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Turning Point for PLM

ALM

BHC PROSTEP

PLM

A turning point for PLM

Application lifecycle management (ALM) is becoming a game changer in PLM environments. But can a clear separation really be made between ALM and product lifecycle management? A joint study conducted by PROSTEP and BHC provides clarity but also raises a number of questions.
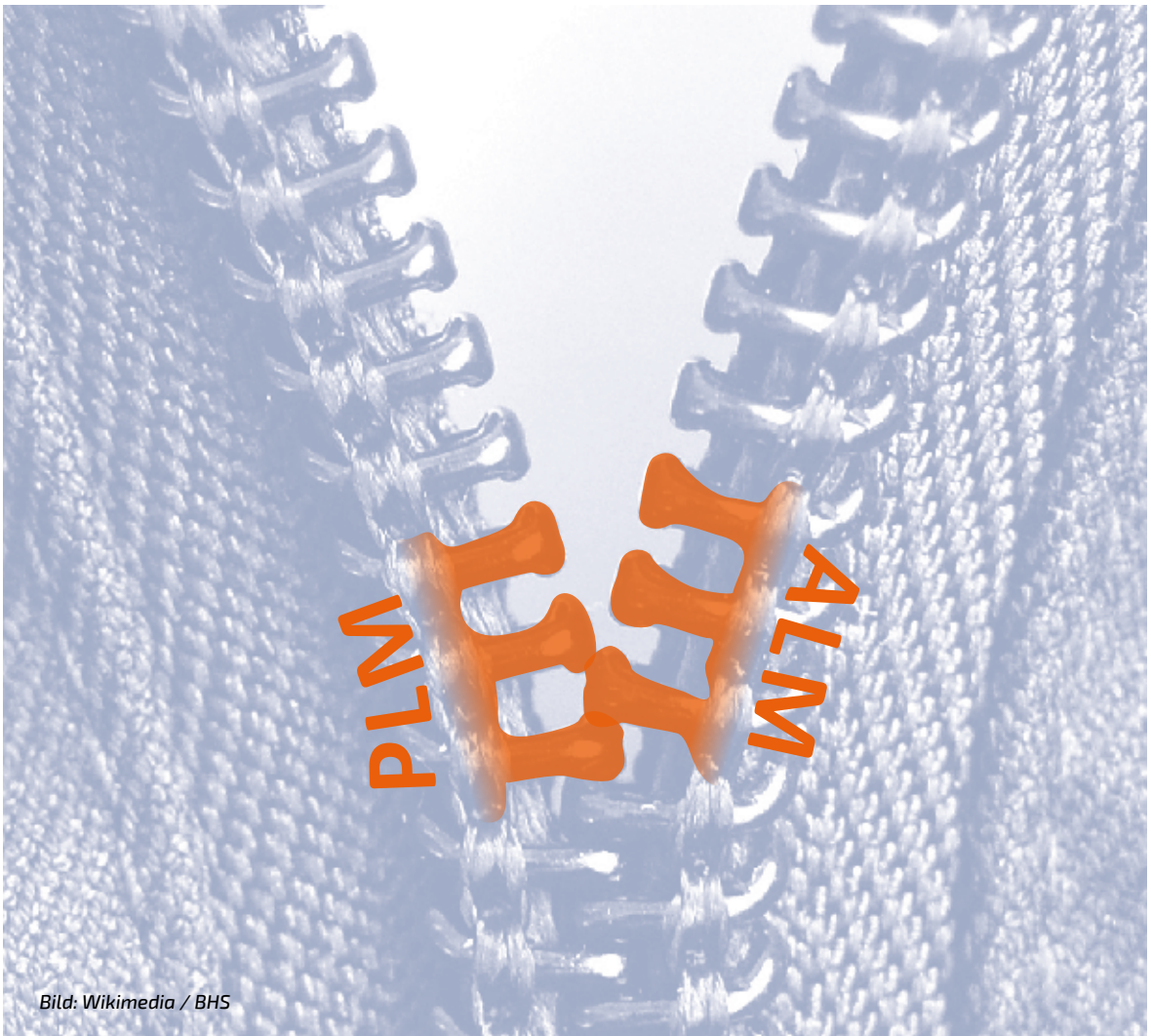

Bild: Wikimedia / BHS

The aim of the joint study conducted last year by PROSTEP AG (Darmstadt) and BHC GmbH (Böblingen) was to determine the current allocation of roles between PLM and ALM in the context of developing mechatronic and software-intensive products and companies' future strategy for systems lifecycle management (SLM). For this purpose, the authors of the study interviewed managers and specialists from leading companies in the automotive, mechanical engineering, electrical and medical engineering industries. The largest of the companies had approximately 400,000 employees, the smallest 100.

Taking a look back at the past

The reasons for the triumph of PDM – prior to being labeled „PLM" – are many and its success dates back to the 1990s. Probably the best known reason for this has to do with the attempts to get to grips with the chaos created by the introduction of 3D CAD in mechanical design. The need for orderliness on the design engineers' hard drives had indeed become particularly urgent when it came to storing CAD artifacts – much like the ink engineering drawings that used to hang in neat rows in cabinets. And so it comes as no surprise that some people dismissed PDM, calling it „information technology's answer to the drawing cabinet." Although there is some truth to this statement, it would be a doing a disservice to this ray of hope for increasing revenues. At the beginning of the 2000s, it had become clear to system vendors that they could no longer truly achieve success on the global market for engineering IT with 3D CAD. A new buzzword was needed, and that buzzword could only be PLM. From this point on, CAD vendors rebranded themselves as „PLM vendors". The development and adaptation of PDM technologies had, of course, already been in full swing in the background for many years, and communication of promised benefits of PLM knew no bounds. It appeared that everything that was in some way related to the management of engineering activities could be leveraged in the safe haven of PLM. The fact that most PLM vendors have their roots in the MCAD world and that PLM could only be used to manage mechanical design artifacts was deliberately swept under the carpet. And that was it. The results of simulations and calculations, ECAD and EDA, and even software release management were and are not included in PLM.

„Cars are becoming smartphones on wheels. If we are to remain competitive, we not only have to get to grips with the hardware but also the software."
Ola Källenius, Daimler AG
(25.05.2020, Handelsblatt)

Image: Wikimedia

The early days of digitalization in engineering

PDM, with its three core elements products, data and management, is used to manage engineering objects and process-related information in a central work environment throughout the product engineering process. Within PDM, focus is placed on managing and tracing the creation, modification and archiving of all product-related information in the broadest sense. PDM makes this data available to downstream phases in the product lifecycle. Information on what exactly is meant by the term PDM can be found in VDI guideline 2219.

Along with PDM, product lifecycle management (PLM) is a systematic approach to managing the various transitions a product goes through during the course of its lifecycle (1). The systems affected therefore include not only production planning and PPS but also sales planning, marketing, distribution logistics, end-of-life management including service and, in some cases, even topics related to recycling.

Irrespective of this, a discipline involving „specific BOM methodologies and repositories for software applications" has evolved and became known as ALM (Application Lifecycle Management) and software BOM (Bill of Materials). And that is just the theory. The joint study conducted by PROSTEP and BHC was intended to determine what is already industrial practice and what strategies are associated with it.

Why ALM is so important

„Cars are becoming smartphones on wheels. If we are to remain competitive, we not only have to get to grips with the hardware but also the software," Ola Källenius, chairman of the board of management of Mercedes-Benz Group, was recently quoted as saying. And to do this, they are prepared to invest billions. This demands a whole new quality of ALM, for example to perform verifiably valid over-the-air updates (2). It is a well-known fact that Tesla has set the bar very high when it comes to managing software artifacts in vehicles. One of the issues involved is end-to-end traceability in order to ensure the traceability of information throughout the entire product lifecycle.

This requirement is documented, for example, in the upper levels of the A-SPICE standard. It is also expected that the ISO/SAE 21434 standard for autonomous functions and cyber security in road vehicles will soon become mandatory. The aim is to put an end to the guesswork as to who released which configuration based on which data that resulted in a product recall, for example.

Once the lifecycle of software components is also fully under control, it is easy to reuse interrelated groups of development artifacts – and not just individual artifacts – in other product-related derivatives. This offers the promise of enormous cost savings. In addition, this level of end-to-end digitalization makes it possible to analyze the impact of product adaptations in a meaningful way and run through what-if scenarios, such as what financial impact will certain changes have in combination with variant management? This makes it possible to take advantage of a new level of quality when validating new business models, such as new service offerings for example.

Conclusions of the study

The authors of the study awarded high marks for the integration of mechanical artifacts, which is hardly surprising given that PLM has its origins in mechanical engineering. Electronic development and electrical engineering project planning are also well on the way to achieving this, as Peter Wittkop, Lead Expert PLM Strategy & Processes at PROSTEP AG and one of the study's authors, explains. Software development in itself functions well, or even very well, as an isolated solution. „The question, however, is how software development can be integrated in the context of a complete product description." The existence of ALM and PLM in separate worlds means that „scarcely any company can ensure the full traceability of deliverables across different disciplines, even though most of them consider this a key future requirement," Peter Wittkop goes on to say.

The study focused on the design options for processes, organization and IT/tools. In the context of process design, for example, the question is which path for introducing requirements management should be selected. Should the path involving a functional system model be taken? In organizational terms, the question is for example what incentives could be used to encourage employees to play an active role in shaping the transformation of the companies. With regard to IT, careful thought is being given to approaches for the efficient handling of product variants, such as how they should be designed.
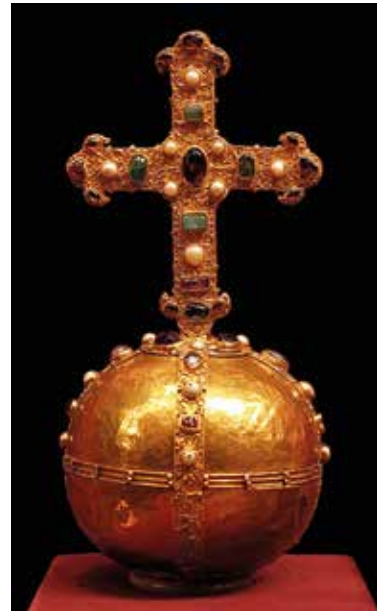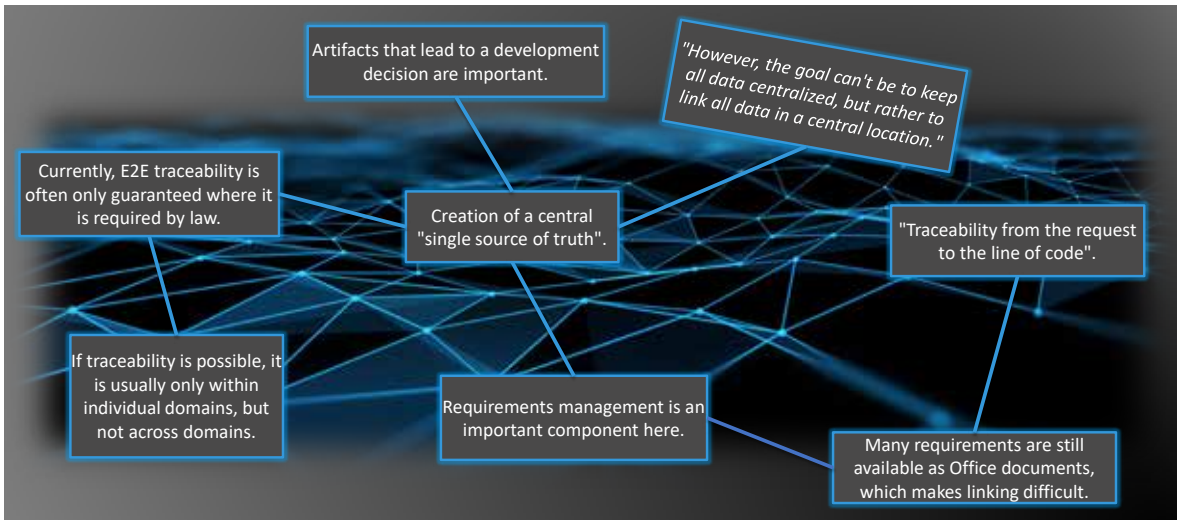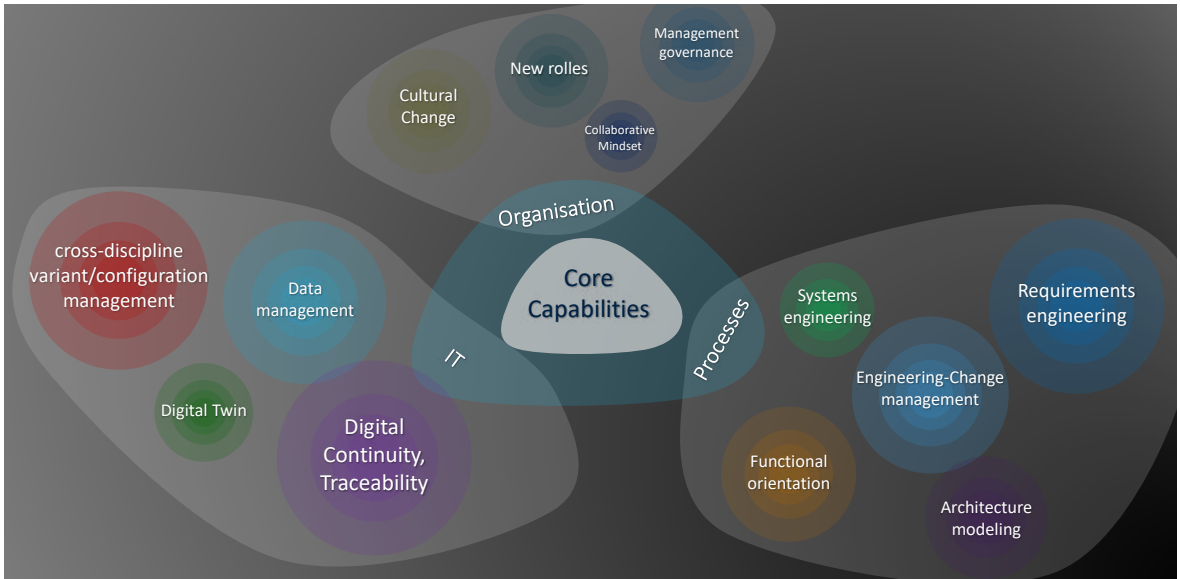

„The ALM system takes the lead, while the PLM system plays a subordinate role."
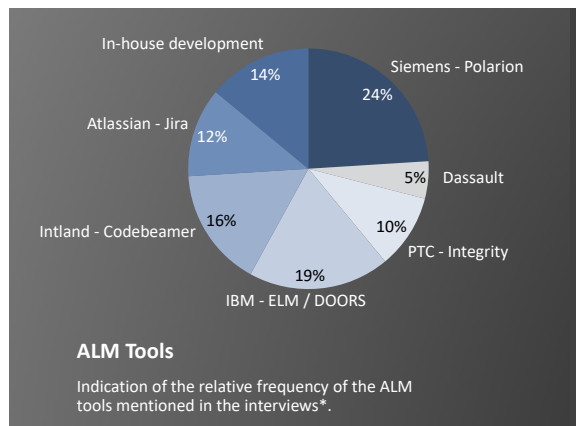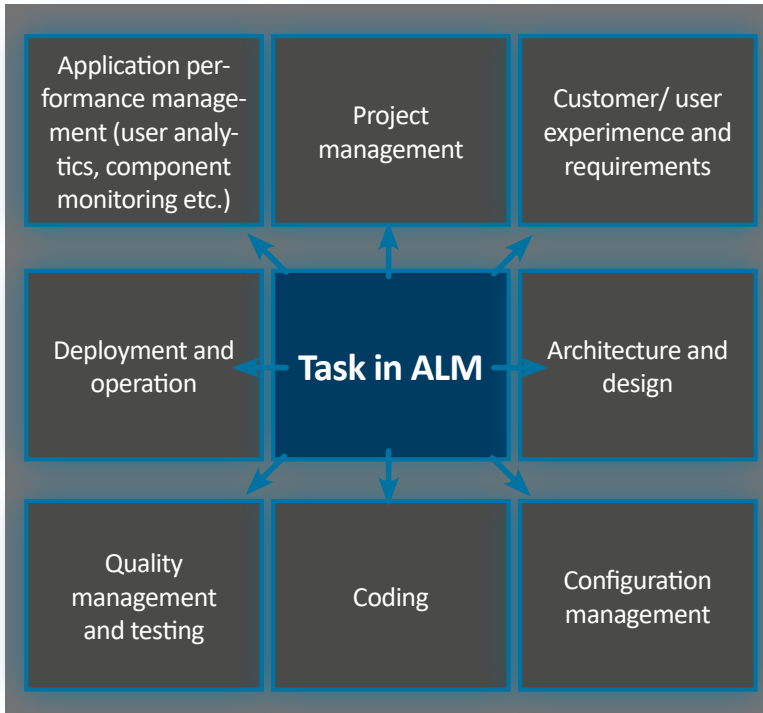*Dirk Denger, AVL*
(participant in the study).

Imperial regalia are the insignia of the emperors and kings of the Holy Roman Empire. The imperial orb is shown in our photo. *Source: Wikipedia*

ALM Tools

Indication of the relative frequency of the ALM tools mentioned in the interviews*.

Results of the study „Industry Inventory on the Maturity of Software-Defined Product Development – How Do Leading Companies Manage the Tension Between PLM and ALM?"

Application performance management (user analytics, component monitoring etc.)	Project management	Customer/ user experience and requirements
Deployment and operation	**Task in ALM**	Architecture and design
Quality management and testing	Coding	Configuration management

Tasks that fall within the realm of application lifecycle management

Source: Stark, R., „Virtual Product Creation in Industry – The Difficult Transformation from IT Enabler Technology to Core Engineering Competence", Springer, Berlin 2022, ISBN 978-3-662-64299-3

A close look at system vendors

The study also takes a critical look at the portfolio strategy being pursued by system vendors. The truth is that the vast majority of respondents do not aim to meet all engineering challenges with a single-vendor solution. Instead, there is a tendency towards a best-of-breed approach, i.e. combining the software from different vendors that best meets the business objective in the respective department, with a great deal of thought being given to a lightweight backbone. Peter Wittkop: „The tendency to turn our backs on monolithic systems in which everything is stored is striking."

Summary

Be that as it may, what is needed are competent analysts like PROSTEP and BHC, who monitor PLM and ALM system vendors with a critical eye and provide customers with recommendations for action based on the experience gained in previous projects. It is very important that sufficient attention is paid to the customer's initial situation – for example, the extent to which the SAP infrastructure has been expanded in the direction of PLM.

Further information on introducing an application lifecycle management system that is in line with you PLM infrastructure can be found at www.prostep.com

„ALM moves into the pole position in development"

Peter Wittkop, Lead Expert PLM Strategy & Processes at PROSTEP AG, talks about the first study to classify systems engineering support for application lifecycle management in the context of PLM.

Wittkop, how do things currently stand with regard to the market?

A lot of things are in a state of flux when it comes to issues relating to the various aspects of ALM in the context of PLM. Initial projects are already underway at the major automotive manufacturers, and SMEs have recognized a need but are still finding it difficult to define clear strategies and projects in this context. If you decide to link ALM with another (PLM) tool, the question remains as to which information should actually be linked. And this bearing in mind the migration of PLM applications in the direction of the cloud. At PROSTEP, we are taking a hard look at this issue with the aim of finding out what the best way forward might be, depending on the initial situation.

Is any information about the product architecture of the future already available?

Of course. System vendor independent information models based on different ontologies are currently being discussed in industry, with STEP AP 242 serving as a guide. A key question here is how the lifecycle of the software should be handled and its development artifacts be integrated in the context. An important keyword in this case is cross-document baselining. Experience indicates that the extent to which the system vendors' data models meet these requirements is unsatisfactory.

What do you recommend when it comes to moving decisions regarding ALM-PLM integration forward?

The following questions need to be answered in the following order:
- What does the information model look like?
- What IT infrastructure that needs to be supported makes sense?
- How can PLM and ALM be combined?
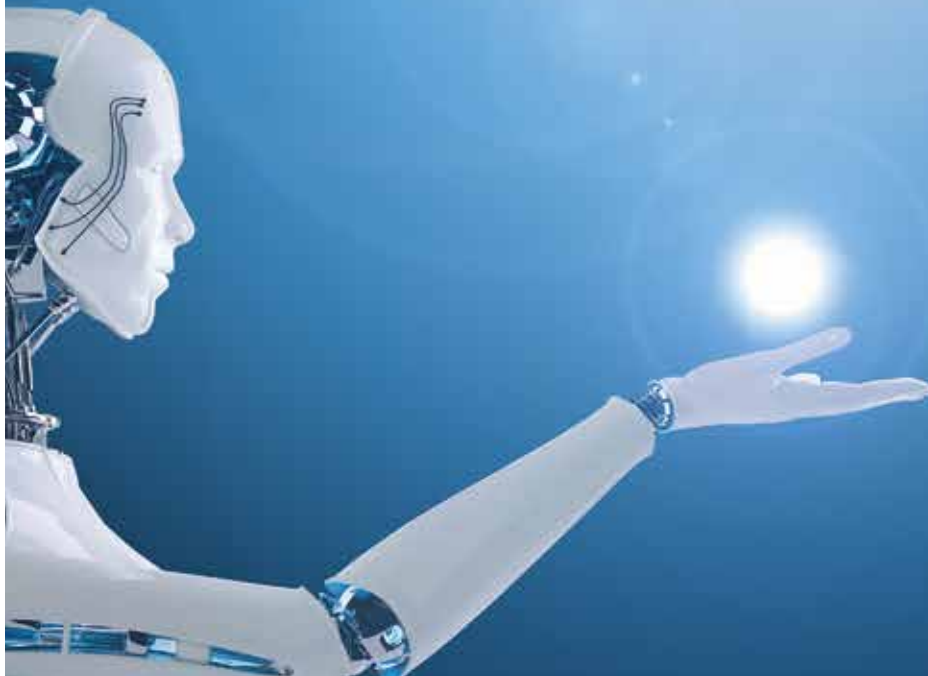
And what comes next?

Our work on this topic will continue and we will probably try to document the progress made to date as part of another study conducted in the coming year. BHC is a management consultancy and as part of PROSTEP focuses on IT-related consulting in the context of product and application lifecycle management. „The combination of our wide-ranging experience in PLM consulting, systems integration, migration and collaboration and BHC's specialized expertise in E/E and software development offers our customers considerable benefits when it comes to digitalizing their business processes.

Thank you very much for this interview.
Interview: Dr. Bernhard D. Valnion

100% PLM

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