

An Oracle White Paper in Enterprise Architecture
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Oracle Enterprise Architecture Framework: Information Architecture Domain

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Introduction

Industries and society as a whole have undergone a number of tectonic shifts in past centuries. The pace of business today demands an extremely high-level of business and IT agility to surpass the competitors. Companies are under pressure to become more competitive to meet higher customer expectations with more operational excellence, through better insight and visibility of their customers, through more efficient internal processes, and through better risk management.

All of this requires quality data. But how are these demands being met?

An Economist Intelligence Unit global survey of more than 200 senior executives across a wide range of industries conducted recently found that accurate and timely decision-making ranked on a par with superior executive leadership and innovation as vital ways of creating competitive advantage. Yet this endeavor is more easily grasped in theory than in practice. Only 3% of respondents describe their companies as “experts” in using business data to drive better decisions, and only 27% agree that their company makes better, faster business decisions than their main competitors.

In other words, while we all realize the importance of our data assets, their value is far from being realized and that has a serious impact on our ability to achieve strategic and tactical business success.

The Business Impact of Enterprise Information Architecture

Business success depends on effective information architecture. Some of the common relationships between business strategies and information capabilities are described below.

Mergers and Acquisitions: Rapid integration of an acquisition’s organizational processes is critical to business success. Minimizing the friction requires information capabilities that minimize complexity, such as enterprise data models, data integration services, master data management and data governance

Strategic Decision Making: Complex organizations often lack a unified view of key metrics on customers, products or operations. This hampers decisions required to drive revenue and margin growth. Enabling visibility across the enterprise requires investments in common data models and governance. Decision makers must be empowered with robust tools to rapidly evaluate information, implement changes and monitor results.

Product Innovation: Evaluating new sources of data, such as social media data or instrument data, can uncover new requirements and trends. To do this, organizations must capture, manage and analyze these new data streams. Organizations may also bundle existing products in new ways or across new channels. This can require the coordination of product and customer information across complex organizations; which is enabled by information capabilities such as common data models, data governance and integration services.

Dynamic Partnering: Many organizations need to rapidly adopt or change business partners. Rapid provisioning of these new partners is critical, and adherence to data and technology standards speeds the process. Additionally a centralized, flexible and robust security capability ensures that information is rapidly, but safely shared.

Enhanced Customer/Citizen Experience: Today’s end users have much higher expectations about the types of information they encounter in their day-to-day lives, like transactional data, financial summaries, location and geospatial data, etc. They also want to see information combined from a variety of sources, and have it presented in visually compelling and informative ways. This dramatically increases the scope of data and the flexibility with which it is managed.

Simply put – without quality data, can you make informed decisions and predict future outcomes?

What is Oracle’s Enterprise Architecture Framework?

Enterprise information architecture must be viewed as part of the overall enterprise architecture (EA), which provides the structure and discipline required to align an organization’s business operations, organizations and information technologies in support of its business goals and strategies.

In an effort to provide an efficient, business-driven framework to help our customers achieve this alignment, Oracle created a hybrid EA framework, influenced by TOGAF, FEA and Gartner. This simple yet practical and prescriptive framework is called the Oracle Enterprise Architecture Framework (OEAF). The OEAF is complementary to other EA frameworks, with clear mappings to TOGAF and FEA, such that customers can use the EA framework of their choice. The intent of building the OEAF was to leverage the strengths of the different industry frameworks and marry that with Oracle’s experience in developing enterprise solutions.

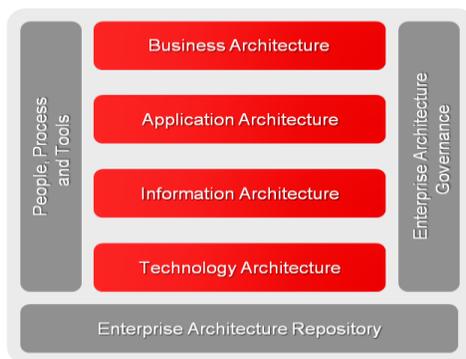


Figure 1: Oracle Enterprise Architecture Framework (OEAF)

The top level view of OEAF (Figure 1) shows the four major views of the enterprise architecture (Business, Application, Information and Technology) in red. The three gray boxes represent the components involved in the creation and maintenance of the enterprise architecture.

For more information on OEAF, see the whitepaper “The Oracle Enterprise Architecture Framework”.

OEAF: Information Architecture Domain

The rest of this paper will describe a way to apply the OEAF and the OADP when tackling Information Architecture centric challenges. These challenges focus on information sharing and often, but not always, analytics. Though these challenges involve all the architectural layers of OEAF, they are focussed around the Information Architecture. Therefore, we will refer to it as the OEAF: Information Architecture Domain, realizing that its scope is broader than just Information Architecture.

The OEAF: Information Architecture Domain consists of the following components:

- Data Realms
- Capability Model

The diagram below displays different domains and types of data in the center with nine management capabilities on the outer ring.

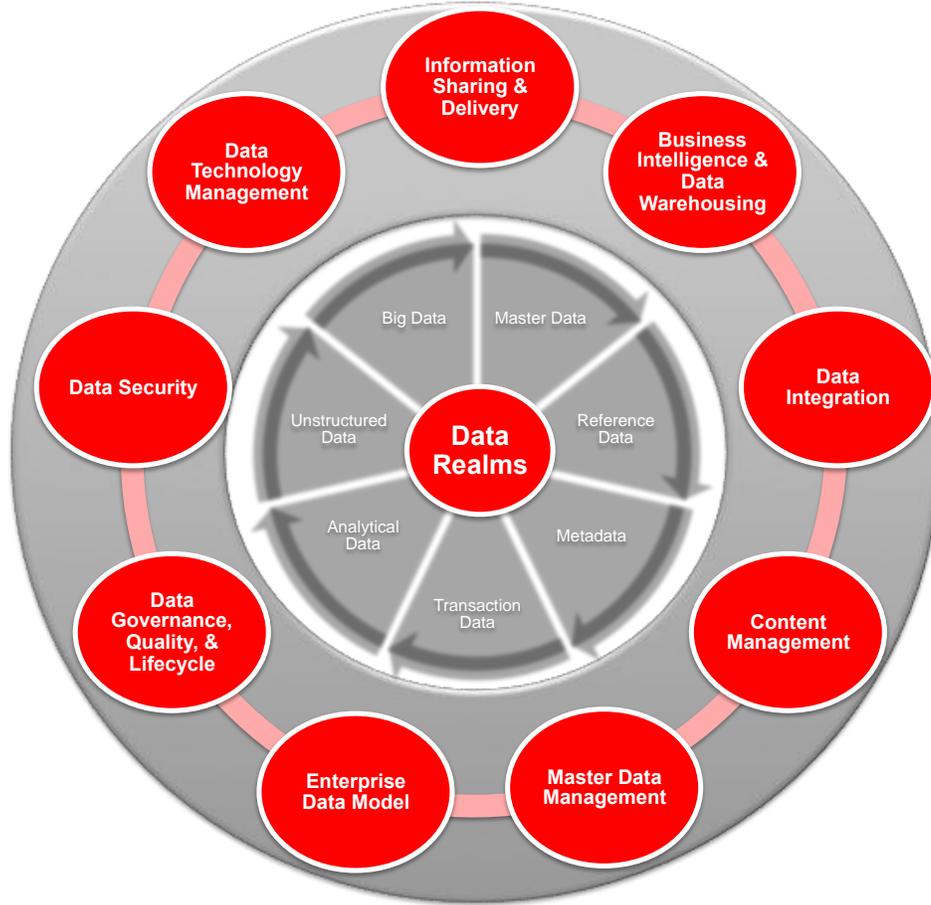


Figure 2. OEAF: Information Architecture Domain

Information Architecture Domain: Data Realms

Different types and structures of data exist within an organization. They can be categorized into the following seven data realms.

Transaction data are business transactions that are captured during business operations and processes, such as a purchase records, inquiries, and payments.

Metadata, defined as “data about the data”, is the description of the data. Examples of metadata include the data name, data dimensions or units, definition of a data entity, or a calculation formula of metrics.

Master data refers to the enterprise-level data entities that are of strategic value to an organization. They are typically non-volatile and non-transactional in nature. Customer, product, supplier, and location/site are some of the common master data entities.

Reference data are internally managed or externally sourced facts to support an organization’s ability to effectively process transactions, manage master data, and provide decision support capabilities. Geo data and market data are among the most commonly used reference data.

Unstructured data make up over 70% of an organization’s data and information assets. They include documents, digital images, geo-spatial data, and multi-media files.

Analytical data are derivations of the business operation and transaction data used to satisfy reporting and analytical needs. They reside in data warehouses, data marts, and other decision support applications.

Big data refer to large datasets that are challenging to store, search, share, visualize, and analyze. The growth of such data is mainly a result of the increasing channels of data in today’s world. Examples include, but are not limited to, user-generated content through social media, web and software logs, cameras, information-sensing mobile devices, aerial sensory technologies, genomics, and medical records.

Information Architecture Domain: Capability Model

Various capabilities are needed in order to manage the different data types and to process different data structures, or the lack thereof. A capability consists of the following dimensions:

- Objectives – the goals and desired outcome
- Metrics – KPI and success criteria to measure the maturity and effectiveness
- Processes - activities, inputs, outputs, and deliverables
- People – roles and skillsets required

Following are the key top-level capabilities an organization needs to manage the data and information assets.

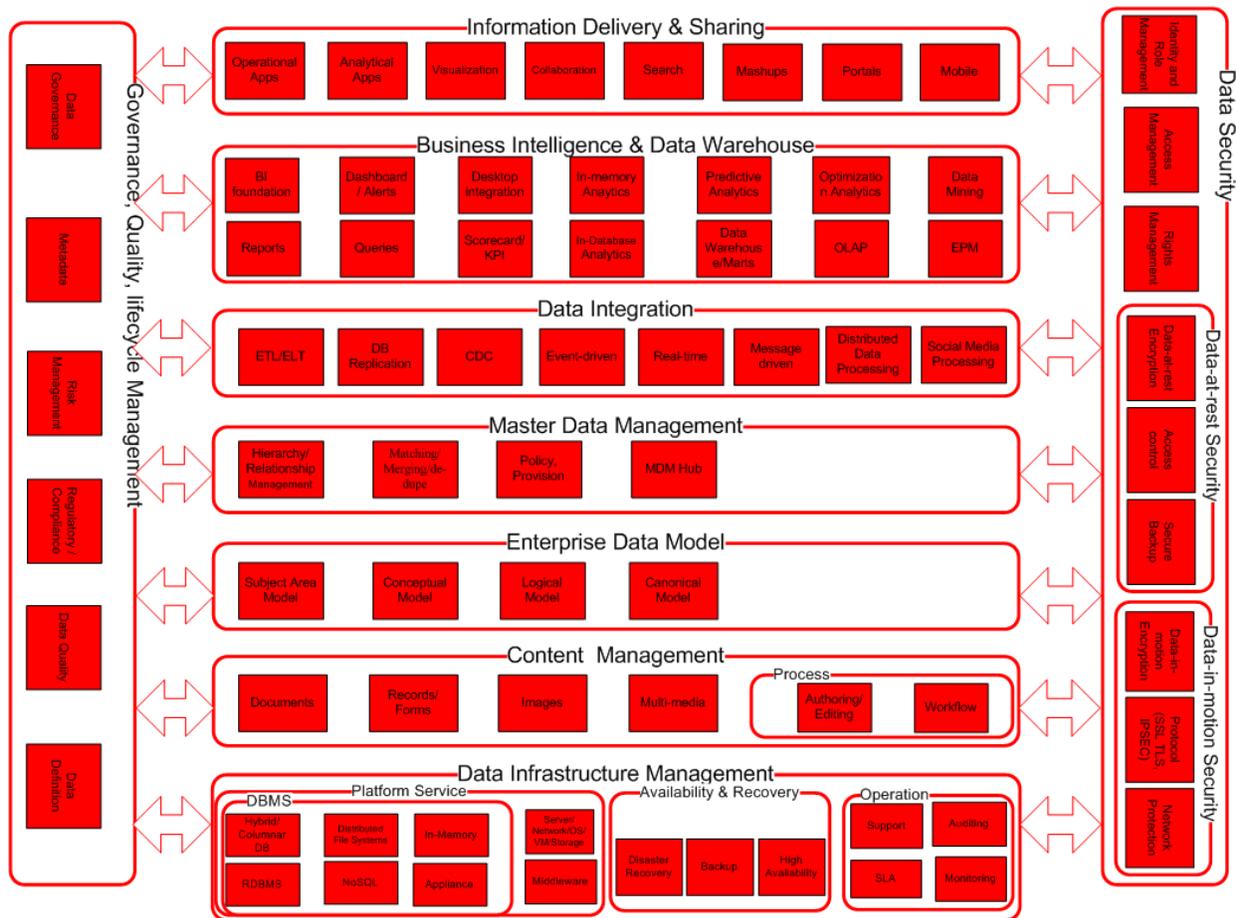


Figure 3. OEAF: Information Architecture Domain: Capability Model

Enterprise Information Delivery and Sharing

Information Sharing and Delivery addresses how information is propagated directly to its consumers within an organization. They can be delivered through various channels and devices including desktop integration, alerts, and mobile devices. Recent developments with collaborative technologies have enabled increased user-to-user interaction and thus the need for more access control to shared resources.

Business Intelligence and Data Warehouse

Business Intelligence and Data Warehouse provide users and stakeholders insights into the health of the business. Rather than delivering rigid/fixed output with outdated information, these systems now deliver the capabilities for end-users to create the information portals and dashboards they need to expedite strategic and tactical decision-making. Sub-capabilities in this space include BI foundations, traditional data warehouses and data marts, predictive analytics, data mining, and enterprise performance management.

Data Integration

Organizations are increasingly dependent on Data Integration to tie together cacophonies of application systems and data stores into cohesive solutions. Legacy sources, merger/acquisition activity, and SaaS/COTS solutions necessitate the need for skillful integration of systems to support business needs. There is a wide spectrum of Data Integration capabilities that provide coverage from batch-based to real-time Integration needs including ETL, ELT, Change Data Capture, Event-Driven, Message-Driven, and real-time integration. Distributed data processing and social media processing are the more recent capabilities to address the volume, velocity, and variety of big data.

Master Data Management

Master Data Management consists of a number of sub-capabilities unique to the management of the master data for an enterprise. They include

- Ability to specify a gold record definition;
- Functions to manage survival rights through rules for merging and matching;
- Master hubs such as customer data hub, product data hub, location data hub, and supplier data hub with specific data models for each of the hubs and relevant reference data; and
- Dimension and hierarchy management capabilities.

Enterprise Data Model

Data silos present a significant challenge for many of our customers. The lack of an enterprise data model and ability to connect and correlate data across subject areas (e.g., customers with products) reduces the efficacy of an organization's investment in its information. Many opportunities are lost because of the inability harvest new insights into customers and business activities. Enterprise data model is a key discipline to instill within the organization to ensure no one solution drives the data model but rather the enterprise data needs. Value chain analysis of core business processes and functions can help draw the boundary of enterprise data domain and to identify key subject areas. The conceptual data model and logical data model make up for next layers of the enterprise data model.

Content Management

Majority of an organization's information asset is unstructured or semi-structured. Therefore, content management is recognized in our framework as a key top-level capability to manage content, records, multimedia, and image capture. Adequate search and workflow mechanisms are also required to enable rapid retrieval of pertinent information for decision-making and maintenance.

Data Governance, Quality, and Lifecycle Management

No architecture discipline, regardless of domain or sub-domain, would be complete with out governance, quality assurance, and lifecycle management. Processes and policies are necessary in order to enforce solid discipline and best practices within the organization. Like application systems and other architectural assets, lifecycle management ensures that organization only retain information necessary to their longevity and legal compliance.

Data Security Management

Data Security controls whether the right individuals have access to the right information at the right time. Data is protected while in transit as well as when it is stored. Additionally, continual monitoring is employed to ensure violations to standards and policies are detected and addressed immediately and proactively.

With the plethora of information being generated today, organizations face numerous challenges with regards to data security. Information is often distributed across multiple applications and databases making accessibility/availability of information a challenge. Ensuring information is connected, available, secure, and reliable across mixed sources and targets is key for enterprises to realize a return on their information investment.

Data Technology Management

Organizations will need to develop or engage core data technology management skills to address the increasing amount of raw information that exists in enterprises today. Organizations are accumulating gigabytes of data every day and deliberate management of these resources is necessary in order to control costs and ensure agility moving forward. A solid data infrastructure foundation is a critical capability within information architecture. The core of this foundation is the ability of the database management system to effectively store and retrieve various styles and structures of data and information. The ability to manage and operate other infrastructure components in a highly available and recoverable fashion is also essential to ensure the availability of the data at all times.

OEAF: Information Architecture Domain: Maturity Model

Information Architecture is not a tool or technology, but rather, a set of business and IT processes, disciplines and practices coordinated with an enterprise strategy to manage the information as a business asset for the organization. Information Architecture must be implemented as a coordinated program that associates with business objectives, so it could deliver business values and serve long term business strategic goals as it evolves. The Information Architecture Domain maturity model provides a guideline and roadmap that enable organizations to identify their current maturity stage and understand the actions items to reach the next stage.

Level 0 - Description

The Information Architecture Domain maturity model is composed of 5 stages, beginning with Stage 1 the Initial stage. In subsequent stages, the organization's capabilities mature until Level 5, when Information Architecture reaches the Innovate stage. The following sections describe each stage and its associated characteristics.

Stage 1 -- Initial

At this stage, organizations have sporadic, inconsistent and uncoordinated activities of information management. The main characteristics are:

- The organization makes decisions based inaccurate and incomplete information aggregated by various departments/LOBs through inconsistent processes.
- Information is fragmented and inconsistent across many different applications and data stores under different LOBs.
- Business and IT organizations view information as by product of applications, and usually handled on a project-by-project and department-by-department basis. There is no concept of information ownership and stewardship regarding governance, security or accountability of key information assets.

- No formal processes, workflows exist for effective information management activities including data quality, data definition, data management etc. Heavy manual interventions and people-based activities are the main methods to resolve conflicts.
- Technologies and tools are informal, and decisions are heavily influenced by project team and/or tech-savvy individuals.

Stage 2 – Manage

At this stage, organizations perceive the enterprise information management as necessary to be more effective and efficient for multiple business processes across LOBs. They are taking actions to improve information management but mostly focus on immediate needs, reactively and inconsistently. The main characteristics are:

- Organizations establish plans for adopting enterprise information management, but cultural and organizational barriers inhibit progress.
- Some LOBs executives see the value of analytics and fact-based decisions, and are aware of poor data quality, fragmented and inconsistent information in key subject areas. They are helping to coordinate and improve information management activities and change management procedures within LOBs, but enterprise wide information management activities are still largely sporadic.
- The concept of information ownership and stewardship emerges, and collaboration and partnership between business and IT organizations expands in the efforts of addressing business pain points on information management, but are still within function units.
- The information quality and problems are usually not addressed proactively at their source. Rather, the issues and problems are handled in a reactive mode, and usually masked and manipulated during various integration phases.
- IT organizations are promoting information ownership and stewardship, taking steps on cross-LOBs information management activities, such as governance, data quality, security, etc. However, lack of senior management championship hampers the advancement, and hesitant buy-in from LOBs results in weak participation.
- Information management knowledge, standards and processes are documented on a project-by-project basis with limited scope. Models have been developed to promote skills sharing and reuse of project materials. Enterprise technologies and tools are evaluated and acquired for sharing across projects and initiatives.

Stage 3 – Advance

At this stage, organizations identify information-driven as critical activities for business growth and cost reductions. Therefore, organizations formally establish enterprise information management with support by executive management and actively build these capabilities. The main characteristics are:

- Executive management appoints senior executive to champion an enterprise information management agenda, communicate visions and promote collaborations among business and IT teams.
- Engagement models are in place. Information owners and stewards understand their roles and responsibilities, and work collaboratively to address business challenges. A governance committee, driven by business stakeholders, defines master data, business rules and policies in related business operations.
- Information management capability development is planned and architected at all levels, from individual programs all the way to unified and coordinated enterprise program. Teams think enterprise-wide, and begin to strategically design solutions that fulfill existing business requirements as well as to re-use and scale in the future.
- The information-centric development activities become part of the entire system application development, and the information architecture is adopted to guide the development of information management capabilities.
- The organization sets enterprise-wide standards for information management technologies, and look into the consolidation and optimization of technology portfolios.

Stage 4 – Optimize

At this stage, organizations complete significant portions of Information Architecture Domain components. The enterprise information becomes pervasive, and part of foundation of business processes to drive profitability and organizational effectiveness. The main characteristics are:

- Information Architecture supports efforts to improve sales, reduce complexity, and meet compliance and regulatory mandates. It is pervasive and self-service enabled. The entire workforce, from senior management to regular employee, can access accurate information in right place at right time within provisions to make fact-based business decisions operationally and strategically.
- There are constant market and business objectives alignment with the Information Architecture program. Business units actively look edge cases to gain a competitive advantage through leveraging information management capabilities. The Information Architecture program funding is tightly related the business operations, objectives, and priorities.
- The authority of information assets among business units is in place. Policies and mandates are documented and understood. Data stewards has collaborated with business and IT in the process of replacing people/manual based processes with automated, predefined information quality control, business rules, governance policies, and metadata management.
- The information architecture has matured during the process of guiding Information Architecture incremental developments to ensure the alignment to business strategies. Metrics have been developed and placed to identify and quantify productivity gains.

- Information management technology services are optimized and consolidated with other infrastructure, application technology services into enterprise-wide, end-to-end integrated technology enabling services.

Stage 5 – Innovate

At this stage, Organizations extend the boundary of entire information ecosystems to external sources and channels to provide innovations in organization growth and drive the market. Information Architecture becomes part of the culture of organizations. The main characteristics are:

- Organizations proactively leverage enterprise Information management capabilities, such as predictive analytics, optimization analysis for innovative business processes to drive effectiveness and introduce new products/services offerings. Information Architecture valuation models are placed to guide investment and M&A strategies.
- Information Architecture capability development is completed. Engagement models are optimized across organization. Organizations extend information ecosystem sharing and collaborations by including customers, vendors, and employees to emerging channels, and actively leverage to drive market and industry.
- Governance councils, information owners, and data stewards have optimized processes in resolving problems pertaining to cross-functional information management issues. Best practices are identified, and an Information Architecture team ensures that these are extended across the enterprise.
- Business-savvy data stewards, aided by technology specialists, expand and extend collaborations with line of businesses and continuously evolve and develop the enterprise information management activities.
- Information Architecture group actively review, evaluate technologies, trends, and jointly works with business to adopt new technologies, tools in evaluating effectiveness of initiatives such as creating new business models and driving new business capabilities.

Oracle Architecture Development Process: Information Architecture Domain

Overview

When develop enterprise architecture with our customers, Oracle applies the Oracle Architecture Development Process (OADP). It is an agile and streamlined method focused on creating future state architectures for information-driven organizations. It was developed using an agile architecture mindset where all activities and process steps were oriented towards delivering business value quickly and repeatedly. This section will give an overview of how OADP is applied to the Information Architecture Domain.

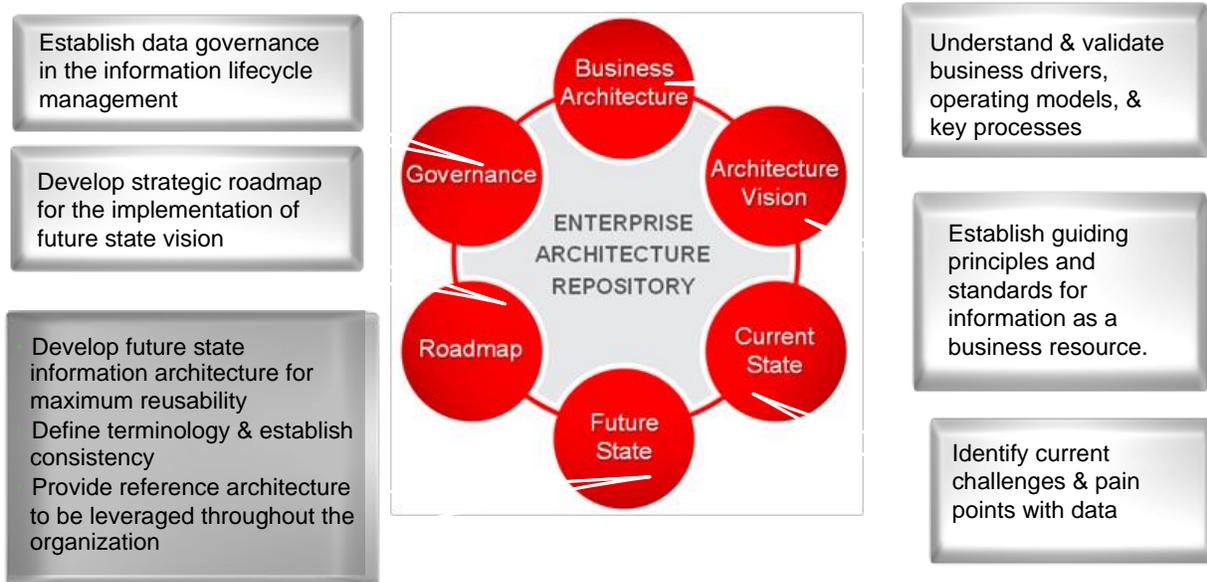


Figure 4. OADP applied to the Information Architecture Domain

Business Architecture

The essence of Enterprise Architecture (EA) is planning, governance, and innovation. The main purpose of the Business Architecture phase is to establish business context and to understand the business drivers behind the information needs.

One of the methods to help us gain an understanding of an organization’s business drivers is to build a strategy map. It is a diagram that describes how an organization creates value by connecting strategic objectives in explicit cause-and-effect relationships with each other in the four Balanced Scorecard objectives including financial, customer, processes, learning and growth.

By connecting such things as shareholder value creation, customer management, process management, core capabilities, innovation, IT, organizational design and learning in one graphical representation, strategy mapping helps greatly in describing and communicating the strategy. Here’s an example of a Business Strategy Map:

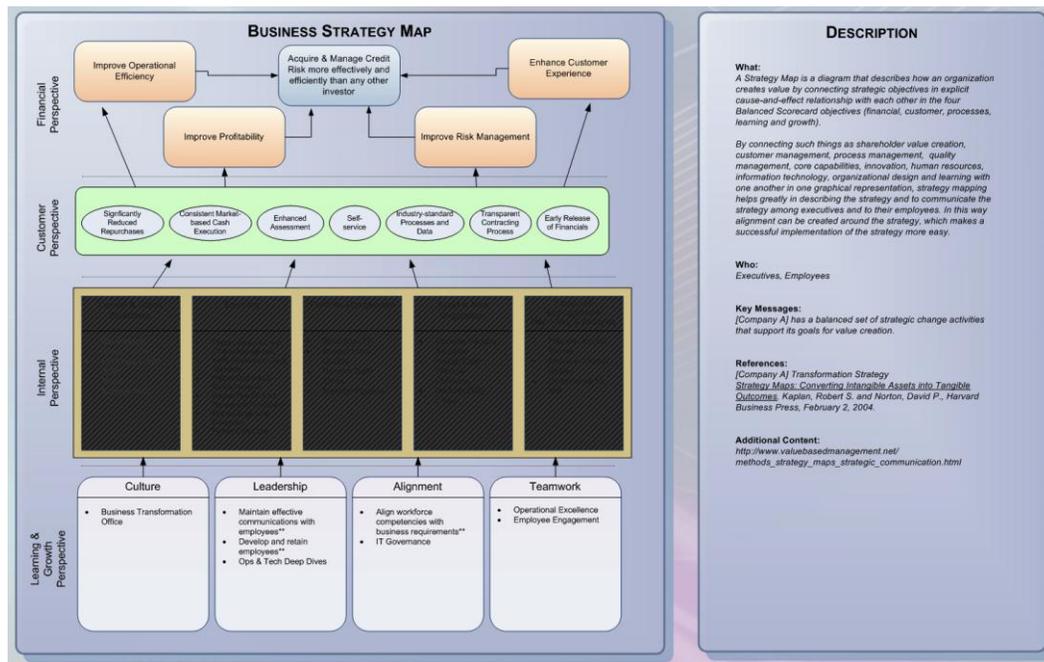


Figure 5. Business Strategy Map

The main goal of this artifact in our process is to validate our understanding of the business strategies and drivers, to link all the perspectives together, and lay a solid foundation for the remainder of the architecture development. Enterprise Architecture is all about alignment of IT and business, and it applies to the information domain as well.

Architecture Vision

All architecture design starts with guiding principles. But it is not just about the principles alone, rather it is more about the rationale and implications. Why does it matter? Why do we need these principles? What do they do?

The challenges we have seen with our customers in the past occurred where the principles established weren't always well understood or closely followed because two things were missing. First, there are the architectural implications of these guiding principles – what does it mean to the design decisions in your projects and systems? Second, there's a missing link between the principles and business drivers. That's where the principle map comes in. Establishing the linkage and focusing on the business strategy makes clear the importance and benefits of these guiding principles that drive the architecture decisions.

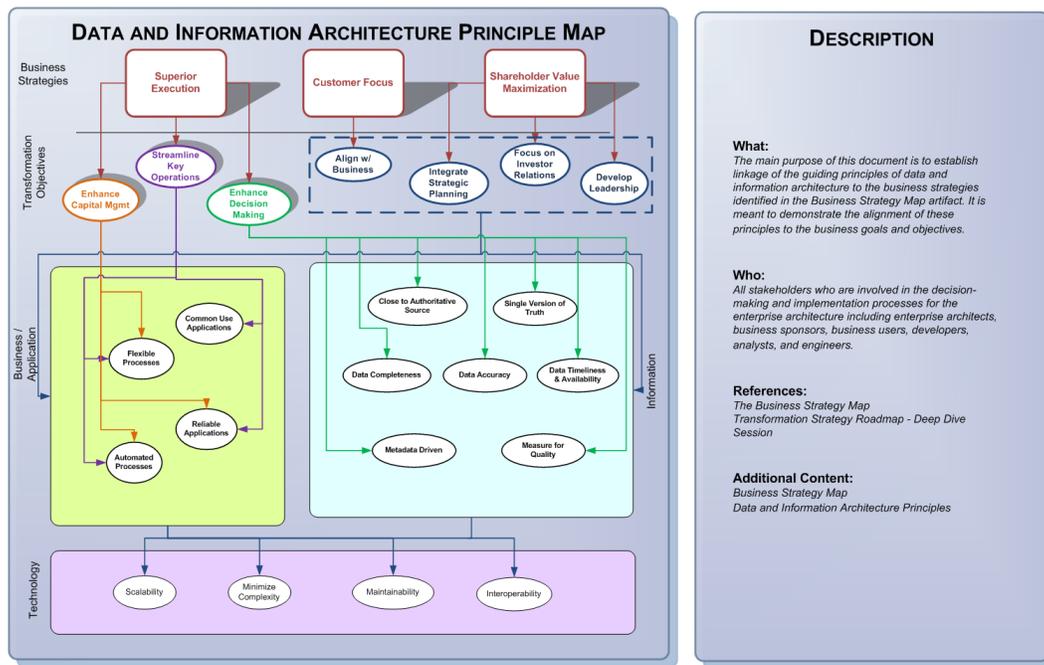


Figure 6. Principle Map

Current State

The main objective of the Current State phase is to capture baseline architecture. Oracle’s position on current state analysis can be summarized by two “just”s – Just in Time and Just In Enough. Not understanding your current state will “blind-side” you. You might establish a future state that is too aspirational and doesn’t take into consideration of your organization’s readiness and maturity level. But at the same time, not all of the current state analysis requires the same level of priority. It is imperative to avoid being overly ambitious, while still having a high level of commitment.

It is important to reach a good balance on the current state approach. A good way to organize the current state capturing is to use the Information Architecture Domain Capability Model and decomposition that were discussed in the earlier section of this white paper. Some capabilities matter more than others. Setting your focus must be based on business context.

Again, there is always a tendency to completely understand the current state before taking any steps. Keep in mind is that not all of current state problems warrant the same attention. The ability to prioritize current state analysis strictly based on business focus at hand is a critical success factor.

One way to ensure this balance is to look at data in the context of business processes. What business processes do they support? How critical are these business processes? How critical are the information / data assets to business processes? What are the risks to the business if such data is unavailable or incorrect?

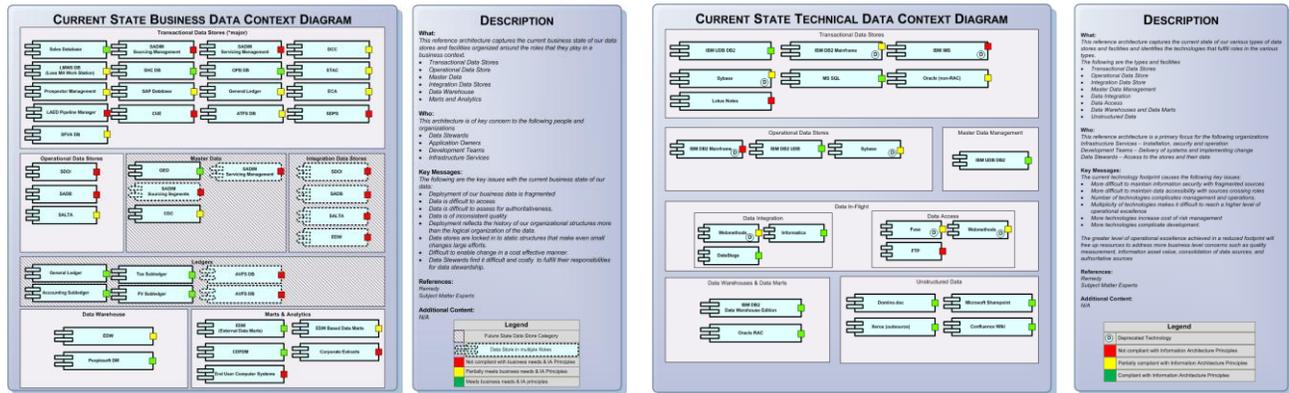


Figure 7. Current State Data Context Diagram

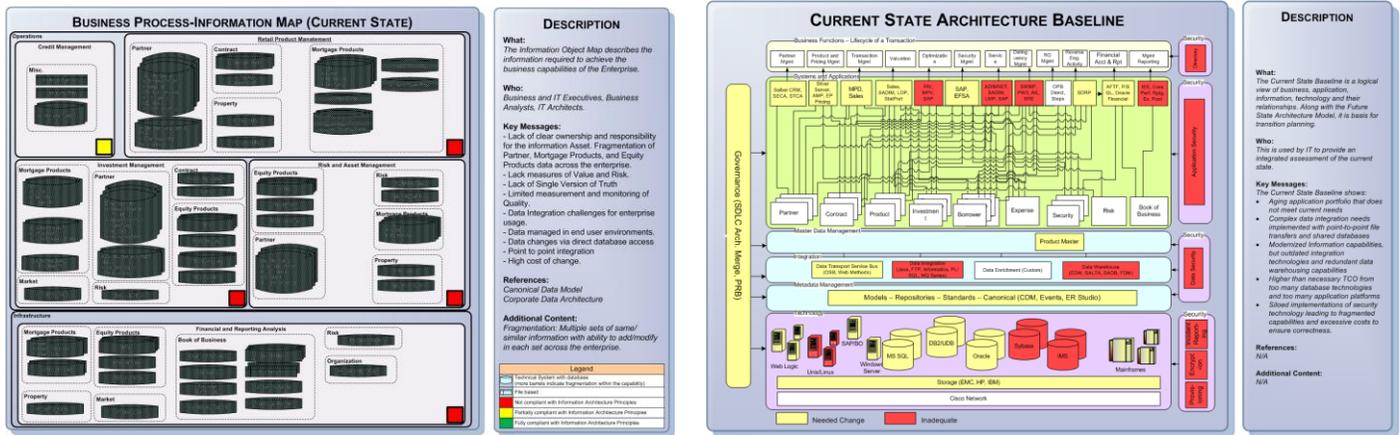


Figure 8. Current State Data Asset Map

The artifacts above highlighted the extent of information asset duplication and fragmentation, and focused attention on the key problem areas that needed to be addressed.

The end-to-end current state view shed light on the main problem area – the excessive point-to-point application data integration. It provides a foundation for a later quick comparison of current vs. future state views for the main challenging areas. It can also facilitate building your next business case.

Someone once said, “A good architect knows not only what story needs to be told, but also how to tell this story.” By crafting the messages in a bold but factual way, you will be able to help both business and executive management to understand the gravity of the situation and bring forth the changes that are needed to get these problems addressed.

Future State

Future state is driven by the newly established business strategies and priorities, and guided by the newly developed or validated principles. Using the same format as the current state but highlighting what will be changed in the future state can help clarify the focus and the impact of the new architecture.

In the diagram below we identify the first important step of successful information and data management – identifying and establishing data ownership based on business processes and functions. This new data/process mapping architecture lays a good foundation to significantly minimize any duplication and fragmentation of data assets as shown in the current state.

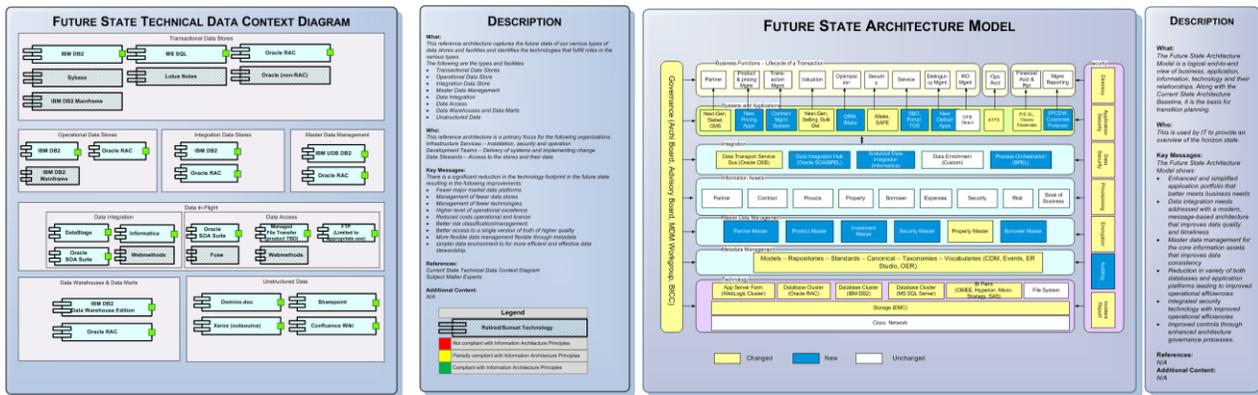


Figure 9. Future State

In the end-to-end high-level future state architecture diagram, we highlighted components in different shades and colors to indicate what is to be added, changed or retired. It is a great preparation for the next stage of the process: laying out our roadmap and transition states.

Strategic Roadmap

There are many options to implementation. This adds to the complexity of creating roadmap planning. Comparing and contrasting various options based on cost, risk, time-to-market, and other factors can help an organization reach consensus and agreement on the approach and associated timeline.

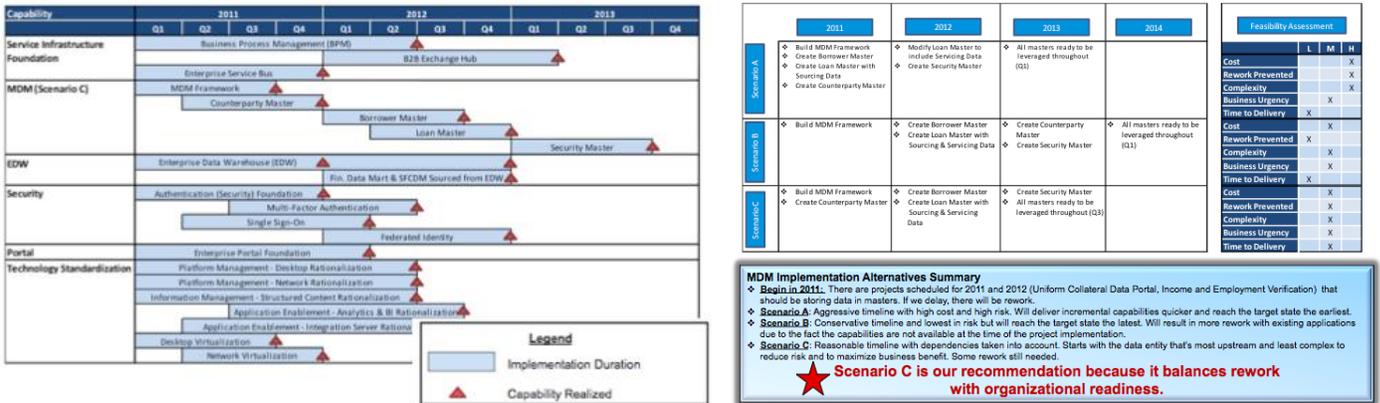


Figure 10. Strategic Roadmap

The diagrams above depict option analysis for a MDM roadmap for an organization. Six master hubs are identified as well as the foundation master data framework including identity management, matching and merging, quality management, integration and distribution, workflow, and security management.

Ongoing projects and projects in the planning stage present challenges to this process. These projects touch bits and pieces of master-data related systems without taking into consideration the need for some of these foundational capabilities. Convincing a business unit that additional cost or time might be added to a project is not easy. Our ability to help them understand options and associated ramifications can lead toward a balanced approach.

In the diagram to the right, three different options are presented and their pros and cons explained, as well as a recommendation based on the best balance of the key factors, risk, value, and cost.

This approach is typically well received because it shows thoroughness and thoughtfulness of the planning process. And more importantly, it speaks about the technical analysis with easy-to-understand business terms with a heavy focus on business value.

Governance

Another important component in architecture is governance. There is EA Governance and data governance. They are both important to consider.

Governance needs to be examined from a variety of angles – people, policies processes, technologies, and financials. With a clear assessment of the current governance maturity, it is possible to recommend a practical and pragmatic governance model to ensure the success of implementing the future state architecture.

It is important but often challenging to establish a Governance Program without boiling the ocean. One key factor to remember is that it does not have to be perfect. It doesn't have to have everything in place to be effective. Determine what should be in place that fits the culture and target to what the business really needed. It's not another committee or titles. It's not creating new positions. It's about putting proper controls in place to guide for this future state implementation.

Business Case – A Hidden, but Necessary Step

The business case needs to be woven it into every stage of the architecture phases. Business drivers and strategies identified in the architecture vision phase will establish the link to support the business case. Pain points gathered during the current state phase will resonate with the business and reveal cost inefficiencies and opportunities for improvement. Future state capabilities and the associated timeline when they will be realized are critical information to determine the benefits for the organization.

Through the incremental fact gathering, you will be able build a strong business case to show how the recommended architectural changes benefit and support the business objectives.

Information Architecture Domain Best Practices

Here are a few general guidelines to build a successful information architecture foundation:

Best Practice #1: Ensure Business Alignment and Collaboration

The overriding reason many data architecture transformation initiatives fail is not that the projects were technically unfeasible. On the contrary many technological challenges have proven answers. The most common cause for failure is that data architecture failed to meet the business objectives of the organization. The best way to mitigate this risk is to get executive sponsorship and get business teams involved early and throughout.

Best Practice #2: Accounting for Organizational Behavior

Without a proper understanding of how people behave within the system, no technology will correct data issues such as lack of data quality. Common issues occur including:

- Upstream system managers may be unwilling to deploy resources needed to address data quality requirements, if their systems and processes do not directly benefit.
- Finding flaws in the data quality from a set of operational processes is likely to expose workplace and personnel inefficiencies associated with those processes.

Be aware of these human behaviors. Be sensitive about potential issues and use strategies that promote positive feedback and incentives.

Best Practice #3: Securing the Proper Expertise for Knowledge Transfer

Developing a solid information architecture foundation is a strategic undertaking. Success depends on having both business and technical expertise. The success of the architecture program depends on personnel who can function as effective agents of change.

At the program's initiation, hire professionals with experience in managing enterprise data / information architecture projects and programs. These individuals will identify opportunities for tactical successes that contribute to the program's strategic success. Engage external experts to help jump-start the improvement process. This builds assurances that your problems are not unique and promotes learning from best practices.

Best Practice #4: Proper Use of Tools and Technologies

Technologies and tools can be effective enablers if properly used. However, it is common that tools are misused. Lack of standards will result in inconsistency in implementing these tools and unintended use.

Build a Data Management Center of Excellence that

- Defines guiding principles and help to assess business needs
- Establishes and promote standards and best practices
- Conducts continued research on new tools and products to expand data / information management capabilities
- Creates processes to make the best use of the tools

Best Practices for Master Data Management (MDM)

MDM Best Practice #1: Attain executive management sponsorship

Executive management sponsorship is vital to a MDM program. It is going to lead to significant cultural disruption and behavioral changes. Executives need to set the tone at top and actively participate to ensure engagement at all levels within the organization. You need to present the value of the MDM program, demonstrate readiness, and gain buy-in from the executive management. Once senior management understands the value of MDM as a strategic corporate initiative, you will have a top down commitment across organization.

MDM Best Practice #2: Think holistic, start small, and deliver fast

MDM is a program, not a project. It requires iterative processes on people, politics, technology, and culture to mature. It's imperative that you deliver and realize business benefits quickly and frequently to win more business participations. Through these quick wins, you will be able to expand the program and accumulate small successes into strategic victory. The “think holistic, start small, and deliver fast” approach lets you effectively balance out the long-term and short-term needs, ensure sustainable executive support on MDM program, and drive towards the strategic objectives.

MDM Best Practice #3: Establish data ownership and stewardship

Business organizations own the data. They are the decision-makers on the data authoritativeness, business rules associated with data, governance policies, and how data lifecycle should be managed and controlled in compliance with regulations. Data stewards leverage technologies, design processes, and implement solutions to ensure the organization data assets are properly managed and in alignment with business requirements and organization objectives. Data steward team must be business savvy and technology proficient. They may include subject matter experts from all units of organizations. MDM program requires close collaboration between data owners and stewards to succeed.

MDM Best Practice #4: Establish data governance structure and processes

Data governance is the most important aspect for the success of an MDM program. It establishes the accountability, responsibility and authority in an MDM initiative. Without data governance, an MDM initiative voids itself and is destined to fail.

Follow the same direction of “think holistic, start small, and deliver fast.” Involve necessary business organizations related to the first MDM build-out, establish structure and repeatable process to address basic factors including those who creates, manages, owns and consumes the data. You can then expand the governance program and structure based on the success of previous effort.

MDM Best Practice #5: Staff the right team

An MDM program is complicated and involves many stakeholders across many units of organizations. Make sure that put your best manager(s) and people in this effort. The MDM team must have the capabilities and abilities to manage scope and risk, collaborate with other teams, communicate effectively, and deliver the results.

Best Practices for Data Governance (DG)

Not all data governance efforts yield expected results. Major obstacles exist that affect the value and success of the program. They include cultural, political, and organizational challenges that

can lead to resistance to the changes that are required to move forward with the governance initiatives.

Here are some steps that help bring success and address the above-mentioned challenges:

DG Best Practice #1: Take a holistic approach but start small

As was illustrated in the earlier section of this article, data governance is an iterative process. Start with the people, politics and culture, and then move on to the data governance and stewardship processes as well as technology. It takes a number of steps to gradually move up the maturity scale. However, start with an end in mind. Balance out strategic objectives and tactical compromises to ensure the overall program is moving towards the desired direction at reasonable pace.

DG Best Practice #2: Obtain executive sponsorship

Data governance involves significant behavioral and cultural changes. Funding for projects and technology tools are also required. Without strong backing from the executive level, none of the above will happen. Analyze your stakeholders and align and get on board key decision makers who represent core functional areas and lines of businesses, who have the strong influence and decision-making power. With them as your champion, the foundational changes have a higher possibility to be successful.

DG Best Practice #3: Define data stewardship during early stage

The main responsibility of the data stewards is to ensure effective control and use of data assets. The best data stewards are found, not made. Take your time to identify and build a data steward team that includes subject matter experts from all business areas.

Difference of opinion exists with regards to whether or not to establish an official position and title for this role. The answer is: it depends. It depends on the stage you are in developing your data governance program and it depends on the political and cultural environment of your organization. What is most important is that the definition of this role is included in the job descriptions of these individuals and proper time allocation is applied to the stewardship work.

DG Best Practice #4: Establish quantifiable benefits by building business case

An effective data governance program brings tremendous benefits to an organization in a long run. However, some of the effects might or might not be visible immediately. As a result, it is not always easy to obtain and justify funding for the program cost. Focus on the relationship of the key data elements and the business processes they support. Calculate the cost of managing these data elements through repeated and duplicated manual integration and validation. Quantify the business risk of such data elements becoming unavailable or incorrect such as missing transaction or loss of customer. Identify clearly the opportunities quality data brings in terms of generating and improving revenue through better customer service and insight, through up-sale and cross-sale.

In short, building a business case to articulate and highlight quantifiable benefits is essential to get buy-ins and support towards the program.

DG Best Practice #5: Establish, collect, and report on metrics to measure the progress

Choose a combination of tactical quick wins and longer-term strategic improvements as a starting project. Measure the immediate returns of the quick wins to gain positive feedback, sustain engagement, and obtain more support. Measures should be determined at the beginning of the project and focus on quantitative metrics that support the objectives of the project as well as the overall program. Metrics need to convey business values and some sample metrics include data value, data management cost (before and after), number of decisions made, and data management process maturity. A data governance KPI dashboard is a good way to automate the reporting of the progress.

DG Best Practice #6: Link and build in incentives to award and re-enforce participation

One of the most challenging aspects of data governance is adequate participation at an on-going basis. Data stewards are usually tasked with multitude of operational duties and business units often vary significantly on resource allocation. The collaborative nature of a data governance program, however, depends heavily on leveled and prioritized commitment from all business functions. Building an incentive-based reward system that links performance to participation can re-enforce priority and thus gain more and sustained commitment from all required parties. It is also important to note that incentives do not have to be all financial-based. Formal and informal recognitions go a long way in showcasing good examples, instilling sustained enthusiasm, and promoting desired cultural changes within an organization.

Information Architecture Guiding Principles

Architectural decisions can be small and big. There are usually multiple options, constraints, and preferences. Consistency in these various decision points is critical but not without challenges. Architecture principles are to address these challenges by establishing a common vision and foundation to ensure that all architectural decisions are cohesive, consistent, and closely aligned with the business objectives and strategies.

Here are some commonly accepted guiding principles in Information Architecture domain from Oracle's Repository. The decision on adopting these principles needs to be based on the business strategies, drivers, and priorities.

TABLE 1. INFORMATION ARCHITECTURE GUIDING PRINCIPLES

NAME	STATEMENT	RATIONALE	IMPLICATIONS
Information as an Asset	Information needs to be managed and treated the same way as physical asset.	We must measure and document the current value, risk, and cost of the asset as you would any physical enterprise asset, such as property or equipment. This principle forces us to stop treating information like a free and infinitely available commodity, because it is not. The ease of moving and copying information is a hidden source of significant inefficiencies and cost in terms of information management.	<p>Information must be made accessible to its end users without wasting resources. The information architecture must enforce management and sharing of data to maximize value at lowest cost to the business.</p> <p>Information value must be utilized regardless of its structure, format or semantic. This returns back to the notion of convergence where the business must be able to leverage information value regardless of whether it stored inside an unstructured digital file or a relational database record.</p>
Value and Risk Classification	A classification of an information asset's value and risk should be based on its management and governance foundation	A fundamental understanding of the value of an information asset to the business and the business risk if is exposed, corrupted or lost is essential to determining the appropriate strategies and investments to make for protecting and managing it.	<p>Information management and security can be expensive. Resources should be prioritized towards protecting the quality, availability, accessibility and security according to business value and risk.</p> <p>A comprehensive business risk management program must be based on an understanding of the value and risk of the key information assets.</p>
Single Version of Truth	Data should only be collected once electronically within a single interface, and shared across systems.	Data, managed at a local application level, requires it to be replicated, stored, and managed in different systems, creating localized versions in content and structure. As a result, it is difficult to integrate business information across lines of business and discrepancy in data often occurs.	<p>Information and data management will be looked at from an enterprise perspective. Local management of data could be useful to certain extent, but the effective of it is largely limited.</p> <p>Master data management approach needs to be adopted and implemented to manage the lifecycle of shared data across the organization.</p>

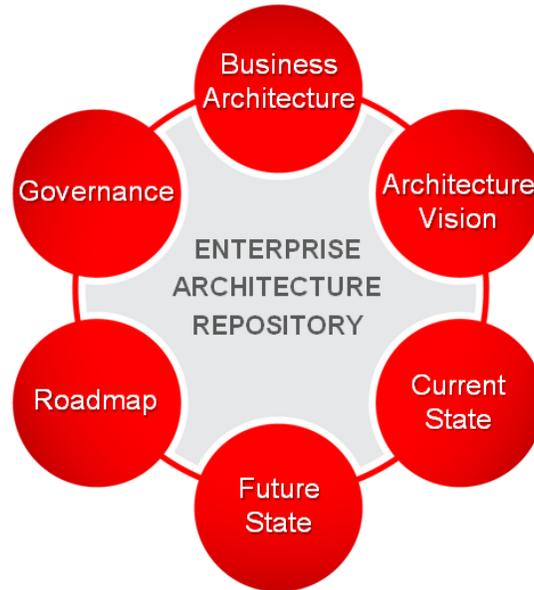
NAME	STATEMENT	RATIONALE	IMPLICATIONS
Information Quality	Quality requirement needs to be set for information assets.	<p>This forces all our design decisions to be accountable to a basic standard and, therefore, eliminates the storage of large dumps of unusable data.</p> <p>Setting quality requirements would not only drive the reduction in the storage requirements, but also make the data more accessible for business purposes and therefore raise its intrinsic value.</p>	<p>Quality of data should be measured in the following dimensions:</p> <ul style="list-style-type: none"> • Completeness – Percentage of the logical data model that is filled with real data • Accuracy – The same value as the source of truth within period of update • Timeliness – A defined metric that commits accuracy within a given time frame (for example, updated in the last 24 hours, real-time, etc) • Accessibility – Ability for the user or another application to consume the data measured in qualitative metrics (for example, understandable by users, integration-capable with another system, and so on)
Information has authoritative sources	All business data needs to have an authoritative source.	<p>Having an authoritative source for all data makes all data management accountable, because we can separate the ownership and stewardship responsibilities and therefore lower the risk of a breach in data privacy and confidentiality. This principle also has a direct impact ensuring better data quality because the authoritative source can be the central integration point for anyone needing that data.</p>	<p>This principle typically drives a master data management solution that designates a system to be sources of truth around different types of business data.</p>
Information Security	Information needs to be secure throughout its lifecycle.	<p>Open sharing of information and the release of information via relevant legislation must be balanced against the need to restrict the availability of classified, proprietary, and sensitive information. Data breach is costly for any organization. Securing sensitive shareholder and corporate data is critical to reduce compliance and regulatory risk.</p>	<p>Traditionally, data security solutions have focused on runtime data inside a running database. However, there are many risks on the data outside the runtime environment. So data security solutions need to address all areas of the information lifecycle - entry, storage, access, and retention. This principle is especially important in the context of a Web 2.0 and Enterprise 2.0 landscapes where data is constantly being shared across enterprise boundaries in a variety of structured and unstructured formats.</p>

NAME	STATEMENT	RATIONALE	IMPLICATIONS
Information Accessibility	Information is accessible for users to perform their functions.	<p>Wide access to data leads to efficiency and effectiveness in decision-making, and affords timely response to information requests and service delivery.</p> <p>Using information must be considered from an enterprise perspective to allow access by a wide variety of users. Staff time is saved and consistency of data is improved.</p>	Information needs to be classified, in accordance with the security principles of the organization, which will determine the levels of access by employees, contractors, vendors, partners, suppliers, customers, general release, etc. The underlying data security definitions may be different to the information security aspects, particularly once the data is combined and given context it may have 'new' levels of sensitivity inherent within it.
Data Stewardship	Every data item has one person or role as ultimate custodian.	The establishment of stewardship ensures the quality of the data that is shared.	Every item of data requires unique and ultimate ownership by a single role or person. This does not imply that all customers, products or other items of data maintain common ownership. Rather a matrix of responsibilities is managed which ensures that issues or conflicts always have an ultimate point of escalation.
Metadata Driven	Information architecture needs to be metadata driven.	A comprehensive approach for metadata management is the key to reducing complexity and promoting reusability across infrastructure. A metadata-driven approach makes it easier for users to understand the meaning of data and to understand how lineage of data across the environment	<p>The enterprise must establish the initial common vocabulary for the business. The definitions will be used uniformly throughout the enterprise.</p> <p>Whenever a new data definition is required, the definition effort will be coordinated and reconciled with the corporate "glossary" of data descriptions. The enterprise data administrator will provide this coordination.</p> <p>Ambiguities resulting from multiple parochial definitions of data must give way to accepted enterprise-wide definitions and understanding.</p> <p>Multiple data standardization initiatives need to be coordinated.</p> <p>Functional data administration responsibilities must be assigned.</p>

NAME	STATEMENT	RATIONALE	IMPLICATIONS
<p>Measurement for Quality</p>	<p>Quality of data will be measured.</p>	<p>Data quality is relative to the purpose to which it is to be applied. Decision makers need to not only have access to data. They also need to understand the timing, reconciliation, completeness, and accuracy of that data. Data quality is neither abstract nor qualitative. Rather it should be measured in absolute terms.</p>	<p>Data quality issues are the most critical limiting factor to fully leveraging information assets. Most enterprises underestimate the extent, severity and business implications of these problems. A pragmatic effort needs to be made to appreciate the types of problems that can exist and reveal them before plunging into data cleansing and integration efforts. Research shows that the quality of information is more important than the volume of information.</p>

Enterprise Architecture and Oracle

Oracle has created a streamlined and repeatable process to facilitate the development of an architecture called the Oracle Architecture Development Process (OADP).



The OADP divides the development of an architecture into the phases listed above. Oracle Enterprise Architects and Information Architects use this methodology to propose solutions and to implement solutions. This process leverages many planning assets and reference architectures to ensure every implementation follows Oracle's best experiences and practices.

For additional white papers on the Oracle Architecture Development Process (OADP), the associated Oracle Enterprise Architecture Framework (OEAF), other enterprise architecture topics, and to participate in a community of enterprise architects, visit the www.oracle.com/goto/EA

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*An Oracle White Paper
in Enterprise Architecture:*

Oracle Enterprise Architecture
Framework: Information Architecture
Domain

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