED

2.1 A data profiling methodology is established and followed.

2.2 Data profiling plans are established for projects.

2.3 Plans for profiling a data store are shared with relevant stakeholders and data governance.

2.4 Data profiling activities are conducted according to the plan, and efforts are adjusted when significant deviations from plan are detected.

2.5 Data profiling results and recommendations are reported to the stakeholders.

LEVEL 3: DEFINED

3.1 Data profiling methodologies, processes, practices, tools, and results templates have been defined and standardized.

3.2 All techniques identified to meet the profiling objectives are performed.

3.3 Traceability between data requirements, documented metadata, the physical data, and data quality rules is captured and maintained.

3.4 Data governance is engaged to identify core shared data sets and the corresponding data stores that should be regularly profiled and monitored.

3.5 Profiling processes are reusable and deployed across multiple data stores and shared data repositories.

3.6 The SDLC includes data profiling tasks with tailoring criteria, guidance, and governance.

LEVEL 4: MEASURED

4.1 Performance of data profiling processes is measured and used to manage activities across the organization.

4.2 Data profiling efforts include evaluation of the conformity of data content with its approved metadata and standards.

4.3 During a data profiling activity, actual issues are compared to the statistically predicted issues based on historical profiling results.

4.4 Results are centrally stored, systematically monitored, and analyzed with respect to statistics and metrics to provide insight to data quality improvements over time.

LEVEL 5: OPTIMIZED

5.1 The organization addresses root causes of defects and other issues based on an understanding of the meaning, technical characteristics, and behavior of the data over time.

5.2 Data profiling processes and other activities are analyzed to identify defects and make improvements based on the quantified expected benefits, estimated costs, and business objectives.

5.3 Real-time or near-real-time automated profiling reports are created for all critical data feeds and repositories.

DATA QUALITY ASSESSMENT

Purpose

Provides a systematic approach to measure and evaluate data quality according to processes, techniques, and against data quality rules.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data quality assessments are performed and results are documented.

LEVEL 2: MANAGED

2.1 Data quality assessment objectives, targets, and thresholds are established, used, and maintained according to standard techniques and processes.

2.2 Data governance determines the key set of attributes by subject area for data quality assessments.

2.3 Data quality assessments are conducted periodically according to an approved frequency per the data quality assessment policy.

2.4 Data quality assessment results include recommendations for remediation with supporting rationale.

2.5 Impact analysis includes estimates of the costs of fixes, the level of effort, characterization of the business impact, and tangible and intangible benefits.

2.6 High-level information in data quality assessment reports is traceable to component individual records to support analysis.

LEVEL 3: DEFINED

3.1 Periodic data quality assessments are conducted in

accordance with data quality policies on an approved schedule, or according to specified event triggers.

3.2 The methods for assessing business impacts, including costs and risks, are defined, approved, and consistently applied across the organization.

3.3 Improvement plans resulting from data quality assessments are integrated at the organization level.

3.4 Data quality is assessed using established thresholds and targets for each selected quality dimension.

3.5 Data quality measurement reporting standards are integrated into the systems development lifecycle and compliance processes.

LEVEL 4: MEASURED

4.1 Data quality measurement reports are systematically generated based on criticality of attributes and data volatility.

4.2 Data quality operational metadata is standardized, captured, and analyzed using statistical and other quantitative techniques to guide improvements.

LEVEL 5: OPTIMIZED

5.1 The organization can quantitatively assess the benefits of proposed data changes and refine management priorities in line with data quality governance practices.

5.2 Data quality assessment and reporting processes are continuously reviewed and improved.

DATA CLEANSING

Purpose

Defines the mechanisms, rules, processes, and methods used to validate and correct data according to predefined business rules.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data cleansing requirements are defined and performed.

LEVEL 2: MANAGED

2.1 Data cleansing activities adhere to data cleansing requirements, which are linked to process improvements to achieve business objectives.

2.2 Data cleansing activities conform with data quality requirements (e.g., quality dimensions such as conformity, accuracy, uniqueness) and quality criteria.

2.3 The scope of data cleansing is defined.

2.4 The process for performing data cleansing is defined by a plan.

2.5 A data cleansing policy is established and maintained.

2.6 Methods for correcting the data have been established and are defined within a plan.

2.7 Data cleansing issues are communicated and resolved, when possible, in the internal or external source.

LEVEL 3: DEFINED

3.1 Data change history is maintained through cleansing activities.

3.2 Policies, processes, and procedures exist to ensure that data cleansing activities are applied at the point of origination in accordance with published rules.

3.3 Data cleansing rules are applied consistently across the organization.

3.4 A governance group establishes, maintains, and ensures adherence to data cleansing rules.

3.5 Standard data cleansing results report templates, at the detail and summary level, are employed.

LEVEL 4: MEASURED

4.1 Service level agreements include data quality criteria to hold data providers accountable for cleansed data.

LEVEL 5: OPTIMIZED

5.1 The organization is involved in the establishment and maintenance of external or industry standards for improving the quality of data content.

5.2 Data cleansing requirements for data providers are managed in accordance with standardized processes.

DATA REQUIREMENTS DEFINITION

Purpose

Ensure the data produced and consumed will satisfy business objectives, is understood by all relevant stakeholders, and is consistent with the processes that create and consume the data.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Stakeholders review and approve data requirements.

1.2 The business glossary is updated with approved data requirements.

1.3 Data requirements are evaluated and adjudicated against deliverables and either confirmed or modified.

LEVEL 2: MANAGED

2.1 The data requirements definition process is documented and followed.

2.2 The data requirements necessary to achieve data management goals are defined and demonstrably aligned with business objectives.

2.3 The traceability of data requirements to business requirements and objectives is maintained.

2.4 Data requirements are aligned with the corresponding data model(s) and other related artifacts.

2.5 Stakeholder roles and responsibilities for involvement with data requirements definition are specified, planned, monitored, and controlled.

LEVEL 3: DEFINED

3.1 Data requirements are defined, validated, and integrated

using the organization's standard requirements definition framework.

3.2 Data requirements are assessed based on business priorities.

3.3 The business processes that produce data are documented and linked to the data requirements.

3.4 Data requirements comply with and include compliance requirements for both physical and logical data, including security rules as well as technical requirements.

3.5 Requirements are evaluated to ensure that they are implementable in the target environment.

LEVEL 4: MEASURED

4.1 Industry best practices pertaining to data requirements have been evaluated against selected criteria to determine if they should be adopted into the development lifecycle.

4.2 Defined and managed metrics ensure that data requirements as defined satisfy business objectives; corrective actions are taken when performance is not meeting business needs.

LEVEL 5: OPTIMIZED

5.1 The organization has implemented continuous process improvement to ensure efficient and consistent prioritization, selection, and verification of data requirements.

5.2 The organization shares best practices with industry and peers regarding data requirements.

DATA LIFECYCLE MANAGEMENT

Purpose

Ensures that the organization understands, maps, inventories, and controls its data flows through business processes throughout the data lifecycle from creation or acquisition to retirement. Data lifecycle management enables better risk management and supports data quality improvements, particularly in situations involving large data volumes or high velocity of data movement, and complex and interdependent processes that share data.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 The data lifecycle for a business process(es) is defined and applied.

1.2 Data dependencies—both upstream and downstream from the initial creation or ingest—have been identified and mapped.

1.3 Stakeholders agree on the scope of data elements and authoritative data sources.

LEVEL 2: MANAGED

2.1 The requirements of data consumers and producers are mapped and aligned.

2.2 Business process to data mappings are defined, maintained, and periodically reviewed for compliance.

2.3 A defined process for collaborative agreements with respect to shared data and its usage within business processes is followed.

2.4 Selection criteria are defined and applied to designate authoritative data sources.

2.5 The systems development lifecycle process requires

reference to and adoption of approved shared data representations and obtaining data from authoritative sources.

LEVEL 3: DEFINED

3.1 Data lifecycle management processes are defined and approved by stakeholders, and managed by data governance bodies and processes.

3.2 Change management processes addressing the entire data lifecycle are established and maintained.

3.3 Project responsibilities for system development lifecycle activities include mapping data attributes to business processes, shared data sets, sources, and target data sets that are important to the organization.

3.4 Data flows and full data to process lifecycle maps for shared data are implemented for each major business process at the organizational level.

3.5 Changes to shared data sets or target data sets for a specific business purpose are managed by data governance structures with relevant stakeholder engagement.

3.6 Designations of authoritative data sources are reviewed and approved by data governance.

3.7 Measures and metrics are defined, and associated information is collected to assess progress in process to data mapping efforts and the adoption of authoritative data sources.

LEVEL 4: MEASURED

4.1 A standard process is used across the organization for data lifecycle impact analysis, and to identify, estimate, and schedule changes to interfaces and data sets.

4.2 Metrics are used to expand approved shared data reuse

and eliminate process redundancy.

LEVEL 5: OPTIMIZED

5.1 Metrics and stakeholder feedback are analyzed periodically for the purpose of introducing improvements into the management of data dependencies.

5.2 Data lifecycle metrics are periodically refined and reviewed by senior management.

5.3 The organization shares experiences with industry and peers regarding data management lifecycle processes.

PROVIDER MANAGEMENT

Purpose

Optimize internal and external sourcing of data to satisfy business requirements and to manage data provisioning agreements consistently.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data requirements are translated into data sourcing specifications.

1.2 Analysis and testing are conducted to verify that procured data meet stated requirements.

LEVEL 2: MANAGED

2.1 A process to analyze data requirements for data sourcing specifications, and mapping requirements to provided data elements, is defined and followed.

2.2 A data procurement process for obtaining data from external providers is defined and followed.

2.3 Data quality criteria are defined and embedded into service level agreements with both external and internal providers.

2.4 Planned discussions are held with data providers to address deviations to established data quality thresholds and targets defined in the service level agreement.

LEVEL 3: DEFINED

3.1 Data governance monitors the standard organization-wide process used to develop data sourcing requirements.

3.2 Metrics for the data sourcing management process are established, maintained, and used.

3.3 Data sourcing evaluation and selection processes are defined and employed across the organization.

3.4 Provider service level agreements are developed based on standard templates and processes, are implemented across the organization, tracked, and enforced.

3.5 Service level agreements are periodically reviewed to assure satisfaction of business objectives and requirements.

3.6 Periodic meetings are held with data providers to review planned changes to data content, processes, formats, quality, etc.

LEVEL 4: MEASURED

4.1 Key performance metrics related to service level agreements are analyzed using statistical and other quantitative techniques, are reviewed, and are used to identify and address issues.

4.2 Partnering relationships are developed with selected external providers based upon provider evaluation results and anticipated data needs.

LEVEL 5: OPTIMIZED

5.1 Statistical and other quantitative analyses of the provider processes are applied to improve them and ensure that business objectives are adequately supported.

5.2 Sourcing lessons learned and evolved best practices are shared with industry peers.

ARCHITECTURAL APPROACH

Purpose

Design and implement an optimal data layer that enables the acquisition, production, storage, and delivery of data to meet business and technical objectives.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 A target data architecture aligns business requirements with the implemented data store for at least one project.

1.2 Business and IT stakeholders are identified and involved in architectural decisions.

1.3 Technical capabilities and requirements are defined to guide implementation.

LEVEL 2: MANAGED

2.1 The target data architecture aligns with and complements the data management strategy.

2.2 A governance process is established and followed to ensure that the target data architecture is jointly rationalized and approved by business and IT stakeholders.

2.3 An architectural transition plan is based upon a mapping between the current data layer components and the future-state environment.

2.4 A process is established and followed to ensure that data interface specifications are documented for shared data, with traceability from creation through consumption (end to end) by all sources within scope.

2.5 A compliance process is established and followed to ensure that projects refer to and utilize the approved

target architecture.

LEVEL 3: DEFINED

3.1 The architectural approach for the target data architecture is followed across the organization.

3.2 A data store rationalization process is performed.

3.3 The target architecture is collaboratively developed and jointly approved by business units, IT, and data governance.

3.4 The organization creates and maintains metrics to evaluate progress on state transition and traceability mapping.

3.5 Both internal and selected external data standards are evaluated and applied to the development of architectural blueprints and component designs.

3.6 The architecture, technical requirements, and supporting infrastructure capabilities are aligned.

3.7 The architecture includes the target integration layer, also known as common interface design.

3.8 Data profiling is performed prior to finalizing the design of a data store component that will contain existing data.

LEVEL 4: MEASURED

4.1 Statistical analysis of performance and data quality improvements are used as input to the architectural design process.

LEVEL 5: OPTIMIZED

5.1 Prediction models are evaluated against architectural changes and adjusted as needed.

5.2 The organization shares architecture and platform lessons learned through publications and conferences.

ARCHITECTURAL STANDARDS

Purpose

Provide an approved set of expectations for governing architectural elements supporting approved data representations, data access, and data distribution, fundamental to data asset control and the efficient use and exchange of information.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data architecture standards are defined and followed for at least one project.

LEVEL 2: MANAGED

2.1 Architectural standards addressing data representations, security, data access, and data provisioning are defined and followed.

2.2 Architectural standards are reviewed with business stakeholders and approved by data governance.

2.3 A process governing requests, approvals, and management of deviations from architectural standards is defined and followed.

2.4 The architectural approach, blueprints, and component designs align with selected standards.

2.5 Architectural standards are reviewed periodically against changing business, architectural, and technology needs.

LEVEL 3: DEFINED

3.1 Architectural standards are followed across the organization.

3.2 External requirements applicable to the organization are included in data architecture standards development.

3.3 Stakeholder roles and responsibilities for architectural standards include compliance accountability, ownership, and training.

3.4 Data governance ensures that architectural standards are aligned with business needs and aligned with the organization's senior architecture governance body.

3.5 Metrics for monitoring and controlling adoption of, and compliance to, architectural standards are defined and implemented.

3.6 An audit process is developed, documented, and performed for evaluating compliance to architectural standards.

LEVEL 4: MEASURED

4.1 Audit result metrics and internal deviation patterns indicate where changes to data architecture standards and enhanced guidance for standards application are needed.

4.2 The organization conducts risk-based impact analysis for proposed changes to organizational data architecture standards and guidance prior to acceptance.

LEVEL 5: OPTIMIZED

5.1 Feedback is provided to external stakeholders on new or proposed changes to data standards.

5.2 The organization contributes to data architecture standards initiatives within its industry.

5.3 The organization researches innovative data technologies and methods for potential adoption, and develops appropriate new standards for those which are deployed.

5.4 The organization shares best standards practices and lessons learned through publications, conferences, and white papers.

DATA MANAGEMENT PLATFORM

Purpose

Ensures that an effective platform is implemented and managed to meet business needs.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data management platforms and components are documented for at least one project.

LEVEL 2: MANAGED

2.1 The platform implementation supports the target objectives set out in the data management strategy.

2.2 A policy and process exists to ensure that build or buy decisions consider the target data architecture and support the data management strategy.

2.3 Platforms are consistent with the technology stack and architectural designs.

2.4 Platforms support the security and access requirements of the organization.

2.5 The executive data governance body advises and consents about major platform decisions.

LEVEL 3: DEFINED

3.1 Critical data elements for which the platform is an authoritative source, trusted source, or system of record are documented.

3.2 Data set duplication across systems is documented, planned, and justified.

3.3 Platform implementation plans address the scalability, resiliency, and security needed to accommodate changes in anticipated complexity as well as the volume

of data and number of users.

3.4 Platform design and capabilities ensure that work flow and service level requirements can be met.

3.5 Platform performance data is captured, stored, and used to verify that the platform meets business performance needs and capacity requirements.

3.6 The platform contributes its metadata to the organization's metadata repository.

LEVEL 4: MEASURED

4.1 Qualitative and quantitative performance metrics for the data management platform are analyzed, using statistical and other quantitative techniques, to support platform change decisions.

LEVEL 5: OPTIMIZED

5.1 Platform improvement objectives are quantitatively expressed and approved by governance.

5.2 The organization continuously improves the platform based on statistical performance data and causal analysis.

5.3 The effects of platform changes are compared with prediction models and analyzed to improve the prediction models.

5.4 The organization is sharing its experiences related to design, development, deployment, and operation of the data management platform within its industry.

DATA INTEGRATION

Purpose

Reduce the need for the business to obtain data from multiple sources, and to improve data availability for business processes that require data consolidation and aggregation, such as analytics. Data integration enables source data optimization, the realization of cost savings through centralization, and improved data quality.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data integration between systems has been performed and documented.

LEVEL 2: MANAGED

2.1 Data integration plans are documented.

2.2 The set of data integration disciplines and tools used by the organization provides bulk transport and load, change data capture, versioning and configuration, metadata capture and management, and in-line data quality checks and controls.

2.3 A change control process is established and followed to ensure that changes to the integration environment, including upstream sources and downstream targets, are controlled and coordinated.

2.4 Remediation processes are established and followed to address selected abnormal circumstances.

2.5 Integration verification is performed to ensure that architecture and interface specifications are documented and will be met prior to being released into production.

LEVEL 3: DEFINED

3.1 The organization follows a standard set of practices and rules for performing data integration activities.

3.2 Quality checks are defined as part of the organizational integration standard and performed as part of data integration processes.

3.3 A standard process is established and followed to create and verify data precedence rules with business users based on use cases, requirements, and selected triggers.

3.4 The development and deployment of integration interfaces are specified in accordance with architectural standards supporting re-use.

3.5 Interface and integration performance metrics are collected and analyzed to identify nonconformance with standards and criteria.

3.6 The organization documents and manages changes to data sources and destination through the data governance process.

LEVEL 4: MEASURED

4.1 Statistical analysis of integration metrics guides decisions on changes to interfaces and integrations.

4.2 Selected highly shared data is fully integrated, centrally managed, and delivered as needed to integration data stores.

LEVEL 5: OPTIMIZED

5.1 Performance models for data integration are periodically reviewed, and are used as input for enhancements.

5.2 The organization publishes and shares integration best practices within its industry.

HISTORICAL DATA, RETENTION AND ARCHIVING

Purpose

Ensure that data maintenance will satisfy organizational and regulatory requirements for historical data availability, and that legal and regulatory requirements for data archiving and retention of data are met.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Historical data is available and used to support business decisions.

1.2 A data store is backed up and data is archived as prescribed in policies.

LEVEL 2: MANAGED

2.1 Policies mandate management of data history, including retention, destruction, and audit trail requirements.

2.2 A defined method ensures that the historical data necessary to support business needs is accessible.

2.3 Restoration testing is performed on selected archived data.

2.4 Access, transmittal, and modifications to historical and archived data are controlled by policy and processes.

LEVEL 3: DEFINED

3.1 The organization has a prescribed data warehouse repository that provides access to historical data for meeting analytics needs supporting business processes.

3.2 Data context at any specific point in time can be recreated.

3.3 Policy is defined and approved by data governance and

implemented at the organizational level requiring logging of data changes, and retention of the logs.

3.4 An audit program ensures compliance with organizational data logging, archive, and retention policies.

3.5 A feedback mechanism exists with stakeholders and regulators to affirm existing retention and archiving policies.

LEVEL 4: MEASURED

4.1 Statistical and other quantitative techniques are used to analyze historical data for input to business process and data quality improvements.

4.2 Models are employed to predict compliance with legal and regulatory requirements.

4.3 Metrics results and stakeholder feedback are used to improve data retention and archiving policies.

LEVEL 5: OPTIMIZED

5.1 The organization shares policies and best practices regarding historical data and archiving within its industry.

MEASUREMENT AND ANALYSIS

Purpose

Develop and sustain a measurement capability and analytical techniques to support managing and improving data management activities.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Data management measurement and analysis is performed for at least one project.

LEVEL 2: MANAGED

2.1 Establish and maintain measurement objectives derived from identified information needs and objectives.

2.2 Specify measures to address measurement objectives.

2.3 Specify how measurement data is obtained and stored.

2.4 Specify how measurement data is analyzed and communicated.

2.5 Obtain specified measurement data and ensure that it meets quality criteria.

2.6 Analyze and interpret measurement data.

2.7 Manage and store measurement data, measurement specifications, and analysis results.

2.8 Communicate results of measurement and analysis activities to all relevant stakeholders.

LEVEL 3: DEFINED

3.1 Measurement and analysis standards are established and followed.

3.2 Measurement and analysis tailoring guidance is established and used.

3.3 An organizational measurement repository is established

and maintained in accordance with usage feedback.

3.4 A data quality program for the measurement repository is established, used, and maintained.

LEVEL 4: MEASURED

4.1 Process performance is monitored using statistical and other quantitative techniques.

4.2 Understand the root causes for selected issues to address deficiencies in achieving objectives.

4.3 Measures to address measurement objectives are managed.

4.4 The performance of the data management attributes is analyzed and the data management baseline measures are maintained.

LEVEL 5: OPTIMIZED

5.1 The organization's business performance is managed using statistical and other quantitative techniques to understand data management shortfalls, and to identify areas for process improvement.

5.2 Root causes of selected outcomes are systematically determined.

5.3 Selected improvements are validated by stakeholders.

5.4 The effects of deployed improvements on data management are evaluated using statistical and other quantitative techniques.

5.5 Measurement and analysis related experiences derived from planning and performing data management activities are collected and shared, and are included in the organizational process assets.

PROCESS MANAGEMENT

Purpose

Establish and maintain a usable set of organizational process assets and plan, implement, and deploy organizational process improvements informed by the business goals and objectives and the current gaps in the organization's processes.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 A group is established to coordinate improvement of processes, standards, and procedures.

1.2 Process needs are identified through appraisals or submitted change proposals.

1.3 Process problems or improvement opportunities are addressed.

1.4 Data, process, and work products are stored, maintained, and accessible.

LEVEL 2: MANAGED

2.1 Establish and maintain the description of process needs and objectives for the organization.

2.2 Appraise processes as needed to maintain an understanding of their strengths and weaknesses.

2.3 Perform impact assessment on suggested improvements.

2.4 Select and implement improvements for deployment based on an evaluation of costs, benefits, and other factors.

2.5 Establish, maintain, and follow process action plans to address improvements to the processes.

LEVEL 3: DEFINED

3.1 Establish and maintain the organization's set of standard processes (OSSP).

3.2 Establish and maintain tailoring criteria and guidelines for the set of standard processes.

3.3 Establish and maintain the organization's process asset library.

3.4 Establish and maintain the organization's measurement repository.

LEVEL 4: MEASURED

4.1 Establish and maintain the organization's quantitative objectives for quality and process performance, which are traceable to business objectives.

4.2 Analyze the performance of the selected processes, and establish and maintain the process performance baselines.

4.3 Establish and maintain process performance models for selected processes in the organization's set of standard processes.

LEVEL 5: OPTIMIZED

5.1 Maintain business objectives based on an understanding of business strategies and actual performance results.

5.2 Analyze process performance data to determine the organization's ability to meet identified business objectives.

5.3 Identify potential areas for improvement that could contribute to meeting business objectives.

PROCESS QUALITY ASSURANCE

Purpose

Provide staff and management with objective insight into process execution and the associated work products.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Process and product issues are identified and addressed.

LEVEL 2: MANAGED

2.1 Objectively evaluate selected performed processes against applicable process descriptions, standards, and procedures.

2.2 Objectively evaluate selected work products against applicable process descriptions, standards, and procedures.

2.3 Communicate quality issues and ensure the resolution of noncompliance issues with the staff and managers.

2.4 Establish and maintain records of quality assurance activities.

LEVEL 3: DEFINED

3.1 Establish, maintain, and follow organizational standard policies, processes, and procedures for process and product quality assurance.

3.2 Establish, maintain, and follow organizational standard policies, processes, and procedures for reporting quality results and escalating noncompliance issues when they cannot be resolved at lower levels.

3.3 Establish, maintain, and apply a measurement system to quality issues.

LEVEL 4: MEASURED

4.1 The organization uses statistical and other quantitative techniques to predict where quality issues will arise.

LEVEL 5: OPTIMIZED

5.1 The organization uses statistical and other quantitative techniques to manage tradeoffs between cost and quality to meet business objectives.

RISK MANAGEMENT

Purpose

Identify and analyze potential problems in order to take appropriate action to ensure objectives can be achieved.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Risks are identified, documented, and monitored.

LEVEL 2: MANAGED

2.1 Analyze identified risks.

2.2 Monitor identified risks.

LEVEL 3: DEFINED

3.1 Determine risk sources and categories.

3.2 Define parameters used to analyze and categorize risks and to control the risk management effort.

3.3 Establish and maintain the strategy to be used for risk management.

3.4 Identify, analyze, and document risks by following the organization's standard process.

3.5 Evaluate and categorize each identified risk using defined risk categories and parameters, and determine its relative priority.

3.6 Develop a risk mitigation plan in accordance with the risk management strategy.

3.7 Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.

LEVEL 4: MEASURED

4.1 Using statistical and other quantitative techniques, analyze and determine the quantitative risk to meeting the goals.

LEVEL 5: OPTIMIZED

5.1 Establish and maintain, using statistical and other quantitative techniques, the quantitative risk posture for selected quantitative objectives.

CONFIGURATION MANAGEMENT

Purpose

Establish and maintain the integrity of the operational environment and data management process assets, using configuration identification, control, status accounting, and audits.

Functional Practice Statements

LEVEL 1: PERFORMED

1.1 Configuration management is documented and implemented.

1.2 Configuration management information is available to all relevant stakeholders.

LEVEL 2: MANAGED

2.1 Changes in the operational environment are planned, managed, and tested to determine impact on data stores, interfaces, and data management process assets.

2.2 Data changes, including those originated by external data providers, are subject to the organization's configuration management processes.

2.3 Data interface changes are managed and controlled.

LEVEL 3: DEFINED

3.1 A configuration management policy is defined, approved by governance, and implemented for selected platforms and data management process assets across the organization.

3.2 Changes to data stores, data interfaces and data management process assets are planned and approved by stakeholders at the organizational level.

3.3 An audit program ensures compliance with configuration management policy across the organization.

3.4 Data governance has accountability and oversight authority for configuration management policies and processes.

LEVEL 4: MEASURED

4.1 Metrics are used to measure compliance and effectiveness of configuration management policies and procedures.

LEVEL 5: OPTIMIZED

5.1 Predictive models are evaluated and improved after completion of the change.

5.2 Metrics and stakeholder feedback are analyzed to improve configuration management of new releases from data providers.

INFRASTRUCTURE SUPPORT PRACTICES

Purpose

The infrastructure support practices are essential for effective and repeatable performance of the implemented processes.

IS 1 PERFORM THE FUNCTIONAL PRACTICES

ISP 1.1 Perform the Functional Practices.

IS 2 IMPLEMENT A MANAGED PROCESS

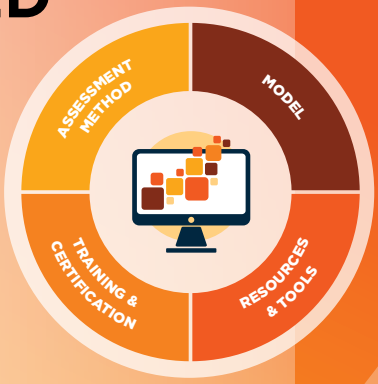
ISP 2.1 Establish an Organizational Policy.
ISP 2.2 Plan the Process.
ISP 2.3 Provide Resources.
ISP 2.4 Assign Responsibility.
ISP 2.5 Train People.
ISP 2.6 Manage Configurations.
ISP 2.7 Identify and Involve Relevant Stakeholders.
ISP 2.8 Monitor and Control the Process.
ISP 2.9 Objectively Evaluate Adherence.
ISP 2.10 Review Status with Senior Management.

IS 3 INSTITUTIONALIZE ORGANIZATIONAL STANDARDS

ISP 3.1 Establish Standards.
ISP 3.2 Provide Assets that Support the Use of the Standard Process.
ISP 3.3 Plan and Monitor the Process Using a Defined Process.
ISP 3.4 Collect Process-Related Experiences to Support Future Use.

INFRASTRUCTURE SUPPORT PRACTICES

GETTING STARTED WITH THE DMM



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