

Teamcenter Reporting and Analytics

A web-based, embeddable, collaborative business intelligence/analytics product

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white paper



- ▶ Dramatically lowering total cost of ownership (TCO) of web-based collaborative business intelligence (BI) solutions.

Table of contents

Executive summary	1
Challenges in providing BI/ reporting capability	2
Teamcenter Reporting and Analytics	3
Input to Teamcenter Reporting and Analytics/Teamcenter Reporting and Analytics' enterprise information integration (EII) capability	4
Teamcenter Reporting and Analytics output	5
Teamcenter Reporting and Analytics server	5
Dramatic reduction in TCO using Teamcenter Reporting and Analytics	6
Teamcenter Reporting and Analytics features and benefits	8
Summary	9

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Over the past years, organizations worldwide have made substantial investments in their IT infrastructure including packaged enterprise applications (such as ERP, MRP, SFA, CRM, SCM, PDM, PLM, etc.) and legacy systems. The decision-makers require visibility into the information that is scattered across these IT systems. Due to their evolution and implementation, these IT systems have formed “islands of information”. The need to collate and leverage the information from these systems for dramatic business performance improvement is unprecedented. Organizations have a strong desire, more than ever before, to provide such capabilities at all levels of the organization at substantially lower TCO.

Teamcenter® Reporting and Analytics (TcRA) provides this very capability. Teamcenter Reporting and Analytics is a collaborative real-time or near real time business intelligence/analytics (BI) product. Teamcenter Reporting and Analytics is built in compliance with the open standards. It is a scalable web based product that can be deployed on various platforms with ease. Its design provides flexibility to customize and embed Teamcenter Reporting and Analytics into other software products or software solutions (such as portals, intranet or internet based solutions). Its modular architecture allows information from multiple systems to be collated and aggregated in a real-time or near real-time frame. Teamcenter Reporting and Analytics provides reporting, ad-hoc reporting, as well as business intelligence/analytics capability over the web.

Due to its architecture and inherent strengths, Teamcenter Reporting and Analytics based collaborative BI solutions can be rapidly implemented while dramatically lowering TCO. This paper discusses the current challenges, and details how Teamcenter Reporting and Analytics provides the required business capability while lowering the TCO for the organizations.

► Challenges in providing BI/reporting capability

Many packaged applications as well as legacy systems effectively address a particular business function. However, business processes run horizontally across these IT solutions, whether they are customer-facing processes, or customer relationship management processes, or marketing and sales processes, or in a manufacturing setup: planning – supply chain – production – distribution processes, or new product development or product life cycle management processes. Therefore, there has been and continues to be unprecedented business requirement to view, report, monitor and analyze the information scattered across these IT systems. Business intelligence from such data, in real-time or near real-time is vital for improved visibility, improved service and improved decision-making at all levels – ultimately resulting in significant improvement in the competitiveness of the entire business enterprise.

The solutions up until now have attempted to tackle this issue at the infrastructure level (EAI solutions) and at output level (BI vendors). Many of the BI vendors require the data scattered across these IT systems to be part of massive data-warehouses or departmental data-marts before BI capabilities can be utilized. Moreover, many of the BI products remain in the thick client-server domain and require substantial investments in terms of licensing fees, deployment fees, upgrade and post implementation maintenance infrastructure. Some of the BI products are able to provide web-based UI along with their traditional thick client-server implementations. However, such web-based clients may be limited in features and may not be truly embeddable as part of other software solutions or portals. Such solutions take many months, sometimes many quarters in deployment time before results can be realized. In addition, if these solutions need a data-warehouse, their development, deployment, maintenance and support dramatically adds to the company's effort, time and ultimately its total cost of ownership.

Enterprise Application Integration (EAI) vendors have addressed the problem of connecting data from various IT systems by building specific adapters for enterprise applications at infrastructure level. They address the need of event based update/modification of data in various IT systems to provide business process connectivity. Such adapters need skilled resources for their initial creation and continued maintenance. Additionally, they do not provide the flexibility and business requirement of re-use and leverage.

The need from a business user standpoint is a real-time or near real-time ability of viewing and analyzing data from multiple IT systems for decision-making, reporting, monitoring and analysis. Moreover, business-process owners/decision-makers want such capabilities with very short implementation cycles along with dramatically lower TCO.

► Teamcenter Reporting and Analytics

Teamcenter Reporting and Analytics is built ground-up to be a true thin client (“zero footprint”), web based, embeddable, collaborative business intelligence/analytics product. Due to its inherent strengths, the deployment time, supporting infrastructure costs, licensing costs, maintenance and support costs and costs involved in migration when the underlying enterprise applications move from one version to the next provide substantially reduced TCO for business enterprises.

Teamcenter Reporting and Analytics platform has the Teamcenter Reporting and Analytics Server supported by Mapper and Teamcenter Reporting and Analytics Adapter framework for data collation on the input side. On the output side, BuildNPlay as well as Teamcenter Reporting and Analytics APIs provide sophisticated BI/reporting/analytics capability as shown in Figure 1. Teamcenter Reporting and Analytics platform is developed in compliance with open-standards.

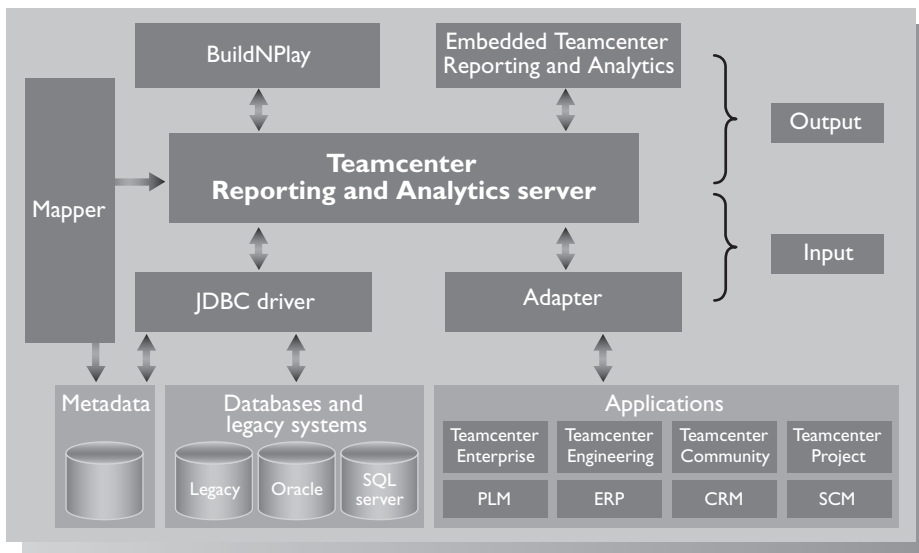


Figure 1: Teamcenter Reporting and Analytics platform

► Input to Teamcenter Reporting and Analytics/Teamcenter Reporting and Analytics' enterprise information integration (EII) capability

Mapping the data via its Mapper module provides input to Teamcenter Reporting and Analytics. For the data residing in enterprise applications, Teamcenter Reporting and Analytics' revolutionary Adapter framework allows for building of the application specific Plug-In that leverages the underlying application's object model as well as its security model. Teamcenter Reporting and Analytics communicates to the application through this specific Plug-In to fetch the desired objects with attributes based on the chosen relationships. For those legacy applications where no API support is available, Teamcenter Reporting and Analytics can fetch the data from the underlying relational database(s) via the database's JDBC driver.

Mapper has a simple web-based interface that allows for data from various data sources to be mapped together.

Adapter framework has a web-based UI that generates a simple 4GL meta-language, which forms the application specific Plug-In. Such a Teamcenter Reporting and Analytics Plug-In leverages the Application's native APIs to take full advantage of the built-in application specific rules and object models. In addition, a Teamcenter Reporting and Analytics Plug-In can be easily developed to get the data from an application or another such EII product that outputs XML.

Due to Teamcenter Reporting and Analytics' mapping technology, the data that is originally non-hierarchical can be represented in multiple hierarchies. This is an essential and potent feature for providing drill-up/drill-down capability, building dashboards or analytics capability. By selecting different hierarchies, the users of the system can view and analyze the same basic data from multiple perspectives based on their business needs.

For example, if users were to perform investment analysis on shares of IBM, they could get to the IBM data elements by drilling into any one of the following hierarchies:

(Note: “–” represents the next level in that hierarchy in the following example)

1. World – Global 100 companies – HQ in North America – Revenues above \$10B; or
2. World – High tech companies – Hardware/Software/Services sector – Employees more than 100,000; or
3. World – Companies more that \$10B in revenue – Employees more than 100,000 – HQ in North America – Traded on NYSE

Similarly, information such as customer, vendor, product, market, dealer, part or process can be viewed and analyzed by multiple hierarchies. Since data can come from multiple data sources, at the time of mapping integrated views of information are provided (a.k.a., EII capability), as if it came from a single data source. If an organization has already made the investments in building a data-warehouse or data-marts, Teamcenter Reporting and Analytics-mapping activity is further reduced as it can get the data from the data-warehouse or the data-mart.

► Teamcenter Reporting and Analytics output

Teamcenter Reporting and Analytics provides sophisticated pure thin-client (“zero footprint” – nothing to download and nothing to install at the client) BuildNPlay for output or UI. Browser is the client for Teamcenter Reporting and Analytics. In addition, Teamcenter Reporting and Analytics has well-defined APIs that can be used to rapidly create any UI of choice. Also, Teamcenter Reporting and Analytics’ multi-dimensional or graphical or on-line analytic processing (OLAP) views can be output in XML format to be integrated with any other UI of choice.

As the name suggests, BuildNPlay, allows users to use intuitive wizard to build, save and play with various analytic views of data. Users can create simple reports, multi-dimensional views, graphs or dashboards. Again selecting any one of the hierarchies to analyze the data can create multiple views of the same data (coming from single or multiple data sources). Once the data has been mapped on the input side with hierarchies defined, no programming is required to create reports or BI views. Users are able to drill-up/drill-down into the data in cubes/reports/graphs, as well as to rotate, sort and drag-drop data elements to view the information from a chosen perspective.

Besides viewing output on the screen over the web, the output can be e-mailed or exported in the following format: Text file, HTML, Microsoft Excel, PDF or XML.

► Teamcenter Reporting and Analytics server

This is a web-based server that takes input based on the Teamcenter Reporting and Analytics API calls or via BuildNPlay (which also uses Teamcenter Reporting and Analytics APIs). The BuildNPlay wizard can be used to save predefined data views, which can be viewed at any time. Predefined reports/views can be scheduled to run at designated time intervals for convenience. The wizard can also be used for real time queries/ad-hoc reporting/on-demand analysis of the data mapped via the Mapper or via Teamcenter Reporting and Analytics Plug-in (s) (**a.k.a. BI on Tap!**). Teamcenter Reporting and Analytics Server provides the output to BuildNPlay or to the Teamcenter Reporting and Analytics API calls in the OLAP/reports/or graphical format over the web.

Teamcenter Reporting and Analytics server works very well with any of the leading application servers (Weblogic, WebSphere, Tomcat, Jboss, etc.) and is tuned for scalability. Frequently required analytic views (Teamcenter Reporting and Analytics views) can be cached and data updates can be scheduled on the basis of company-specific policies.

Key components of TCO in any software solution include:

1. Development efforts – resources and time – and therefore, cost
2. Deployment environment requirements, such as databases, OS, Application servers, etc. and therefore, resulting cost
3. Product licensing cost
4. Post deployment support and maintenance costs
5. Cost of migration
6. Enhancement efforts and therefore, costs
7. Security

We will address each of these points in detail related to Teamcenter Reporting and Analytics based implementations.

Development efforts

resources and time – and therefore, cost

- As explained in this paper, Teamcenter Reporting and Analytics does not require building a data-warehouse or data-mart. Obviously, this can substantially reduce the time and efforts and therefore, cost.
- Teamcenter Reporting and Analytics can map the data residing in databases, legacy systems, Excel spreadsheets and enterprise applications seamlessly. Due to the sophisticated capabilities of Mapper and Teamcenter Reporting and Analytics Adapter framework (which runs on a simple 4GL), mapping data, including hierarchical representation of that data, requires less time. This EII capability reduces efforts and time and does not need experienced programmers to map the data from multiple sources. Again, if a data-warehouse or data-marts is already in place, then mapping effort can be further simplified. The net result will be a dramatic reduction in mapping effort, time and cost!
- Once the data is mapped, BuildNPlay or a custom UI can be used to create analytic views/reports/graphs by using the built in wizard. This effort needs no programming, and substantially less effort, time and cost.

Deployment environment requirements

such as databases, OS, Application servers, etc. and therefore, resulting cost

- The Teamcenter Reporting and Analytics meta-data created by the mapping activities can be stored in any relational database (Oracle, dB2, SQL-server, Postgress, My-SQL, etc.). Its footprint is very small and therefore, it can be part of any of the existing databases at the customer site. As a result, users can implement the solution with little or no additional database cost.
- Teamcenter Reporting and Analytics is written in compliance with open standards and therefore, works with all major OS (Unix, Linux, freeBSD, Windows, etc.) and Application servers. For example, a customer can choose Linux or freeBSD OS with any of the expensive or free application servers and reduce the total deployment cost.
- Due to its architecture, it's a painless process to rapidly move Teamcenter Reporting and Analytics implementation from development environment to acceptance environment and finally to production environment.
- BuildNPlay or output capability functions in a pure thin client environment with IE or Netscape browsers. There are no installations required at the client computers. As a result, users will experience dramatic reductions in their deployment costs, as well as in maintenance and support.

Product licensing cost

- Teamcenter Reporting and Analytics is priced competitively in the market.

Post deployment support and maintenance costs

- Due to the points discussed above, the total post deployment support and maintenance cost are very low.

Cost of migration

- For those enterprise applications where Teamcenter Reporting and Analytics leverages the application's native APIs, the time and efforts required to migrate Teamcenter Reporting and Analytics (and Teamcenter Reporting and Analytics based reports/analysis views) from one version of the enterprise application to the next are minimal. This is achieved because Teamcenter Reporting and Analytics typically uses core APIs in its application specific Plug-In. Such core APIs do not change very much from one version to the next. In the case that they do change from one version to the next, typically, that change is not that dramatic for Teamcenter Reporting and Analytics as it means changing very few things in its application specific Plug-In.
- In addition, when a customer migrates from one version of Teamcenter Reporting and Analytics to the next, eQ provides migration utilities for a rapid and accurate migration of Teamcenter Reporting and Analytics' metadata.

Enhancement efforts

and therefore, costs

- For the Mapper, Teamcenter Reporting and Analytics Plug-In development environment – 4GL based, and BuildNPlay modules, experienced programmers are not required. Also, a Teamcenter Reporting and Analytics based solution can easily be extended due to the inherent capabilities of each of these modules, development environment and Teamcenter Reporting and Analytics APIs.
- Comprehensive training for the Teamcenter Reporting and Analytics platform allows customers to enhance Teamcenter Reporting and Analytics based solutions rapidly.
- Net result being substantially lower costs to enhance Teamcenter Reporting and Analytics based solutions.

Security

- Whenever Teamcenter Reporting and Analytics is able to leverage an application's native APIs, it can also leverage that application's in-built security model. In other solutions that go the database directly for generating reports, in-built security is not used!
- This is more of a binary issue and its implications on TCO are dramatic.

As can be seen from these points, the amount time, effort and therefore, TCO for Teamcenter Reporting and Analytics based solution can be dramatically lower than any other solution in the market.

- **Pure web-based, thin-client**
Uses a zero footprint client. Users have nothing to install at the client. They simply need a browser deployment and upgrade in order to minimize maintenance.
- **Distributed data mapping**
Maps multiple data sources, thereby providing enterprise information integration (EII) capability.
- **Mapper**
Maps any relational or legacy system data source(s).
- **Teamcenter Reporting and Analytics application-specific Plug-In**
Maps data/objects and relationships from any enterprise application software leveraging its native APIs. Customer's investments in the enterprise applications are leveraged as-is!
- **Real-time query generation**
Leverages the mapping and hierarchies to perform complex queries effortlessly.
- **Ability to define multiple hierarchies on top of distributed data**
Allows viewing, reporting and analyzing the data from multiple perspectives. Also, allows for drill-up and drill-down capability in data centric or graphical views.
- **Caching**
Leverages a sophisticated caching mechanism for enhanced performance. Frequently used analysis (OLAP) views are cached and updated based on admin defined schedules/policies.
- **OLAP capability**
Enables users to view data from various resources as reports, graphs or OLAP with drill-up drill-down, drag-drop capabilities.
- **Dashboard generation capability**
Presents information in the form of metrics or executive dashboards or process dashboards.
- **Embeddable**
Enables users to embed Teamcenter Reporting and Analytics as part of other software solutions or portals. Provides rich OLAP functionality over the web that integrates multiple data sources.
- **Administrative tools**
Provides extensive administrative tools that allow setup of role based user access privileges. Teamcenter Reporting and Analytics can use LDAP based single-user sign-on capability or a specific application's security model or a security model can be custom defined.

▶ Summary

The need to leverage existing investments in IT systems and to provide web-based collaborative business intelligence/analytics capability is unprecedented. To address this need, Teamcenter Reporting and Analytics provides enterprise information integration as well as collaborative OLAP/BI capability over the web. Due to its open standards based architecture and its pure thin client and embeddable capabilities, Teamcenter Reporting and Analytics based solutions can be deployed rapidly while dramatically reducing the TCO.

About Siemens PLM Software

Siemens PLM Software, a business unit of Siemens Industry Sector, is a leading global provider of product lifecycle management (PLM) software and services with 4.6 million licensed seats and 51,000 customers worldwide.

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