PLM UPGRADATION

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ABSTRACT

Enterprises that have PLM Solutions deployed are often faced with challenges on how to optimize their investments on PLM upgrades. PLM vendors are continually coming up with next generation PLM platforms to address the changing business needs. But at the same time, organizations want to ensure their IT investments and data assets are at minimal risk, when they do a PLM upgrade.

While need for upgrade is strong, the path to achieve the same is not often straight forward for most companies. Organizations are often faced with conflicting decisions on PLM upgrade, and across the industry, there are a number of upgrade projects that fail to deliver planned objectives.

This white paper describes the common drivers for PLM upgrade, and discusses the key challenges involved in executing PLM upgrade projects.

In this context, the white paper discusses, several areas affecting PLM upgrades such as configuration management, data upgrades, upgrade testing, production rollouts and handling PLM user transitions during upgrades.

1. Introduction

"The only thing constant in life is change" said a famous French classical author François de la Rochefoucauld and this applies to everything including PLM in today's context.

There are changes all over the world that are impacting the way organizations do business, Collaborate and create products. Even though PLM systems are getting more mature to add more functionalities and new business process under its umbrella, the technical and practical complexities to handle change remains challenge.

The focus of this white paper is to uncover how organizations currently using PLM can plan and effectively execute a platform upgrade, while ensuring that it helps them achieve the objectives and is in alignment with their overall strategy.

2. Overview of PLM Upgrade

The figure above shows a high level process that is used in the paper to describe the flow of a typical PLM upgrade implementation.

The discussion by and large applies to all popular PLM platforms in the market, though there could be variations sought for specific technical aspects that need to be tailored for a particular PLM product. Additionally, as described in step two, a particular upgrade scenario might decide to limit its scope to certain specific objectives and therefore, will affect the scope and elaboration of each phase, though overall

flow and intent is expected to remain applicable in most cases.
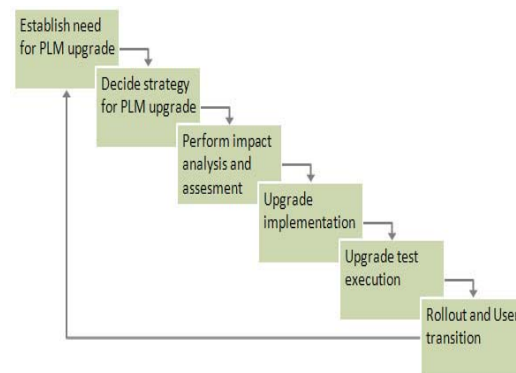
3. Questionnaire Methodology:

Most enterprises struggle to make the right decision about when to upgrade and what level of upgrade is necessary. The biggest challenges identified in an upgrade project are timing, balancing the execution of the upgrade project with other concurrent projects, and lack of knowledge regarding release-specific functional enhancements. Keane's plm experts have developed a readiness questionnaire that we use with our clients, who find it a helpful and effective guide for evaluating their present situations.

1. How stable is your business? _____

 1 – Very unstable; 5 – Not very stable; 10 – Very stable

2. Do you have resources that can be readily deployed for upgrade? _____

1 – No resources are available; 5 – Very few resources are available and they are not sufficient; 10 – Handful of resources

3. How frequently do you face problems (such as compatibility issues with specific hardware/ database platforms, performance issues, etc.) in the current ERP product? _____

1 – No such problems encountered; 5 – Encounter problems once in a while; 10 – Encounter problems very frequently

4. What percentage of existing customizations is available as a ready-made solution in the to-be upgraded version? _____

 1 – More than 50 percent; 5 – 10 to 50 percent; 10 – 0 to 10 percent

5. Is the product vendor announcing the withdrawal of support for the current version? _____

1 – No such announcement; 5 – Withdrawal is announced, but not immediate; 10 – Yes, withdrawal deadlines are nearing

6. Is the current version of the product able to support the regulatory requirements needed for the business? _____

1 – Almost all regulatory requirements are supported; 5 – Yes, but a few regulatory requirements are not supported; 10 – No regulatory requirements are supported

7. How many productive business instances do you have that are to be consolidated? _____

 1 – 0 to 2 instances; 5 – 2 to 5 instances; 10 – More than 5 instances

8. How many disparate systems must be integrated with the ERP system? _____

 1 – None; 5 – Very few; 10 – Many

9. What is the tentative ROI on the upgrade methodology? _____

1 – Marginal/ Have not done that exercise yet; 5 – Not great, but acceptable; 10 – High

10. Is adoption of evolving technology trends such as SOA a primary focus for you? _____

1 – Yes, very much; 5 – We are still debating these issues; 10 – No, we are not focused on this now

11. Is your SAP system volatile and subject to frequent patches/releases/versions? _____

1 – Very stable; 5 – Stable but not very predictable; 10 – Quite, volatile Questions Score

TOTAL SCORE: _____

10 – 40: Upgrade may not be required in the immediate future. The current business needs could be handled in a much more cost-effective way without an upgrade. However, we recommend evaluating the need for upgrade on a periodic basis to ensure that upgrade needs are captured well in advance.

40 – 75: Upgrade does not seem to be a compelling need at this point of time. However, there may be certain business needs that are very unique to your business that may drive an upgrade requirement. It is advisable to conduct an evaluation in the light of your future business direction. The objective of your evaluation is to:

Evaluate all possible solutions for the current business problem and arrive at the final decision on whether or not to upgrade immediately

Define the symptoms to be monitored should an upgrade be deferred

Above 75: Upgrade may be required in the immediate future. It is advisable to conduct an extensive evaluation of the IT landscape to identify how well it is aligned with the long-term goals of your organization. The evaluation should also help to identify:

The best upgrade strategy

The right vendor (if outsourcing is considered)

Break-even period for return on your upgrade investment

4. Establishing the need for PLM upgrade
PLM is no different than any other enterprise IT systems. Before embarking on the upgrade, the key point is to be able to determine the need for PLM upgrade and articulate the objectives of PLM upgrade.
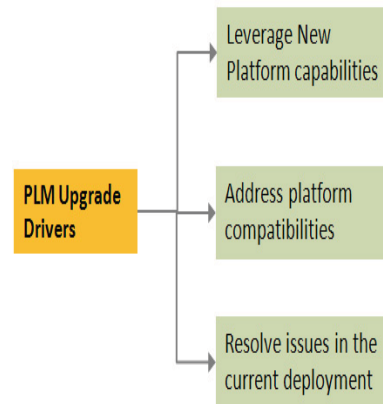

Fig: Common drivers for PLM Upgrade

PLM users look for upgrade for several reasons. The following section contains the typical reasons organization essentially look to perform PLM upgrades:

4.1 Leveraging new solutions in next generation PLM platforms
As PLM vendors evolve to add more vertical specific solutions and accelerators, businesses want to leverage additional capabilities that did not exist, few versions earlier.

For example:
New PLM platform comes with enhanced user interface components, or performance enhancements that provides great user experiences, impacting productivity and usability of the system

Compliance Management solution built to support specific regulatory strictures that is available only in a future or specific release of PLM could drive users to upgrade.

4.2 Resolving issues in current PLM deployments
Large PLM implementations have variety of issues in areas of performance, sustainability, maintainability and stability.

This could be due to the gaps in earlier implementations or underlying technology platforms that did not have the capabilities to efficiently address business requirements

For example:

Next generation PLM platform uses new technology to efficiently access CAD files over a distributed and collaborative environment. PLM business users currently have burning issues with CAD file performance, and need to address it via upgrade

Another common issue is the custom solution deployed is not in line with the best practices available from the PLM vendor, making it extremely hard to maintain. Organizations want to streamline their implementations so that IT Support and future upgrades are less painful

4.3 Addressing platform incompatibilities

Getting away from old unsupported platforms, often force PLM upgrade. Underlying software and hardware platforms keep evolving and organizations fear running their critical PLM systems on old and unsupported platform versions.

For example:

User community's desire to use a new version of a CAD tool that is supported only on latest PLM platform, requires the business to upgrade

Corporate IT decides that the enterprise should retire old version of database organization‑wide and hence, needs to upgrade to the latest supported database

Since PLM systems are very much integrated with other Enterprise IT systems, a scenario where interconnected piece of software or system, be it ERP or custom integration gets upgraded, might force the PLM to be upgraded as well.

5. Deciding the PLM upgrade strategy

Once the upgrade objectives are determined it is important to decide upon the strategy that will be adopted to achieve the objectives.

5.1 Fundamental PLM upgrade strategies are:

5.1.1.1 Plain upgrade

Sometimes the need is to perform PLM upgrade is with a specific objective. For example, to use a specific version of a CAD Tool supported by latest version of PLM release

In this case, the upgrade project is not very focused on leveraging the new PLM software version's benefits, but to address the compatibilities. This type of upgrade is done with minimal effort and change, since the execution is part of the extended maintenance activity.

Only essential components are upgraded, and the goal is to retain all the customizations in the current system, and only fix the broken portions of applications. 8 Getting ready for PLM

5.1.1.2 Comprehensive upgrade

The comprehensive upgrade approach looks at all PLM system components with the objective to migrate custom applications towards OOTB applications, aligning customizations with best practices, resolving issues in data, performance, applications, infrastructure , etc.

Instead of keeping things as is, the goal here is to make the system more robust, maintainable, and address issues in current system.

Another option which some organizations might leverage is "Hybrid Approach" wherein for certain PLM applications areas they opt for a comprehensive upgrade, while in remaining areas a quick or plain upgrade.

5.2 Selecting the upgrade strategy

Each option has associated pros and cons in terms of cost of upgrade and benefits organizations will derive by adopting a specific approach. The actual strategy would require a detailed assessment of the PLM system from both functional and technical point of view.

Even though majority of the discussion in the paper is written considering comprehensive upgrade, many strategies will still apply irrespective of the upgrade approach selected.

For example:

Customer had a large heavily‑customized PLM application on an earlier version that had issues in performance and maintainability. Since the time application was developed, there were several changes in the underlying PLM product that improved usability, configurability and extensibility.

The approach taken was to perform a comprehensive upgrade in the highly customized areas of application, to revamp and re‑factor the application code and schema. Other applications areas that did not change much had a simple upgrade.

## 5.3 Selecting the right PLM implementation partner

In many cases there is a wide gap in what the PLM product vendor advertises as capabilities of new releases, and the value an upgrade can actually bring to the customer. Customers in such a dilemma can ensure this gap gets addressed, and the upgrade brings the right benefit by seeking appropriate external help.

PLM implementation partners who have wide range of experience across industries in implementing PLM could assist customer's right from the initial assessment phase, through to implementation, migrations and rollout.

5.4 Performing upgrade assessment and impact analysis

The purpose of assessment is to analyse the impact of upgrade in terms of fitment of the new functionality it brings, infrastructure components, changes in user experience, and also to find out the consequences of PLM upgrade to overall system architecture. The assessment process is important as it will drive the overall success of program.

5.5 Critical elements of PLM upgrade project execution
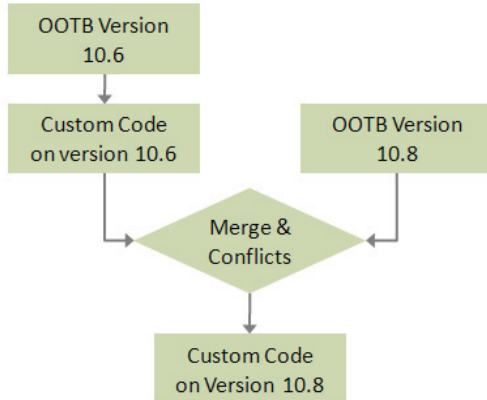
The execution of upgrade project is little different than any other software development projects due to two reasons.

Concurrent projects: First of all there could be multiple projects or production fixes going on in the PLM system. For example, there could be planned releases of different modules happening soon after the upgrade project.

Data handling: Secondly upgrade projects, depending on the scope and strategy, could bring about significant impact on the data.

Both these aspects are discussed in detail in following sections. The first section, Code and configuration management in PLM upgrade discusses the challenges during the upgrade project implementation; while the second, PLM data upgrade strategies uncovers all the possible scenarios that can occur when performing a PLM upgrade.

Code and configuration management in PLM upgrade

The upgrade project has to ensure that code merging is done, to ensure that none of the current functionalities of the deployed system, or from the new release gets inadvertently overridden. The second challenge is that during the length of upgrade project, production fixes or some other enhancements requests could run in parallel.

If a company opts for a comprehensive upgrade, then configuration and build management becomes all the more critical, since the team would need to develop rules and guidelines on how different teams will manage configurations, and resolve conflicts.

Typical custom codes merge process

Example: Upgrade from an ENOVIA PLM system version 10.6 to 10.8 will look like the figure below Typical PLM implementations have following code elements

Custom Source Code (example Java, JSP, JS files)

OOTB Source Code

Custom   Configurations   (Properties,   UI Configurations, etc)

OOTB Configurations

5.6 Handling PLM data during an upgrade project

Key considerations involved in PLM data upgrade are:

PLM data is the most critical asset for the deployed PLM system, and organizations should ensure that the upgrade process does not affect the data integrity in any way. Therefore, it is important to ensure that the upgrade process is traceable, and has verification points at each step to ensure data integrity.

Many companies would want to address the data corrections and schema optimizations that can be achieved as a part of a comprehensive upgrade. The goal could be to re‑engineer data model or correct data issues as part of upgrade.

PLM data upgrade process is a multi‑step process, and complexity could vary depending on difference in data in the source and target system.

Following diagram illustrates the typical stages involved in PLM upgrade.

Essential considerations in PLM upgrade testing

In context of PLM upgrade there are multiple changes involved like changes to code, schema and data. The impact of upgrade project can be huge from application usage and data perspective. Hence, systematic planning and execution of test plans is a very important phase of the project.
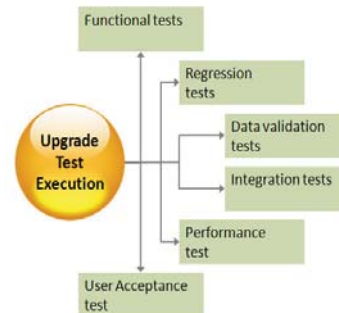
5.7 Functional tests
Functionalities that are newly introduced as part of upgrade implementation need to be thoroughly tested. Test plans need to be developed in order to validate that expected behaviour matches the intended functional specifications.

5.8 Regression tests
Regression tests are an important part of upgrade testing, and can be broadly classified into following areas:

Existing functions with changes: Functionalities that have undergone changes in implementation during upgrade.

Modified functionality needs to be thoroughly tested with revised test plans that address the changed functionality or behaviour.

Existing functions without changes: Functionalities that have not undergone any changes. Even though impact is expected

to be minimal, still first level regression tests are required to confirm things are working as expected.

5.9 Data validation tests

Validation tools: In case the upgrade involves significant changes to schema, devise post migration tests that validate or confirm migrations are completed successfully. The tools, which perform the migrations, might be extended to handle validations and create reports that depict changes.

Error handling: Additionally, migration and upgrade process needs to ensure proper error handling at every stage, and report errors to ensure the team is aware of any issues during upgrade.

5.10 Integration tests

In case the upgrade involves PLM interfaces with external systems as ERP or other custom collaborations, then tests designed to validate PLM integrations with external systems must be undertaken.

Depending on the kind of upgrade, the integration might not need to be upgraded. It is important to test these integrations in the upgraded development and staging environments prior to rollout.

5.11 Performance tests

Performance is a critical aspect for any IT system and natural expectation is that upon upgrade the newer system should be faster and better than what was before.

In case of PLM upgrades there could be several aspects that can impact performance. Changes in underlying PLM platform could be in form of newer algorithms at API layer or improvements in caching at different layers etc. On the other hand things such as database tuning or application server settings in the new environment if not handled, can adversely impact performance of upgraded setup.

So it becomes critical to benchmark performance on the current environment and conduct performance tests on production equivalent hardware in the new upgraded environment.

Many times it requires extra level of tuning on databases and application servers in upgraded environment. Very often we hear statements like "This was running fast earlier... With better hardware and software it is surprisingly slower". A detailed discussion in performance tuning is beyond the scope of this paper. However, it is important that critical parameters like memory settings, thread pool sizes, connection pools, etc. are set correctly in the upgraded environment. Also, benchmarking the current performance vis‐à‐vis the upgraded system is essential to troubleshoot performance issues.

5.12 User acceptance tests

User acceptance testing involves validating the upgraded system against the acceptance criteria as defined by the user groups. Early involvement of user representative groups is beneficial for the upgrade project to get inputs on expectations.

Defining the acceptance criteria and test plans

Execution of test plans on staging environment along with performance test results

Classification and prioritization of open issues and performing rollout go‐no.

6. Ensuring smooth rollout and user transition

Rolling out PLM upgrade can involve a large number of tasks that span across systems, locations and IT groups. Key challenges in rollout are:

To ensure that the rollout happens within schedule constraints, causing minimum disruption to the user community.

Ensure there are certain contingency measures available to handle unforeseen issues.

6.1 Rollout planning and preparation

Based on global usage of PLM and time‐zone variations the rollout window will need to be determined. Based on earlier iterations, the different tasks need to be timed and estimated rollout schedule needs to be prepared.

Long running jobs such as bulk copy of large data, processing of migrations, etc. need to be optimized in earlier iterations to ensure upgrade is executed within the rollout window. 15 Getting ready for PLM

6.2 User transition

Even though PLM upgrade may or may not involve a significant change in the user experiences, early involvement of user groups will ensure easier transition.

Following are few activities that are involved to ensure smooth user transition:

Preparing the training materials highlighting 'what's new' in terms of user experience between the two versions

Updates to the current user guides and related content

Demo of the upgraded platform, prior to release, will help getting inputs on queries to the upgrade team for rollout.

Preparing a list of FAQ and common issues will help address queries on new platform.

Organized Help Desk team that has the support infrastructure and systems working at multiple locations to handle user requests.

7. Conclusion

- The paper presented a perspective on several aspects involved in a PLM upgrade.

- Establishing the need for an upgrade, followed by detailed assessment of process and technology components will ensure PLM upgrade objectives and consequences are determined.

- Engaging the right implementation partner, who can guide customer in strategizing and executing an upgrade, is critical to ensure achievement of objectives.

- Well defined process for handling data in PLM upgrade will make sure that data integrity is not compromised at any point of time in the process.

- Comprehensive testing methodology that includes function, regression, validation and user acceptance

tests ensures PLM upgrade results in sustainable and stable rollout

8. References

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