

Democratizing PLM with Low-Code Extensions that Enable AI Data Readiness and Implementation

Denise Fitzgerald

PLM Road Map™ & PDT North America 2026

AI in PLM: A Disruptive Opportunity and Challenge

Turning AI disruption into enterprise value:

Strategic insights for the PLM professional

6-7 May 2026

www.CIMdata.com

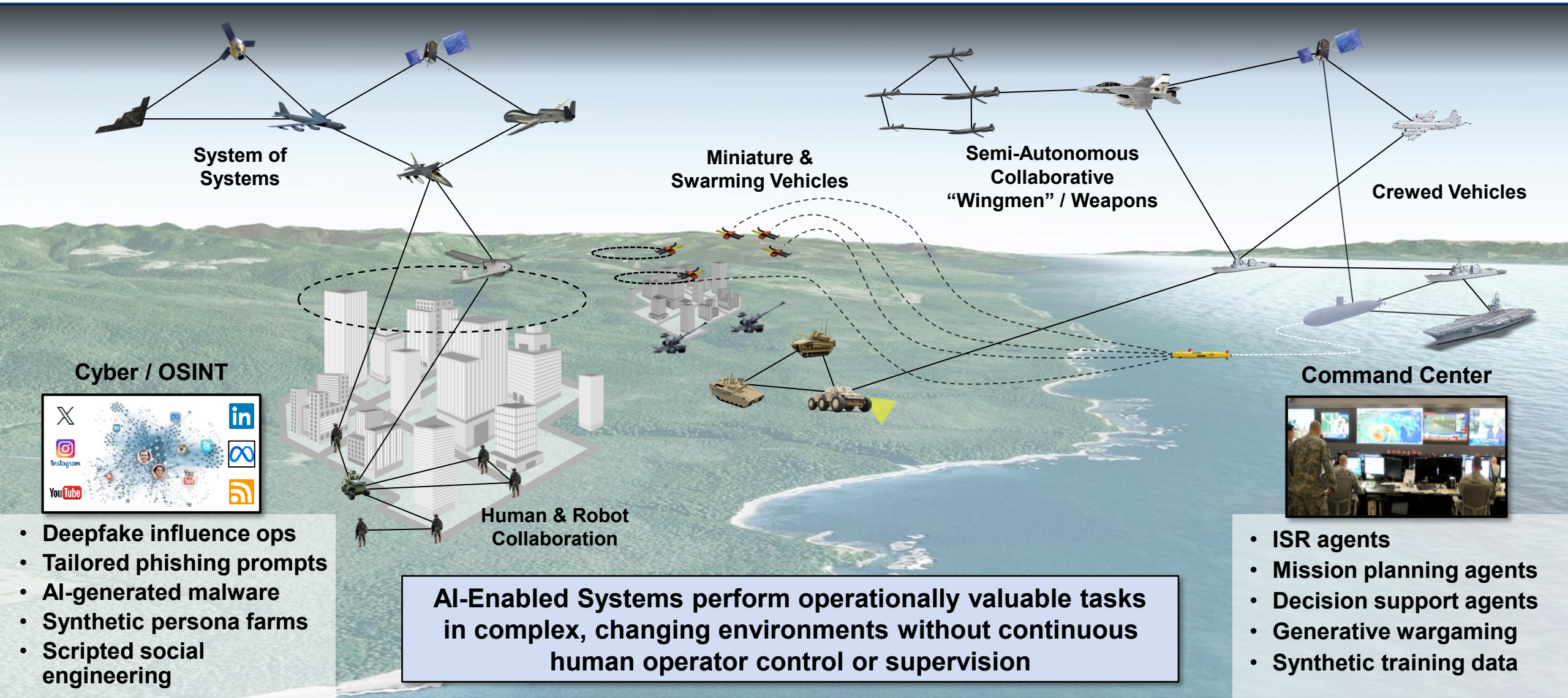
CIMdata



DISTRIBUTION STATEMENT A. Approved for public release.
Distribution is unlimited.
This material is based upon work supported by the Department of the Air Force under Air Force Contract No. FA8702-15-D-0001 or FA8702-25-D-B002. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Department of the Air Force.
© 2026 Massachusetts Institute of Technology.
Delivered to the U.S. Government with Unlimited Rights, as defined in DFARS Part 252.227-7013 or 7014 (Feb 2014).
Notwithstanding any copyright notice, U.S. Government rights in this work are defined by DFARS 252.227-7013 or DFARS 252.227-7014 as detailed above. Use of this work other than as specifically authorized by the U.S. Government may violate any copyrights that exist in this work.



GenAI Empowered Battleground of Tomorrow





Engineering in the Battleground of Tomorrow

Mission and Systems Modeled and Simulated
IoT feedback
Digital Twin

System of Systems

Digital Twin enhanced control systems
Edge computing
Stiff integrated mechanical structures
Advanced sensors
AI supported decision making

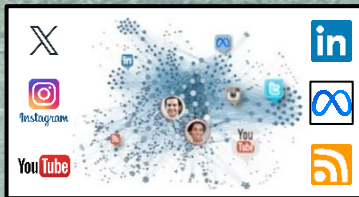
Crewed Vehicles

Miniature & Swarming Vehicles

Semi-Autonomous Collaborative
"Wingmen" / Weapons

Rapid trade space exploration and design
Rapid deployment
Modular systems
Rapid fabrication

Cyber / OSINT



Command Center

Collaborative mission and scenario wargaming
MBSE
Digital Twin



Human & Robot Collaboration

AI-Enabled Command Systems will constantly change the landscape of the battlefield requiring hardware design and deployment at the speed of AI.

- ISR agents
- Mission planning agents
- Decision support agents
- Generative wargaming
- Synthetic training data



MIT Lincoln Laboratory

DoD Federally Funded Research and Development Center

Technology in Support of National Security

- **Forward-looking national security architectures**
- **Long-term technology development**
- **Unique pathfinder prototypes**
- **Agile technology transfer**



The Future Fight

National Security Threats

Adversary Political and Military Advancement

Technology

AI
Quantum
Autonomy
Biotech

Advanced Weapons

Cyber
Electronic
Hypersonic

Global Events

Climate Change
Infectious Diseases



Digitally enabled Defense Infrastructure

Collaboration

Monitoring

Advanced Technology

Agile Acquisition

Mission Planning and Risk Assessment

Physical Assets

Resilient Supply Chain

Digital Assets

Emerging Technology

Connected, Secure, Digitally Enabled Infrastructure



Imagine if ...

AI can create agents that are 80-90% of the ability of the best expert in every mission area



Leverage AI agents as a force multiplier for every mission area and every enterprise service to:

- **Accelerate technology development and transition**
- **Improve sponsor mission effectiveness**
- **Increase productivity and efficiency**
- **Reduce the cost of delivery of Technology in support of National Security**

... and imagine if we don't.



Outline

- **Digital Engineering and the Digital Thread**
- **Artificial Intelligence**



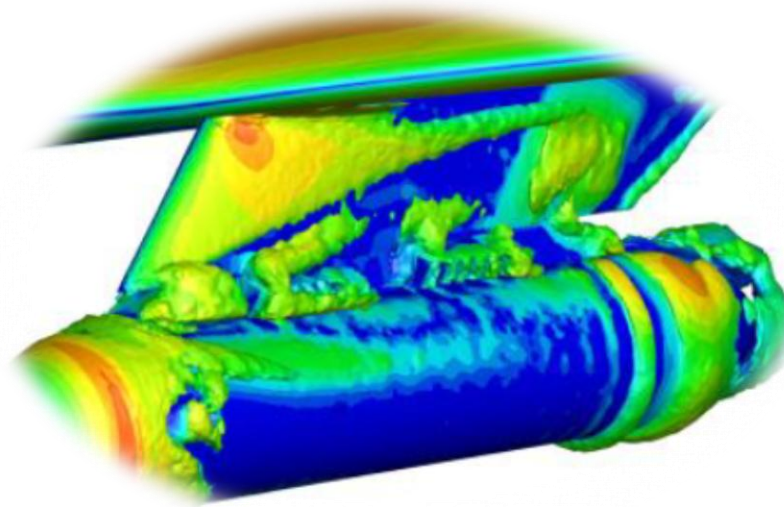
Mission to Realize Transformative Prototypes for National Security

Vision: A national resource for capability development through rapid execution, pioneering of novel engineering capabilities, and enablement of the tech base

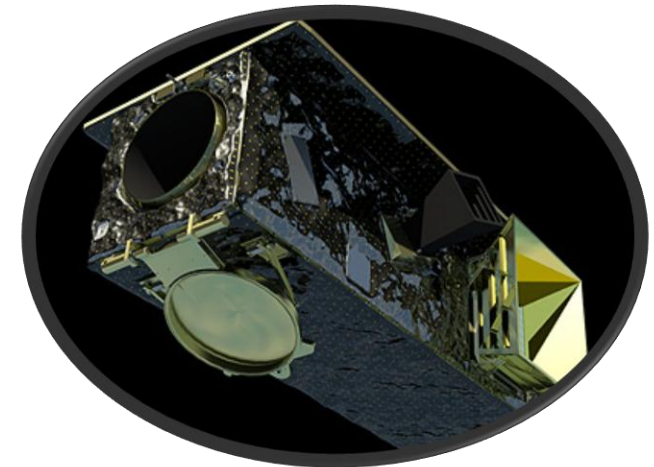
Highly Integrated and Diverse Core Capabilities



Advancing Art-of-Possible



Enabling Next-Generation Industry





Example Lincoln Technology Development Laser Communications





Strategic Alignment

DIVISION 7 PRIORITIES

Highly Integrated and Diverse Core Capabilities

Advancing Art-of-Possible

Enabling Next-Generation Industry

DIGITAL TRENDS

Fully digital product lifecycle – integrated digital thread

Ubiquitous AI/ML in engineering and operations

Digitally integrated smart factories and supply chains

DEC STRATEGY

Development of digital engineering ecosystem

Transformation through tailored Training and Support

Advance digital technology through partnership and sponsored research

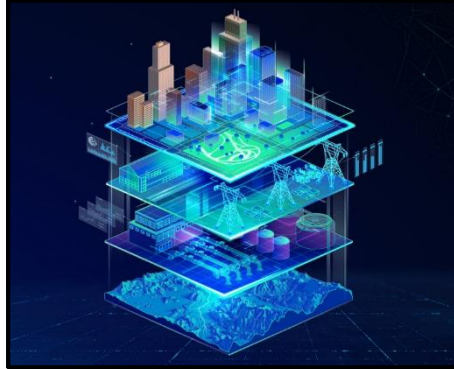


Vision for Lincoln Digital Engineering

**Real-Time Data Access
and Configuration
Management**



**Collaborative Cross
Domain Modeling And
Simulation**



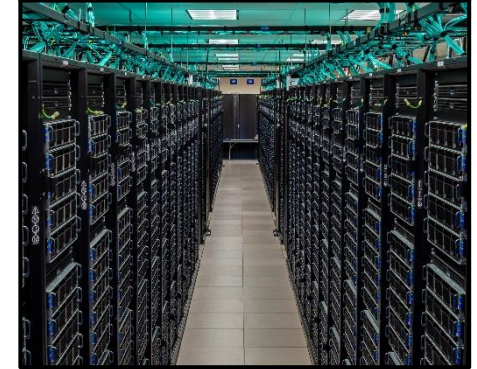
AI/ML Technologies



Visualization Tools



Super Computing



Integrated DE Ecosystem

Data Driven Decision Making

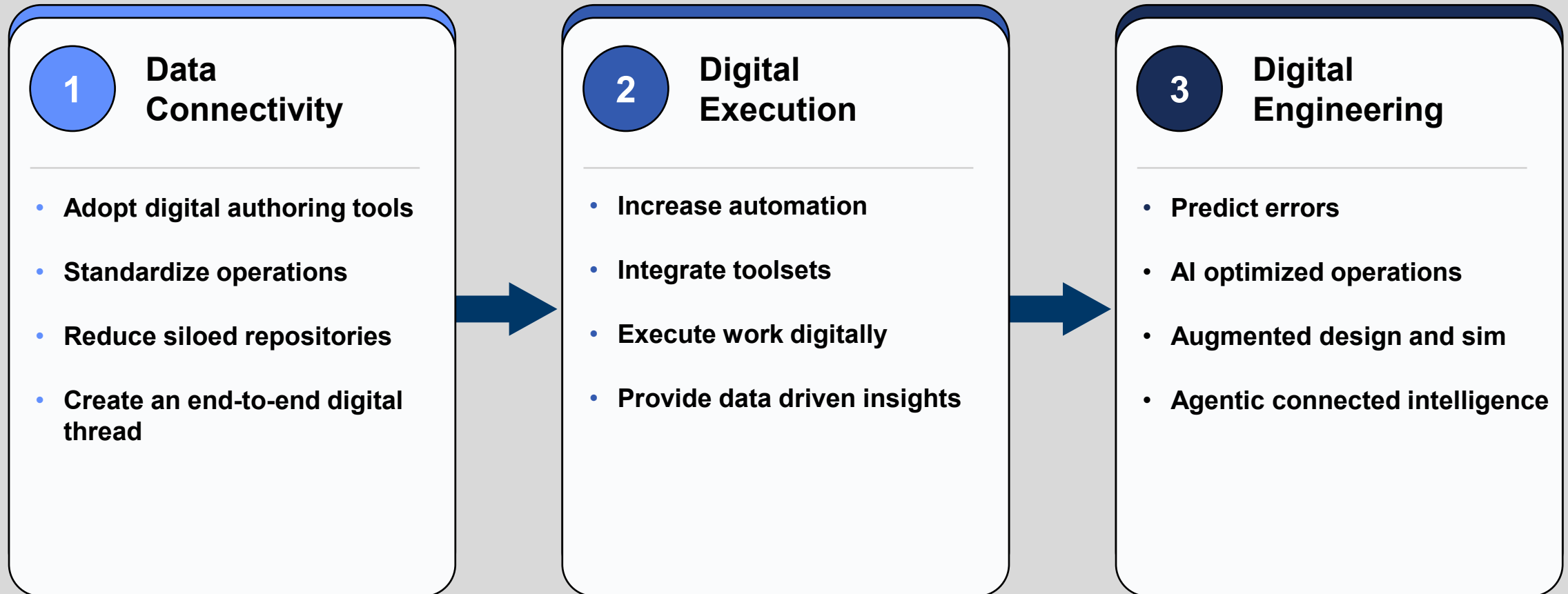
Connected, Source of Truth

Collaborative Execution

High Quality Prototypes, Dynamic, Accelerated Execution

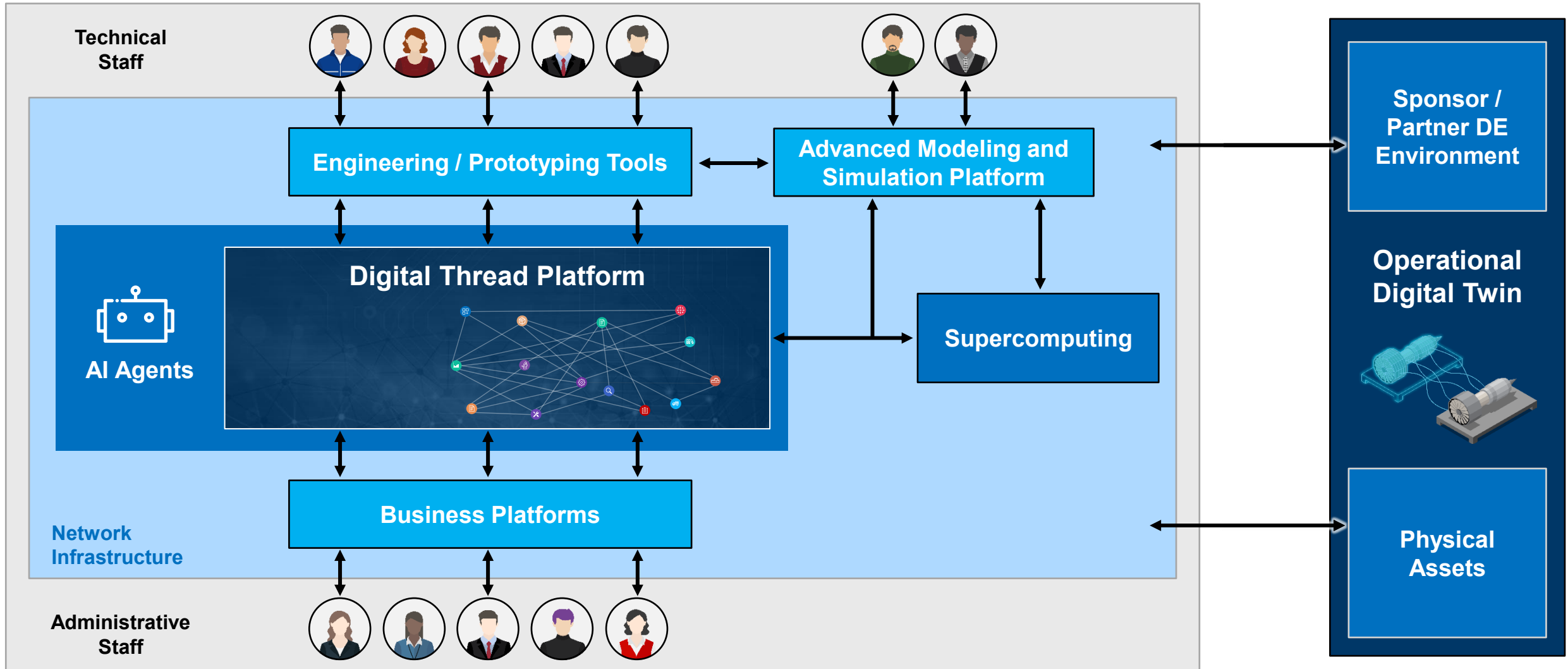


Transformation Goals





Digital Engineering Ecosystem





Structure First Intelligence Follows



The challenge:

Processes varied program to program — making it difficult for AI to learn what good looks like

The approach:

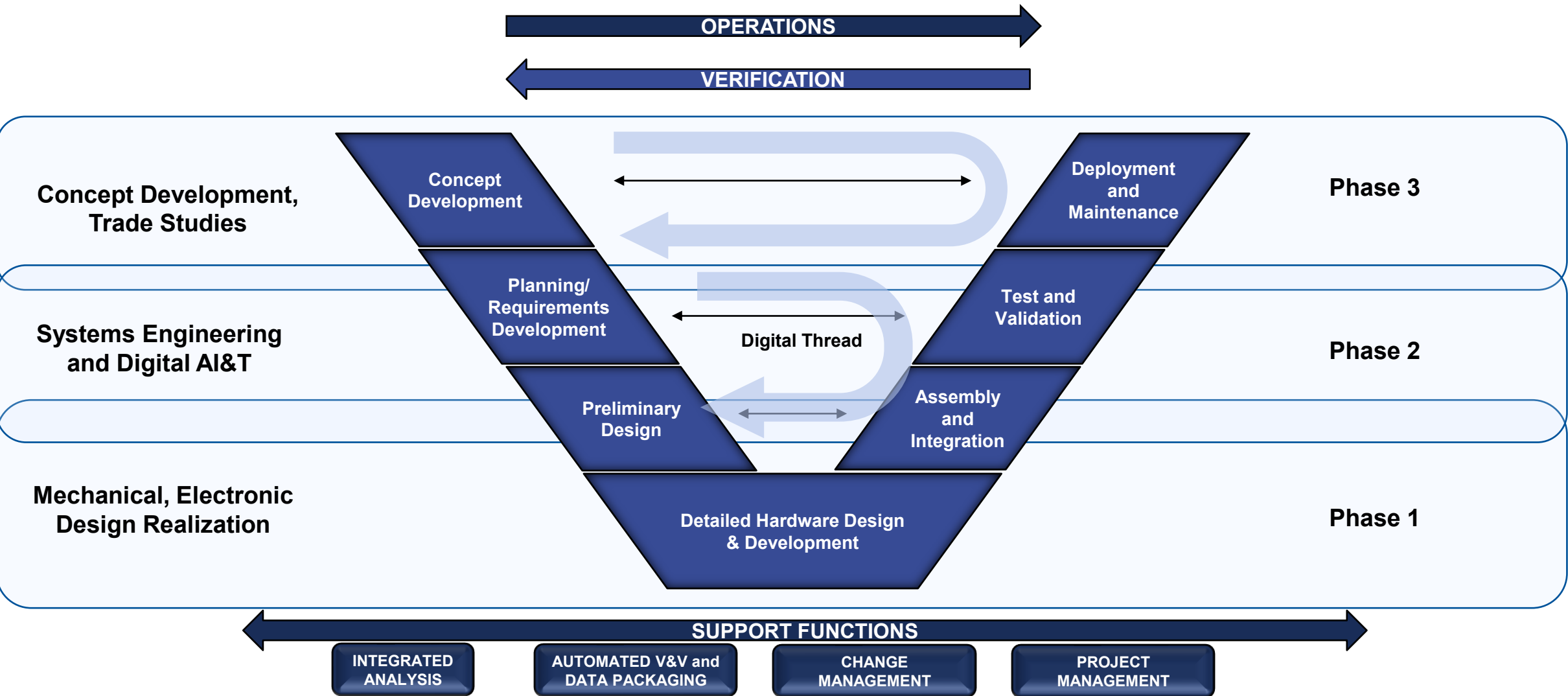
Aras is digital twin of the work itself, using the modeled digital thread as the structured pattern AI learns from

The result:

As context is continually added to the thread, the AI-ready foundation grows stronger with every program

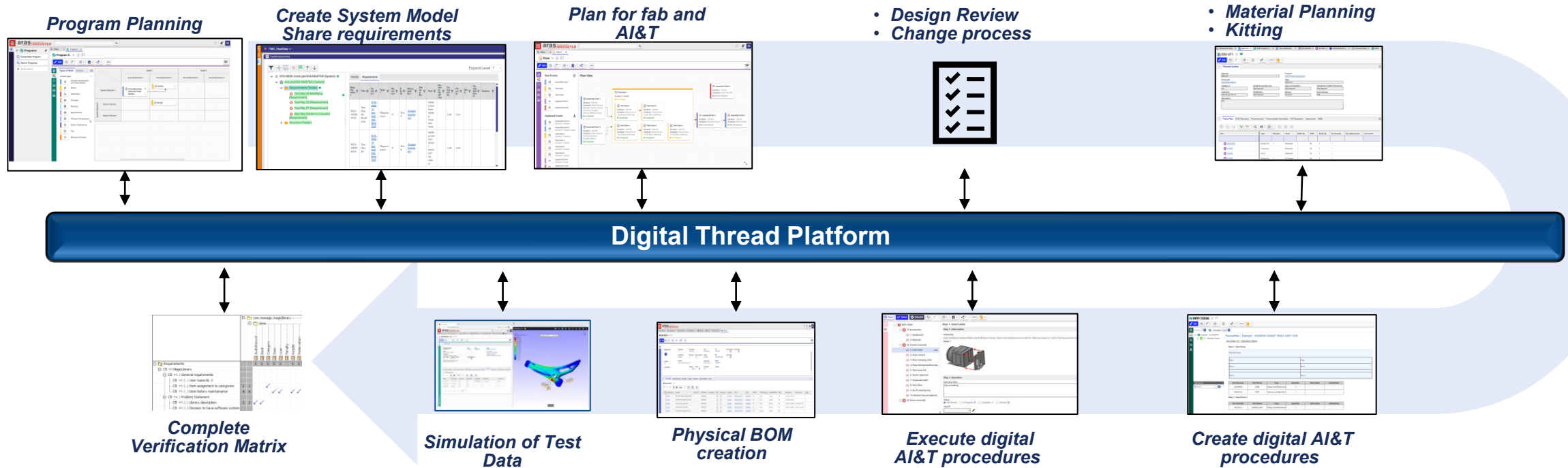


Digital Thread Implementation Strategy





Systems Engineering Lifecycle

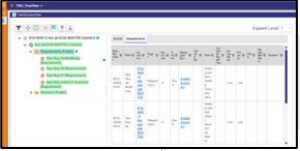


- Data created in all aspects of design reused for assembly and test procedures
- Digital procedures break down information for reuse
- Complete thread from requirements to completion

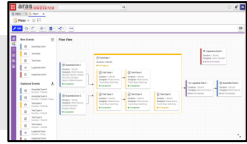


Design Engineering Lifecycle

Create System Model
Share requirements



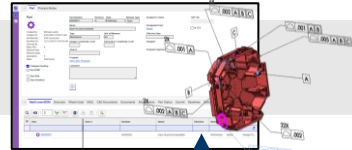
Plan for fab
and AI&T



Integrated
modeling and
simulation



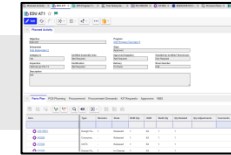
• **Create CAD / Part**
• **Fully-annotate Model**



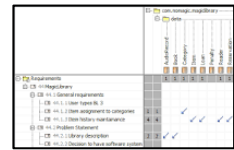
• **Design Review**
• **Change process**



• **Procurement**
planning



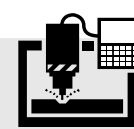
Digital Thread Platform



Complete
Verification Matrix



• **Inspect with Model**
• **Report/ disposition defects**



• **Model Access**
• **CAM with Model**



• **Create ERP**
material and order

- **Linkages and workflows for design to fabrication more streamlined**
- **All users have access to thread as needed and create new threads**
- **Data captured and organized**



Building Patterns on a Consistent Datamodel

Flexible, Extensible Underlying Data Model

Every item in the system is built on the same foundational data model
System is easily extensible



System model of PLM platform is extracted - data structures, relationships, and workflow complexity becomes visible, and informs decision making

*Entire data model is able to be extracted and navigated
Important for AI because we teach on the data model rather than the data*

Operational Experience through Familiar Interfaces

REUSABLE INTERFACES BUILT ON CONSISTENT DATA MODEL

Flow Charts

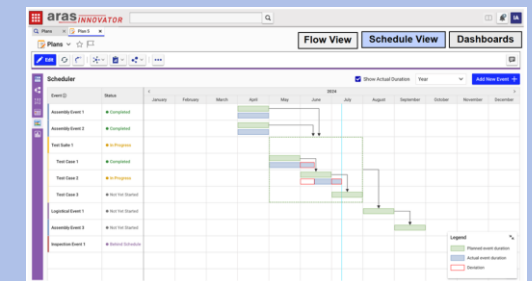
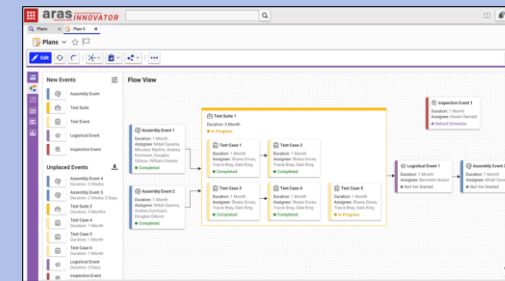
Rich Text Editors

Editable Grids

Schedules

Kanban Board

Checklists



*Users can easily understand applications through familiar, connected interfaces.
Interfaces are reused throughout system*

PLM becomes a human and machine-readable system.



Context Enrichment

Enriching the Record

HOW CONTEXT ENTERS THE THREAD

Photo

Video

Voice-to-Text

Barcode

Direct Connectors

Indirect Connectors

Example: Reading an assembly procedure tells you the steps. A video capture shows how it was actually done.

Deeper Context in the Thread

WHAT INSIGHT ITEMS CAPTURE

Design Rationale

Lessons Learned

Organizational Knowledge

Decision Points

Risk & Trade-off Notes

Anomaly Explanations

Example: You have the procedure and the video — but only an Insight Item explains why the team chose one approach over another.

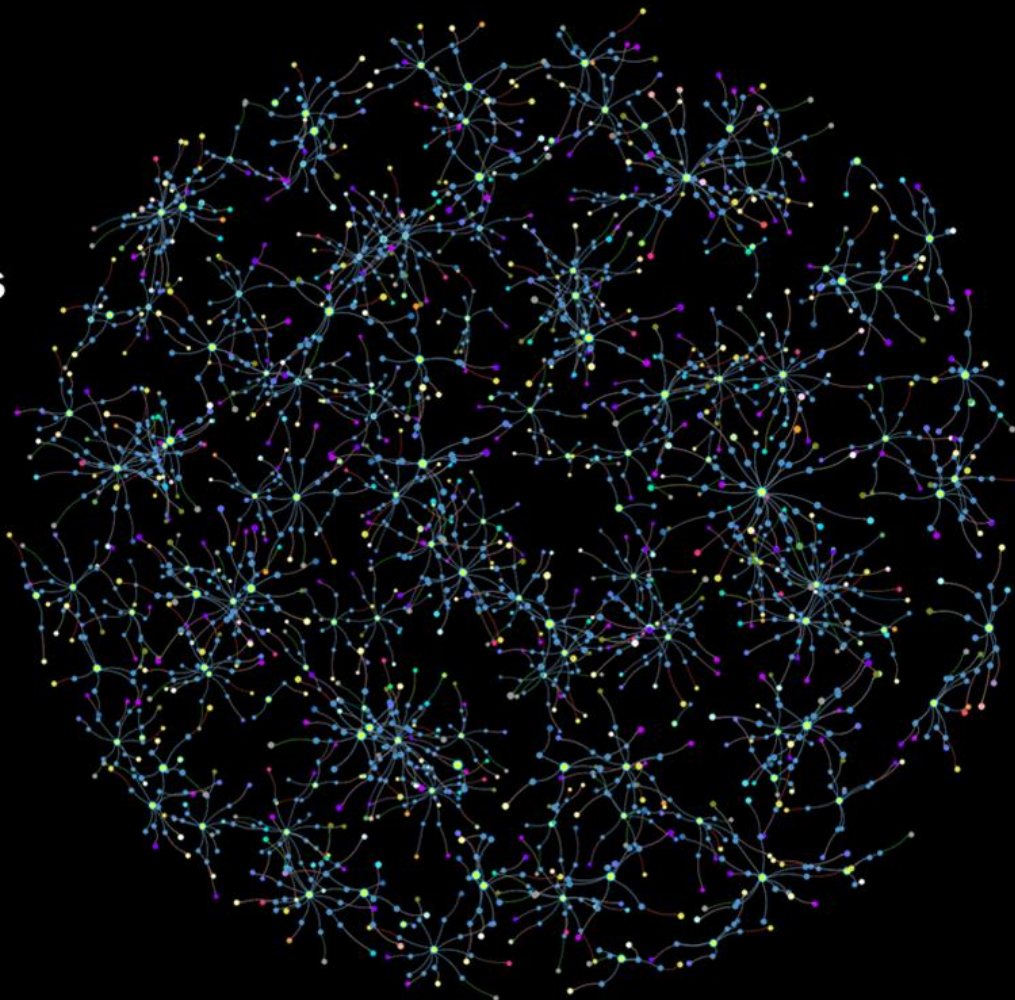
Together, these make the digital thread not just a record of what was done — but a foundation for understanding why.



Thread Growth

**AUGUST
2025**

**142 Programs
1.1 million Data Connections**



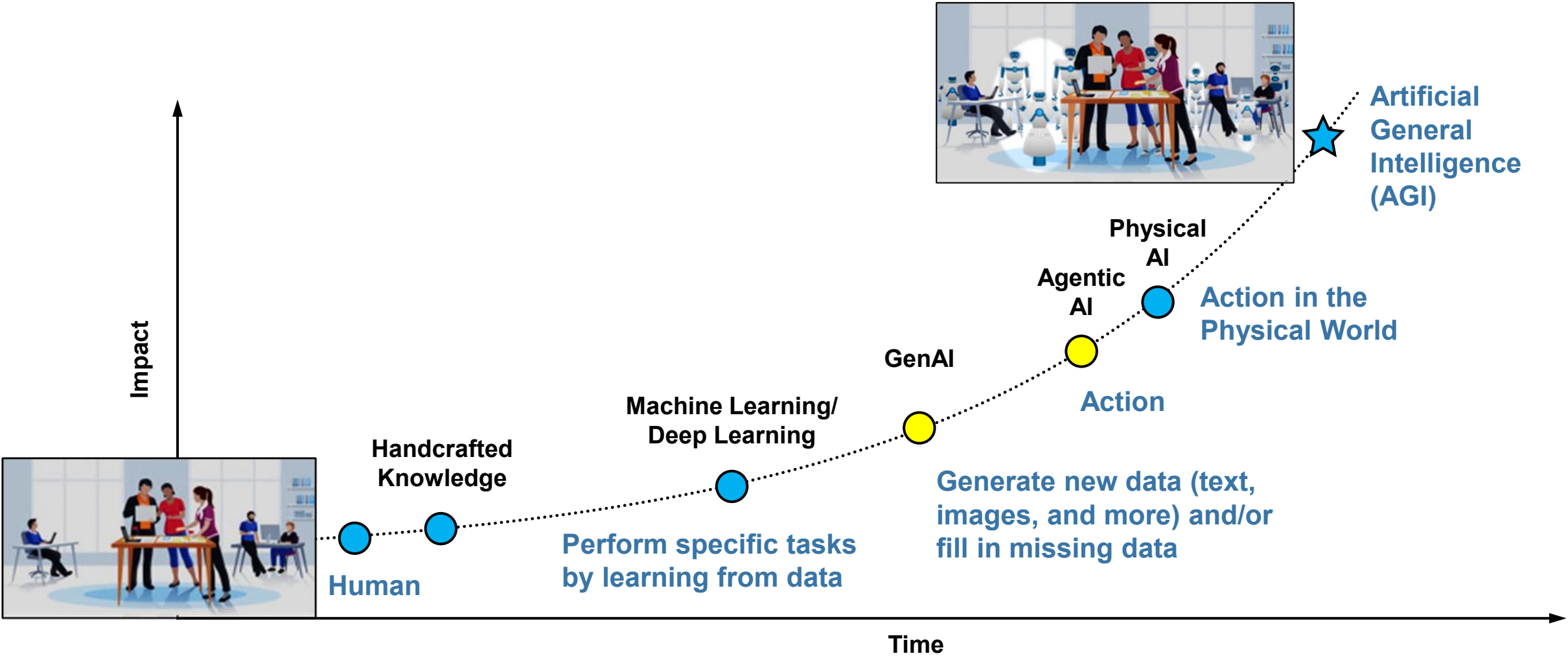


Outline

- **Digital Engineering and the Digital Thread**
- **Artificial Intelligence**

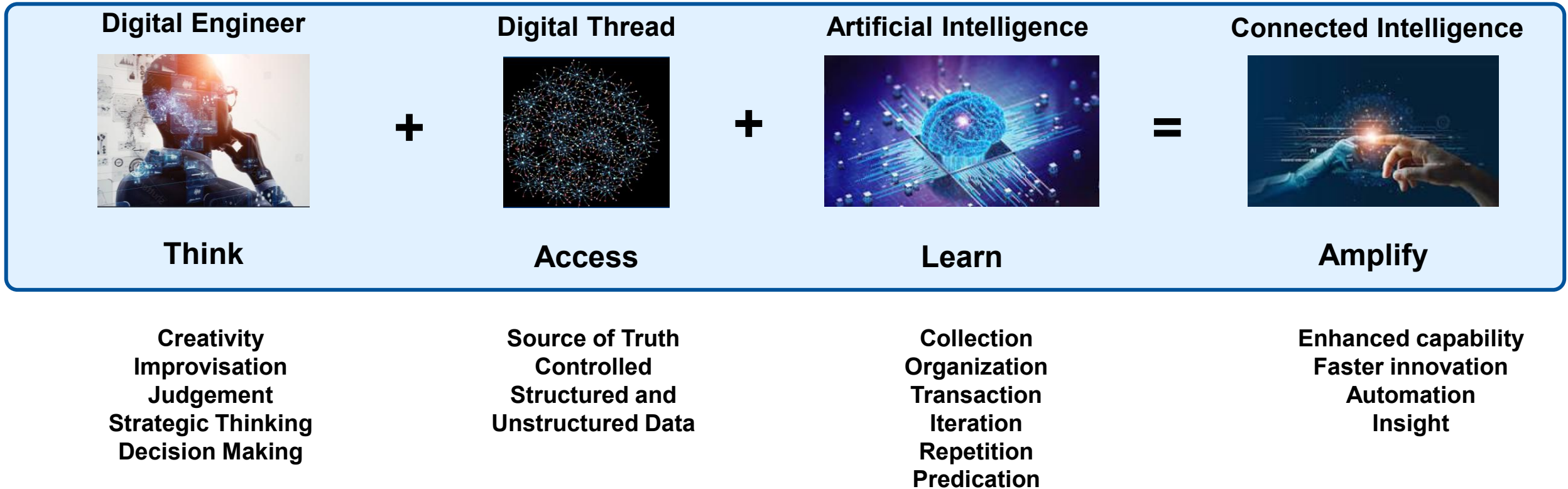


Artificial Intelligence Progress





Achieving Connected Intelligence





The Future Engineer – the Digital Engineer

Engineering Discipline	Estimated % of Tasks Automated	What Will Be Automated	What Will Still Need Humans
Software Engineering	50–70%	Code generation, unit testing, debugging, low-complexity feature builds, documentation	System architecture, product vision, complex problem-solving, security oversight
Mechanical Engineering	40–60%	CAD modeling, design iteration, simulation setup, design validation, BOM generation	Concept design, physical prototyping, failure diagnosis, multidisciplinary innovation
Electrical Engineering	35–55%	PCB layout, circuit simulation, signal integrity checks, basic firmware generation	Real-world system integration, complex analog design, EMI/EMC resolution

- **Human-AI partnership**
- **Engineers in strategic roles**
- **Conductors rather than performer**
- **Interdisciplinary skills and tools**
- **Collaborative, platform centric work**
- **Access to broad datasets**



Foundation of the Extendable AI framework

Unifying Diverse Capabilities

Cross platform discovery

**Integrated with staff insights,
training, standards**

Example Prompts

“Find all of the parts on my program that have not been ordered for the space build.”

“Have any other Programs had issues with these parts”

“Order them”

Human Ingenuity Amplified Through Connected Intelligence

Optimized M&S

Analysis of large datasets

Example Prompts

“Find designs for optical windows over 6 inches in diameter”

“Change the thickness to .5 inches”

“Run the simulation and output the scatter in my assembly”

Enabling Context-rich Technology Transfer

Lessons learned synthesis

Automated documentation generation

Example Prompts

“Generate a tech transfer package for this assembly including procedures and open risks.”

“Create the as-built and flag deviations from the original design intent.”



Lessons Learned

- **It's taken almost 10 years to digitize**
 - **Changes in Lincoln processes and tools**
 - **Waiting for technology to be available**
- **Commercial AI technology is developing faster than tool manufacturers can integrate it**
 - **Exposes challenges with upgrade methodologies**
- **There is a lot of bad data**
- **Many engineers are skeptical of AI (they aren't wrong)**
 - **We chose benign applications to start**



Questions

SCAN THE QR CODE!

Please give me feedback
on my presentation!

