**Why do we need Business Intelligence Architecture?**

Much before an organization starts adopting a business intelligence architecture, there are series of indicators which accelerate the case for building a BI system. There are many important factors, but the key ones include:

* **Backlog of business requests:** IT department is under a lot of pressure to fulfil the report requests from various business users.
* **Need for self-service BI:**Business users are stuck as they need to depend on IT for even minor pieces of information. This hinders their decision-making process and forms a bottleneck for smooth operation.
* **Messed up IT system:**Silos of data, different data formats, disparate data and applications – these will form a complex IT system, building a justified case for a stronger BI infrastructure.
* **Cost:**Cost of maintaining information silos and feeding to huge number of IT resources for even small sets of data is detrimental to an organization.

These factors push the organizations to build a business intelligence architecture that will seek to help them make better decisions. A solid architecture will help in structuring the process of improving business intelligence and helps implement the Business Intelligence strategy in a very cost-effective way.

BI architecture, among other elements, often includes both structured and unstructured data. This data comes from both internal and external sources and are transformed from raw transaction data into logical information.

**Components of Business Intelligence Architecture**

One mistake that top leaders of many organization make is think of their BI system as equivalent to front-end BI tools being used. Then there is another set of technical geeks who make lot of discussion about a business intelligence architecture around some fancy jargons without giving due importance to what exactly comprises BI architecture.

The key elements of a business intelligence architecture are:

* Source systems
* ETL process
* Data modelling
* Data warehouse
* Enterprise information management (EIM)
* Appliance systems
* Tools and technologies

**Source Systems – Transaction Processing Systems**

This is the starting point for any BI initiative. Organization data is first created in these databases. Point to note: if you do not capture the data in the operational system, you can’t analyse it.

Operational systems (OLTP) form the bulk of the data needed for the data warehousing. In addition to that, source systems may also include data from secondary sources such as market data, benchmarking data etc. Business Intelligence architecture should address all these various data sources which are of different formats and standards.

**ETL Process**

In an ETL process data is extracted from the operational systems and loaded into a data warehouse. ETL, which stands for Extract Transform Load, is usually done using custom solutions available in the market. IBM Websphere Data Stage, Oracle Data Integrator, Ab Initio, and Microsoft Integration Services are examples of such tools.

**Data Modeling**

Data modeling will help to address what exactly is needed from data sources, the format of the data, and how it will be related to other data elements. It is not feasible to extract everything from a source system as that comes with cost issues. Data modeling will help to organize the data and therefore will minimize cost of storage replication, and effort needed to build a data warehouse.

**Data Warehouse**

Warehouse will have data extracted from various operational systems, transformed to make the data consistent, and loaded for analysis. A data warehouse will help in achieving cross-functional analysis, summarized data, and maintaining one version of the truth across the enterprise.

**Enterprise Information Management (EIM)**

EMI is another BI jargon which may stump some beginners. The term usually refers to ETL tools, data modeling tools, data quality, data profiling, metadata management, and master data management.

**BI Hardware**

It is important to make decisions on the hardware requirements to maintain a high performance and scalable BI system. Apart from server configurations, we have data warehouse appliances to combine the server, the database, and the data storage into one system. Netezza and DATAllegro are some well-known appliances in the market.

**Tools and Technologies**

Another important component of business intelligence architecture is what tools and technologies to implement. It is not just the front-end UI tools, but the tools used for EIM as well. There are cloud solutions, SaaS model, many full-fledged BI solutions (such as MSBI, Oracle BI suites, MicroStrategy and more) to choose from. BI framework should have guidelines to make decisions on what is required for the organization.

A business intelligence architecture is the framework for the various technologies an organization deploys to run [business intelligence](https://searchbusinessanalytics.techtarget.com/definition/business-intelligence-BI) and analytics applications. It includes the IT systems and software tools that are used to collect, integrate, store and analyze BI data and then present information on business operations and trends to corporate executives and other business users.

The underlying BI architecture is a key element in the implementation of a successful [business intelligence program](https://searchbusinessanalytics.techtarget.com/feature/5-valuable-business-intelligence-use-cases-for-organizations) that uses data analysis and reporting to help an organization track business performance, optimize business processes, identify new revenue opportunities, improve strategic planning and make more informed decisions overall.

**Importance of a BI architecture**

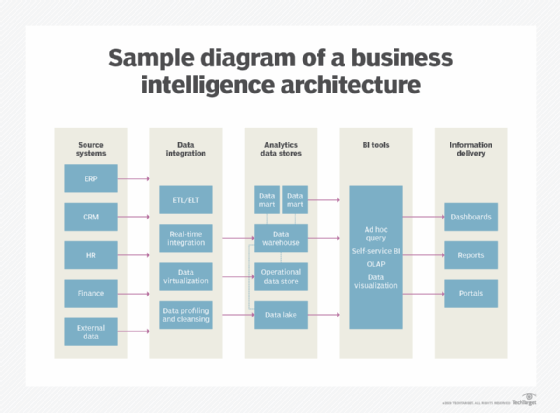
A business intelligence architecture articulates the technology standards and [data management](https://searchdatamanagement.techtarget.com/definition/data-management) and analytics practices that support an organization's BI efforts, as well as the specific platforms and tools that will be deployed. It serves as a technology blueprint for collecting, organizing and managing BI data and then making the data available for analysis, [data visualization](https://searchbusinessanalytics.techtarget.com/definition/data-visualization) and reporting. A strong BI architecture also incorporates policies to govern the use of the technology components.

Putting such a framework in place enables a BI team to work in a coordinated and disciplined way to build an enterprise BI program that meets its organization's data analytics needs. The BI architecture also helps BI and data managers create an efficient process for handling and managing the data that's pulled into the **environment.**

Enterprises benefit from an effective BI architecture by using the insights generated by [business intelligence tools](https://searchbusinessanalytics.techtarget.com/feature/How-to-evaluate-and-select-the-right-BI-analytics-tool) to make data-driven decisions that help increase revenue and profits. To ensure their needs are met, C-suite executives, business managers and other business users who rely on data analysis to formulate strategies and guide their decision-making should have a stake in creating the architecture.

**Business intelligence architecture components and diagram**

A BI architecture can be deployed in an on-premises data center or the cloud. In either case, it contains a set of core components that collectively support the different stages of the BI process, from data collection, integration, storage and analysis to data visualization, information delivery and the use of BI data in business decision-making.



As shown in the accompanying business intelligence architecture diagram, the core components include the following items.

* **Source systems.** These are all of the systems that capture and hold the transactional and operational data identified as essential for the enterprise BI program -- for example, ERP, CRM, finance, manufacturing and supply chain management systems. They can also include secondary sources, such as market data and customer databases from outside information providers. As a result, both internal and external data sources are often incorporated into a BI architecture.

Important criteria in the data source selection process include data relevancy, data currency, [data quality](http://searchdatamanagement.techtarget.com/definition/data-quality) and the level of detail in the available data sets. In addition, a combination of structured, semistructured and unstructured data types may be required to meet the data analysis and decision-making needs of executives and other business users.

* **Data integration and cleansing tools.** To effectively analyze the data collected for a BI program, an organization must integrate and consolidate different data sets to create unified views of them. The most widely used [data integration](https://searchdatamanagement.techtarget.com/definition/data-integration) technology for BI applications is extract, transform and load (ETL) software, which pulls data from source systems in batch processes. A variant of ETL is extract, load and transform (ELT), in which data is extracted and loaded as is and transformed later for specific BI uses. Other methods include real-time data integration, such as change data capture and streaming integration to support real-time analytics applications, and [data virtualization](https://searchdatamanagement.techtarget.com/definition/data-virtualization), which combines data from different source systems virtually.

A BI architecture typically also includes data profiling and [data cleansing](http://searchdatamanagement.techtarget.com/definition/data-scrubbing) tools that are used to identify and fix data quality issues. They help BI and data management teams provide clean and consistent data that's suitable for BI uses.

* **Analytics data stores:** This encompasses the various repositories where BI data is stored and managed. The primary one is a [data warehouse](https://searchdatamanagement.techtarget.com/definition/data-warehouse), which usually stores structured data in a relational, columnar or multidimensional database and makes it available for querying and analysis. An enterprise data warehouse can also be tied to smaller [data marts](https://searchdatamanagement.techtarget.com/definition/data-mart) set up for individual departments and business units with data that's specific to their BI needs.

In addition, BI architectures often include an operational data store that's an interim repository for data before it goes into a data warehouse; an ODS can also be used to run analytical queries against recent transaction data. Depending on the size of a BI environment, a data warehouse, data marts and an ODS can be deployed on a single database server or separate systems.

A [data lake](https://searchaws.techtarget.com/definition/data-lake) running on a Hadoop cluster or other big data platform can also be incorporated into a BI architecture as a repository for raw data of various types. The data can be analyzed in the data lake itself or filtered and loaded into a data warehouse for analysis. A well-planned architecture should specify [which of the different data stores](https://searchdatamanagement.techtarget.com/feature/Beyond-the-RDBMS-Data-warehouse-vs-data-lake-vs-data-mart) is best suited for particular BI uses.

* **BI and data visualization tools.** The tools used to analyze data and present information to business users include a suite of technologies that can be built into a BI architecture -- for example, [ad hoc query](https://searchbusinessanalytics.techtarget.com/definition/ad-hoc-analysis), data mining and online analytical processing, or [OLAP](http://searchdatamanagement.techtarget.com/definition/OLAP), software. In addition, the growing [adoption of self-service BI tools](https://searchbusinessanalytics.techtarget.com/tip/5-self-service-BI-best-practices-for-larger-organizations) enables business analysts and managers to run queries themselves instead of relying on the members of a BI team to do that for them.

BI software also includes data visualization tools that can be used to create graphical representations of data, in the form of charts, graphs and other [types of visualizations](https://searchbusinessanalytics.techtarget.com/tip/12-data-visualization-techniques-for-effective-BI-applications) designed to illustrate trends, patterns and outlier elements in data sets.

* **Dashboards, portals and reports.** These information delivery tools give business users visibility into the results of BI and analytics applications, with built-in data visualizations and, often, self-service capabilities to do additional data analysis. For example, [BI dashboards](https://searchbusinessanalytics.techtarget.com/definition/business-intelligence-dashboard) and online portals can both be designed to provide real-time data access with configurable views and the ability to drill down into data. Reports tend to present data in a more static format.

Other components that increasingly are part of a business architecture include [data preparation](https://searchbusinessanalytics.techtarget.com/definition/data-preparation) software used to structure and organize data for analysis and a metadata repository, a business glossary and a [data catalog](https://searchdatamanagement.techtarget.com/definition/data-catalog), which can all help users find relevant data and understand its lineage and meaning.