

## Business Intelligence 101

*A large number of Business Intelligence (BI) consumers struggle with the appropriate understanding and expectations out of a BI initiative. This gap can range from a basic misunderstanding, for example the difference between BI reporting and operational reporting, to the more critical aspect of BI initiatives related to identifying the business problem which needs a solution. This document intends to provide a basic, high level understanding of BI solutions and is targeted towards audiences ranging from BTAs to Partner/Directors who are new to BI concepts but are involved in the delivery or sales of the same.*



### Introduction

#### What is BI?

“Business Intelligence is a collection of technologies, applications, processes and practices for the transformation of business data into business useful information.”

There are a variety of other definitions, but in essence BI is not a single – product, principle, method or technology, but rather all of them.

Over past few decades, enterprise information levels have grown substantially. According to Forrester (Data, Data Everywhere, July 2007), the world produced 5 exabytes (5 with 18 zeros) of data by 2003. Most of this information is generated by the transactional systems (such as ERP, CRM or Legacy) and these systems are not capable of processing high volumes of data in order to generate useful information. This is where a BI solution becomes important. A BI solution, also referred to as a “stack”, typically, consists of various components and technologies. See Figure 1 below.

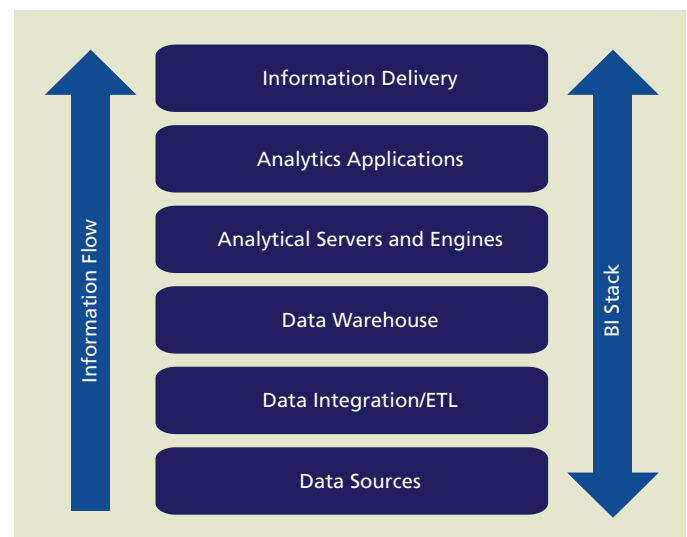


Figure 1: Components of a BI Solution

A BI solution helps to transform raw data into actionable information which helps support business decision making. As examples, inventory levels could be dissected across products and vendors, thus triggering not only a reorder process but also assisting the managers in identifying the supply and demand trends and the efficiency of vendors. Expenses could be sliced across departments, time periods and drilled down to the level of individuals thus providing a more meaningful analysis for cost cutting. Opportunity reports could be run across various customer segments thus helping in identifying premium customers. In summary, BI is a technologically organic entity which supports business critical decision making capability by leveraging an aggregation of tools, methodologies, people and processes not only to improve the efficiency of the operations, but to improve the effectiveness of business processes and in turn improving the ROI.

### Why BI?

In today's age of a shrinking global economy and increased competitiveness, traditional enterprise systems and solutions which increased the efficiency of the transactional systems are reaching a point of flat growth. This is primarily due to the following reasons:- 1) Matured technology and products making innovation challenging 2) Pre-packaged solutions and business processes across all industries, which standardizes growth and efficiency while diluting the "business edge" factor 3) Generation of extremely large amounts of transactional data, but inefficient and siloed reporting on the same.

Through a successful BI initiative, an organization can benefit in the following ways:

- Extract actionable data from the extensive volumes of business transactions.
- Identify profitable customers, reduce costs, and identify profitable products, services and trends.
- Provide an environment which helps in refining or building business processes, planning strategies by applying results from the BI system/solution which make an organization more competitive.
- Provide users with a platform to run customized reports on-the-fly (ad hoc analysis)
- Eliminate the reporting inertia which results from vast amounts of transactional data and reporting silos resulting from multiple systems within an enterprise.
- Provide a single decision support system for the disparate transaction systems that exist in organizations today. This also helps in standardizing the presentation of information.
- Track internal and operational performance within the organization. Evaluate performance on regional, local, departmental and individual basis.

However, before any organization can realize the benefits of a BI solution, they need to first understand the business questions that they are trying to answer and address the business challenges.

## Business Challenges

BI applications have evolved from being mere reporting engines of data previously locked away in transactional systems, to providers of information analytics that can be utilized by enterprises to gain competitive advantage.

Although BI applications deliver insight into business processes and help align corporate strategy with individual performance, they are faced with plethora of challenges at various fronts which negatively impact end-user trust and adoption.

Some of the key challenges that hinder the hastened adoption of BI initiatives are enlisted below:

- **BI Metrics Management** – The lack of common data definitions across different departments and/or geographic regions of the same organization render it impossible to gain a single, consistent view of business. One of the world's leading direct-selling companies for example has at least 5 different definitions for demand and net sales across marketing, finance and other operational departments and geographies. It is imperative to establish a process to help define and reconcile semantics across the organization with minimal impact on current systems.
- **Disparate Data Sources** – The one constant rule about enterprise data is that it's always changing, be it due to internal re-organizations or due to mergers & acquisitions. As a result, IT must continuously be prepared to deal with disparate data that comes from heterogeneous data sources.

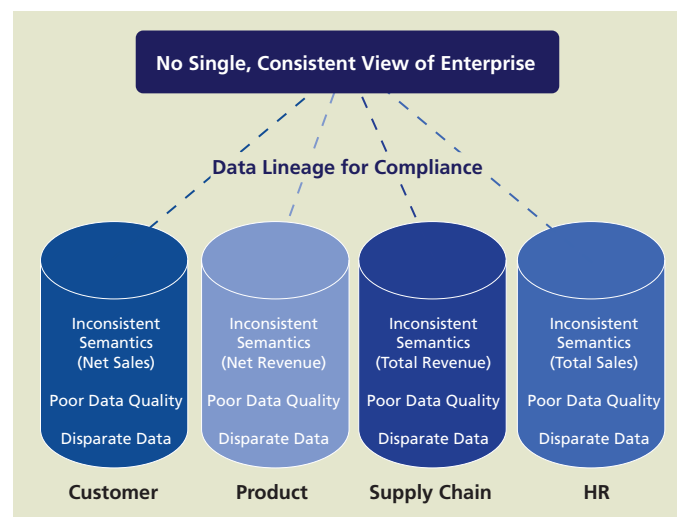


Figure 2: Silos of data and metadata present challenges in providing an integrated and coherent view of business to corporate users.

- **Data Quality and Data Governance** – In an increasingly competitive market, BI vendors have made pervasive BI and enhanced predictive analytics a reality. Even so, BI implementations have been continuously plagued with back-end data quality issues culminating in the failure of BI projects.

Most transaction systems are faced with data quality issues which can be attributed to a number of issues like incorrect data entry by field sales representatives, existence of multiple records of the same customer coming from different legacy systems, empty fields (such as missing contact information), and redundant or inconsistent data between two data silos to name a few.

A robust and effective three-fold process, namely data profiling, data cleansing and data validation needs to be set-up to address this concern.

- *Data Lineage* – “Where did that number come from in the report?” is the most common question asked by business users. The answer to this question can be derived by accessing the BI application and ETL tool metadata together with the source data.

The challenge is that every data source, BI tool, and ETL tool contains its own metadata and they do not talk to one another thereby rendering answers to such questions time consuming and cumbersome. Such queries must often go through as formal BI service requests.

By using a metadata management solution to consolidate and integrate all BI-related metadata into a single location, IT can view, analyze, and explore metadata from disparate systems. A metadata management solution enables IT staff to understand the context of information in their BI environment and the underlying relationships between metadata objects, data structure, end-to-end impact analysis, report-to-source data lineage, and operational statistics.

Once the organization understands the challenges, it needs to define a roadmap in order to approach the BI implementation in order to address these challenges. An important decision that an organization would make at this point is selecting a specific BI solution and vendor.



## Choosing a BI Solution and Vendor

Organizations have long relied on in-house developers to write code for developing data marts, cubes and generic reports based on the current requirements. Yet, for almost 20 years, they have had alternatives in the form of extract, transform and load (ETL) tools and analytics platforms. Although many BI vendors historically have failed to deliver, it is the experience from these failures that has helped the current vendors to develop very robust and scalable data warehouse and analytics applications based on industry best practices.

As organizations consider investing in analytics application software (which contain pre-written ETL, data models, and metadata repositories), they encounter familiar questions:

- How can applications that are “generically” designed, work for their organization?

Based on the prior work done at their client sites by Oracle, it is determined that for a given subject area (for example, Financial Analytics) 70% to 80% or more of the average data warehouse is based upon non-unique content. This content is typically the same regardless of whether your business creates pharmaceuticals, flies airplanes or makes hard drives. It's the last 20% to 30% of development that makes the unique differences between industries, as well as the differences in business strategies from company to company, even if those businesses sell the same types of products to the same types of customers. So during an average data warehouse project using pre-built applications, the majority of the development time would be expended on the 20% to 30% of non unique data elements only.

- When and why does it make sense to buy technology to do something that you could do manually?

Productivity gains are a big reason that many organizations choose pre-built applications over custom development. In addition to saving time, many common, repeatable functions are coded into the software, so that companies do not have to “reinvent the wheel” every time they do an integration project. Furthermore, a pre-built ETL tool means that you have all of the code in one place; documented and managed for version control. However with custom coding (hand coding?), you have code all over the place with little management and documentation. That is a problem when companies need to replicate integration adaptors, troubleshoot or change code.

Also, there are issues like auditability and transparency, since regulations like SOX or HIPAA demand that companies be able to track data back to their original source systems. Pre-built applications help by automatically documenting information about data sources and transformations, making for an easier audit trail.

- How can organizations justify cost of pre-built package when compared with the cost of custom developed software?

Calculation of ROI or justification of cost with respect to pre-built analytics application is not an exact science. However organizations can use the illustration provided in this section as a yardstick to compare the cost of deploying pre-built application versus custom developed software solution.

Pre-built BI application typically covers ETL extracts, Transform and loads, OLAP schemas, Meta Data repository and Dashboard / Reports. The real value of pre-built applications should be judged based on the backend system from which the data is sourced from. For example, if Oracle Business Intelligence (OBI EE) tool (which has extracts written for Oracle E-Business suite) was pointed to a non-EBS backend, the additional work would be required to the extent of 20% to 30% based on the 80/20 or 70/30 rule described in the above section. In real world terms, if a "typical" deployment requires 20 weeks, then a deployment requiring an Extract layer to be developed might mean a 26 week project.

The diagram below demonstrates visually the differences, and the level of effort typically applied to each component of the application.

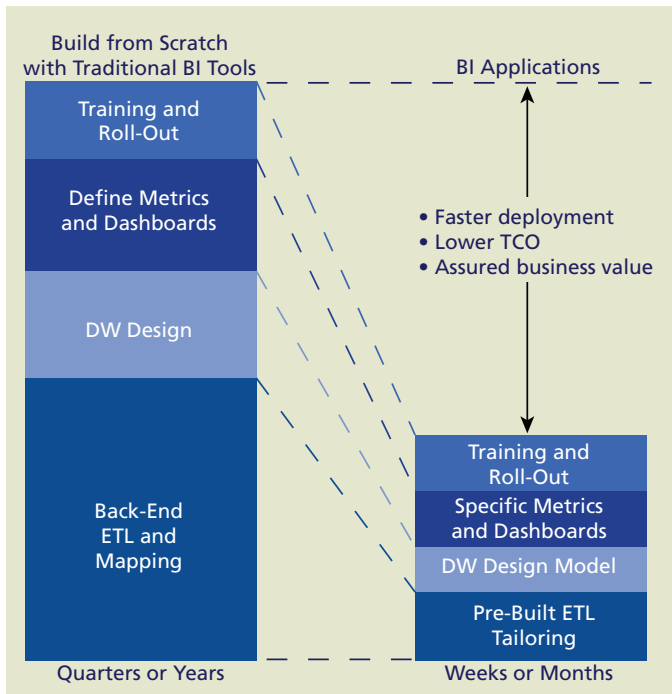


Figure 3: Custom versus packaged solutions.

Based on industry experience, it would be fair to say that a pre-built business intelligence system with data loaded on a regular basis would justify the cost for its inherent productivity gains.

In recent years, the BI industry has seen a wave of vendor consolidations and the resulting landscape is the availability of cross-industry, cross-functional, scalable BI products. As organizations weave their way towards selecting a solution or product, they also have to evaluate their specific business needs which influence the selection of particular vendors.

### Vendor Selection

Before a vendor is selected, organizations need to answer some key questions around requirements and expectations from a BI solution. There should be a clear understanding of what business questions or problems are expected to be solved via a BI solution. This also goes hand in hand with analyzing the current management reporting capabilities and their limitations within the organization.

With BI vendor consolidation, a more integrated suite of solutions which address broad spectrum of performance measurements are available (Financial performance, Cost & Profitability performance, 360 degree customer view, internal performance measurement, forecasting to mention a few). This provides organizations with lesser but more broad-based options for BI solutions which would integrate with their existing transaction systems (ERP/CRM) seamlessly. Some of the major consolidations that have taken place recently are - Oracle acquired Siebel and Hyperion solution, SAP acquired OutlookSoft and Pilot Software, Business Objects acquired Cartesis and ALG Software and Cognos acquired Applix. In addition to this, SAS and Microsoft are major players in the BI field. Each vendor brings common and unique features to the BI mix.

While this document does not deep dive into the comparative features of each of the above mentioned vendors, some of the criteria that should be evaluated while comparing various vendors include:

- Support for industry specific processes
- Technical capabilities
- Vendor’s market strategy, stability, and market share
- Ease of integration with the existing IT infrastructure and standards, including ERP and/or CRM applications
- Support of the business case and ability to meet ROI objectives .

According to Forrester, the BI pack is led strongly by Oracle after the acquisition of Hyperion, a leading financial planning and performance product, in addition to its broad spectrum of BI applications running on the Oracle Business Intelligence Enterprise Edition (OBIEE) platform based on the Siebel Analytics engine. Cognos is also recognized as a strong Business Performance Solution vendor. And, Forrester recognizes SAS Institute as having strong predictive analytical capabilities within their solution suite. Both, Business Objects and SAP are catching up in the BI space through acquisitions and capability enhancements. A recent entry to this market is Microsoft with its PerformancePoint Server 2007 which leverages the common MS technologies and products.

Deloitte<sup>1</sup>, through its wide experience in the BI space, is able to assess the needs of our clients and evaluate vendors in order to come up with solution recommendations and implementation strategy by leveraging a rich pool of methods and practices. The following section highlights our key methodology for implementing BI solution.

## Deloitte's BI Implementation Methodology

A key component to a successful BI project is a BI-specific, comprehensive, technology-independent, proven, repeatable methodology that cuts through BI project complexities. Based on rich industry experience within BI space, Deloitte provides the appropriate guidelines to these success factors.

Deloitte's business intelligence methodology is called EIM (Enterprise Information Management). The EIM method helps clients to organize, manage and deliver enterprise information to the enterprise. This method provides a structured approach to deliver on the key disciplines of EIM implementation projects. In other words EIM method helps project teams succeed and deliver value to the client.

The EIM Implementation methodology is organized as following phased manner:<sup>2</sup>

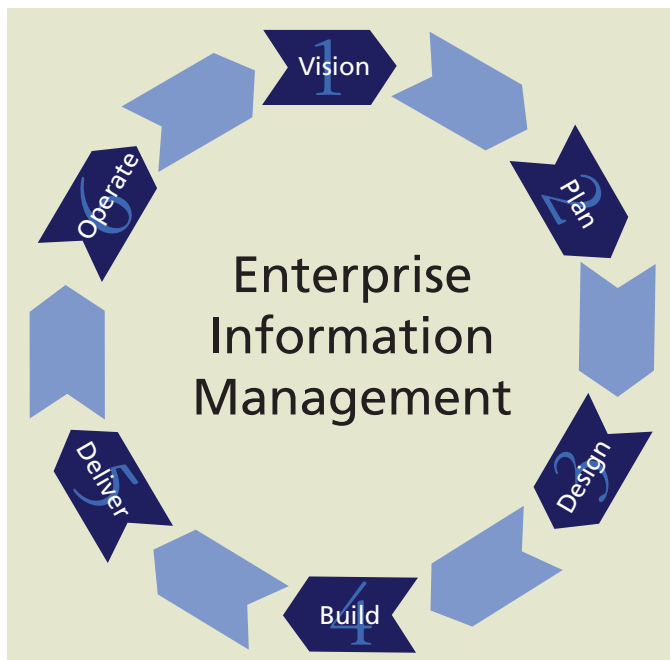


Figure 4: Deloitte's EIM Methodology.

**Vision:** The objective of this phase is to define the scope and direction of the BI in the organization. It is to align the BI initiative with strategic business goals.

<sup>1</sup> As used in this document, "Deloitte" means Deloitte Consulting LLP. Please see [www.deloitte.com/us/about](http://www.deloitte.com/us/about) for a detailed description of the legal structure of Deloitte LLP and its subsidiaries.

<sup>2</sup> For greater details on EIM Methodology, refer to Deloitte EIM Methodology document.

**Plan:** The objectives of this phase are to define and document the client's business intelligence requirements, including scorecards and dashboards, decision support systems, analytics capabilities, data mining capabilities, and key performance indicators (KPIs).

Key activities of this phase are:

- Assess existing BI setup and/or initiatives
- Define operational and performance KPIs
- Define data elements relevant for the purpose of analysis or regulatory or legal compliance
- Define new reporting requirements
- Identify key data sources and processes related to it
- Define Information governance organization

**Design:** The objective of this phase is to develop designs of the information environment that support the enterprise information needs and decision-making requirements of the business.

Key activities of this phase are:

- Define Information organization charter
- Define information capacity requirements
- Design DW and BI architecture
- Design logical data flow between identified SOURCE systems and planned TARGET system
- Develop logical data flow model
- Develop dimensional data model
- Design procedures for application functions
- Define procedures for metadata management
- Develop data transformation system
- Design data quality management procedures
- Monitor Information Governance Operations

**Build:** The objectives of this phase are to develop and test high-level reporting, analytics, data mining processes that satisfy the client's business requirements and build the cutover approach for moving the system from test environment to Production environment.

Key activities of this phase are:

- Configure Dev, Test and Production environments
- Develop data transformation system
- Develop BI capabilities
  - Data mining
  - Analytics
  - Information delivery
- Perform testing of each component per the testing process
- Develop cutover approach (from legacy to new System)
- Monitor Information Governance Operations

- **Deliver:** The objective of this module is to conduct final cutover in a production system environment and implement procedures to verify their alignment within the enterprise.

Key activities of this phase are:

- Conduct performance and stress testing
- Execute mock Cutover
- Conduct Go/No-Go Evaluations
- Conduct Final Cutover
- Implement support organization and infrastructure
- Implement procedures/policies based on the plans and assessments performed during Design phase

**Operate:** The objective of this module is to implement security & control measures and complete transition to company.

Key activities of this phase are:

- Transition controls
- Implement auditing, monitoring and feedback measures
- Monitor support strategy
- Support technical environments
- Implement continuous Improvement

Like any other project, it is important to have the right skills along with the right experience to implement a BI solution. Deloitte offers a rich pool of professionals with strong experience in all aspects of a BI engagement. The following section highlights some of the critical technical aspects of a BI engagement which in turn exemplifies the understanding that Deloitte BI professionals bring to the table.

## Technical insight into BI

Knowledge is the fundamental objective of business intelligence. That is, to provide information and analytical capabilities to business people with the insights to solve problems. Whether you use relational or OLAP technology, you need to understand the transformations required to go from data to information, and consider those transformations in selecting BI technology.

Before selecting a BI technology, the analytical and decision support needs of the users need to be understood, mapping those needs to analytical functionality is required, and finally assess the analytical capabilities in the products. Advanced analytics involves dimensional rankings, exception based selection, time series functions and other similar functionality. While analysts and power users often need these capabilities, the average casual users either may not require advanced analytical functionality, or may not have the skills to use such functionality.

OLAP technology tends to deliver better analytics and faster performance. However OLAP technology requires another level of Meta data and data staging. To complicate things further, there are many OLAP architectures to choose from: 1) MOLAP – or multi dimensional online analytics processing where data is stored in a separate OLAP cube or database; 2) ROLAP - relational OLAP where the underlying data resides in a relational database and a specialized analytical calculation engine is used to support the analytics; and 3) HOLAP - or Hybrid OLAP where some of the data stays in the relational database and some subset of aggregates are stored in an OLAP database. MOLAP will almost always perform faster than ROLAP, but requires additional processes to build cubes and may require additional disk space. Additionally, analytical capabilities are sometimes less robust in ROLAP technologies that rely on SQL instead of a separate analytical engine.

All OLAP is multidimensional, but not all multidimensional presentation is OLAP. There are BI tools that provide relational based information access with no specialized calculation engine and can present information in both a tabular and cross tabular format. Generally, relational based tools with multi-dimensional presentation capabilities will not provide as robust analytical capabilities as an OLAP technology, but offer more overall flexibility and serve a wider spectrum of needs.

Each technology has its place in building decision support solutions. Following are a few important aspects that need to be understand: 1) All leading vendors provide competitive solutions; 2) Most large applications will require some pre-aggregation of data to meet acceptable performance requirements; 3) In most situations there are trade-offs in selecting one solution over another; and 4) The right approach depends on the business situation and objectives.

## BI Product Framework and Architecture

Providing business intelligence involves two key components: the front-end user interface and the back-end data repository or engine. So a key consideration is placing vendors in the appropriate categories of front-end, back-end or both components of the BI tools spectrum framework. The evolution of BI technology market forces has taken shape and the vendors can be classified into three categories:

- **One-stop-shop vendors** that offer a complete solution for both the front-end and either back-end or middleware engines. The relational based solutions require a relational database source. Some of the vendors that fit into this category include OBIEE, Cognos, Business Objects, Hyperion, Micro strategy, Crystal Decisions and Brio.
- **Large database vendors** offering back-end solutions: Microsoft and IBM. These vendors, with Microsoft in particular, are fundamentally changing the pricing dynamics of the overall market.

- **Specialty BI front end vendors** that offer end user solutions. These vendors require a BI back-end repository with an open API, and fall into two categories: those that work with many back-ends and those that are optimized for a particular back-end. Some of the vendors that fit into this category include Proclarity, Alphablox and Panorama.

The vendors that provide complete solutions consisting of both front end and back end components can offer one stop shopping for reporting and analysis capabilities. These single solution vendors generally use closed proprietary technology. Although some of these vendors claim to be open, in practice, customers seldom use a multi-vendor mix of these types of products.

### Other Architecture Considerations

Another architecture question is choosing Web versus Client-Server deployment. Most large scale BI deployments require a web interface for the majority of users. Most of the more established BI vendors, whose original offerings were client-server, continue to offer the client-server products with the web offerings. Often the older client-server products offer more robust functionality than the web based offerings, and should be considered as an alternative for power user deployment. Several vendors have built web based products from the ground up and have no client server offerings. For large scale deployments, the reduced cost of web deployments outweighs the functionality trade-offs that may exist with a web-based front-end.

A major debate associated with the web deployment model involves using a "thin client" (HTML) versus a "rich client" (JAVA, Active-X) interface. There are clearly strengths and weaknesses to both models. The rich client interfaces tend to be easier for interactive analysis since the support "drag and drop" capability. HTML interfaces, while easy to deploy, require multiple steps to accomplish

functionality such as drill down, rotation, filtering and other analytics. With HTML, the "simple functionality" is simple, but the complex analytical functionality can be challenging for casual users.

A final consideration regarding web based product offerings is "open component architecture" versus "self contained products". Some web-based BI vendors offer capabilities that can be easily imbedded in other web applications as components, while other vendors offer self contained web environments that do not lend themselves to this component approach. If you are embedding BI capabilities into a portal framework, make sure you select a technology that offers component architecture.

### Conclusions

A key success factor in implementing a successful BI solution is the understanding of the BI subject. It is important that the right questions are asked and answered while evaluating a solution. When selecting BI tools and technology, understand your business objectives and issues, information needs, user base, and then assess a solution, product or vendor based on the same.

Deloitte brings a rich pool of people, knowledge and expertise to our clients through multiple years of experience in implementing BI solutions. This coupled with our mature methodology and business process tools such as EIM and Value Map helps organizations to visualize the roadmap for defining goals, achieving results and measuring ROI. Deloitte, through its Enterprise Applications (EA) and Technology Integration (TI) service areas, is able to assess business issues and needs, evaluate vendors, build a roadmap, engage experienced professionals and execute a well planned implementation for BI solution. We have partnered with multitude of clients to help them achieve a productive state of BI and there are multiple references available upon request.

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