Model Based System Engineering

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Guy DE SPIEGELEER
guy.de-spiegeleer@twiinit.com

Content

Design in not simulate

General view of design process

Complex system simulation / design model

Collaborative design process, a step toward engineering forge

    Collaboration in space

    Collaboration in time

Complex system design
Design is not simulate

Simulate: *Behaviour <= Definition + Mission*

$$B = simu(D, M)$$

Solution **always exists in real life**

Design: *Definition <= Mission + Behaviour*

$$D = simu_D^{(-1)}(B, M)$$

Solution **only exists in real life** if design choices are consistent

A unique model to perform both simulation and design
How do you transform a simulation system into design system ?

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Collaborative Design Software

Complex system design
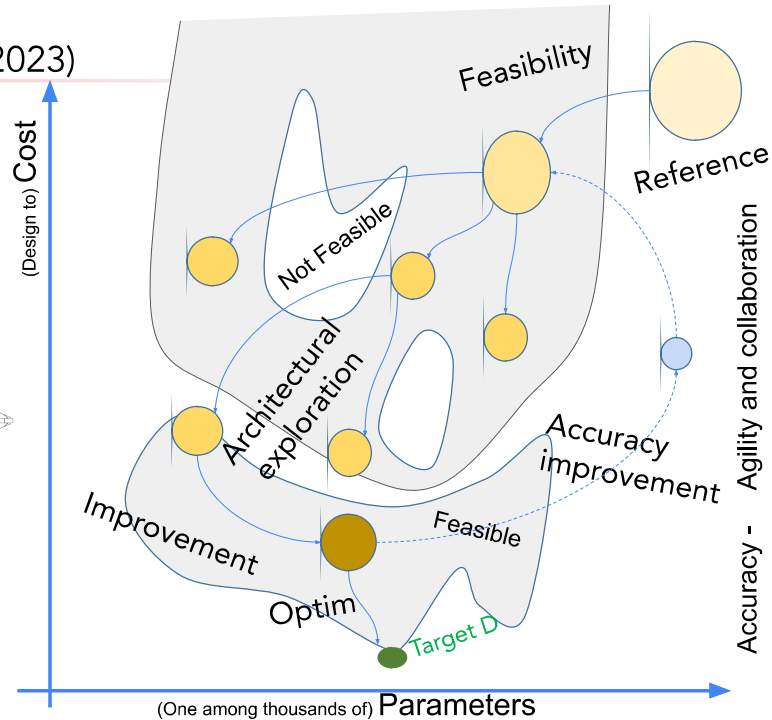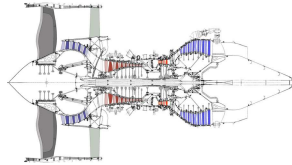A general view (shared with MDEN in December 2023)

Decide of thousands of parameters that

- Comply the needs and requirements
- Respect feasibility and knowledge
- Maximise value(s)
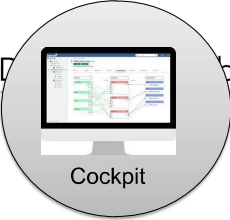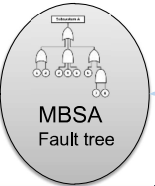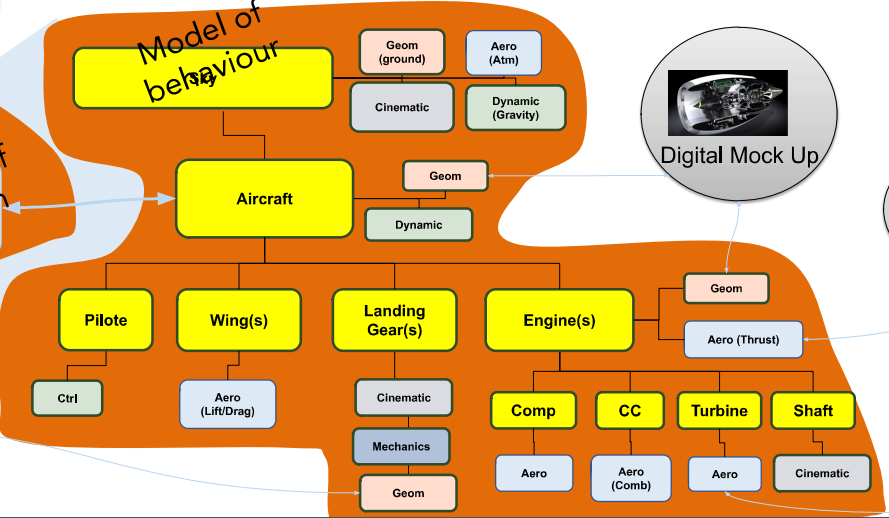
Find the target D !

Design major steps

- Feasibility studies
- Concept studies
- Detailed studies (improvement, optim)
- Validation & verification

A specific model to perform exploration and feasibility
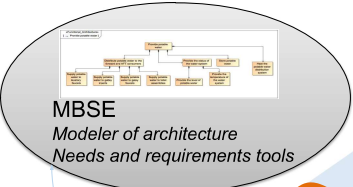With modularity with right accuracy

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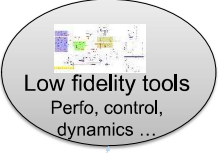
Complex system design
Digital twin extension (shared with MDEN) ...

A device made to simulate and design a complex system
is a complex system …

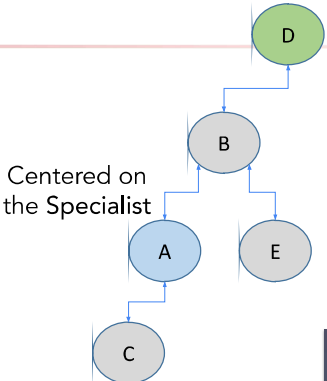twiinIT
Collaborative Design Software
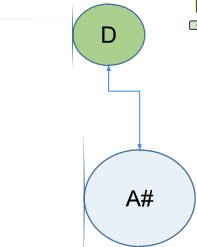
Complex system design
Collaboration in space

Same graph !
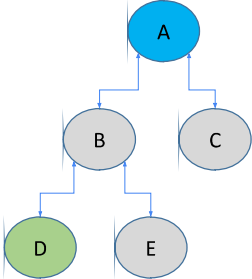
Centered on the System Head

Centered on the Specialist

Dynamic models for collaboration in space

Alerte raised by C while D designs
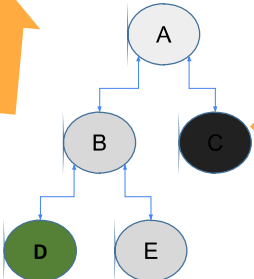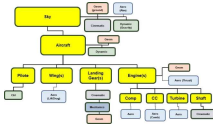
Discussion engaged

We collaborate to the Product value and the system links us

Updated product

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Complex system design
Collaboration in time

Specialist designs in system environment

Referenc e

Specialist contribution is merged in reference

System design conflict must be solved
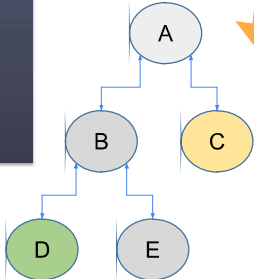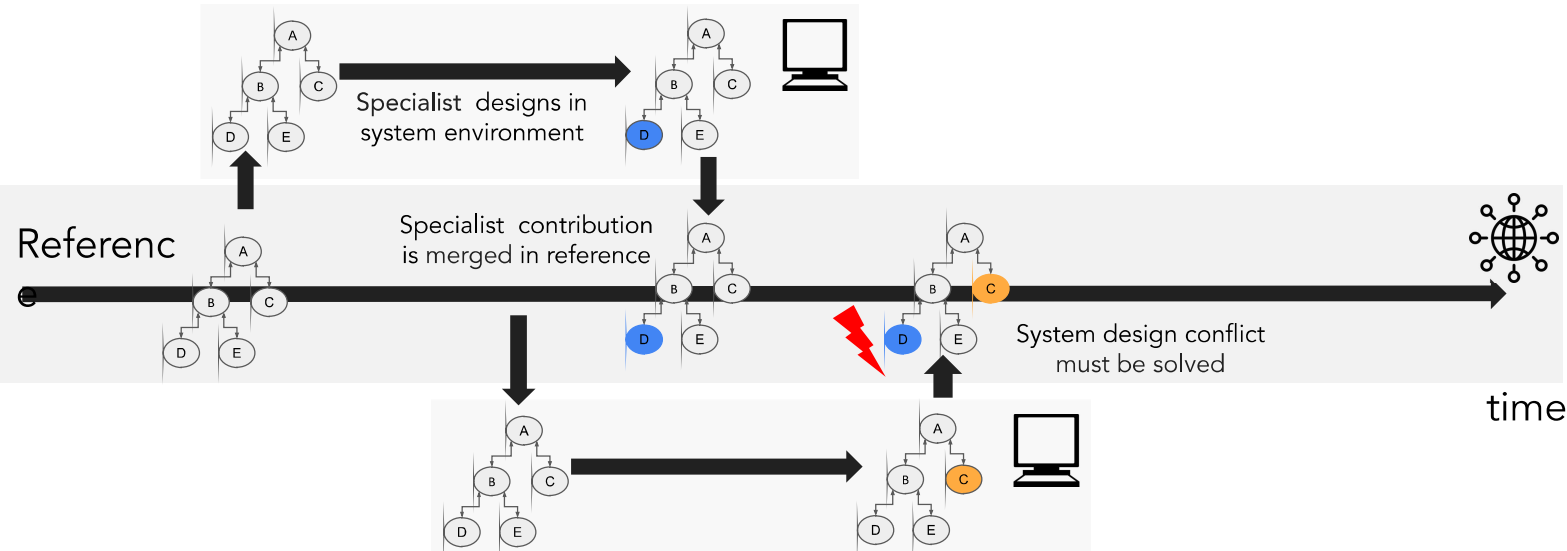
time

Git approach to manage collaboration in time

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Conclusions

Digital continuity extends beyond mere tool integration:

- Temporal continuity: enabling the transformation of tools throughout the product lifecycle.
- Spatial continuity: interconnecting tools that were not originally designed to work together.
- Tool modularity: enhancing accuracy or agility as needed.

Deployment prerequisites:

- Minimize the diversity of simulation languages.
- Simplify interfaces.
- Facilitate access to more robust and secure computational kernels.

twiinIT: Interested in collaborating (with you) on European projects to demonstrate these concepts through prototypes and real-world applications.

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Dr. Guy DE SPIEGELEER
X, HEC Challenge+
co-founder - CEO
28 years of designing engines at Safran
guy.de-spiegeleer@twiinit.com

Eng. Adrien DELSALLE
ENSMA, HEC Challenge+
Co-founder - CTO
10 of scientific software development
adrien.delsalle@twiinit.com

Dr. Gaétan LAURENS
eco design
complex system
simulation
python

Dr. Bruno HARTMANN DA SILVA
complex system design
augmented spreadsheet

Dr. Louis FONTENEAU MARCEL
model translation
python

Dr. Gaël TOUQUET
c++
artificial intelligence

Scientific Committee:

Inria/DiverSE

Prof. Benoit COMBEMALE, CSA
Systems eng., Open Source Software

Prof. Olivier BARAIS, CTA
Web development, DevOps

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