SMART PLM (PLM 4.0)

Uthayan Elangovan

Entrepreneur | Consultant| Author |
Key Note Speaker | Founder & CEO

19' February 2021

Executive Summary

Digital and Collaborative Product Lifecycle Management

Digital NPD/NPI

Key Takeaway:
- PLM
  - Digital Product Development
  - Business Use Case – PLM through IIoT

Traditional PLM to Digital PLM

Digital Product Lifecycle Management

Neel SMARTEC
Consulting

Executive Summary

Abstract:

     Smart products are the future of the smart connected world. Digital transformation has radically changed traditional manufacturing processes through new collaborative connected product development to smart manufacturing. Smart product development is an essential fact for many manufacturing industry today. New product development teams are changing from a majority of mechanical engineers to numerous proficient disciplines of engineers and manufacturers have the ability to check specifically how their products are utilized in actual time with the help of sensing units and also systems attached to the internet/intranet within the product. In addition, touch base on the smart product ecosystem over which manufacturers have incredible access to a constant stream of up to date insights of the product. This informative session review a high level introduction of development of SMART product through SMART manufacturing in the era of Industry 4.0

Keyword: *Industrial Internet of Things (IIoT), Smart Manufacturing, Smart Product Development*

Key Takeaway:
- Product Lifecycle Management
  - Process Automation
  - Smart Product Development

Topics

- Product Lifecycle Management (PLM)
- Components of PLM
- Process Automation
- Smart Product Development
- Business Use Case
- Summary

Neel SMARTEC
Consulting

Customer to Customer

Manufacturing business are constantly changing

- Product is the blood of any business

- Product development is an crucial factor to survive

- Product development process is a cycle

- New product has to go through from conceptualization to the last introduction right into the marketplace

NPD Leader

Designer

Manufacturing Engineer

Vendor Development

Testing Engineer

Quality Engineer

Costing Engineer

Marketing

Product Service and Support

Idea Generation → Screening & Evaluation → Concept → Business Case → Design → Development → Launch to market

Product Data Management (PDM)

- A system used during product design to store and retrieve data to ensure information consistency throughout the life cycle of a product. It benefits use of concurrent engineering while maintaining control of data and distributing it automatically to the people who need it – when they need it.

Principle of PDM

Product Data Management (PDM)

A system used during product design to store and retrieve data to ensure information consistency throughout the life cycle of a product. It benefits use of concurrent engineering while maintaining control of data and distributing it automatically to the people who need it – when they need it.

PDM works on the concept of Check In and Check Out Mechanism.

Workspace: private area where the user can work on the objects, create new ones. This area is not accessible by other users.
Each time a user wants to work on a product data, this object has to be brought into his workspace.

Commonspace: Shared area accessible to all authorized users. This is where checked in objects go.

Check in

workspace

Commonspace

Check out

User A

User A   User B   User C

Neel SMARTEC
Consulting
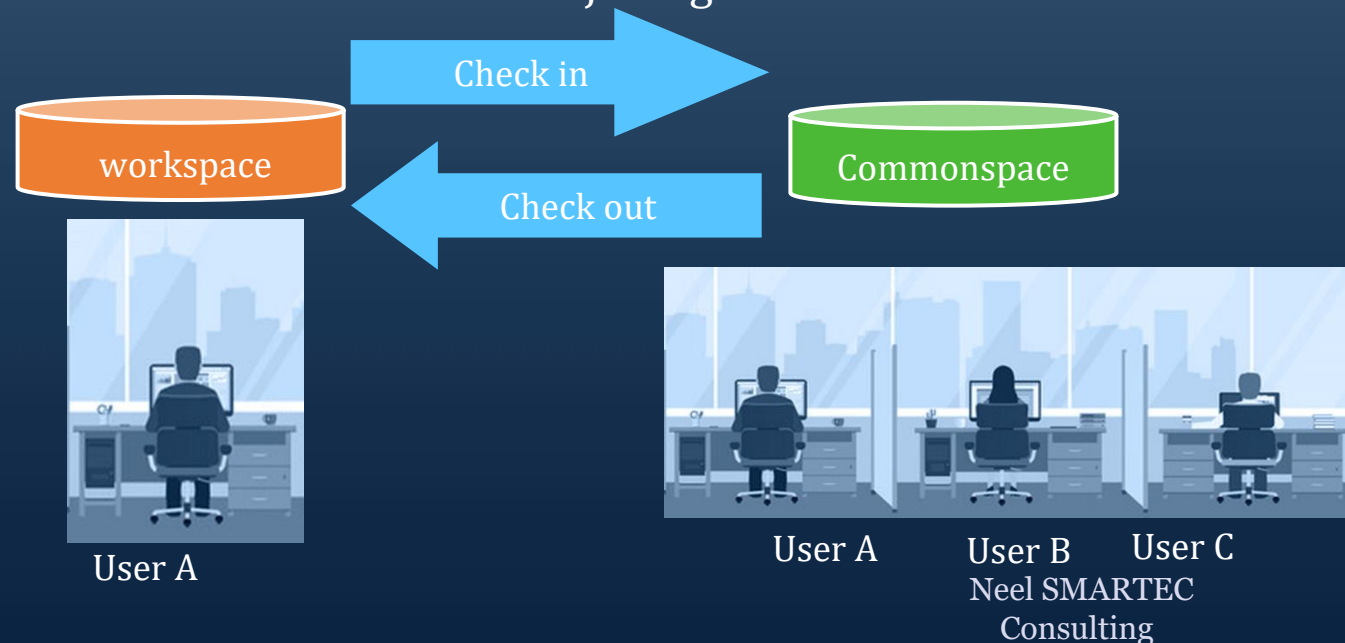
PLM

Product Lifecycle Management (PLM)

- Development of a new product is separated into significant phases

- Phases are beginning of product life (BOL), middle of product life (MOL), and end of product life (EOL)

- Processes connected to the different phases depicts the maturity of the product

- Monitoring of the phases establish a name PLM or Product Lifecycle Management

- A business strategy that helps companies share product data, apply common processes, and leverage corporate knowledge for the development of products from conception to retirement across the extended enterprise.

Evolution of PLM

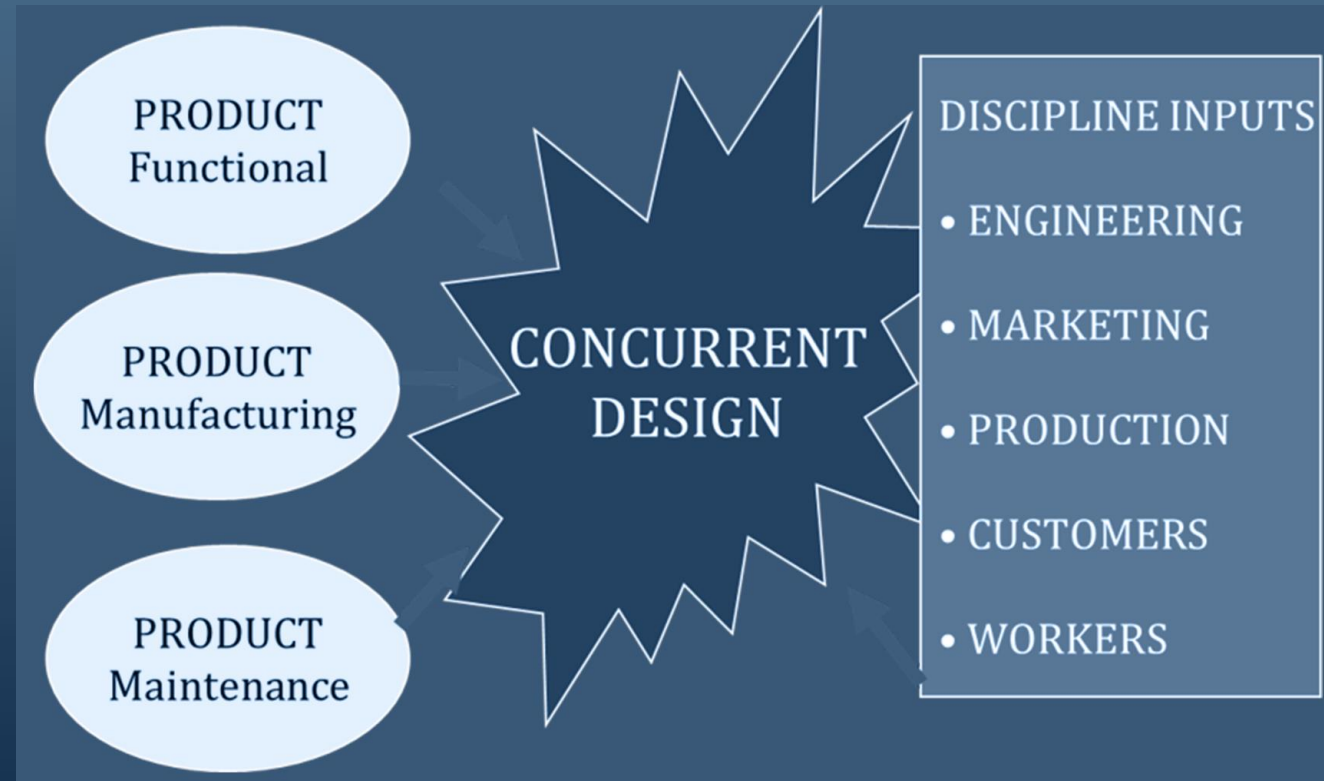| 1985 +	Mid 1990's	Late 1990's	2017 +
EDM	PDM	cPDM	SMART PLM / PLM 4.0
		CPC	
		PLM	
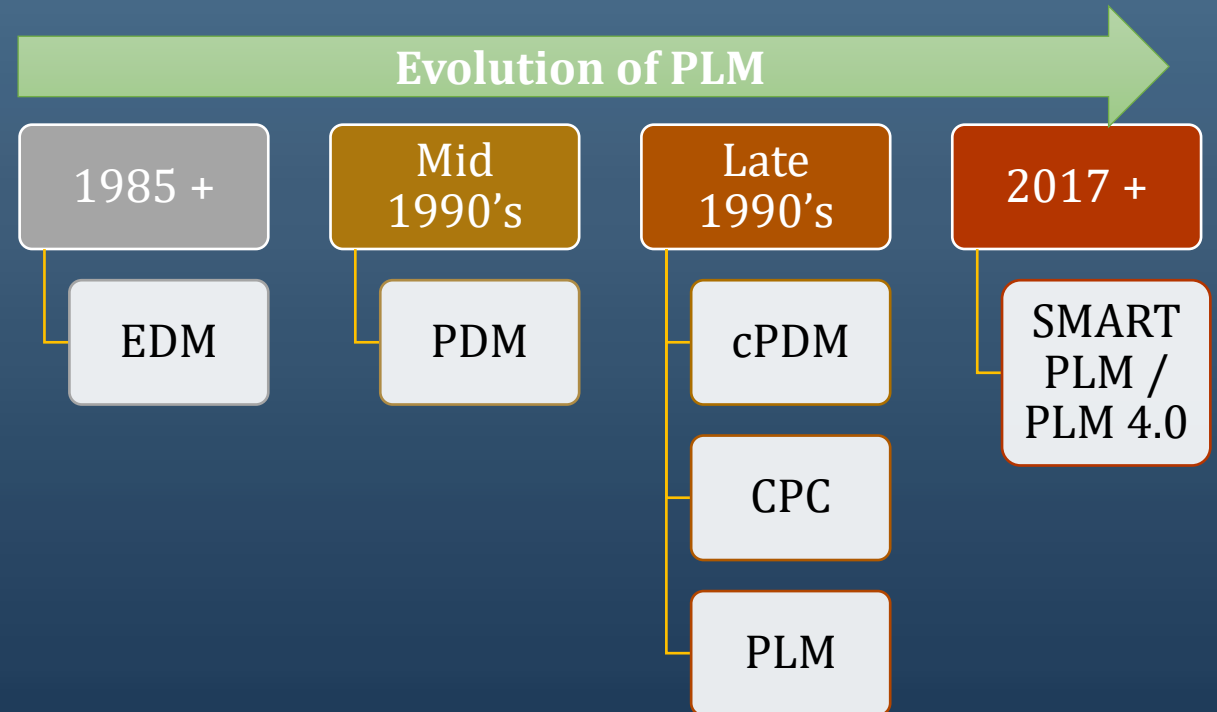
Why PLM is required?

Products are becoming more advanced and smarter. Enterprise's need a better model to support their product development in this competitive era. PLM manage all aspects of the product lifecycle, from concept design to product retirement.

"To be competitive, corporations must alter their product and process development cycle to be able to complete diverse tasks concurrently"

PLM helps companies take a cohesive, holistic view of their products and product-related processes that results in

- Efficiency improvements

- Improving development for new products

- Reduced costs

- Increase productivity

- Improved quality of products

PRODUCT Functional

PRODUCT Manufacturing

PRODUCT Maintenance

CONCURRENT DESIGN

DISCIPLINE INPUTS
- ENGINEERING
- MARKETING
- PRODUCTION
- CUSTOMERS
- WORKERS

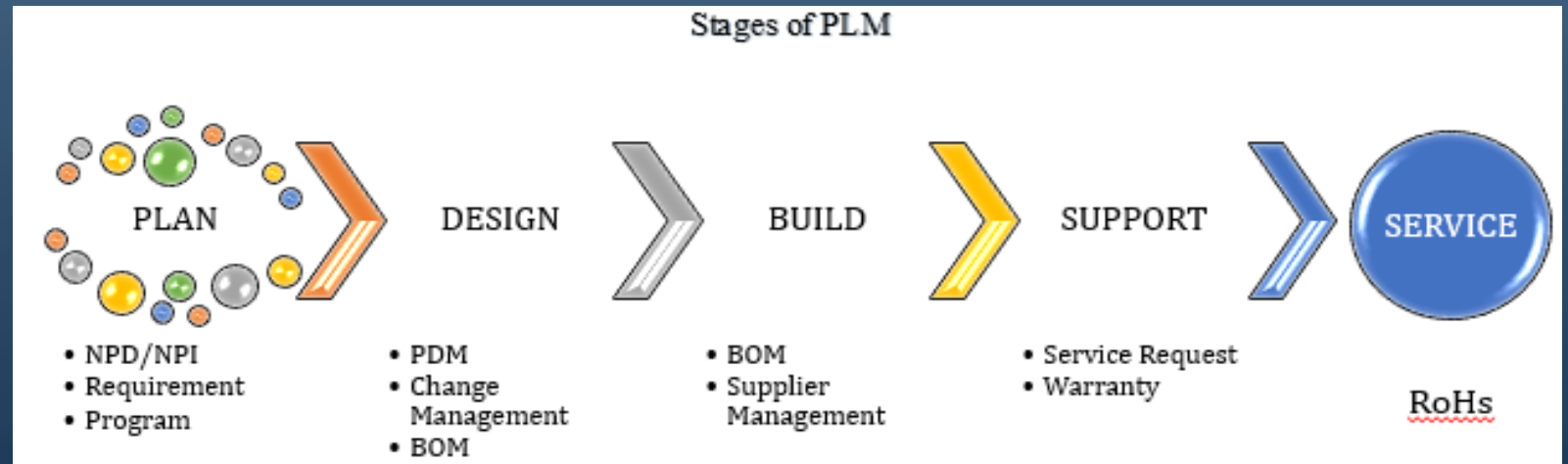Neel SMARTEC Consulting

Concept of PLM

What kind of data does a manufacturing company need to manage?

Companies produce two types of data

- Product data
- Business data

Product data is split into

- Content data
- Metadata

Stages of PLM

PLAN → DESIGN → BUILD → SUPPORT → SERVICE

- NPD/NPI
- Requirement
- Program

- PDM
- Change Management
- BOM

- BOM
- Supplier Management

- Service Request
- Warranty

RoHs

Basic objects managed by PLM system are

- Product definition
- Product documentation
- Relationships

Components of PLM

Product Data Management

CAD, eBOM, Requirement, Release to Manufacturing

Manufacturing Process Management
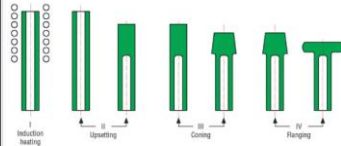
Process layout, mBOM, Process plan, Work instruction, Control plan
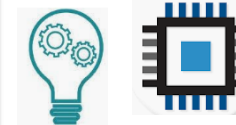
Change Management

1. Request for Change
2. Impact Analysis
3. Approve/Deny
4. Implement Change
5. Review/Reporting

PR, ECR, ECN, ECO

Quality Management

CAPA, PPAP

Supplier Management

AML, AVL, Supplier parts

Project Management

NPD, NPI, Tracking

Product Structure

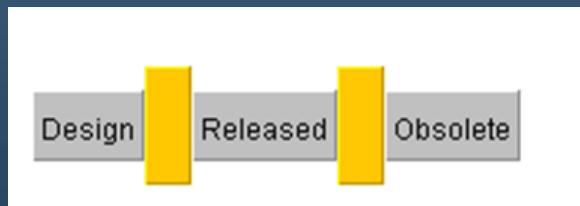- Product structure tree provides a hierarchical classification of the items which form a product

Product Lifecycle and its Workflow

Lifecycle are based on

During its life, from first Design to manufacturing, the product go though several Phases that describe its maturity.

Product would go through several phases (Simple or Complex) :

|	
Design	Design - Check In / out, send for approval
Released	Approve and Released
Obsolete	Promote from Release to Obsolete

Workflows – Used to translate the business practices of the company and/or regulatory agencies into repeatable, documented processes

Business Process Flow

Process Flow as

Design	Design - Check In / out, send for approval
Released	Approve and Released
Obsolete	Promote from Release to Obsolete
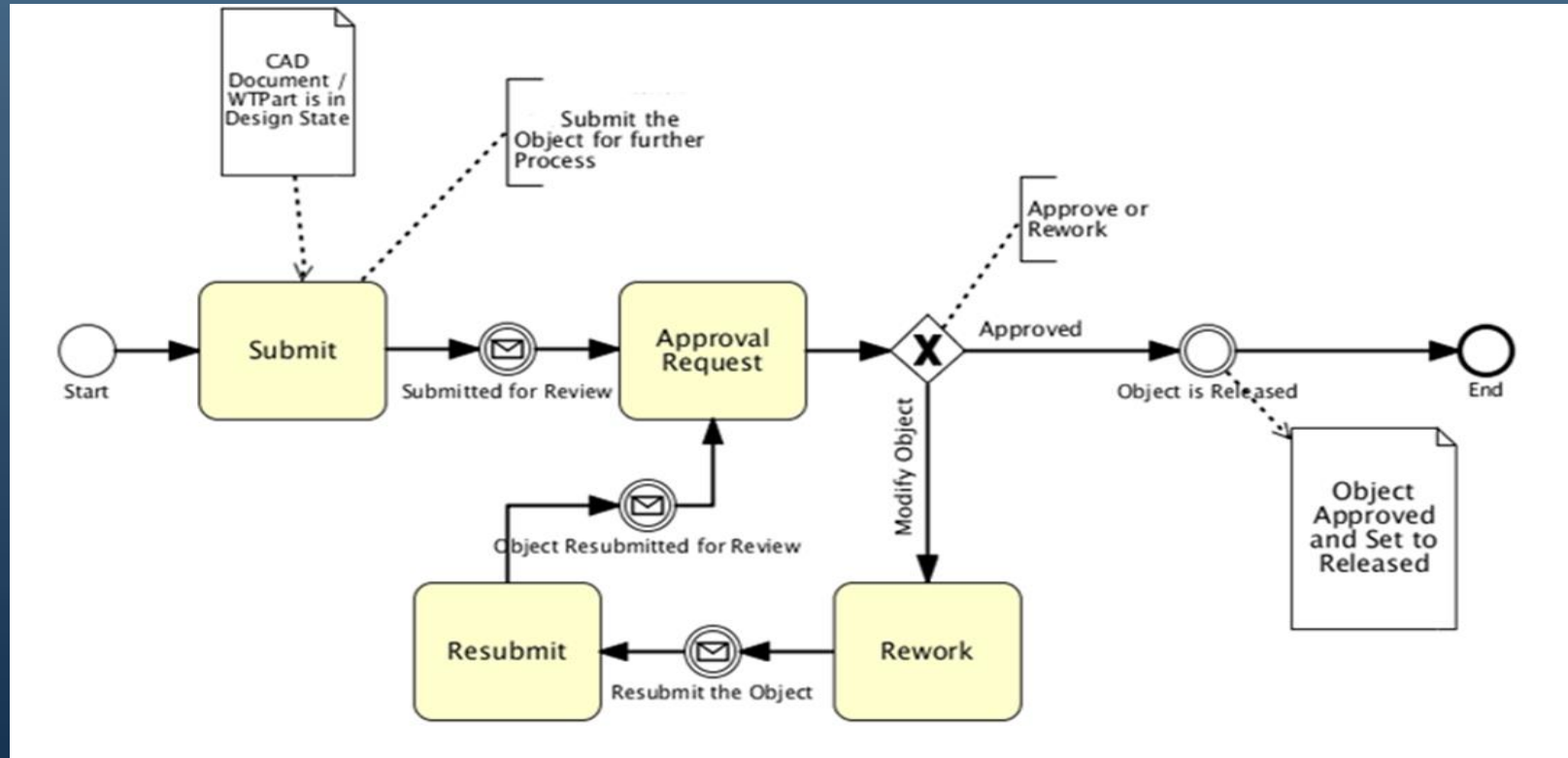
PLM – ERP Integration

PLM is all about product development – the very first stage of the manufacturing process.

PLM is a building block for any company that designs and manufactures its own products, or manufactures to order. PLM software also provides the single point of product truth used by ERP to manage product resources and financials.

For example, by using EBOM data from the PLM system, ERP can accurately generate purchasing and inventory management records, enabling seamless management of both resources and production.

ERP Vs PLM

"An ERP system is a business management tool used to fulfill the needs of many facets of a company including; finance and accounting, distribution, human resources, customer service and manufacturing."

ERP supports these various departments by delivering improved processes such as an automated 3 method for order fulfillment, providing a single location for tracking cost information to ensure consistency, and helping human resources to standardize their information

ERP = Material Requirements Planning (MRP) + Manufacturing Resource Planning (MRP II)
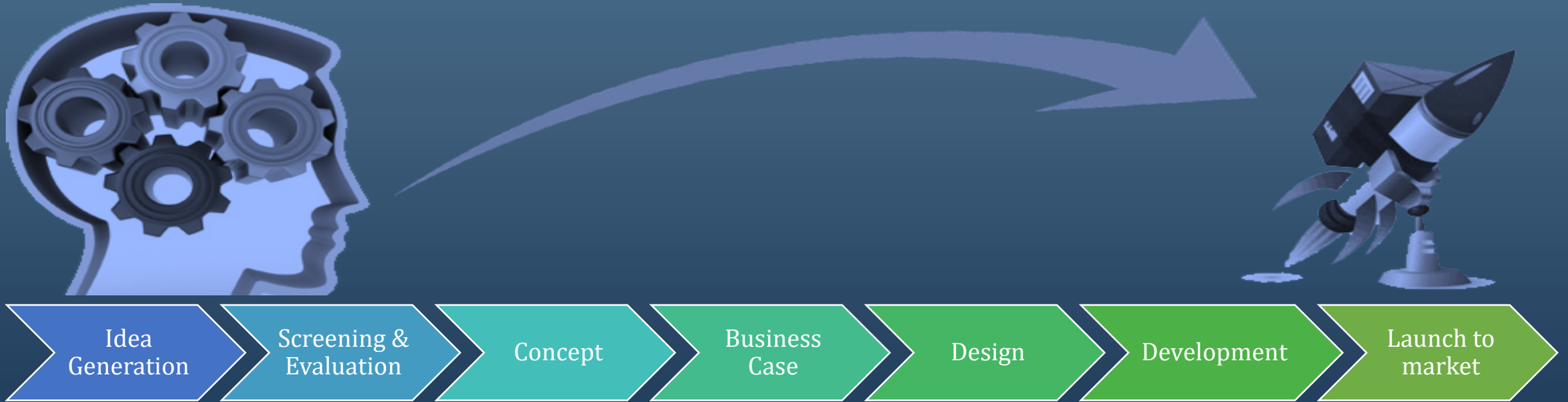
PLM manages the innovation and design process, while ERP ensures quality products are manufactured in a timely, cost controlled manner once a product has been engineered and approved.

SMART Product Development

As an engineer or product leader with responsibility for product development, you are driven to reduce costs, accelerate product innovation, enhance product features, improve product quality and get to market faster.

- Usage-Based Requirements

- Immersive Product Review

- Connected Product Quality Analysis

- Product Configuration Management

Product Development Process

| Idea Generation | Screening & Evaluation | Concept | Business Case | Design | Development | Launch to market |

Standard to Smart Product Design

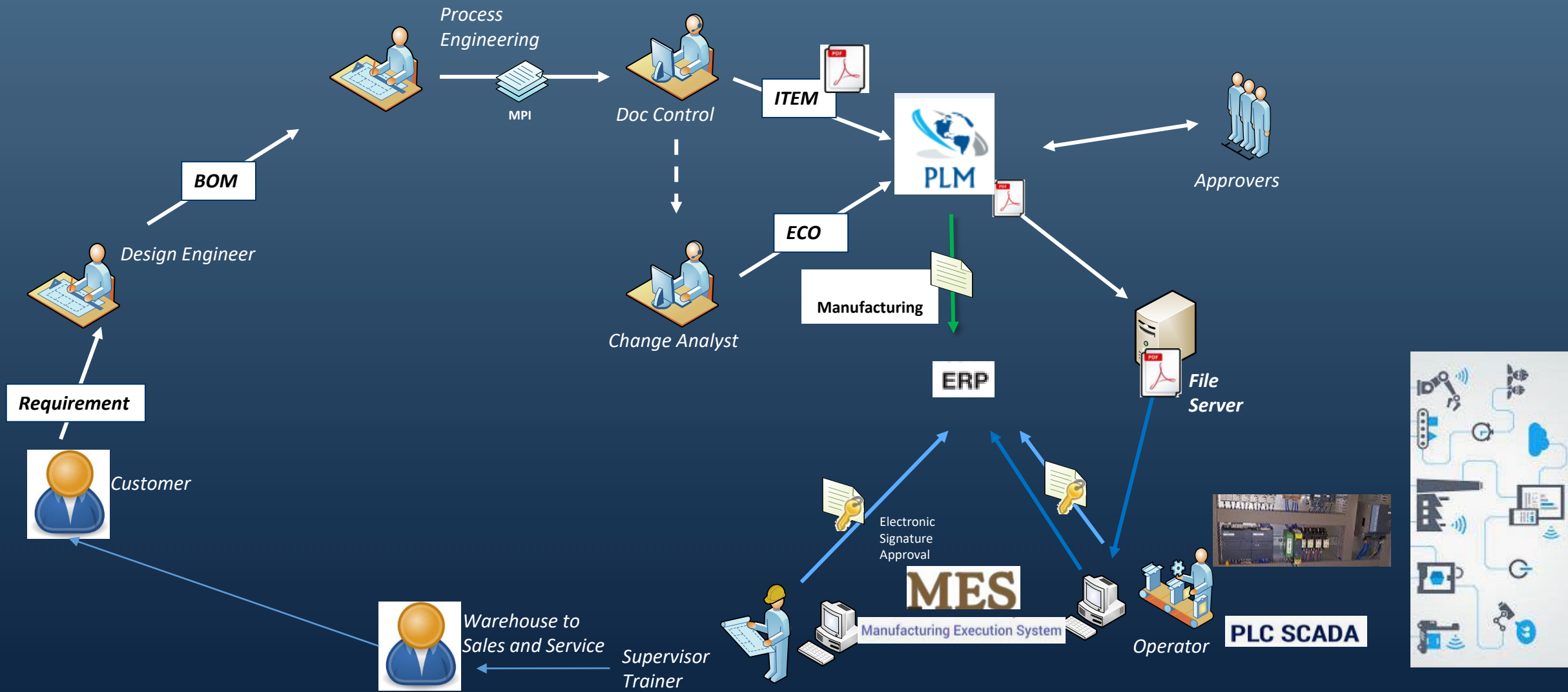| Standard Product	Smart Product
Traditional Design	Coupled Design
Product is Sales Oriented	Product is Service Oriented
Isolated Product	Connected Product
Long Design Cycle	Short Design Cycle
Functionality is in-built	Distributed Functionality
Data and Security is Product specific	Data and Security is System specific

Stages -Smart Connected Product Development

- Product Design is changing with Customer demands
- Digital Knowledge of the product reveals possibilities for
  - New performance
  - Greater integrity
  - Product utilization
  - Product Ability
- Product development shifts from
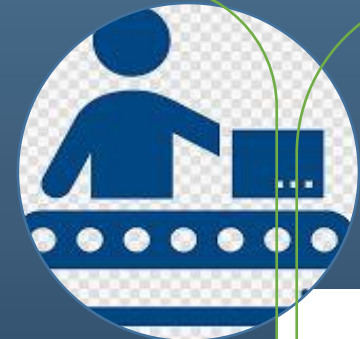 - Mechanical design to true interdisciplinary systems engineering

Quality Function Deployment → Material Selection → Product Structure → Communication Protocol → Prototype → Quality Assurance → Product Certification → Pre Launch → Product Launch → Post Launch

Business Use case – PLM to IIoT

Neel SMARTEC
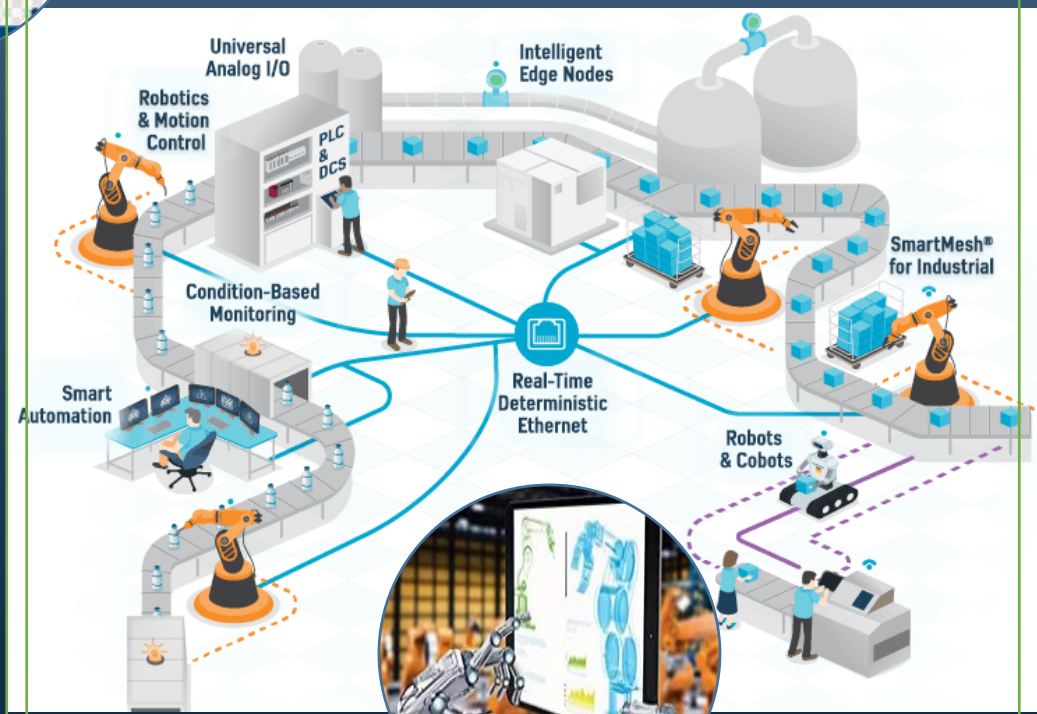Consulting

Smart Design to Smart Manufacturing

SMART Engineering

Digital Transformation

SMART Manufacturing

Industries , Key players and market growth of PLM

PLM system can be used in many different sectors. For example: **Space and aviation, architecture, construction, automotive, industrial, energy, petrol, infrastructure, Computing, shipbuilding, textile, Medical, FMCG.**

Looking toward 2022, CIMdata forecasts the PLM market to grow at a compound annual growth rate (CAGR) of 6.9% to $61.0 billion." Ref: CIM Data
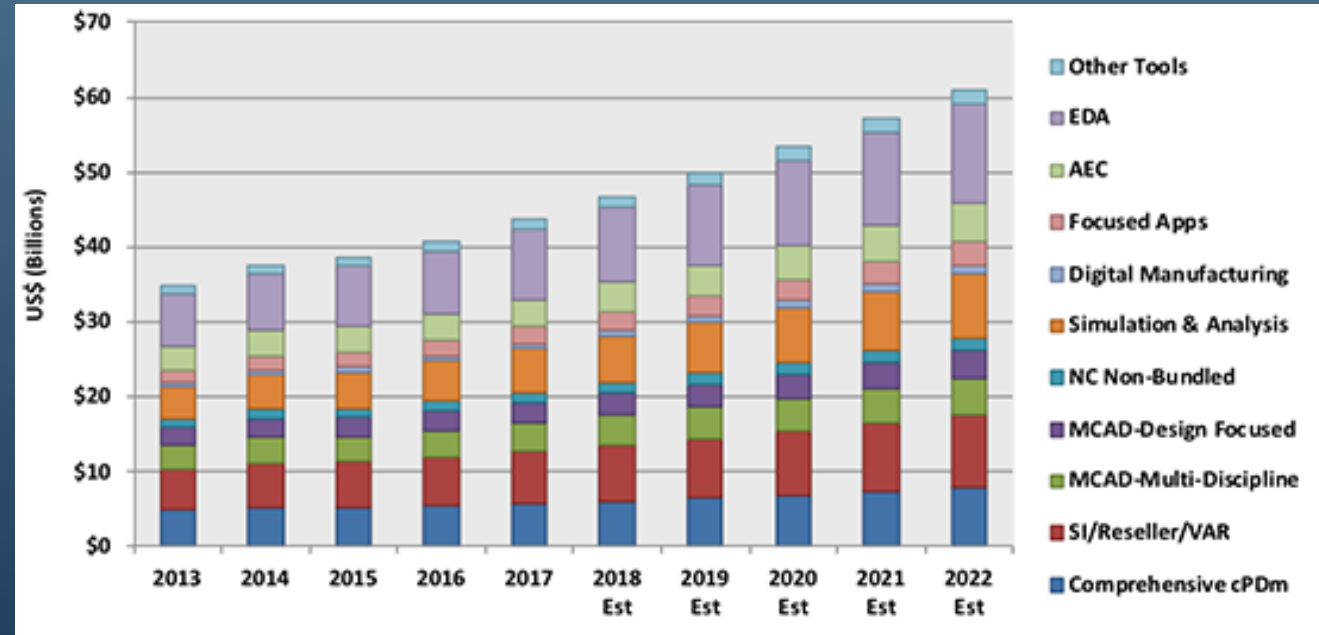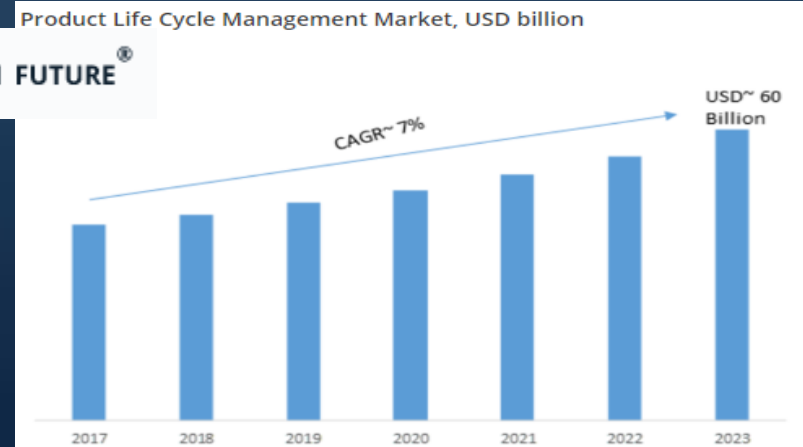
Our Partners

Product Lifecycle Management (PLM) Software Market 2020 The product lifecycle management PLM) software market was valued at USD 46 billion in 2018 and is expected to reach USD 67.3 billion by 2024

Posted on Jan 29 2020 6:47 AM

Product Life Cycle Management Market, USD billion

Source: MRFR Analysis

Product Lifecycle Management (PLM)

A Digital Journey Using Industrial Internet of Things (IIoT)

Uthayan Elangovan

CRC Press
Taylor & Francis Group

Bookauthority
BEST INDUSTRIAL MANAGEMENT BOOKS OF ALL TIME
WINNER

Bookauthority
BEST NEW INDUSTRIAL MANAGEMENT BOOKS
WINNER

Bookauthority
BEST NEW PRODUCT DESIGN BOOKS
WINNER

Find in library

BRITISH LIBRARY

ETH zürich

LIBRARY OF CONGRESS

NASA **Jet Propulsion Laboratory** California Institute of Technology

MiT Massachusetts Institute of Technology

W UNIVERSITY of WASHINGTON

of 7 Best Global Universities of 2021

UNIVERSITY OF **OXFORD**

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

JOHNS HOPKINS UNIVERSITY

UNIVERSITY OF **CAMBRIDGE**

Berkeley UNIVERSITY OF CALIFORNIA

Book Authority
11 Best New Product Design Books To Read In 2021!
8 Best New Industrial Management Books To Read In 2021!
26 Best Industrial Management Books of All Time!

£85 & $110 UK & USA

2020 Taylor & Francis Award Winner for Outstanding Professional Book!

contact@neelsmartec.com | +919538047356 | www.neelsmartec.com | India