**LM Digital Twin Maturity Model**

**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, Fit 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?

**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 to represent 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?

**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 automatically 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 corrective action been completed?
- 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?

**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?

**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**