LM Digital Twin Maturity Model

Simulation / Virtual Prototypes

Level 1 – Virtual Digital Twins (DT)

Virtual Digital Twins – Prototype Modeling and Simulation

Do you have high fidelity or physics based digital twin models and simulations for :

- Configuration and Master Data
- Stealth
- Structural Performance
- MBSE Requirements and system interferences
- Vehicle Systems. Flt Controls, and SW
- Mission Systems and SW
- Operations Analysis
- Manufacturing/Production
- Supply Chain
- Sustainment, Reliability, Maintainability, Safety
- Affordability/Cost/Capital Req.

Does your Digital Twin predict mission success and compliance with customer requirements?

Did your models identify opportunities?


Physical System → Data → Digital Twin

Level 2 – DT/PA Synchronization

Manual Virtual/Physical Synchronization of Digital Twins

- Is your DT representative of the physical asset?
- Did your DT baseline facilitate design trades and configuration optimization?
- Are your DT models manually updated for design and requirement changes?
- Does your digital twin represent the physical asset performance and design?
- Are your DTs manually updated with the latest test and field data?
- How well did your level 1 DT support the physical asset performance and configuration baseline ?
- Were major changes required after design start to address performance or requirements issues unidentified by the DT?
- Are your DTs resident in an integrated design environment?
- Do your DT simulations interact with hardware in the loop?
- Did your virtual PAVs identify opportunities for improvements?


Physical System → Data → Digital Twin
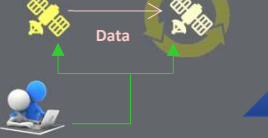
Level 3 – DT/PA Validation

Automated or Continuous Virtual/Physical Synchronization and Validation of Digital Twins with Physical Assets

- Are your DT models routinely or automatedly synchronized to the latest configuration baseline?
- Do your DTs predict physical asset behavior?
- Are your DT models automatically updated to represent the latest test, field, or analysis data?
- Have your DTs predicted problems with the physical asset performance, design, field results, or requirements that require corrective action?
- Has validation or qualification or fielded results of the physical asset identified unexpected problems?
- Do your DTs support visualization capabilities in the simulation environments?

Physical System → Data → Digital Twin
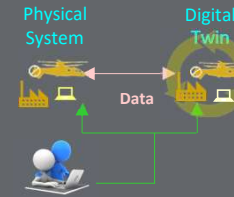
Level 4 – DT/PA Integration

Enterprise Integrated Product Digital Twin

- Do your DT simulations drive your hardware in the loop?
- Does your DT enable parts monitoring, forecasting and predictions from operational data?
- Do you have mature integrated DT models to support Operations Analysis, spiral development, and sustainment?
- Are your physical asset validations used to improve your DT development and sustainment tools in preparation for the next product development cycle?
- Does the DT accurately predict performance in the operational environment?
- Have your DTs eliminated some or most legacy physical testing and lab validation?
- Is the DT accredited as the Master Model of the Product that can be used for virtual customer validation of requirements?

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Level 5 – DT Operational Ecosystem

Digital Twins Common Operational Simulation Eco-system

- Can your DT models be connected and integrated with other LM product DTs and with customer provided non LM assets in a common simulation environment?
- Do your DTs adequately predict actual performance and operations (including sustainment data) in the JADO environment?
- Will customers use simulation based performance and operations validation without requiring subsequent physical demonstrations?
- Is your DT development and testing used to upgrade your DT tools and processes?
- Do customers utilize integrated Digital twin effects as certification criteria?
- Did your models identify opportunities for improved performance in the simulation environment?
- Do your interoperable DT's predict the performance of coordinated mission effects across multiple domains (land, air, sea, space, cyber)?

DT/PA = Digital Twin/Physical Asset