Digital Engineering Ecosystem(DEE) as a Service: Revolutionizing Data Interoperability

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Presenters Bio

- **Roshan is part of NG's Future Technical Leader Program(Class of 2026) and has been interning and working for Northrop since 2020. He has served various positions within NG such as Lead Developer to implement Augmented Reality on a large-scale radar program, product lead for an asset tracking solution for material and inventory, and various leadership roles for the Digital Transformation Office (DTO) Shop Floor Augmented Reality Team. His most recent assignment was serving as a Technical Integrations Deputy/Product SME on a large government contract delivering a digital engineering environment. Roshan's current assignment is as the deputy responsible engineer for a Network and Field Services Products Engineering Group within the Defense Systems Sector. He has won company awards for his work on Augmented Reality. He has a B.S., in Industrial and Systems Engineering and M. Eng in Management Systems Engineering from Virginia Tech.**

- **Joe has over 20 years in Digital Engineering with a broad range of architecture, product research & design, development, business/systems process integration, new product introduction, IT Operations and business development experience. For the past 15 years, he has held various technical and PM leadership positions at Northrop Grumman implementing enterprise scale digital system solutions for NG and external customers and he and his teams have won various industry and Company awards. He is currently a Sr. Systems Engineering Manager within NGDS' Strategic Deterrence Systems division after serving on a large government program as the Product Manager/Owner working on a cloud-based digital systems of systems environment. Prior to joining NGC, Joe worked in various technical leadership roles to management positions for companies such as Andersen Consulting, Deloitte Consulting and various technology or tech start-ups. He is a certified Scrum & SAFe practitioner. Joe graduated from UCSD.**

Presentation Overview

- Problem Space and Strategic Importance
- Understanding Digital Ecosystems
- DEE Lifecycle and Strategies
- Real World Examples and Lessons Learned

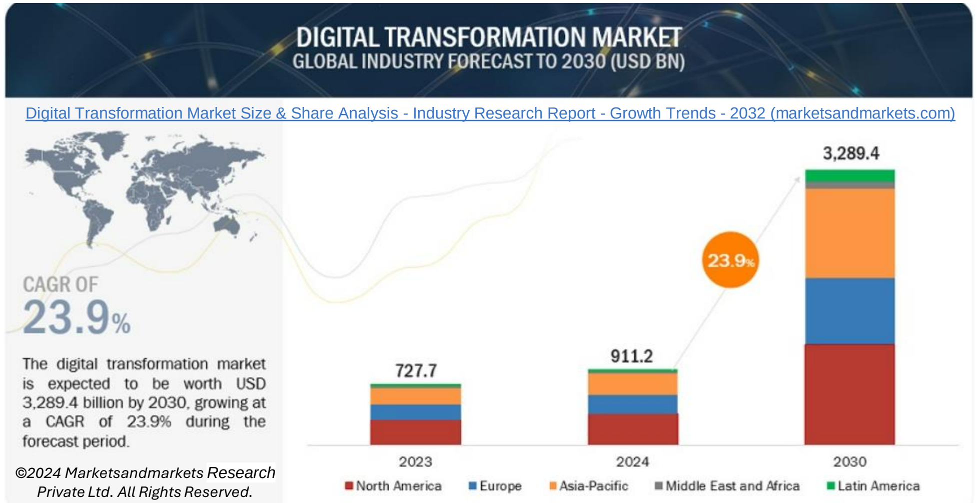
> **"…This 'digital trinity' – digital engineering and management, agile software [development] and open architecture – is the true successor to stealth…"**
>
> **Hon. Will Roper, There is No Spoon: The New Digital Acquisition Reality**

Problem Space and Strategic Importance

THE PROBLEM

- Disparate engineering tools and platforms leading to siloed data
- Difficulty in integrating legacy systems with modern digital solutions
- Complex security and compliance requirements
- Challenges in maintaining consistent data standards and models across projects

THE OPPORTUNITY



THE SOLUTION

Digital Engineering Ecosystems(DEE) provide a **centralized, innovative** solution to overcome siloed data, integrate legacy systems, and maintain consistent data standards. By utilizing **modular, interoperable services**, the ecosystem ensures **engineering efficiency, seamless collaboration** and **execution of a model-analyze-build philosophy**.

What is a Digital Engineering Ecosystem?

DoD 5000.97

A Digital Engineering Ecosystem is an **interconnected** framework of digital tools, models, processes, and data that **supports the entire lifecycle** of defense systems.

DAU Glossary

The interconnected infrastructure, environment, and methodology (process, methods, and tools) used to store, access, analyze, and visualize **evolving systems' data and models** to address the needs of the stakeholders.

A service is a self-contained unit of functionality that performs a specific task and can be independently deployed, managed, and interacted with.

What Makes up a Digital Engineering Ecosystem?

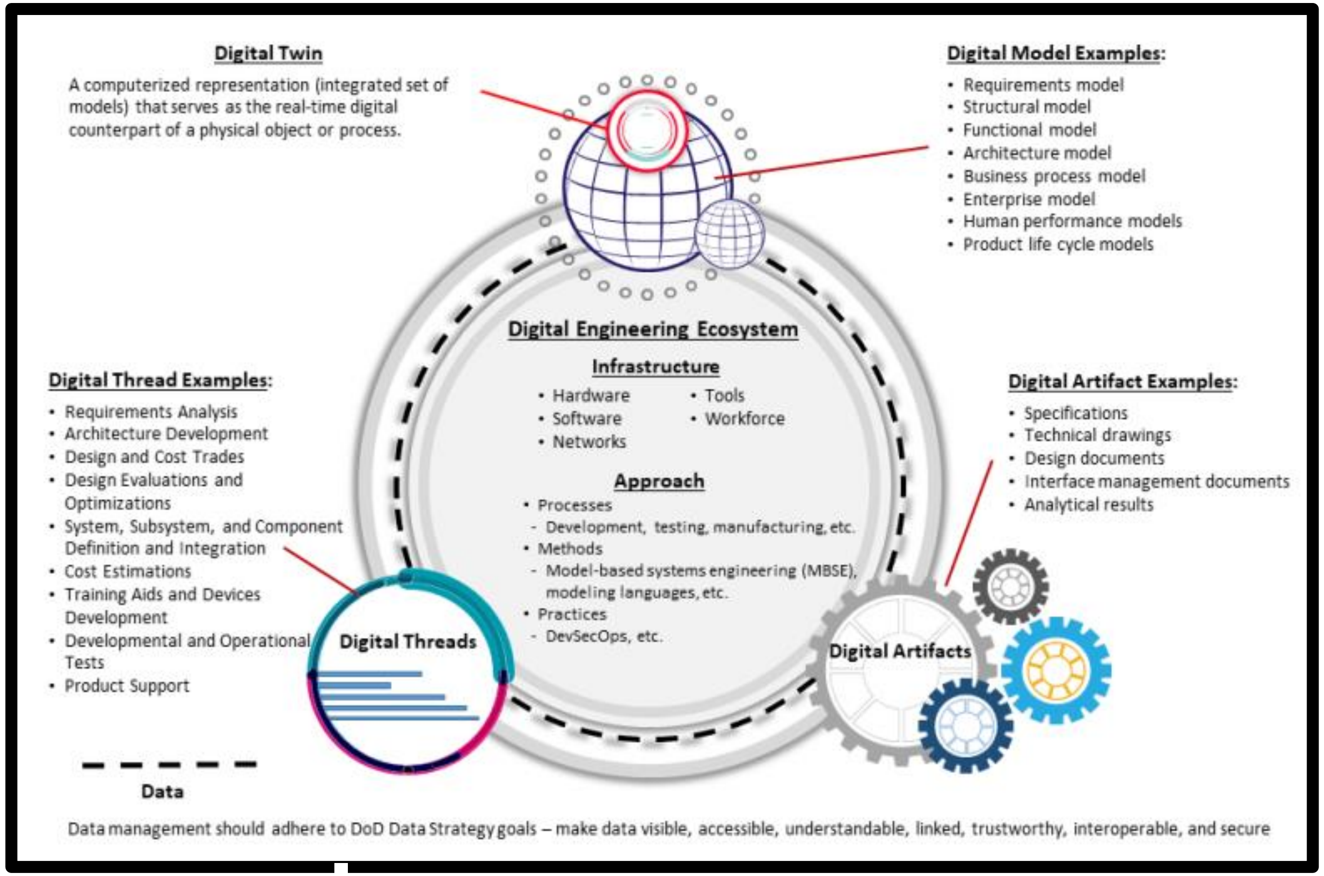


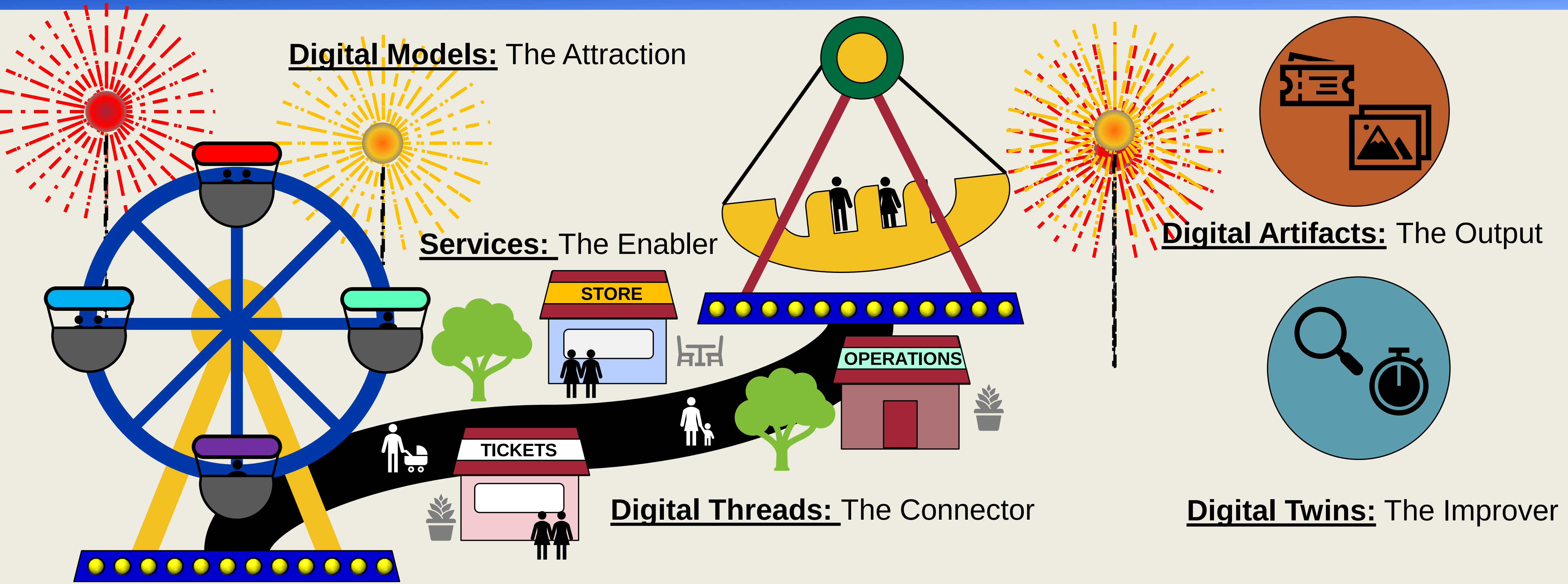
Image from DoDI 5000.97, December 21, 2023.

DoD Digital Engineering Framework

Digital Twins	Digital Models
Real-time insights for monitoring and decision-making	**Communication for system information and design**

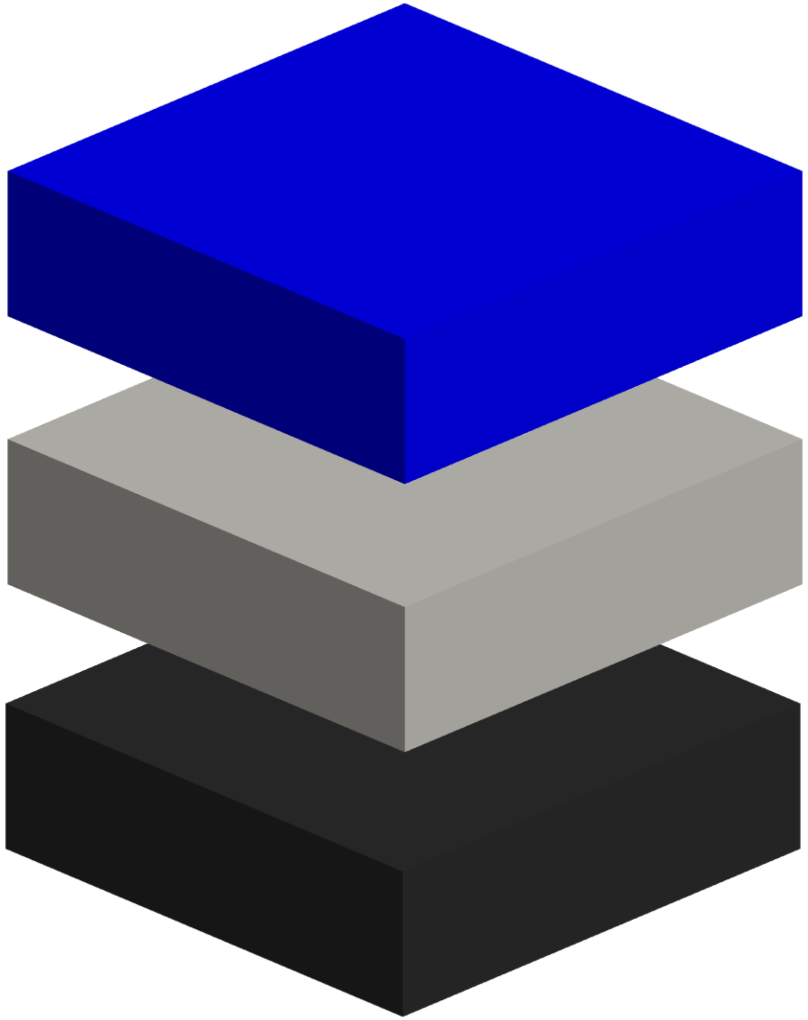
Digital Threads	Digital Artifacts
Connect product lifecycle for data integration and seamless flow of information	**Verification documentation and traceability for product development**

DEE as an Amusement Park



Services are the enabler for these key components, user experience, and ultimately the Digital Engineering Ecosystem

Services as the Foundation for the DEE



Digital Engineering Ecosystem

- Interconnected framework of digital tools, models, processes, and data that supports the entire lifecycle

Key Components

- Digital Models
- Digital Artifacts
- Digital Twins
- Digital Threads

Services

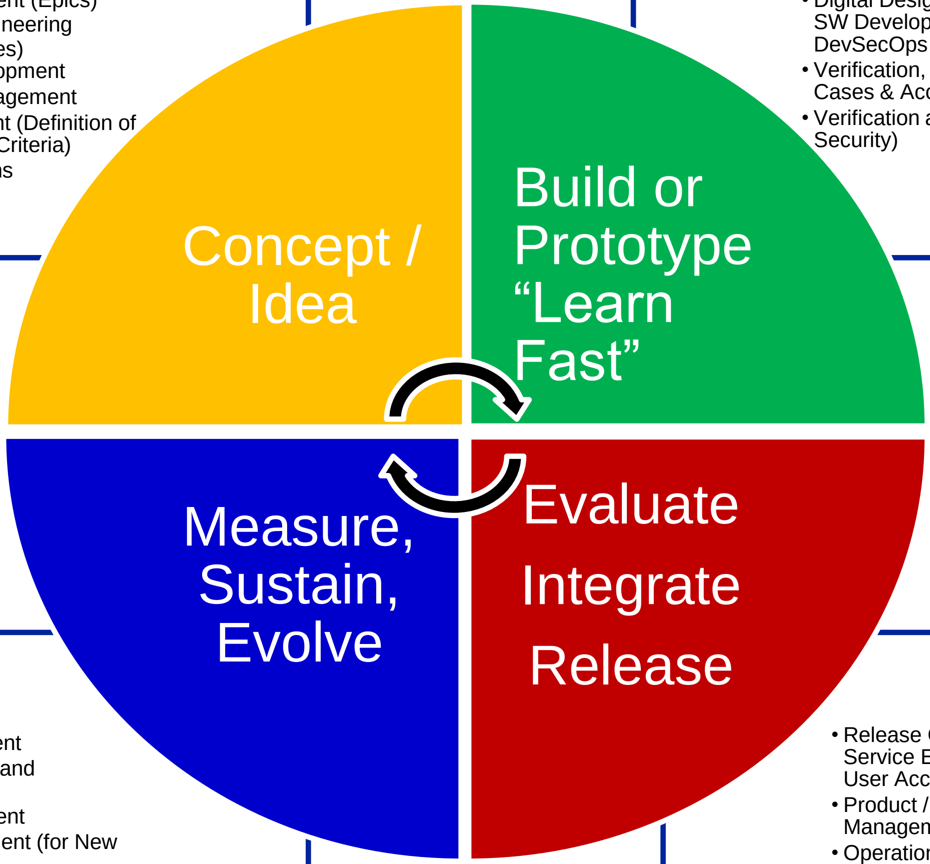
- Infrastructure
- Environments
- Products/Services
- Data

DEE Lifecycle & Strategy

Global Product Data Interoperability Summit | **2024**

- Service and Product Mission Engineering
- Product Management (Epics)
- Requirements Engineering (Capability, Features)
- Architecture Development
- Configuration Management
- Scope Management (Definition of Done and Sell-Off Criteria)
- Make/Buy Decisions

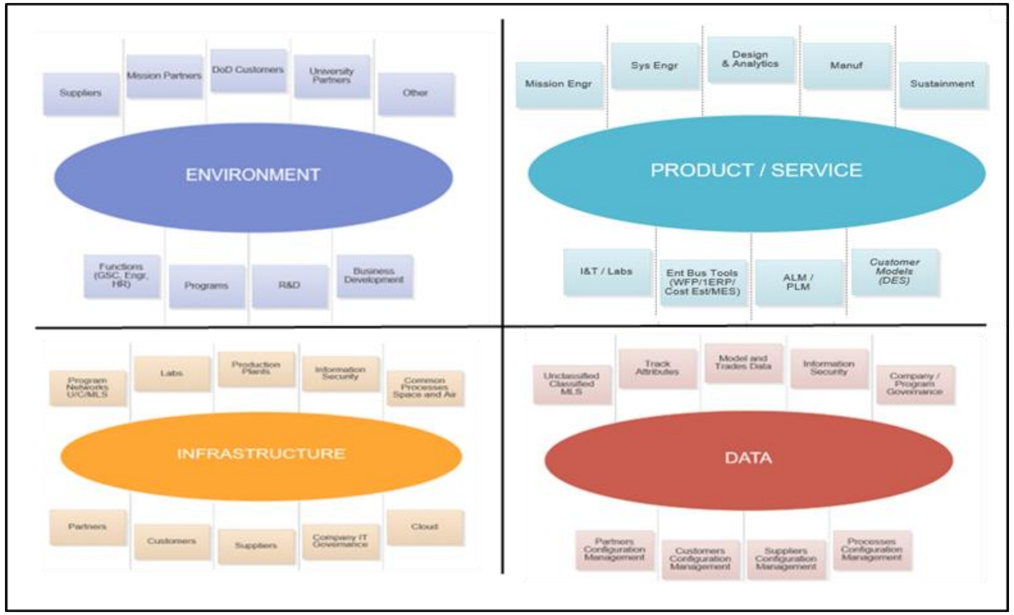
- Use Case / Feature development
- Software Acquisition
- Digital Design and Prototyping or SW Development leveraging DevSecOps (DSO)
- Verification, Validation Test Cases & Acceptance Criteria
- Verification and Beta Testing (inc. Security)



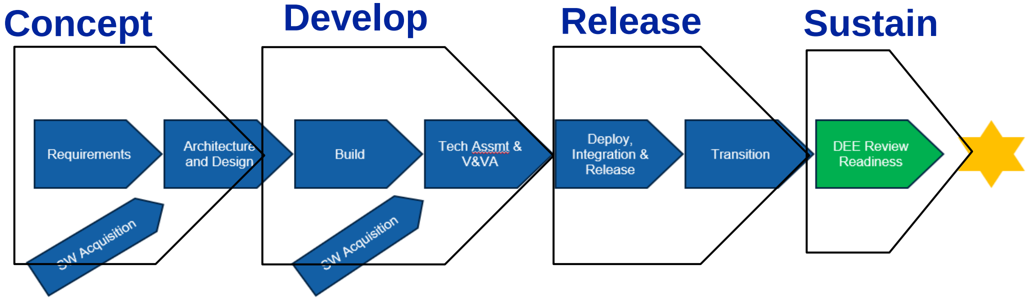
- Service Management
- Metrics Evaluation and Management
- Change Management
- Demand Management (for New Ideas, Updates)
- Product Management (Retire Products or Services)

- Release Candidate Products / Service Evaluation (Beta and User Acceptance Testing)
- Product / Service Release Management
- Operational Readiness
- Updated Technical Documentation and Platform Configuration

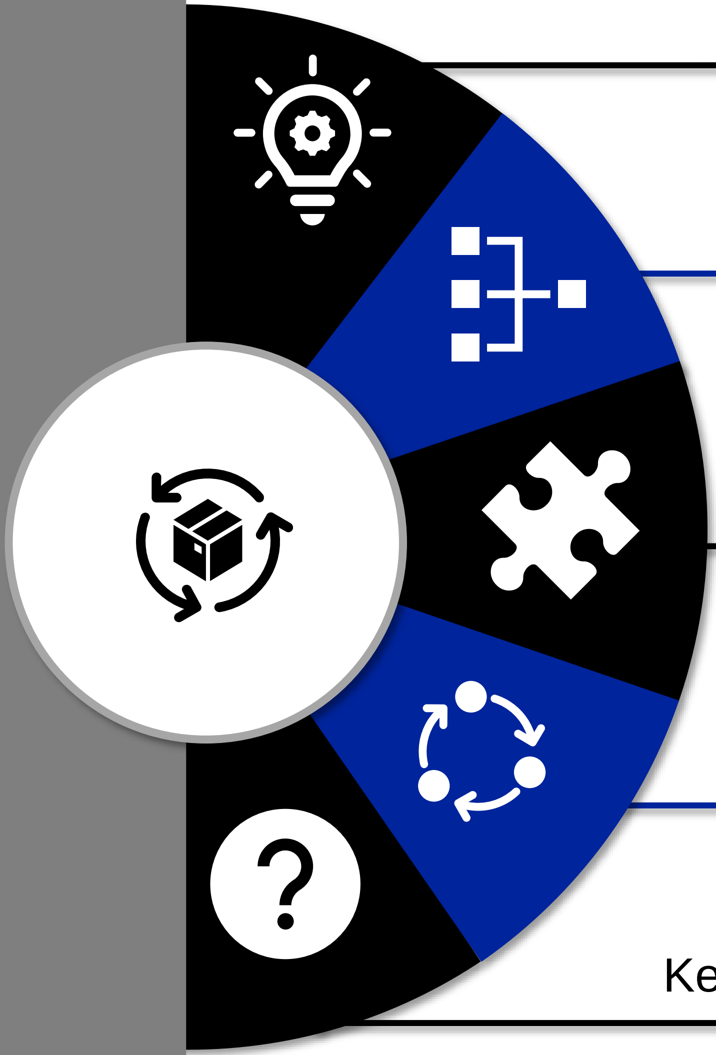
DEE Building Blocks



High-Level Roadmap (*per Epic)*



DEE Lifecycle and Strategy – Some Thoughts From the Trenches



Key Takeaway — SW intensive, SW SDLCs work well *regardless of* leveraging Agile or Not

Unsung Enabler — Infrastructure Services (close second Cybersecurity and Access Services)

Key Strategic Question — Is incremental delivery, OK? (Impacts Time to Market)

Key Tactical Question — What level of Quality is acceptable (per release)? (Impacts Tech or Service Debt)

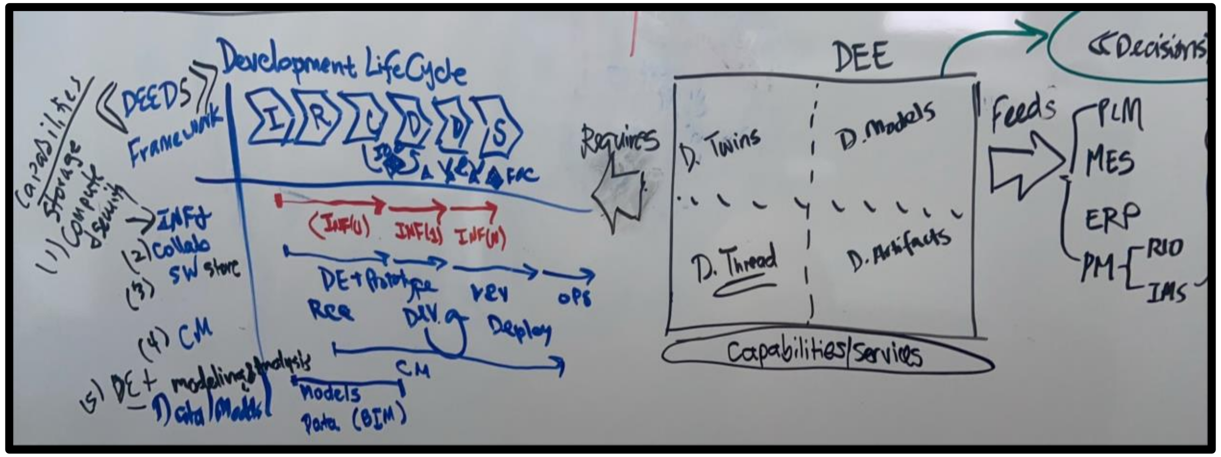
Key Exit Criteria Question — What is the definition of done & Acceptance Criteria for Product/Service? (Impacts Sell-off & Release Strategy)

DEE Lifecycle and Strategy – Services, Training, and Support

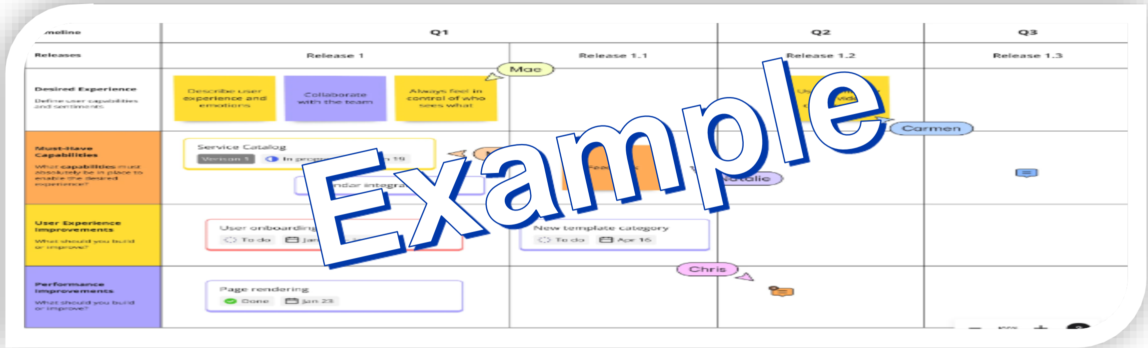
Execute During **Release** and **Sustain** Phases of SLC

Culmination of Services Development, Organization and Management Activities

Key Success Factor: Implement a Seamless (or at least consistent) User Experience to DEE products and Services



On Joe's Drawing Board



Program Increment Implementation Artifact

Real World Examples

Company 1

- Flexible open architecture
- Cloud/On Prem Implementation
- Expert Evaluation and Support
- Managed and Maintained by Company

Company 2

- Integration and Interoperability
- Focus on collaboration(partner and external)
- Common set of tools and applications
- Service Model

Others

- GOCO Implementations
- Mission Engineering and Multi-Disciplinary Analysis of Alternatives
- PM&P and standards KM
- MRB & NC Processing

Closing Thoughts- The DEE as Service Future

PRIORITIZE DIGITAL EARLY

If the program or effort has already start, there is a massive amount of tech and service debt to realign and catch up.

DON'T FORGET ABOUT SERVICES

Services are the enabler for the successful implementation and adoption of a DEE. Maintenance and prioritization are key.

CROSS FUNCTIONAL TEAMS

IPT structure can lead to siloes and challenges. Consider cross functional, collaborative teams.

STAY INNOVATIVE

Stay up to date with current tech trends and look to incorporate them into your DEE: AI, IoT, Quantum Computing, 5G.