



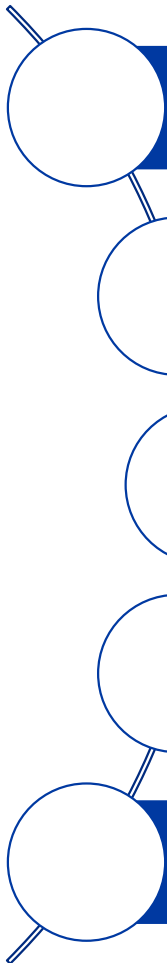
PDT Europe 2016

Data Standards: A Strategic Lever for Boeing Commercial Airplanes

Brian Chiesi, Boeing Commercial Airplanes

100

Agenda

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- 1: Introduction to Boeing
 - 2: PLM Situation at Boeing
 - 3: Future Architecture
 - 4: Opportunity of Standards
 - 5: Boeing Position Statement

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History

The first 100 years



Boeing Airplane Co. 1916



Douglas Aircraft Co. 1921



Stearman Aircraft Co. 1927



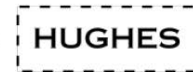
North American Aviation, Inc. 1935



Piasecki Helicopter 1940



McDonnell Aircraft Corp. 1945



Hughes Space and Communications 1948



McDonnell Douglas Corp. 1967



Rockwell International
Rockwell International 1968



The Boeing Company today

A heritage that mirrors the history of flight

Commercial Airplanes

2015 revenues
of **\$66 billion**

Headquartered in the
Puget Sound region
of Washington state

Approximately
83,000 employees

Offers a family of airplanes and a broad portfolio of aviation services for passenger and cargo carriers worldwide

- Boeing airplanes represent about half of the world's fleet, with more than 10,000 jetliners in service
- About **70 percent** of Commercial Airplane sales (by value) go to customers outside the United States



Defense, Space & Security

Designs, builds and supports net-enabled platforms and systems for government and commercial customers

Formed in 2000 to integrate Boeing's defense, space, intelligence and communications capabilities

Headquartered in St. Louis, Mo., with global operations in three countries and 26 states

Approximately 50,000 employees

2015 revenues of \$30 billion

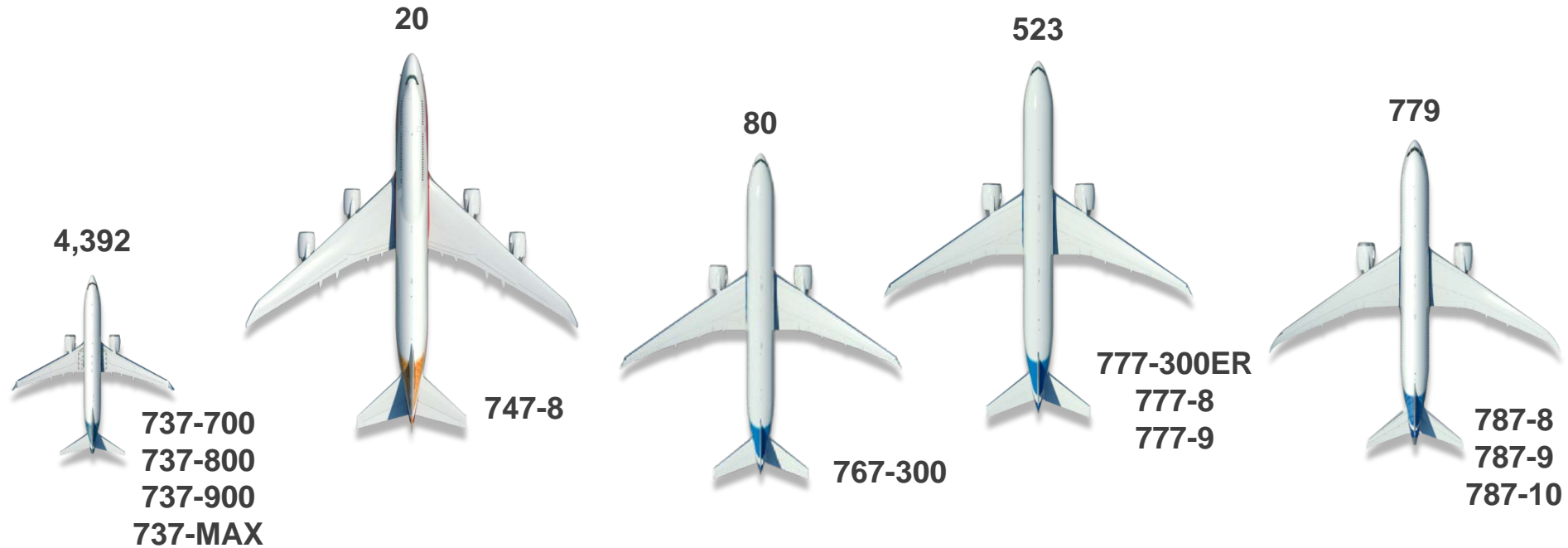
Has balanced backlog across all markets including a strong mix of development, production and support contracts



Delivering the future

Boeing Commercial Airplanes

Rich History with a Strong Lineup for 2nd Century



BOEING **EDGE**
Material Services

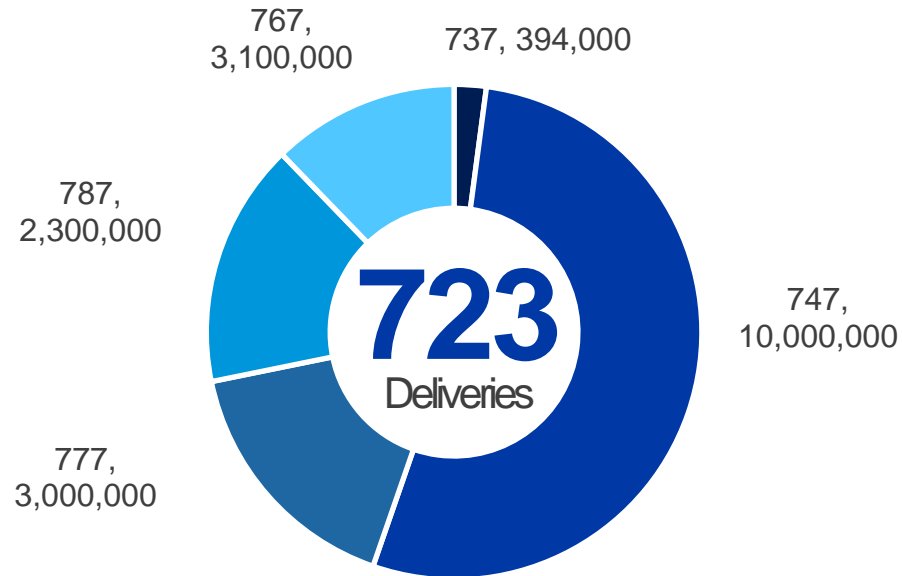
BOEING **EDGE**
Fleet Services

BOEING **EDGE**
Flight Services

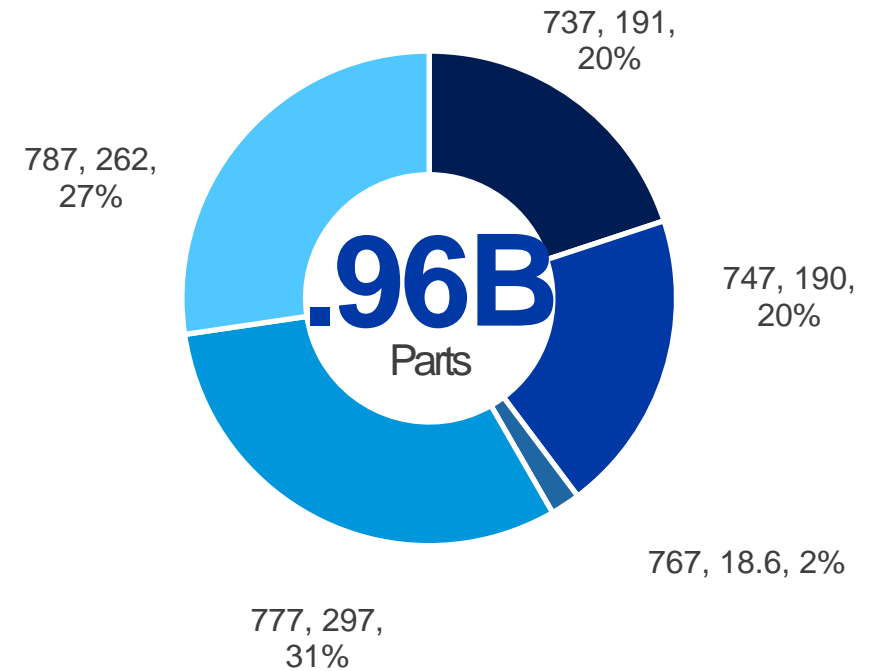
BOEING **EDGE**
Information Services

Production at Scale

Parts / Airplane

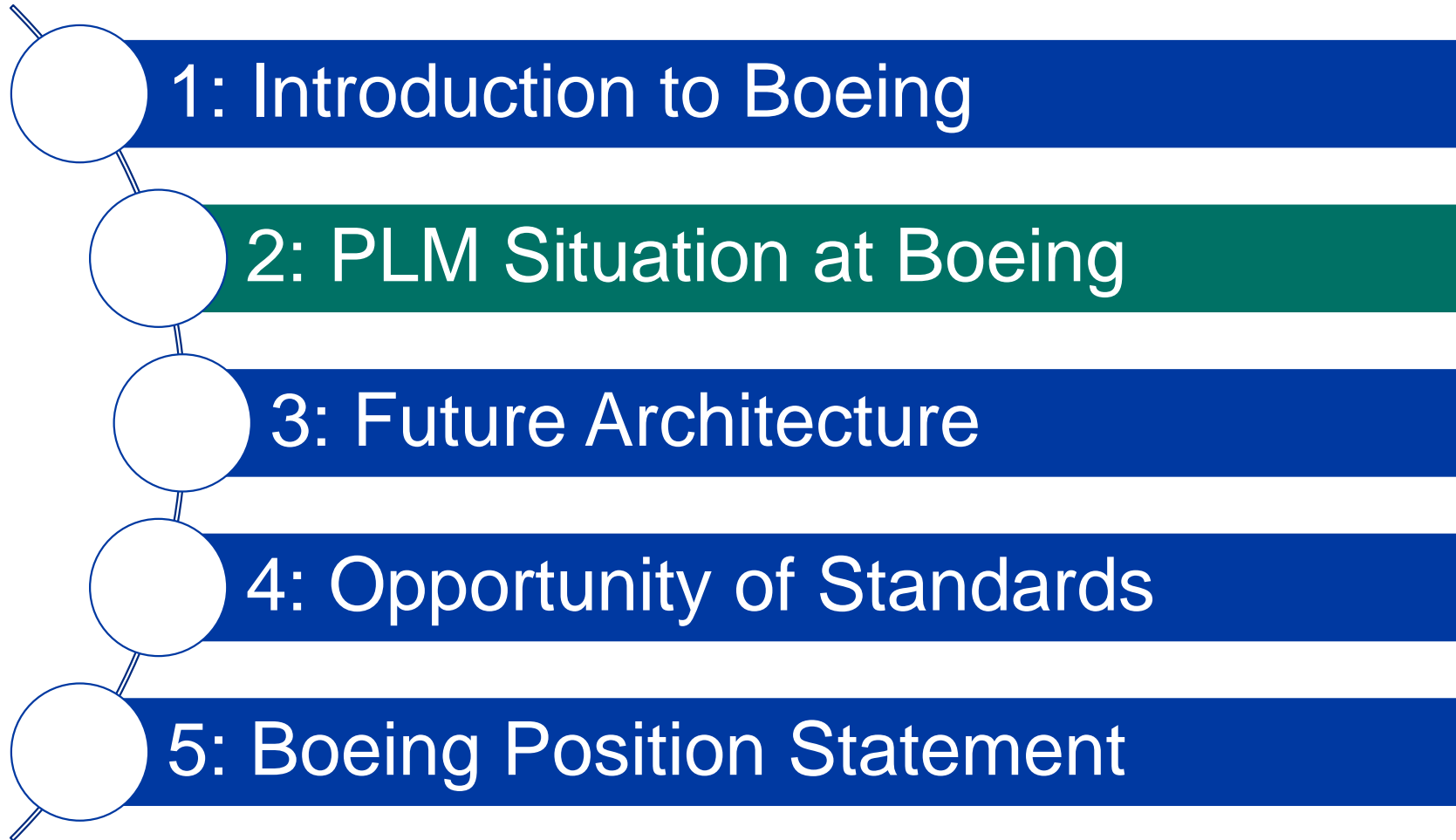


Volume in Millions / Year



8.7 Billion Records in ERP

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PLM Evolution at Boeing Commercial Airplanes

	1960 - 1990	1990 - Now	2005 - Now
Design	2D Drawings	3D Model + 2D Drawings	3D Model Based Definition
Change	Paper	Textual based, Boeing built	Textual based, Boeing built
Validation	Physical Mockup	Spatial Pre Assembly	Spatial, Functional, Build & Support Pre-assembly
Bill of Material	Paper / Forms on Mainframe	Teamcenter Enterprise + Specialty PDMs	ENOVIA LCA / Teamcenter Enterprise + Specialty PDMs
Configuration	Explicit airplane effectivity	Option driven quantity based	Option driven instance based
Applications	Boeing Computing Services	Customized COTS + Boeing IT	Customized COTS + Boeing IT
Technology	Mainframe	Unix + Windows, Thick & Thin	Windows, Thick & Thin

As-Is Architecture

A System of Systems at incredible scale

Comprised of

~ 2,500 Applications

On

~5,000 Servers

Affected by

~ 900 changes annually

Impacting

~ 40,000 Users

With

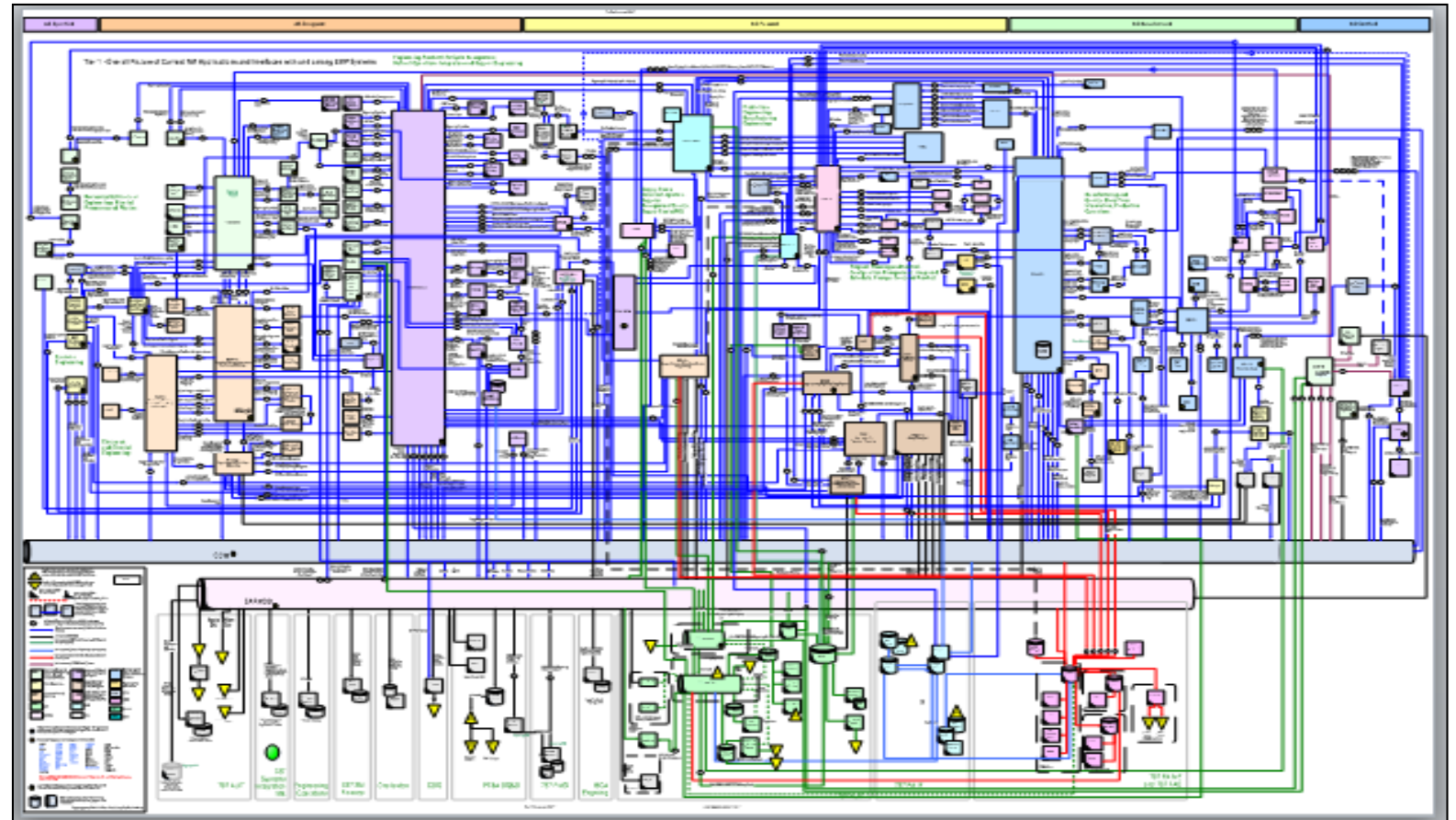
~ 12 copies of the data

And maintaining

~ 9.1 PB of data

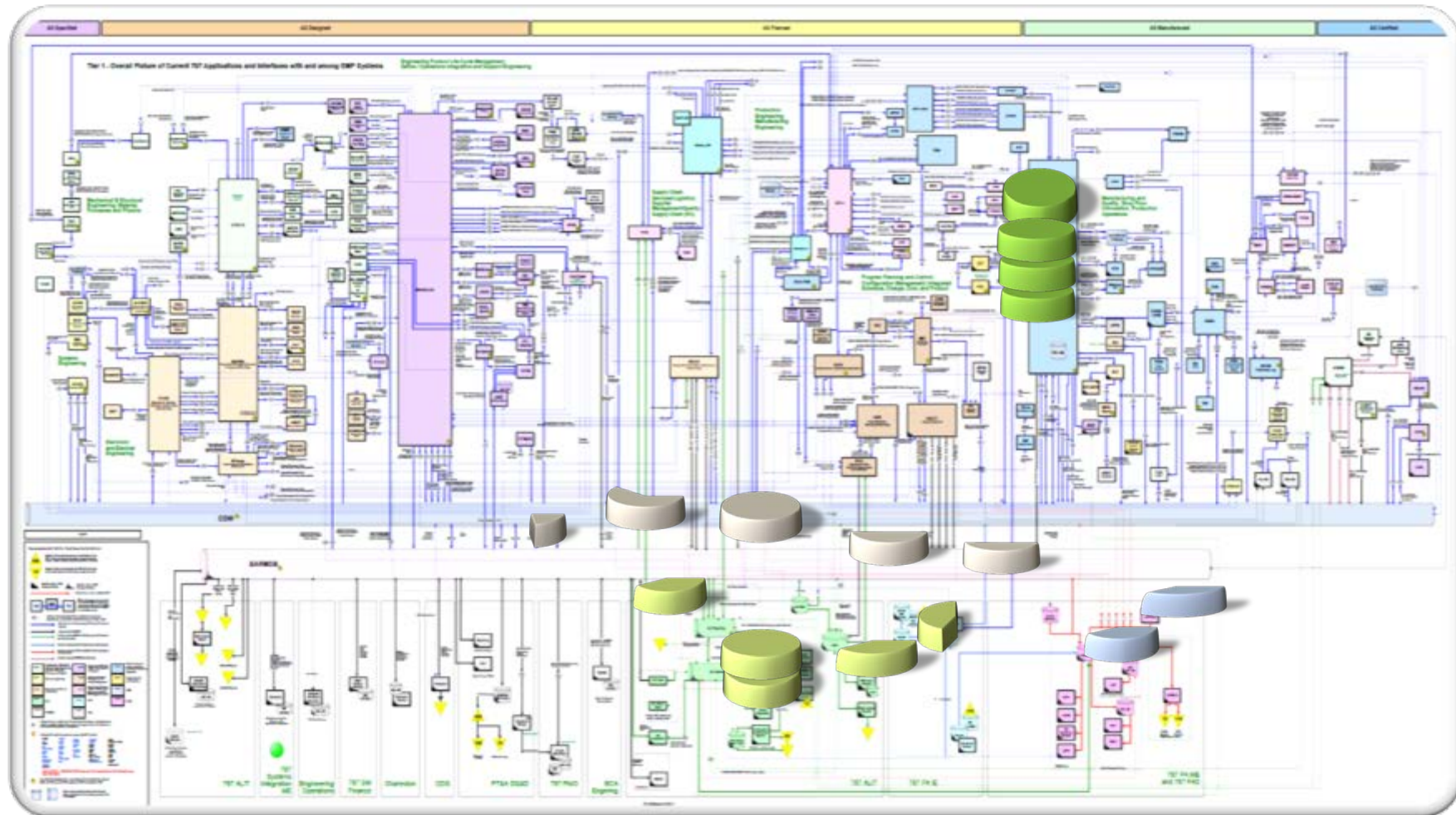
Across

7 Countries



Data Replication: An Increasing Burden

12 copies when 2 or 3 will do



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Technology Convergence – Our Challenge

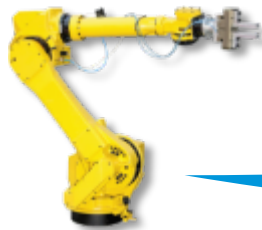


737 Max

777X

???

- **SMAC**
(Social, Mobile, Analytics, Cloud)
- **Automation**
- **Robotics**
- **Miniaturization**
- **Sensors**
- **IoT**

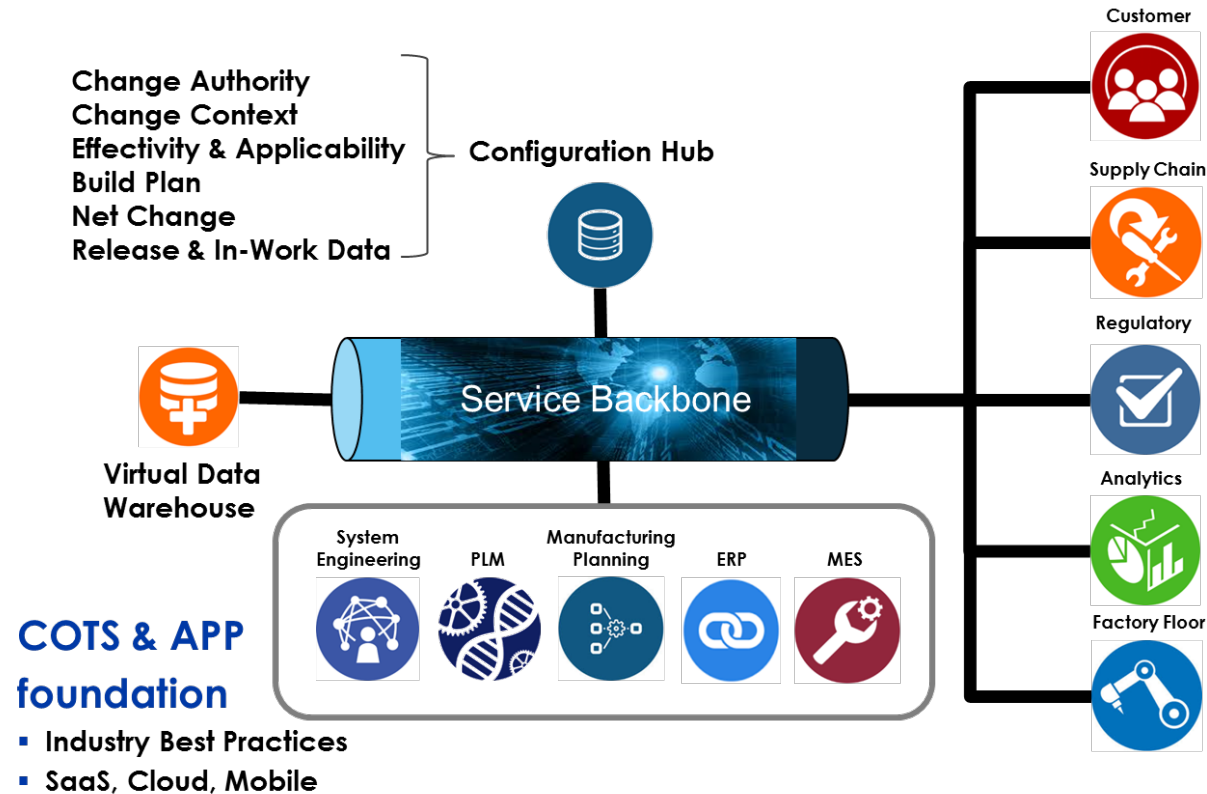


Architect a system that enables rapid technology insertion

Future Architecture Solution Concept

Key Requirements

- Smart User Interface
- Information Centric
- Obsolescence resilient
- Analytics Driven
- Incrementally Deployed
- Standards Compliant
- Globally Available
- Technology enabling

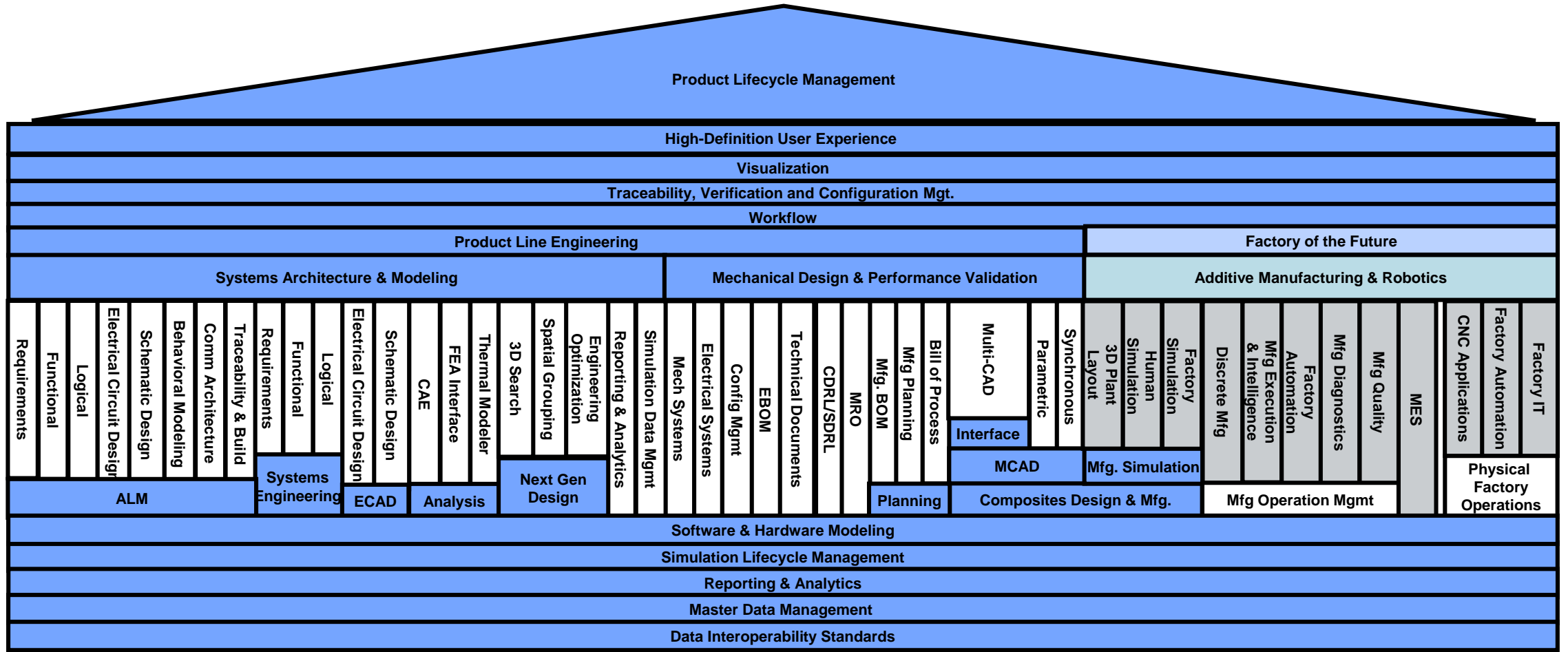


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Product Lifecycle Management

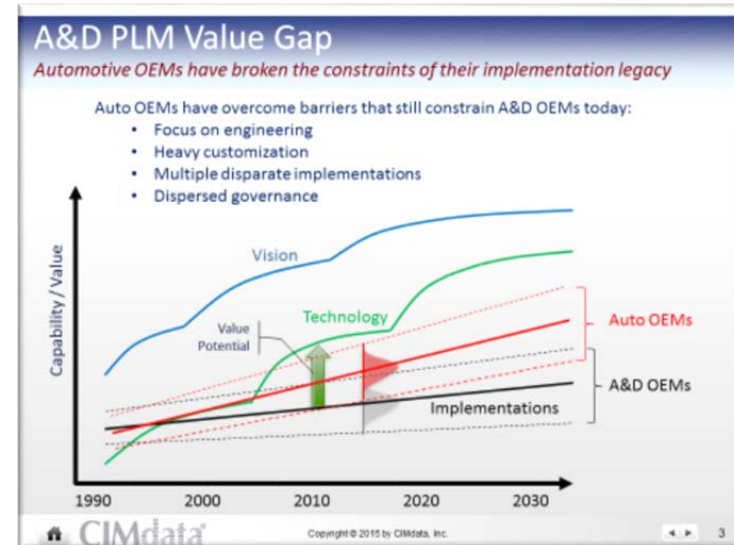
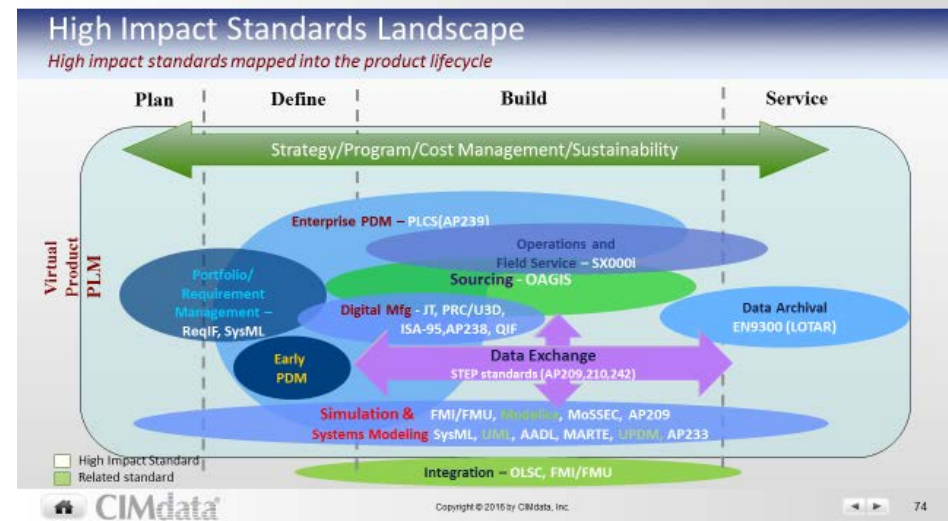
An opportunity space for standards



Standards

A Study in Challenge

- > 200 Standards Exist; ~20 High Importance
- Segment duplication dilutes value
- Alignment spawns velocity
- Companies pull, vendors deliver



The Value of Standards

One example illustrating the opportunity

- **Minimize customized applications and maximize COTS capabilities**
- **Break the obsolescence cycle**
- **Minimize cost of integration and data migration**
- **Enable future technologies**

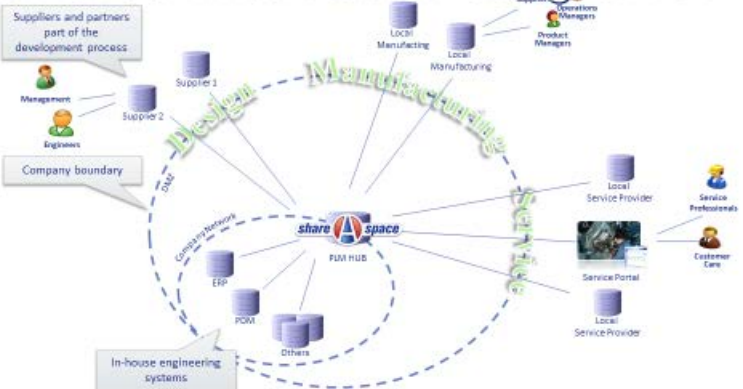


Concept of collaboration

Share-A-space®

eurostep COPYRIGHT EUROSTEP GROUP **share space**

External communication using a HUB



eurostep COPYRIGHT EUROSTEP GROUP **share space**

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Position Statement

- **Single set of interoperable standards**
- **Fully open**
- **Minimum redundancy**
- **Support harmonization**
- **Become a contractual requirement**
- **Adopt interim standards to fill gaps**
- **Lead development and adoption**

Position Statement

Global Product Data Interoperability Summit | 2015

1. BCAREquires a harmonized suite of data standards that covers the Product lifecycle. The data standards are the basis of a stable, vendor independent, interoperable data exchange interface between applications and organizations across Boeing, the A&D industry and essential for LOTAR.
2. The suite should minimize redundant data definitions across standards, i.e. there is a single consistent standard representation for data content but allowing for multiple implementation techniques.
3. Boeing will proactively support efforts to harmonize standards that provide strategic value.
4. The suite of standards will be based on the ISO STEP standards (ISO 10303) augmented by other fully open (IP owned by a standards organization, no IP limitations, level playing field) standards.
5. It is the intent of BCATo add contractual requirements to contracts with Software vendors. The language will require that vendors support the entire suite of A&D data standards with the same level of fidelity as their own proprietary formats.
6. Boeing may adopt or define an interim standard where an industry standard is unavailable. It is the intent to adopt the industry data standard when available, mature and affordable.
7. Boeing will be an Industry Leader in information standards development and adoption.

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Aerospace & Defense PLM Action Group



✦ Charter members

Aerospace & Defense PLM Action Group

Mission

An association of aerospace & defense companies within CIMdata's globally recognized PLM Community Program, which functions as a **PLM advocacy group** to:

- Set the direction for the aerospace & defense industry on PLM-related topics that matter to members
- Promote common industry PLM processes and practices
- Define requirements for common interest PLM-related capabilities
- Communicate with a unified voice to PLM solution providers
- Sponsor collaborative PLM research on member-prioritized industry and technology topics



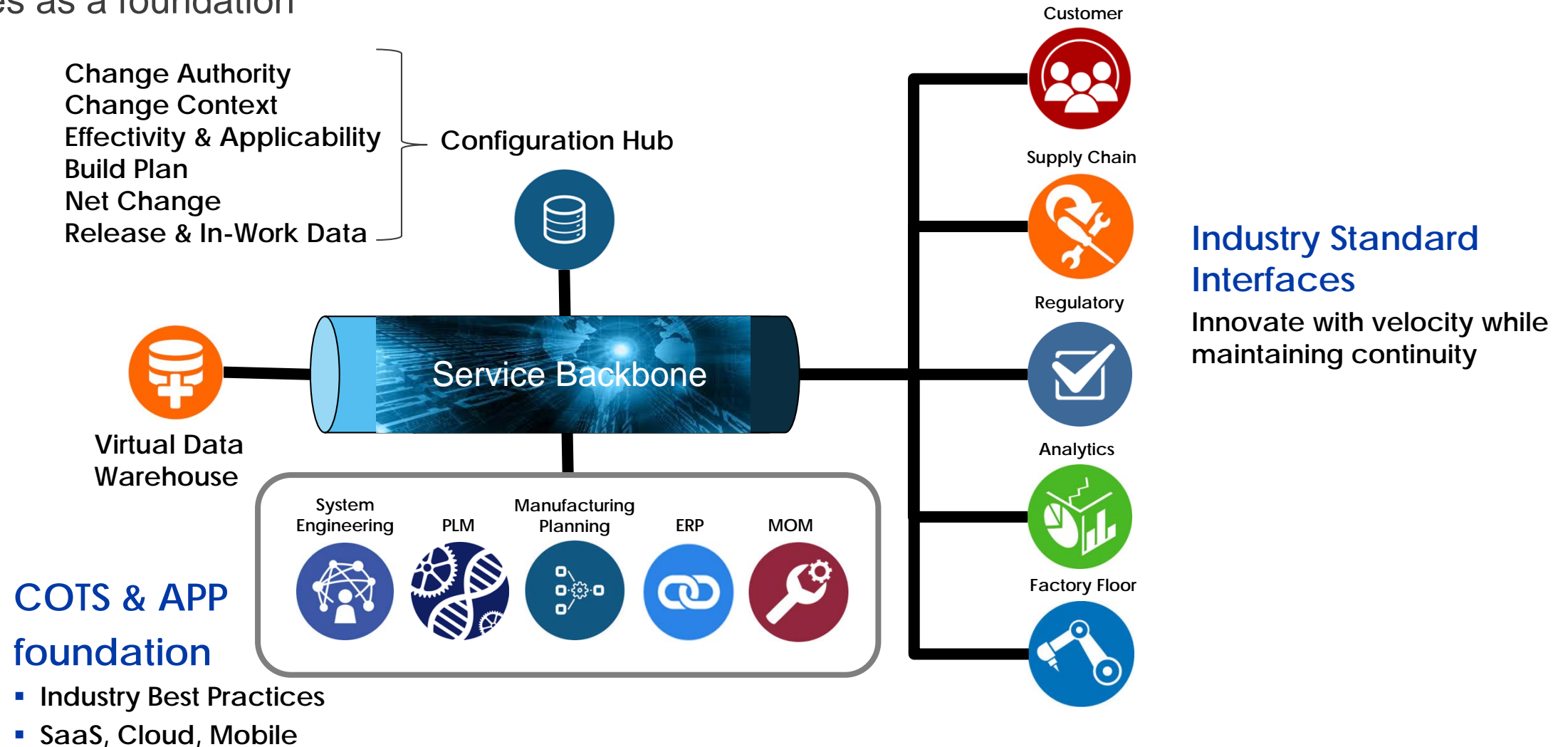
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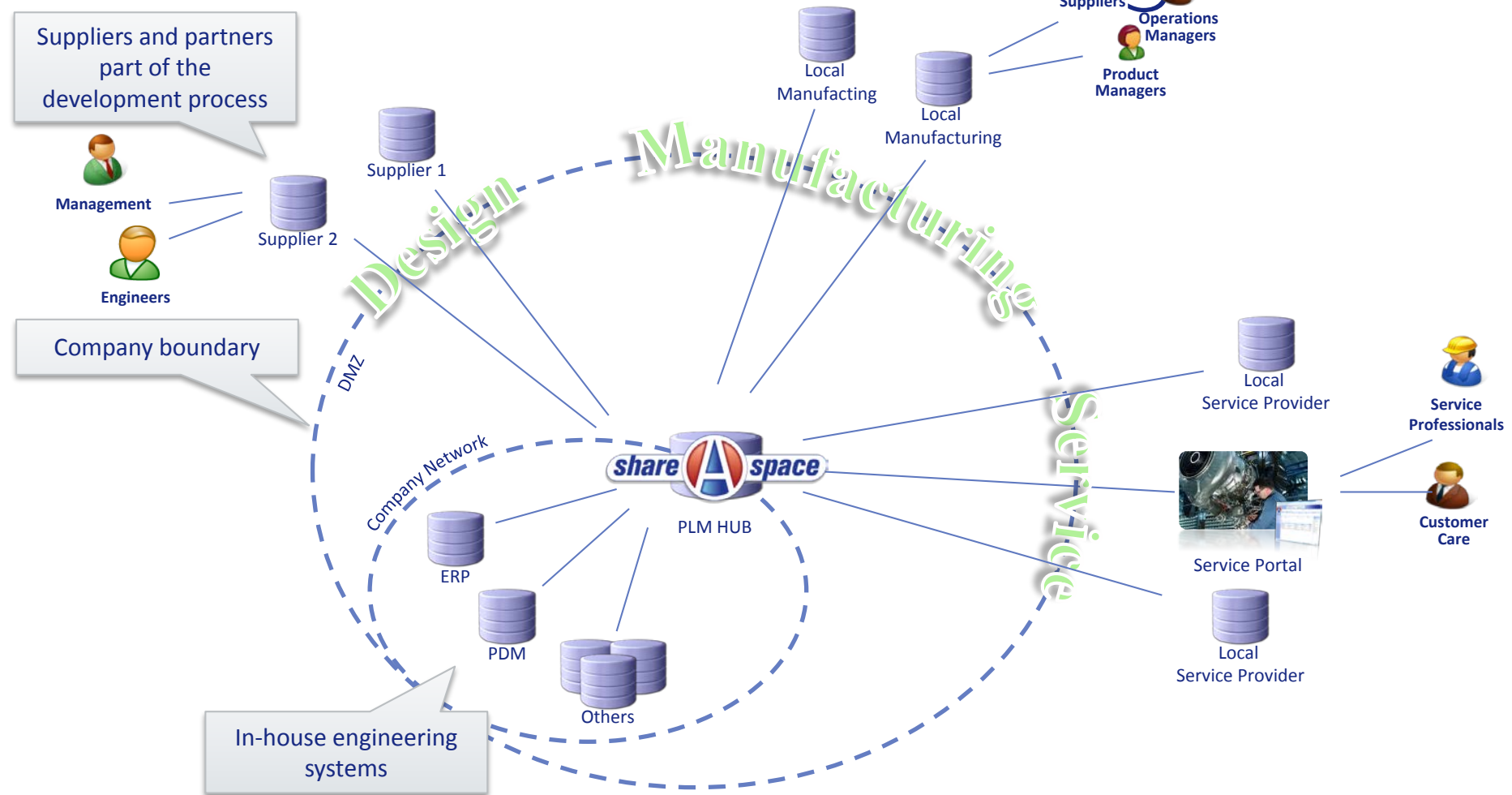


Future Architecture Solution Concept

Services as a foundation

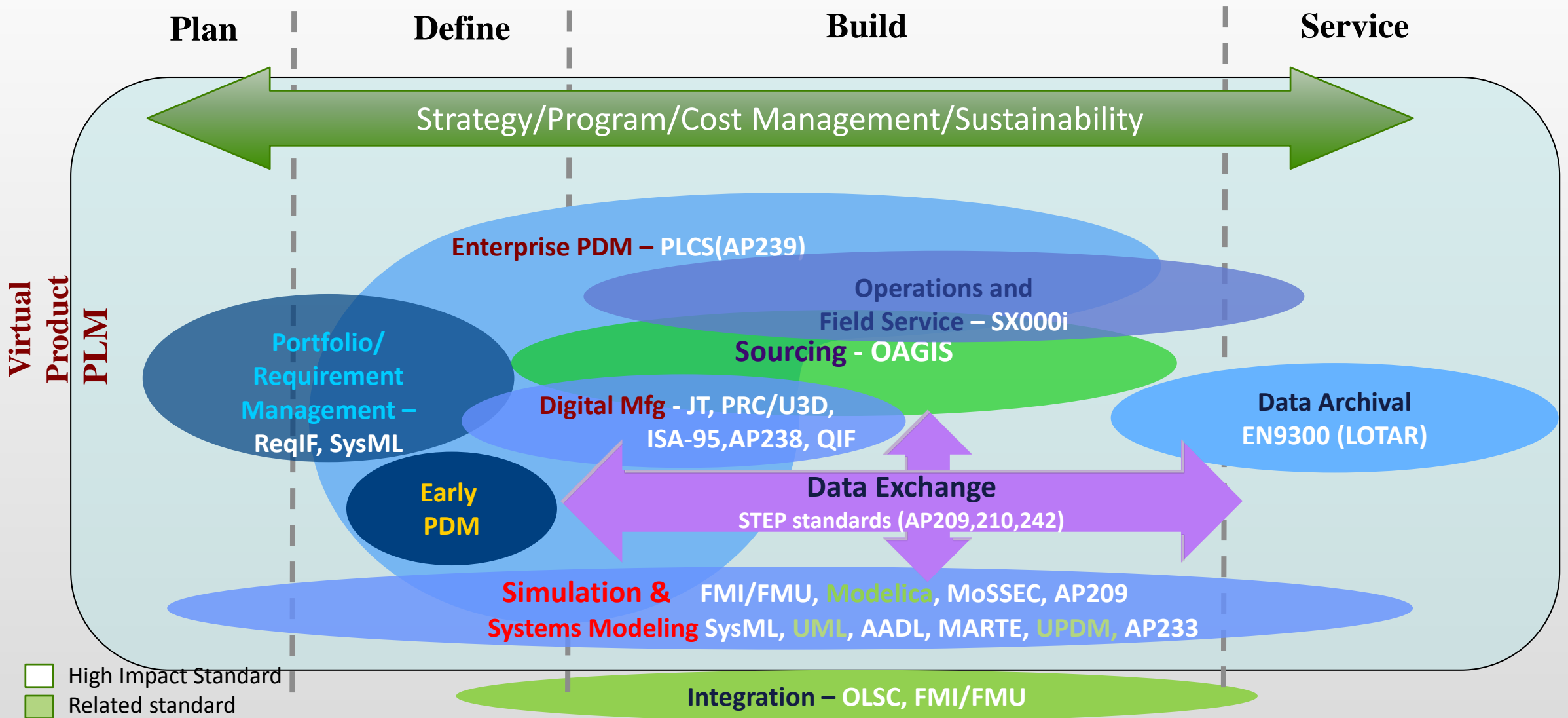


External communication using a HUB



High Impact Standards Landscape

High impact standards mapped into the product lifecycle



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