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Leverage D&A Architecture as a Strategic Enabler of D&A

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5 Things a D&A Architecture Discipline Does for a CDAO

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Initiatives: Chief Data and Analytics Officer Leadership; Evolve Technology and Process Capabilities to Support D&A

> Chief data and analytics officers (CDAOs) need a dedicated focus on D&A architecture. This is critical to realizing D&A strategy and enabling a high-functioning D&A operating model, especially as data ecosystems evolve and D&A tech stacks become more complicated.

Overview

Key Findings

- A dedicated D&A architecture discipline formalizes viewpoints on both D&A's business architecture and technology landscape, enables CDAOs to operationalize strategy, and informs where to invest.
- An architecture discipline is a critical strategic enabler of D&A.

Recommendations

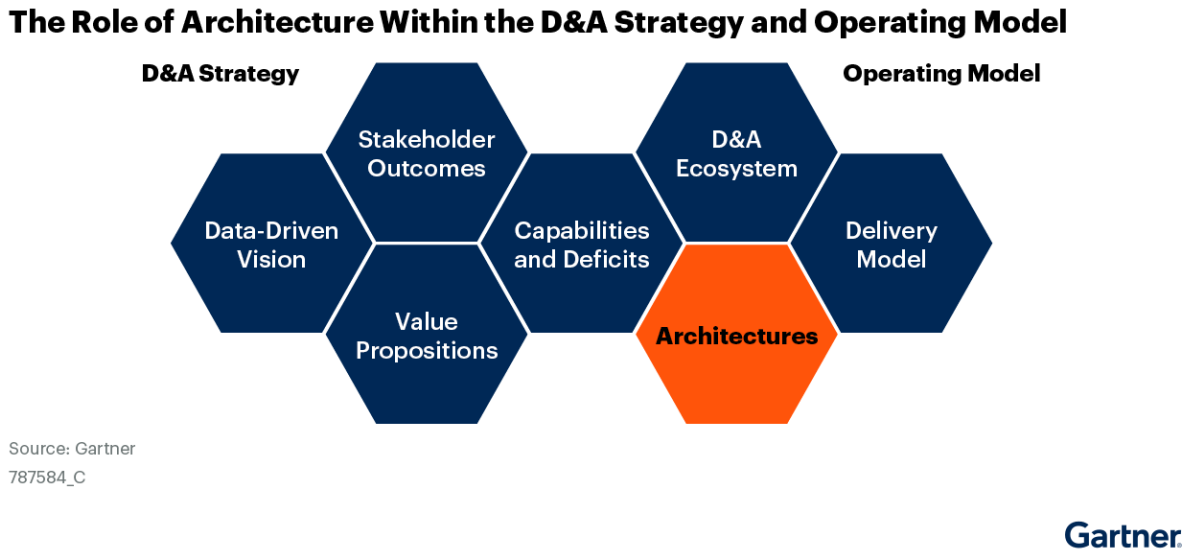
Chief data and analytics officers with responsibility for a data ecosystem or a D&A technology stack should:

- Create a dedicated, D&A-specific architecture discipline by developing both business and technical architecture for D&A, and establish who will be responsible for their evolution and maintenance.
- Improve the operationalization of strategy by using architecture viewpoints to direct investments to capabilities and supporting technologies that will advance the D&A strategy.

Introduction

According to the Gartner Chief Data and Analytics Officer Agenda Survey for 2023, [1] the D&A function has become broad, multifaceted and complex. D&A now comprises a vast, evolving data ecosystem as well as D&A-specific technology stacks in analytics, AI and machine learning (ML). The complexity of the function is a recognition of the maturity of the D&A function and a sign of growing confidence in the CDAO role. CDAOs need to formalize a D&A architecture discipline to enable their strategic vision and successfully implement their operating model (see Figure 1 and Design and Implement an Effective Data and Analytics Operating Model That Delivers Business Outcomes). Architecture is a critical strategic enabler that improves capability-based planning and provides structure and consistency for directing investments in D&A.

Figure 1: The Role of Architecture Within the D&A Strategy and Operating Model



The 2023 CDAO survey also showed that human resource shortages and lack of funding for programs are two of the biggest roadblocks to success of D&A initiatives. CDAOs must use business and technical architecture to request and direct investments in D&A based on a more holistic view of D&A capabilities.

The majority of CDAOs also say that they are not effective at informing senior business decision makers about the impact of D&A capabilities on:

- Their respective areas of responsibility
- Identifying new data and analytics product/service opportunities to advance business strategy

CDAOs must use business and technical architecture to conduct capabilities-based planning and to operationalize business strategy. A comprehensive understanding of D&A capabilities enables CDAOS to move back and forth between strategic and tactical considerations when developing solutions and building programs. Therefore, a D&A architecture discipline can help the CDAO with five major jobs:

- Connecting D&A to business outcomes
- Maintaining a holistic viewpoint on D&A technology
- Facilitating technical collaboration enterprisewide
- Maintaining a risk posture for D&A assets
- Building the D&A future state

The size of these architecture jobs depends on the operational context and technical complexity that is unique to each enterprise. Some CDAOs can formalize these jobs as a part of existing D&A roles while others may need new dedicated roles.

Analysis

Connect D&A to Business Outcomes

CDAOs must identify what their D&A capabilities are and what those capabilities do to generate value for the enterprise. Formalizing this understanding constitutes a minimum D&A business architecture that CDAOs must have to be successful.

CDAOs need business architecture to manage their maturing and increasingly complex business and technology environments. CDAOs now have responsibility for the data ecosystem, analytics technology stacks and AI/ML technology stacks. Additionally, the levels of investment in D&A continue to increase.

Investments in D&A assets must be coordinated to deliver the desired business advantages and to evaluate the return of value. Mapping capabilities helps identify what business changes are associated with tangible values — for example, monetizing data to increase revenue, investing in foundational D&A to make enterprise capabilities more effective, or creating entirely new business models based on proprietary analytics. At an enterprise level, capability assessment can describe potential versus realized value of the existing D&A assets and can inform how to invest to create additional value. For more on capabilities and deficits, see:

- Toolkit: How to Connect Data to Business Outcomes
- Design and Implement an Effective Data and Analytics Operating Model That Delivers Business Outcomes
- Data and Analytics Maturity Assessment Score

Assess D&A capabilities. What are your information capabilities? Can how capabilities link to enterprise value creation?

Maintain a Holistic Viewpoint on D&A Technology

CDAOs must have a perspective on their future- and current-state technologies that is grounded in business and technical requirements. Formalizing this viewpoint constitutes the minimum D&A technical architecture that CDAOs must have to be successful.

Delivery of D&A solutions requires effective negotiation of trade-offs between business and technical requirements. CDAOs must be equipped to conduct these negotiations in a way that consistently furthers their strategic vision. Without a viewpoint into the D&A technology landscape, CDAOs leave the operationalization of their strategy to chance (or at least to the engineers).

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CDAOs must maintain a holistic understanding of their data ecosystem, analytics technology stack and AI/ML technology stack to provide strategic design guidance and necessary oversight for technical changes. At an individual solution level, technical decisions should reflect an appropriate trade-off between business and technical requirements.

CDAOs should take advantage of other architecture resources — such as enterprise architecture, solution architecture or platform architecture — to inform and complement their technical perspective (see Note 1: Definitions). However CDAOs should understand that, however well-intended, input on technical or business design from outside D&A is likely to lack D&A domain expertise, awareness of D&A operations, or business context for major D&A initiatives.

Develop a living future state of D&A capabilities. What is the desired data ecosystem? What should the technology stacks for D&A include? What are the critical shortcomings of current technology?

Facilitate Technical Collaboration

CDAOs can use D&A business and technical architecture to identify use cases and teams that share capabilities, D&A assets or technologies. Detailing technical points of contact with other teams is a great way to scale D&A initiatives and build new enterprisewide collaboration (see Data and Analytics Essentials: The Data and Analytics Infrastructure Model).

Opportunities for collaboration are often obscured by organization structure, team culture/vocabulary, processes and metrics. Identifying common technology touchpoints can highlight overlooked common ground. For example, lots of applications now include AI models, and yet it is not immediately apparent how model development and application development teams can work together. By looking at the capabilities of the two teams and any overlap in their tools, you can identify numerous shared technical opportunities (see The Impact of AI and ML on Software Engineering).

Identify opportunities for high-potential technical collaboration. Who has shared capabilities? Who can improve by greater use of D&A assets? Where can D&A improve by combining efforts with others?

Maintain a Risk Posture for D&A Assets

CDAOs can use the D&A business and technical architecture to analyze the data ecosystem and information to determine an appropriate risk-value posture. Developing a perspective on D&A risk is an essential part of the CDAOs collaboration with the chief information security officer (CISO).

CDAOs know they must treat security requirements with special attention. Developing an D&A risk posture — including a data classification policy, at a minimum — informs all aspects of the data life cycle, from creation through to destruction. Moreover, it exerts direction or influence over all aspects of architecture, including information architecture, data engineering and data management.

CDAOs must work with their chief information security officers (CISO) to establish the business risk and security posture that defines appropriate data access policies. These business risks will include a variety of business impacts that include project performance, customer experience, compliance and privacy, and security threats.

The CDAO must make sure that information can be made available to the right person, at the right time, in the right place. Sometimes the data to protect is strictly private customer or citizen data. Sometimes it includes intellectual property, and at other times, it includes critical business information, such as strategies or forthcoming mergers. Such information is essential to the daily operation of an organization, and inadequate protection, can cause needless amounts of risk.

More challenging examples include comparing achievable value delivery, opportunity cost and potentially nonquantifiable downsides. For these use cases, the CDAO should have a consistent risk posture that appropriately balances value and risk.

Understand the basic profile of data risk and collaborate with the CISO. What are essential security requirements? What informs the risk-value trade-off? What regulatory or contractual obligations exist?

Building the D&A Future

CDAOs can use D&A architecture to assess the relevance of emerging technology. Due diligence on emerging technology has much higher fidelity when it is based on a detailed understanding of current D&A capabilities and technology.

CDAOs can clarify their business cases by mapping new technology, features and functionality to an existing capability map and technical architecture. At a minimum, CDAOs can determine that emerging technology does not redundantly cover existing capabilities. The additional context provided by architecture reference material should also highlight how emerging technologies complement existing technology and enable core business capabilities.

On the technical side, by having an overview of the surrounding technology landscape, architects can support engineers by developing technical roadmaps, assessing design implications and preempting any integration problems. For analysis on emerging D&A technology and trends, see Top Trends in Data and Analytics, 2022 and Hype Cycle for Data and Analytics Programs and Practices, 2022.

Extend D&A capabilities into the future. What technology drivers need to be realized or adopted? What core business capabilities require new investment? What is your level of readiness for adopting and integrating new technology?

Evidence

The analysis in this document is based on information from a number of sources, including but not limited to conversations with CDAOs and interactive briefings with end-user organizations.

[1] **Gartner Chief Data and Analytics Officer Agenda Survey for 2023:** This study was conducted to explore the business impact of the CDAO role and/or the Office of the CDAO and understand the leadership traits of the most successful CDAOs that distinguish them from their peers. The research was conducted online from September through November 2022 among 566 respondents from across the world. Respondents were required to be the highest-level data and analytics leader in the organization: chief data officer, chief analytics officer, chief data and analytics officer, the most senior leader in IT with data and analytics responsibilities, or a business executive such as chief digital officer or other business executive with data and analytics responsibilities. Disclaimer: Results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.

Note 1: Definitions

- **Architecture** is defined as:
  - In reference to computers, software or networks, the overall design of a computing system and the logical and physical interrelationships between its components. The architecture specifies the hardware, software, access methods and protocols used throughout the system.
  - A framework and set of guidelines to build new systems. IT architecture is a series of principles, guidelines or rules used by an enterprise to direct the process of acquiring, building, modifying and interfacing IT resources throughout the enterprise. These resources can include equipment, software, communications, development methodologies, modeling tools and organizational structures.

- **Enterprise architecture (EA)** is a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve targeted business outcomes that capitalize on relevant business disruptions. Enterprise information architecture (EIA) is the part of the enterprise architecture process that describes — through a set of requirements, principles and models — the current state, future state and guidance necessary to flexibly share and exchange information assets to achieve effective enterprise change.

- A **platform** is a product that serves or enables other products or services. Platforms (in the context of digital business) exist at many levels. They range from high-level platforms that enable a platform business model to low-level platforms that provide a collection of business and/or technology capabilities that other products or services consume to deliver their own business capabilities. Platforms that enable a platform business model have associated business ecosystems. They typically expose their capabilities to members of those ecosystems via APIs. Internal platforms also typically expose their capabilities via APIs, but they may offer other mechanisms, such as direct data access, as required by the products that consume them.

- **Solution architecture (SA)** is an architectural description of a specific solution. SAs combine guidance from different enterprise architecture viewpoints (business, information and technical), as well as from the enterprise solution architecture (ESA).

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