

# ***Product Lifecycle Management (PLM)***

***Solution to manage innovation for manufacturing industries***

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*Founder of Dassault Systemes*  
*Board Member, ESI Group*  
*Board Member, DEMSolutions*  
*Executive Advisor, ParallelGraphics*

**Isicad 2008**  
**Novossibirsk, Russia**

# Agenda

1

The challenges of the industry

2

PLM

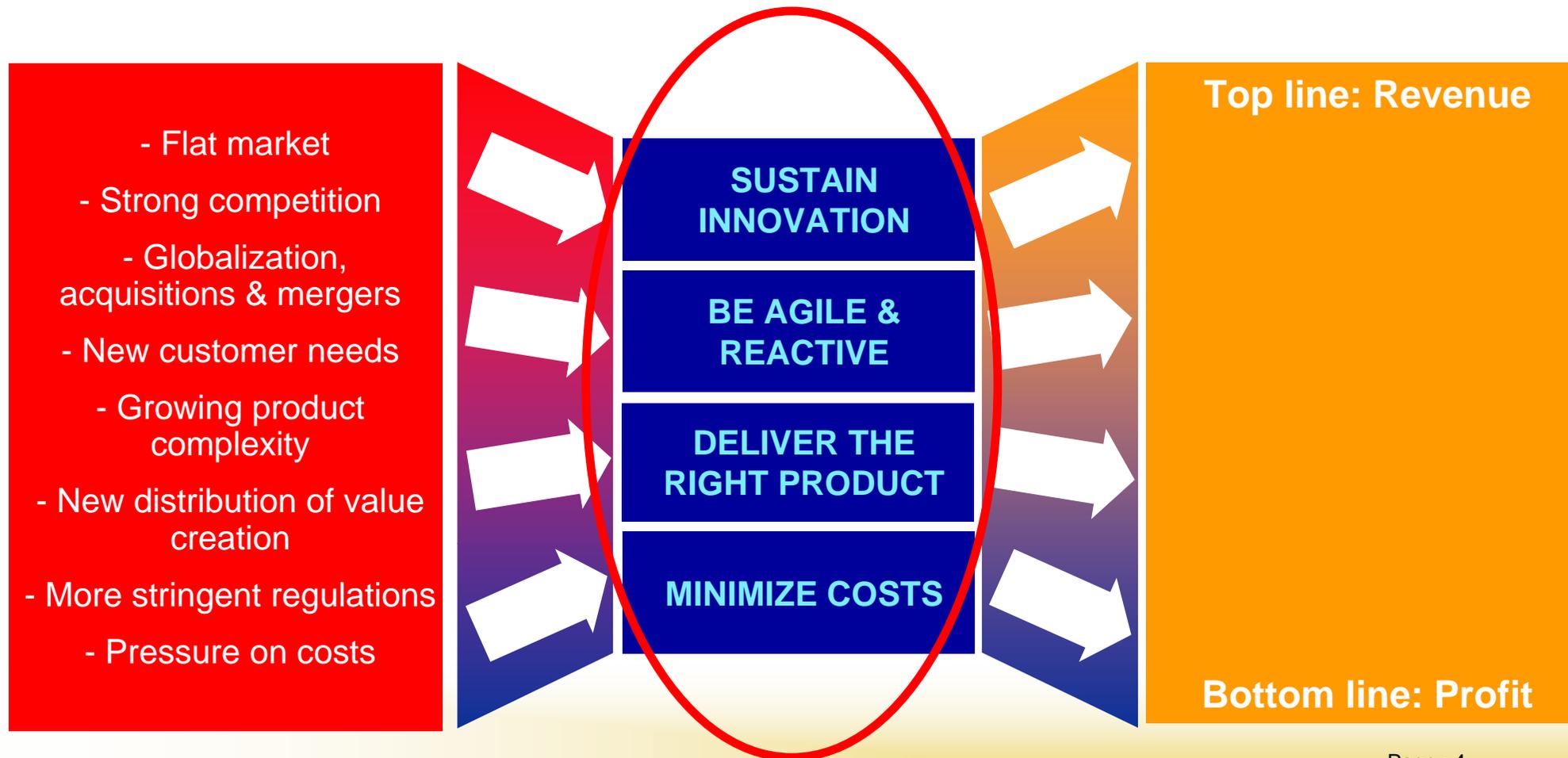
3

The PLM Solution breakthroughs

# *The Industry Challenges*

- Flat market
- Strong competition
  - Globalization, acquisitions & mergers
- New customer needs
  - Growing product complexity
- New distribution of value creation
- More stringent regulations
  - Pressure on costs

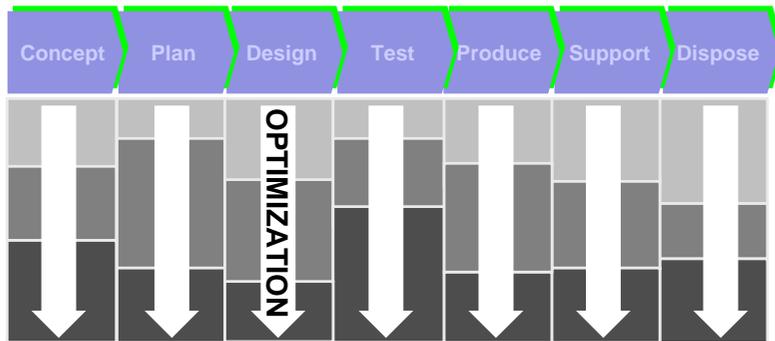
# *These Challenges require new Initiatives*



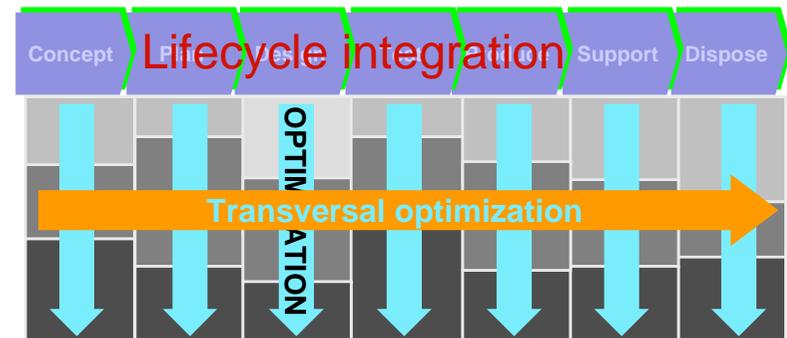
# Revenue and Profit optimization require a new Approach

*From a vertical optimization...*

*...to a global approach!*



- Traditional approach to optimization is vertical and business function orientated
- This is a bottom line focused approach with cost reduction as a key objective



- Objective is now to improve both a company **revenu and profit**
- Transversal approach allows to optimize a program across its **entire lifecycle**

# Agenda

1

The challenges of the industry

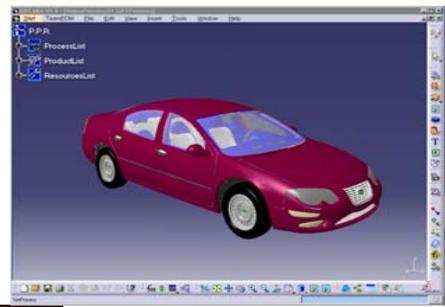
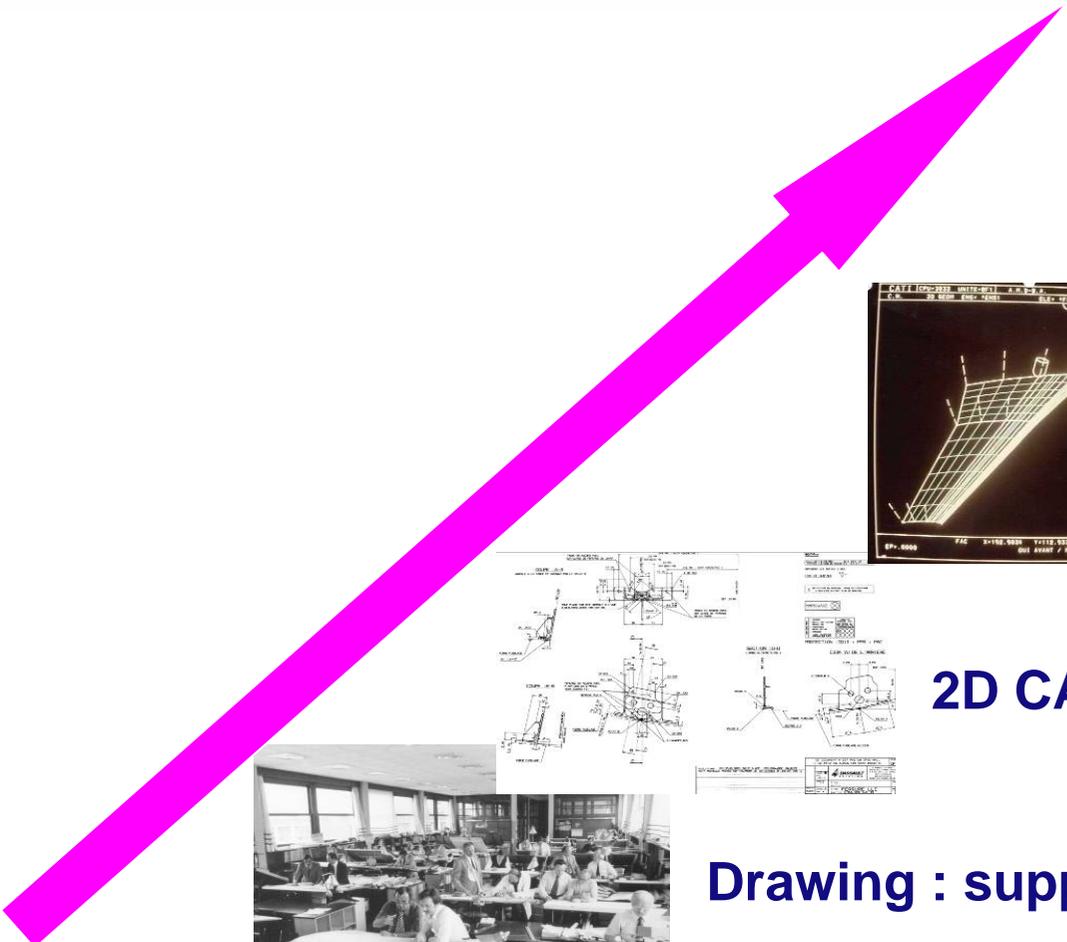
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PLM

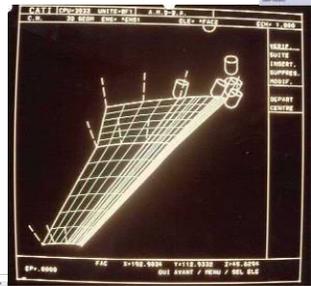
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The PLM Solution breakthroughs

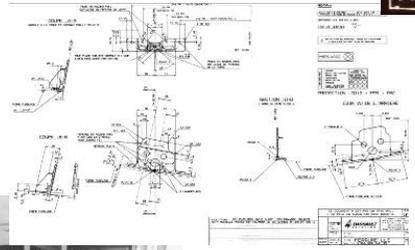
# A long history to improve Product Development...



**PLM**



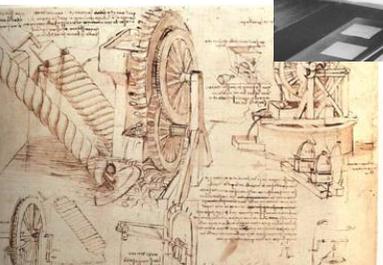
**3D CAD/CAM/CAE**



**2D CAD : improves productivity**

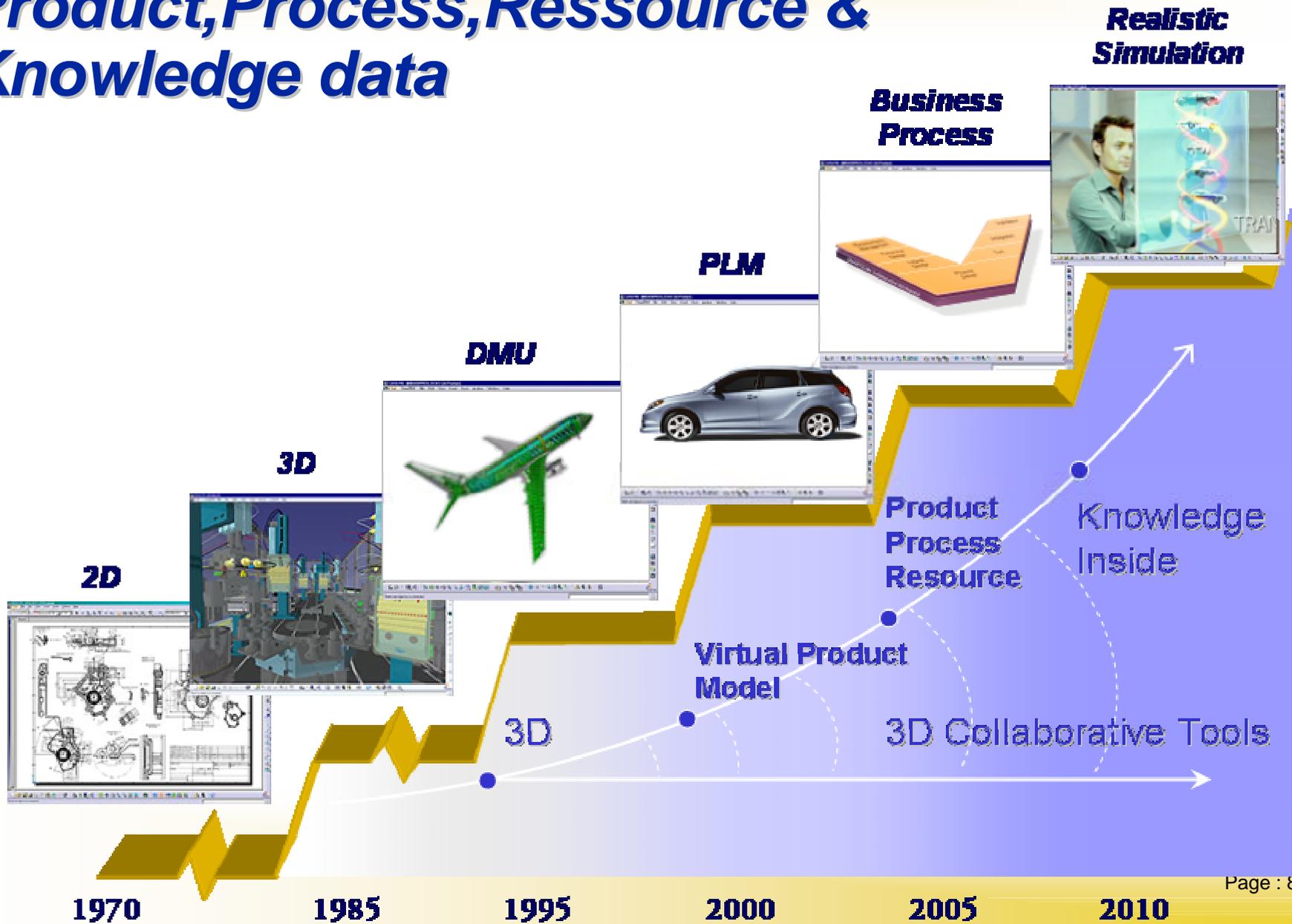


**Drawing : supports collaboration**



**Sketch : only the designer understands the design**

# Managing & Integrating Product, Process, Resource & Knowledge data



# ***What is full PLM deployment today ?***

***1- PLM Software Solution***

***2- New Best practices***

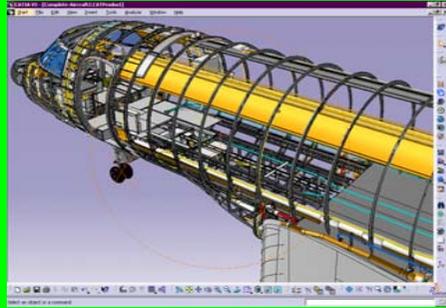
***3- New organizations in the enterprise***

***4- New Extended Enterprise model  
with OEM and partners/suppliers***

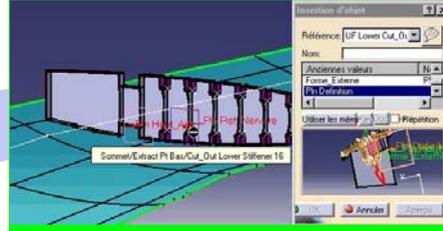
***Supporting 7 Macro-processes***

# The 7 PLM Macro-processes

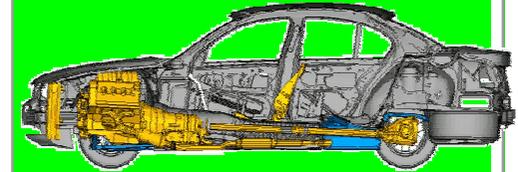
## 1. Engineering



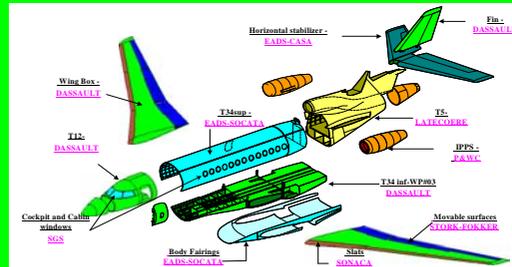
## 2. Knowledge capture & Re-use



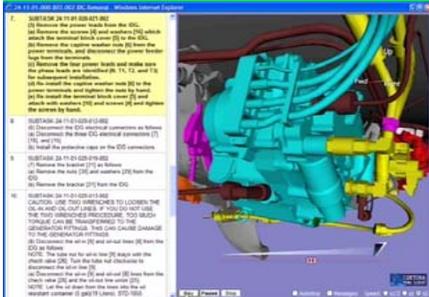
## 3. Prototype Simulation



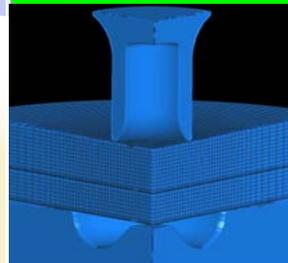
## 7. Collaboration



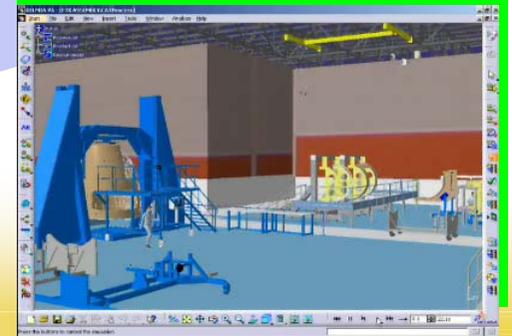
## 6. Maintenance Support



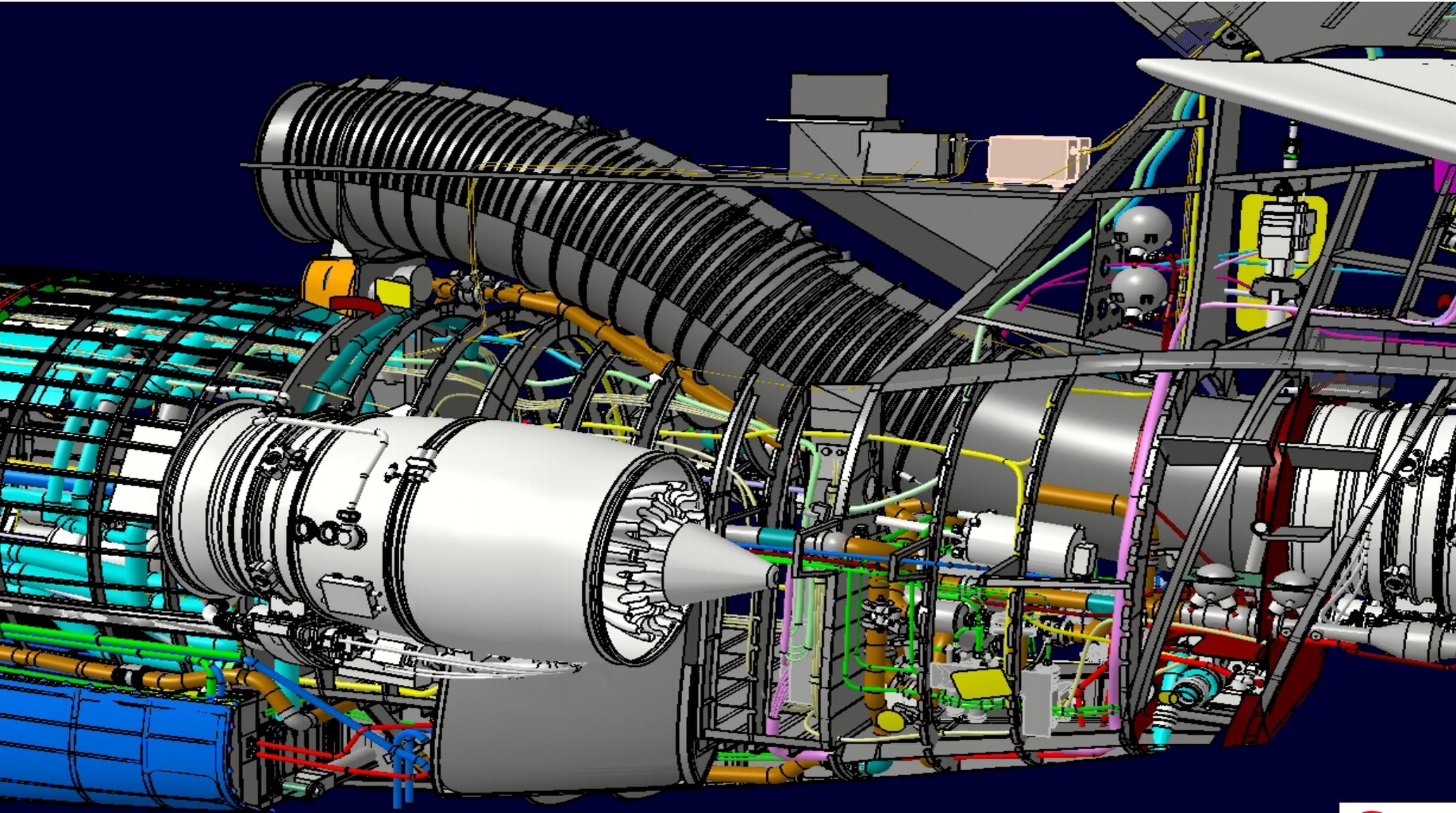
## 5. Manufacturing Optimization



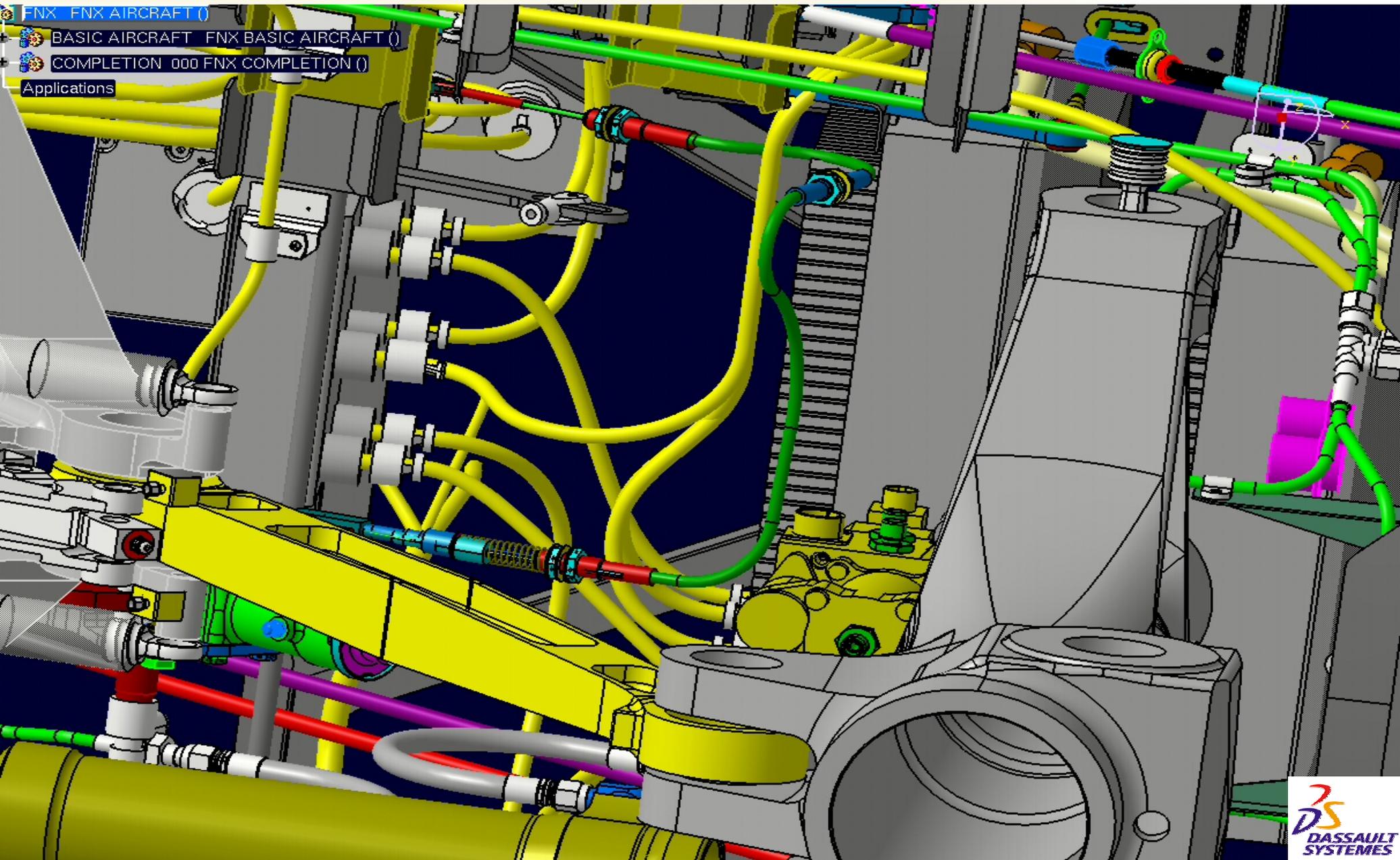
## 4. Manufacturing engineering



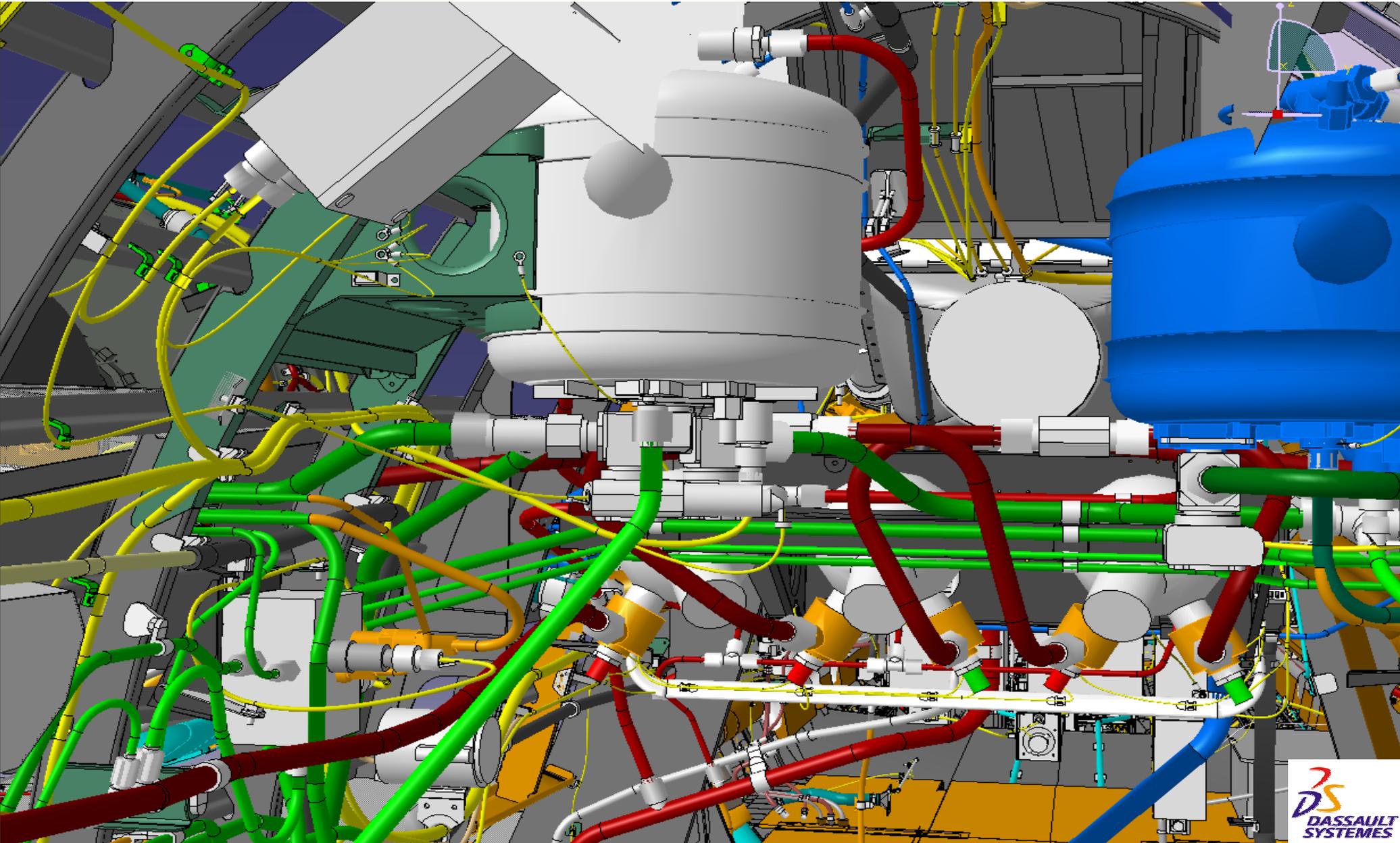
# 1- Engineering



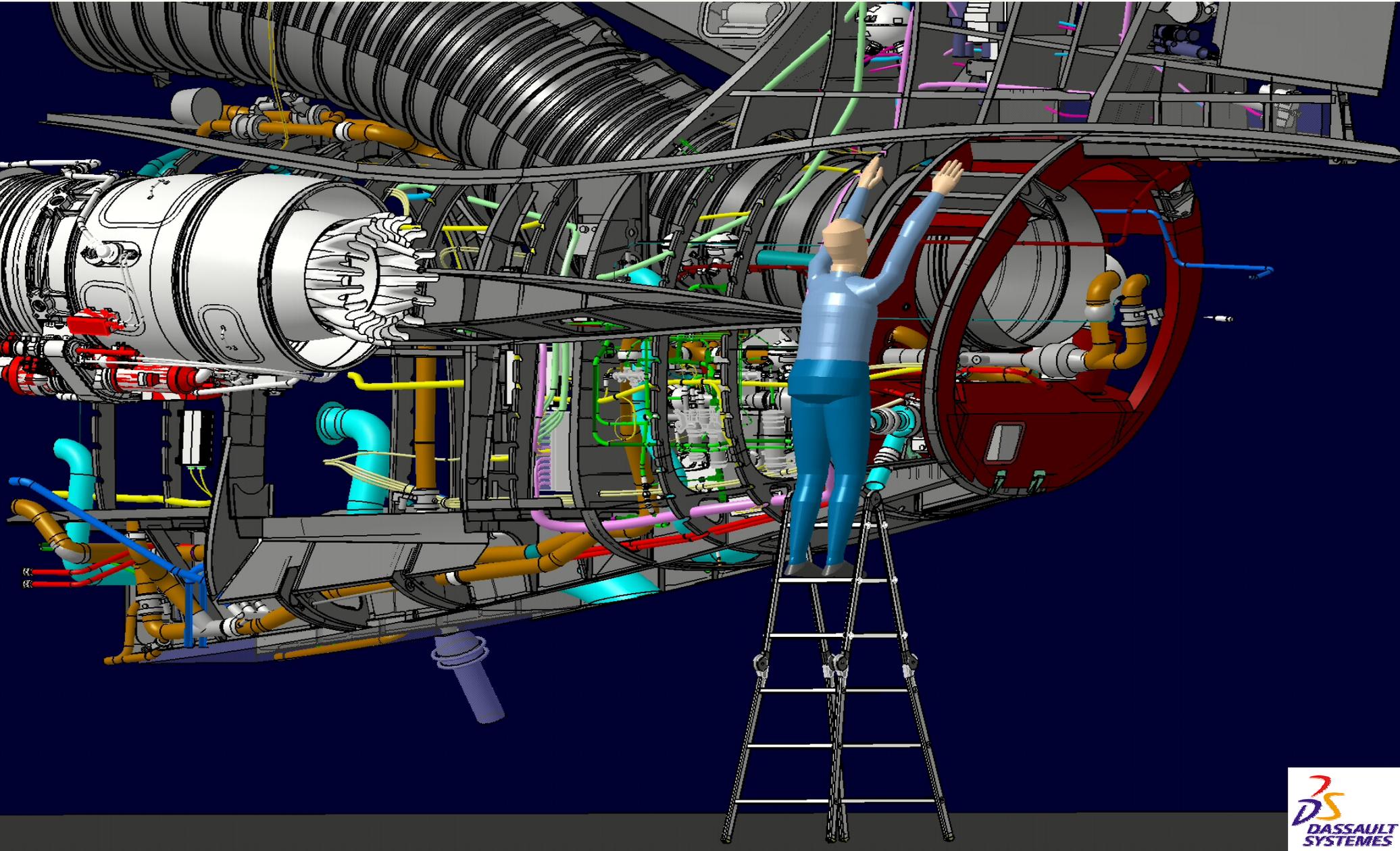
# 1- Engineering



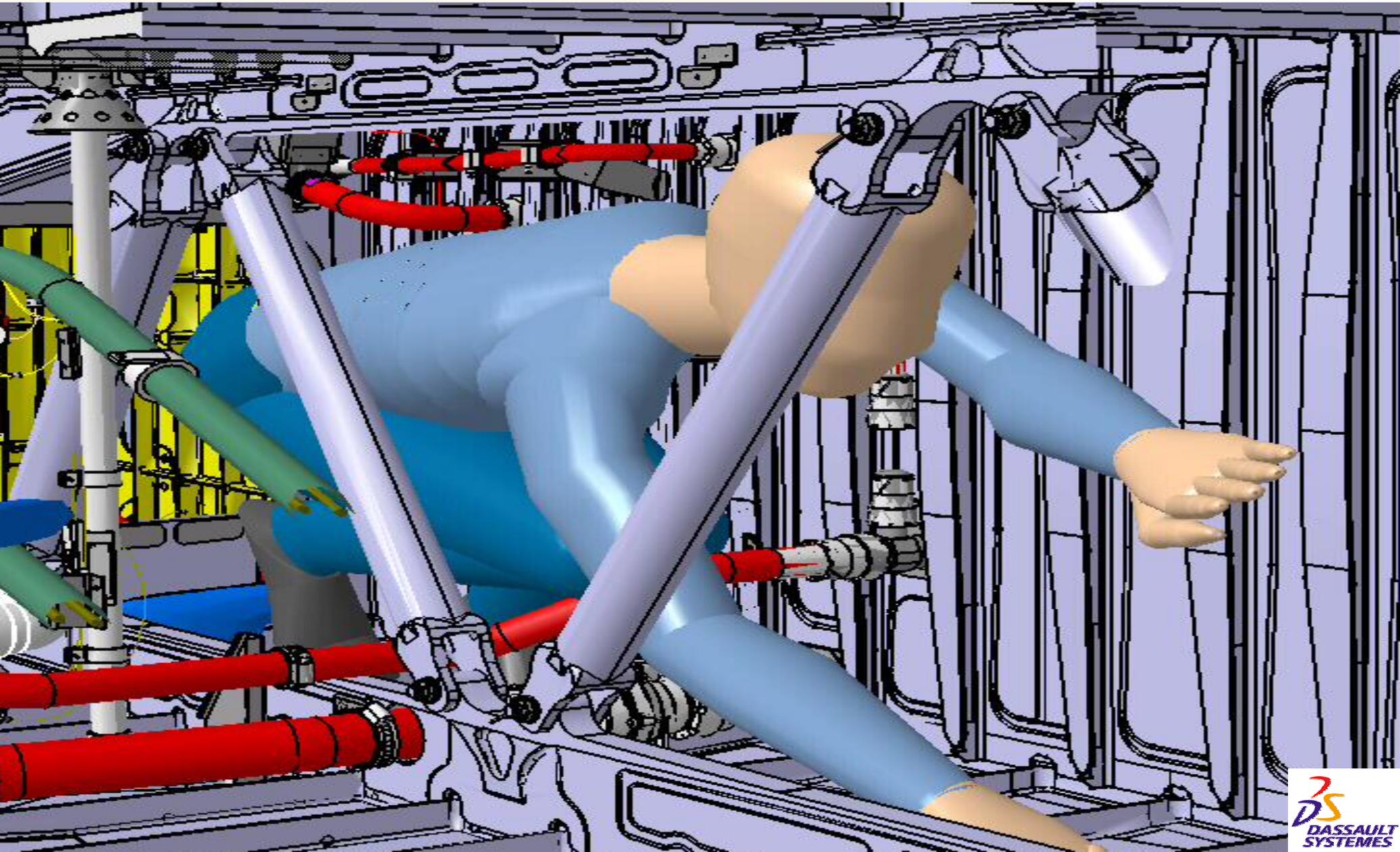
# 1- Engineering



# 1- Engineering

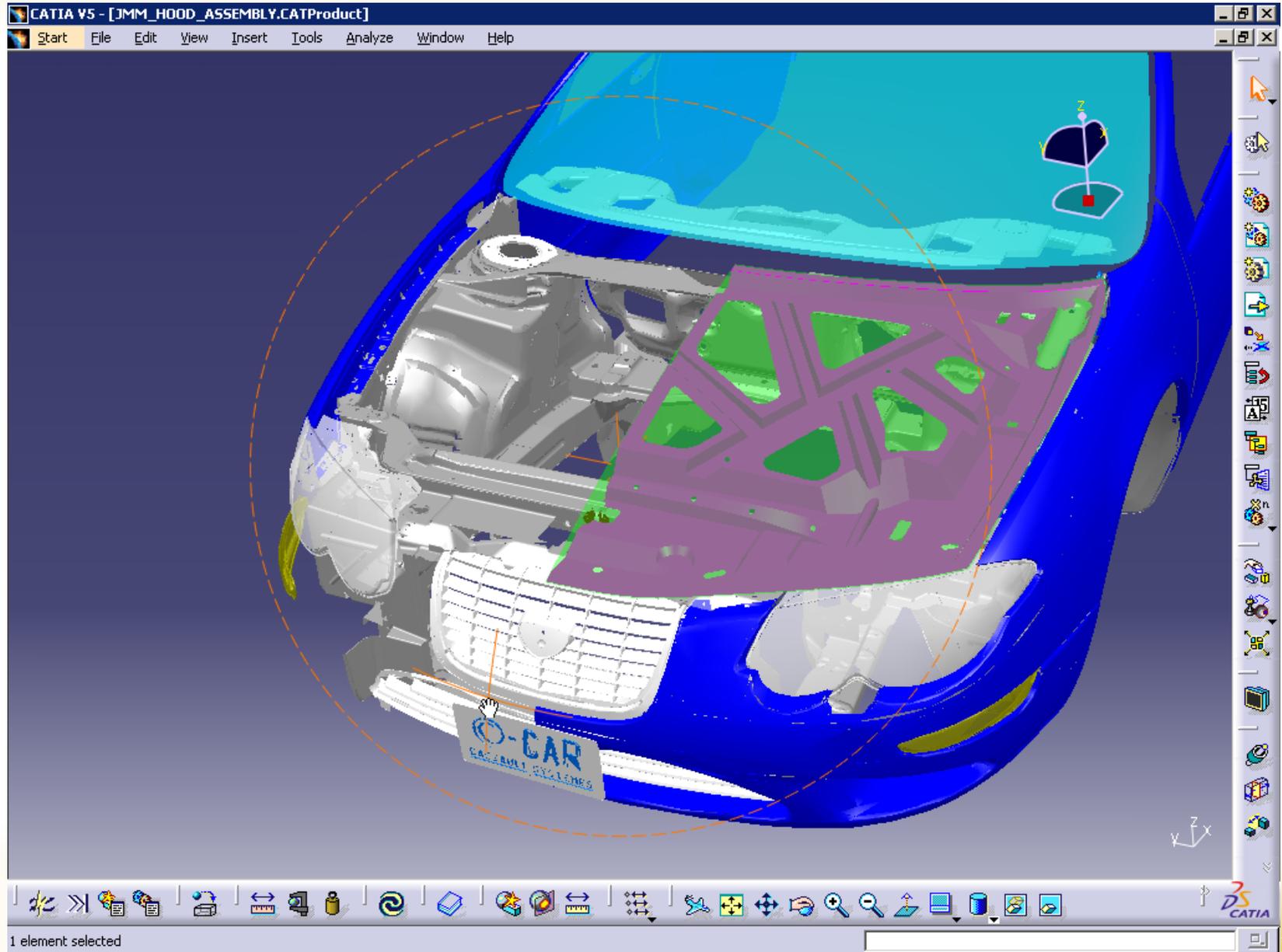


# 1- Engineering





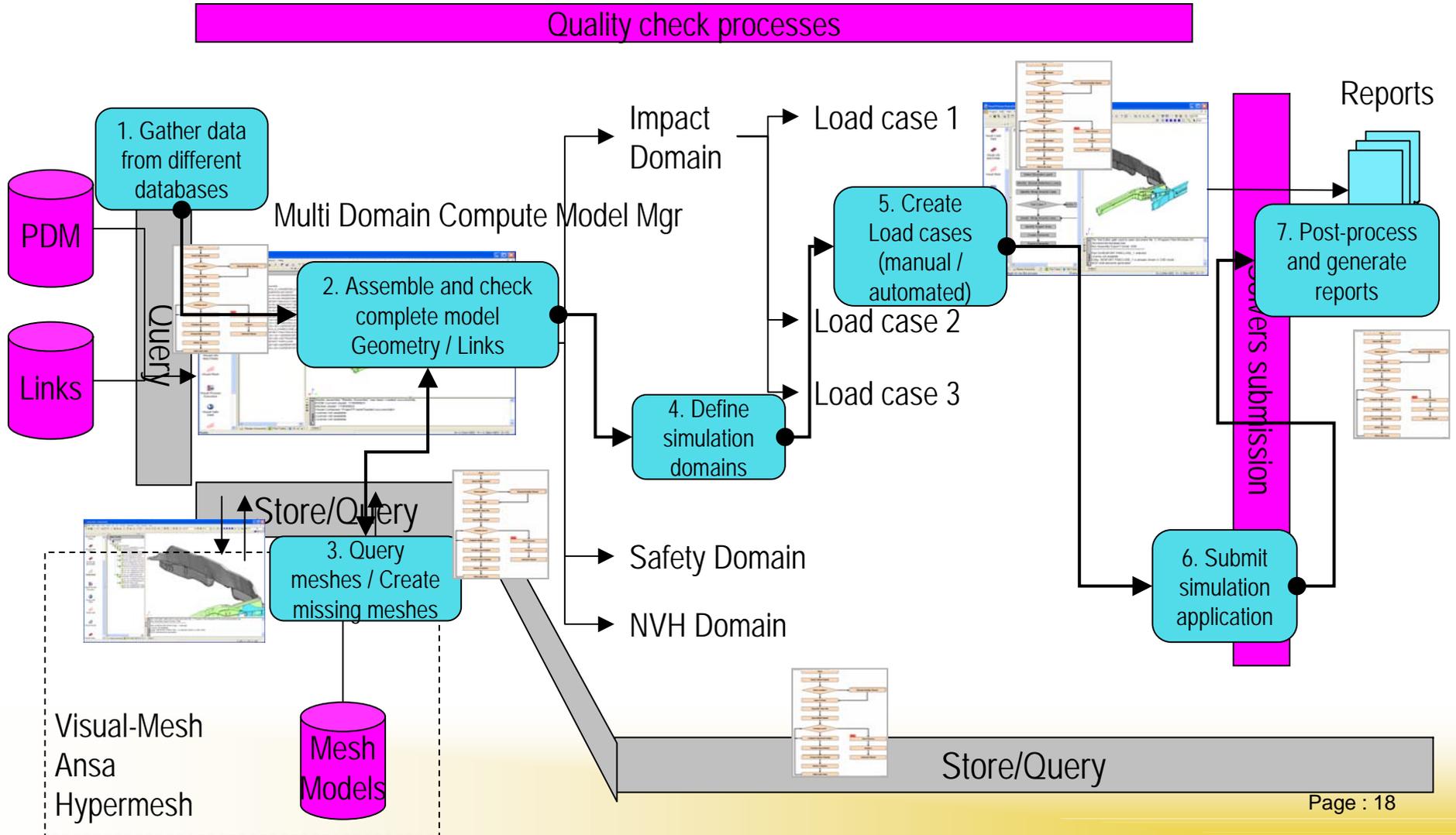
# 2-Knowledge Capture & Reuse in design



# 2-Knowledge Capture and Re-use for prototype simulation



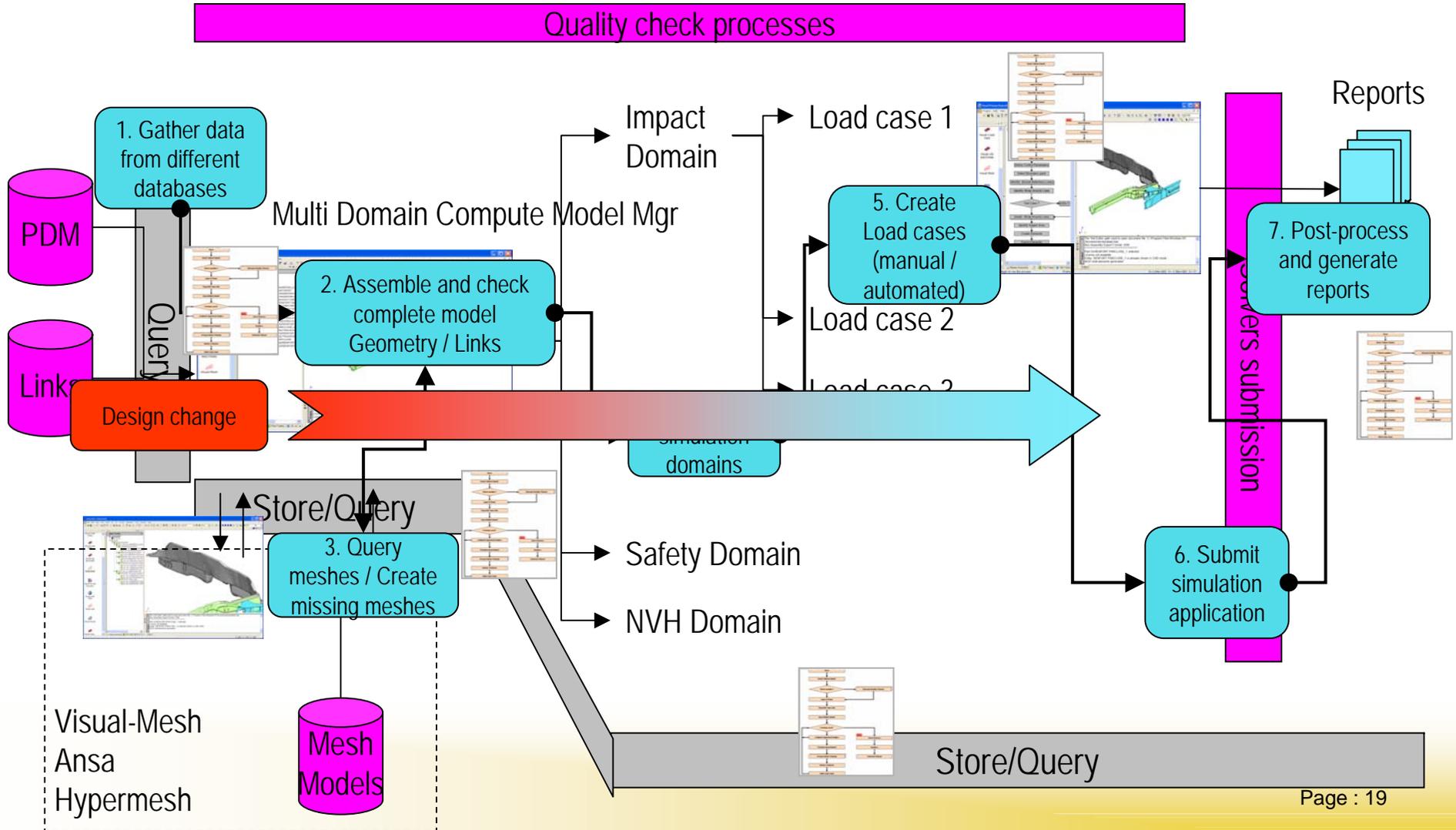
Store, replay & automate the workflow



# 2-Knowledge Capture and Re-use for prototype simulation



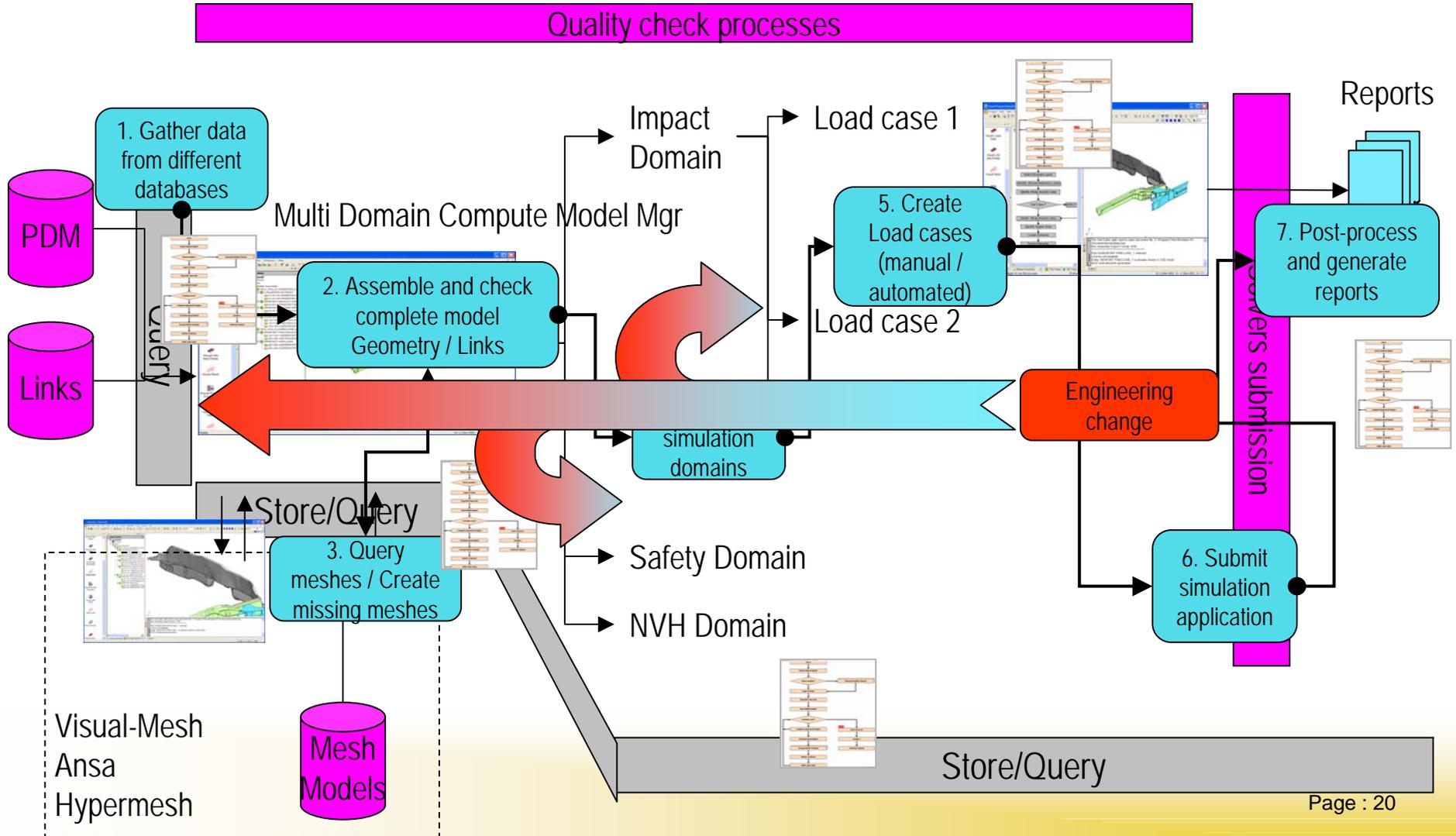
Store, replay & automate the workflow



# 2-Knowledge Capture and Re-use for prototype simulation



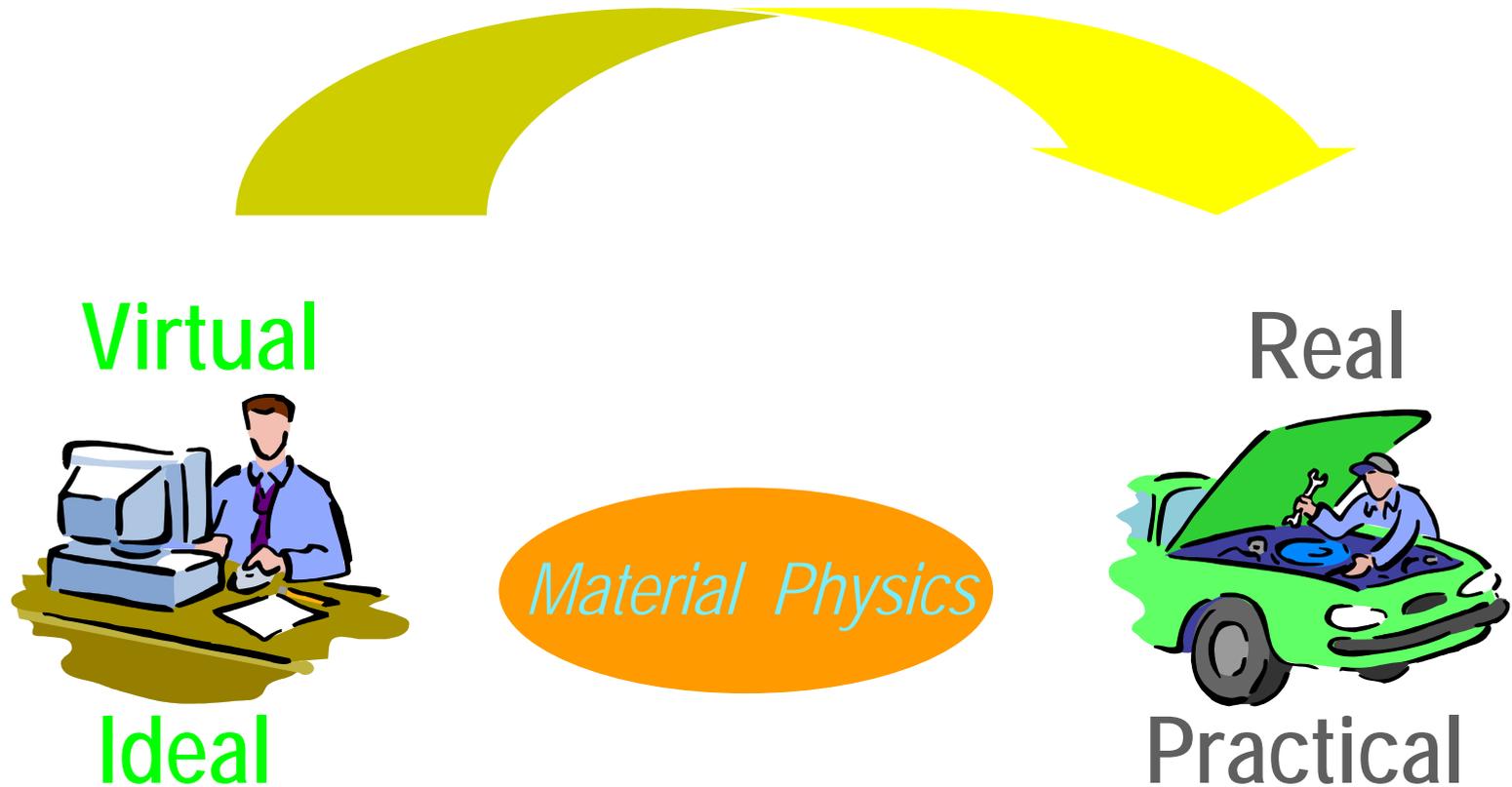
Store, replay & automate the workflow





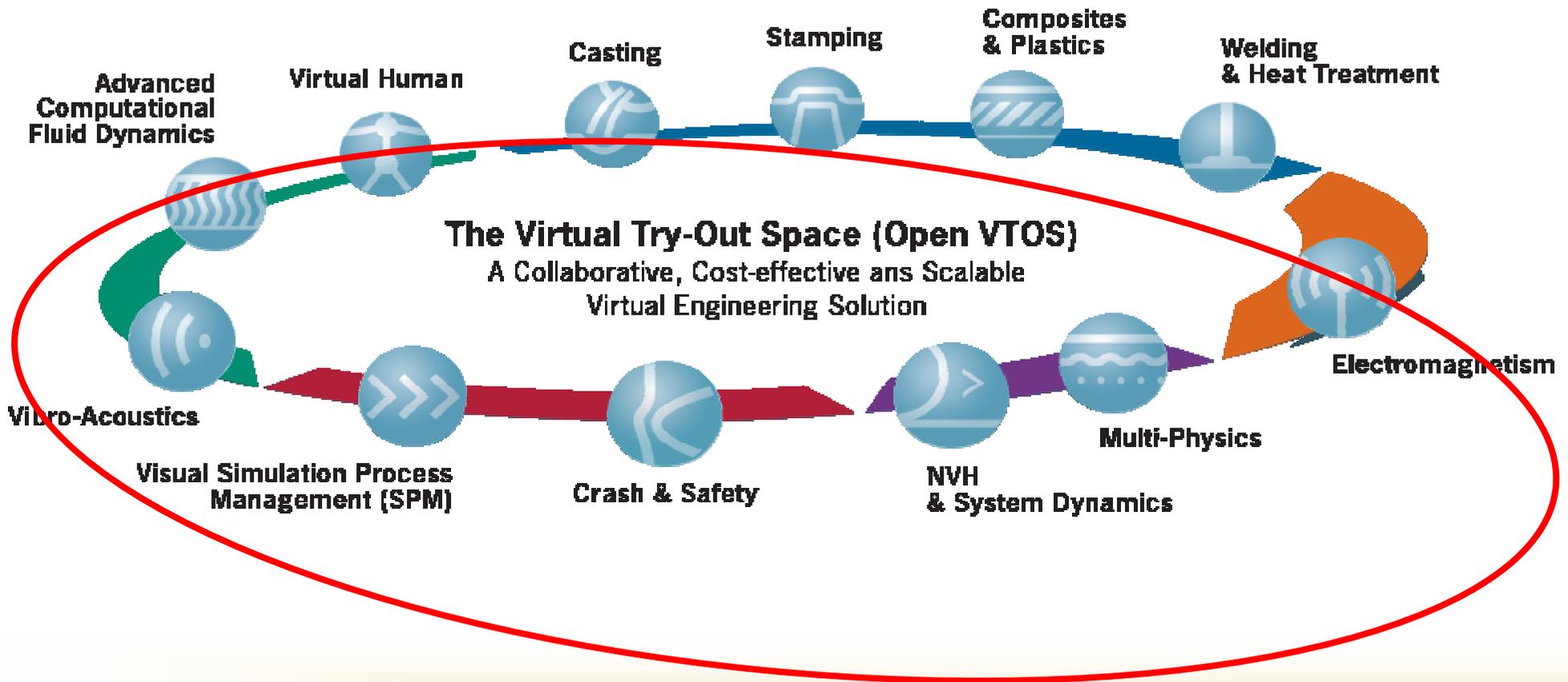
# 3-Prototype Simulation

**“Define, simulate and monitor the Physical World”**



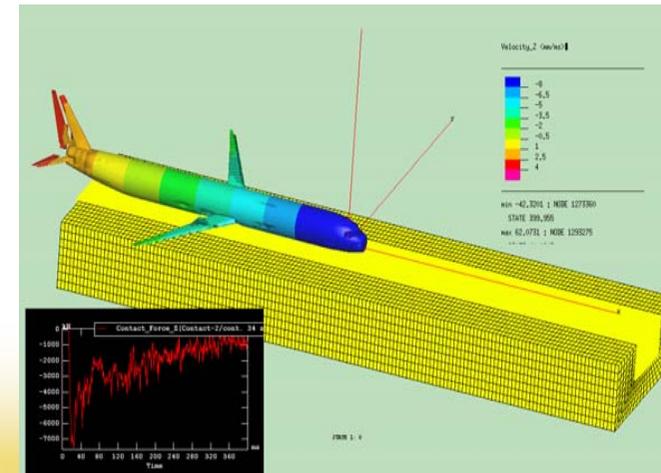
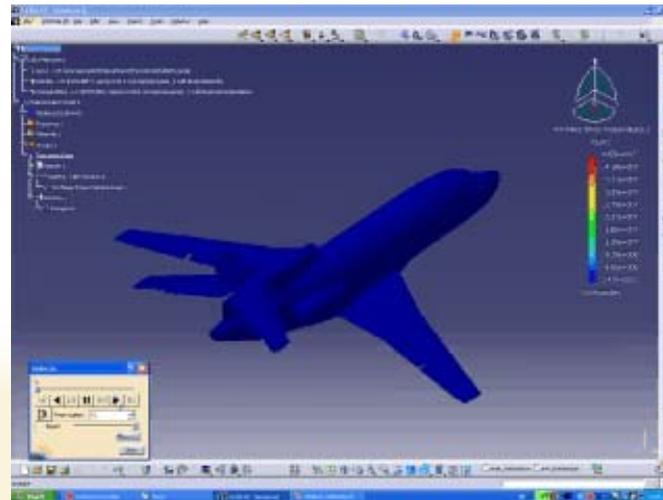
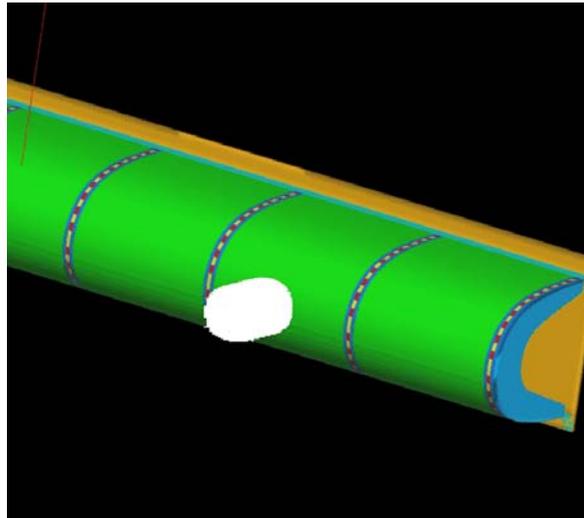
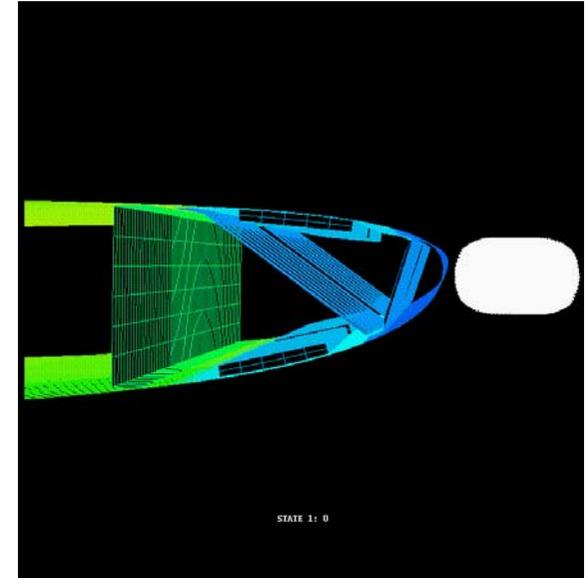
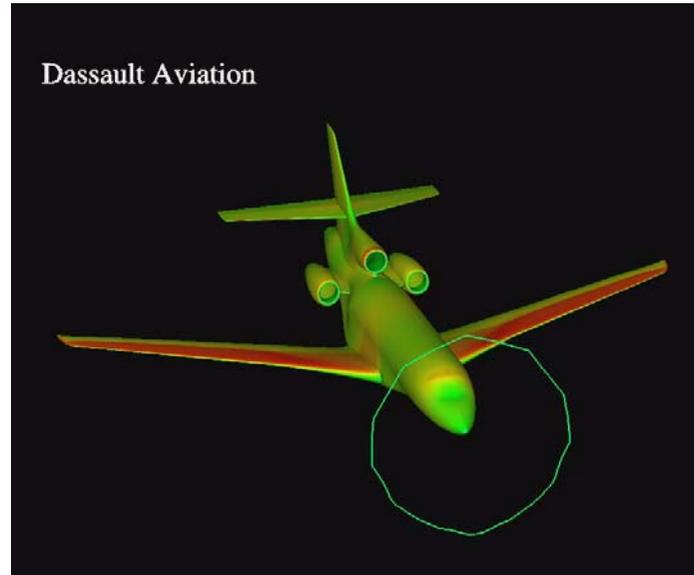
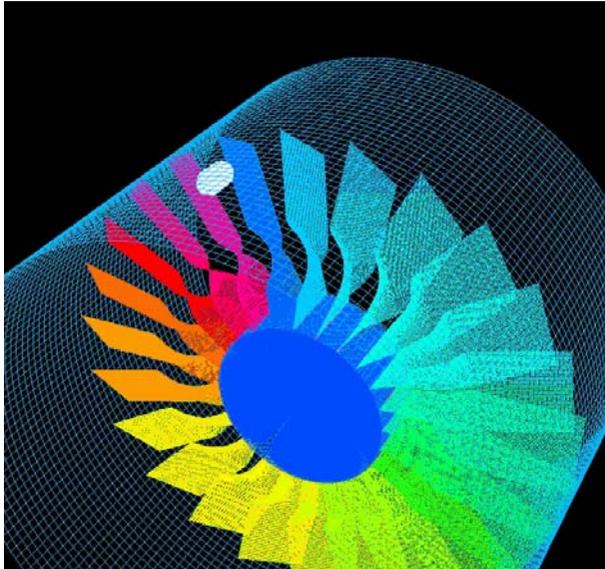
*From DMU to Digital Prototyping*

# A virtual engineering optimisation



# Virtual prototyping simulation

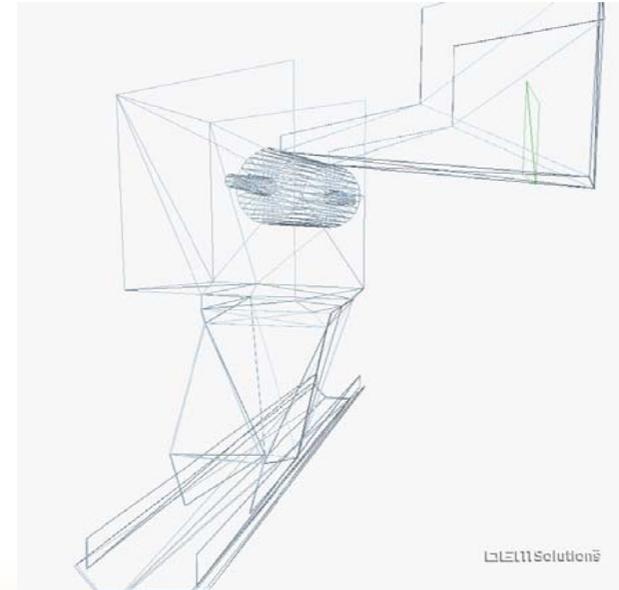
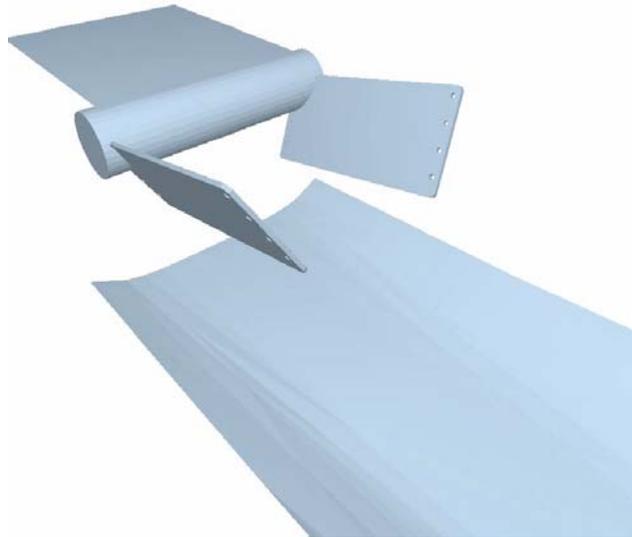
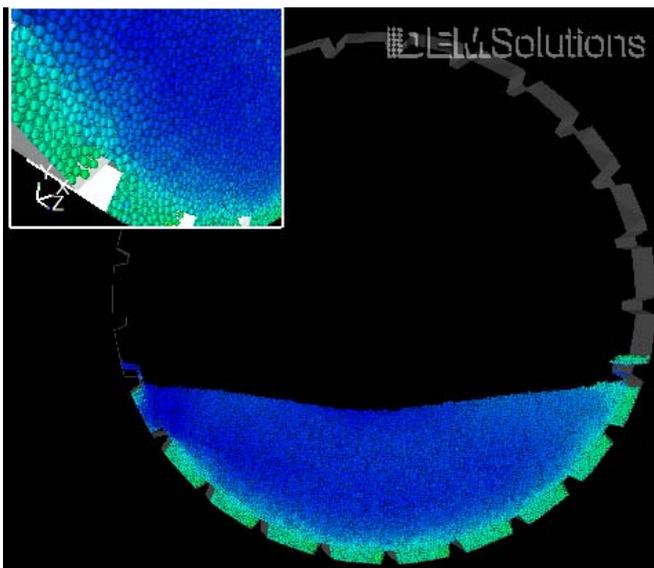
Fluid dynamics, Vibro-acoustics, Crash&Safety, Structure analysis,...



# Discrete Elements Method

 **DEM**Solutions

[www.dem-solutions.com](http://www.dem-solutions.com)



# Simulation for all

Manager / Designer / Partners /...

Engineer



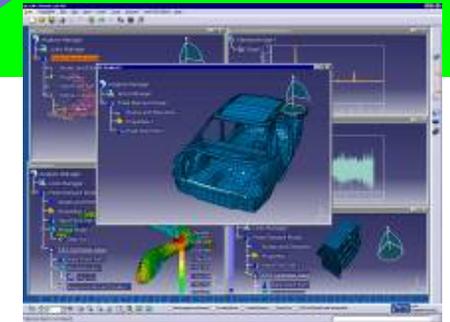
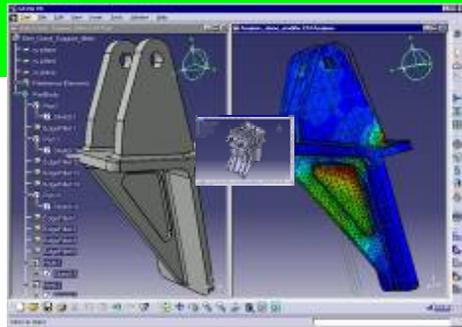
Analyst / Specialist



Provides Methodologies & Process

PLM

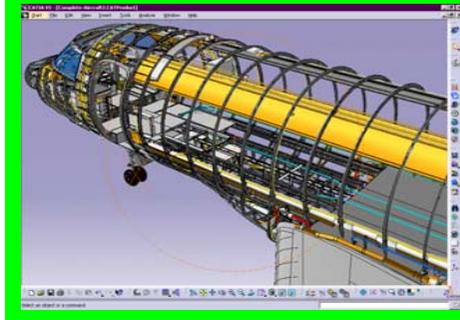
Participate to the Product Simulation



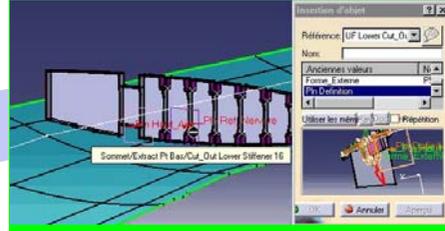
- **Collaborative environment for all: Manager, Engineer & Specialist**
  - Identify the issue sooner and reduce cost
  - Increase product quality & innovation

# The 7 PLM Macro-processes

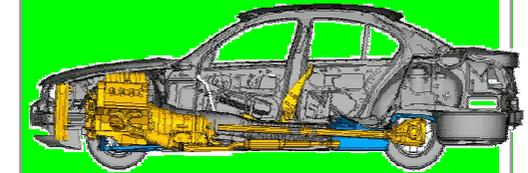
## 1. Engineering



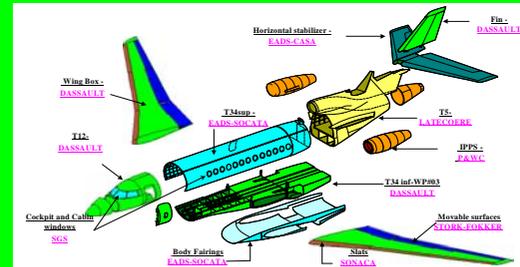
## 2. Knowledge capture & Re-use



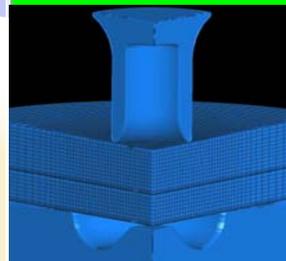
## 3. Prototype Simulation



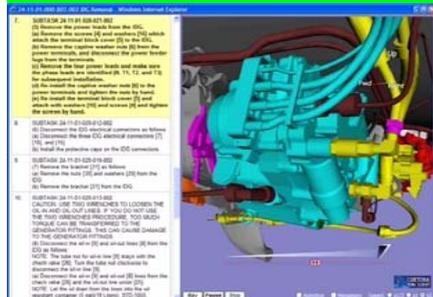
## 7. Collaboration



## 5. Manufacturing Optimization



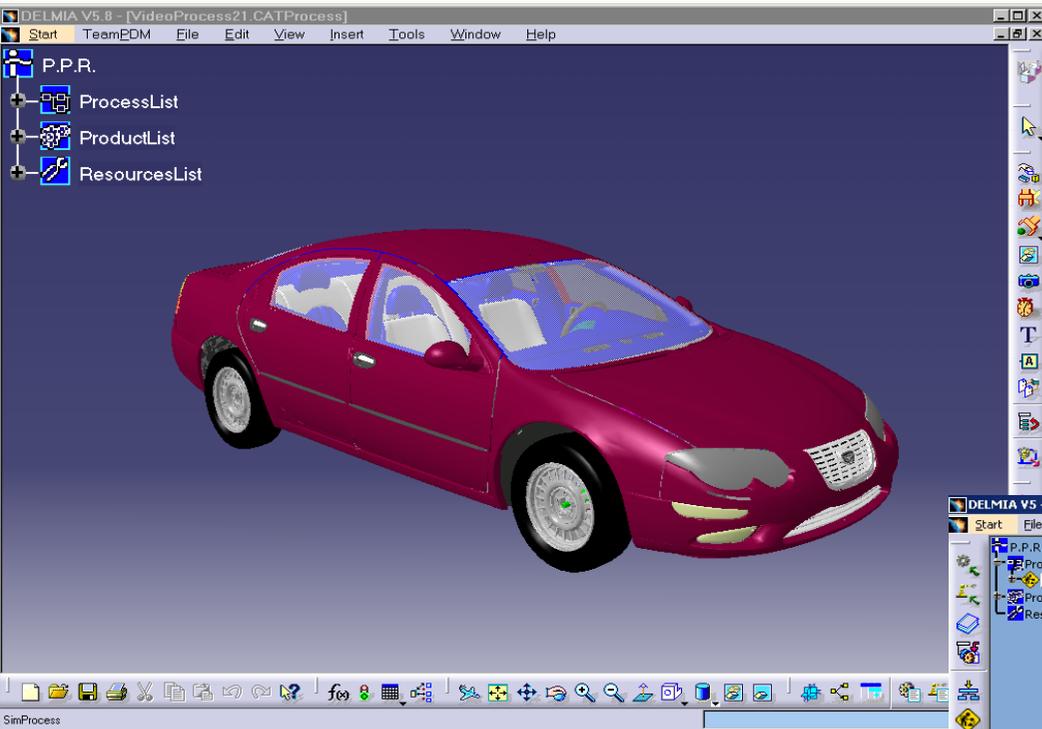
## 6. Maintenance Support



## 4. Manufacturing engineering

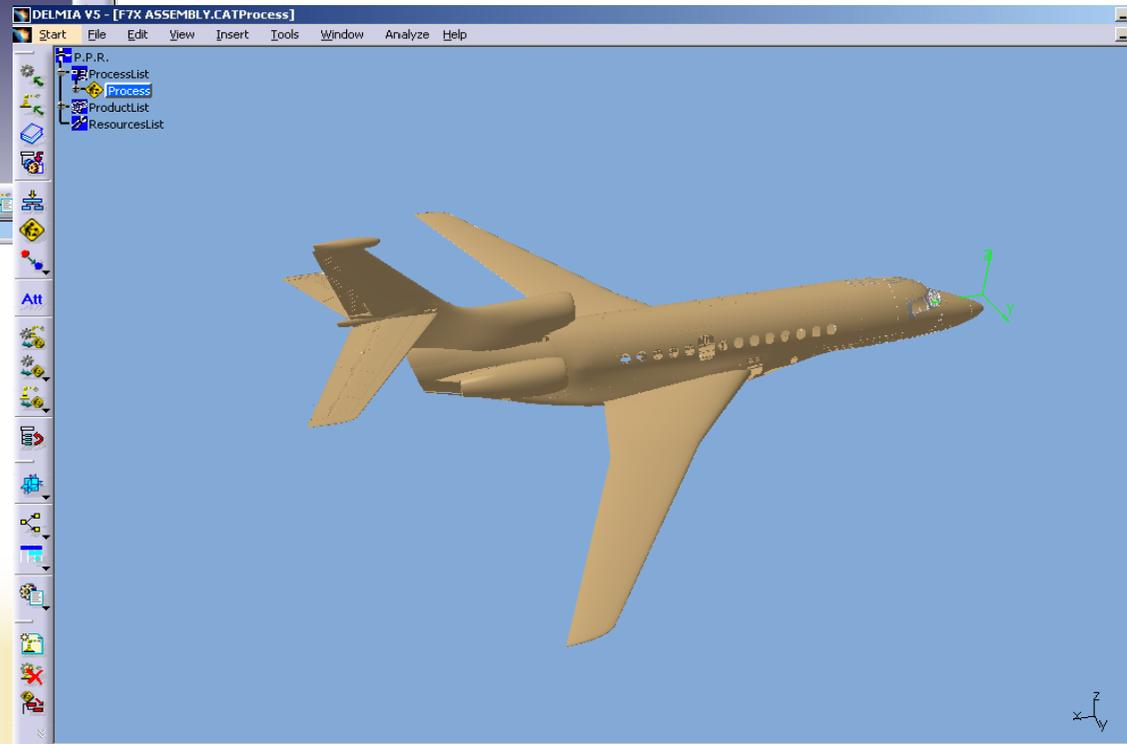


# 4-Manufacturing engineering



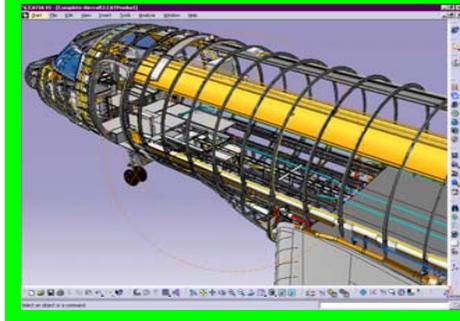
**Product  
Process  
Resources**

} **Integration**

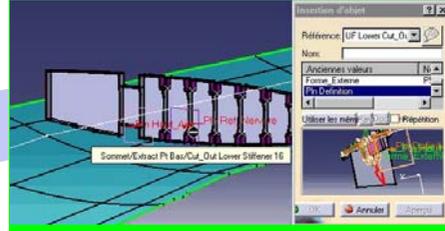


# The 7 PLM Macro-processes

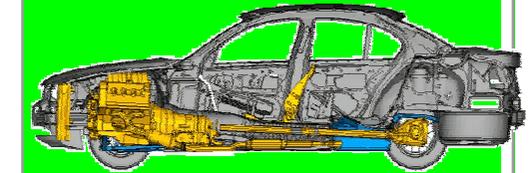
## 1. Engineering



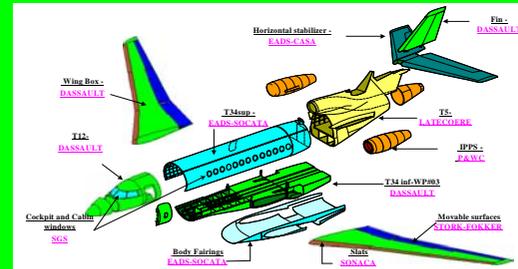
## 2. Knowledge capture & Re-use



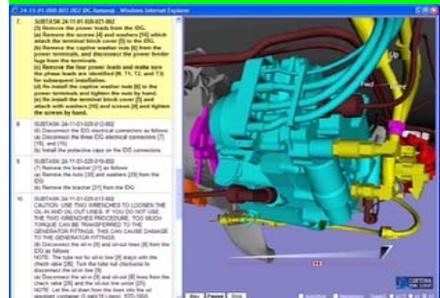
## 3. Prototype Simulation



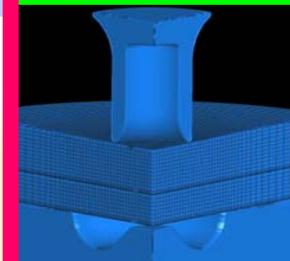
## 7. Collaboration



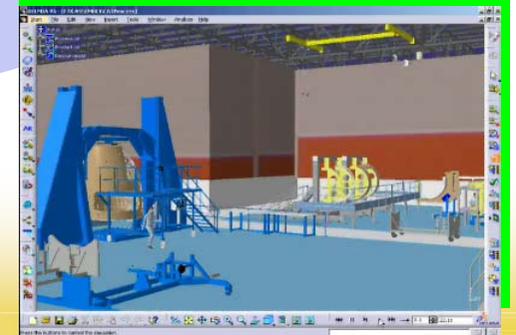
## 6. Maintenance Support



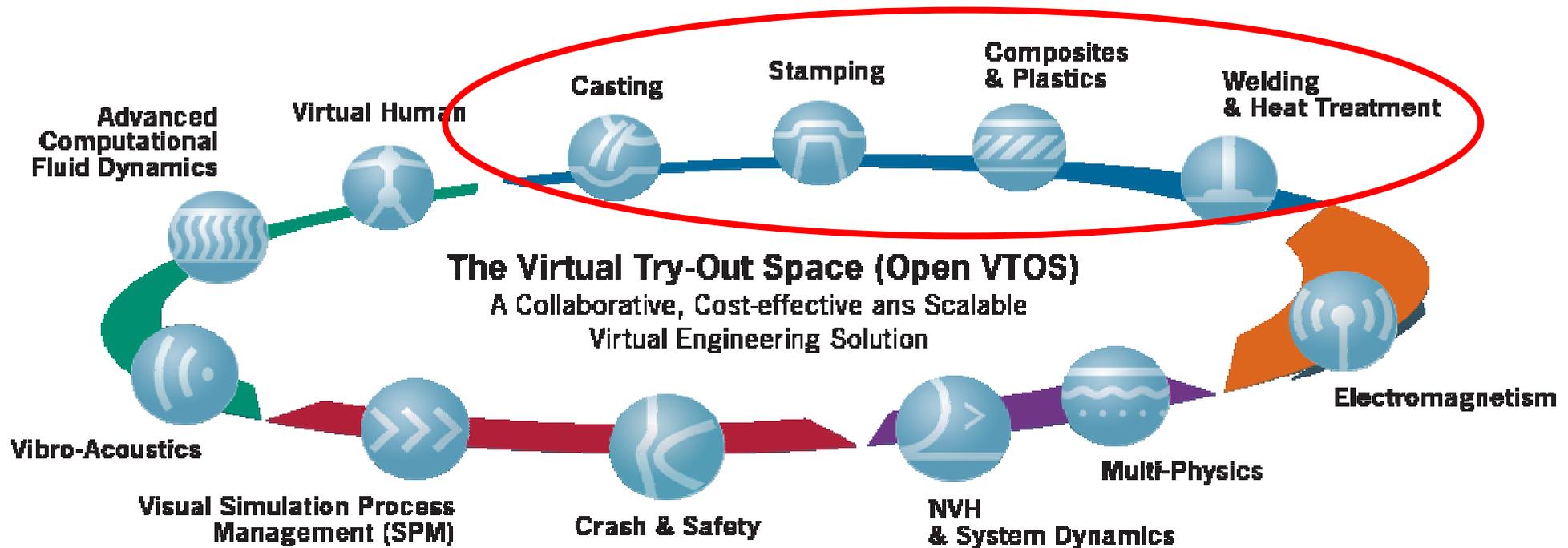
## 5. Manufacturing Optimization



## 4. Manufacturing engineering

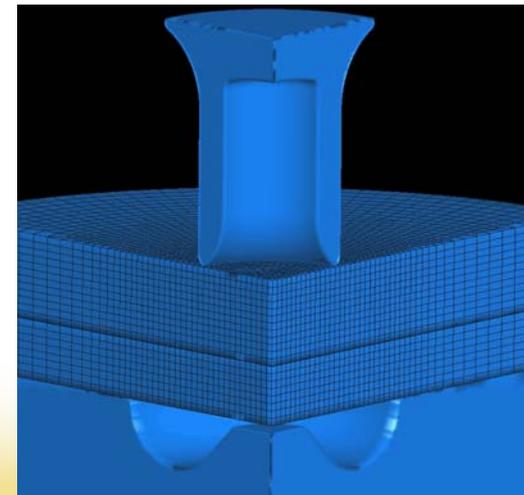
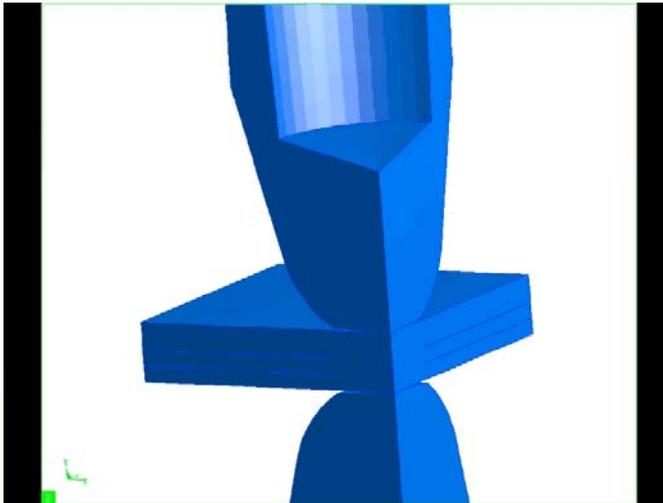
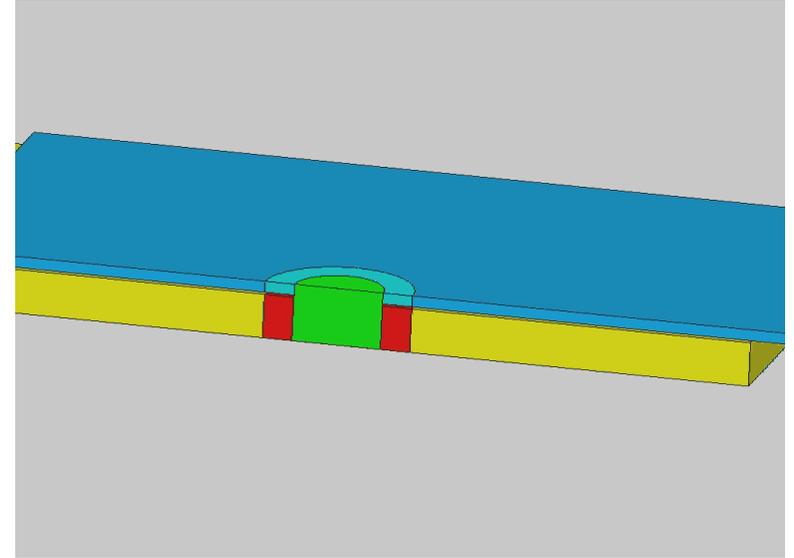
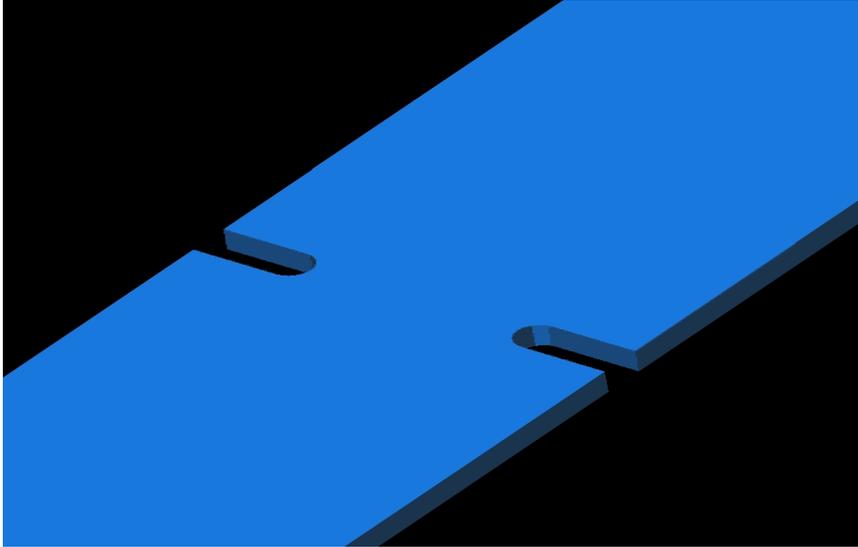


# A virtual manufacturing optimisation

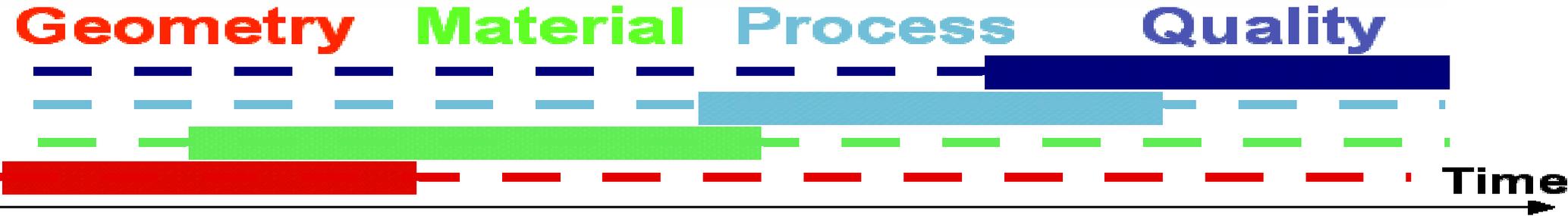


# 5-Manufacturing optimization

*Casting, Stamping, Composites&Plastics, Welding&Heat treatment,...*



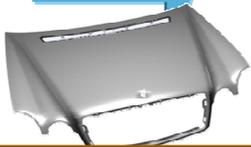
# Example : Stamping



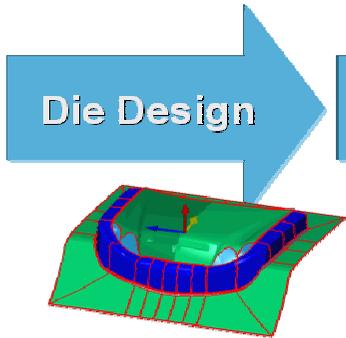
## Feasibility

## Validation

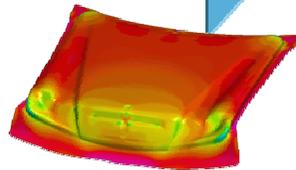
Part



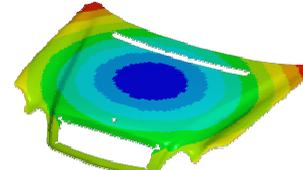
Die Design



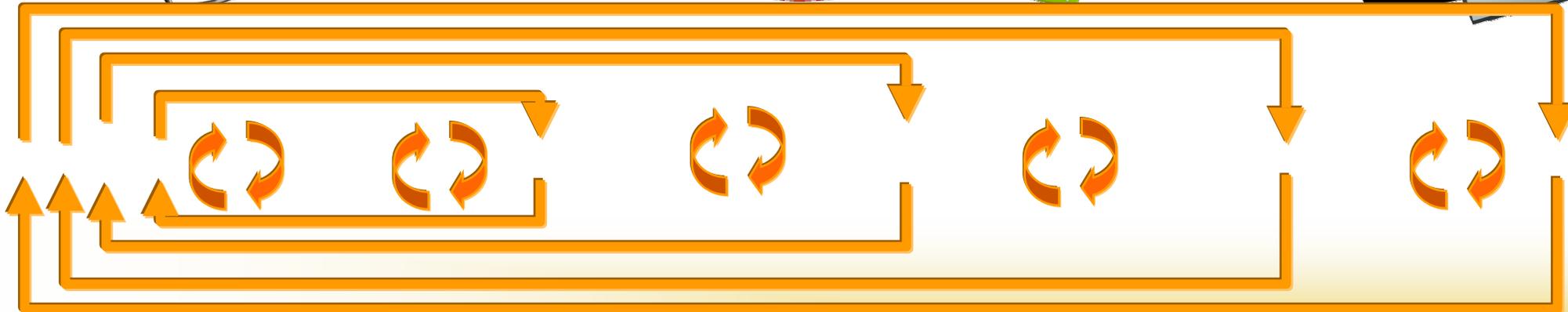
Quick evaluation



Tuning & validation

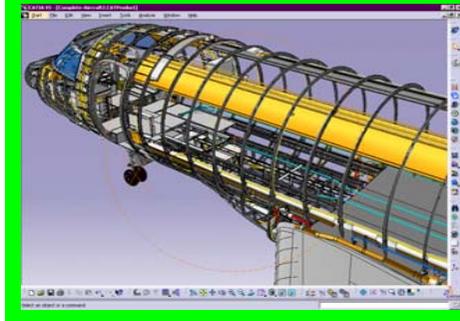


Draw dies

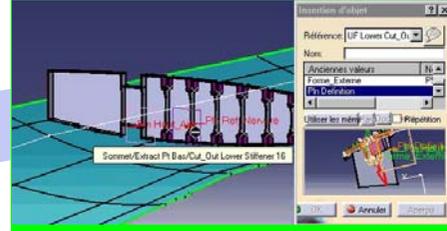


# The 7 PLM Macro-processes

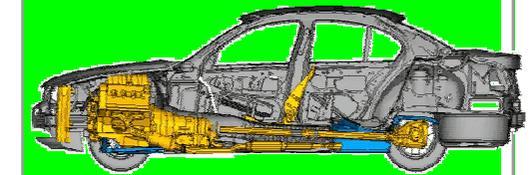
## 1. Engineering



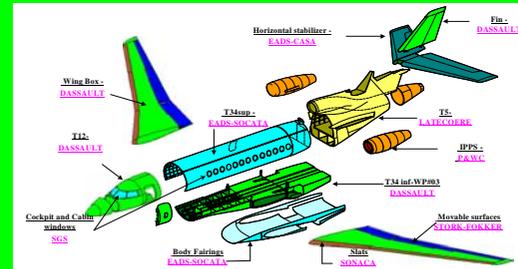
## 2. Knowledge capture & Re-use



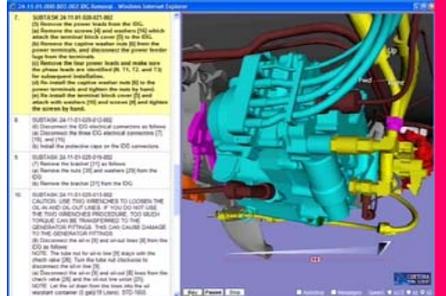
## 3. Prototype Simulation



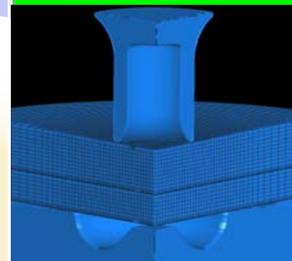
## 7. Collaboration



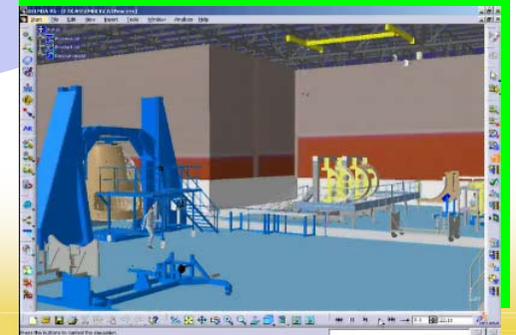
## 6. Maintenance Support



## 5. Manufacturing Optimization



## 4. Manufacturing engineering



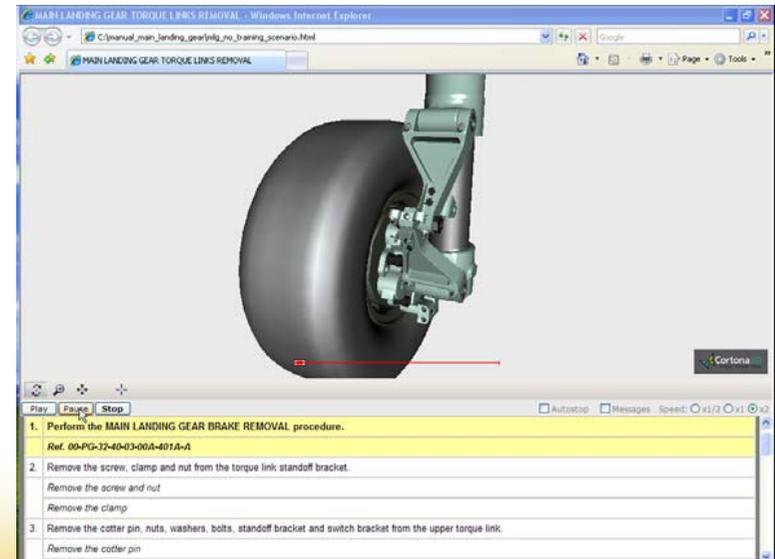
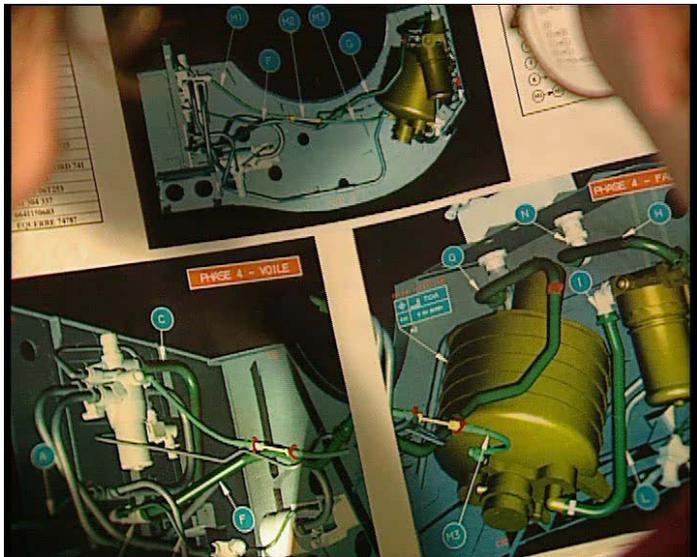
# 6- Maintenance support

**PARALLEL GRAPHICS**

**3D, Web access**

**Replace 2D technical manuals**

**Language independance**



# 3D Maintenance support



TASK 55-37-08-000-101 (Carefully remove) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address E:\kryshev\Tests\Video\Demo\IDEMO\_2005\_07\_22\demo3\demo.html

Subtask 020-004 [Close]

Maintenance Manual

TASK 55-37-08-000-101

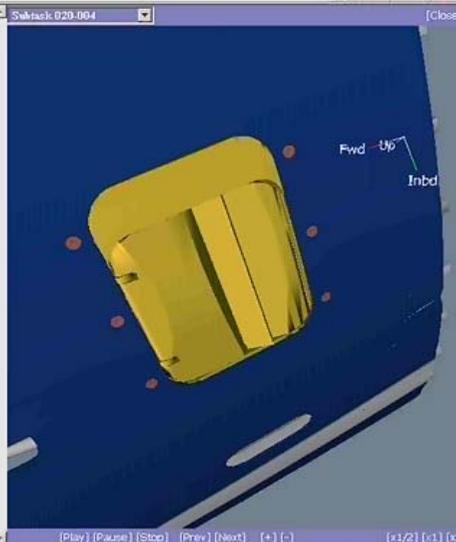
2. Aft Outflow Valve Assembly Removal (Fig. 101)

30 SUBTASK 020-004

(6) Do these steps to remove the aft outflow valve [1]:

- (a) Turn the aft outflow valve [1] as necessary until you can get to the manual motor electrical connector [4].
- (b) Disconnect the manual motor electrical connector [4].
- (c) Lift and turn the aft outflow valve [1] so that it is diagonal to the skin opening of the airplane and so that the valve motors are up.
- (d) **Carefully remove** the aft outflow valve [1] through the skin opening of the airplane.

**NOTE:** Remove the valve [1] such that the valve motors come out last.



[Play] [Pause] [Stop] [Prev] [Next] [+1] [-1] [x1/2] [-x1] [x2]

Done My Computer

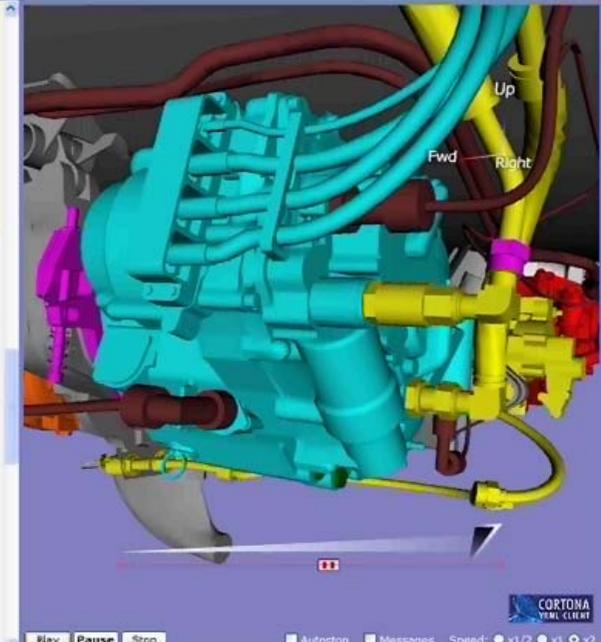
24-11-01-000-802-002 IDG Removal - Windows Internet Explorer

7. SUBTASK 24-11-01-020-021-002  
(5) Remove the power leads from the IDG.  
(a) Remove the screws [4] and washers [16] which attach the terminal block cover [5] to the IDG.  
(b) Remove the captive washer nuts [6] from the power terminals, and disconnect the power feeder lugs from the terminals.  
(c) Remove the four power leads and make sure the phase leads are identified (N, T1, T2, and T3) for subsequent installation.  
(d) Re-install the captive washer nuts [6] to the power terminals and tighten the nuts by hand.  
(e) Re-install the terminal block cover [5] and attach with washers [16] and screws [4] and tighten the screws by hand.

8. SUBTASK 24-11-01-020-012-002  
(6) Disconnect the IDG electrical connectors as follows:  
(a) Remove the nuts [30] and washers [29] from the IDG.  
(b) Install the protective caps on the IDG connectors.

9. SUBTASK 24-11-01-020-019-002  
(7) Remove the bracket [31] as follows:  
(a) Remove the nuts [30] and washers [29] from the IDG.  
(b) Remove the bracket [31] from the IDG.

10. SUBTASK 24-11-01-020-013-002  
**CAUTION:** USE TWO WRENCHES TO LOOSEN THE OIL-IN AND OIL-OUT LINES. IF YOU DO NOT USE THE TWO WRENCHES PROCEDURE, TOO MUCH TORQUE CAN BE TRANSFERRED TO THE GENERATOR FITTINGS. THIS CAN CAUSE DAMAGE TO THE GENERATOR FITTINGS.  
(8) Disconnect the oil-in [9] and oil-out lines [8] from the IDG as follows:  
**NOTE:** The tube nut for oil-in line [9] stays with the check valve [26]. Turn the tube nut clockwise to disconnect the oil-in line [9].  
(a) Disconnect the oil-in [9] and oil-out [8] lines from the check valve [26] and the oil-out line union [25].  
**NOTE:** Let the oil drain from the lines into the oil resistant container (5 gal/19 Liters), STD-1055.



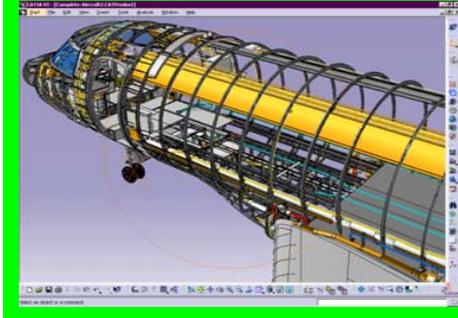
Up  
Fwd  
Right

Play Pause Stop Autostop Messages Speed: x1/2 x1 x2

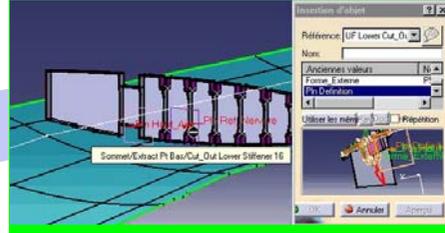
CORTONA  
TRIAL CLIENT

# The 7 PLM Macro-processes

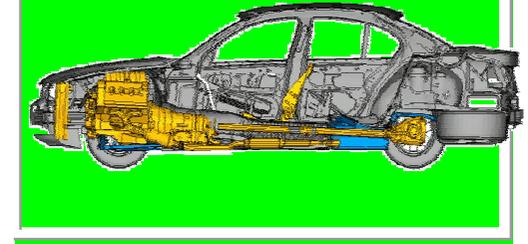
## 1. Engineering



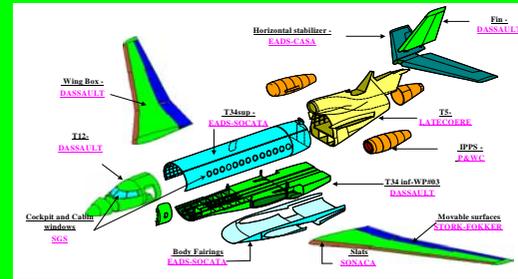
## 2. Knowledge capture & Re-use



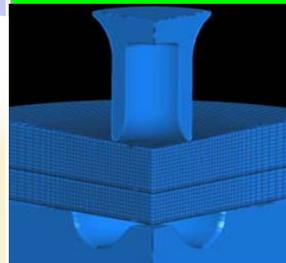
## 3. Prototype Simulation



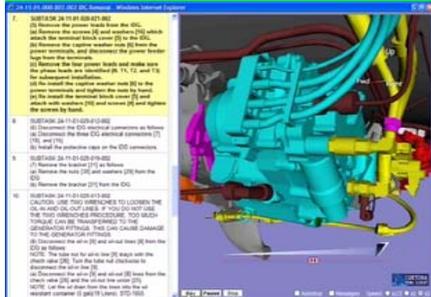
## 7. Collaboration



## 5. Manufacturing Optimization



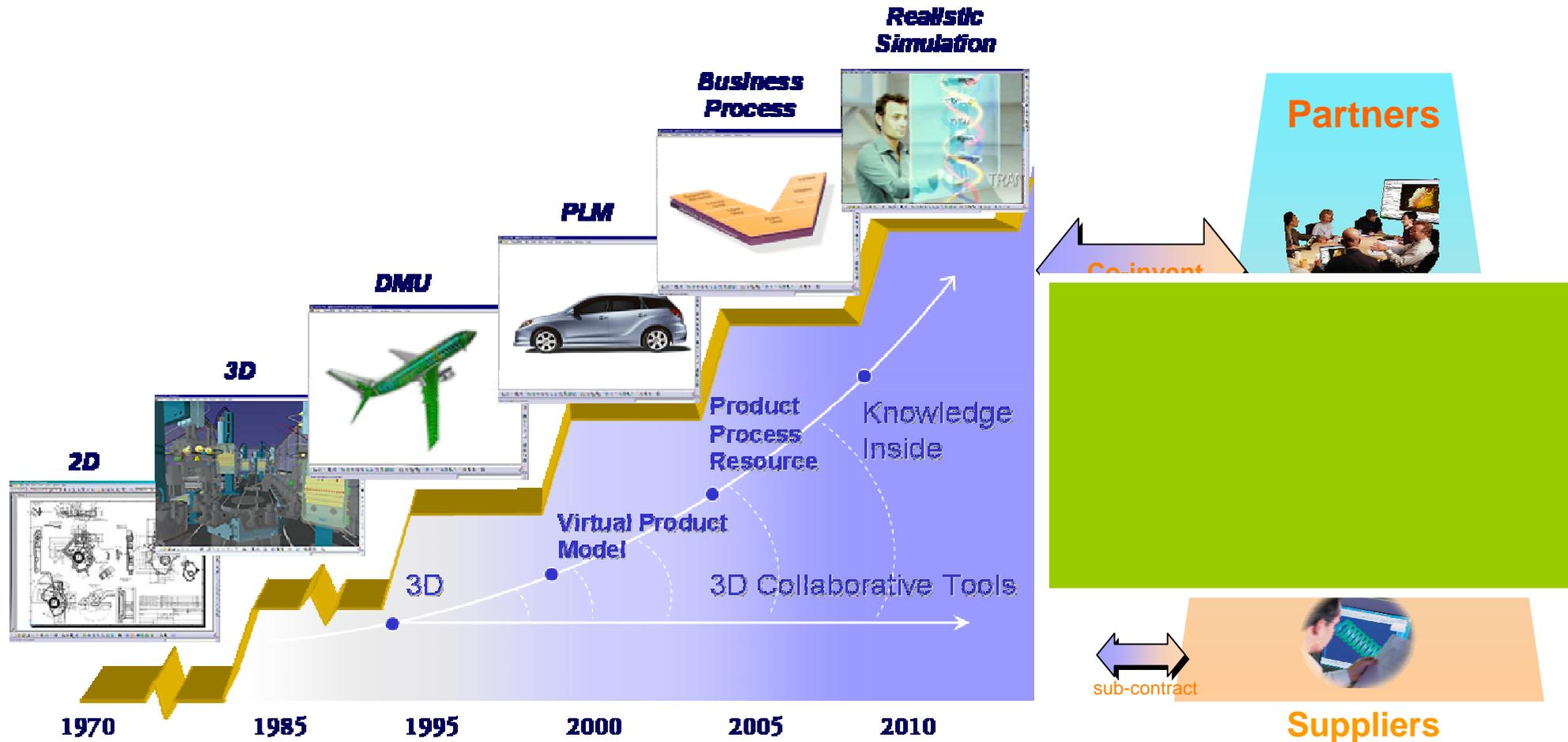
## 6. Maintenance Support



## 4. Manufacturing engineering



# 7- Collaboration



Implementing a successful engineering collaboration across the value chain conducts to increase the level of PLM semantic shared between companies

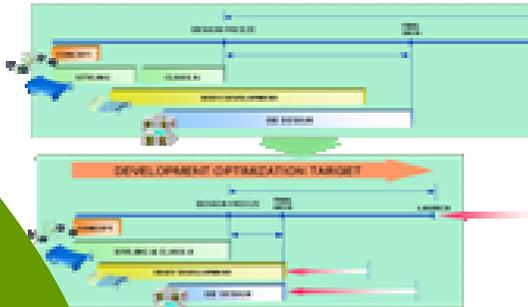
# The requirements :

*A need to reduce development times and costs, decrease cycle times and increase reactivity*

- Current partners/suppliers participation profile
- New partners/suppliers participation profile

Increased supplier role in product synthesis and integration

Increased engineering collaboration



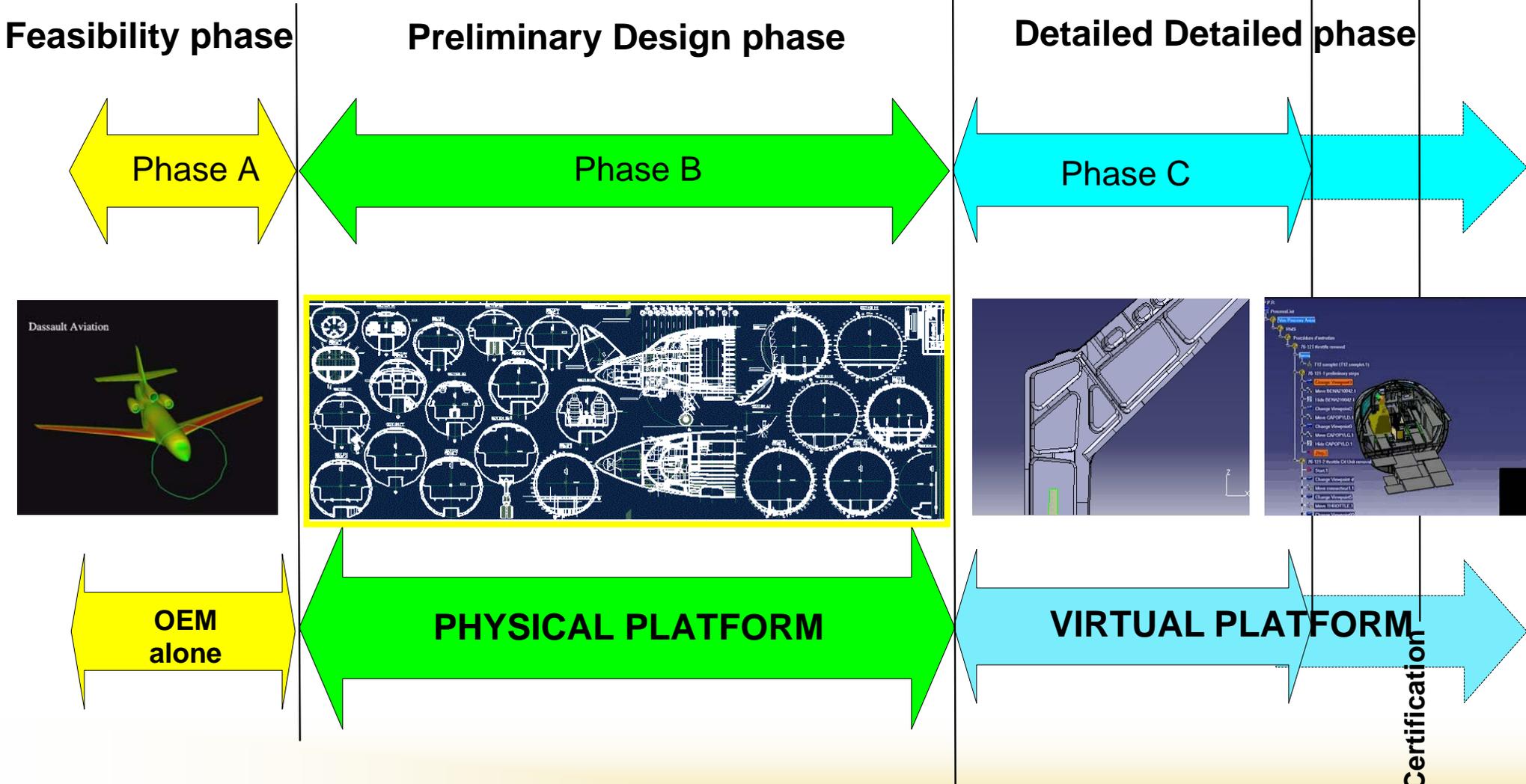
Participation in the conceptual design phase

Suppliers must manufacture complex modules & integrate in final assembly process

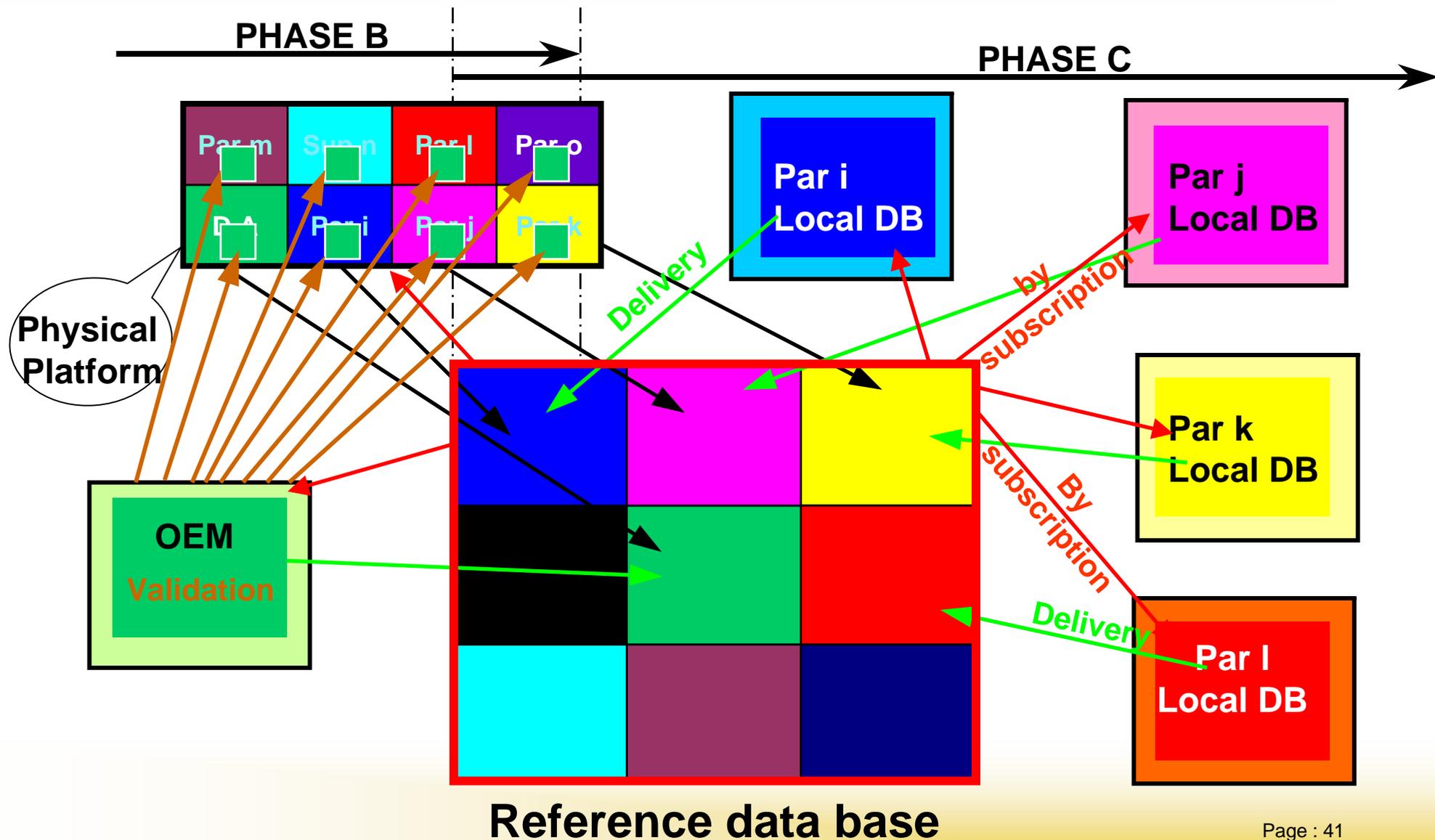
# *How to work around PLM in this context?*

- *How to work together on complex projects, while having teams geographically dispersed?*
  - *Taking into account the diverse and heterogeneous development environments of the company.*
- *How to develop sub-systems within the global constraints of the system?*
- *How to maintain continued cost reduction?*
  - *While ensuring that information is secure, and at the same time protecting the intellectual property.*

# Phases of the development process

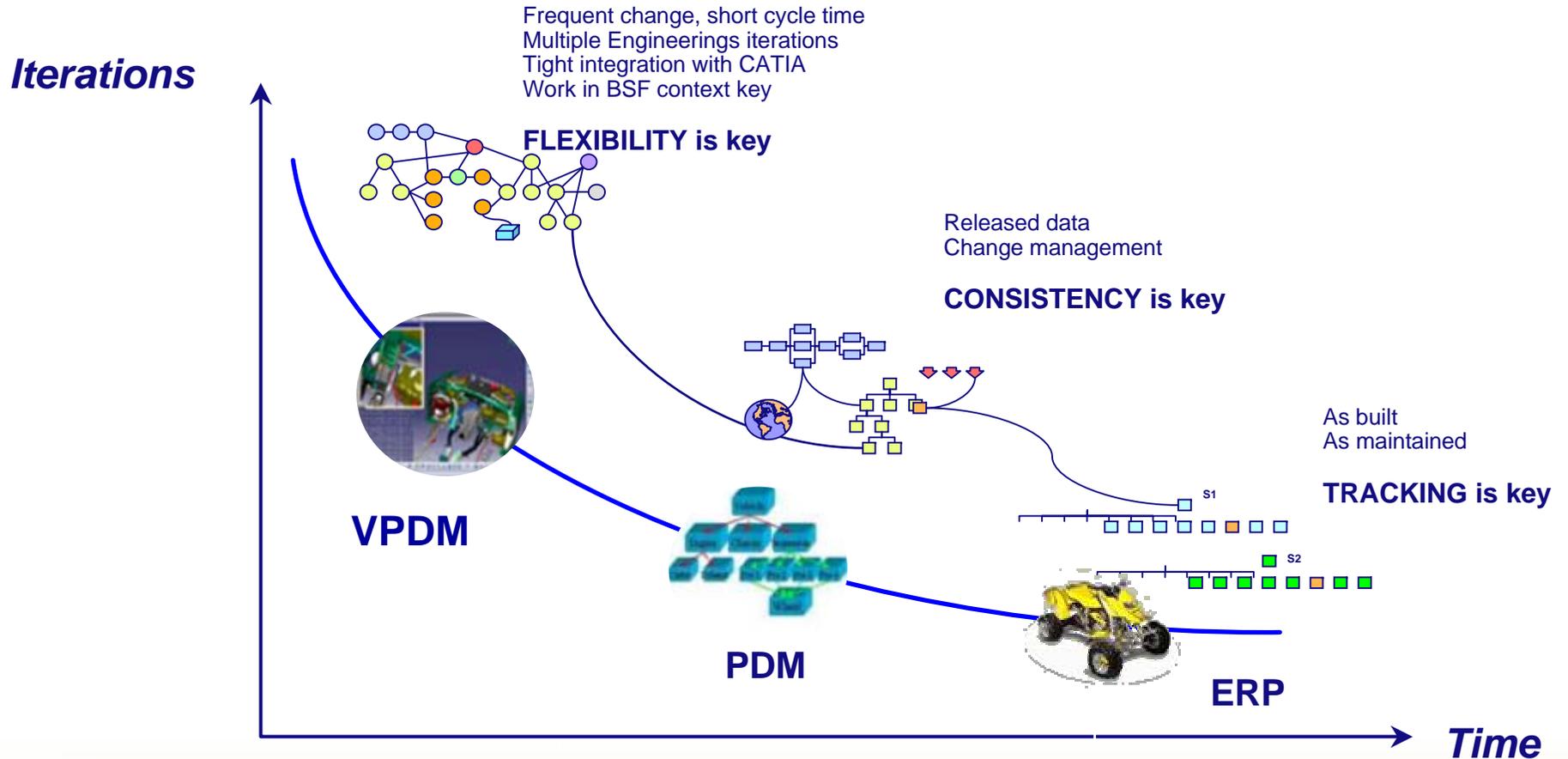


# Data sharing functional scheme



# 7- Collaboration

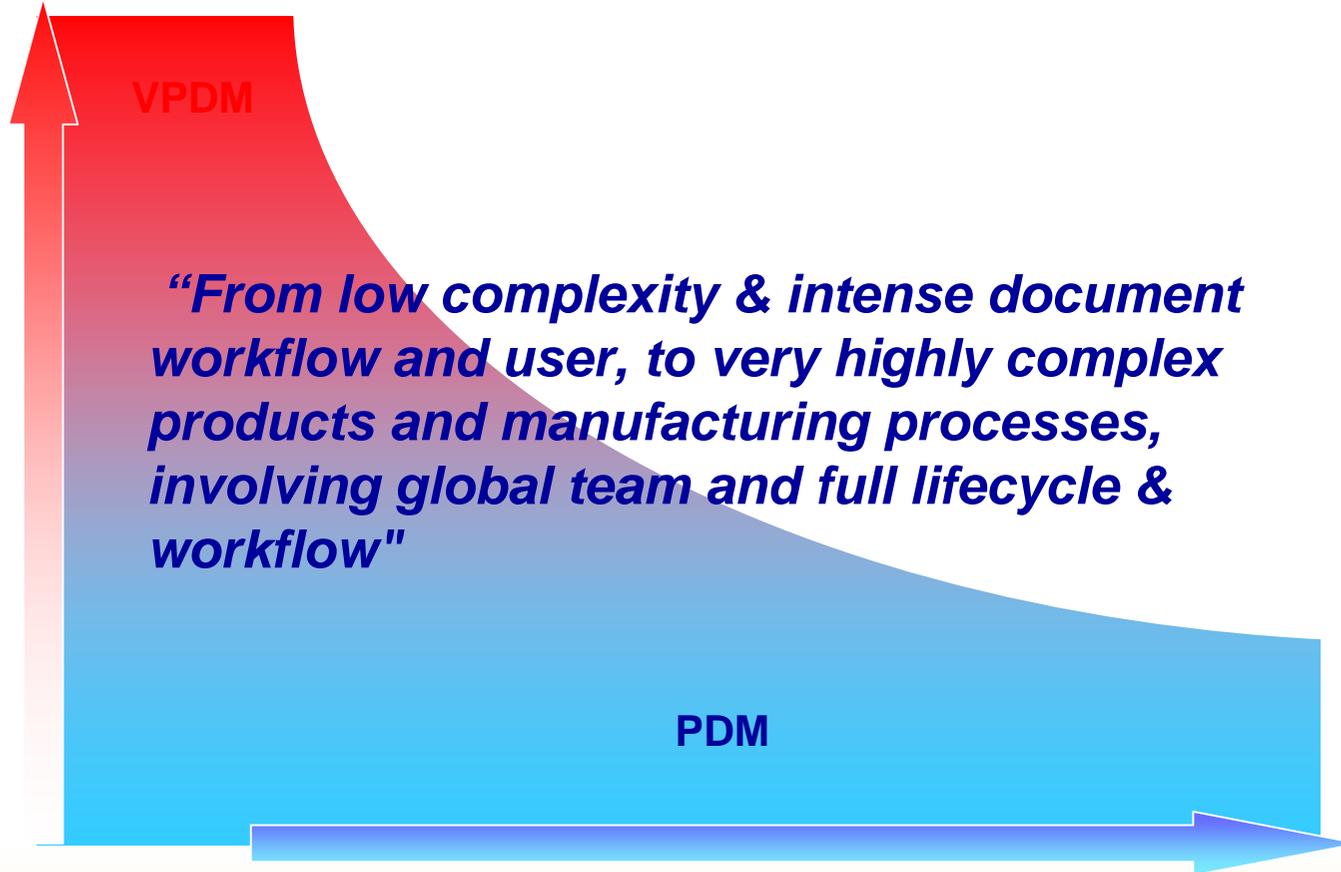
## How VPDM/PDM/ERP fit into the product lifecycle ?



From Concept ... to Service after Sale

# Supporting collaborative environment...

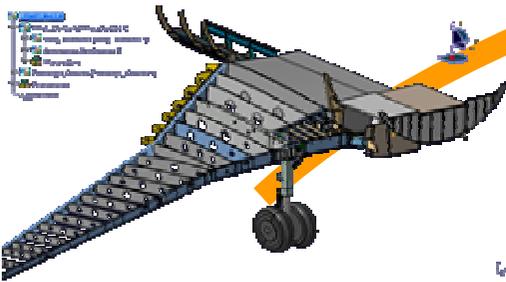
Product x Manufacturing Process x Resources  
Complexity



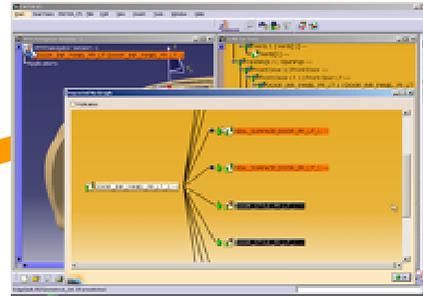
Document x Workflow x User Complexity

# The 5 Most Important VPDM Functionalities

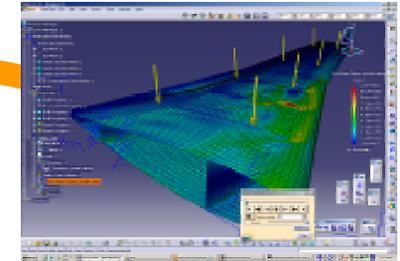
## 1 Design in Configured Context



## 2 Relational Design

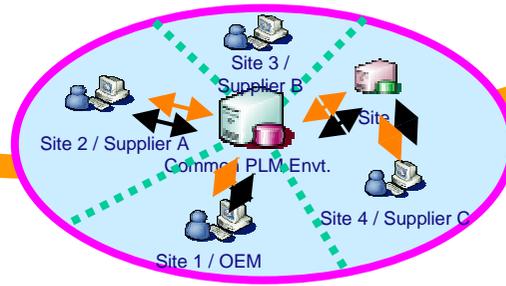


## 3 Multidiscipline Collaboration

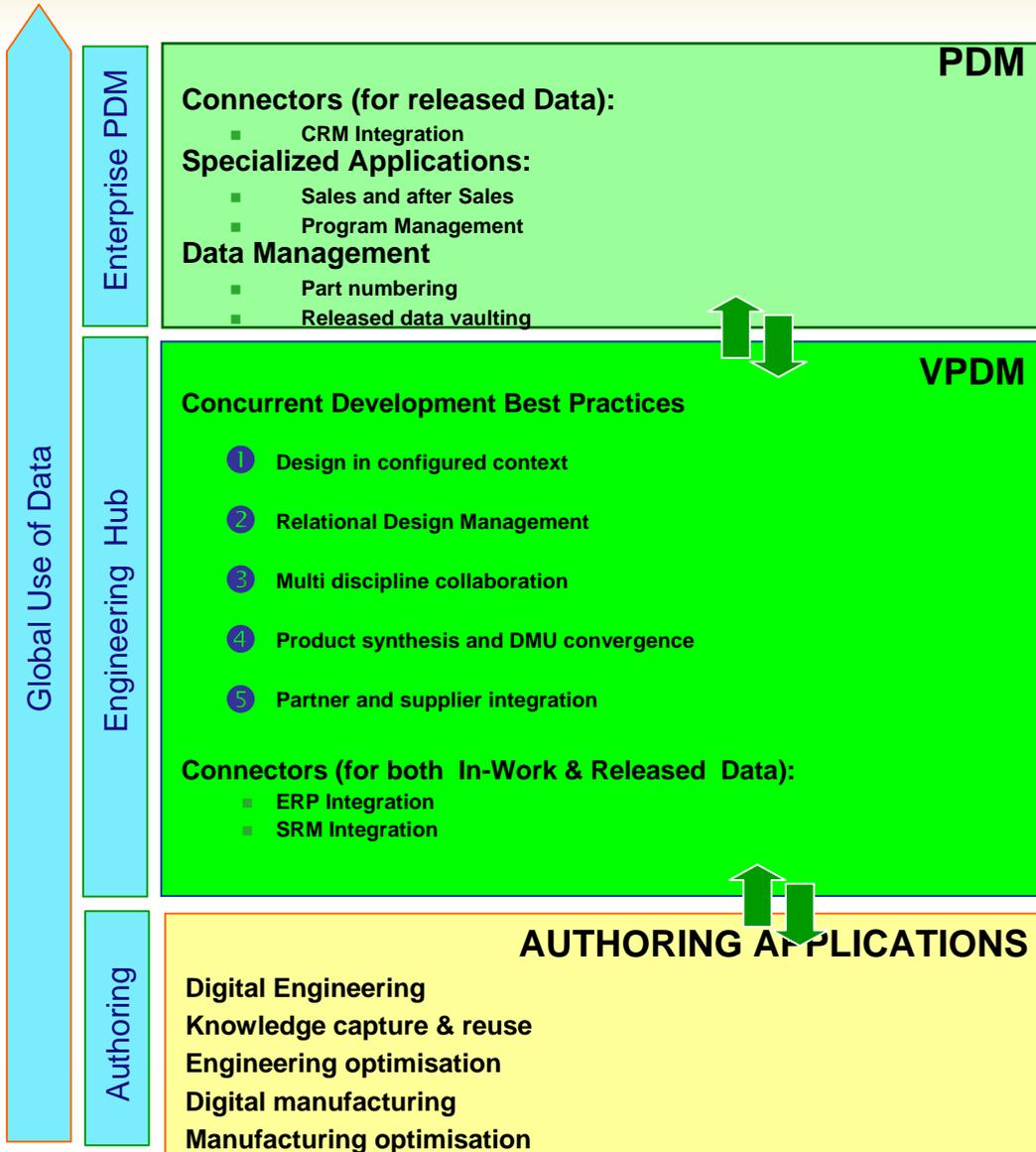


## 4 Accelerate Product synthesis & DMU convergence -clash management -DMU review

## 5 Enhance Partner & Supplier integration

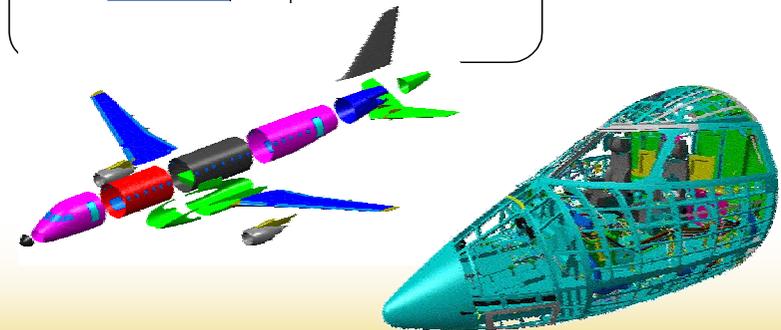
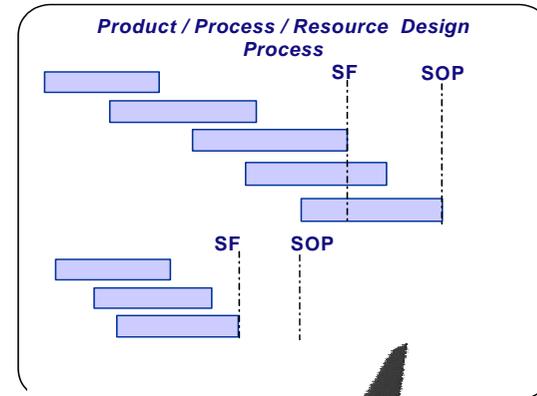


# Enterprise Engineering Hub with VPDM and PDM

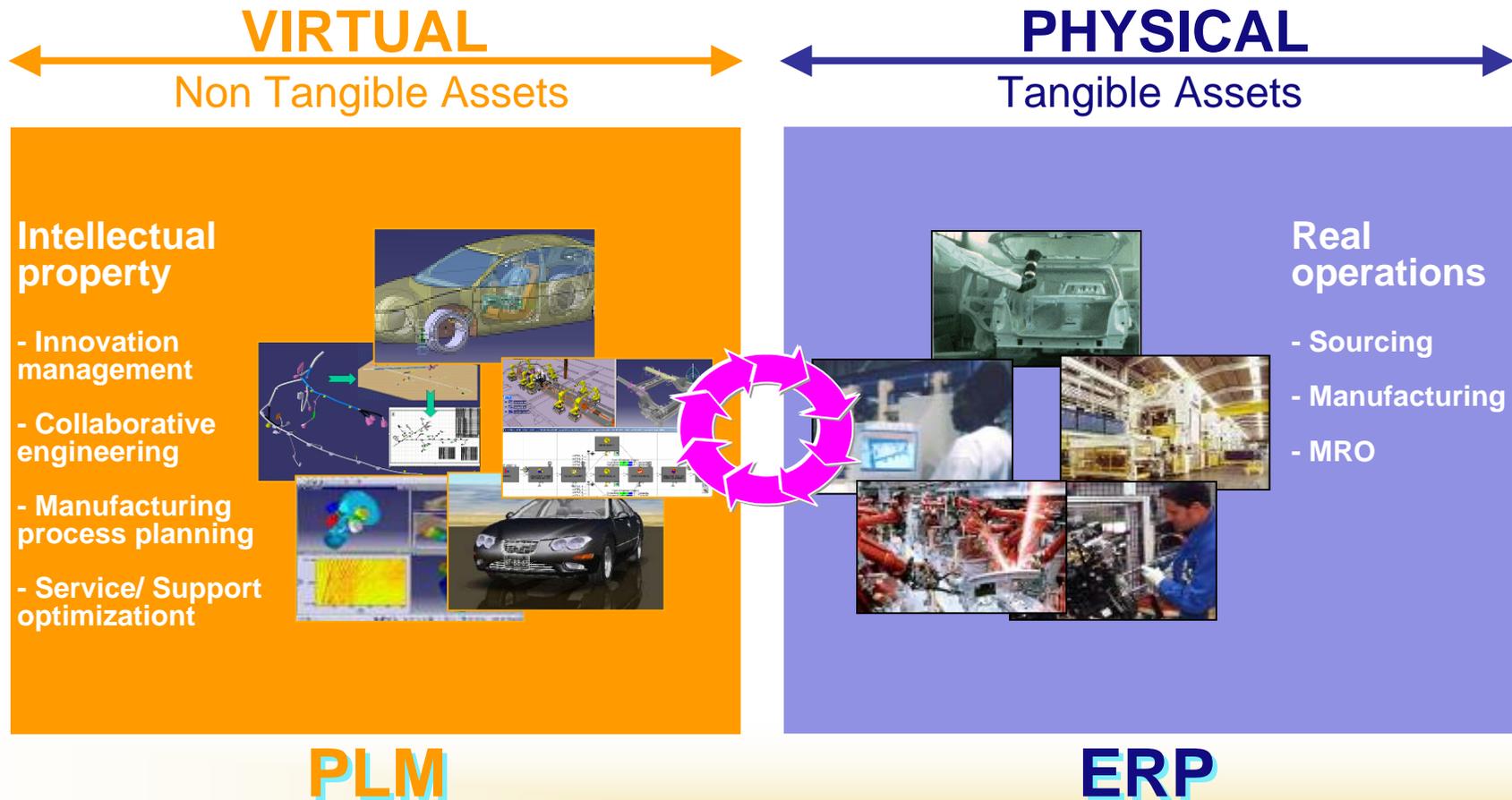


## Benefits

- Consistent Lifecycle and Change Management for both in work and released configured Product Structure
- End-to-end control of Product Diversity at a fine granularity level
- Supply chain collaboration for both in work and released data



# PLM and ERP positionning



# ***PLM...***

## ***A business transformation***

**Francis BERNARD**  
*Founder of Dassault Systemes*  
*Board Member, ESI Group*  
*Board Member, DEMSolutions*  
*Executive Advisor, ParallelGraphics*

**Isicad 2008**  
**Novossibirsk, Russia**