PLM & ERP: What is the Difference, and Why Should you Care?

CIMdata PLM Leadership Webinar Series

28 January 2015

#cimdatawebinar

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CIMdata® | Global Leaders in PLM Consulting
www.CIMdata.com

Our Mission...

Strategic management consulting for competitive advantage in global markets

CIMdata is the leading independent global strategic management consulting and research authority focused exclusively on the PLM market.

We are dedicated to maximizing our clients' ability to design and deliver innovative products and services through the application of PLM.

Presenters' Profile

Your presenters' professional background

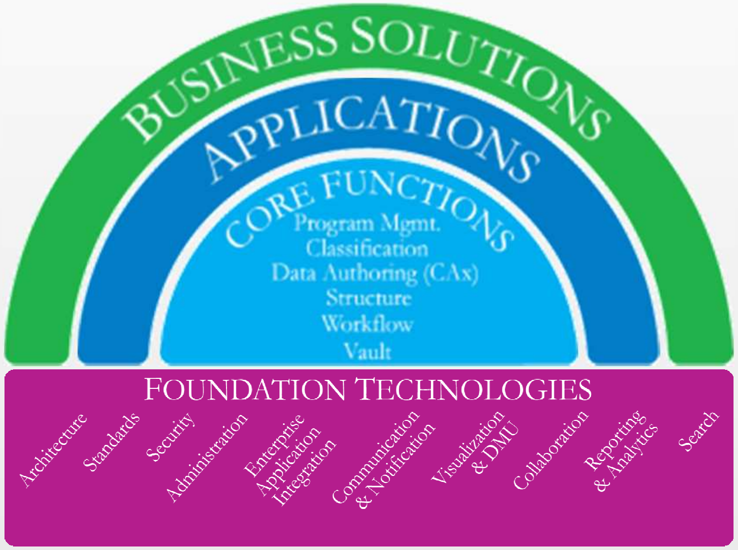
- Jim McKinney, PLM Leadership Practice Manager
  - 30+ years of experience in almost all areas of PLM
  - Has held positions in MCAD support, PDM implementations, product marketing, training, competitive intelligence, and consulting to companies large and small around the globe
  - Holds a B.S. in Design Engineering Technology from BYU

Topics to Discuss

- What is PLM
- What is ERP
- Engineering-centric vs. Manufacturing-centric
- Key Integration Points
- How to Leverage PLM and ERP Integration to Improve Innovation
- Concluding Remarks

CIMdata's Definition of PLM...

PLM – integrating people, processes, information, and business systems


BUSINESS SOLUTIONS
APPLICATIONS
CORE FUNCTIONS
Program Mgmt.
Classification
Data Authoring (CAx)
Structure
Workflow
Vault
FOUNDATION TECHNOLOGIES
Architecture
Standards
Security
Administration
Enterprise Application Integration
Communication & Notification
Visualization & DMU
Collaboration
Reporting & Analytics
Search

- Strategic business approach
  - *NOT* just technologies
  - Consistent set of business solutions
- Collaborative creation, use, management & dissemination of product related *intellectual assets*
  - All product/plant definition information – the virtual product
    - MCAD, AEC, EDA, CASE, analysis, formulas, specifications, portfolio, docs, …
  - All product/plant process definitions – the virtual processes
    - Processes that plan, design, produce, operate, support, decommission, recycle, …
- Supports the extended enterprise
- Spans full product/plant lifecycle, from concept to end of life

What Products Are We Talking About?

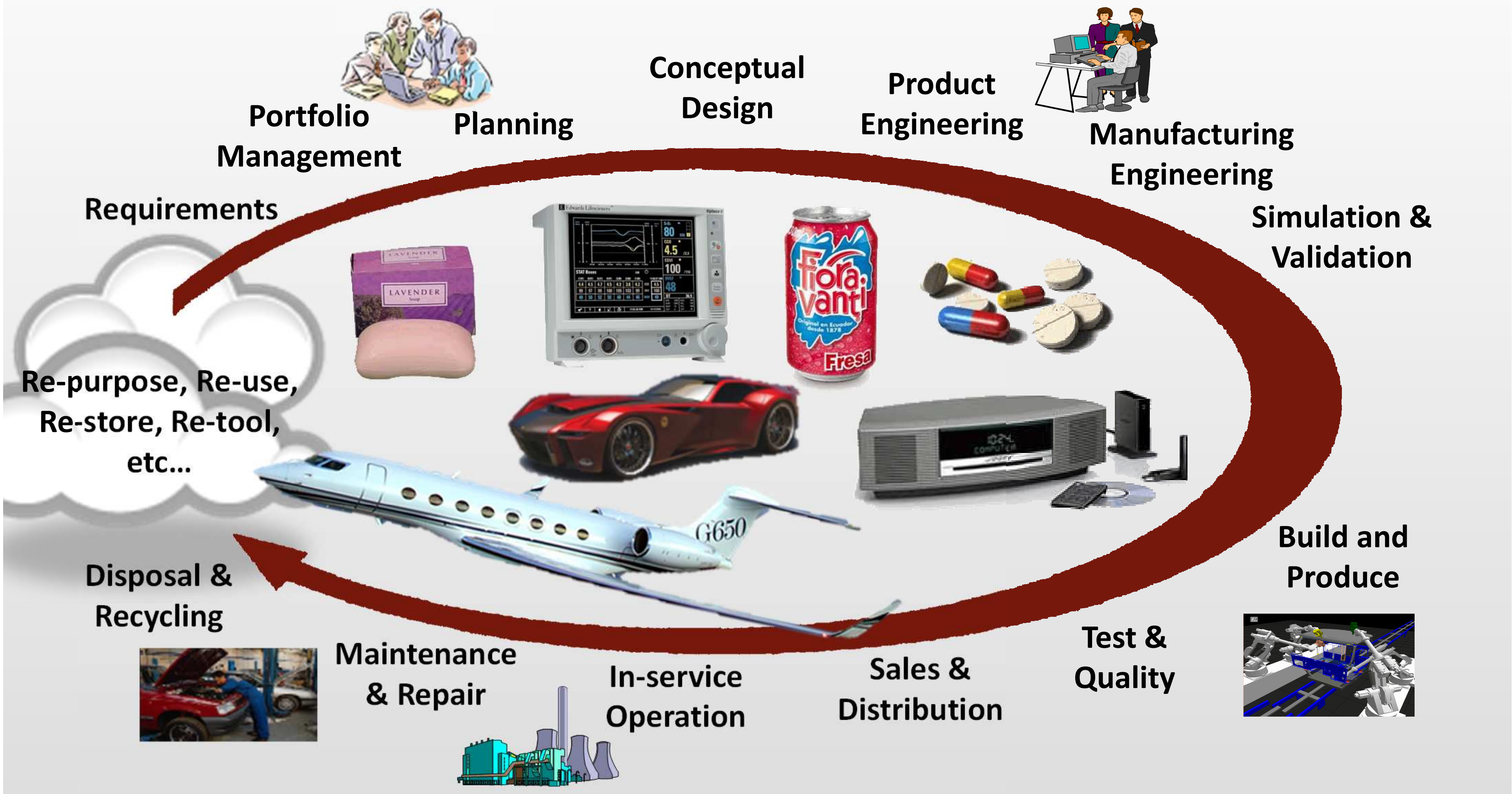
Companies can’t afford to only think about traditional discrete products!

- PLM spans the life of any “product”
  - Manufactured products—automobile, computer, pill, soda, hat
  - Projects—building, bridge, highway
  - Plants—oil refinery, offshore platform
  - Assets & Facilities—airport, railway system, utility distribution network (e.g., electricity, telecoms, water, gas)
  - Others…

EMBRAER 190

PLM Supports the Complete Lifecycle

Every part of the product lifecycle provides PLM innovation opportunities



Requirements

Portfolio Management

Planning

Conceptual Design

Product Engineering

Manufacturing Engineering

Simulation & Validation

Build and Produce

Test & Quality

Sales & Distribution

In-service Operation

Maintenance & Repair

Disposal & Recycling

Re-purpose, Re-use, Re-store, Re-tool, etc…

PLM Solutions—Information Management across Media, Process, Time, Geography, & Enterprise

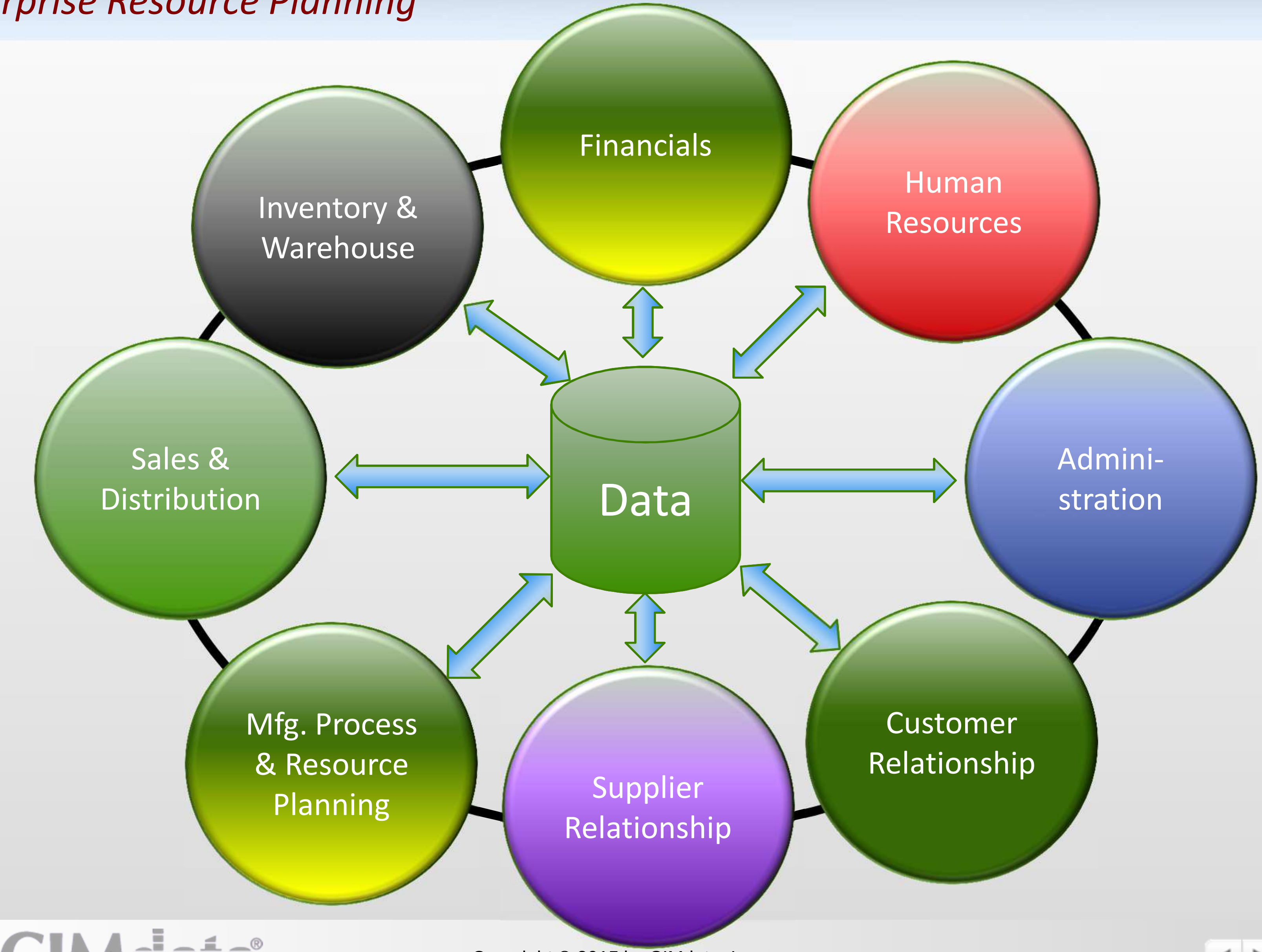
What is ERP?

Enterprise Resource Planning

- Transaction-based activity to create real products
- Includes planning, manufacturing, and logistics
- Manages all processes that manufacture products
- Controls all aspects of manufacturing including inventory, purchasing, process planning, production scheduling, warehousing and delivery, human resources, finance, configurations, effectivity status, and others

What is ERP?

Enterprise Resource Planning


Financials

Human Resources

Inventory & Warehouse

Sales & Distribution

Data

Admini- stration

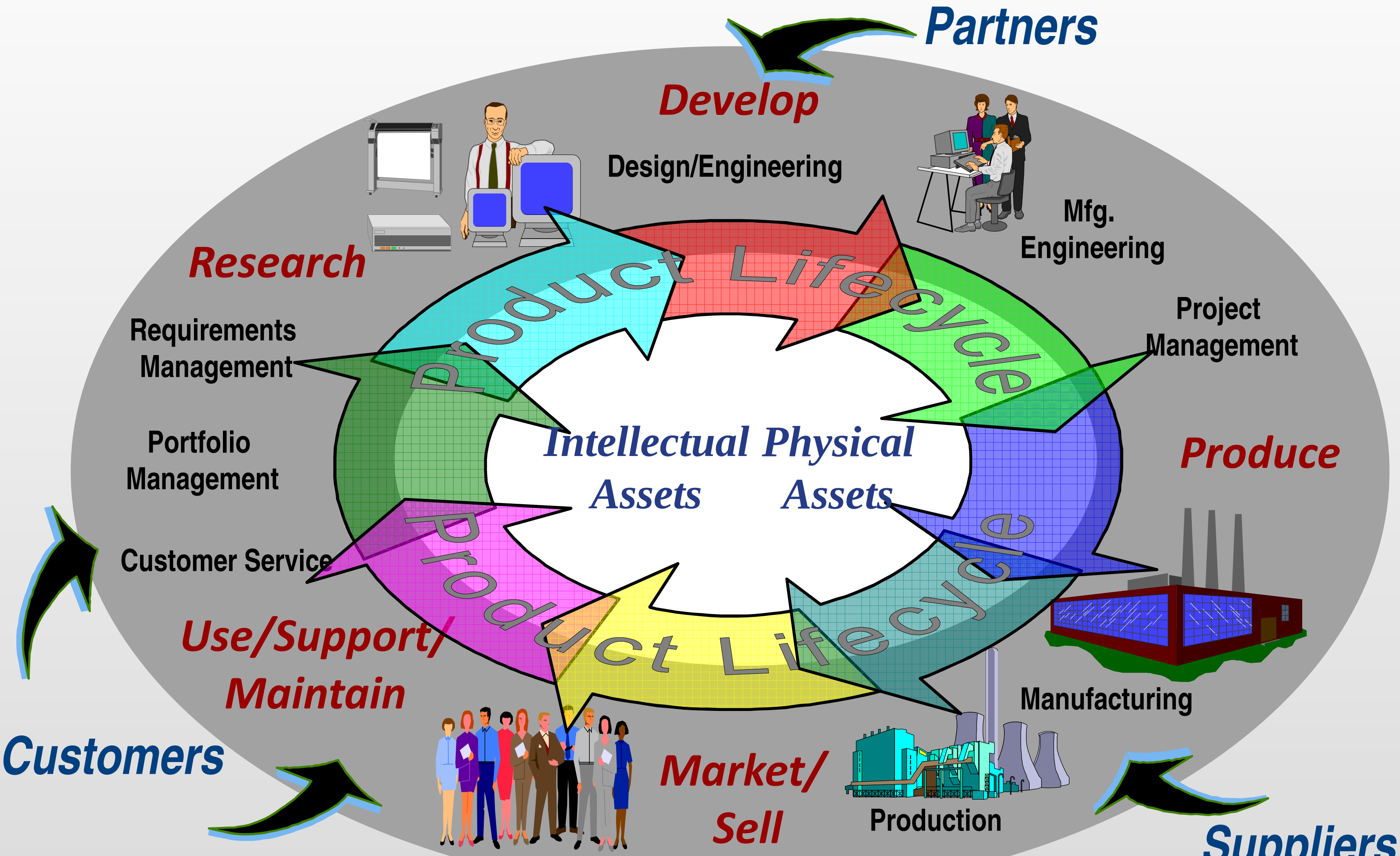
Mfg. Process & Resource Planning

Supplier Relationship

Customer Relationship

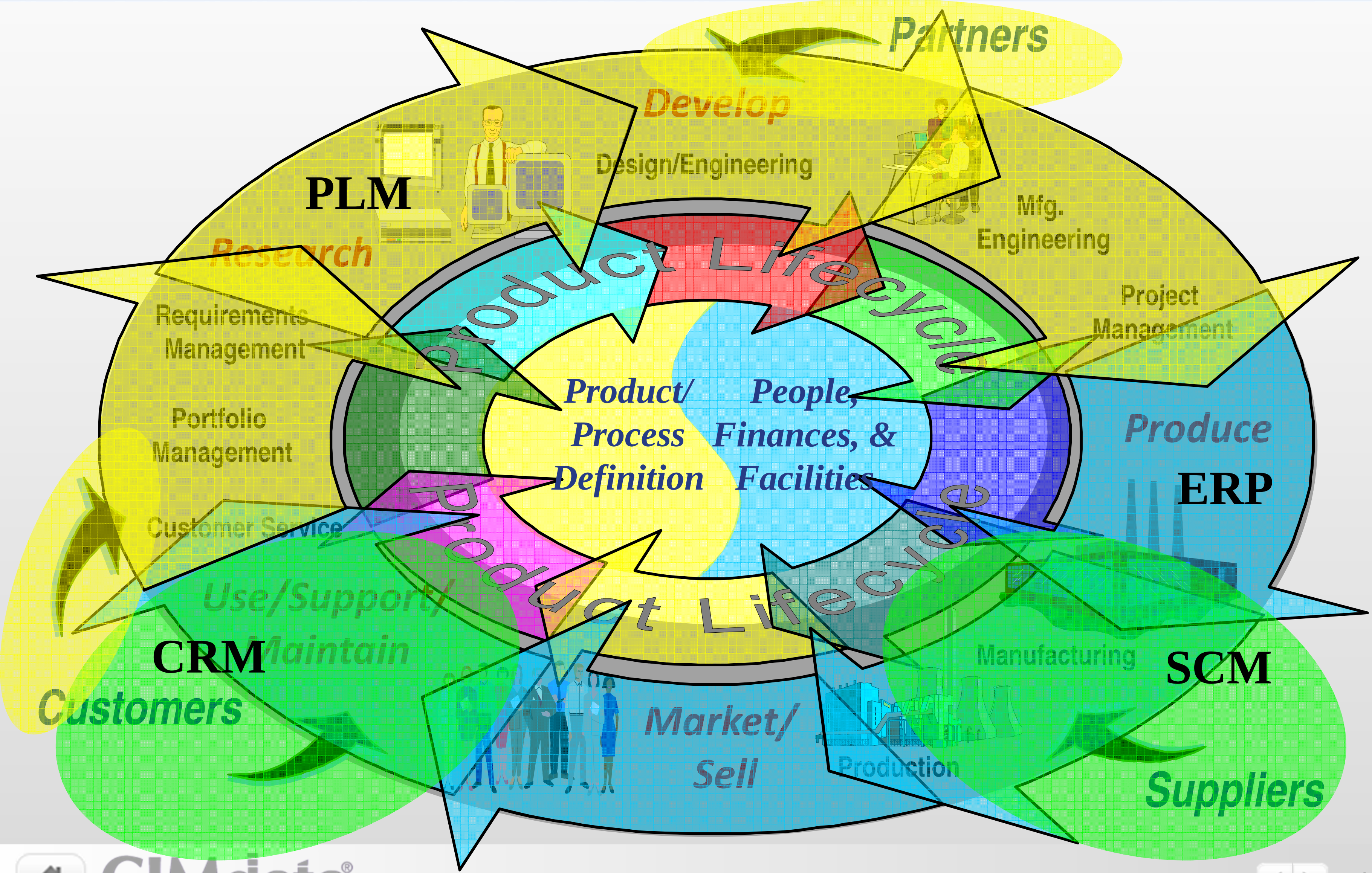
Intellectual Asset are at the Core

Intellectual assets are the organization's product/process definitions


Partners
Develop
Design/Engineering
Mfg.
Engineering
Research
Project
Management
Requirements
Management
Portfolio
Management
Product Lifecycle
Intellectual Assets
Physical Assets
Produce
Customer Service
Product Lifecycle
Use/Support/
Maintain
Manufacturing
Customers
Market/
Sell
Production
Suppliers

PLM's Position in the Enterprise

PLM and an enterprise's information management environment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Portfolio
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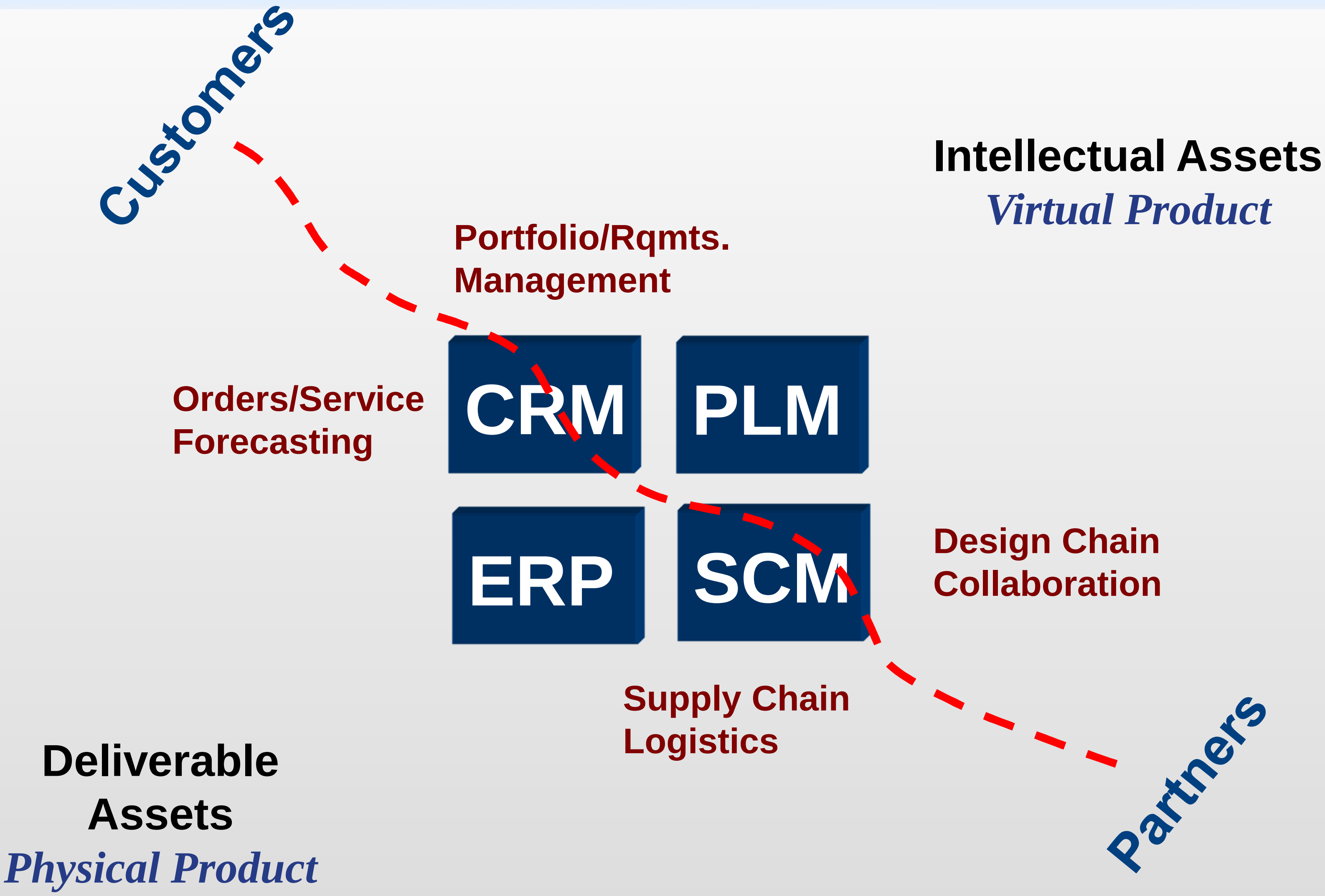
Product Lifecycle
Product/
Process
Definition
People,
Finances, &
Facilities
Produce
ERP
Customer Service
Use/Support/
Maintain
CRM
Customers
Market/
Sell
Production
Manufacturing
SCM
Suppliers
Product Lifecycle

Major IT Enterprise Domains Evolve

Intellectual vs. deliverable asset management – Today



Customers

Intellectual Assets

Virtual Product

Portfolio/Rqmts. Management

Orders/Service Forecasting

CRM

PLM

ERP

SCM

Design Chain Collaboration

Supply Chain Logistics

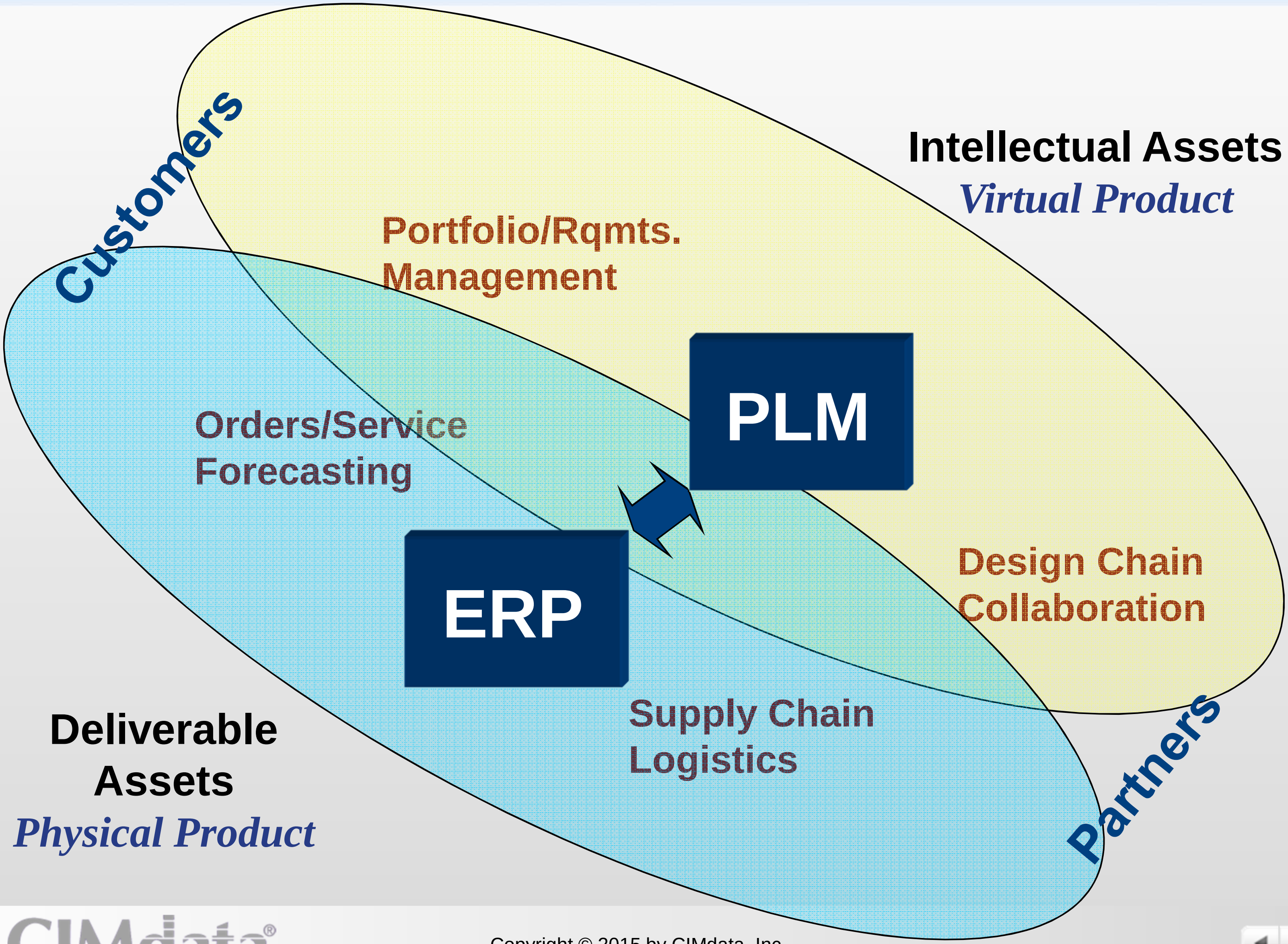
Deliverable Assets

Physical Product

Partners

Major IT Domains Emerge

Intellectual vs. deliverable asset management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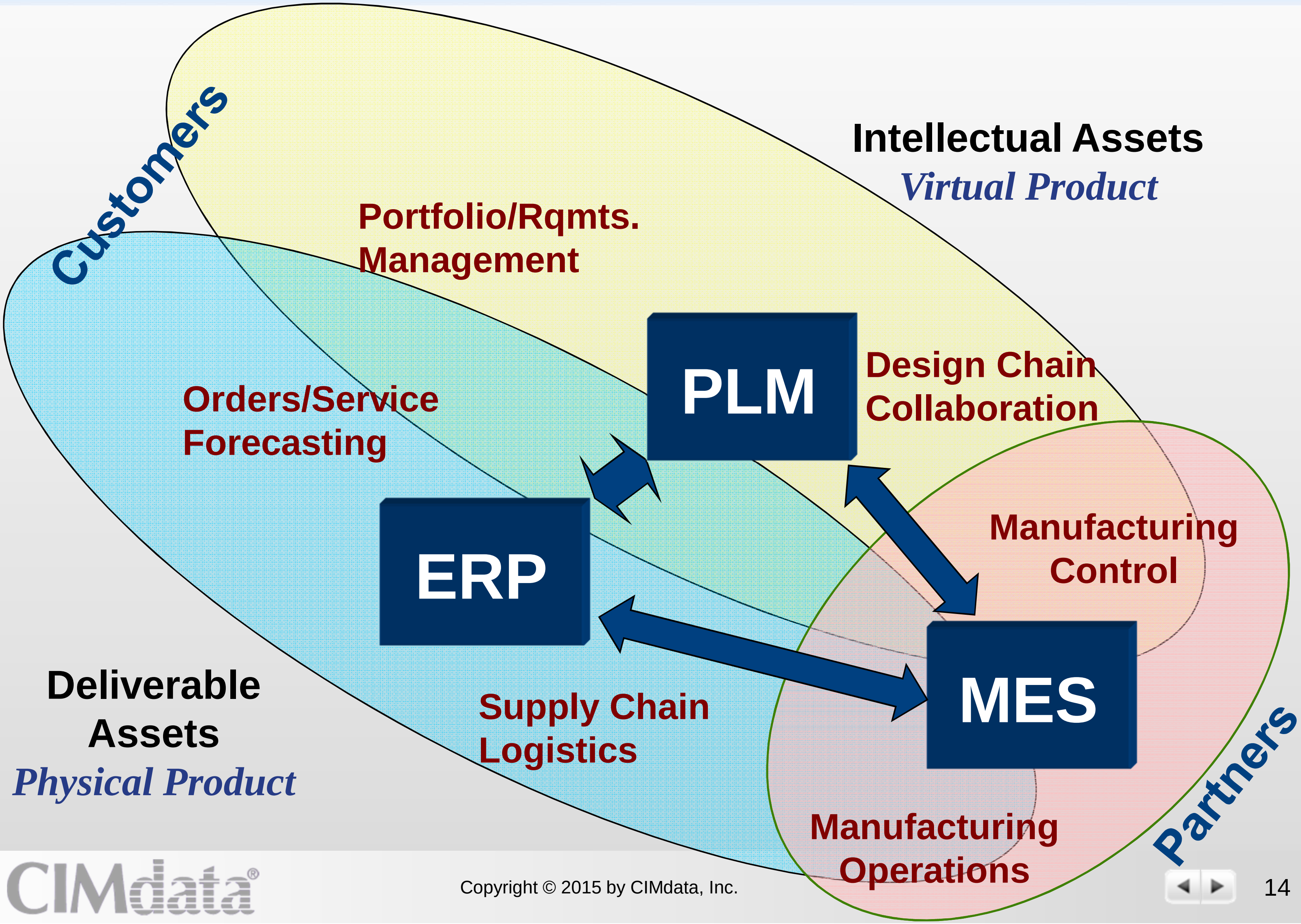

Intellectual Assets
Virtual Product

Customers

Portfolio/Rqmts. Management

PLM

Design Chain Collaboration

Orders/Service Forecasting

ERP

Manufacturing Control

MES

Deliverable Assets
Physical Product

Supply Chain Logistics

Manufacturing Operations

Partners

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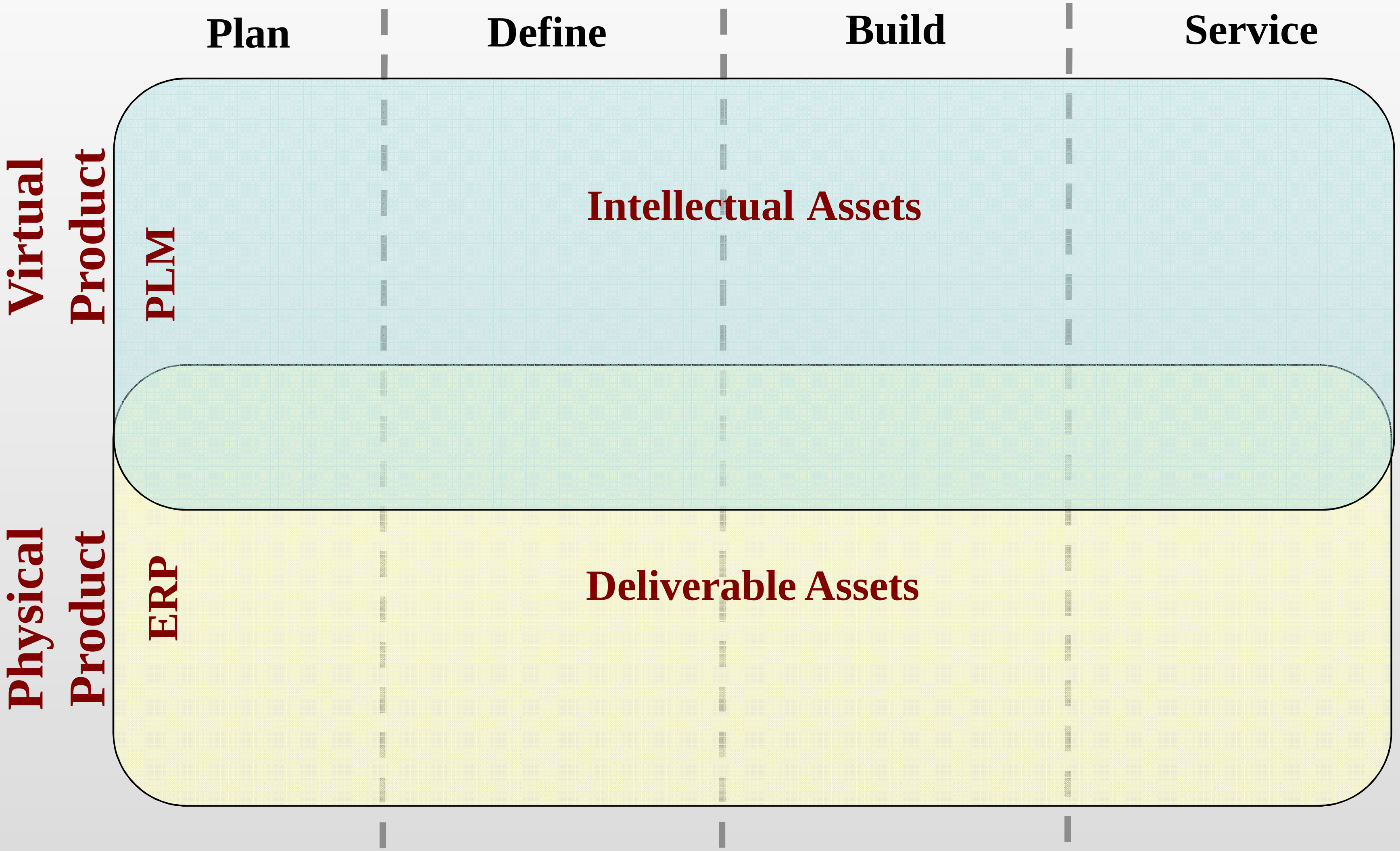
Major IT Domains Emerge

PLM footprint overlaps and integrates with other major enterprise initiatives



Plan
Define
Build
Service
Virtual Product
PLM
Intellectual Assets
Physical Product
ERP
Deliverable Assets

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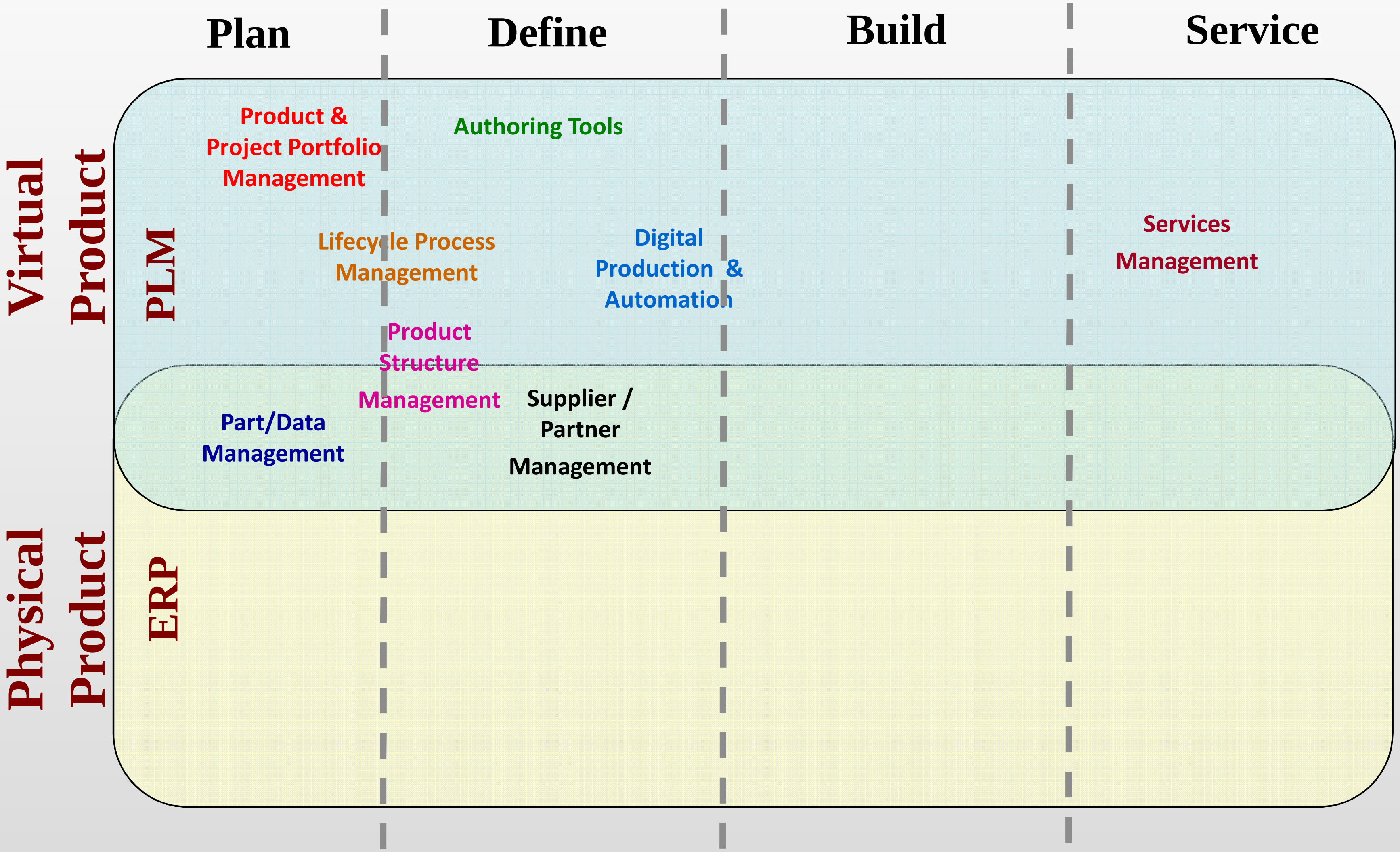

Plan

Define

Build

Service

Virtual Product

PLM

Product & Project Portfolio Management

Authoring Tools

Lifecycle Process Management

Digital Production & Automation

Services Management

Product Structure Management

Part/Data Management

Supplier / Partner Management

Physical Product

ERP

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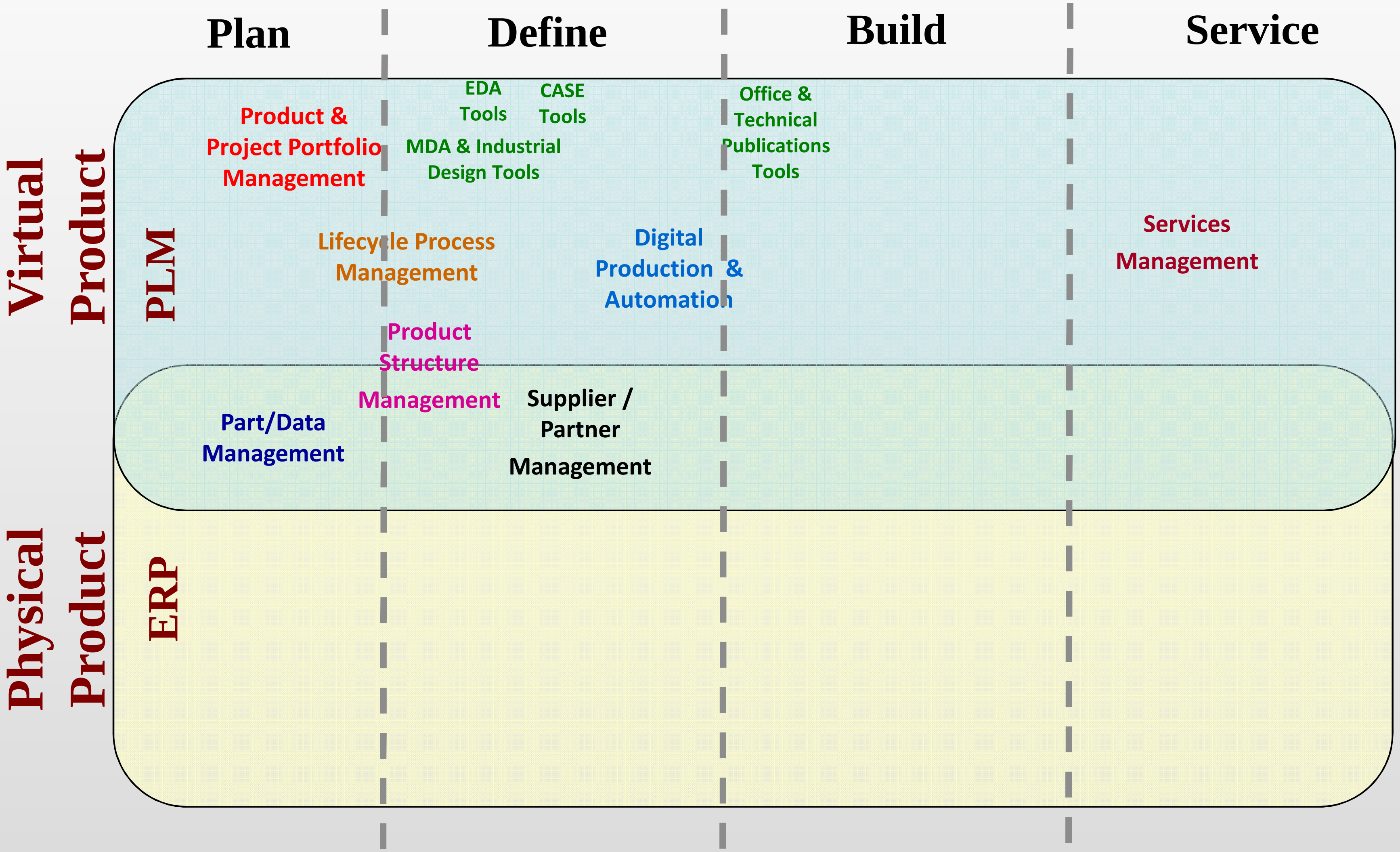
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CASE Tools
MDA & Industrial Design Tools
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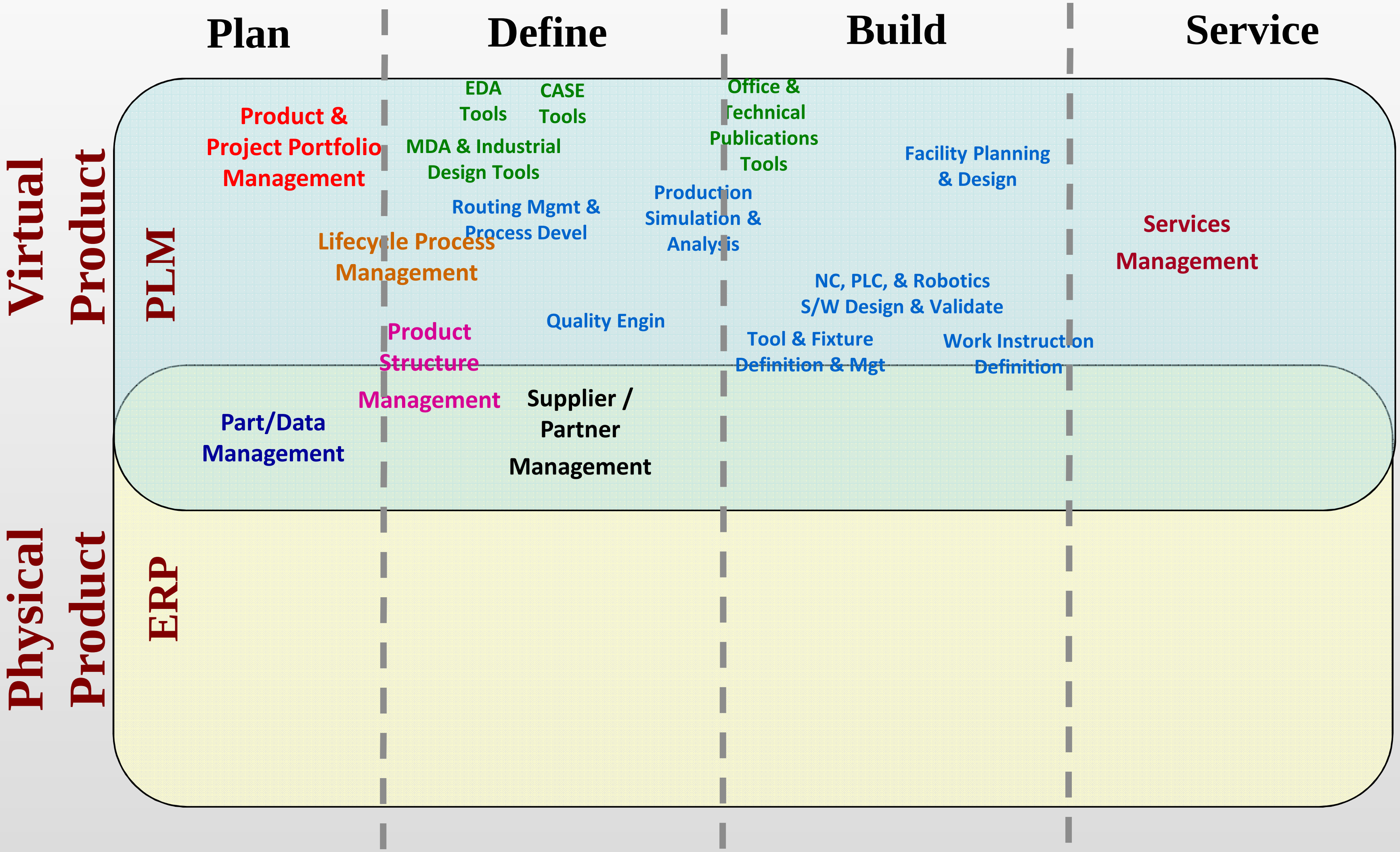

Plan

Define

Build

Service

Virtual Product

PLM

Physical Product

ERP

Product & Project Portfolio Management

EDA Tools

CASE Tools

MDA & Industrial Design Tools

Office & Technical Publications Tools

Facility Planning & Design

Routing Mgmt & Process Devel

Production Simulation & Analysis

Lifecycle Process Management

Services Management

NC, PLC, & Robotics S/W Design & Validate

Quality Engin

Product Structure Management

Tool & Fixture Definition & Mgt

Work Instruction Definition

Supplier / Partner Management

Part/Data Management

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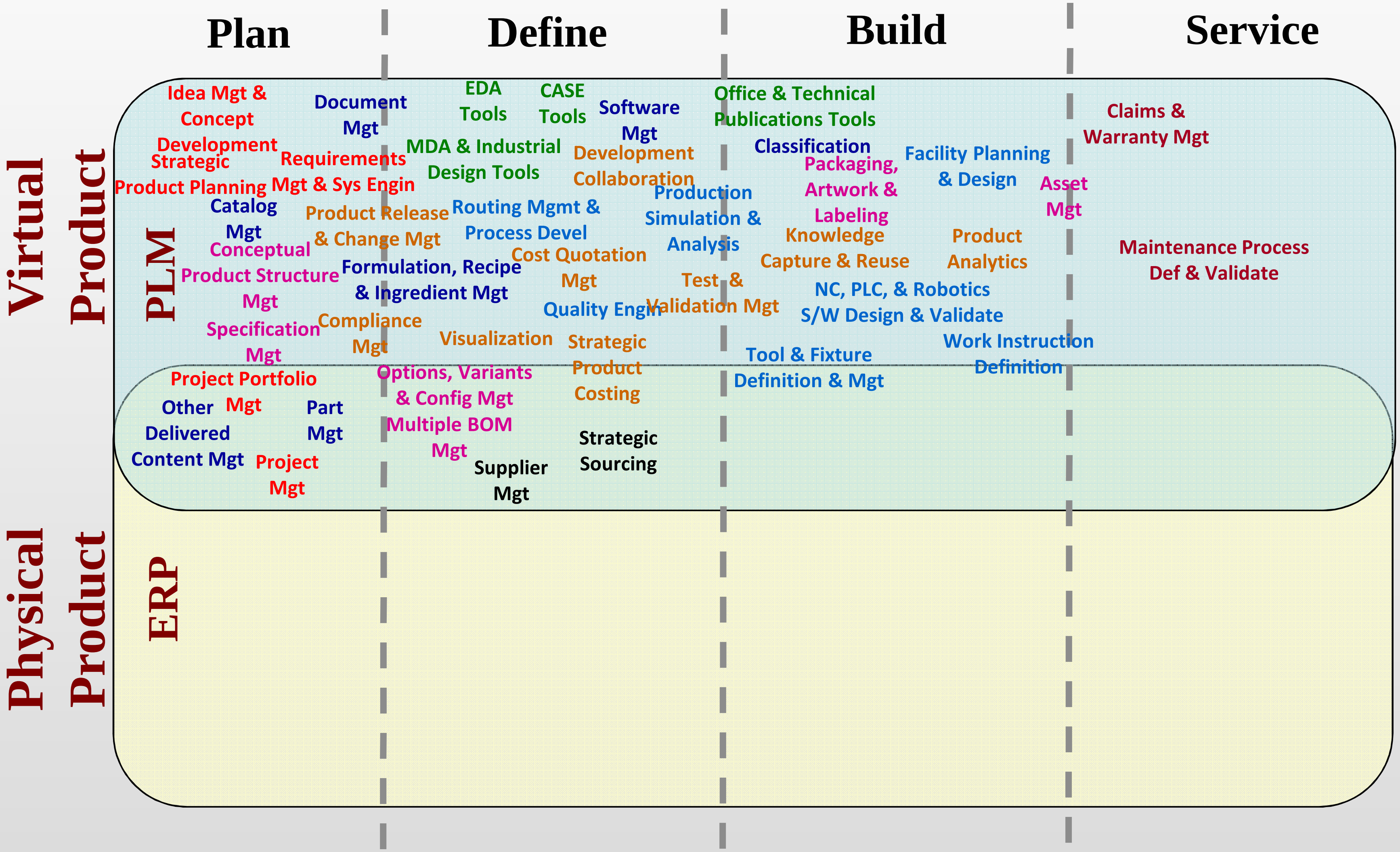

Plan

- Idea Mgt & Concept Development
- Strategic Product Planning
- Document Mgt
- Requirements Mgt & Sys Engin
- Catalog Mgt
- Conceptual Product Structure Mgt
- Specification Mgt
- Product Release & Change Mgt
- Compliance Mgt
- Project Portfolio Mgt
- Other Delivered Content Mgt
- Part Mgt
- Project Mgt

Define

- EDA Tools
- CASE Tools
- Software Mgt
- MDA & Industrial Design Tools
- Development Collaboration
- Routing Mgmt & Process Devel
- Formulation, Recipe & Ingredient Mgt
- Cost Quotation Mgt
- Quality Engin
- Visualization
- Strategic Product Costing
- Options, Variants & Config Mgt
- Multiple BOM Mgt
- Supplier Mgt
- Strategic Sourcing

Build

- Office & Technical Publications Tools
- Classification
- Production Simulation & Analysis
- Test & Validation Mgt
- Packaging, Artwork & Labeling
- Knowledge Capture & Reuse
- Facility Planning & Design
- Product Analytics
- NC, PLC, & Robotics S/W Design & Validate
- Tool & Fixture Definition & Mgt
- Work Instruction Definition
- Asset Mgt

Service

- Claims & Warranty Mgt
- Maintenance Process Def & Validate

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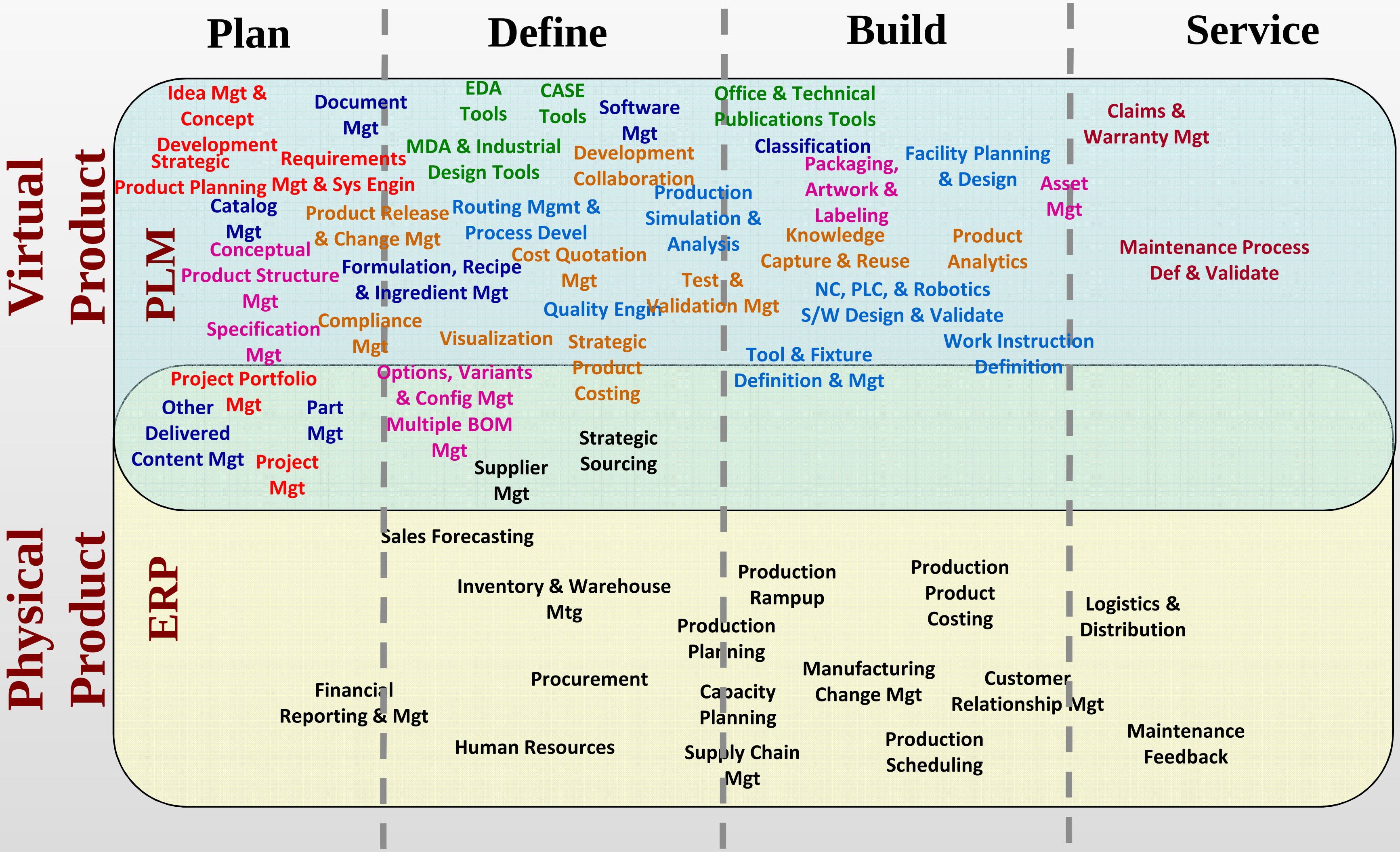

Plan

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Work Instruction Definition

Claims & Warranty Mgt

Maintenance Process Def & Validate

Sales Forecasting

Inventory & Warehouse Mtg

Production Rampup

Production Product Costing

Production Planning

Logistics & Distribution

Financial Reporting & Mgt

Procurement

Manufacturing Change Mgt

Customer Relationship Mgt

Capacity Planning

Human Resources

Supply Chain Mgt

Production Scheduling

Maintenance Feedback

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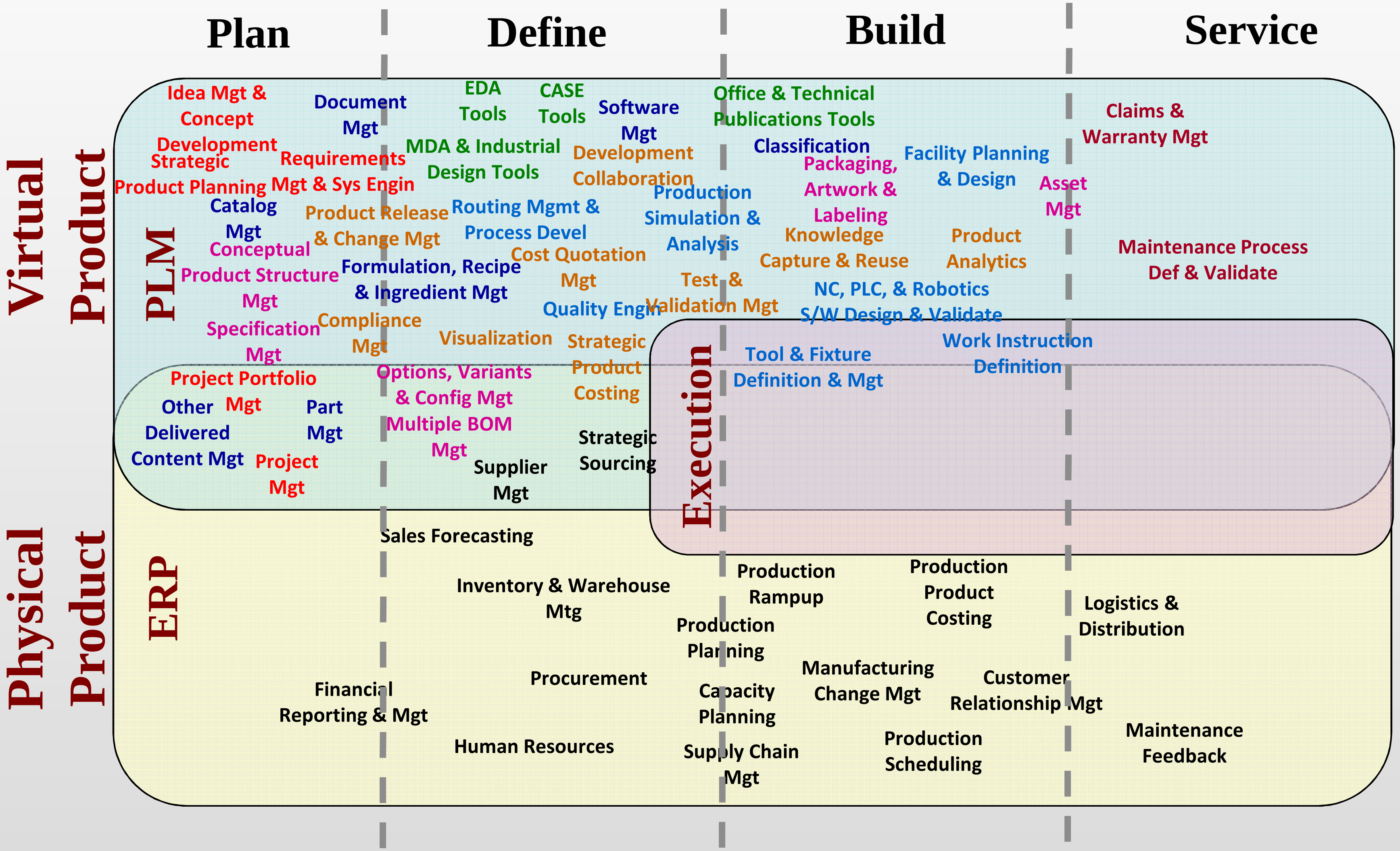

Plan
Define
Build
Service

Virtual Product
Physical Product

PLM
ERP
Execution

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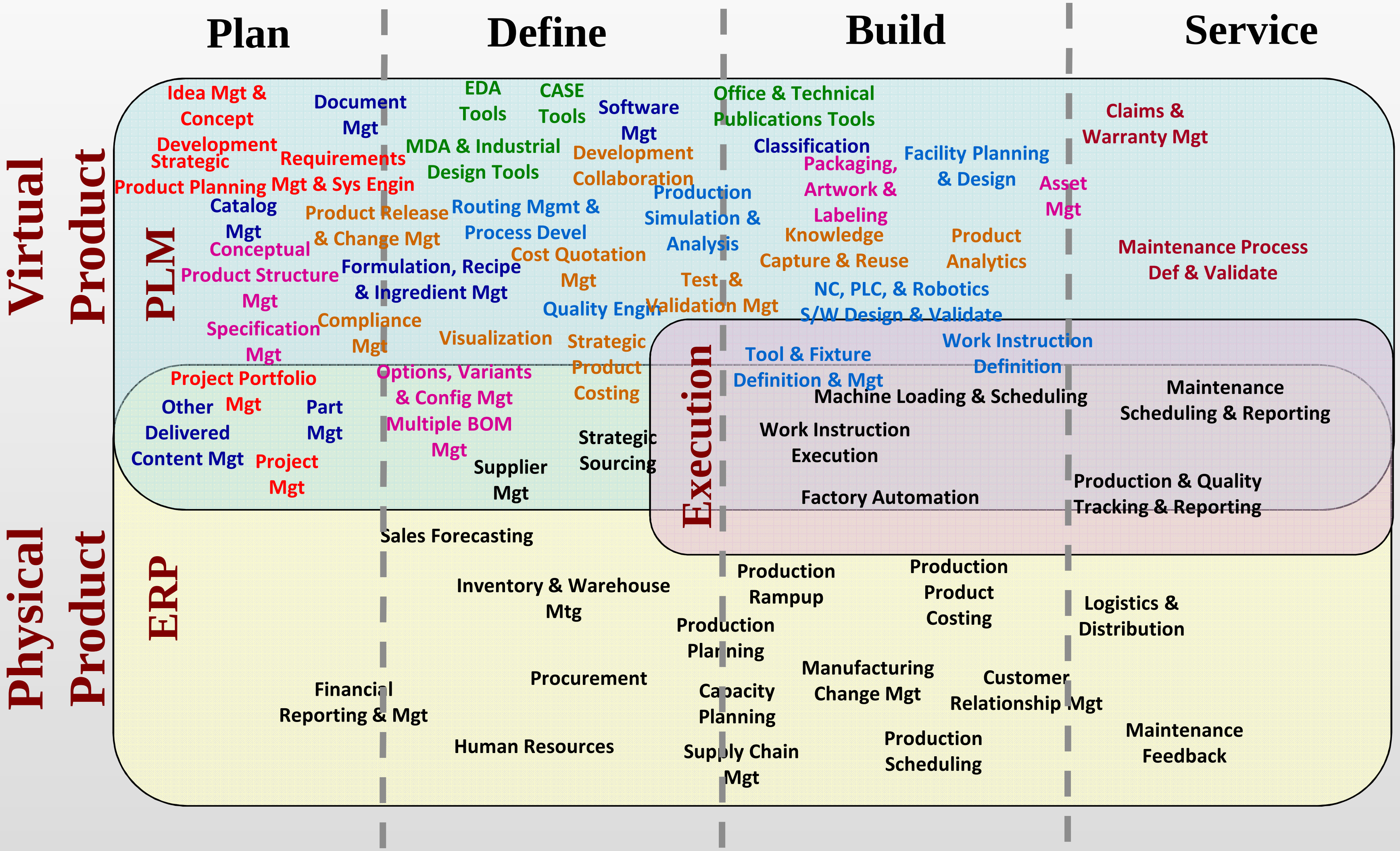

Plan | **Define** | **Build** | **Service**

Virtual Product

PLM

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Document Mgt

EDA Tools

CASE Tools

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Office & Technical Publications Tools

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Part Mgt

Project Mgt

Supplier Mgt

Strategic Sourcing

Execution

Tool & Fixture Definition & Mgt

Work Instruction Definition

Machine Loading & Scheduling

Maintenance Scheduling & Reporting

Work Instruction Execution

Production & Quality Tracking & Reporting

Factory Automation

Physical Product

ERP

Sales Forecasting

Inventory & Warehouse Mtg

Production Rampup

Production Product Costing

Logistics & Distribution

Production Planning

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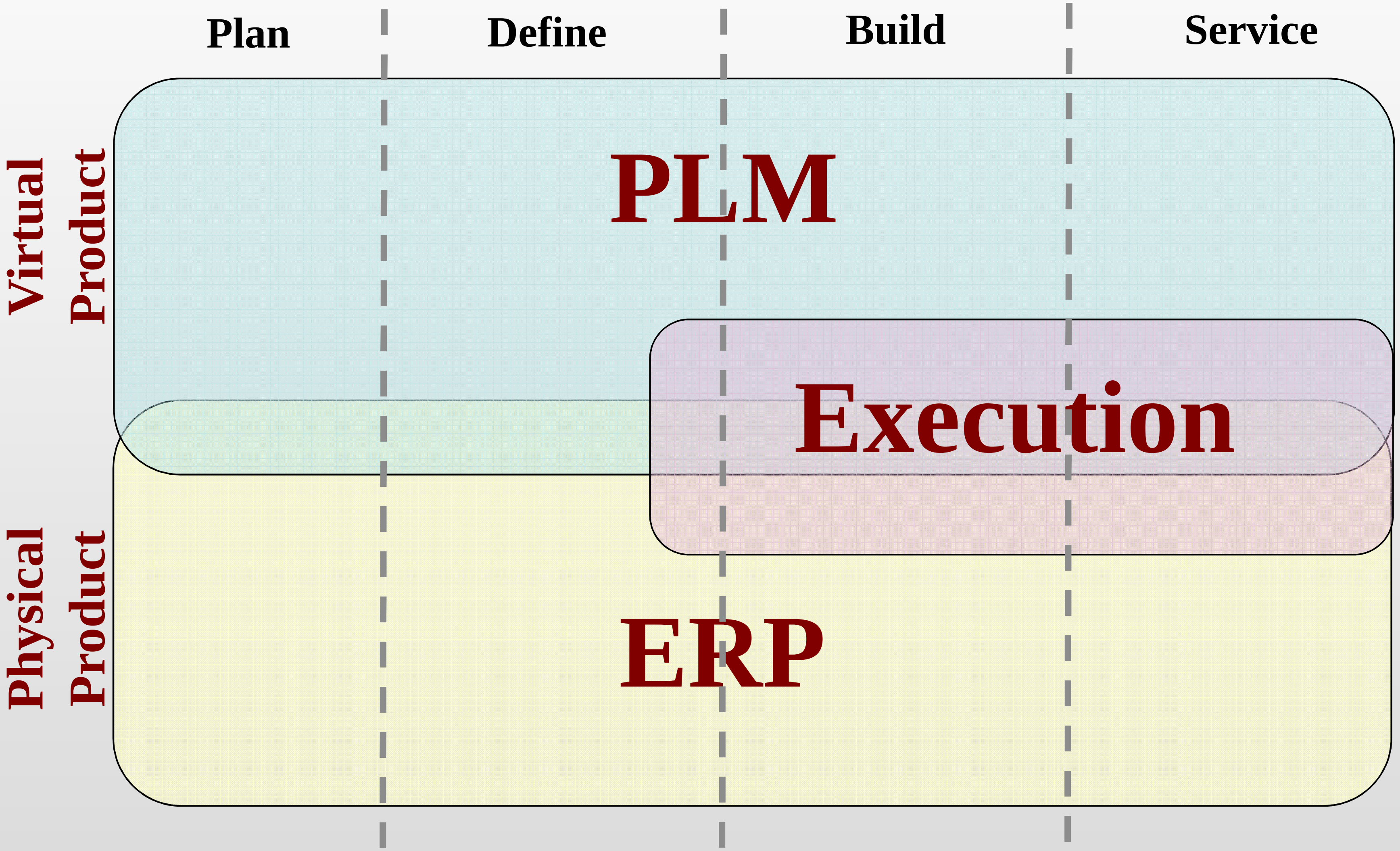
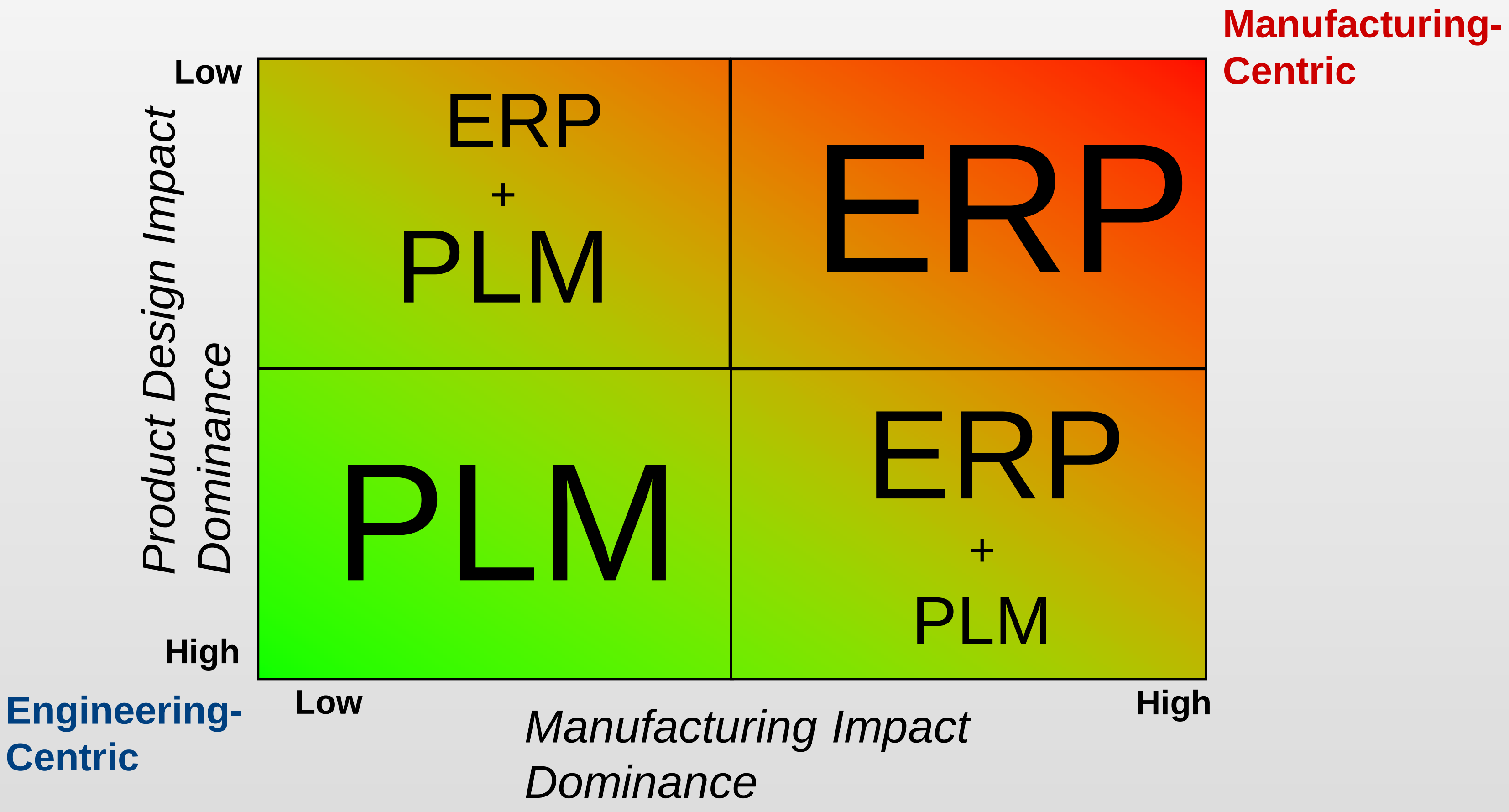

Plan
Define
Build
Service
Virtual Product
Physical Product
PLM
Execution
ERP

A PLM-ERP Model to Consider

Where does your company fit?

Is the dominant contributor to product cost, quality, delivery time, etc.—development or manufacturing?


Manufacturing-Centric
Low
Product Design Impact Dominance
High
ERP + PLM
ERP
PLM
ERP + PLM
Engineering-Centric
Low
Manufacturing Impact Dominance
High

Engineering-Centric Characteristics

Companies that focus on the definition of product

- Resources focus on product design, engineering functions, and processes
- View design and engineering of their product as a competitive advantage
- Develop products with high engineering content
- High investment in design process improvements
- Tend to design complex and innovative products
- Focus on systems rather than parts and components
- High investments in skilled engineering resources
- Iterative, rapid design process

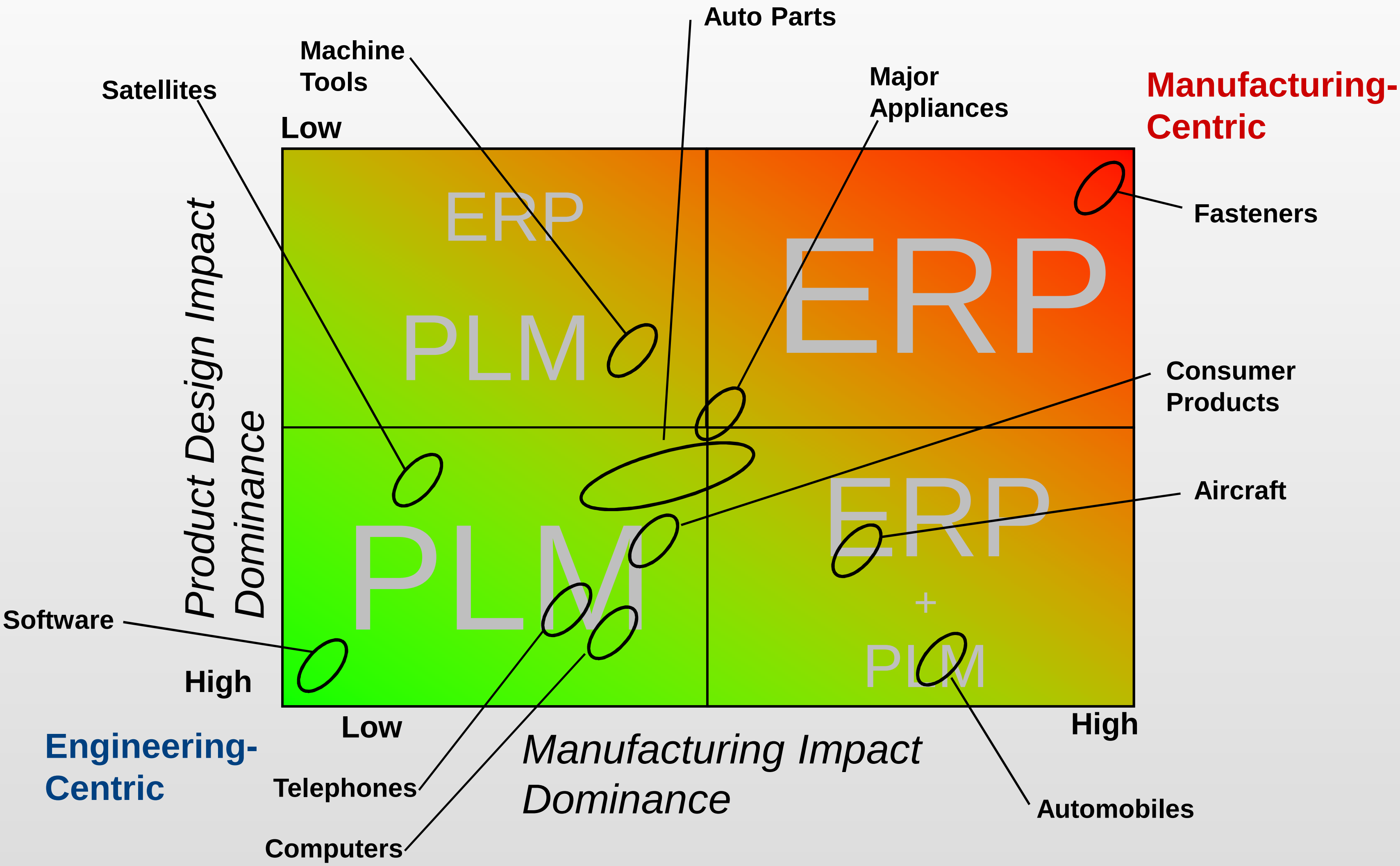
Manufacturing-Centric Characteristics

Companies that focus on the product production

- Resources focus on manufacturing functions & processes … flexible, agile, etc.
- Focus on improving purchasing, assembly, and distribution mechanisms
- View their manufacturing capabilities as their competitive advantage
- Engineering and design resources are often contract employees
- Engineering and design activities are frequently out-sourced

How Industries Align

Mapping industries onto the PLM-ERP Model

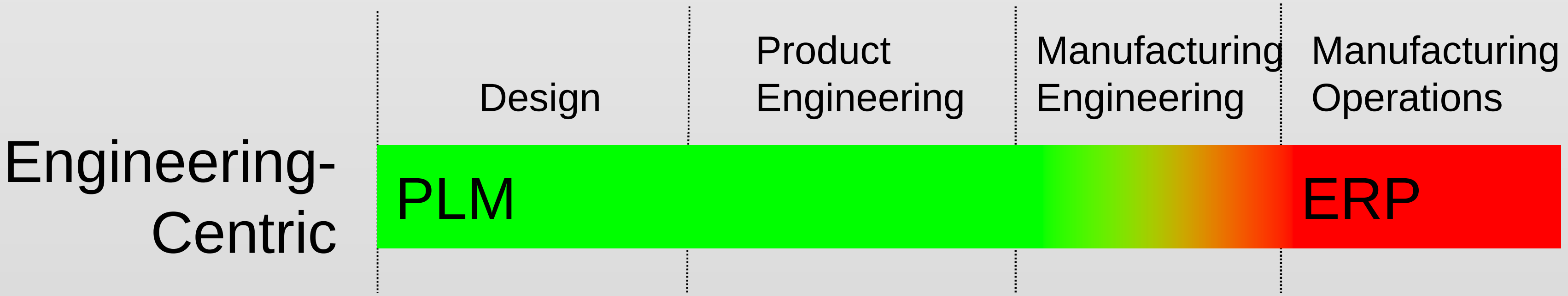


Auto Parts
Machine Tools
Satellites
Major Appliances
Manufacturing-Centric
Low
ERP
PLM
ERP
Fasteners
Consumer Products
Aircraft
Product Design Impact Dominance
PLM
ERP
+
PLM
Software
High
Low
High
Engineering-Centric
Manufacturing Impact Dominance
Telephones
Automobiles
Computers

PLM and the Engineering-Centric Model

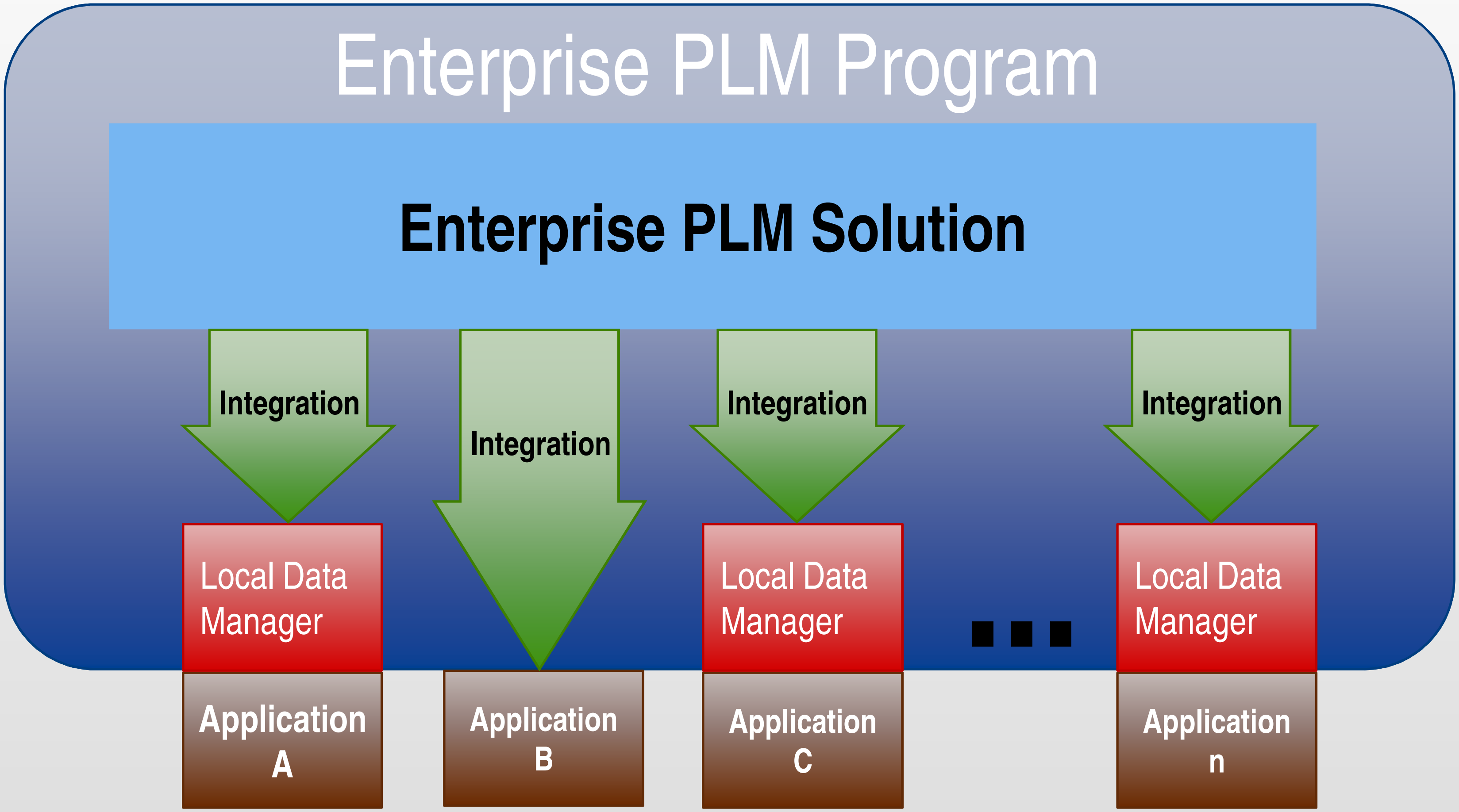
PLM solutions are designed to support the engineering-centric operating model

- PLM solutions provide a solid support infrastructure for engineering-centric companies
- PLM's designed-in flexibility allows them to be customized to support ever-changing product definition environments
- PLM solutions leverage the use of engineering methodologies, such as concurrent engineering and IPD
- New technologies pushing the need for product design focused solutions: IoT, mobility, MBD, Systems Eng, Servicability, etc.


Design
Product Engineering
Manufacturing Engineering
Manufacturing Operations
Engineering-Centric
PLM
ERP

PLM Integration Vision

An enterprise vision encompasses multiple technology integrations



Enterprise PLM Program

Enterprise PLM Solution

Integration
Integration
Integration
Integration
Local Data Manager
Local Data Manager
Local Data Manager
...
Application A
Application B
Application C
Application n

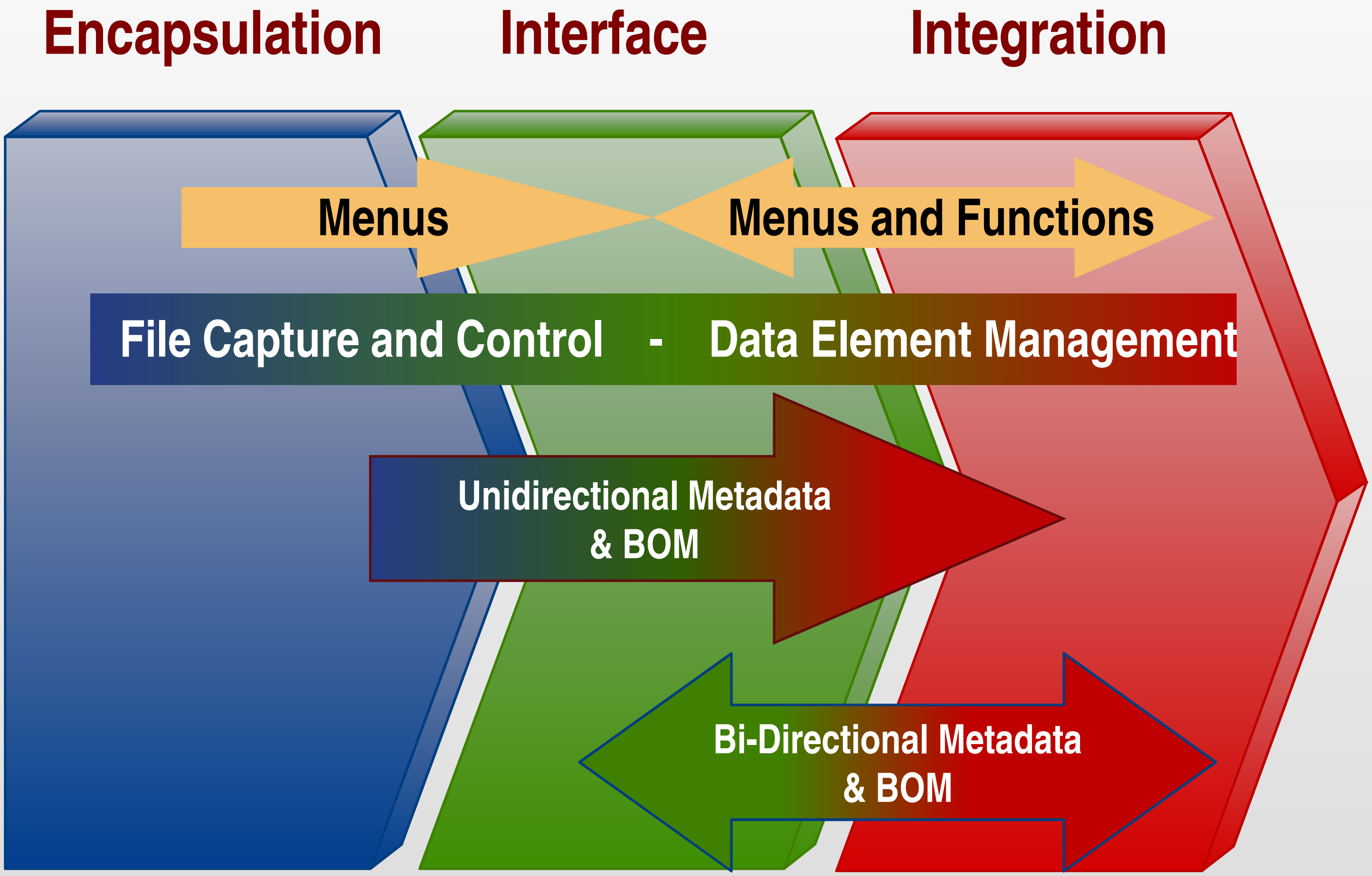
Types of Integrations

CIMdata defines three levels

- Encapsulation $
  - Application files are recognized and the application can be launched by PDM
- Interface $$
  - PLM and the application can exchange files and some metadata automatically (without user intervention)
  - PLM functions are provided via the application's menus
  - Data is passed one-way to PDM structures by CAD applications
- Integration $$$
  - Provides full, automatic exchange of all types of product data and metadata
  - Application-specific data (such as product structures) are 2-way associative and managed by the PDM solution
  - All PLM functions are available in the application
  - The user works in a consistent environment

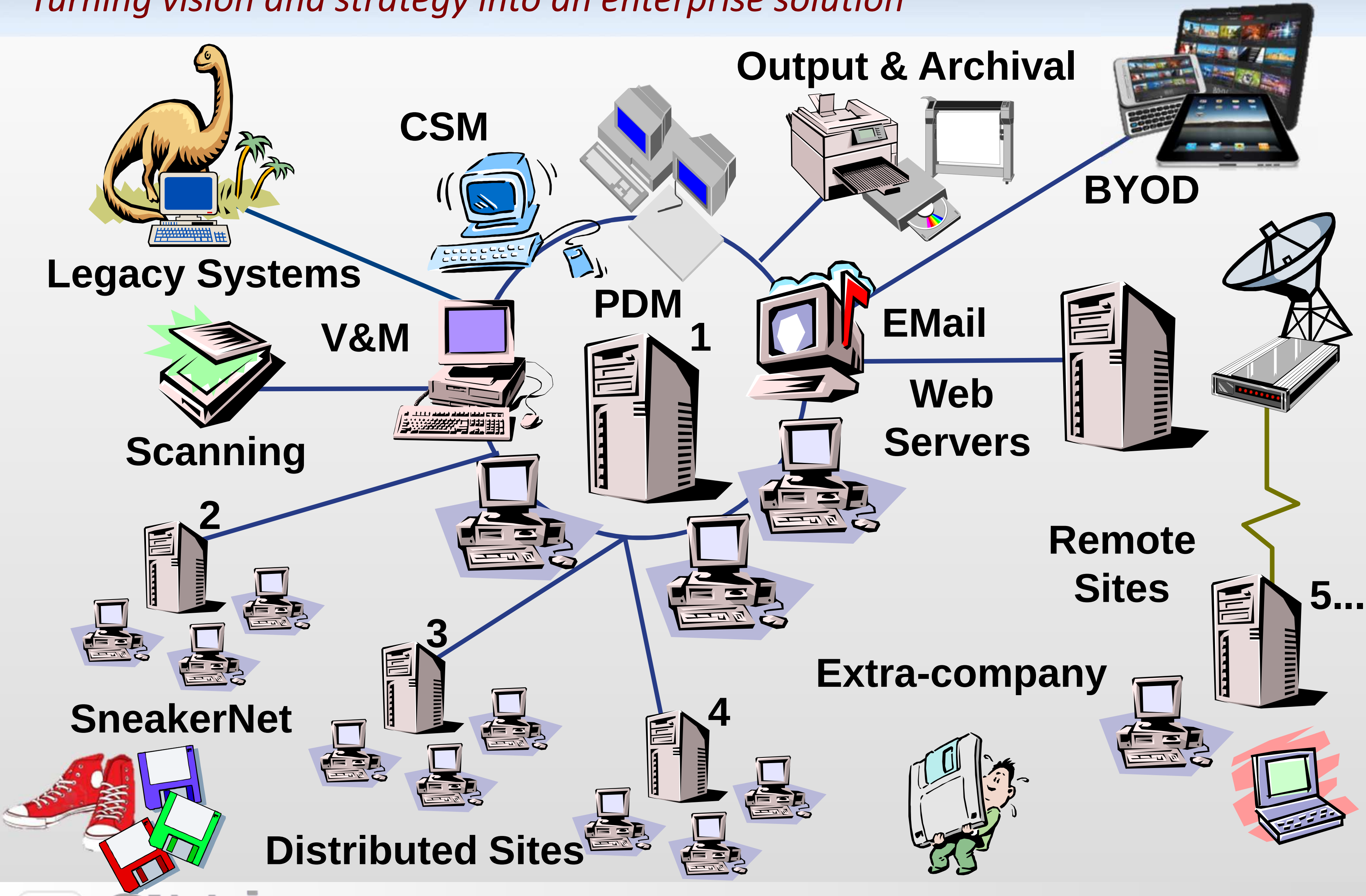
Levels of Integration Scope

An integration continuum


Encapsulation
Interface
Integration
Menus
Menus and Functions
File Capture and Control - Data Element Management
Unidirectional Metadata & BOM
Bi-Directional Metadata & BOM

Generic Enterprise PLM Architecture

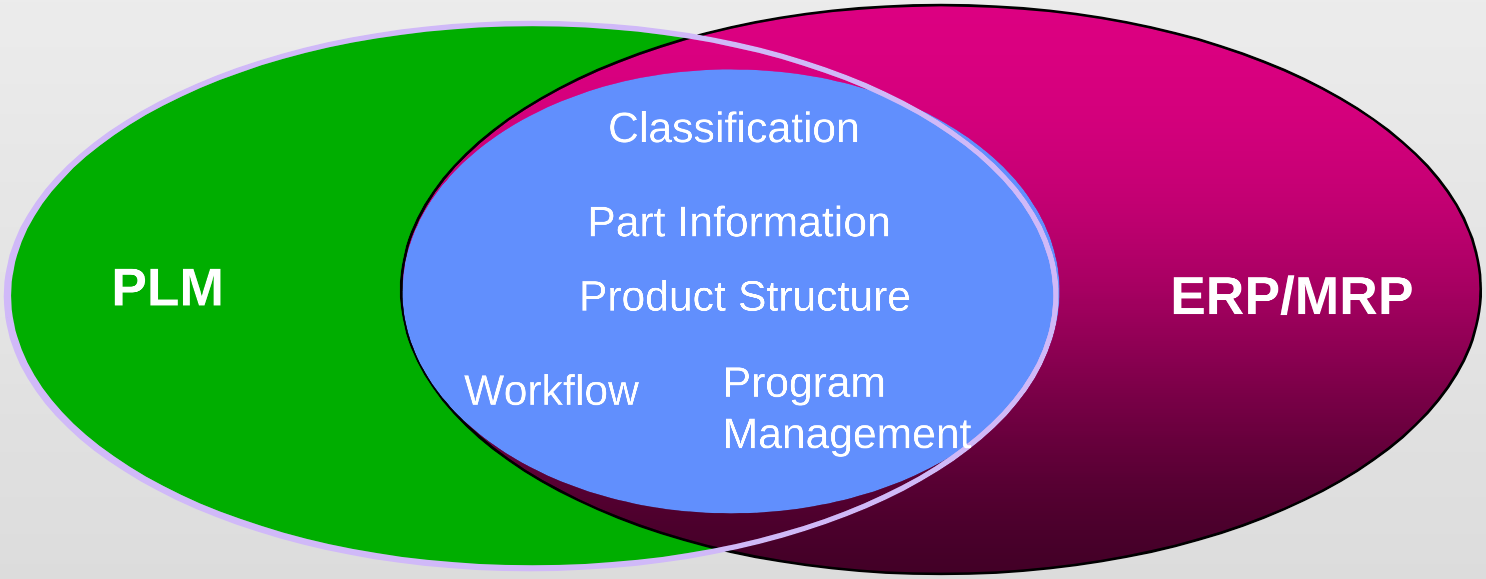
Turning vision and strategy into an enterprise solution


Output & Archival
CSM
BYOD
Legacy Systems
PDM
1
V&M
EMail
Web
Servers
Scanning
2
Remote
Sites
5...
3
Extra-company
SneakerNet
4
Distributed Sites

PLM & ERP: A Key Integration

PLM and ERP must coexist

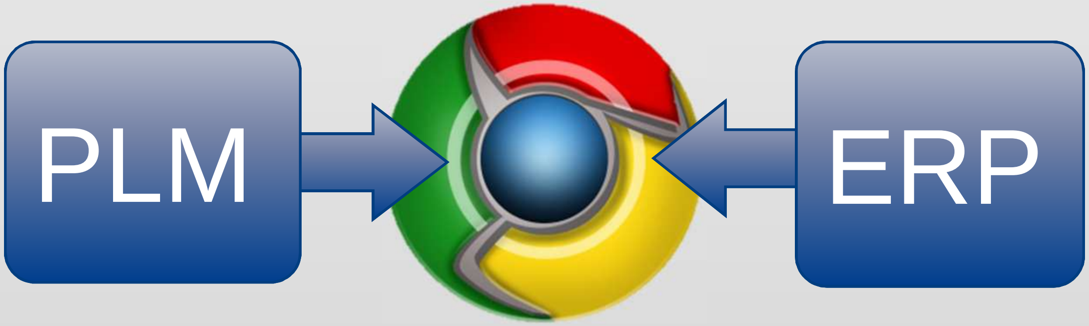
- Many users see an overlap and are confused
- As PLM and ERP implementations expand,
  the overlap of users and capabilities increases
- PLM and ERP offer a major opportunity for improved enterprise integration


PLM
Classification
Part Information
Product Structure
Workflow
Program Management
ERP/MRP

Information Portal Approach

Data interfacing providing information aggregation through the Web

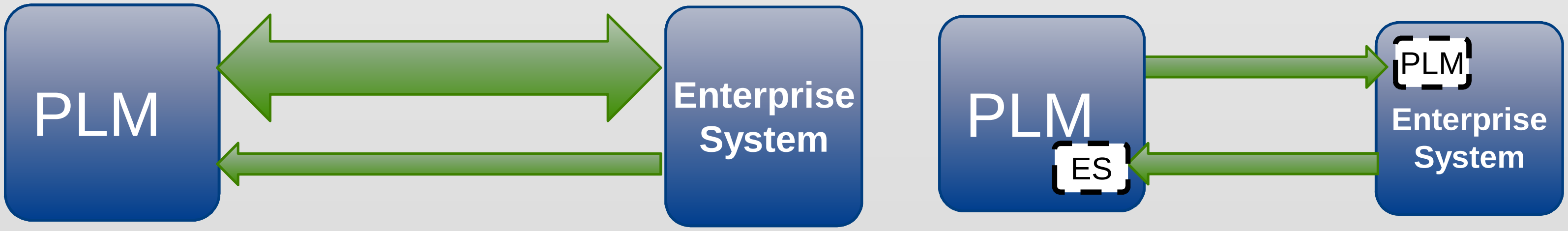
- Provides much of the value of integration, but at lower cost and more quickly (e.g., using MS SharePoint as a portal)
- Browser is used to present information from multiple enterprise systems and repositories
  - E.g., stock or cost information from ERP, viewing drawings from PLM
- Provides limited data control, limited data integrity, and no integration for processes
- A potentially cost-effective starting point for integration



Integration Approach

Various approaches to integration may be used successfully

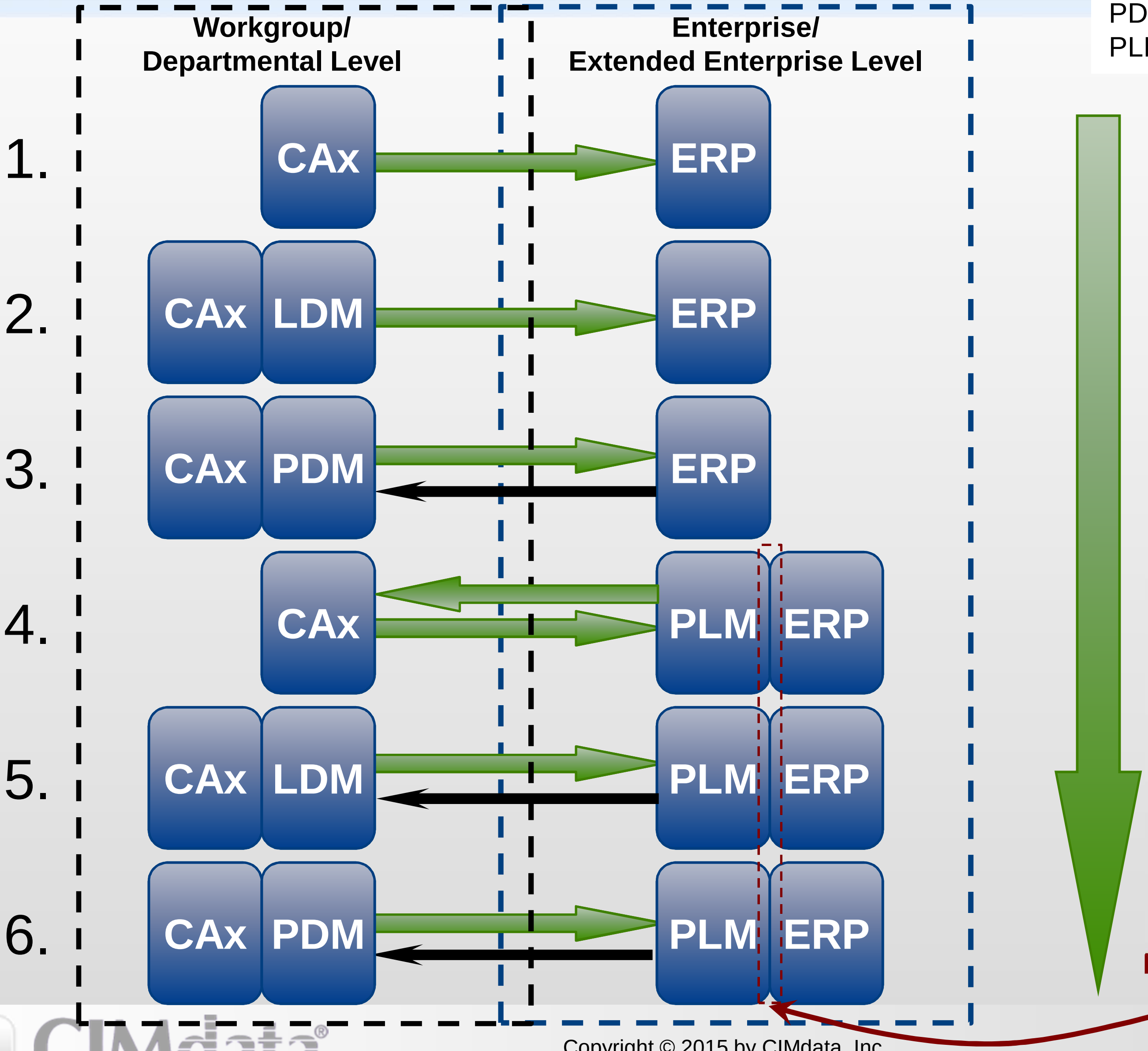
- PLM integrations to enterprise systems may be accomplished with different levels of "tightness"
  - Some integrations are merely one-way transfers of information (e.g., from design to production)
  - More extensive integrations support two-way information flows (e.g., product design data to ERP)
- Establishing clear operational processes is critical to success
- Requires integration of information & processes



Integration Scenarios

There are six primary enterprise integration scenarios

CAx = Computer-Aided “x”
ERP = Enterprise Resource Planning
LDM = Local Data Mgt.
PDM = Product Data Mgt.
PLM = Product Lifecycle Mgt.



Workgroup/ Departmental Level

Enterprise/ Extended Enterprise Level

1. CAx → ERP
2. CAx LDM → ERP
3. CAx PDM ⇄ ERP
4. CAx ⇄ PLM ERP
5. CAx LDM ⇄ PLM ERP
6. CAx PDM ⇄ PLM ERP

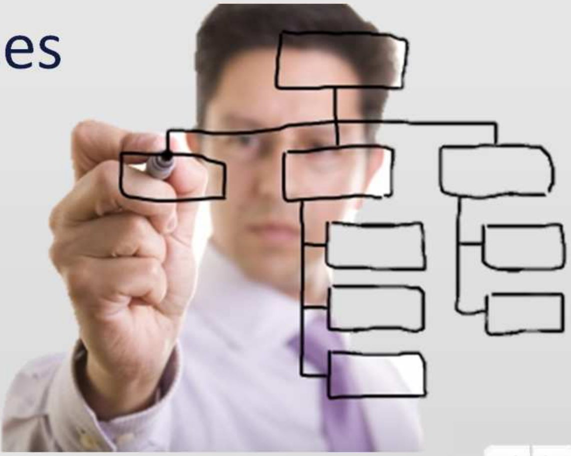
Cost, Time & Complexity Increases

Possible Integration Area

How to Leverage PLM + ERP for Innovation

Integration planning supports innovation

- Product design information can be used to prepare and inform early process planning activities
- Early detection of product design issues can lead to more innovative ideas and higher quality products
- Past changes/fixes in ERP can guide PLM activities and produce more customer-centric innovation
- Warranty and claims information can lead to innovative ideas that support product design and services
- Changes can be moved earlier in the design process with linkages to ERP
- New technologies require integration



Concluding Remarks

Integrating PLM & ERP presents many opportunities for innovation

- Understanding the difference roles of PLM and ERP can lead to a beneficial linkage between them
- Choose the best areas for integration to gain the advantage in your business; you can’t do everything
- Integrated PLM and ERP solutions lead to more innovative products with fewer late changes and higher quality
- Focus on the overlapping areas and provide automatic integrations whenever possible
- Use the proper level of integration
- Learn more about PLM!

CIMdata’s Services…

Creating, disseminating, and applying our intellectual capital

Research

- *Market research & analysis*
- *Technology research & analysis*
- *Reports & publications*
- *Market news*
- *Member services…*

Education

- Executive seminars
- PLM Certificate Programs
- Technology seminars
- Int’l conferences & workshops
- Best practices training…

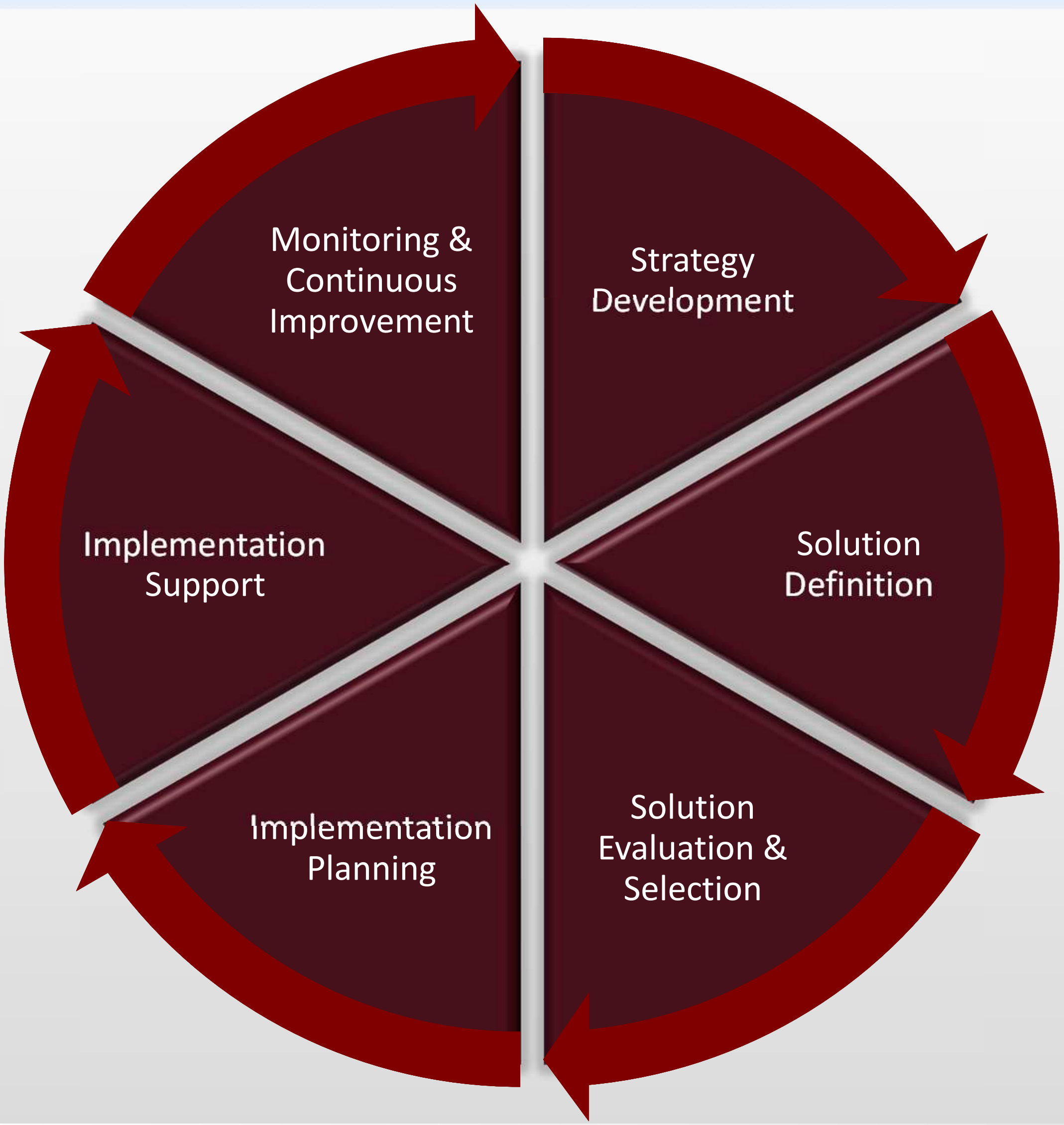
Consulting

- Strategy & vision
- Needs assessment
- Solution evaluation
- Best practices
- Quality assurance
- Program management
- Market planning…

Delivering strategic advice and counsel through a comprehensive, integrated set of research, education, and consulting services

CIMdata's PLM Transformation Services

Services for Industrial Organizations—improving your PLM-related processes



Strategy Development

Solution Definition

Solution Evaluation & Selection

Implementation Planning

Implementation Support

Monitoring & Continuous Improvement

CIMdata's PLM consulting methodology—transforming your business for a competitive advantage!

A comprehensive set of services tailored to fit your specific needs…

Our PLM Transformation Clients…

A sampling of CIMdata's international industrial clients (1 of 2)

A&D

- ALLEN VANGUARD Defeating the Threat
- Vought Aircraft Industries, Inc
- BETTIS LABORATORY
- AIRBUS GROUP
- BOEING
- Bell Helicopter A Textron Company
- NORTHROP GRUMMAN
- ZODIAC AEROSPACE
- BOMBARDIER
- CURTISS WRIGHT Controls Defense Solutions
- Fokker
- EMBRAER
- Gulfstream
- United Defense
- RAFAEL ADVANCED DEFENSE SYSTEMS LTD.
- ROLLS ROYCE Rolls-Royce
- CAE
- LOCKHEED MARTIN
- Litton TASC
- BAE SYSTEMS
- GENERAL DYNAMICS
- GIAT industries
- THALES
- NASA Ames Research Center
- Los Alamos NATIONAL LABORATORY EST. 1943
- Sandia National Laboratories
- US ARMY MATERIEL COMMAND

Auto

- AAM
- RENAULT
- ASTON MARTIN
- MANN+HUMMEL
- DURA
- DELPHI Driving Tomorrow's Technology
- NISSAN
- JAGUAR
- LAND ROVER
- GM
- TOYOTA
- VOLVO
- Johnson Controls
- BOSCH
- TIMKEN
- EATON
- MAHLE
- faurecia
- HONDA
- HARLEY-DAVIDSON MOTOR COMPANY
- PAULSTRA
- LEAR CORPORATION Advance Relentlessly
- BMW The Ultimate Driving Machine
- Visteon
- Ford
- MAN
- YAZAKI
- CHRYSLER
- FIAT
- TENNECO
- GRUPO BOCAR Automotive Systems
- CSA COOPER STANDARD AUTOMOTIVE
- Autoliv
- RIETER
- RICARDO
- INTIER Automotive
- AVL
- nemak
- FURUKAWA

Fab & Assembly

- JOHN DEERE
- KONE
- McQuay International a member of DAIKIN group
- AS&E
- WÄRTSILÄ
- CAT
- JCB
- Swagelok
- SLOAN
- ROLEX
- JLG
- meyn
- SIEMENS
- ABB Group
- BOSCH
- CASE
- Schindler
- Schneider Electric
- Pentair
- STRATTEC
- BISSELL
- ACCO BRANDS
- Whirlpool HOME APPLIANCES
- Steelcase
- BOMBARDIER
- OTIS
- Andersen AW
- GE
- DANAHER
- marel
- STANLEY
- WinWinD
- FISHER
- TORO
- BOBST
- Colfax Fluid Handling
- GRUNDFOS

High-Tech

- AMD
- Microsoft
- SHURE
- PHILIPS
- APPLIED MATERIALS
- Seagate
- ERICSSON
- IBM
- ALCATEL
- GIGABYTE TECHNOLOGY
- OKI
- Sun microsystems
- MINOLTA
- tellabs
- BOSE
- BANG & OLUFSEN
- BenQ
- NOKIA Connecting People
- Veeco
- Waters THE SCIENCE OF WHAT'S POSSIBLE.
- XEROX
- LEXMARK
- STORAGETEK
- 3Com
- opnext
- Pulse
- Raytheon
- hp
- DELL
- FLUOROWARE
- SONY
- NXP founded by Philips

Our PLM Transformation Clients…

A sampling of CIMdata's international industrial clients (2 of 2)

CPG/F&B/Process

Kimberly-Clark
Dow
GMCR
Altria
JTI
Coca-Cola
P&G
McCORMICK
csm
GOODYEAR
LEGO
DSM BRIGHT SCIENCE. BRIGHTER LIVING.
amcor
Imperial Tobacco

Medical/Pharma

Baxter
Edwards
Alcon
SIEMENS
medrad
Dräger
DePuy a Johnson & Johnson company
Playtex
BANG & OLUFSEN
Johnson & Johnson
smith&nephew
ETHICON ENDO-SURGERY, INC. a Johnson & Johnson company
Abbott A Promise for Life
GE

Emerging Ind.

NOV NATIONAL OILWELL VARCO
P B M R
Outotec More out of ore
eDF
IBERDROLA Ingeniería y Consultoría S.A.
AREVA
DOOSAN Doosan Power Systems
EAB ENGINEERING SUBSEA SOLUTIONS
Rijkswaterstaat
ROYAL CANADIAN MINT MONNAIE ROYALE CANADIENNE
adidas
UNITED STATES POSTAL SERVICE U.S. MAIL
NIKE
JPL Jet Propulsion Laboratory
Samsonite
IHC MERWEDE

Other

SAVONIA
KONGSBERG
VTT
IDS Infotech Ltd.
Cranfield UNIVERSITY
NTNU – Trondheim Norwegian University of Science and Technology
財團法人資訊工業策進會 INSTITUTE FOR INFORMATION INDUSTRY

CIMdata

CIMdata PLM Leadership

PLM Industry's most comprehensive non-biased education & training offering

This CIMdata offering is primarily comprised of a set of well defined, assessment-based PLM education and training certificate programs. These certificate programs are available to industrial companies who are considering and/or implementing PLM, and to PLM technology and service solution providers.

CIMdata®
PLM Leadership

PLM Certificate Program Outline

5-day, 9-session outline for PLM Leadership offering

- **Day 1:** Session 1: Introduction to PLM
- **Day 2:** Session 2: PLM Benefits & Potential Value
  Session 3: PLM Strategy & Solution Definition
- **Day 3:** Session 4: PLM Solution Evaluation & Selection
  Session 5: PLM Implementation, Monitoring & Continuous Improvement
- **Day 4:** Session 6: PLM Process Development & Testing
  Session 7: Integrating PLM within the Enterprise
- **Day 5:** Session 8: Expanding PLM Across the Value Chain
  Session 9: Configuration Management's Role in PLM

What Others Are Saying

A sampling of feedback received from past certificate program participants

"A must attend program for anyone that is planning to participate in PLM selection or implementation activities at their organization."
—*Shinod Kumar, Edwards Lifesciences, USA*

"An excellent overview of all PLM and it's fit to companies. Good insights that can avoid many troubles in implementation."
— *Paulo C L Villaca, Embraer, Brazil*

"I wish we had done this before we started our PLM effort..."
— *Jeff Burk, Whirlpool, USA*

"Hazy about PLM? Come to CIMdata and clarify."
—*Mrs. B. Uma Prasad, Bharat Heavy Electricals Ltd., India*

2015 PLM Certificate Class Schedule*

Join us, and get educated about PLM

- March 16-20 – Amsterdam, The Netherlands
- May 4-8 – Ann Arbor, MI USA
- September 21-25 – Boston, MA USA
- December 7-11 – Cypress, CA USA
  - Custom & on-site programs by request

Special Discount: 15% off!

Sign up and pay by February 15th 2015

SPECIAL
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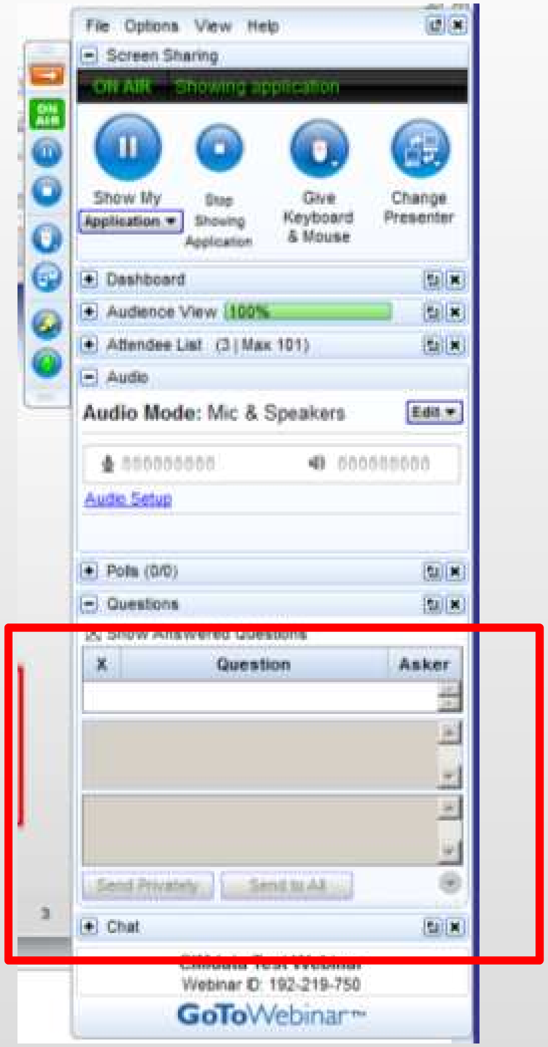
**Dates may be subject to change*

Questions?

Please use the GoToMeeting chat panel

- We're hoping that the anonymity of the chat window might help participants ask more questions
- If you want to ask a question on the record, we'll certainly let everyone know you're asking
- The most important thing is interaction – let us hear from you on the call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Polls (0/0)
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