PROSTEP
integrate the future

WHITEPAPER

FUTURE PLM AND THE ROLE OF THE CLOUD

A WHITE PAPER FROM PROSTEP AG

Many companies are considering moving all or part of their PLM solutions to the cloud in order to respond more quickly to technological innovations, new market trends and unexpected customer requirements. But not all clouds are the same. This white paper explains the key drivers for cloud PLM, the different manifestations of cloud solutions, and their potential and weaknesses. It also shows how companies should proceed when defining their cloud PLM strategy.


VUCA

The challenges of the VUCA world

It is not just since the advent of the coronavirus pandemic that the world we live in is characterized by volatility, uncertainty, complexity and ambiguity (VUCA). The term VUCA was originally coined by the US military to characterize the new lack of clarity following the end of the Cold War. But it is also a perfect description of the current times, in which companies are faced with the challenge of having to respond ever faster to technological innovations, new market trends and unexpected customer requirements. On the one hand, this requires a more agile organization and, on the other, IT system landscapes that can be adapted flexibly to new requirements.

Technological change has accelerated dramatically in recent years. The Internet of Things (IoT), cloud computing, federated data infrastructures, and the fifth generation (5G) mobile telecommunications standard are opening up new opportunities for companies to connect their products and systems with each other and to link data from all phases of the product lifecycle with the aim of developing new services and thus increasing their added value. At the same time, change is forcing them to rethink their existing business models. Instead of selling their smart products, many companies have started offering them as a service (Product as a Service), which among other things requires much tighter integration of development and service processes.

Existing IT system landscapes make it difficult to respond agilely to these new requirements. Updating their software architectures and extending them to include new functions is usually very time-consuming and cost-intensive due to the fact that they been heavily adapted to the specific processes of the respective company. This also applies, albeit not exclusively, to PLM solutions, which play a key role in the end-to-end digitalization of development, manufacturing and service. This raises the question of whether the cloud offers an opportunity to better exploit the innovation potential of PLM. In this white paper, we explore the main drivers of cloud PLM and explain how companies should go about defining their cloud PLM strategy.

The cloud – more than just an infrastructure issue

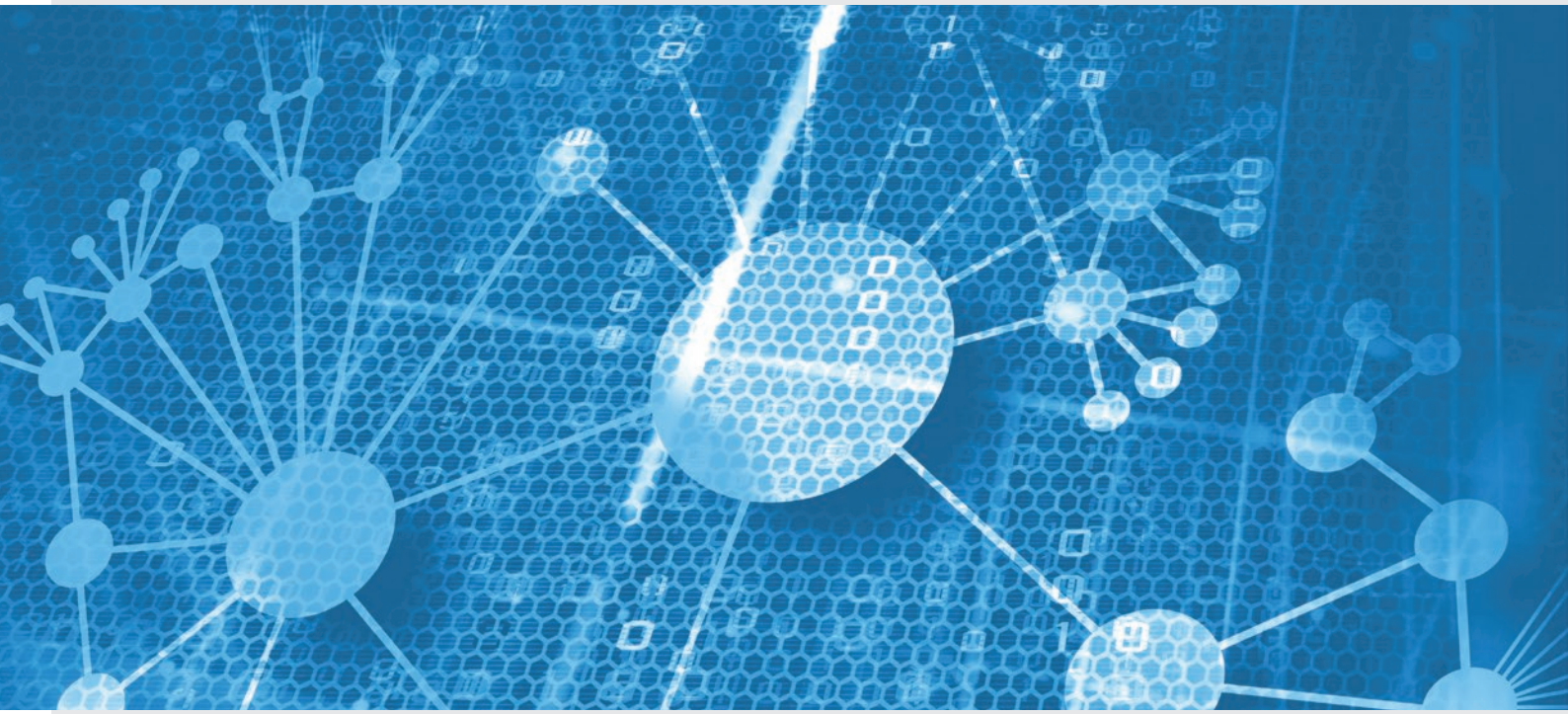
Many companies still view the cloud and also cloud PLM as an infrastructure issue that is primarily evaluated in terms of cost. In doing so, they fail to do justice to the strategic importance of the cloud in the context of IT infrastructures. The cloud offers solutions to a wide range of challenges that businesses face today. That is why it should be given adequate consideration as an option for a future-oriented PLM infrastructure when defining PLM strategy.

One of the major challenges companies are facing is constant technological change, which puts IT organizations under considerable pressure. If smart products are to be developed efficiently, the various disciplines and domains, each with their own heterogeneous IT systems, must be better integrated in the product development process. The interaction between software, electronics and mechanical development in particular will be crucial to success. At the same time, users in the specialist departments want to be able to flexibly integrate the services that external specialists offer in the Internet. The cloud promises greater flexibility in this context.

Constant technological change means that companies are developing new business models that make additional demands on the IT. It must ensure access to the operational data of products that have been delivered and the evaluation of this data with the aid of data analytics tools, which today already run in the cloud; or provide software updates over-the-air, which are used to further develop and improve the functionality of the products. In many areas, there is therefore no way around the cloud.

Users often need new IT tools to perform their tasks and expect the continuous deployment of additional functions with which they are familiar from private cloud applications. Neither the software architectures of existing IT systems nor the processes for software development and implementation in companies are designed for this. Agile process models are only gradually gaining entry into IT organizations. In many cases, they play the role of a service provider who responds to the requirements of the specialist departments instead of proactively developing new solution approaches together with them.

IT organizations face the challenge that they are finding it increasingly difficult to meet the growing demands of the specialist departments. Their budgets tend to be shrinking. Qualified employees who are familiar with the latest technologies are hard to find and are correspondingly expensive. The IT infrastructures in companies are often obsolete and can only be scaled up or down with a great deal of time and effort. The cloud makes it possible to outsource not only the infrastructure but also certain basic services to the cloud provider and thus increase the focus of scarce internal resources on the essential issues.



Possible cloud solutions variants

The vast majority of companies today are already using applications from the cloud. In the coming years, it will also become established in PLM environments as it offers companies enormous potential. However, the specific benefits will depend on the service and operator models offered by the PLM providers or cloud operators that the respective company chooses. It is therefore important to be aware of the differences and, if necessary, to work with an external consulting company when selecting the cloud PLM offering that best meets your specific needs. For example, it makes a big difference whether you choose a SaaS solution from a public cloud or a PLM instance hosted as managed services in a private cloud.

When it comes to operator models, a clear distinction is made between a public cloud with a public provider such as Amazon AWS, Microsoft Azure or Telekom and a private cloud in the company's own network, which can also be hosted by an external provider where appropriate. Multi-clouds and hybrid clouds, which combine multiple public cloud infrastructures or public and private cloud infrastructures, are also available. In a public cloud, multiple companies share the same hardware resources and, where appropriate, also the same software applications, i.e. their data is logically separated from one another using a multi-tenant system, which is useful in the context of scalability and offers economies of scale. Customers, however, often express security concerns.

In the case of cloud services, customers can choose between several models that build on each other. Infrastructure as a service (IaaS) includes the hardware (servers, storage media, etc.) and the virtualization functions required to operate cloud services. Platform as a service (PaaS) supplements the IaaS layer with basic software applications such as the operating systems but first and foremost provides cloud application developers with an appropriate development environment. Another intermediate layer that is becoming increasingly important when it comes to developing hybrid cloud scenarios is cloud-based platforms for providing integrations between different cloud services or between cloud and on-premise applications (iPaaS).

The top layer of the technology stack provides the application software as a service (SaaS). This can be a separate instance of the software, which can be managed in a private cloud, or a so-called "multi-tenant" application where several clients use the same instance. Multi-tenant SaaS solutions in a public cloud promise maximum benefit when it comes to enabling application to go live quickly, the continuous deployment of new features and the scalability of the environment but often offer only limited adaptability and integration capabilities.

Initially, there were hardly any multi-tenant SaaS offerings in PLM environments because the software architecture of most PLM solutions was not designed for this purpose. Companies also initially showed little interest because they did not want to dispense with their customer-specific adaptations or had security concerns. In the meantime, however, the situation is changing. This is partly due to the fact that customers are willing to permit a higher level of standardization to gain more ability to update their applications. At the same time, numerous PLM vendors have expanded their cloud offerings. Low-code programming and new middleware technologies make SaaS solutions easier to customize and integrate with other enterprise systems.

Opportunities and potential offered by cloud PLM

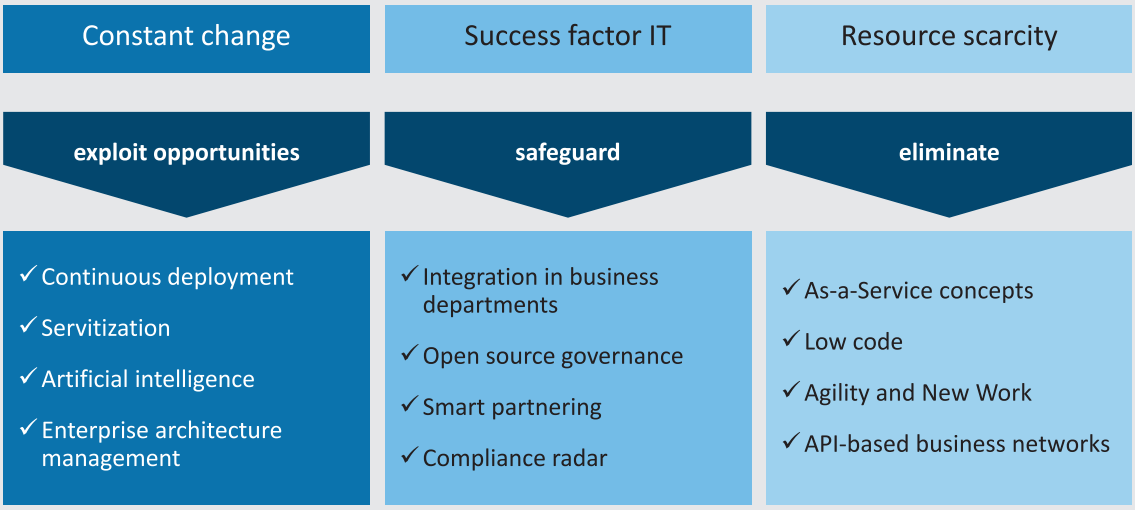
Companies' IT budgets have been shrinking for years. And even the coronavirus pandemic has not changed this fact, although it has provided a boost to digitalization in a number of different areas. It is therefore not surprising that, when it comes to cloud PLM, companies focus first and foremost on the actual or supposed cost benefits. Cloud applications, however, offer much greater potential that needs to be evaluated in the context of defining a sustainable PLM strategy and a corresponding development plan.

This does not mean that cost benefits should be neglected. The cloud saves start-ups and smaller companies that have no or only a rudimentary PLM installation in particular the cost of purchasing, implementing and maintaining hardware and software. Instead, they only pay running costs for using the cloud infrastructure and the PLM applications from the cloud – costs that are based on the number of users and/or the resources used, depending on the licensing model. This makes it easier to calculate costs, even though they may not be significantly lower in the long run than for an on-premise installation. In addition, cloud solutions compensate for the shortage of IT specialists and make it possible to use scarce resources more efficiently, for example as a result of simple configuration or low-code programming.

One of the advantages that SaaS solutions offer and which drives numerous cloud PLM projects is the fact that the applications can be used basically from the word go, and not just at one location but practically anywhere in the world that offers high-performance Internet access. Global scalability is an important reason for moving to the cloud, especially for medium-sized companies that have in recent years acquired competitors in other countries and want to integrate the new subsidiaries in their IT infrastructure.

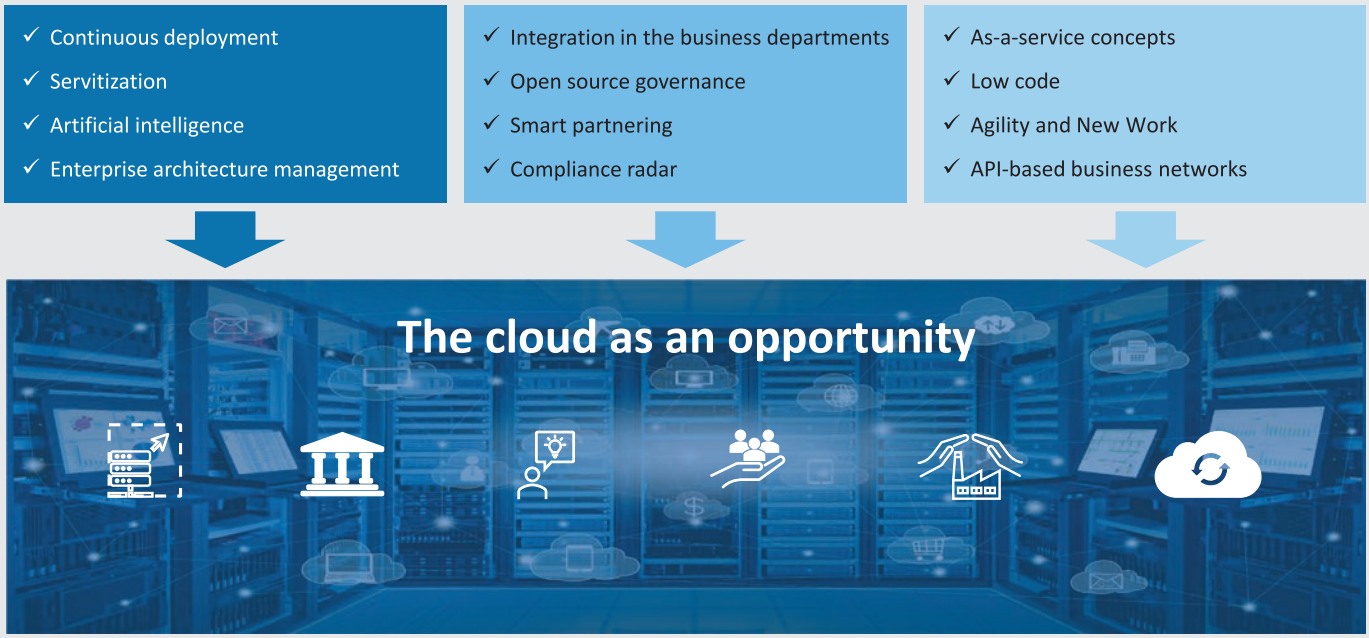
Cloud applications can be scaled both up and down, i.e. it is possible to expand the required resources with no installation effort if the number of users increases or additional functional requirements have to be met and quickly reduce them again once a project ends or the number of users decreases. How flexible they actually are in a given scenario, however, depends on the licensing and price models of the respective PLM provider. Pay-per-use and pay-as-you-go models, in which invoicing is based on the duration of use or throughput, are currently still the exception when it comes to SaaS offerings in PLM environments.

The disadvantage of many on-premise installations that have evolved over time is that they have been customized to a great extent over the years. This means that updating to newer versions that provide new functions requires lengthy preparations with long test phases. And then there are the relatively long release cycles of the suppliers, who often provide only one new release a year. This means that users are rarely working with the latest software version. Multi-client SaaS solutions, on the other hand, have the advantage that new functions can be installed continuously and additional modules can be added practically at the touch of a button. This makes it possible for companies or their IT organizations to respond much more quickly and flexibly to new user requirements.



When the first cloud PLM applications came onto the market, users had little faith in the reliability of the solutions and the ability of cloud providers to ensure the security of the installation and their sensitive data. This has changed over the past few years. A growing number of companies find that the data in their own data centers is more likely to be at risk than it would be with a trusted provider, who often employs hundreds of people who concern themselves with data security. Many companies, on the other hand, lack the specialists they need to provide their infrastructures with secure access to the Internet and, for example, to integrate external specialists securely. Increasingly, we are hearing that companies have had to shut down their IT systems completely due to hacker attacks.

The issue of data security, which was initially more of an obstacle, is increasingly becoming a driver for cloud PLM projects. The cloud infrastructures of professional providers today offer a level of reliability and performance that is superior to that of corporate VPN networks. In addition, unlike many enterprise data centers, these infrastructures are constantly being updated.



Lack of adaptability and integration capabilities

Some companies still have concerns about the security of their data in the cloud, but data security and intellectual property protection (IPP) are no longer the biggest obstacle on the way to the PLM cloud. In many cases, an even bigger obstacle is the fact that many companies have created extensive PLM installations over the course of the past few decades, some of which have been customized to a relatively large extent. Although they can be moved to a cloud infrastructure, they cannot truly be migrated to the cloud. Switching to a multi-tenant SaaS solution represents a new beginning for companies and their users, with opportunities and risks that need to be weighed against one another.

Companies with existing PLM installations need a persuasive migration strategy that should take account of more than just the financial aspects. They need to decide what role they want the cloud to play in their future PLM architecture and how the cloud components can be integrated in the existing infrastructure. Under certain circumstances, it may be best to gradually replace the existing PLM solutions and supplement them with new PLM capabilities that are immediately made available in the cloud.

The lack of adaptability capabilities of many SaaS solutions is another obstacle on the way to the PLM cloud. This is particularly true of the limited options for integrating authoring systems and other enterprise applications in largely standardized cloud PLM applications. Although integration capabilities have generally improved thanks to middleware solutions and iPaaS offerings, integrating cloud PLM in existing IT infrastructures is still causing headaches for numerous companies. This is also related to the fact that some system integrators lack cloud-specific expertise and the absence of standard solutions. Another important question is whether existing solutions for system integration and data exchange are still up to the job when moved to the cloud. With regard to PROSTEP solutions, the answer is yes. The new architecture of the tried-and-tested OpenPDM platform for PLM migration, integration and collaboration was designed from the outset for use in multi-cloud or hybrid cloud scenarios. The OpenDXM GlobalX data exchange solution is also ready for the cloud and is already being used as a cloud service by numerous customers.

The cloud strategies of PLM providers

If you take a look at PLM vendor websites, you come to the conclusion that virtually all providers now have a cloud – if not cloud-first – strategy. Some are developing new functionality for the cloud and then transferring it to their on-premise solution where appropriate. Others have in recent years invested massively in acquiring cloud-only PLM providers so that they can integrate their solutions and technology in their portfolios. In the USA in particular, a wide variety of new providers have emerged, some of which are developing cloud-only PLM solutions, based in part on existing PaaS offerings.

The sometimes considerable investments made in cloud technology make it clear where PLM vendors think the path is leading: They hope that the cloud will result in an enormous surge in growth in the coming years. Their cloud offerings and licensing models, however, are often still based to a great extent on their existing solution portfolio. One of the reasons for this is that many PLM applications have not been developed expressly for the cloud but have been made cloud-ready retrospectively. Multi-tenant SaaS offerings from a public cloud are still the exception in PLM environments – as is the flexible activation and deactivation of licenses according to the pay-per-use principle, which guarantees scalability.

Some PLM vendors offer their cloud customers functionally “slimmed-down” and heavily preconfigured versions of their on-premise solutions. Others offer them the option of migrating their existing PLM installations, including all adaptations and integrations, to a cloud infrastructure where the vendor’s employees provide support, which makes “managed hosting” a more appropriate term. There are providers who allow the customer to deploy the PLM solution either in the cloud or on-premise. With others, cloud and on-premise solutions are more or less incompatible, making incremental migration impossible.

The range of cloud PLM solutions is therefore highly heterogeneous and difficult to compare. Companies therefore urgently need independent consulting to be able to decide how the cloud can be incorporated in their PLM strategy and which cloud offering is best suited to meet their needs. As a vendor-neutral software and consulting company with many years of experience in capability-based PLM strategy consulting, PROSTEP can provide them with optimum support when evaluating the benefits of the cloud for their PLM infrastructure.

The PLM vendors’ implementation partners, who ordinarily look after medium-sized customers, can only be of limited help. Many are themselves still looking for the role that they will play in the cloud in the future. In particular partners to PLM vendors that rely on multi-tenant PLM solutions from a public cloud need to reinvent their business models because the business involving implementation and customization is dispensed with completely and in some cases, the vendors also assume responsibility for migrations to the cloud. Some system integrators now offer their customers cloud solutions they have developed themselves and/or assume responsibility for managing solutions hosted in the cloud. It can be assumed that the cloud will reshuffle the deck in the PLM market in the coming years.

PROSTEP as guide on the way to the cloud

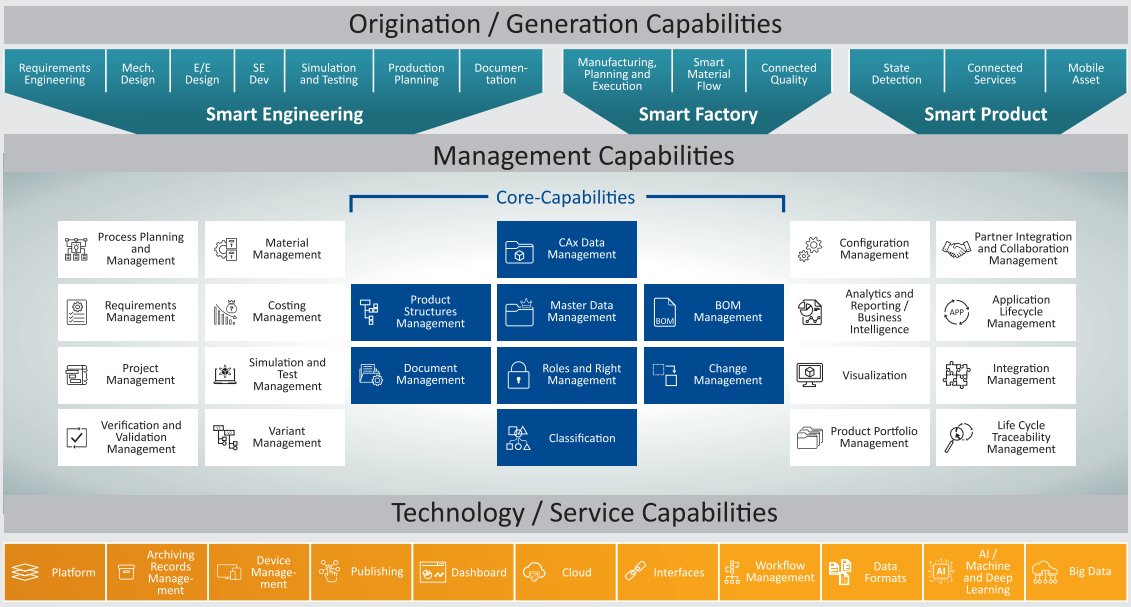
PROSTEP believes that the cloud will bring fundamental changes to the way in which companies use PLM in the future. Cloud-based PLM capabilities will become the cornerstones of a sustainable PLM architecture, which is understood to be the coordinated interaction between organization, processes and information technology in the context of enterprise architecture management (EAM). This means that the cloud cannot be seen purely as an infrastructure issue, but must be given adequate consideration when defining the PLM strategy and developing a roadmap for the future PLM infrastructure.

PROSTEP's capability-based PLM strategy consulting is based on EAM methods, supplemented with the PLM-specific know-how gained over the course of numerous consulting projects. The aim is to build a sustainable PLM architecture that is aligned with business objectives and links process and system landscapes via appropriate PLM capabilities. This PLM architecture represents a section of the overall enterprise architecture but one that is focused on the organizational, integration and software levels.

As a certified LeanIX partner, PROSTEP offers its customers the opportunity to map their enterprise architecture in the EA suite using models and thus document their business requirements, PLM capabilities and current/target architecture over the long term. Among other things, the model-based documentation offers an opportunity to run through what-if scenarios and to simulate the impact of moving certain IT components to the cloud in advance.

PROSTEP has developed a modular process model for capability-based PLM strategy consulting that establishes a structured approach – from the analysis of the current status to the target concept and evaluation of the potential PLM solutions through to rollout planning. Based on the business model of the company in question, the consultants first analyze the organization and processes, especially those relevant in the context of expanding or modifying the business model. They also examine which information is required for which processes and how it flows within the application landscape in order to identify potential weaknesses in the information flows.

The aim of analyzing the current status is to identify mission-critical processes and determine the PLM capabilities required for their execution, which are prioritized with the aid of a heat map. The consultants then take a closer look at the capabilities available in the company and determine their degree of maturity based on the difference between the current status and the target status. The maturity levels and their criteria are based on Capability Maturity Model Integration (CMMI), which serves as a guideline for continual process improvements. The results are presented in a clear and concise maturity model that illustrates the need for action and forms the basis for developing the target concept for the future PLM architecture.



Based on the maturity analysis and the PLM capability map, the consultants work with the customer to determine which components of the IT architecture are better off in a cloud infrastructure and define a roadmap for implementing or migrating the respective PLM capabilities. For example, complementary capabilities such as supplier collaboration or cross-domain and cross-enterprise project management can be implemented very well in the cloud and tested together with the existing on-premise solutions in order to migrate further capabilities afterwards if necessary.

Venturing into the PLM cloud

The cloud is an integral part of a sustainable PLM infrastructure. Companies should therefore analyze the opportunities and risks associated with cloud PLM as soon as possible and take account of the cloud as a strategic option when reformulating their PLM strategy. It is then important that they work with an experienced partner to find the optimal path to the cloud.

Companies without legacy systems, or with legacy systems that need to be replaced anyway, should venture into the cloud immediately. Companies with a well-functioning PLM infrastructure, on the other hand, must evaluate what additional benefit the cloud offers them. They can, for example, encapsulate their existing PLM installations and expand them to include supplementary PLM capabilities from the cloud to postpone replacing them. Another option is to gradually migrate existing PLM capabilities to the cloud. Although both options minimize risk, they are associated with a higher level of complexity as the interaction between on-premise and cloud installations have to be adjusted again and again.

According to leading PLM analysts, companies with a PLM landscape that has evolved over time are more likely to pursue a hybrid cloud approach that provides for the temporary coexistence of existing on-premise and new cloud PLM applications. PROSTEP has proven tools and decades of experience in the field of PLM migration to which customers also have access when migrating their existing PLM installations to the cloud.

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Do you have any comments or questions?

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Published by
PROSTEP AG

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Edition 1, 2021