

Leverage Cloud and SaaS for Improved Collaboration and Speed

15 May 2023

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LIVEWORX

A NEW ERA IN PRODUCT LIFECYCLE INNOVATION

SESSION ID: PL1113B

LEVERAGE CLOUD AND SAAS FOR IMPROVED COLLABORATION AND SPEED

Harald Vogt

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TRUMPF IN NUMBERS

At a glance

Key corporate figures 2021/22

Sales revenues (in bn. €)

4.223

+20.5 %

Order intake (in bn. €)

5.577

+42.1 %

Employees on June 30, 2022

16,554

+12.1 %

(Quantity)

Earnings before taxes and interest (EBIT) (in m. €)

468

+26.8 %

EBIT margin

11.1 %

R+D costs (in m. €)

448

+17.1 %

R+D quota

10.6 %

Investments (in m. €)

218

+50.1 %

TRUMPF



100

1923–
2023

Worldwide presence

Close to our customers worldwide with over 70 locations

Locations worldwide

Germany	America
14	12
Europe (without GER)	Asia/Pacific/ Others
30	17



TRUMPF BUSINESS AREAS

Machine Tools business division

Machines for laser cutting



Machines for punching and punch laser processing



Machines for bending



Machines for laser welding



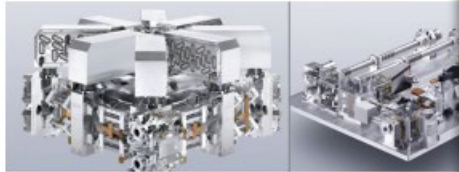
Mach



8 | First Name Surname

Laser Technology business division

CO₂ and solid state lasers



Laser marking systems



9 | First Name Surname

Laser systems

Our other future fields

Electronics



Process power supply for high technology application

Additive Manufacturing



Additive manufacturing for innovative components

Photonic Components



Laser diodes for sensors, data communication and heat treatment

11 | Vorname Nachname

TRUMPF



OUR PLM MISSION STATEMENT

*As a high-tech machine tool company, we are enriching and augmenting our products with **digital solutions and services**. This enables us to implement data-based business models.*

To further expand our portfolio, we need improved capabilities to retrieve and exploit product data throughout the overall lifecycle.

*The strategic initiative **PLM Next** establishes the required methods, processes, and tools to facilitate major application areas such as the simulation of machines and systems, functional modeling, configuration of complex solutions, and data-based optimization of decisions during the product development process.*

The PTC partnership helps us to establish extended bill-of-material information and functionality in our PLM system, supporting the group's strategy, including our sustainability goals.

OUR APPROACH TO EVOLVING PLM



The PLM Next Reality Lab

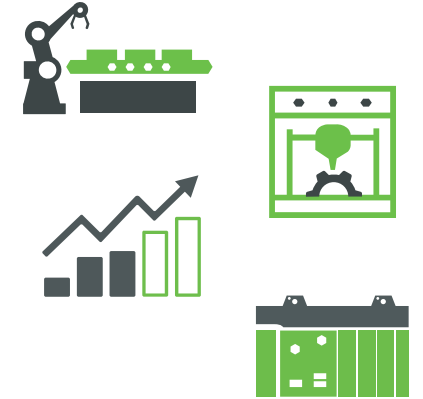
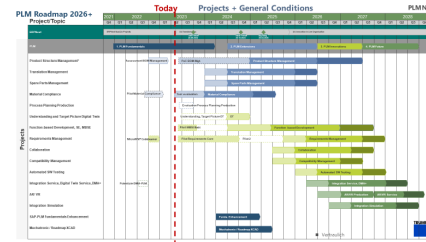
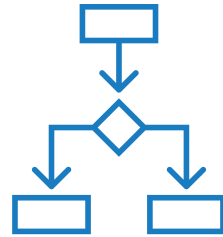
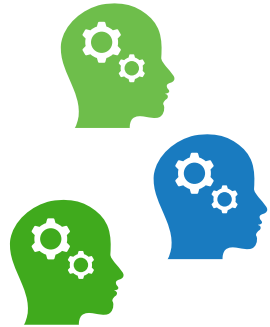


Implementing the PLM Roadmap & Architecture



Driving Innovations

THE TRUMPF PROGRAM **PLM NEXT**



Determine course of action, develop PLM strategy

Solution evaluation, decision

Create and implement roadmap

Benefit



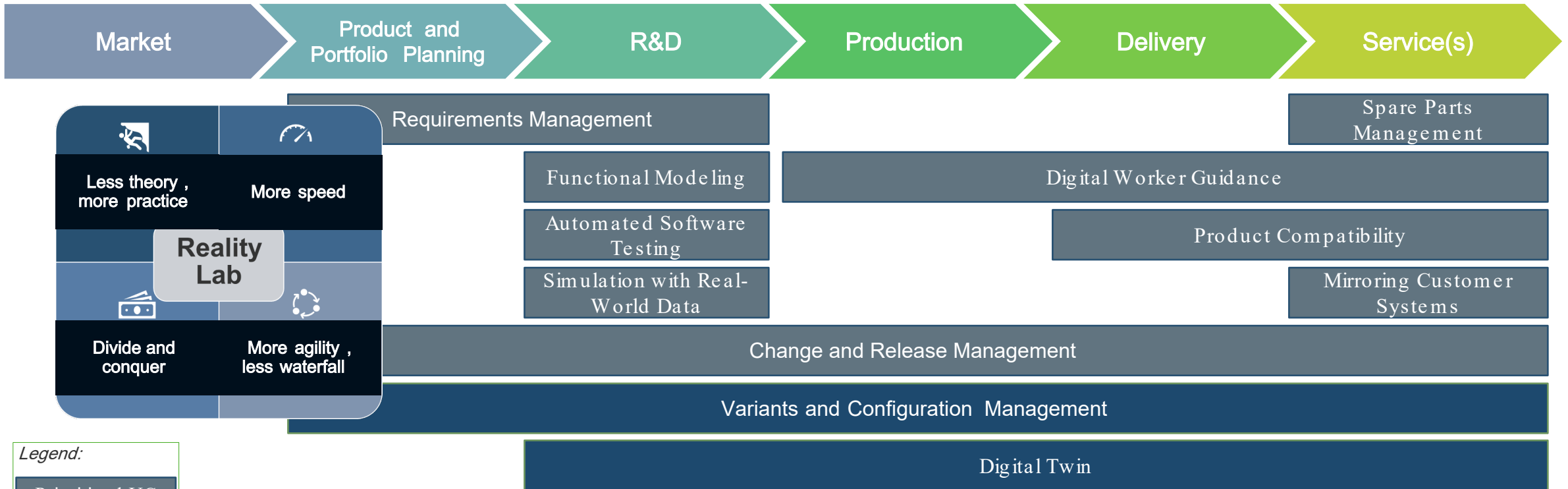
2020



2026+

THE REALITY LAB APPROACH TO DECISION MAKING

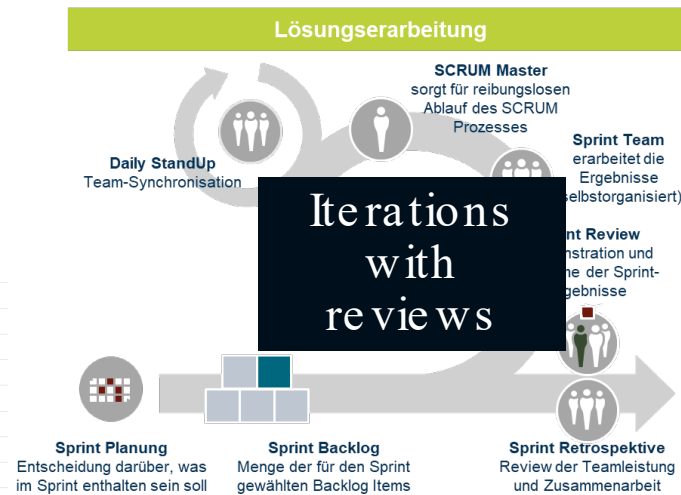
Time-boxed evaluation of PTC solutions using the most relevant (regarding PLM) use cases within the TRUMPF value chain – final go/ no-go decision based on results:



ITERATIVE, USECASE BASED EVALUATION (AGILE)

Backlog

PLMNEXT-101	18.E1 Datenmodell für die Abbildung der Strukturen (as-is/...	OFFEN
PLMNEXT-102	18.E2 Strukturen aufbauen und initial bedaten	OFFEN
PLMNEXT-103	18.E3 Parametrisierung eines Gesamtsystems	OFFEN
PLMNEXT-104	18.01 Aufbau und Speicherung einer Maschinenmodell bez...	OFFEN
PLMNEXT-105		OFFEN
PLMNEXT-108		OFFEN
PLMNEXT-115		OFFEN
PLMNEXT-116	20.02 Optimierung Design & Accelerated Lifetime Tests	OFFEN
PLMNEXT-117	20.04 Schnelle, korrekte ET-Identifikation	OFFEN
PLMNEXT-118	20.05 Austauschempfehlungen für Kunden	OFFEN
PLMNEXT-119	20.06 Rückrufaktion für Kunden	OFFEN
PLMNEXT-120	20.07 Ersatzteilbestellung für Kunden	OFFEN
PLMNEXT-121	20.08 Berücksichtigung von Repair-Kits	OFFEN



Final assessment

	Systems Engineering				Operations		Digitaler Zwilling	
	MVP1	MVP2	MVP6	MVP10	MVP4	MVP5	MVP7	MVP8
Fachliche Funktionalität	7	10	7	7	7	7		
Performance (Testsystem)	7	7	10	10	7	10	8	
Usability	5	6	7	7	6	7		
Rollenkonzept umsetzbar	10							
Zusammenarbeit mit PTC	10							
Methoden und Konzepte bestätigt	10							
Funktionale Abdeckung	75%							
Integration unter der PTC-Tools	95%							
Integration in TRUMPF Landschaft	20%							
Signifikanz PTC für den Use Case	8							
Wesentliche Verknüpfung durch PTC	10							
Verfügbarkeit von Informationen	10							
Vermeidung von Entscheidungen	8	3			4	10	5,5	
Akzeptable Komplexität der Systemhandhabung	9	4			7	8	8	6
Nutzung von Daten im Produkt-Lebenszyklus	10				9	5	5	6
Mehrwert durch PTC-Tools	10	8			3	7	8	7

Case-oriented functionality
Performance (Test system)
Usability
Role concept implementation
Cooperation mit PTC
Confirmation of methods and concepts
Functional coverage
Integration of PTC tools
Integration with TRUMPF landscape
Relevance of PTC for use case
Simplification through PTC
Information availability
Facilitation of decisions
Complexity of system landscape
Usage of data in product lifecycle
Added value through PTC tools

REALITY LAB TAKE-AWAYS

- Reality Lab as an alternative to „traditional“ provider and solution evaluation
- User stories as the foundation for system evaluation
- Guided validation of user story feasibility within a PTC sandbox
- Intensive Q&A between experts from both sides; high workload !
- Strong commitment by PTC was necessary – and we got it!

- Identified key areas with high potential
- High workload
- High confidence for vendor decision



- 25 project team members
- 80 contributors
- 8 use cases
- 5 months preparation
- 9 months execution
- 3-6 months per use case
- ~10 user stories per use case
- Top management level oversight
- Company-wide communications
- Benefit analysis

KEY RESULTS

■ Requirements Management

- rv&s vs. Codebeamer
- Wanted: New cloud-based tool!
- High potential impact on the development process

■ Functional Modeling

- Reality Lab confirmed high value of the approach
- Tool offering adequate
- Long -term goal due to high impact on development method

■ Product simulation

- Important topic due to product complexity
- Wide applicability: Compatibility, functionality, configuration, etc,
- Minor contribution from PLM

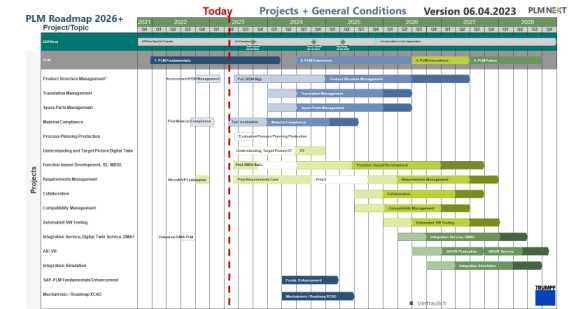
IMPLEMENTING THE PLM ROADMAP

- Step 1: Establish Windchill as the CAD repository
 - Solidworks integration
 - Migrate the existing database from SAP
 - Update our CAD-related processes
- Step 2: Design the future product structure management landscape
 - Benefit from Windchill capabilities
 - Integrate with established tools
 - Support novel applications
- Step 3: Start with innovation projects
 - Requirements management
 - Functional modeling

- Challenge: Integrate with established tools – or adapt the organisation
- Challenge: Keep the organisation up to speed under changing environment

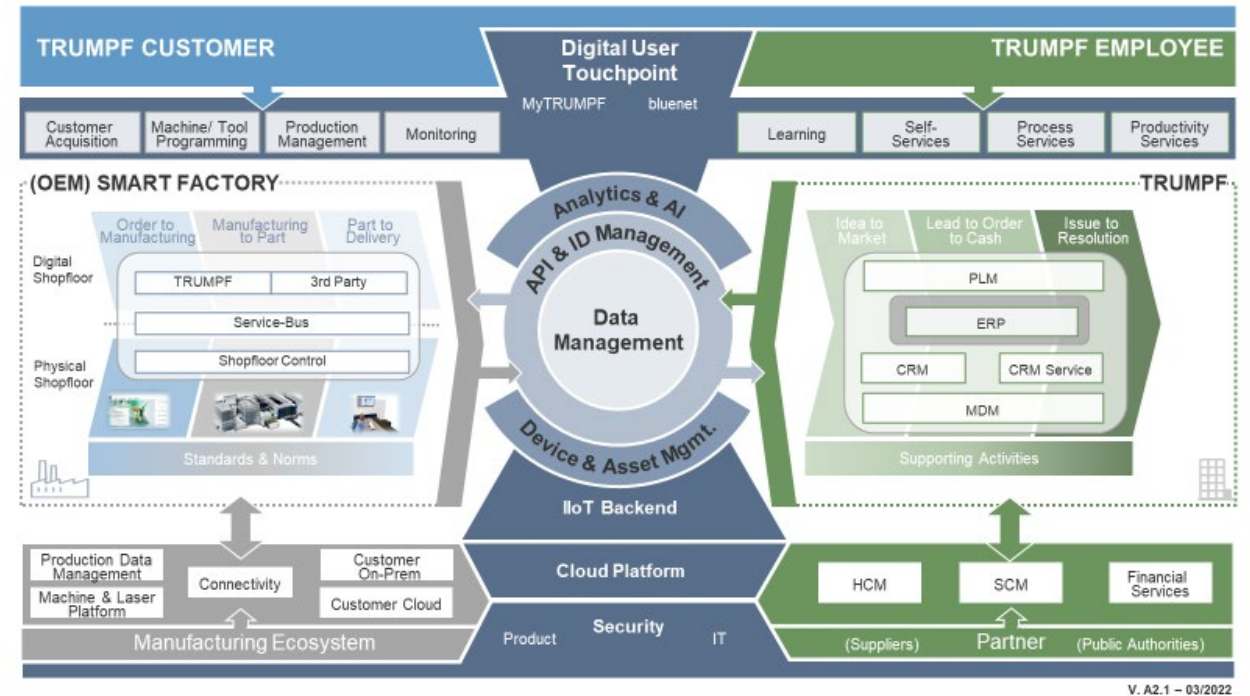


windchill modeler



EVOLVING THE PLM SYSTEMLANDSCAPE

- TRUMPF Digital Reference Architecture: unifies customer products / solutions and business IT
- Scalability through cloud -based services
- Evolving the traditional PLM architecture through consolidation and with modeling
- Close data loops through customer smart factory solutions

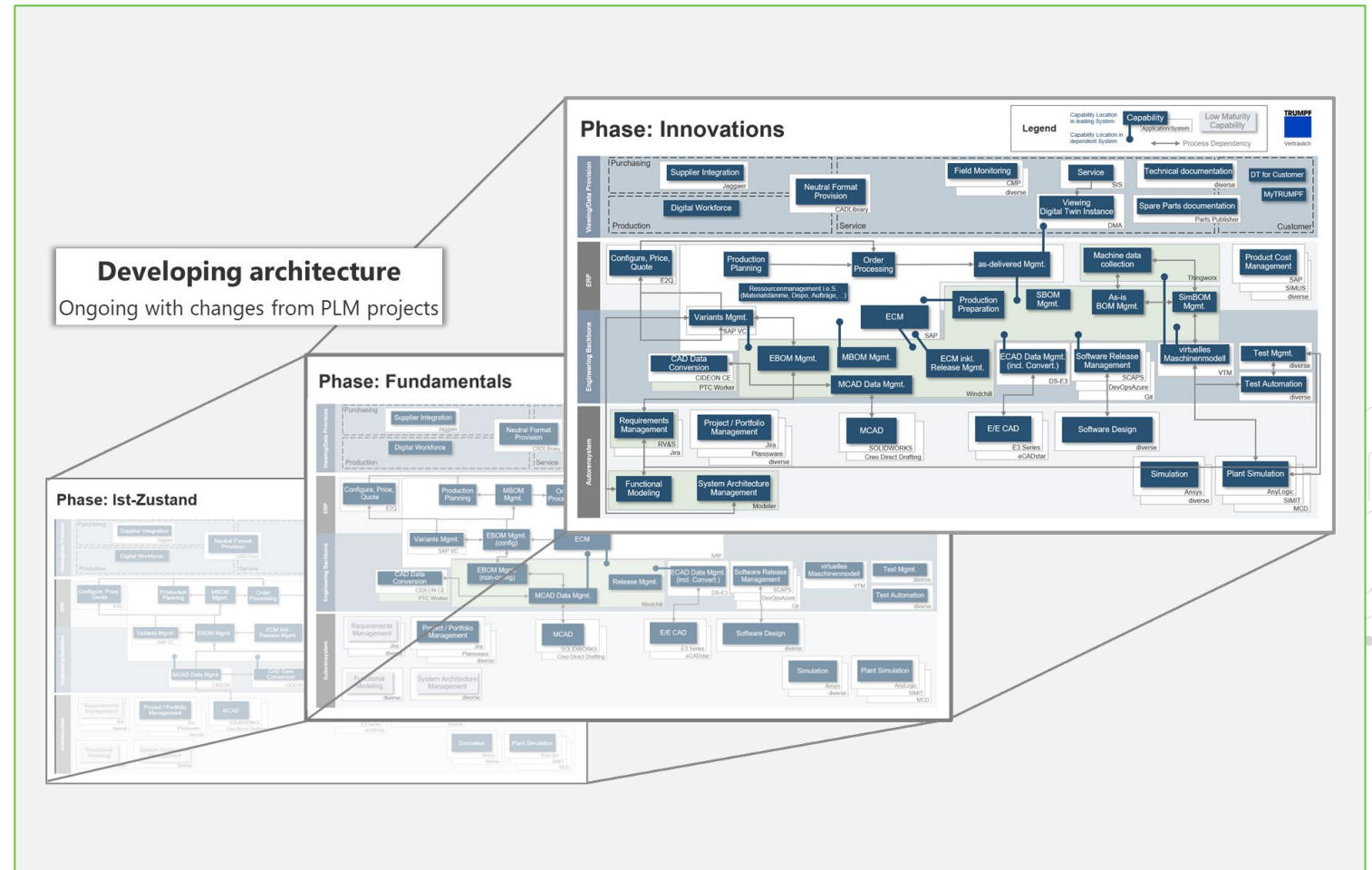


Ongoing: Integration of PTC solutions:



IT ARCHITECTURE INTEGRATION

- Evolving the existing architecture from bottom to top
- Guided by the IT architects organisation
- Driven by extended use cases building on what we have today
- Consolidate existing systems, add systems for innovation



DRIVING INNOVATIVE METHODS

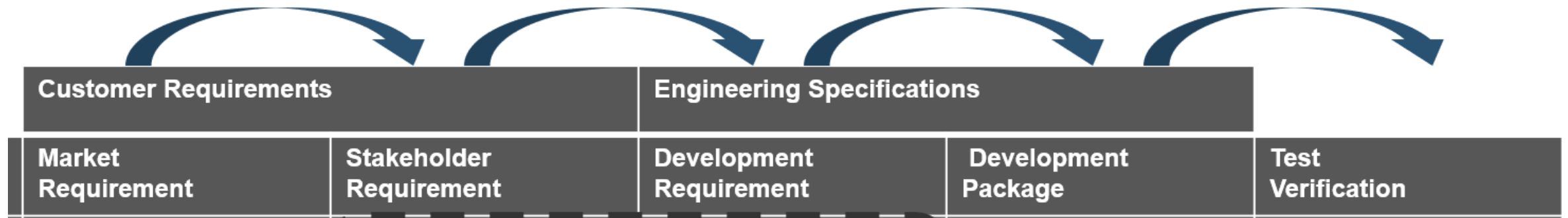
- **Systems Engineering** : a foundation for innovative approaches to product improvement
 - Innovation? Focus, yes!
 - What is SE after all? Philosophy, perspective, tools, methods, collaboration, formalization, ...
- Different level of maturity throughout the organisation
 - In some areas, the job title „systems engineer“ has been established
 - Product modeling has proven useful
 - Grassroots -driven interest for wider application
- The way ahead
 - Interesteparties convene in a „Community of Practice“
 - Use the PLM program as a framework for pilots

“What are communities of practice? In brief, they’re groups of people informally bound together by shared expertise and passion for a joint enterprise”

- Wenger/ Snyder,
HBR 2000/ 01

DRIVING INNOVATIVE TOOLS

- **Requirements Management**
 - universally used, but heterogenous approaches and underdeveloped formalization
- Current approaches lack support in ...
 - Customer interaction
 - Requirements validation
 - Risk management
 - Reusability
 - Versioning
 - ...
- **Heterogeneous needs**
 - Development process phases
 - Product families
 - Stakeholders
 - Project/team approaches (agile or hybrid)
- **Objectives**
 - Process harmonization
 - Tool standardization
- **Rationale**
 - Foster collaboration
 - Minimize administration overhead
- **Evaluation and establish Codebeamer**



CONCLUSION

- The Reality Lab approach to solution validation has disclosed the strengths and limitations , and set the focus for the design of the PLM roadmap
 - Prioritize the topics with low dependencies and high potential
 - Further deepen the evaluation of complex , high-impact topics (e.g. BOM management)
- The Digital Reference Architecture provides a useful framework for system decisions and business process implementation
 - Emphasis on cloud solutions offers a lower barrier to entry
- PLM is a great framework for introducing innovative methods and tools , with the perspective of deep integration



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THANK YOU

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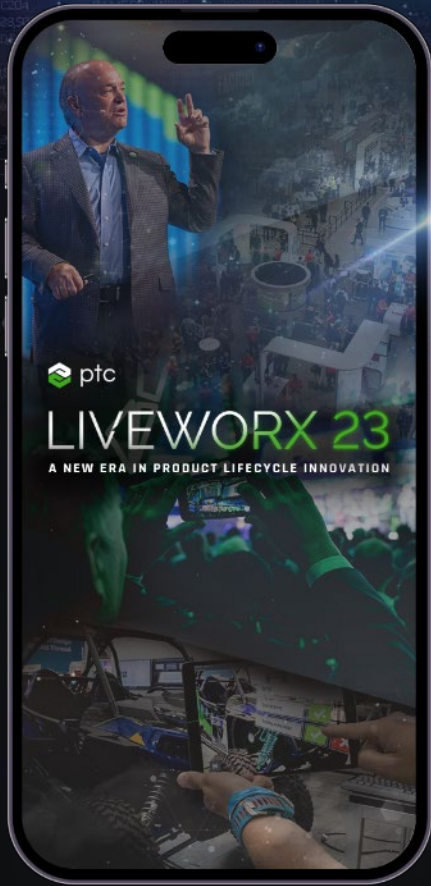
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PROVIDE SESSION FEEDBACK

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