Professional
PLM

Xlifecycle
MANAGING THE
LIFECYCLE OF THINGS

TOWARDS A DIGITAL FUTURE: THE EVOLVING ROLE OF PLM IN THE FUTURE DIGITAL WORLD

13 May 2020

White Paper

Almost every company that undertakes Product Lifecycle Management will be affected by, and will want to take advantage of, the new 'Digital' advances.

Not only do such developments as Industrie 4.0, the Industrial Internet of Things, the Digital Thread and the Digital Twin offer ways to enhance PLM, but they have captured the attention of senior management in a way that PLM never has.

However, PLM has been digitising the design, engineering and manufacturing world for over two decades. There is a vast amount of experience that should be carried forward into this new Digital Age. Furthermore, a sound PLM platform is an essential requirement for accurate digital connectivity.

The drive to establish a new PLM Profession means that a clear definition of the relationship between PLM and Digital is needed. Every PLM professional will need a full digital skill set to work effectively in the future.

This White Paper is intended to be the starting point for a widespread and open debate that will eventually establish how PLM and Digital relate to each other.

TABLE OF CONTENTS

1.   PURPOSE OF THIS WHITE PAPER

The purpose of this White Paper is to put forward a neutral picture of the role of Product Lifecycle Management (PLM) in the ever-changing Digital landscape, and of how Digital is transforming PLM.

This may help to answer questions such as how to:-

- (Re-)define the place of PLM in the wider digitalisation landscape, from product creation to smart factory / Industry 4.0 and the wider digital thread

- Assess the evolving capabilities of digital twins, PLM and other enterprise platforms across the digital thread – and how they interface from a data, process, functions / people perspectives

- Set the direction for future digital PLM evolution and integration strategies – defining clear boundaries with other digital platforms and their respective usages

- Assess digital, business transformation requirements and PLM roadmap to enhance value creation from this digital future

Feedback is invited so that this can be iterated into a concise and accurate reference document for future discussion.

2. PLM'S DIGITAL TRACK RECORD

It could be said that the entire 'Digital' phenomenon that we see today began with the earliest origins of Product Data Management (PDM) in the 1980s.

Manufacturing companies were already using computers to support or control their factory operations, using text-based Manufacturing Resource Planning (MRP) systems, but products were designed on drawing boards until the advent of Computer Aided Design (CAD).

This meant that, for the first time, digital information became part of the overall product development process. Initially, 2D drawings created digitally were sent in paper form to suppliers and customers. This digital data had to be controlled, which gave rise to Engineering Data Management (EDM), and the first logic of how such data should be handled. Gradually, 2D data became an ever more complete 3D representation, and the understanding of how to deal with it evolved via PDM to PLM.

Over the same timeframe, general advances in computing power and connectivity meant that customers and suppliers could transfer, process and return such data, leading to the current knowledge of how this all can be managed.

This long-term evolution of expertise is sharp contrast to the headlong development of the 'Digital Wave', where the mantra seems to be "connect everything, because it is possible".

It has long been known that one should not automate chaos. The knowledge and experience of PLM must be a fundamental part of any sensible and structured Digital programme.

3. THE ADVENT OF DIGITAL

In essence, Digital is a solution looking for a problem: "We have masses of computing power and connectivity – what can we do with it?" Unusually in such cases, it happens to find lots of problems to solve.

At the beginning of the PLM timeframe, in the 1980s, computing was primitive and separate. The earliest CAD systems ran on cabinet-sized computers with 8MB of memory, which needed an air-conditioned room and had to be wired under the floor to terminals at the far side of the office. When it first became possible to connect desktop computers over an Ethernet, it was a revelation.

[cont.]

Since then, computing power and connectivity have continuously multiplied, so that now any computing device in the world can be interfaced with any other at minimal cost. It has spawned the new Digital industry, most of which has nothing to do with PLM.

'Digital' is much bigger than PLM, and encompasses such things as machine control and analytics; agriculture systems that monitor the yield of every square metre of land; and the ability to switch your heating on before you set off home.

This means that senior management within a company are likely to see 'Digital' as a brand new opportunity, and fail to see the connection with PLM – or even neglect PLM completely as "yesterday's technology".

Nevertheless, Digital offers massive opportunities to enhance the capability of PLM in terms of collaboration along the value chains, and integration of the product lifecycle. Every company should have a PLM Strategy and a Digital Strategy, and the two should be closely coupled.

4.   HOW PLM AND DIGITAL IMPACT EACH OTHER

PLM and the new Digital Wave impact each other in several ways.

- *Alignment to Smart Factory / Industrie 4.0*

    How are data analytics used on the shop floor to run and improve operations, such as links to PLCs / SCADA systems? Where and how is the IIoT being applied? How do MES / MOM solutions organise and coordinate their data? What are the high-level feeds from ERP and PLM to MES/MOM? What are the "feedback loops" and related business processes across these platforms?

- **Shop floor to top floor data continuity: joining the dots along the Digital Thread**

    What is the Digital Thread: are there one or multiple "threads" across the enterprise? How are virtual and Digital Twins created along this Digital Thread? What are the different scope, usage, and target audiences across PLM, ERP and MES/MOM? What data sets are upstream and what are the master data systems? What business capabilities are supported by these data sets? How are "data overlaps" managed, and is there a link to master data management?

[cont.]

- *Business integration requirements across enterprise functions*

  Including: Design Engineering and Marketing; Engineering and Product Development; Engineering and Programme Management; Engineering and Manufacturing; Virtual Build and Manufacturing Engineering; Engineering, Manufacturing and Service.

  Which virtual / digital twins are used (for what purpose and how) across these functions?

- *Platform integration across PLM-ERP-MES*

  What are the core data flows and interfaces across these platforms: PLM-ERP, ERP-MES, and PLM-MES/MOM? What is the IT point of view on data integration strategies (point to point, hub and spoke, ESB, overlay, etc.)?

- *Evolving PLM complexity and growing platform integration requirements*

  Is the PLM scope changing beyond what used to be the traditional "PLM eco-system"? What are the new PLM boundaries? How to define robust PLM roadmap in the wider context of hyperconnected digital thread?

  What are the implications to how PLM is to be implemented? How to implement change in this new paradigm? Does it require new approach to enterprise data governance while implementing digital continuity?

  How to assess "PLM maturity" in this new digital complexity (it is not only about business capabilities anymore, but also ability to integrate seamlessly, ability to change and speed of change)?

  How to prioritise digital transformation efforts to deliver robust, yet scalable and agile PLM roadmaps?

It is the aim of the Professional PLM Initiative to generate neutral, agreed answers to these questions, so that the role of a future PLM Professional in the Digital Future can be defined.

The process of clarifying and defining this is likely to enable product-oriented companies to establish their own PLM-Digital Roadmap that integrates the best opportunities of each discipline.

5. THE PLM-DIGITAL PREMISE

Any sound roadmap for integrating PLM with the new Digital Future should be based on the following premise:-

> *For over 2 decades, PLM has been integrating and digitising the world of product development, building up a wealth of technical capability and business expertise.*
>
> *The recent advent of technologies within the 'Digital Wave' offers new opportunities to advance the reach and effectiveness of PLM; and also offers brand new areas of opportunity that should be exploited in their own right.*
>
> *The relationship between PLM and Digital should be symbiotic and harmonised. Considering this holistic landscape, PLM knowledge and techniques provide a sound and proven structure for "connect everything" integration that the Digital discipline has yet to learn; and Digital capabilities offer a path to extend PLM beyond its current boundaries.*
>
> *For any product-oriented company, the most effective strategy for the future will be based on a genuinely integrated approach to PLM and Digital development.*

6. GIVE YOUR FEEDBACK

This White Paper is a draft for discussion, presented by the Professional PLM initiative and Xlifecycle (www.xlifecycle.com).

Feedback is welcome from all PLM practitioners and leaders, in any role and from any part of the industry:-

- PLM users / data creators and consumers
- Implementors / system integrators / consultants
- Vendors
- Academics

You can send feedback or discussion points of any kind via whitepaper@professionalplm.org.

More information about the Professional PLM initiative can be found at www.professionalplm.org/wac1plmdigital.shtml.