



## PLM 2025-35 AI Working Group

### Project Proposal

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The current debate about AI is split between hyperbole and warnings about its shortcomings. Knowledge about how to do it well is fragmented and hidden behind closed doors.

PLM has very specific requirements in terms of how AI should interact and perform, and also offers areas where AI tools could be particularly useful.

If we can capture and consolidate the learnings then people can stop wasting effort and begin to work effectively. Solid ideas and concepts will be in a framework that doesn't move. The depth and complexity can be explored in detail and everyone can start to build.

This is the aim of the AI Working Group. Over a 12-month period the Group provides a neutral, collaborative environment in which PLM organisations can exchange and crystallise knowledge to produce a best-practice paradigm that can be applied across the industry.

This document is a Proposal for the PLM Interest Group to manage and support the AI Working Group over its first twelve months, and explains how organisations of all types can participate.

## 1 INTRODUCTION

Current AI does not work for PLM, and cannot work unless we reconsider how it should be applied. At its best, AI gives insights and productivity gains that one would not gain by other means. But when managed badly it can produce mirages of false information and collapse the data model on which it is based.

The complexities of PLM are well known to its practitioners, but not to the creators of AI engines. AI needs to be shaped, and not just within PLM itself – as PLM reaches across the enterprise, AI agents from different domains will need to interact with each other, which creates a whole additional layer of ‘orchestration’ that needs its own structure and planning.

Users may experiment for themselves with AI tools, waste an enormous amount of time, and become disillusioned. They will only move forward and implement real AI when they have a clear understanding of how to do it, and a clear framework that shows how and when the benefits will be achieved.

The PLM industry can create this framework by standing on the shoulders of those who have already made sound progress. AI capability has been built into vendor product sets, driven by commercial motivation and huge technical resources. Major corporations have their own teams working on this within their own testbeds. Consultancies and integrators are also working on their offerings.

The PLM 2025-35 AI Working Group enables everyone from around the industry to collaborate in a neutral, structured environment that leverages the collective knowledge and expertise that has already been gained: crystallising the facts so that users can refer to them and start from the right place; and analysing the detailed technical issues that must be understood before AI works.

Over the course of 12 months the Project will map out and define an industry-wide best practice landscape that enables any PLM-oriented organisation to implement their own AI right first time. It is a holistic, year-long collaboration that will transform the ease and efficacy of AI implementation within PLM.

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## **Section 1: Context**

### 3 TARGET

The Project will run for 12 months. Over the course of that time the AI Working Group will:-

- develop a common language and framework for working with AI;
- collaborate in a test network using a 'distributed sandbox' system of safe localised testbeds;
- examine and formalise the lifecycle and orchestration elements of AI integration;
- explore the possibilities of AI for generating genuinely new ideas outside the scope of current working tenets;
- identify and agree best practices;
- build a landscape and roadmap that form a comprehensive reference for how to implement AI effectively and accurately in PLM.

The collective target is therefore to produce the landscape and roadmap that will become part of the industry-wide PLM Body of Knowledge.

The target for each participant is to have developed their test 'sandbox' into the fully-functioning, comprehensive AI platform they will use into the future (for users); or to position and enhance their products and expertise within the best-practice paradigm (for vendors and providers).

### 4 VISION

The Vision for the end of the Project is:-

*"The AI Working Group has explored, evaluated and codified the full scope of AI as it can be applied to PLM, with current tools and along potential lines of development. Everyone within the Group has a complete knowledge of its benefits, pitfalls and possibilities, and is able to apply AI to its best effect within their extended enterprise. The collective findings have become a reference point for the wider PLM industry, enabling right-first-time adoption for companies around the world."*

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## 5 ISSUES TO BE RESOLVED

One could write an epic novel about all of the issues that beset the current world of AI, and the reasons why it is not being or cannot be implemented effectively, but that would distort this Proposal – and in any case, the AI Working Group Project is all about the solutions.

It is useful to have a reference point for these issues so that we can be sure they are being addressed. They have therefore been collected in the **Appendix: AI Issues** under the following headings:-

### MISCONCEPTIONS

- What 'AI' Is
- The Inverse Turing Effect
- Mirage Results

### CONFUSION

- Hyperbole
- Overload
- AI Slop

### BLURRED AIMS

### DATA MANAGEMENT

- Abdication
- Configuration Management
- IP Leakage
- Internal Security
- Model Collapse

### SYSTEM ADMINISTRATION

- Visibility and Control
- Tracking
- Security

### AI vs. KNOWLEDGE

### ECOLOGY

Over the course of its 12-month timeframe the AI Working Group will resolve all of these.

## 6 FUTURE PLM – FACTORY INTEGRATION

There is an ongoing debate about whether PLM should be ‘re-imagined’ for the modern age of smart products. Mainstream applications have evolved from the product landscape of the early 2000s, and may not have evolved far enough; ERP has developed separately, meaning that PLM-ERP integration continues to be a major issue; MES, CRM etc. still need bespoke interfaces; and legacy systems are still a complex and unwanted overhead.

AI offers the chance to rethink the PLM paradigm, if it is applied in a very advanced way.

In the real world it is never going to be an option to throw away existing PLM platforms and move to something new – apart from the effort, it would just create yet another legacy system.

So for a ‘PLM reset’, the first step is to think through to a better scenario, after which we can evaluate how the improved or transformed PLM can be realised. The AI Working Group will do both of these things.

PLM-ERP is a very good example. The reason they are separate is that they have evolved from CAD and MRP in the 1980s, in the days of floppy discs and green screens. There just wasn’t the computing power to do anything else. If it all started now we would create a single, comprehensive Product Management system, which deals with everything from configuration and manufacture through to sales performance and quality improvement.

AI, applied in a very advanced way, could blur the boundaries between PLM and ERP, and in so doing could provide the new functionality that would build them into this new integrated entity. And it could do the same with MES, CRM, ALM – integrating factory operations in a seamless way that has never been possible before.

It will require a level of preparation, discussion and implementation that is higher even than the company-wide orchestration of AI agents, and the AI Working Group is uniquely placed to provide this. It may well be the best opportunity the PLM industry has to leap forward into the new age.

## **7 KNOWLEDGE CAPTURE**

### **7.1 1990s Research**

Academic research in the 1990s into Knowledge Management (how to capture what someone knows, so that you keep the knowledge when they leave; and how to think like a human being) was far more advanced than today's offerings.

It failed at the time because the 'Rolls-Royce' solution was too difficult to do, but the findings still exist and there are now tools that could achieve 80% of those benefits with 20% of the effort.

### **7.2 2015 Possibilities**

A group of forward-thinking companies in Norway quietly continued with the 'classical' ideas, but encountered similar problems. In 2015 the PLMIG produced a proposal for basic knowledge capture and management using everyday computer tools in the course of real day-to-day work.

### **7.3 AI Possibilities**

Even the current AI engines are more advanced than those 2015 tools and offer the possibility to go further.

If we step back from the current focus on "how to do jobs more quickly" then we can start to look at the clever stuff that AI ought to be doing.

First thoughts on this might be how to capture design intent in a way that is easy to refer to and re-use; the new hype idea of 'Product Memory', which might have some real value; and generating new non-human ideas for innovation. The list of possibilities is likely to grow as more attention is given to it.

## **Section 2: Methodology**

## **8 OVERVIEW**

### **8.1 Concept**

The Project is open to PLM organisations of all types, from anywhere in the world. By collaborating within the AI Working Group framework, each participant develops their own AI environment while learning from the collective findings.

The Project is entirely practical. Over the course of 12 months we will test and build a central PLM AI environment, and define the roadmap of possible implementation routes. By the end of the Project this will be distilled into a neutral, comprehensive reference set for how AI should be applied that can become part of the PLM Body of Knowledge.

User participants will leave with their own AI implementations having been built into the most advanced and accurate configuration for effective future use.

### **8.2 Collaboration**

Everyone joins with their own views and experience of AI, so the Mobilisation phase begins by defining the core logic. This in itself will provoke a useful debate and will help participants rationalise their ideas.

It would be difficult to manage and maintain a single testbed due to issues such as hosting and IP protection. Collaboration is therefore based on a 'distributed Sandbox' test environment, based on a template that the Group will define together. Once again, the dialogue around this is a key driver for learning and improvement. The PLMIG provides the working documentation and manages the discussion so that the core logic is distilled.

In parallel with the Sandbox testing the Enhancement strand will explore ways in which AI can be made more useful for PLM, including such things as design intent, product memory, the evolution of decisions over time, and insight development.

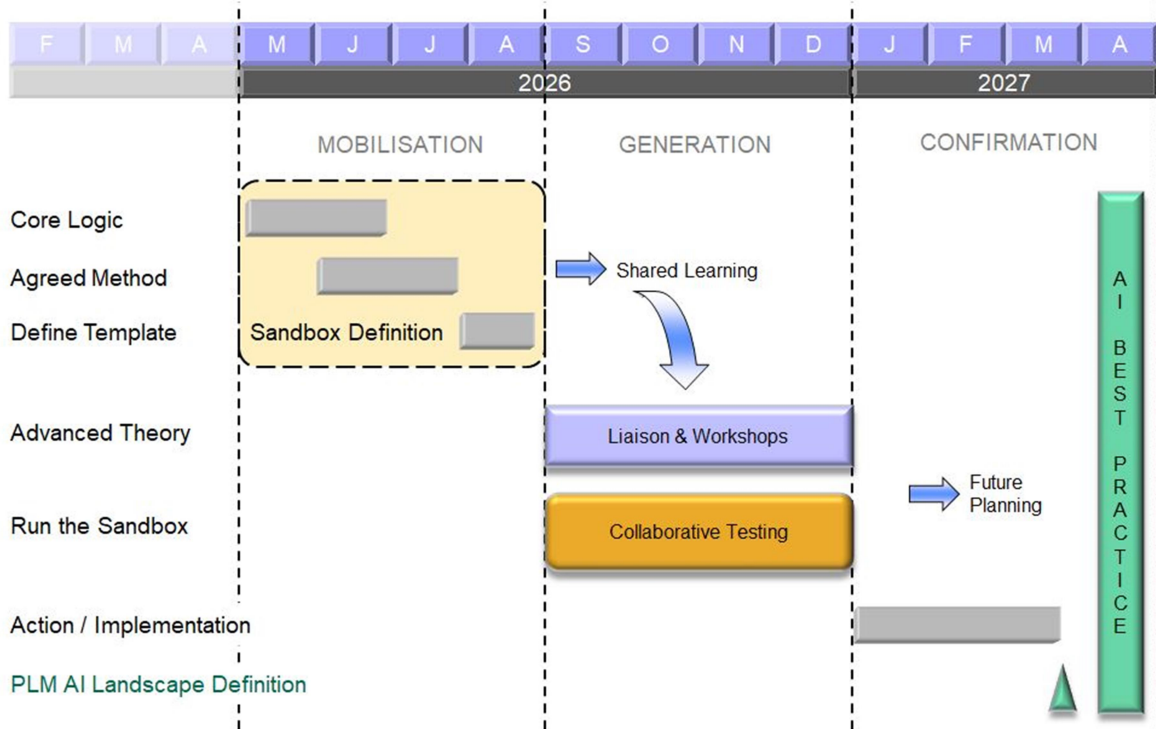
### **8.3 Enterprise-Wide Scope**

PLM has its own scope, across the enterprise and along the lifecycle, and it also sits within the wider company or corporate environment, which may have its own AI initiatives.

In any real-world environment there will be issues around how AI applications and agents interact with each other, so 'Orchestration' will be an integral part of the investigation.

## 9 METHODOLOGY

The 12-month programme is split into three phases: Mobilisation, Generation and Confirmation.



As the Project starts, every participant has a different AI setup and outlook. Vendors and integrators will have existing theory and products, and users will have their own testbeds and questions to be resolved. In **Mobilisation**, the first step is to define a core logic that everyone can work with; and then to agree the method by which testing can be carried out without disruption to operations or prejudice to IP. The third step is to define the Sandbox itself so that it will be representative but also flexible for individual needs.

The **Generation** phase is the engine room of the Project. Participants collectively test their versions of the Sandbox and the PLMIG processes the results. In parallel with this the Group addresses the advanced possibilities of AI for PLM, again coordinated and documented by the PLMIG.

In the **Confirmation** phase everything is rationalised, structured, and laid out as a roadmap for PLM AI best practice. This neutral layout is integrated with the PLM Body of Knowledge, while participants take away their own fully-advanced configurations to continue with into the future.

## **10 PLMIG SUPPORT**

### **10.1 Management**

This is a participatory project, designed to run with a minimum of effort and overhead for the participants. The PLMIG provides the tools and the structure; participants receive the material and join in with the actions at each stage, contributing to the findings; and the PLMIG provides the published results.

### **10.2 Tools**

The PLMIG provides all of the tools and working documentation for the project, together with direct support for participants as they are used. In the opening Mobilisation phase these will be bespoke templates to establish the core logic; and an iterative series of draft templates for the Sandbox. In the Generation phase they may include any of the multiple handbooks and manuals that the PLMIG has developed over twenty years; and in Confirmation these will be brand new AI-specific documents.

### **10.3 Workshops**

There will need to be specific working meetings to investigate and analyse the detailed issues that participants want to work on. The PLMIG has extensive experience in running such workshops to produce accurate and useful findings, and the project members who are interested in each particular issue can take part.

### **10.4 Documentation**

In addition to the direct project documentation the PLMIG will produce all of the ongoing working documentation, distilled into neutral format to protect confidentiality and IP.

The PLMIG will write, iterate and publish the final roadmap and landscape as the Confirmation phase completes.

### **10.5 Coordination**

Once the mobilisation phase has been completed, PLM Teams from different organisations will be talking to each other in much more detail than has previously been possible. When PLM practitioners get together in this way they generate their own ideas. It is expected that participants may hold local discussions amongst themselves, as part of the general activity of a community. The PLMIG will coordinate the feedback into the overall Project.

## 11 HOW TO TAKE PART

The PLM 2025-35 AI Working Group is designed to be an informal and flexible project that is easy to be involved with and to benefit from. The Conditions of Participation are therefore minimal:-

1. Membership of the Project commences on receipt of the Membership Fee, and will last until the completion of the 12-month project schedule. The fee is the same for all participants at €8,500 (£7,400, \$10,000).
2. This is an international project - you can take part no matter where in the world you are based. Organisations of all types are eligible to join the Project and to participate in the collaborative 'Sandbox' test programme. Internal discussions will be confidential, published documentation will be in a neutral format, and there is no requirement to reveal proprietary information or existing intellectual property.
3. New Members may join at any time by payment of the same fee, and their membership will run until the completion of the 12-month schedule. It is not expected that the Group will become so large that it cannot function.
4. No specific practical, financial or legal liability is attached to Project Membership.
5. For the first 12 months (as covered by this Proposal) the AI landscape will be entirely in draft form, with the first release at the end of the project period. The PLMIG and the project members will therefore own it collectively while it is under this development. As publisher, the PLMIG will retain the copyright, and make it available to every project member.
6. At the end of the 12 months the PLMIG and Group members will decide whether the Project should continue in its current form or should disband.
7. PLMIG tools and material, and new material produced by Project activity, are confidential to Members. Participants are encouraged to reproduce, modify, or take extracts from any part of it for their internal use. The PLMIG may compile some of the ongoing draft documentation into new tools which will then become available as part of general PLMIG Membership.

Further information can be requested via [aiworkinggroup@plmig.com](mailto:aiworkinggroup@plmig.com).

## **Appendix: AI Issues**

## 12 MISCONCEPTIONS

### 12.1 What 'AI' Is

As far back as the 1990s, researchers were trying to build computer systems that would capture and manage knowledge - in other words, artificially to think like a human being.

That involved such things as elicitation, corroboration, implication, prediction, mechanical reasoning and epistemics. It failed, because it was too hard to do. What has arisen out of the ashes is a very specialised application of a tiny technical subset of overall knowledge management.

This AI subset is so narrow that, in fact, the computer still doesn't know what it is doing. The apps will search and generate and present information that looks impressive and can be very useful - but they will not tell you if the task you have set happens to be impossible. They don't "know", but people assume they do because of the Inverse Turing Effect.

### 12.2 The Inverse Turing Effect

Alan Turing proposed around 1950 that if a machine could exhibit behaviour equivalent to that of a human, and if a human could not tell that they were talking to a machine, then that machine would be intelligent.

In fact the opposite is true, because Turing did not take into account the "impersonated policeman" effect. If someone dresses in a policeman's uniform, members of the public assume they are a policeman (which is why it is illegal in the UK). People inherently take what they see at face value.

Current AI is very good at conversational text, and at creating fancy graphics. Users do not understand what LLMs are actually doing, and give unwarranted credence to their results simply because they 'impersonate' good answers.

### 12.3 Mirage Results

A corollary of 12.2 is that when AI creates a plan (for example) it looks like a plan, but cannot be used as such. It has no internal integrity, and none of the ancillary capabilities that a plan from a conventional planning app would provide. If it generates an update it has to do so afresh from the LLM, which might have changed in the meantime.

Widen the view from plans to the complex array of PLM structures and documentation and it is easy to follow AI to a scenario of widespread error.

## 13 CONFUSION

### 13.1 Hyperbole

This is obvious and widespread. Every tech provider in every business sector is claiming that AI makes their product better than the rest, and that if you don't have AI then you will be left behind.

The claims are always vague and unsubstantiated, and collectively they create the illusion that "everyone else is doing this and you must not miss out".

### 13.2 Overload

As well as the profusion of hyperbole, there is the problem of its verbiage. Pundits write articles of 2000+ words which link to other equally long articles by other people and to web videos that take 5 or 10 minutes each to watch. Alongside this there is the implication that users should be doing their own experiments with three or four different AI engines to see which works best.

Nobody in a proper job has the spare time or bandwidth to do this.

### 13.3 AI Slop

This is one of the more insidious problems, and is clearly evident on LinkedIn for example. Diagrams with the same cartoon people in front of the same cartoon 'high-tech' backgrounds; with robots on them to make them look cleverer; with spelling and syntax errors unfixed – being 'liked'. The worrying aspect is that people seem to accept this poor quality precisely because it has been generated by AI.

## 14 BLURRED AIMS

There is no clear definition of what AI should be aiming for. For example:-

- What, exactly, do manufacturing companies want?
- What are the specific requirements of PLM?
- How do you control the dataset, and what happens when different companies combine their own set with each other or with the Body of Knowledge?
- How do you check the outputs for accuracy?
- How do you manage the outputs when they are written into documents which have their own circulation?
- Which of the available engines is most useful?
- Can any of the engines be made to work in the way that we need?

Of course there are many other aims that should be defined before starting out, but this serves as an illustration.

## **15 DATA MANAGEMENT**

### **15.1 Abdication**

Data management is one of the fundamental skills of PLM, and its importance does not need to be explained here. To cede control of data to an AI app whose treatment of it is unknown is an abdication of one of the PLM Manager's core responsibilities, with potentially huge consequences over time.

### **15.2 Configuration Management**

Another fundamental of PLM is Configuration Management, stemming from Product Design and extending across the enterprise. PLM systems embody the configuration so that it can be managed accurately, whereas AI will never actually know what the configuration is.

### **15.3 IP Leakage**

Dabbling with AI in PLM does not work - unless it has been trained on your own company data, all it produces is a rehash of what people are saying in discussion forums.

And if you train it on your company data, it trains itself and gives better answers to whoever asks the next question. So adopters of AI need to be certain about what data the AI engine sees, what intellectual property it has absorbed, and where it outputs that information.

### **15.4 Internal Security**

A corollary of 15.3 is that if you want to, for example, produce PLM plans that are aligned with other company plans and objectives, you must train the engine on those other company plans – which could be confidential. The AI engine may bypass the access controls that are applied to human members of staff, and thus disseminate or publish information to areas where it was not meant to have been released.

## 16 SYSTEM ADMINISTRATION

### 16.1 Visibility and Control

Many of the problems with AI as it currently exists seem to arise because the providers have abandoned the principles of basic good programming - building in error traps, making the code robust and controllable, and (with AI in particular) making it explain its workings.

There is no reason why an AI engine shouldn't do all of this, apart from a lack of care from the companies that produce it. However, for PLM we need something much better, more accurate, and more constructive; and the Working Group will define what that will be.

There is a balance to be struck between in-house AI coding by the System Administrator and built-in coding within the engines. The configurability of the engines must be properly understood.

It is expected that the SysAdmin can understand the detailed installation and customisation of the PLM application, and the operating system, but how much should they know about the AI apps? Can you understand the code? Is AI code even human readable? What training does the System Administrator need before AI is adopted? How do you tell the AI engine(s) what to report so that you know exactly what they have done?

### 16.2 Tracking

Industry 4.0 proposed the 'Intelligent Factory', including components that moved themselves around the shop floor and negotiated space on the necessary machines. The effect of this on PLM was never properly considered. (Current PLM is designed for static products or components that the system can organise, not for component that think and act for themselves.)

AI agents could be even worse. If they are allowed to act autonomously, which data will they work on, will they change it, and how can you tell if this has happened?

### 16.3 Security

Not only can AI agents bypass normal access controls (15.4), but there are also reports that they are refusing to obey instructions.

There is a well-known story in which an AI-powered drone, if told to abort its mission, would decide it should kill the operator in order to be able to continue. More recent, and better documented, instances include agents that over-ride anti-virus software in order to download software. The point is that is unrequested and unwanted behaviour, but the agent has no reason not to carry it out. If it can't carry it out, it may spawn another AI agent that can.

In a PLM environment the deviations may be less dramatic, but it is the job of any System Administrator to have absolute control of what their system does, and this includes a complete clampdown on security.

## 16.4 Model Collapse

This is a generic phenomenon of AI models, in that they train themselves on whatever material they encounter, whether it is good or bad; and do so recursively (training on their own results, and sometimes on the results of other models that learned those results from them).

The outcome is that AI models tend to degrade as they iterate over time. In PLM this cannot be allowed to happen. Apart from ongoing data integrity, one of the requirements of PLM is to be able to recreate a product precisely as it was at a given previous revision.

Whatever the future best-practice method of implementing AI in PLM, it will have to deal with this issue.

## 16.5 Model Performance

A more recent issue is that AI engines may set a licensing limit on the number of internal transactions that its engine can make, which can result in the 'thinking process' being aborted before a complete solution is reached by its algorithm - thus producing incomplete or incorrect answers.

## 17 AI vs. KNOWLEDGE

The background to this has been covered by 7 KNOWLEDGE CAPTURE, but there is a more fundamental issue. Businesses rely on people, and successful business is based on motivated, informed people taking decisions based on their skills and experience.

The aim in all of this is not to build a wonderful AI system that is a monument to advanced technology. It is to enhance the way that human beings use their own knowledge; and perhaps to augment that knowledge in the process.

This is also true for the PLM Body of Knowledge. Somehow, AI will be a necessary part of it - perhaps as a sort of "tour guide" or instructor that shows practitioners where to find the material they need and how to apply it in their live, day-to-day environment: perhaps as something more. But the real knowledge will be in the heads of PLM practitioners.

## 18 ECOLOGY

A significant issue to bear in mind in the age of Global Warming is the vast amounts of energy required for LLM-based AI engines to function. Because the engine knows nothing, and has no internal structure, it has to iterate through an infinity of words, looking for the likely next one and the next, to create the simplest answer - even when that answer is already available in a static document or web page.

Someone proudly announced a post on LinkedIn that said they had taken some photographs of a (fairly simple) production process; fed these to AI; and AI had written the process plan in two minutes.

This of course used the energy requirements of a large city, whereas any competent human being could have done the same thing in half an hour for the price of a good breakfast.