Leveraging investments in your PLM solution

SIEMENS

White Paper

Are you asking the right questions in selecting a reporting/analytics (business intelligence) product?

Insight versus hindsight versus no sight – Teamcenter® Reporting and Analytics software delivers a visibility infrastructure to organizations with the right tools to make business intelligence truly intelligent for impact on business goals.

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Summary

Over the past decade, industrial organizations worldwide have made investments in CAD, CAM, CAE and PDM solutions. Some of these solutions were initially homegrown/in-house developed solutions. However, over recent years, few enterprise application vendors have blazed the trail to provide comprehensive solutions that would allow their customers to take their products from cradle to grave while giving them unprecedented advantages in terms of product introductions, time-to-market, product differentiations and innovations! Managing and maximizing the value of a product throughout its lifecycle creates daunting challenges. Product lifecycle management (PLM) solutions are geared to address these challenges.

These PLM solutions cover various aspects of a product's lifecycle: requirements management, project management, workflow, change management, product data management, design, engineering analysis, manufacturing process, after-sales support, maintenance-repair-overhaul, etc.

Given the breadth of these offerings, they are considered by some analysts as equivalent to ERP solutions. Due to their inherent nature, PLM solutions tend to accumulate massive amounts of critical data throughout the lifecycle of a product. Engineers and managers need comprehensive capabilities to track and monitor various aspects of such data for reporting, ad hoc reporting, analysis and decision-making. Without such comprehensive capabilities, organizations are unable to fully leverage their substantial investments in the PLM solution.

Teamcenter Reporting and Analytics software addresses this need most effectively. Teamcenter Reporting and Analytics is an open standards-based reporting, ad hoc reporting and business intelligence (BI) analytics product. When used in the PLM space, its revolutionary architecture allows for the PLM data to be accessed based on the application's object-model objects, relationships and attributes.



This unprecedented capability allows the end-users to monitor, report and analyze the data inline with the business issue rather than being concerned about the underlying database schema. Additionally, this approach allows for Teamcenter Reporting and Analytics to leverage investments the customer has made in customizing the object model of its PLM implementation as well as the security model.

To date, many approaches and solutions have been tried with very limited success. To decide on the reporting and BI/analytics solution, the decision-makers need to be asking the right questions.

This paper is intended to address this issue in depth while providing input for the selection process.



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Challenges

Various approaches for reporting and BI/analytics in PLM

Due to their inherent nature, PLM solutions tend to accumulate massive amounts of critical data throughout the lifecycle of a product. Engineers, planners and management at various levels need comprehensive, flexible and timely capabilities to track and monitor various aspects of such data for reporting, ad hoc reporting, analysis and decision-making.

Out-of-the-box reporting capability for most of the PLM solutions in the market today is highly inadequate to address this need. Therefore, various customer organizations have tried one or more of the following approaches with very limited success: A) Use of standard reporting solutions that require writing database queries; B) Use of business intelligence (BI) solutions that require all PLM data to be part of a data warehouse before the BI tool can be used; or C) Writing custom reports against the PLM data. We will address each of these approaches in more detail.

A) Use of standard reporting solutions that require writing database queries

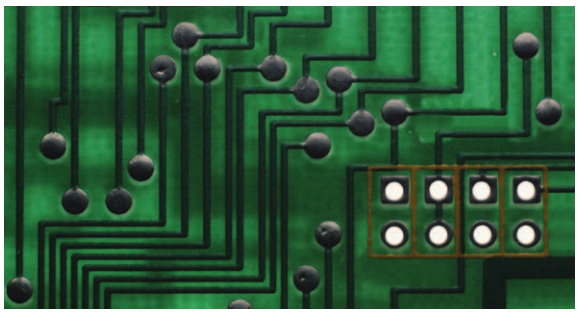
There are a number of standard reporting solutions in the market. Their architecture and, therefore, their approach to reporting involves someone to convert the business requirements in terms of the underlying database tables and columns. Once identified, they provide capability to write queries (typically SQL queries) against the underlying database. This straightforward approach works in some cases however fails dramatically short in the case of very large data/ complex database schema.

The top PLM solutions in the market today are object-based/object-oriented. Over the years these solutions have spent substantial efforts in defining objects, relationships and attributes that are domain-specific and, hence, are readily understandable for the PLM solution user. Such underlying object model tends to be in line with the business processes and encapsulates the business rules more effectively. The out-of-the-box object model tends to have several thousands of objects and various relationships among those objects that allow for a flexible and realistic definition and use of the business processes. The resultant impact of such comprehensive capability of a PLM solution is a very large and complex underlying database schema. Furthermore, most PLM customers tend to heavily customize this out-of-the-box object model and security model to fit their unique business needs. Customizations add to the complexity of the database.

Additionally, when queries are fired directly against a database, such a process completely bypasses the application's security model. Many Fortune 500 customers of PLM have had trouble writing efficient database queries due to complexity of the database and, if successful writing one, had experienced problems executing them with efficiency or executing them at all!

Besides, one needs to be an expert in writing the queries to be able to use such reporting products. This approach has hardly been able to address the end-user needs of flexible and timely ad hoc reporting, regular/production runs of reports and analytics. To top it all, if some of these queries are prepared and are being used for small/limited data, it becomes a dramatic challenge to port all this effort to the production environment and later to a newer version of the underlying PLM solution. When customers move from one version of their chosen PLM solution to the next, the object model may get extended some, but the underlying database schema can change dramatically. Once that takes place, all the efforts to create these queries must be repeated again to suit the new database schema.

Therefore, this approach has had very limited success, and many of the customers who have chosen this approach, have spent lots of money, energy and effort to make it work. Many have written off the money spent in adopting this approach.



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B) Use of business intelligence (BI) solutions that require all the PLM data to be part of a data warehouse

In the past, whenever there was a business need to monitor, to report against and to analyze data from large and complex production systems, data warehousing was considered to be the only option! Reasons are many, including what was possible technologically some years back. At a macro business level, data warehousing involves identifying all the relevant data sources, applying data extraction, transformation and load (ETL) tools to those data sources, and then populating that data in a specific form of database schema. Intent had been to separate the production data source from the data warehouse and then allow the reporting and analytics engines to work off the data warehouse.

The downside to this approach can be significant. It is in the form of time, effort and money. In short, from the time a company decides to build a data warehouse until it is in production can easily take years with an army of high-priced consultants and internal resources tied at dramatic costs to make it a reality.

Once built, the work does not end there. It continues in ensuring data integrity on an ongoing basis, maintaining the data warehouse – a sizable investment in resources and time – and then utilizing the BI tools to help report against the data.

Additionally, similar to the issues with approach A described above, the security model of the PLM solution is bypassed in this approach as the data is directly extracted from the underlying tables. All the efforts and investments that may have gone into installing, customizing and adopting the PLM solution cannot be leveraged readily as this approach does not leverage the customized object model of the PLM solution.

In summary, this approach is resource-, time- and money-intensive before any results can be seen Many large established companies that do not have a data warehouse in place may not even consider this option given the prohibitive time frame (in years) and costs (in millions) required to have one. The ones that have a data warehouse in place are finding the costs and efforts involved in keeping the data warehouse updated and dealing with the security issues overwhelming. Additionally they have to deal with the constant and ever changing demands from their internal customers for flexible, on-demand and efficient (effort and money) reporting, ad hoc reporting and BI/analytics capabilities.



C) To write custom reports against the PLM data

Many PLM customers have tried, in earnest, approach A above, explored in detail approach B and then resigned to this approach of writing custom reports against the PLM data. In the past, with lack of robust, flexible and efficient production-worthy solutions in the market and the constant changing needs of their internal customers, they had to resort to creation of custom reports.

In this approach they can leverage the underlying highly customized object models while leveraging the security model as well. However, the process involves their internal high-end IT resources to spend enormous efforts in creating these reports and more importantly to deal with the constant change in the internal user requirements and need for ad hoc capabilities. The end result is they can address their needs at a substantially lower rate. In essence, the demand for reports keeps rising and the lead time from the internal IT departments to respond to such needs keeps exponentially growing from weeks to months.

This approach results in a lengthy, inflexible and expensive option with limited internal customer satisfaction.



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Asking the right questions

The needs of the end users of PLM are obvious and are well defined. In order to select the right solution, management needs to be concerned about asking the right questions. These questions predominantly should first focus on issues related to the solution; once users are satisfied with the solution, questions should focus on the implementation methodology of that solution.



Solution related questions

These questions, first and foremost, should revolve around the ability of the proposed solution to leverage all the efforts and investments that you may have spent in customizing the object model and the security model of your PLM solution. A solution that can leverage the object model of the PLM application has an inherent ability to provide the most flexibility, efficiency and ease of use to the internal PLM-IT organization and their internal customers. With such a solution, the business need expressed by an internal customer can easily be translated/matched with the object model in order to most efficiently provide the required information.

Additionally, in the case of PLM solutions, there can be/are various views of data (for example, as designed, as-built, etc.) that are provided. If a solution can leverage the native APIs, then it has the capability to leverage the user security model, user PLM login credentials and the user preferences as is!



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The solution must have the capability to define reporting/analytics templates that allow end users to develop ad hoc reports of their own, as well as convert some of these templates to regularized production reports that run at predefined frequency. The solution shall have the capability to manage the load on the PLM production servers.
A proposed solution:

1. shall be easy to install, easy and flexible to develop reporting/ analytics templates;
2. shall provide robust capabilities to productionize the reports/analytics templates; and above all
3. shall be easy to deploy, maintain and migrate from one version of PLM solution to the other.

All of these factors substantially contribute to the total cost of ownership (TCO) of such a solution.

Implementation methodology related questions

Once a satisfactory solution has been selected from the business and technical perspectives as described above, the focus then should be on implementing the solution. These questions should deal with the proven expertise and experience of the organization offering the professional services as well as the type and level of internal resources required for a successful implementation.

Additionally, these criteria shall include the overall lead-time for such engagements, training programs, as well as hands-on training of the internal resources.



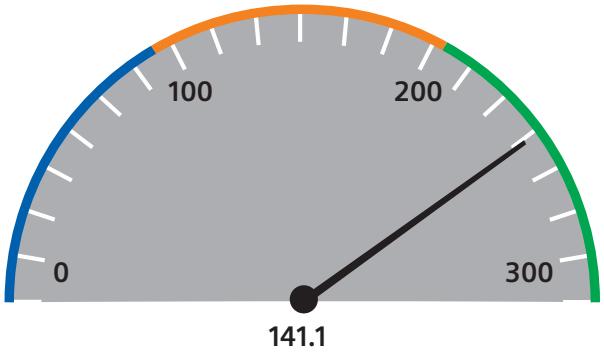
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Questions matrix

The following matrix summarizes the critical questions that need to be asked to select a proposed reporting, ad hoc reporting and analytics (BI) solution for PLM:

Does the solution have pure web-capable, open standards-based architecture? **(Yes/No)**

Does the solution provide tight integration with a PLM solution (for example, Teamcenter)? Essentially, does it leverage the underlying object model, context, logic and the domain? **(Yes/No)**



Time				All
Products	**Sales Channel**	**Units**	**Unit cost**	**Sales**
All	All sales channel	111,815.00	104.76	129,286.64
	Catalog	65,406.00	104.76	129,286.64
	Direct sales	11,737.00	104.76	18,285.26
	Internet	14,672.00	104.76	31,250.53
Hardware	All sales channel	24,802.00	180.31	129,286.64
	Catalog	19,141.00	180.31	129,286.64
	Direct sales	2,489.00	180.31	18,285.26
	Internet	3,172.00	180.31	31,250.53
Software/other	All sales channel	87,013.00	29.21	36,920.41
	Catalog	C66,265.00	29.21	36,920.41
	Direct sales	9,248.00	29.21	5,532.12
	Internet	11,500.00	29.21	8,805.60

Does the solution provide an ability to use/leverage the PLM solution's security model? **(Yes/No)** and user credentials? (for example, configuration contexts)

Can the solution use the native APIs of the PLM solution so there is no need to access production database directly? **(Yes/No)**

Can the solution work without a need for a data warehouse or datamart before it can be used? **(Yes/No)**

Does the solution architecture allow for a pure "zero foot-print"/thin client? **(Yes/No)**

Is there ease of migration from prior version of a PLM solution to the next (for example, Teamcenter Enterprise CF 2.0 to Teamcenter ADS 3.1 to Teamcenter 4.0 to Teamcenter 2005)?

Is the solution capable of providing the following capabilities all in one: reporting, ad hoc reporting and OLAP/BI capability? **(Yes/No)**

Is it easy to create dashboards to track key performance indicators?

What is the time to implement?
(Short – few weeks/Long – months or quarters)

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Is it easy to create, maintain, enhance reports/analyses?

Does the solution have an ability to cache frequently used reports (scalability)? **(Yes/No)**

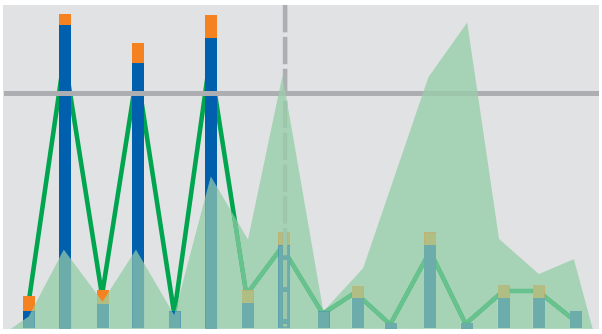
Does the solution come with integrated scheduling capability to schedule report templates, to e-mail/ print/export to Excel, to create a pdf with ease? **(Yes/No)**

Does the solution provide ease of training for administrators, super users and regular users?

Does the solution require programming to use the product? **(None to very low/Specialized skills/ NA – not applicable)**

Does the solution have an ability to embed the product capability in intranet sites or other applications? **(Yes/No)**

Does the solution have an ability to fetch data from multiple systems (on the web) without a need of data warehouse? **(Yes/No)**



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Teamcenter Reporting and Analytics

Teamcenter Reporting and Analytics is an open standards-based reporting, ad hoc reporting, BI/analytics product. Its evolutionary architecture allows for data to be collated from one or more data sources and presented for analysis in its browser-based client.

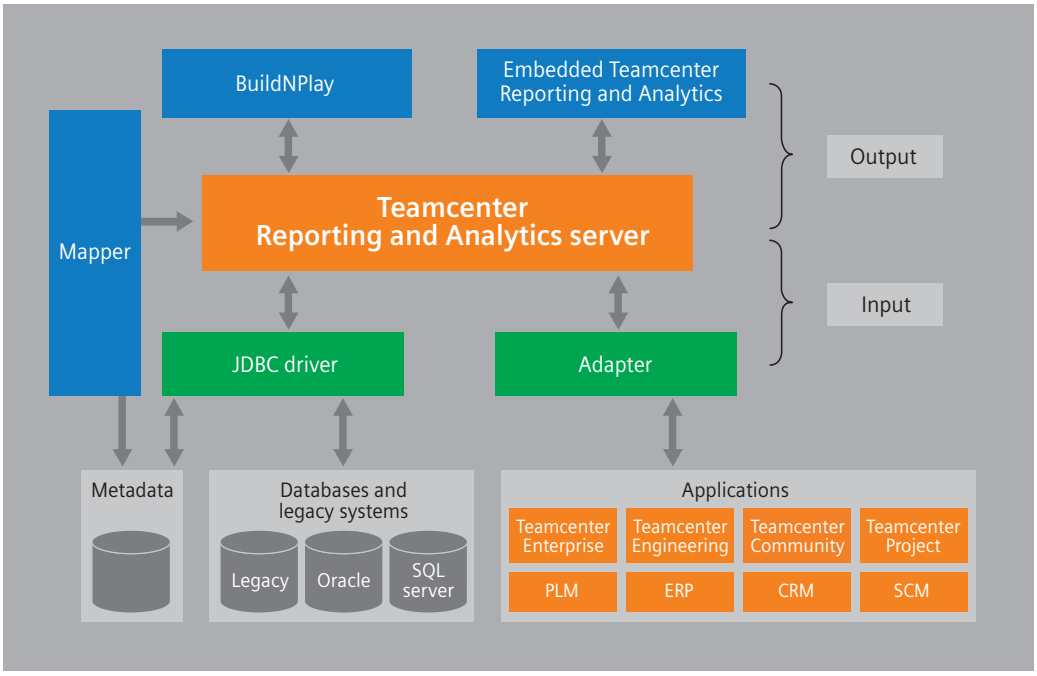
When the underlying data source is an enterprise application that has object model and provides its native APIs to access this model, Teamcenter Reporting and Analytics can leverage that object model as is! When no such APIs are available, in the case of legacy applications or data sources, Teamcenter Reporting and Analytics can easily access data from the databases.

Although a BI/analytics product, Teamcenter Reporting and Analytics does not require a data warehouse present for it to work. On the other hand if there is a data warehouse already in place or it is one of the data sources that is required for analysis, Teamcenter Reporting and Analytics can easily map to it and access data from it.

In addition, Teamcenter Reporting and Analytics comes with a true zero-footprint client. Therefore, the cost of Teamcenter Reporting and Analytics deployment, maintenance and upgrade is very minimal. Teamcenter Reporting and Analytics comes with a highly intuitive user interface that allows for the end user to work with regular reports and analysis, as well as allows them to perform ad hoc analysis and schedule some of the analysis for regular production.

In the case of PLM solutions, because Teamcenter Reporting and Analytics accesses the PLM data through that solution's native APIs, it leverages the highly customized PLM object model and security model as is. Due to all of these factors, Teamcenter Reporting and Analytics-based implementations are typically completed in a matter of a few short weeks while providing the flexibly and efficiency to address the internal end-user needs.

All of these benefits are delivered to the customer at a dramatically lower total cost of ownership (TCO). Essentially, Teamcenter Reporting and Analytics becomes the visibility infrastructure of your PLM solution resulting in unprecedented abilities for you to leverage your investments in the PLM solution.



Teamcenter Reporting and Analytics open standards-based architecture.

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Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a leading global provider of product lifecycle management (PLM) software and services with nearly 6.7 million licensed seats and 63,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with companies to deliver open solutions that help them turn more ideas into successful products. For more information on Siemens PLM Software products and services, visit *www.siemens.com/plm*.

Siemens PLM Software

Headquarters	*Americas*	*Europe*	*Asia-Pacific*
Granite Park One 5800 Granite Parkway Suite 600 Plano, TX 75024 USA 972 987 3000 Fax 972 987 3398	Granite Park One 5800 Granite Parkway Suite 600 Plano, TX 75024 USA 800 498 5351 Fax 972 987 3398	3 Knoll Road Camberley Surrey GU15 3SY United Kingdom 44 (0) 1276 702000 Fax 44 (0) 1276 702130	Suites 6804-8, 68/F Central Plaza 18 Harbour Road WanChai Hong Kong 852 2230 3333 Fax 852 2230 3210

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