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What Is Data Fabric Design?

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Initiatives: Data Management Solutions

Organizations lack clarity on the emerging data management design concept called "data fabric." Data and analytics leaders should use this research to raise awareness of the data fabric design among peers and stakeholders, and eventually enable building one.

Quick Answer

What Is Data Fabric Design?

- A data fabric is a design concept that serves as an **integrated layer (fabric) of data and connecting processes**. The fabric presents an enterprisewide coverage of data across applications that is not constrained by any single platform or tool restrictions.

- A data fabric follows a **metadata-driven approach**. Active metadata discovery and semantics inference are key new aspects of a data fabric compared to traditional approaches.

- A data fabric is **composable by design**. It is made up of components that can be selected and assembled in various combinations.

- **Designing a data fabric** requires understanding your own maturity as well as the maturity of the various components. We recommend starting with leveraging passive metadata, adapting to knowledge graphs, introducing active metadata and, finally, planning the orchestration services.

More Detail

This Quick Answer raises awareness on the data fabric design, following several client interactions between January 2020 and April 2021.
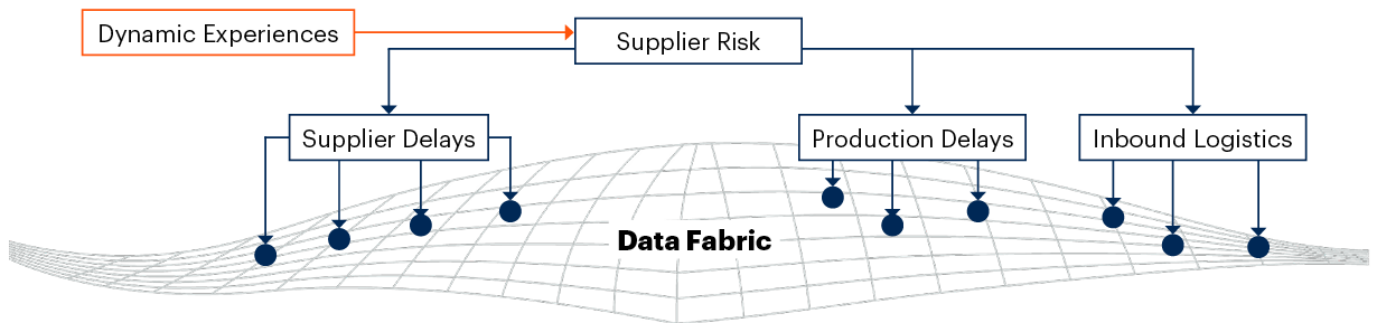
Fabric of Connected Data

A data fabric maps data residing in disparate applications (within the underlying data stores, regardless of the original deployment designs and locations) and makes them ready for business exploration. Connected data enables dynamic experiences from existing and newly available data points leading to timely insights and decisions. This is very different from a static experience with reports/dashboards.

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Data fabric serves as a backbone for knowledge discovery, data analysis and augmented decision making. For example, a supply chain leader using a data fabric can connect supplier delays with production delays (as and when these data points are available), identify developing risks and make informed decisions in real time, as shown in Figure 1.

Figure 1: Data Fabric Serves an Integrated Layer of Connected Data

Data Fabric Serves an Integrated Layer of Connected Data

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Metadata-Driven Approach

Think of data fabric like a human brain — that can store information (data and metadata from participating systems captured for graph analysis) and process information (the decision engines).

A data fabric engages with two categories of metadata:

- **Passive metadata**: This includes traditional design-based metadata (such as data models, schema definitions, glossary) and runtime metadata (such as database query logs, integration job logs, data quality audits).

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- **Active metadata**: It's the continuous analysis of data usage by systems and users to determine alignment and exception between "data as designed" versus "actual experiences". It's AI-driven, assisted by humans.

The three-core metadata processing engines of a data fabric are:

- **Usage and utilization engine**: Processes the information captured about data subjects, systems, logs and users in the data fabric's metadata repository

- **Continuous inference engine**: Infers the semantics of data by profiling the content and registering the findings (such as the inferred data domain, data quality) in the fabric's repository

- **Alignment and exception engine**: Compares designed metadata against inferred metadata and deals with misalignments

Figure 2 illustrates this metadata-driven approach to processing information.

The AI Engines of a Data Fabric
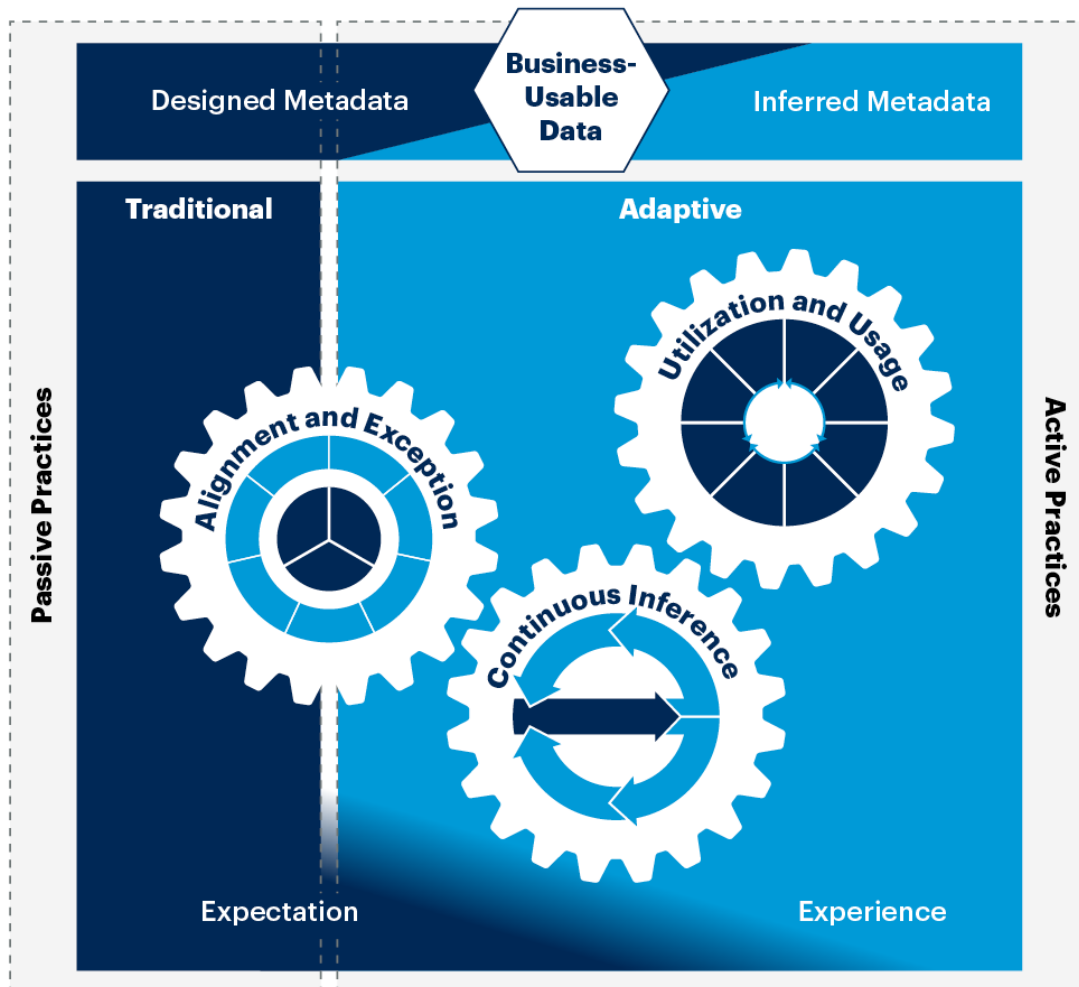
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Composable Design

A data fabric is made up of components that can be selected and assembled in various combinations (see Figure 3). The component maturity levels vary. As a result, data fabric implementations may vary significantly.

Using ontologies, the connected data is enriched with business semantics — modeling relationships across heterogeneous applications. Compatible metadata and assured data quality are essential to joining data across the enterprise into a common model.

Using artificial intelligence (AI), the fabric recognizes similar data in previously unused or unknown (but now available) data, and alerts users that "new data is available," which might otherwise take weeks or months to discover. But when AI cannot infer the data, it can be set up to "scream for help" from human allies who can explain the data, and then the fabric learns.

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Maturity of Data Fabric Components
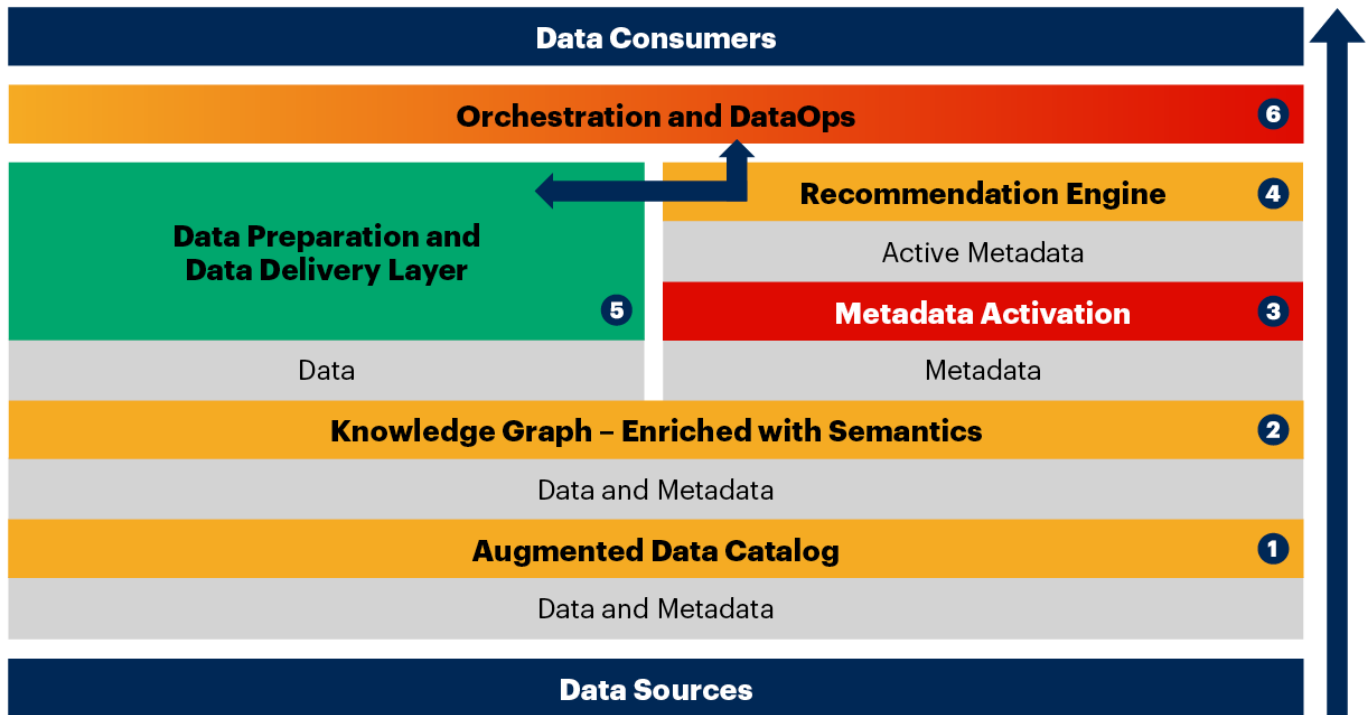
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Designing a Data Fabric

In our Hype Cycle for Data Management, 2020, we positioned the data fabric innovation profile atop the Peak of Inflated Expectations. During this stage, overenthusiasm and unrealistic projections prevail. **At the moment, building a data fabric is not an easy task.** However, organizations can and should invest in the components of a data fabric now, and evolve the fabric design organically. Here is our recommendation:

- Start with your **passive metadata** by deploying an augmented data catalog. A catalog can help you curate an inventory of information assets, communicate shared semantics, and collaborate for accountability and governance.

- Progress your metadata discovery journey by adapting **knowledge graphs.** You build a fluid, connected data environment using uniform identifiers, flexible schemas and triples. As a starting point, choose a domain or subdomain that has a well-defined set of data and a use case that will demonstrate impact.

- Introduce **active metadata** by enabling your data fabric to collect, share and analyze all forms of metadata. Feed the results to machine learning models that produce recommendations and automation metrics as output.

■ Plan the **integration and orchestration services** for your data fabric — i.e., how and where will you run the fabric. These services are best delivered by vendor products; otherwise, you need a high level of skills.

What's Next?

Take advantage of the recommended Gartner research on data fabric. Speak to our analysts — we can assist in shaping your data fabric business case and in selecting the right methodologies, architectures and technology.

Recommended by the Authors

Top Trends in Data and Analytics for 2021: Data Fabric Is the Foundation

Data Fabrics Add Augmented Intelligence to Modernize Your Data Integration

Demystifying the Data Fabric

Infographic: An Intelligent Composable Business Demands a Data Fabric

Emerging Technologies: Data Fabric Is the Future of Data Management

How to Build Knowledge Graphs That Enable AI-Driven Enterprise Applications

How to Activate Metadata to Enable a Composable Data Fabric

Cool Vendors in Data Management

Solution Comparison of 7 Data Fabric Offerings