



Multi-view Bill of Material

How to Enable Collaboration Between Business Entities with Different Product Data Organizational Structures

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Multi-Bill of Material Configuration Management

The agenda

- Introduction
- Comparison of the Single and Dual Bill of Materials
- Proposed next steps and ambitions





Introduction



Introduction

- Presentation created as a collaboration between aerospace companies (CIMData Aerospace and Defense consortium)
 - Key Contributors, to prototype use cases and report out findings
 - **Boeing** - Bruce HIEBERT, Ian GILKERSON, Alek PRZYBYLO
 - **Airbus** - Benoit PLANTE, Jean-Luc JARRIGE
- What we have learned so far.....
 - After several discussions between Boeing and Airbus on multi BOM accountability (E-BOM/M-BOM), we discovered that
 - **First**, we needed a good way to communicate E-BOM/M-BOM **concepts**
 - **Second**, a way to communicate conceptual E-BOM and M-BOM **architecture**





Comparison between current Single and Dual BOMs concepts



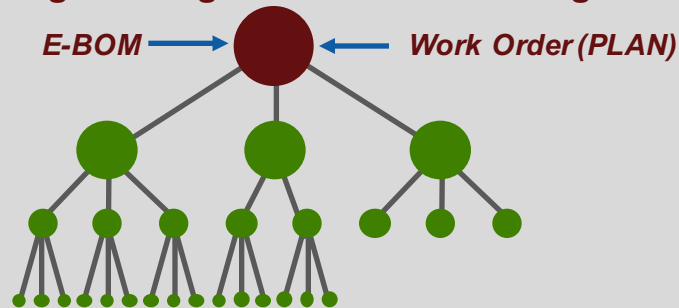
Definition of the concepts



Single BOM approach

A common data organization between Engineering and Manufacturing

Engineering = Manufacturing



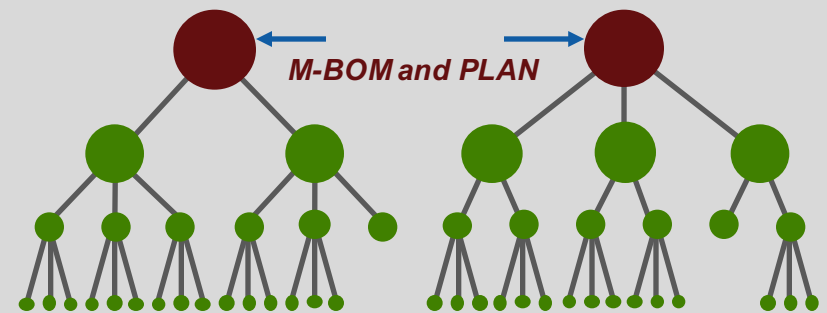
EBOM completed on a single plan



Dual BOM approach

Two separate data organization for Engineering and Manufacturing

Engineering ~ Manufacturing



EBOM completed on a more than on plan

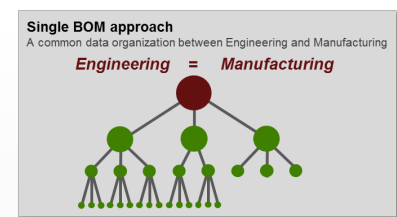


Configuration Management key concepts and Fundamentals

- Invariant of the BOMs
 - ADAP-CI (As Design As Planned-Configuration Item..)
 - CCZ (Configuration Control Zone)
- Effectivity
 - Unique configuration for single BOM
 - Dual configuration for dual BOM
- Fundamentals to be deeper discussed in the future
 - P/N
 - Product structure..
 - Level of effectivity (at part level, higher,...)
 - ...

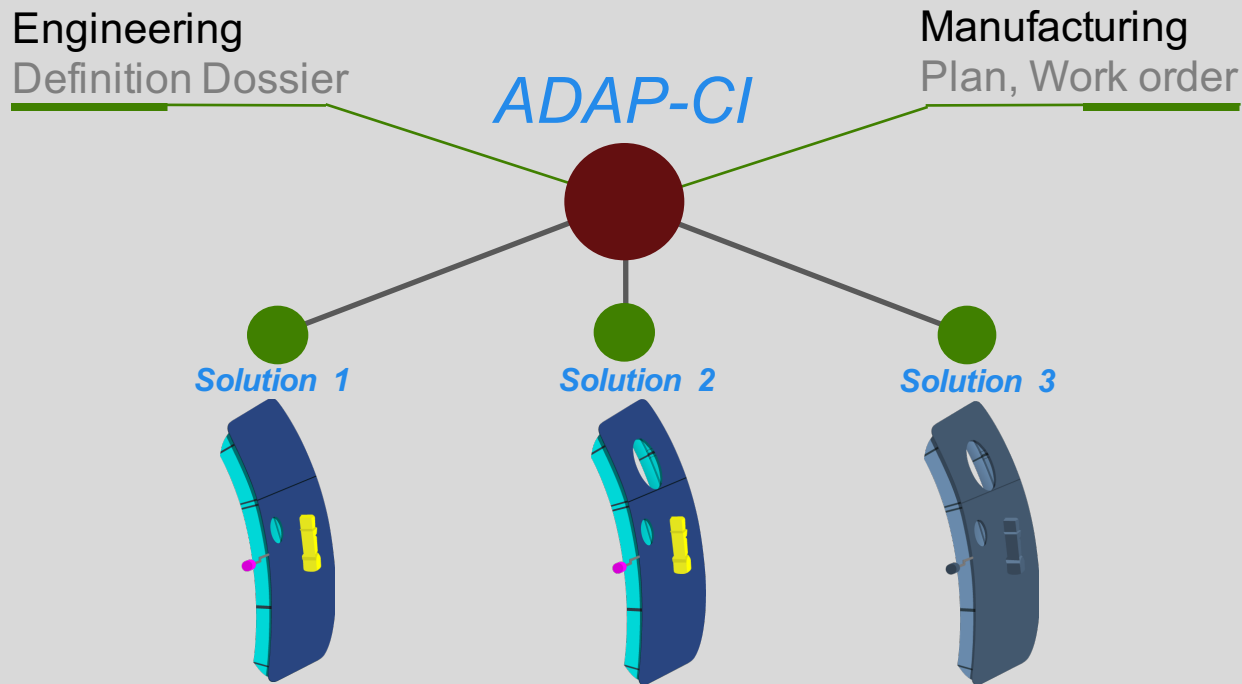


Single BOM

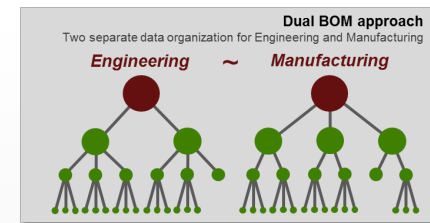


- The main concepts linked to the Single BOM
 - ADAP-CI concept from Airbus

The As-Design As-Planned Configuration Item is an agreed invariant element between Manufacturing and Engineering. For example an ADAP-CI could be “installation of the door”.



Dual BOM

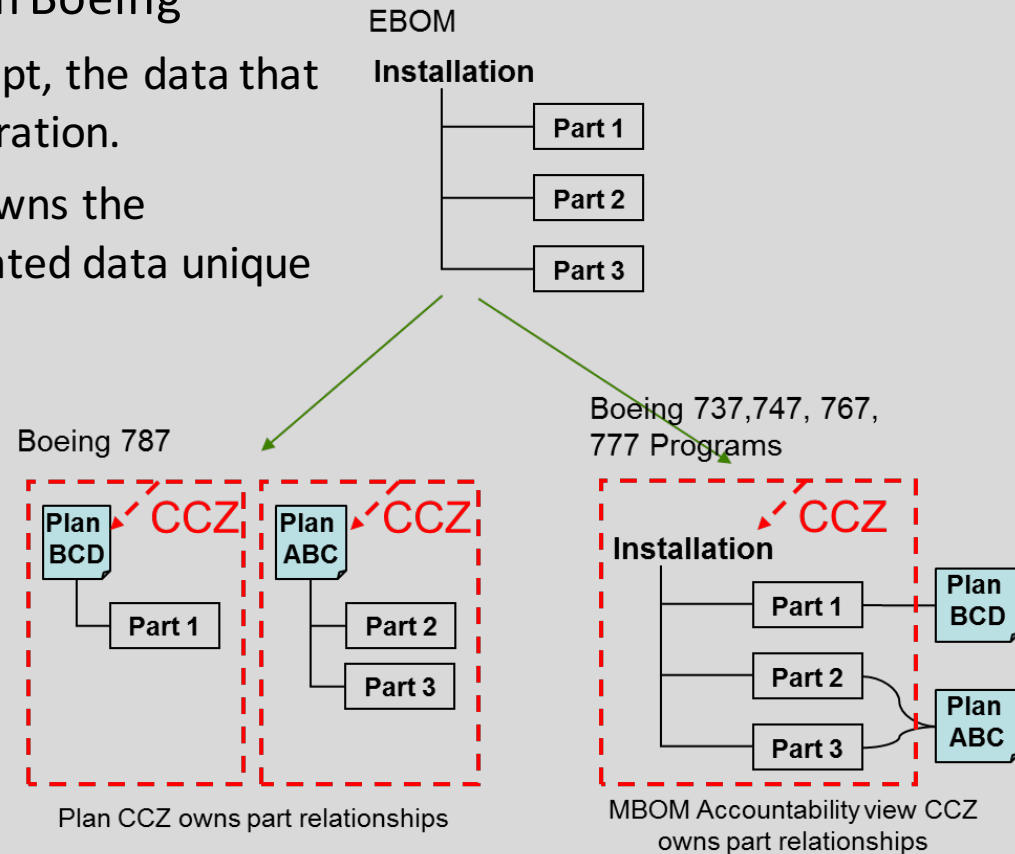


- The main concepts linked to the Dual BOM

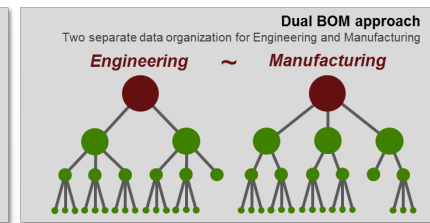
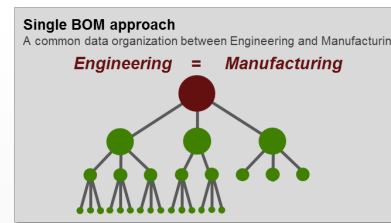
- Configuration Control Zone from Boeing

In the Configuration Control Zones concept, the data that is owned by a single revision of a configuration.

For example, a revision of an assembly owns the relationships to the components and related data unique to that assembly.



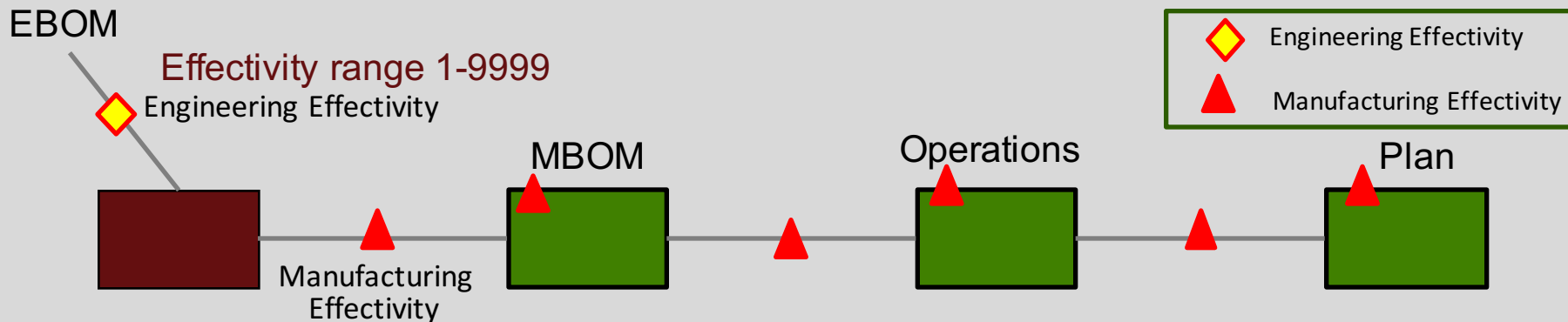
Single or Dual BOM



- The main concepts share between Single BOM and Dual BOM

- Effectivity management

What ever **Single** or **Dual** there are different layers of effectivity that we need to manage.
For example - **Manufacturing effectivity are different than Engineering effectivity**

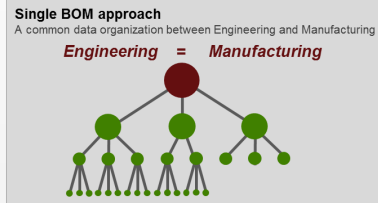


- PLM systems allow effectivity on objects and relationships without a common schema to ensure accountability. Without an industry best practice in this area, **every company must create internal effectivity schemas that are very difficult to change once implemented.**
- There are many different approaches to simplifying this problem
 - Create PLM customizations to keep the E-BOM and M-BOM reconciled prior to release. (Boeing Premier models)
 - Use as COTS, eliminate the M-BOM and force the E-BOM to manage all manufacturing changes (Airbus)
 - Use as COTS with M-BOM and use reconciliation reports post release (ENOVIA/DELMIA Boeing 787)

Comparison



Single BOM



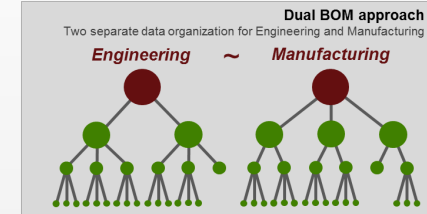
Conformity

Communication

Rigidity

Commitment

Dual BOM



Flexibility

Simplicity

Reconciliation

Integration

Opposing force between single or dual...

- **Are there any other choices ?**
- **Is there another model?**





Proposed new concept, the multi-view



Multi view in PLM, the opposing force



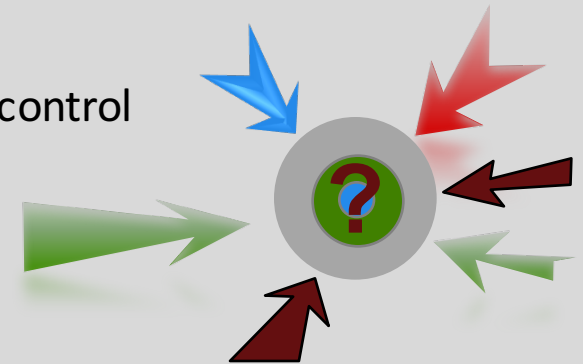
PLM Today statement

- The cost and complexity of implementing each new generation of PLM creates the need for the Aerospace industry to consolidate on common functionality.
- PLM providers create flexible capabilities for managing the variation that occurs when we integrate CAD/E-BOM/M-BOM.
- Some of this variation is created by “opposing forces” that drive customizations in PLM because there is no industry standard or best practice.



Pain points we all experienced

- Each new development in CAD/E-BOM design integration impacts the M-BOM and downstream solution set.
 - Internal tabulation (150% BOM) versus part number control
 - Multi Variant Option capability
 - Configuration management
 - Reconciliation



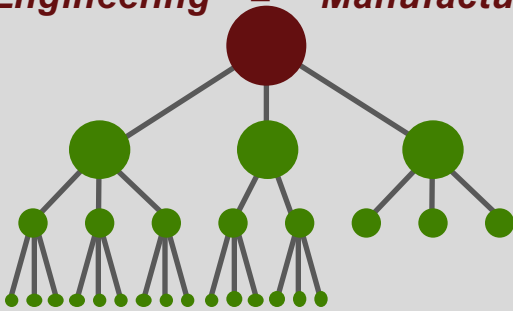
Multi view Definition

the target...

Single BOM approach

A common data organization between Engineering and Manufacturing

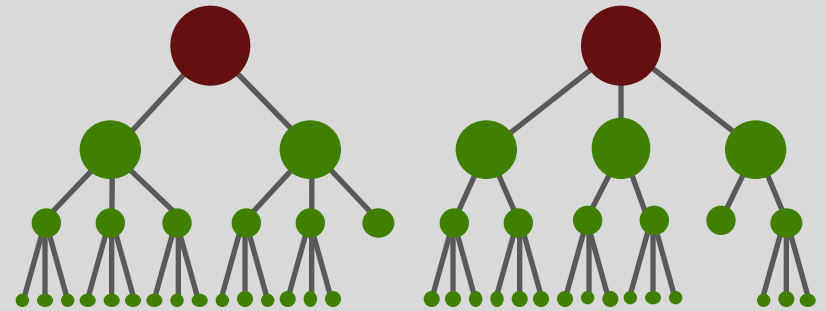
Engineering = Manufacturing



Dual BOM approach

Two separate data organization for Engineering and Manufacturing

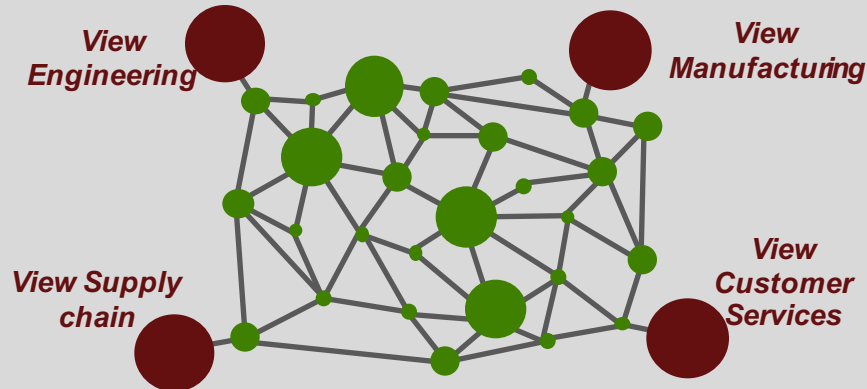
Engineering ~ Manufacturing



*We share a common target
But the way to reach it, is different!*

Multi view approach

A data lake allowing multi view setup





Proposed next steps and ambitions



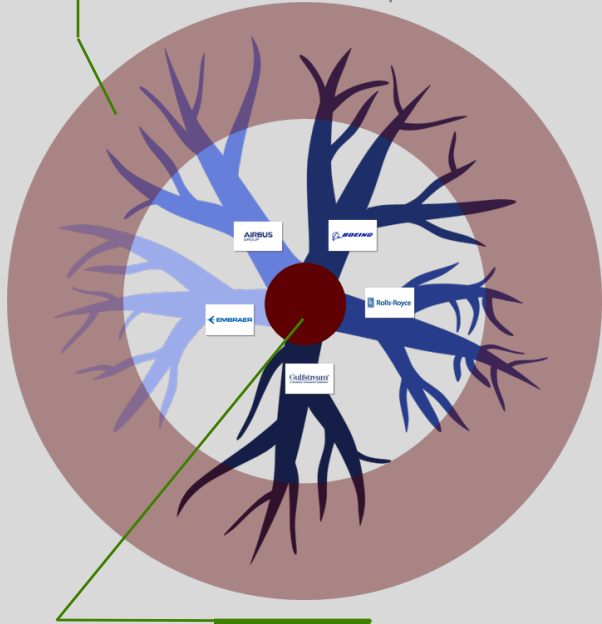
Move the aspiration to an higher level

3 steps to reach the target

1 Back to basics

First area of analysis

Level of complexity and diversity in the Product Structure concept



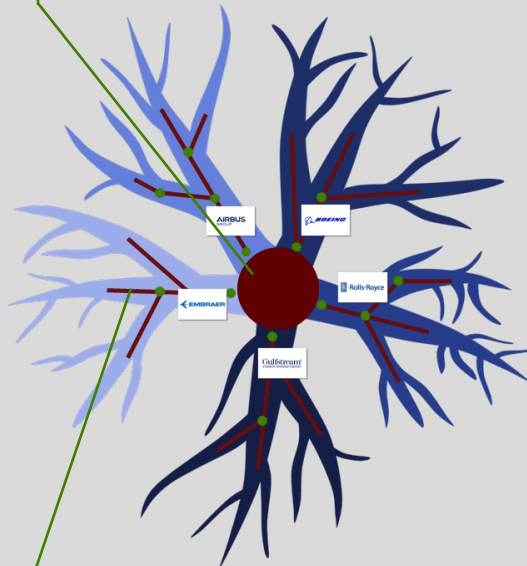
Target area for analysis

The good level should be the **Fundamentals**, making understandable the Product Structure concepts

2 Translate fundamentals into PLM solutions

Harmonized Process and Patterns

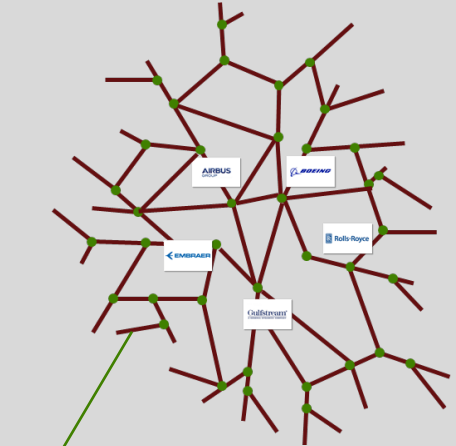
Identify common process for Product Structure that match as much as possible with all.



Symbiosis deployment

Engage A&D suppliers, PLM editors to manage Product Structure with a common A&D vision

3 Facilitate A&D collaboration



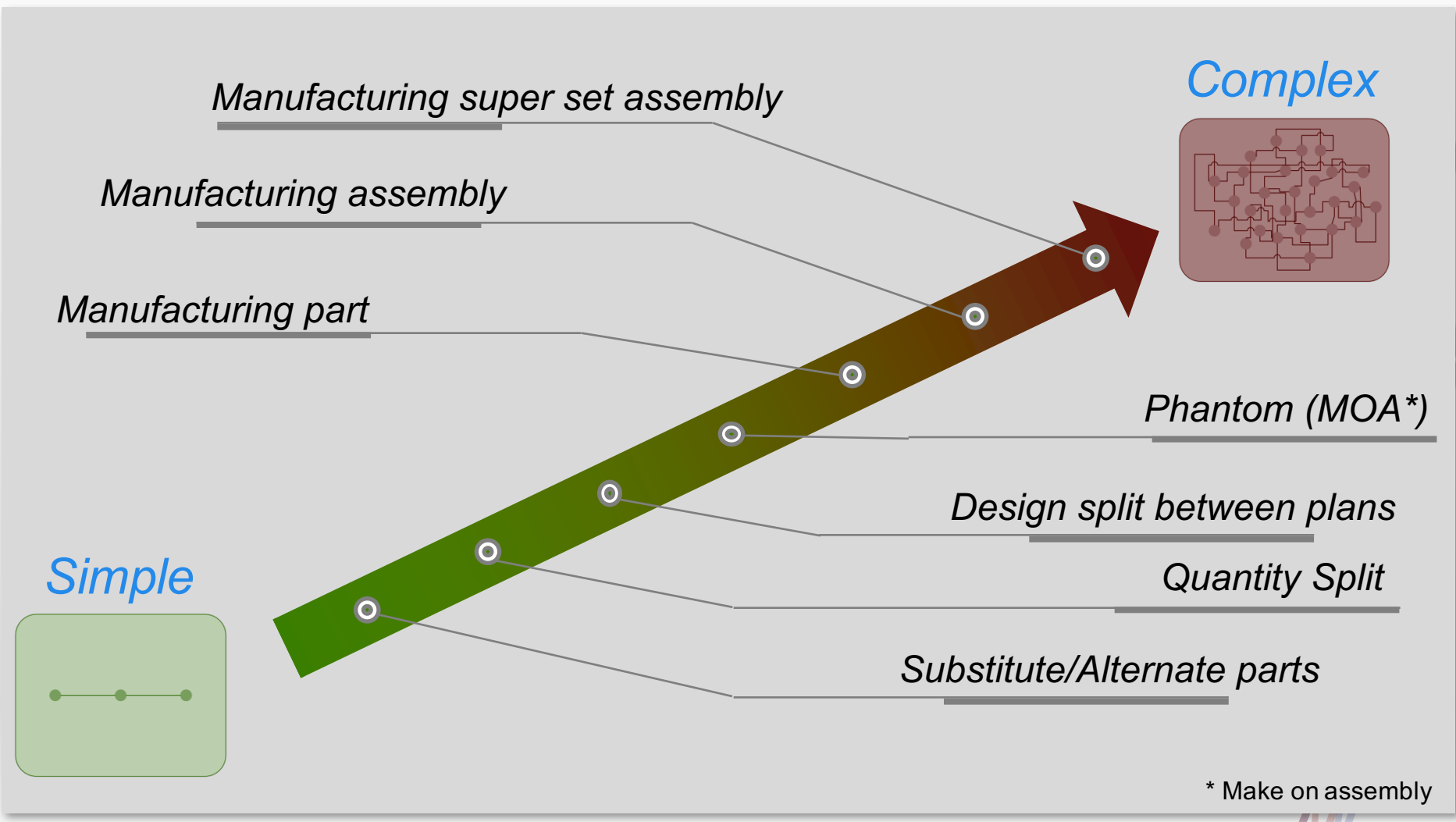
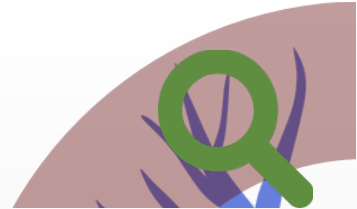
Enable the collaboration

Share common parts of product, managed by a common supplier. Knowledge management. Build products with common platform.



Use cases of restructuration

Classification



* Make on assembly

Methods

Way of working for passing the 3 steps



- Create a team of expert (3, 4 people per company)
- Physical workshop with all experts
 - Deep dive on the Product Structure concept
 - To be organized Q1-2017
 - Weekly based discussion to prepare input of the workshop and then secure output progress.

- To organize a first meeting in Airbus Smart collaboration environment to prepare the planning and reach the objectives
- Create a project structure to ensure involvement, reporting and action tracking.
- Identify synergies with existing initiatives in the different companies



Thank you



Q&A



Microsoft
PowerPoint Presentat

AEROSPACE & DEFENSE
PLM ACTION GROUP

