

# Evolution of PLM for Design Integration

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## GLOBAL PRODUCT DATA INTEROPERABILITY **S U M M I T** 2015



ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING



## We are part of Airbus Group

**AIRBUS**  
GROUP

**138,000+**  
Total workforce

**€857.5billion**  
Order book

**€60billion**  
Annual revenue

 **AIRBUS**



 **AIRBUS**  
HELICOPTERS



 **AIRBUS**  
DEFENCE & SPACE



## The most global aerospace player – close to our customers worldwide



### The numbers

- 
- 11** Production sites
- 4** Assembly line locations
- 5** Training centres
- 4** Engineering centres
- 3** Customer support centres
- 10** Materials & logistics centres\*

Data to end 2014

\*Satair Group

## Delivering value for airlines and enabling people to connect

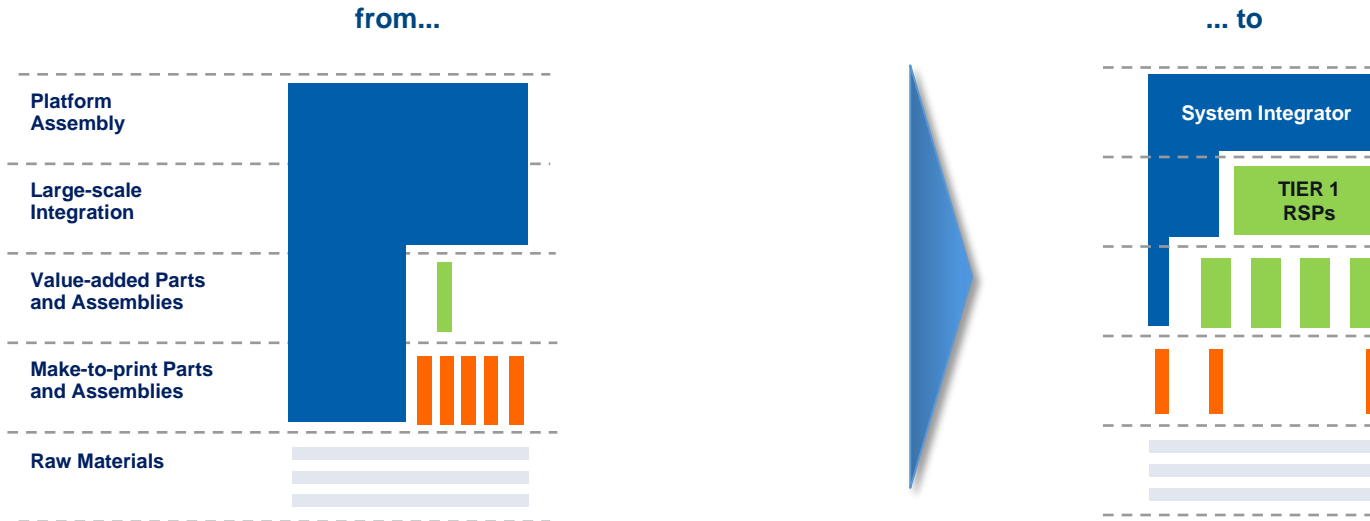




# The supply-chain & delivery model is evolving

## From a “Built-to-Print” to an “Integrator” model with an RSP strategy

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- High degree of vertical integration.
- Development responsibility mainly on Airbus.
- Local sourcing of BtP packages in an “extended workbench” approach.

- Acting as an A/C integrator.
- Focus on overall A/C architecture and requirements for structure, systems & cabin.
- Sourcing of major components from a network of D&B risk sharing partners (“extended enterprise”)

**An efficient collaborative design environment is required !**

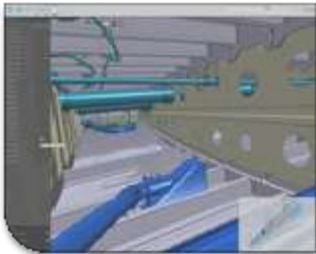
# OEM as Integrator

## Challenges

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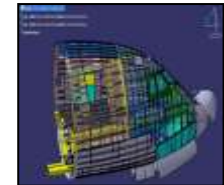
Most of the design is done outside the OEM



Complex product : ~3 000 000 components represented



Configuration managed by more than 30 000 configuration items



Necessity to manage concurrently different skills like:

- Structure
- Mechanical systems
- Electrical systems
- Manufacturing, ...



# A350 Digital Mock-Up Key Figures

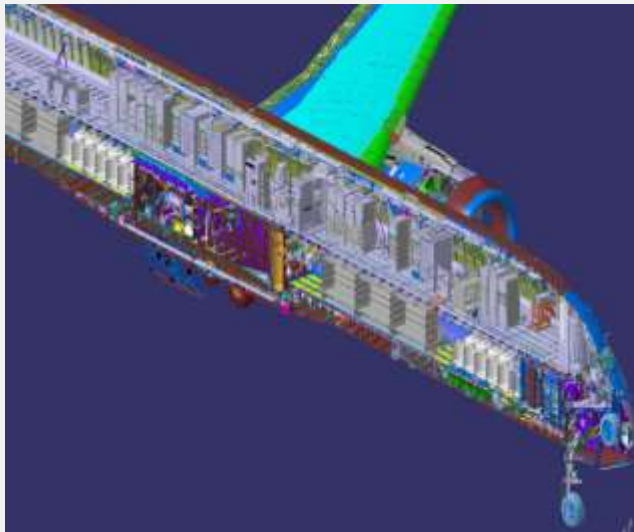
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cDMU review dataset

Part  
Instances  
Parts

## A complex product:

- More than **3 million** part instances.
- **17 million** links.
- More than **30,000** Configuration Items.



A/C



1,498,600  
162,854

MC



999,066  
108,569

Section



175,544  
29,111

WP



360  
180

DS



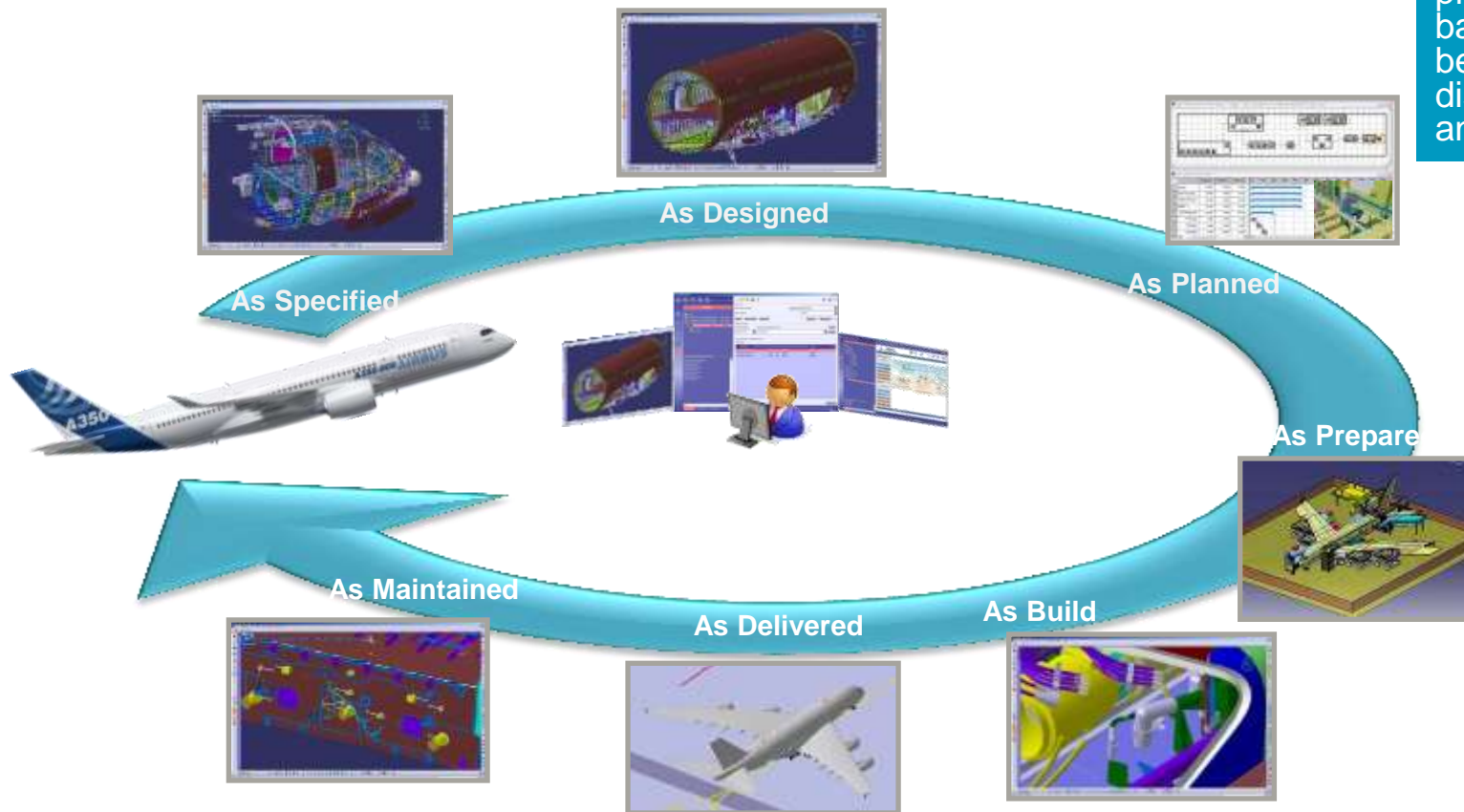
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# Today's world is digital

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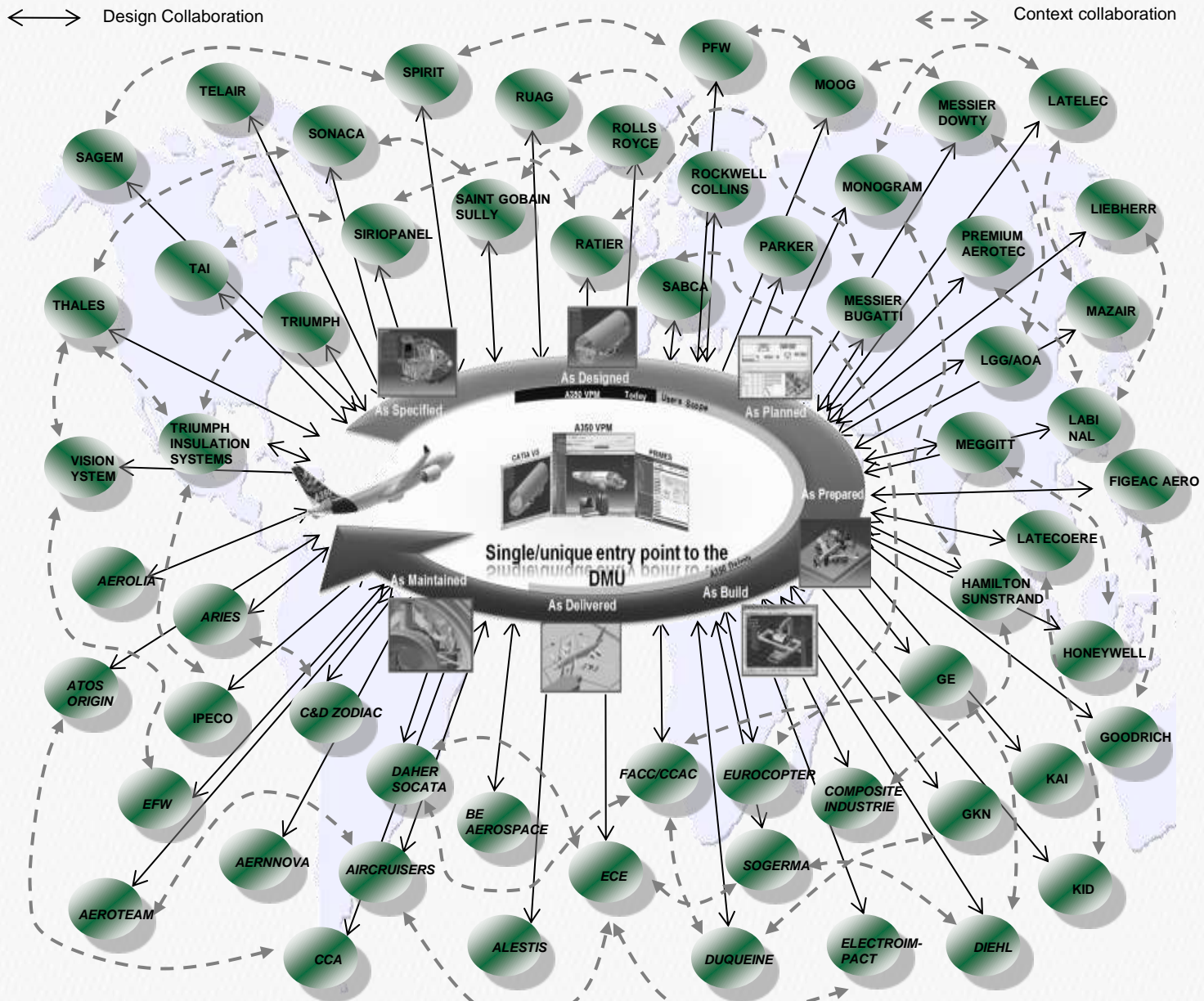
## Unique DMU (Digital Mock-up)

- providing and sharing basic information between all disciplines, partners and sites





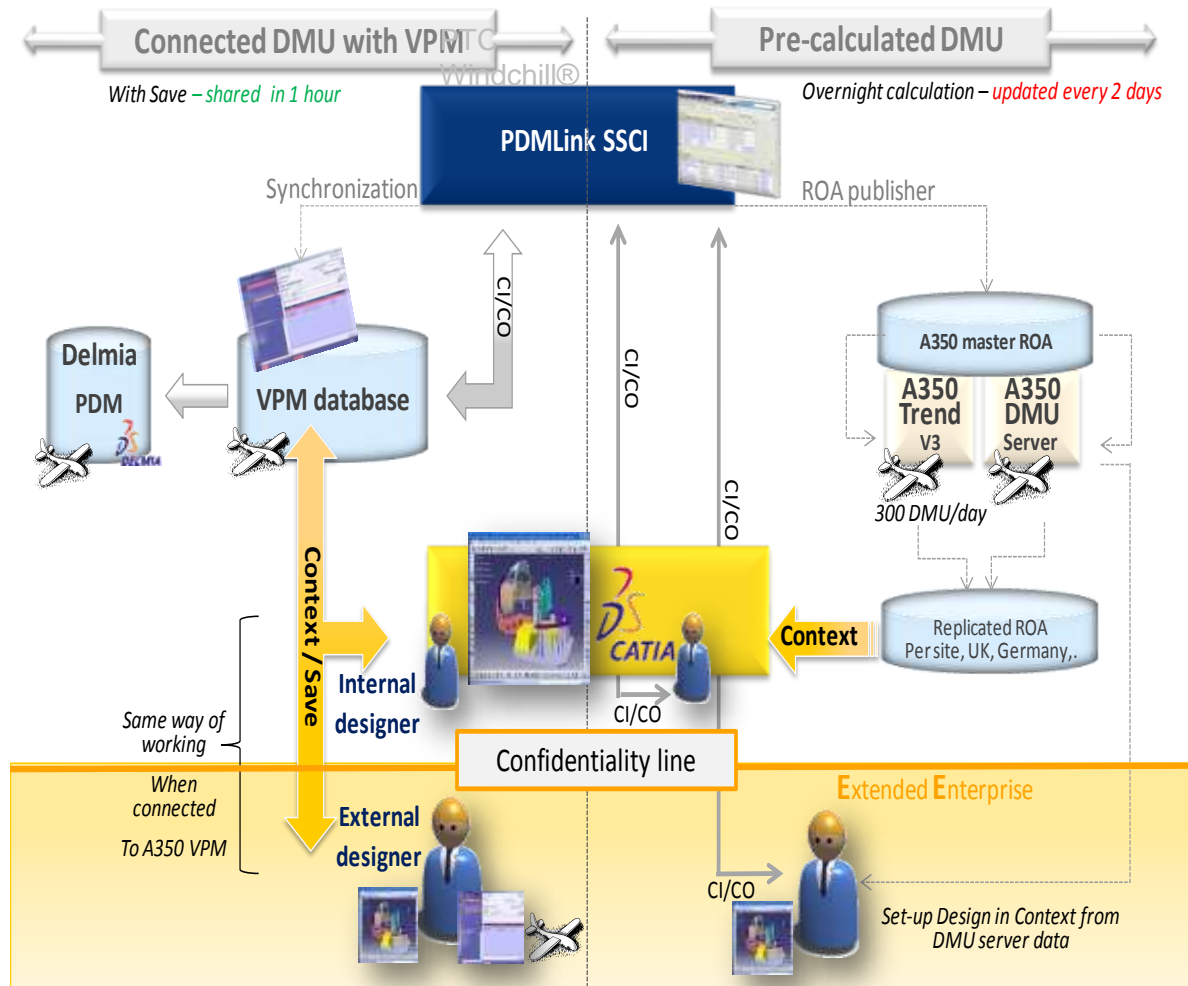
## Extended Dimension of Collaboration



## We require an Up-To-Date Digital Mock-Up Context World Wide

# PLM Information System “Ten years of evolution”

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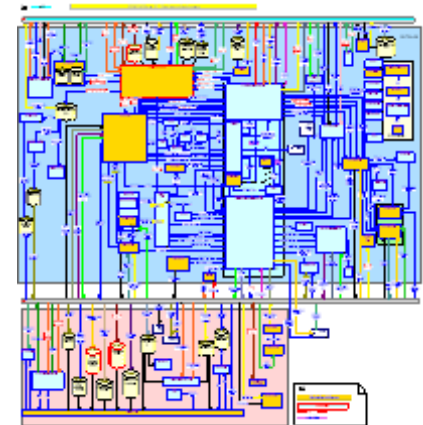
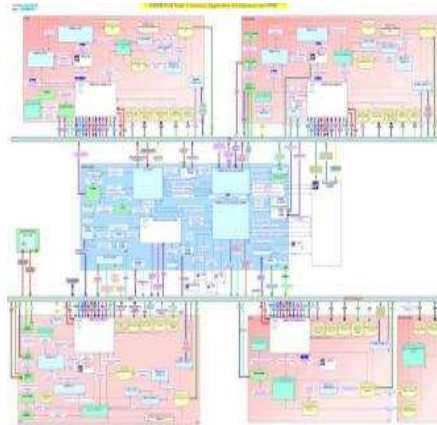
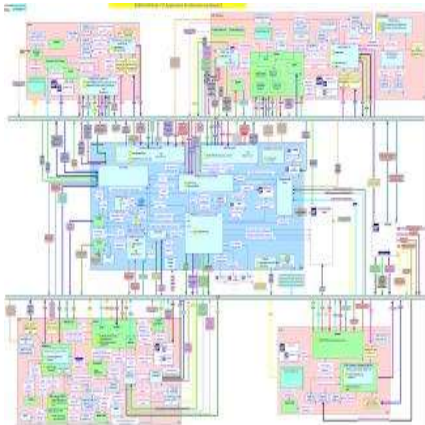


## Facts & Figures

- ✓ More than **130** Risk Sharing Partners connected
- ✓ PDM : >**5,000** active users daily
- ✓ VPM : >**3,000** active users daily
- ✓ **85%** users in Extended Enterprise
- ✓ **24/7** availability since 2012
- ✓ Data doubled every 6 months
- ✓ cDMU updated every **60** min EE included – (no exchanges anymore)
- ✓ Data management and consistency through one repository
- ✓ DMU review of **full A/C**
- ✓ Extended Enterprise connected in real time through a **common Digital Mock-up (cDMU)**
- ✓ **Design in context** with VPM
- ✓ **Full 3D process (MBD)**

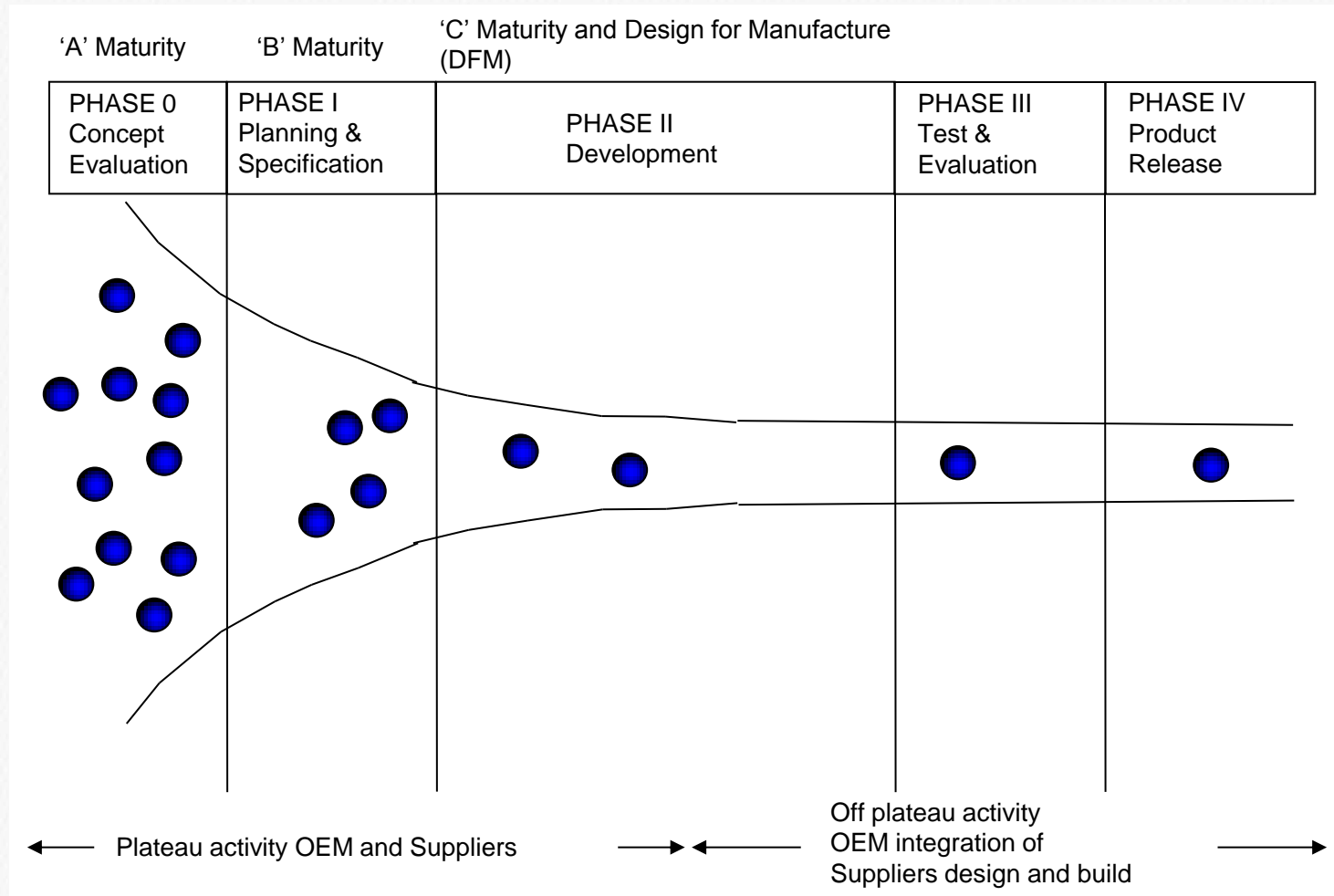
# PLM Information System “Ten years of evolution”

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# Product Development Phases

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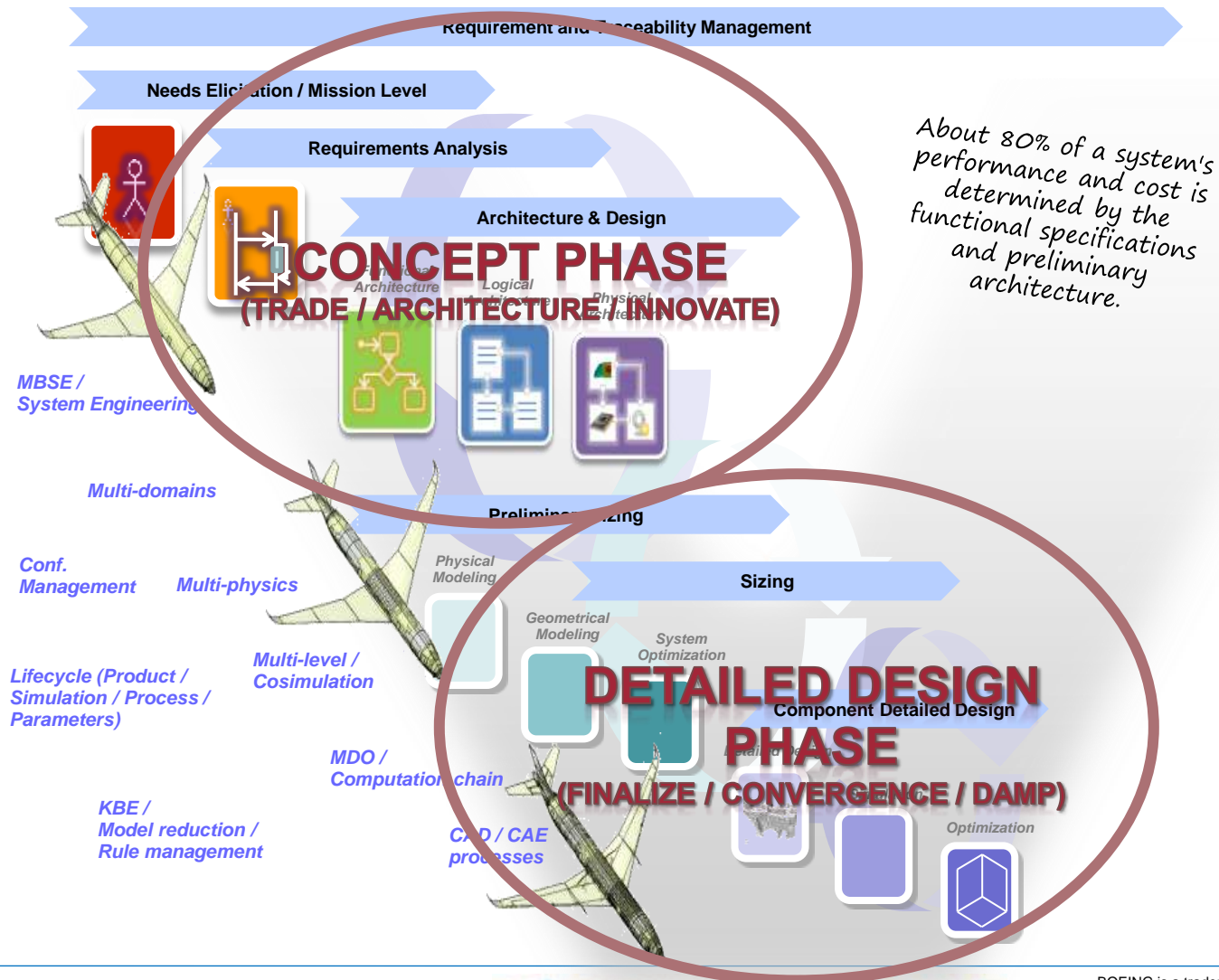
*Adapted from Wheelwright and Clark (1992)*



# Integration of System Engineering

## Concept phase vs Detailed Design phase

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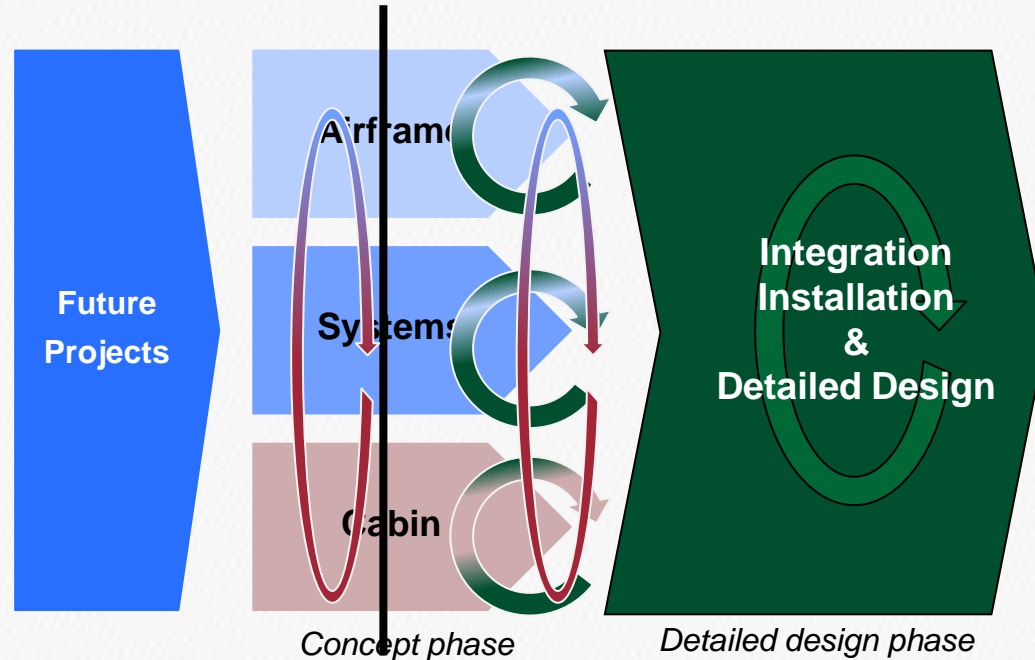
# Integration of System Engineering

*Enable earlier global integration loops & smooth transition to detailed design*

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1. Enable flexible but clear conf management during concept phase (trade process)

2. Enable early axis reconciliation (keep global view)



3. Enable global / local back & forth analysis (foresee details from global choice, check details are aligned with global decision)

4. Enable multi-disciplinary assessment in extended enterprise context (leveraging simulation capabilities)

# Why PLM Interoperability Standards?

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## Strategic benefits

- **Protect** our digital information
- Open PLM approach **supporting compatible ways of working** across the Extended Enterprise & with customers
- **More independence** from PLM vendors

## Economic benefits

- **Reduction of costs** related to product development, product rework, and PLM applications obsolescence (i.e. migrations...)
- **Less redundancy** in work, data creation and processes
- **Less time to market**

## Operational benefits

- **Enhanced collaboration** throughout complete product lifecycle
- Optimization of **Extended Enterprise efficiency** based on increased tool flexibility
- **Better integration of PLM principles** for development of new products & services

## Quality benefits

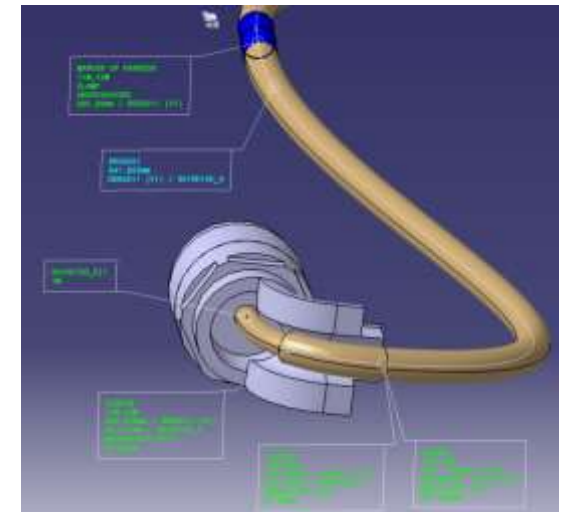
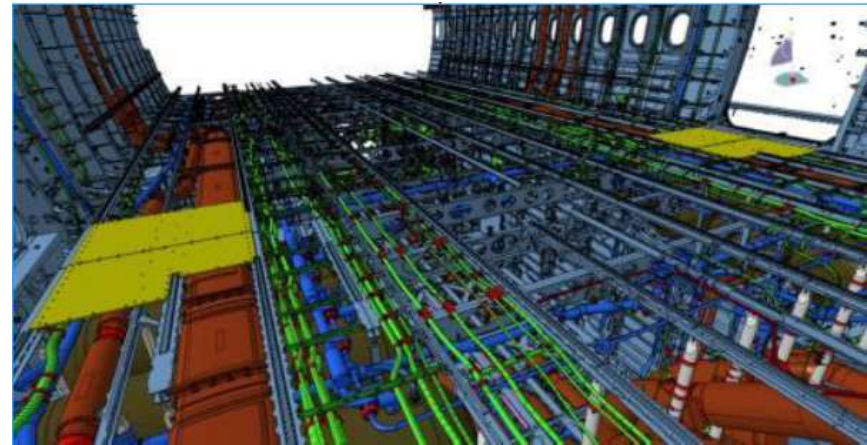
- **Better product data integrity** by reducing rework
- **Improved product information robustness** by highlighting specific data quality issues

EXCHANGE  
SHARING  
VIZUALIZATION  
ARCHIVING

# Examples of Airbus use of STEP AP 214 and AP 242

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- **STEP AP 214 for the conversion of legacy 3D CAD models to Catia V5**
- **Long Term Archiving of A350 “Full 3D” definition in STEP AP 214 and STEP AP 242**
- **STEP AP 214 for exchange of PDM product structure**
- **STEP AP 242 for CAD exchange with equipment suppliers**





# Engineering domain interoperability standards

## *Airbus Group involvement*

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- **STEP AP242 ed1 & 2 development, benchmarks, deployment**
- **Participation to the ASD Strategic Standardization Group**
- **NAS / EN 9300 LOTAR standards**
  - Recent extensions to the Engineering and Analysis Simulation domain
- **Development of MoSSEC (collaborative Systems Engineering)**
  - Traceability and re-use of collaborative modelling and simulation
- **White paper for the launch of ISO STEP AP 239 PLCS ed. 3 project**
  - ISO standard supporting the integration of information models of AIA – ASD ILS specifications,
  - Finalization of PDM harmonization between STEP AP 239 and AP 242 ed2
- **Participation in OASIS OSLC, including ALM-PLM WG**

# Summary & Conclusion

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## Full value of PLM comes through

- Integration across disciplines
- Covering the complete life cycle of our products & processes
- Integrating all teams globally

## We don't want a monolithic PLM system

- High dependency on one Vendor
- Need to be able to use best-of-breed technology

## We have abandoned the holistic approach

- We don't believe in a monolithic PLM system (no one-for-all solution)
- Impossible to align the product range on one system



**Openness & Standards are the key to success**  
**Compete with content, not interfaces & data formats**

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