

DEFENCE AND SPACE

Digital Twin in the Context of Product Line Approach

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Overview

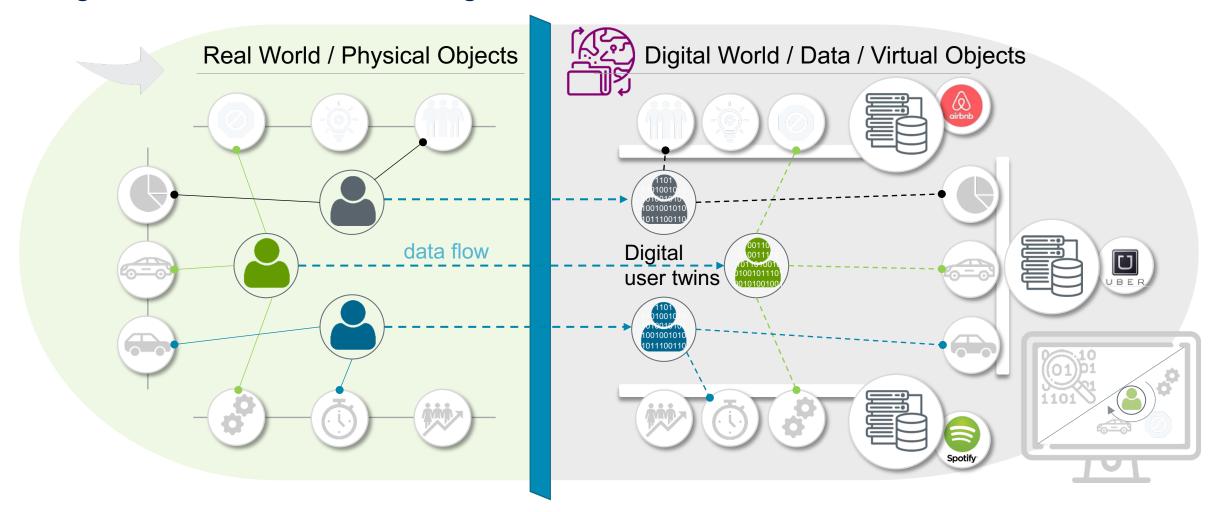
- Digital Twin a myth, the next hype ?
- Digital Twin Synthesis: Overall Concept to strategically address new data flows, technologies supporting concrete use cases
- Digital Twin for product approach a first sketch of ideas ?

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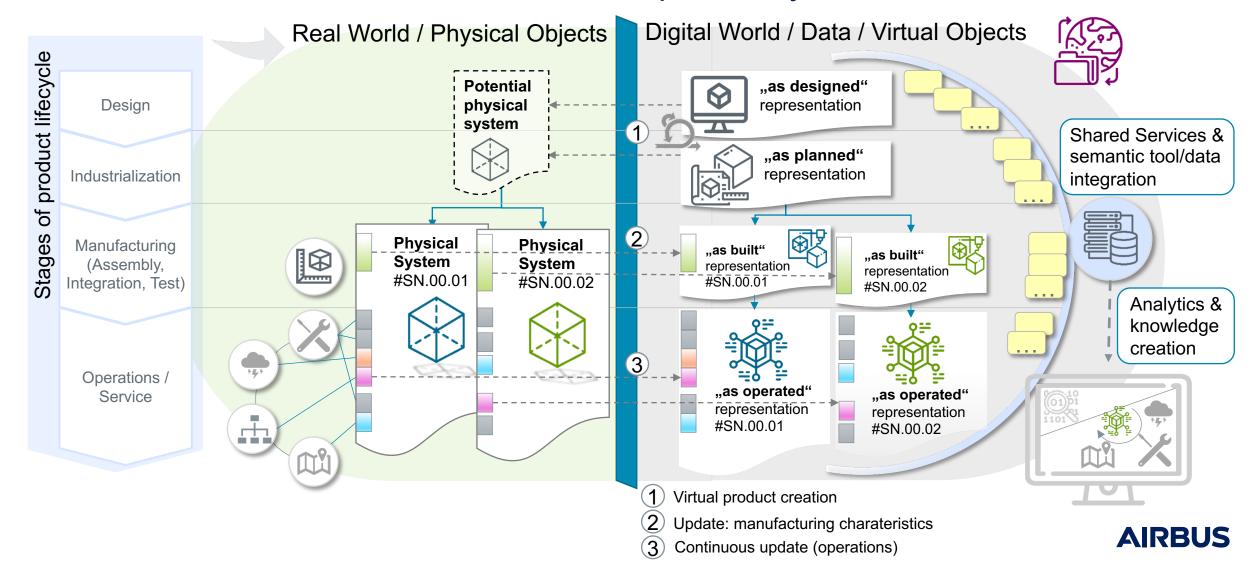
Digital Twin, what is it?

A digital reflection of something, or someone, or ...



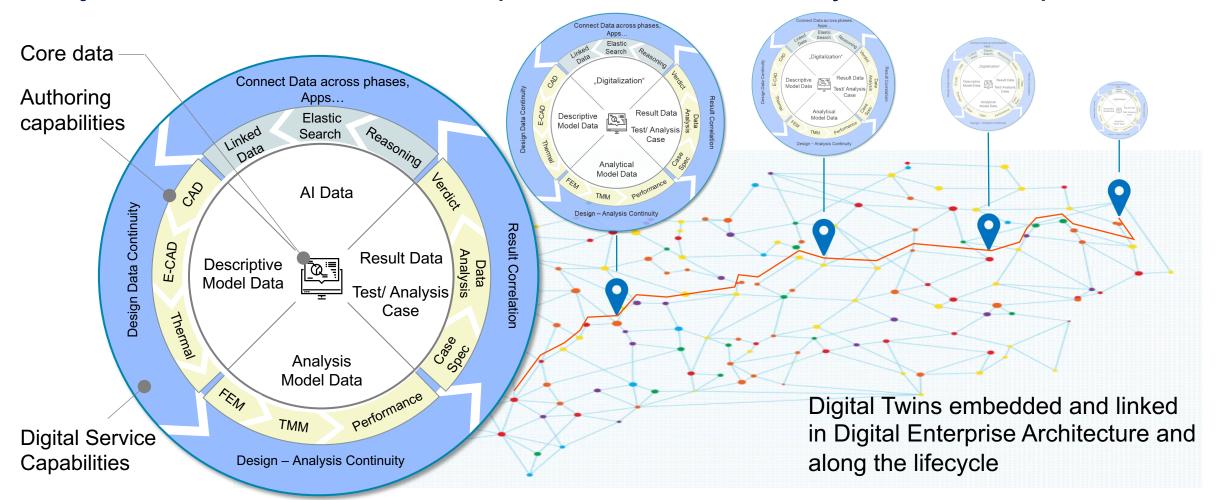


What are the specifics of a Digital Twin of a System? Various individual "instances" needed to capture a system



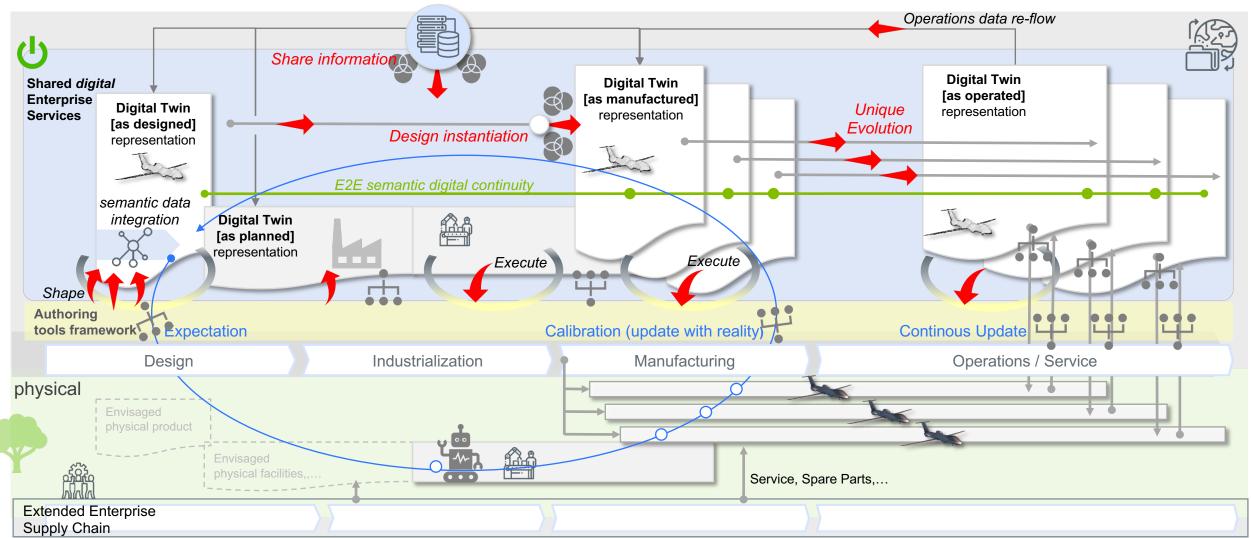
Digital Twin – what is it?

It is just Data/Models – created, processed or viewed by individual capabilities





Use case elaboration of "Digital Twin" – along the life-cycle: Concept Synthesis





But how to realize Digital Twin? In small steps along concrete use cases !

> "as designed" fully digital engineering approach to give birth to the digital twin

Extended Enterprise – seamless supplier integration

Measure and data patch to obtain "as manufactured"

Continuous data patch to maintain "as operated"

Utilize knowledge for future missions / product

> Digital Twin for product line approach

Digital Twin Use Cases

Drives & Technologies

Usability and User Experience

> Automate data flows and processing

From data model for tool development to living ontology

Enable Modeling & Simulation with all digital twins

Leverage of AI to make knowledge accessible

Remain and extend capabilites of configuration control and data governance

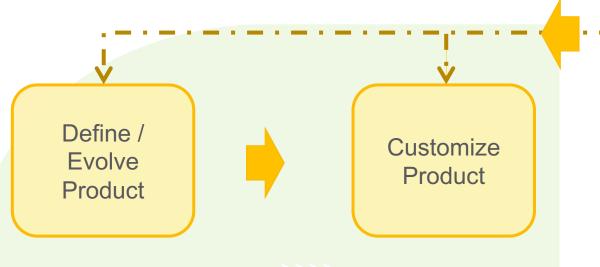
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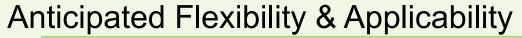
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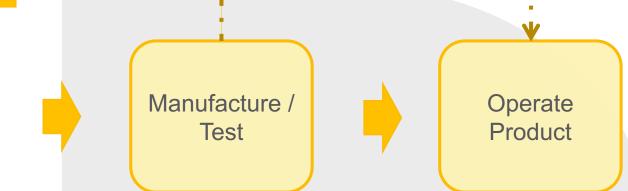
DD MONTH YEAR

Complement Product line Engineering with "real world" Data





- Versatile overall System Design
- Possible wide range of applications
- Evolution of product according to market demands
- Analysis of boundary conditions



VS Observed Flexibility & Applicability

- Correlation between "as designed" vs "as operated"
 - performance on all different levels
 - System margin
- Close tracking of system performance over time
- Support of marketing / sell what can be expected from the product for particular UC
- Calibration of analysis models with reduction of verification effort



Conclusions

- Digital Twin is not entirely new many capabilities required for digital twin do already exist
- Digital Twin Concept stresses / requires the
 - Completion of tool integration effort i.e. in Engineering (MBSE, digital continuity, ...)
 - Establishment of new data flows to capture data coming from the "real" world
 - Make the data / models forming the individual digital twins "accessible" (e.g. performance simulation of "as operated" S/C)
 - Consideration of usability aspects !!
- Digital Twin will benefit massively from AI technologies if it comes to
 - Analyze / process data coming from real world
 - Utilization of data for engineering
- Overall digital twin concept is needed to enable taking the right steps in the good overall direction

