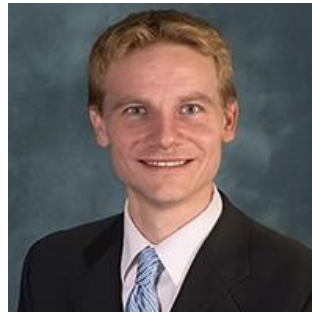


AIAA Digital Engineering Integration Committee

AIAA / AIA Digital Twin Implementation Paper Update for Team Defence Information (TDI)

Digital Twin Subcommittee Chairs



John Matlik
Rolls-Royce



Olivia Fischer
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Digital Twin Implementation Paper

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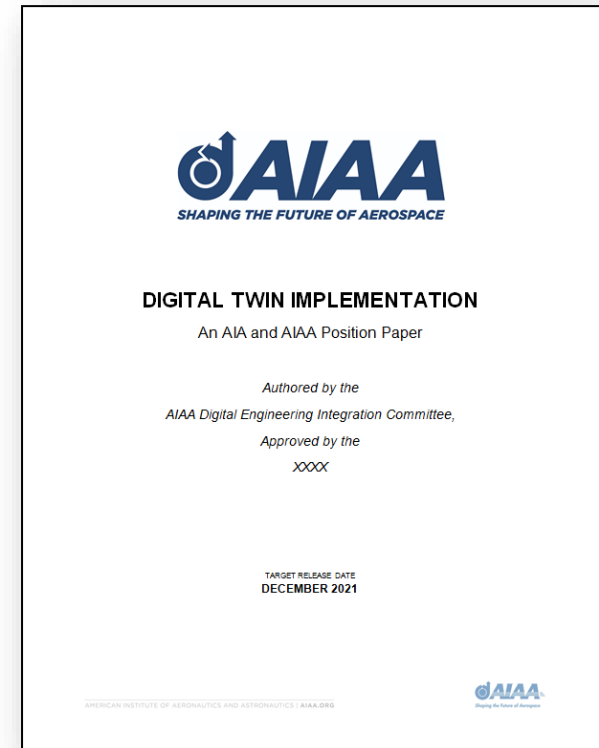
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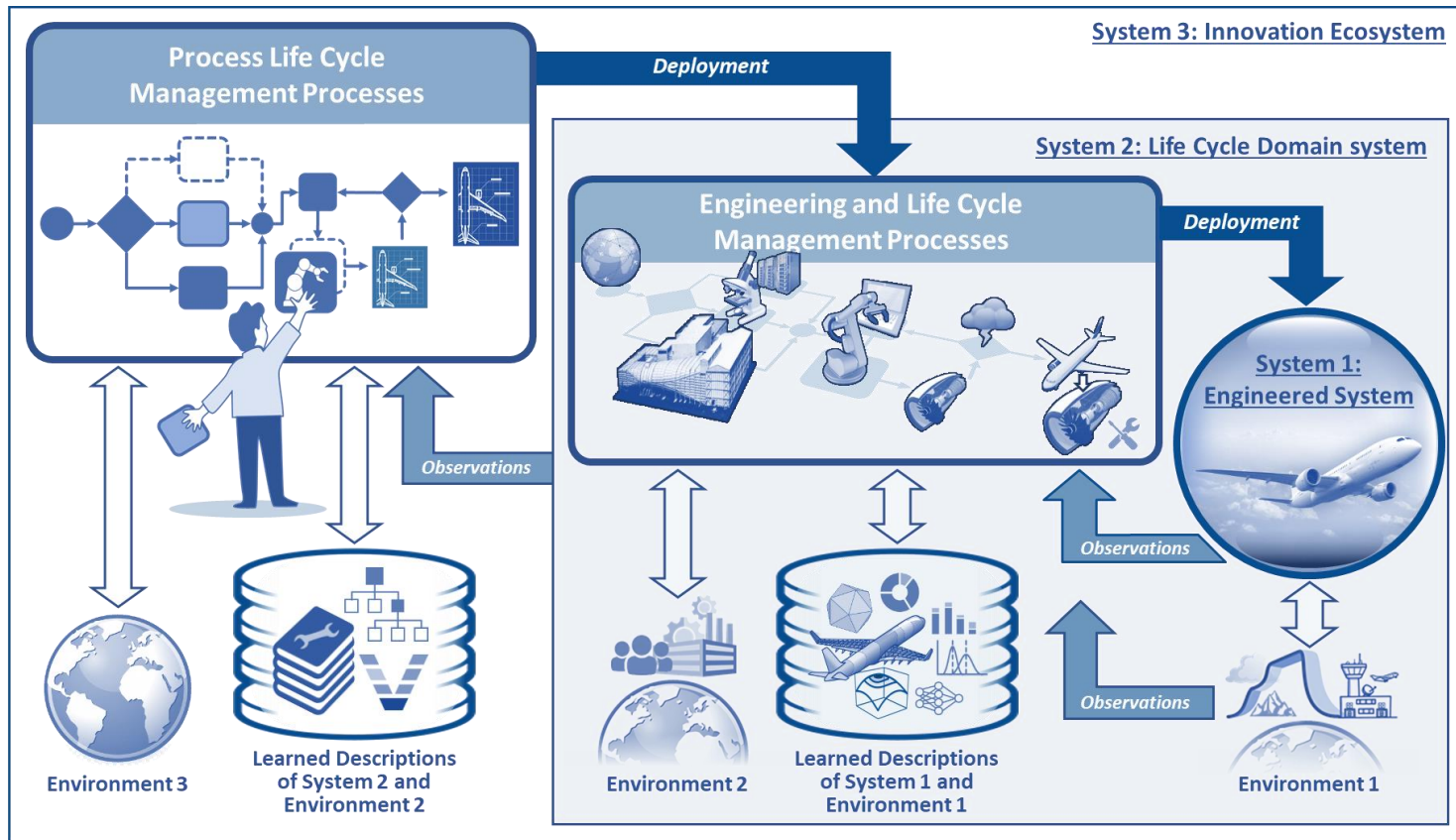
Outline & Content:

1. Context & Purpose
 - Emphasize the gaps we are filling in the context of what others have done/proposed.
2. Generic Framework/Pattern
 - Provide a generic reference model and framework (INCOSE's Agile Systems Engineering Life Cycle Management (ASELCM) Pattern) for describing how Digital Twins integrate with the broader digital enterprise
3. Case Studies
 - Provides context for demonstrating specific instance of framework/pattern
 - Industry prioritized case studies for Space, Air & Ground
4. Summary of ASELCM Applications
 - Synthesize how the generic reference model supports the various use case applications
5. Recommendations & Next Steps
 - Stay consistent with & integrate "recommendations/next steps" agreed as part of the AIA/AIAA Digital Twin Position Paper



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Generic Framework / Pattern Overview:



Agile Systems Engineering Life Cycle Management (ASELCM) Logical Architecture – Level 0

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Selected Digital Twin Case Studies:

1. Rotorcraft Component (Mahadevan)
2. Manufacturing Twin Family (Ganguli/Hardwick)
3. Building Twin (Fischer)
4. Cygnus Orbital Ferry Vehicle (French/McKnight/Hutchinson)
5. Aerospace ICME (Arnold)
6. Airplane Seat Certification Twin (Kabir)

Recap of Case Study / Use Case attributes & intent:

- Open & Non-proprietary
- Stay aligned to Position Paper
- Pervasively relevant & prioritized by multiple Orgs to get “Aerospace Voice”
- Demonstrate vertical alignment (cross supply chain/system) & horizontal alignment (across life cycle)
- Case Studies/Use Cases are a select subset configured from the much larger Digital Twin framework/pattern

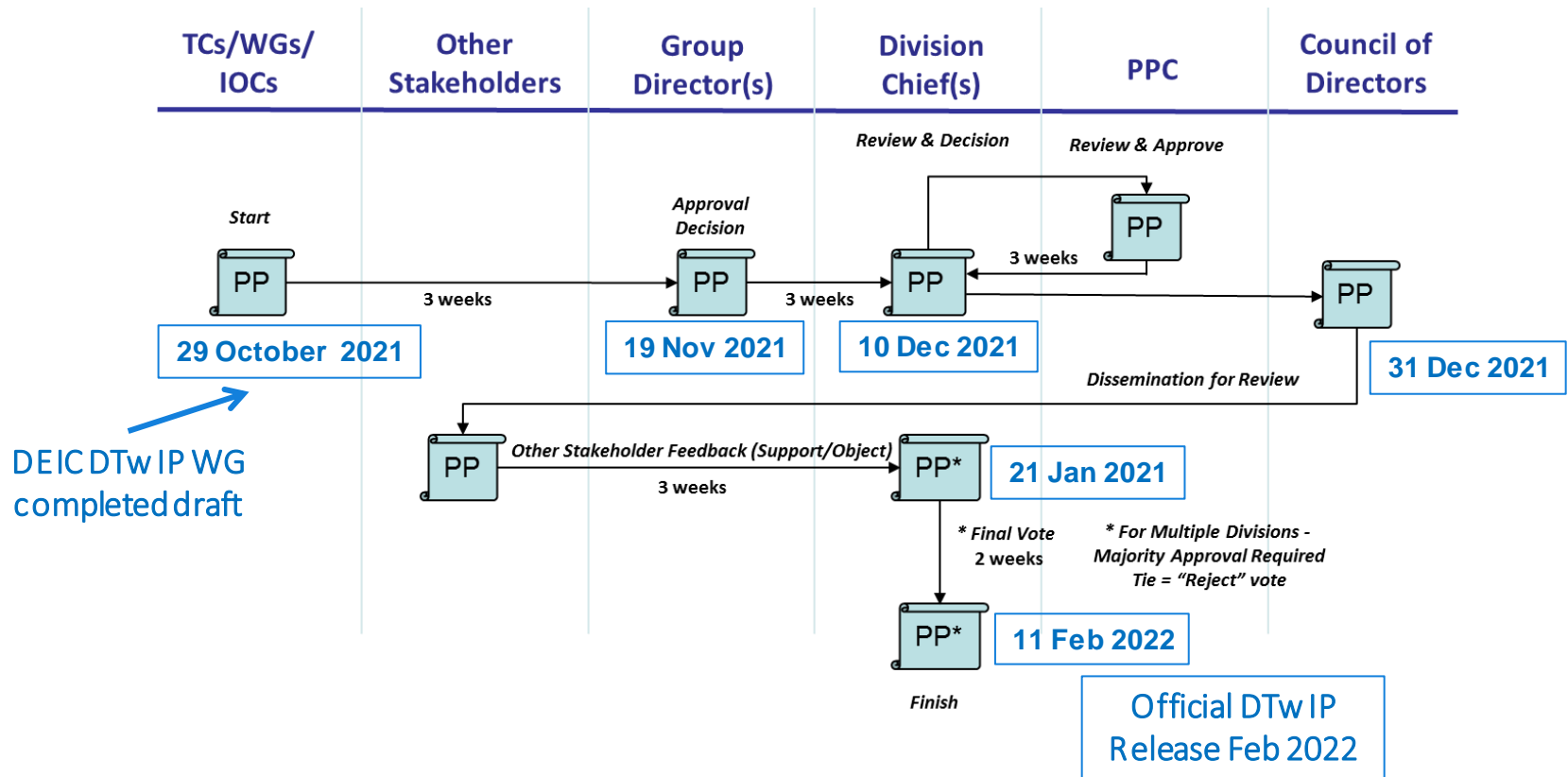
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Recommendations:

- Adopt a methodology that ...
 1. Requires enterprise level systems engineering
 2. Aligns with related enterprise efforts
 3. Manages 'trust' over time
 4. Pursues on-going multi-level group learning
- Create/leverage Aerospace Digital Transformation Consortia
 1. ... to provide focus (tactical)
 2. ... to ensure scalability (strategic)
 3. ... to promote awareness (marketing)
 4. ... to influence policy & regulation (political)
 5. ... to inform workforce development (education)

Digital Twin Implementation Paper

Paper review process timeline:



Digital Twin Implementation Paper

Next Steps:

- Complete update from “Pink Team” review feedback
- Industry wide release “Red Team” review ~end of Oct 2021
- Collate Industry feedback across Professional Societies
 - AIAA, AIA, INCOSE, NAFEMS OMG Digital Twin Consortium
 - ... and Team Defence Information?!
- Adjudicate feedback / update paper for ~ Feb 2022 publication