An Element of Digital Engineering Practice in Systems Acquisition

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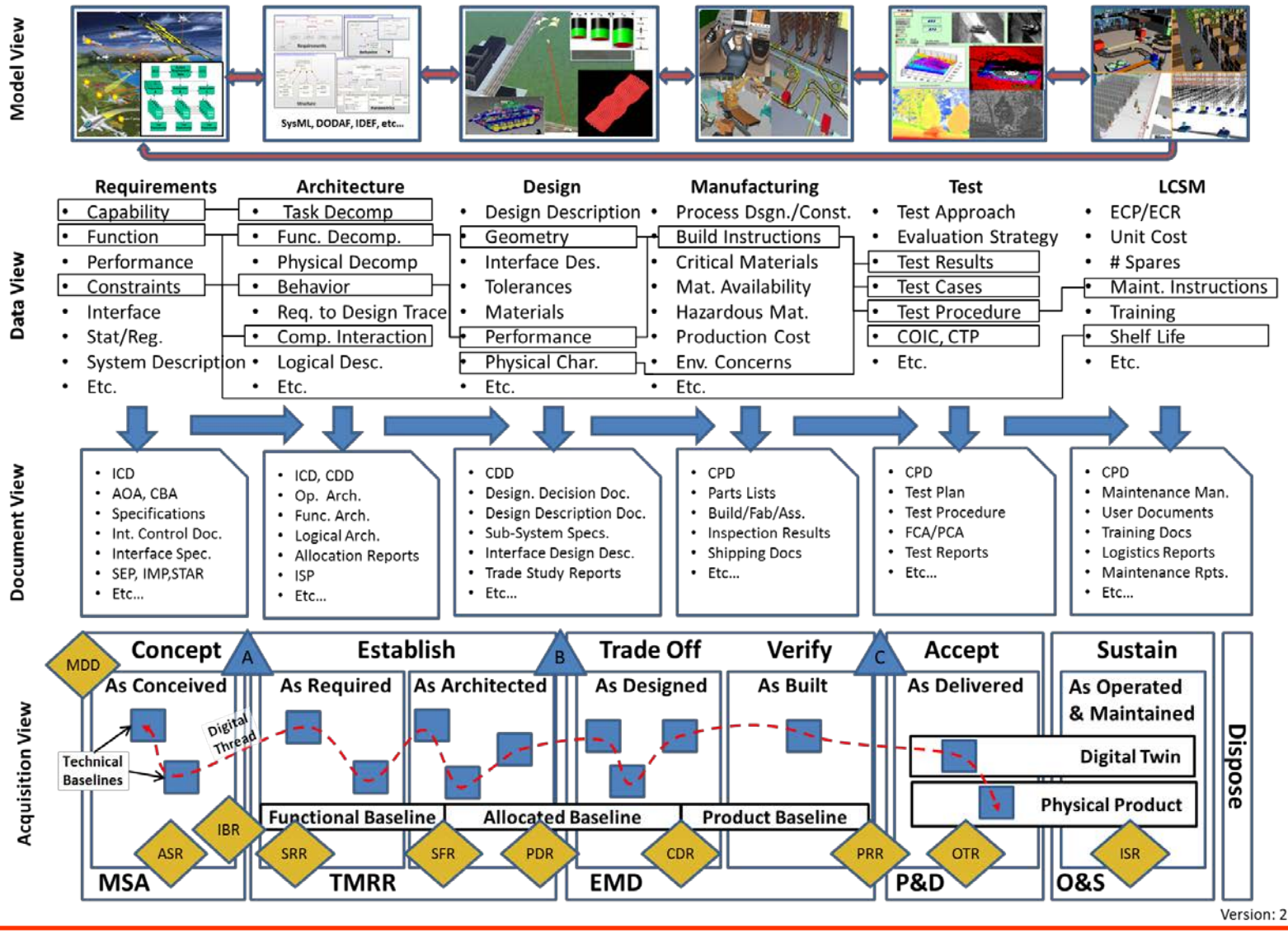
Transition to Digital Engineering – Generalized Acquisition Process



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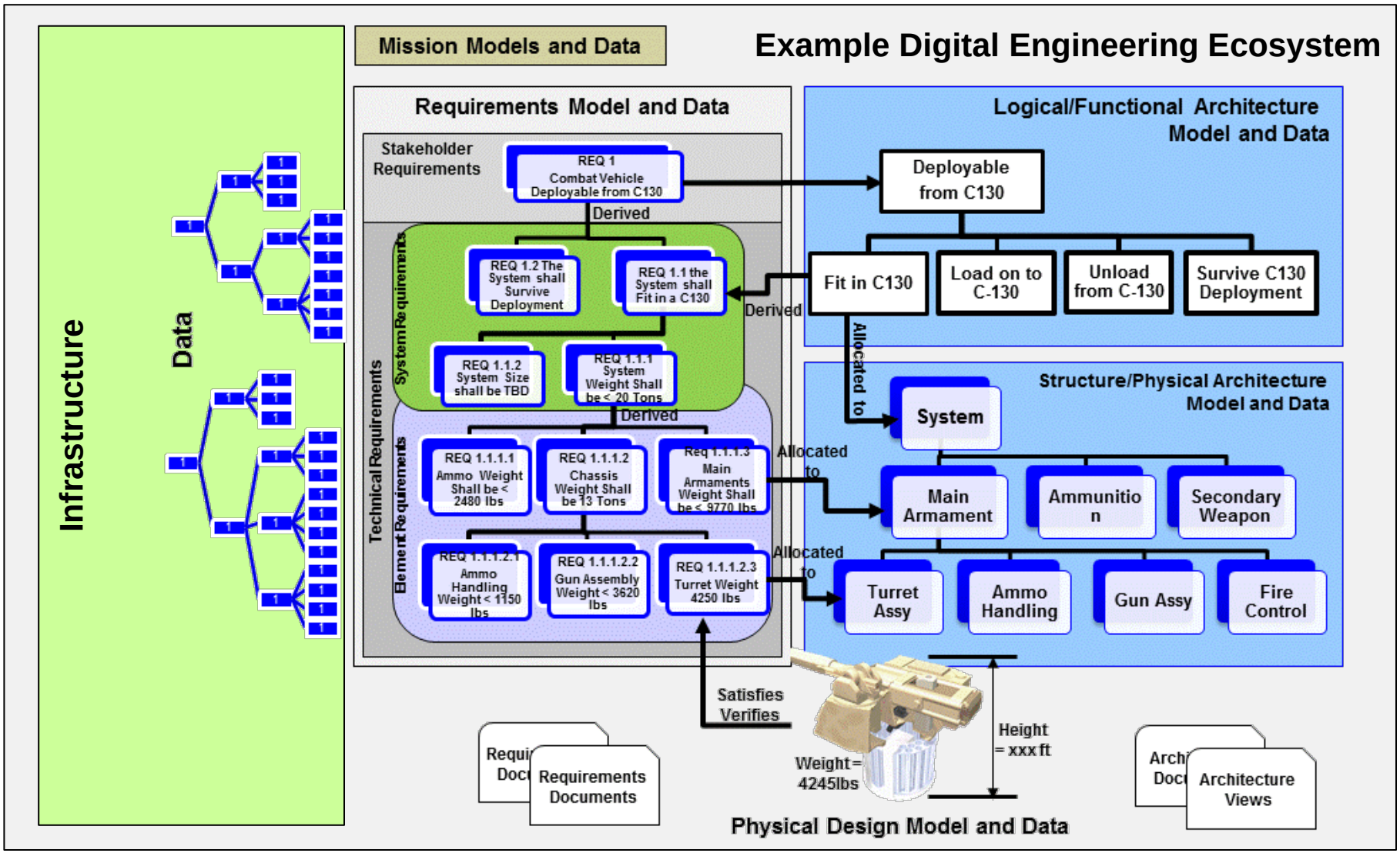
Digital Artifact Example



5000.02 Generic Acquisition Phases and Decision Points

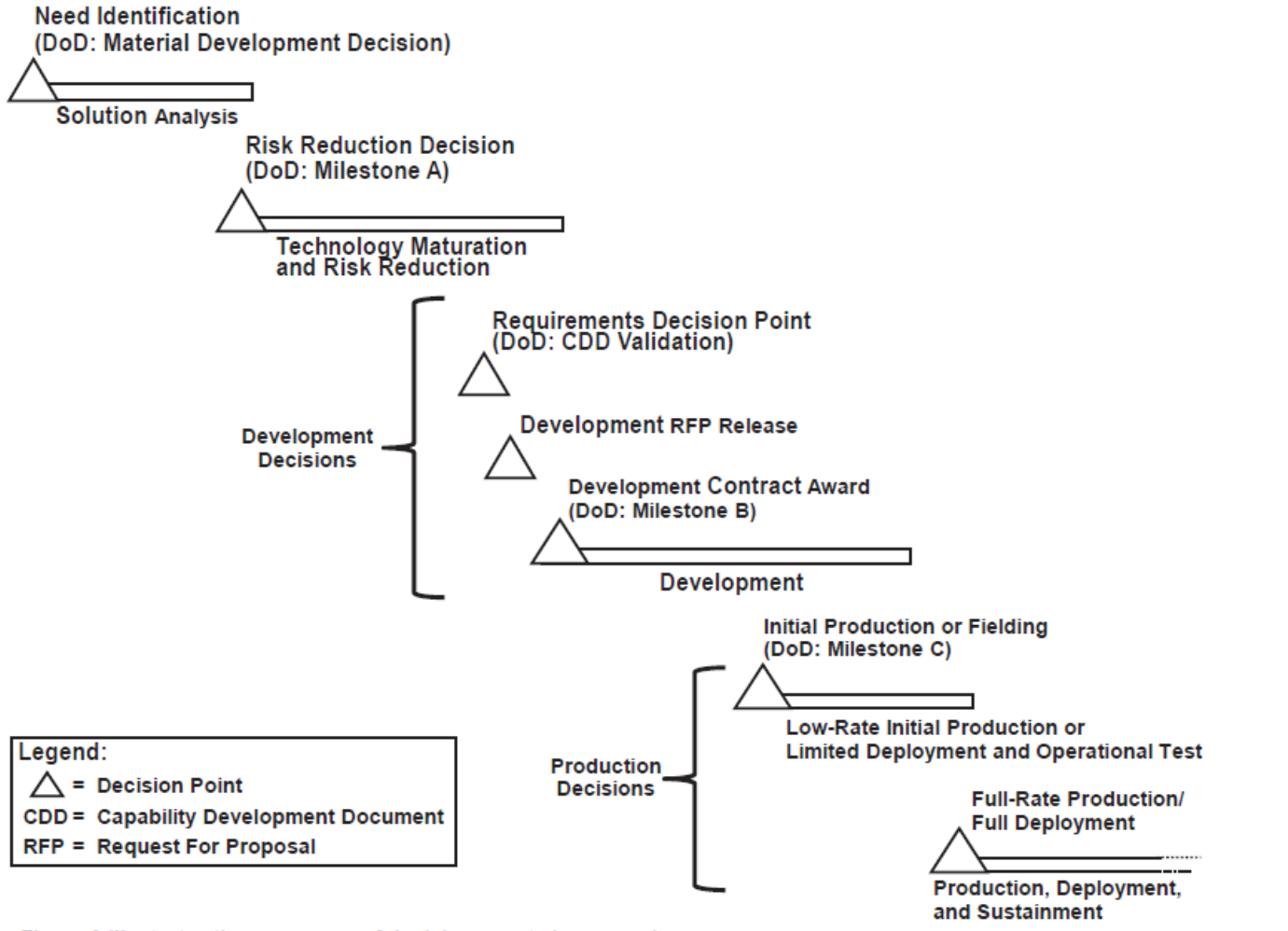


Figure 2 illustrates the sequence of decision events in a generic program. It is not intended to reflect the time dedicated to associated phase activity.

Adoption of ERS methods, processes, and tools provides for a data-drive decision process, and may reshape the linear acquisition process, allowing for informed tailoring of the process

Materiel Solution Analysis

DoD Entry Decision Point: Material Development Decision

- A new product is needed

Shift to Digital Methods, Processes and Tools can provide:

- Digital requirements set (a model), validated in operationally relevant situations (executable OMS/MP)
- Model-based information about the product ready for execution according to the AoA study guidance
- Expanded set of alternatives (in models) to be considered in cohesive trades between cost, schedule, performance, affordability, etc.
- Expanded set of alternatives (in models) able to be viewed by leading requirements/indicators for various viewpoints
- Digitally represented schedule (model) aligned to trades

Technology Maturation and Risk Reduction

DoD Entry Decision Point: Milestone A

- An investment decision to pursue a specific product or design concepts and commit the resources required to mature technology and/or reduce any risks

Shift to Digital Methods, Processes and Tools can provide:

- Immediate use of tools and artifacts from previous phase
- Data-driven risk mitigation strategies and decisions
- Executable prototypes based on physics and engineering
- Continuing trades between cost, schedule and performance
- Evolution of digital product description in data, algorithms and processes (model) – useful in IP/data rights deliberations
- Automated workflow alerts for later activities from design changes

Engineering and Manufacturing Development

DoD Entry Decision Points: CDD Validation Decision; Development RFP Release Decision; Milestone B

- Plans for a program are carefully reviewed for affordability and executability
- Commits an organization's resources to a specific product, budget profile, sequence of events, etc.

Shift to Digital Methods, Processes and Tools can provide:

- Immediate use of tools and artifacts from previous phase
- Evolving executable prototypes unambiguously reflecting design changes over time
- Digital design data (model) linked to cost assessment
- Accurate representations of product for use in test and eval
- Establishment of necessary data files for production

Production Deployment

DoD Entry Decision Points: Milestone C (Limited Deployment); Full-Rate Production Decision; IOC

- Based on developmental test results and for full-rate on operational test results to begin, and scale-up production and deployment

Shift to Digital Methods, Processes and Tools can provide:

- Immediate use of tools and artifacts from previous phase
- Understood evolution of product through lifecycle phases
- Understood manufacturability of end item (to include SW)
- Establishment of digital production base
- Easy shift from ‘as-designed’ to ‘as-built’ for future sustainment actions
- ‘As-built’ digital configurations provided PER item produced

Operations and Support

DoD Decision Points: (includes) Full Deployment; Disposal

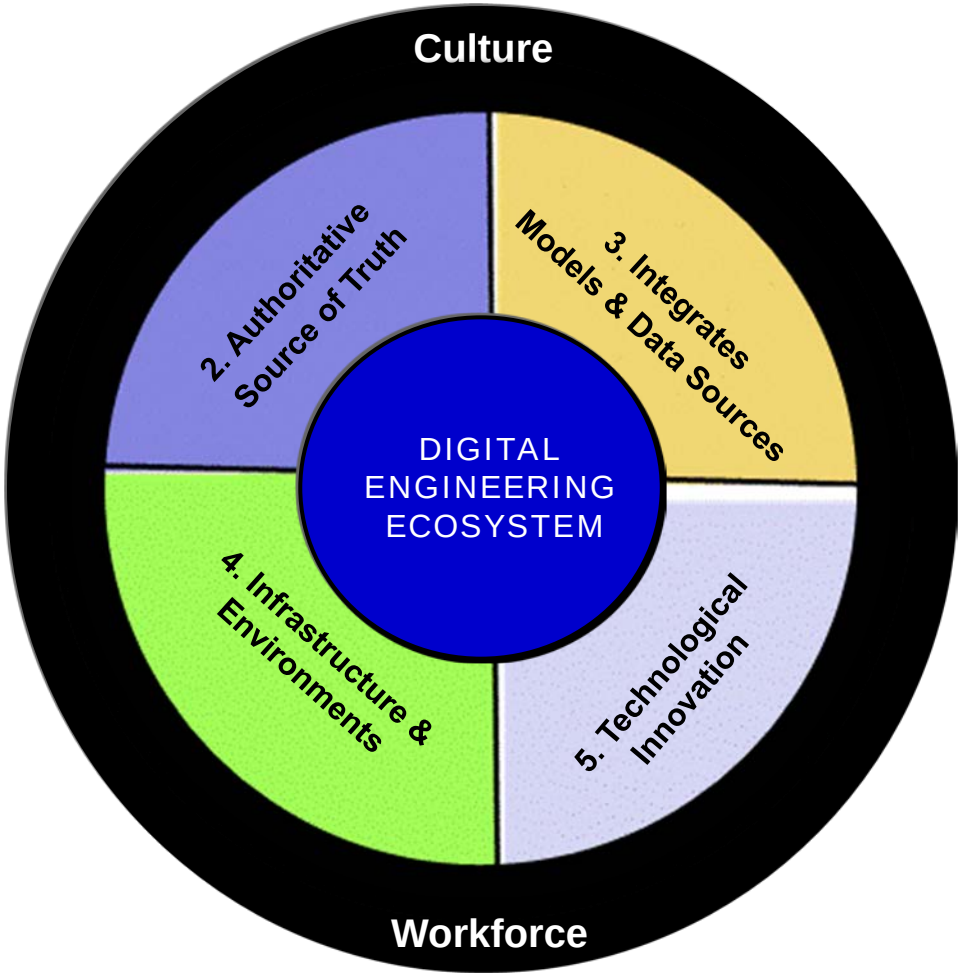
- Initiates (continues) all sustainment activities
- At the end of its useful life, a system will be demilitarized and disposed of in accordance with all legal and regulatory requirements and policies

Shift to Digital Methods, Processes and Tools can provide:

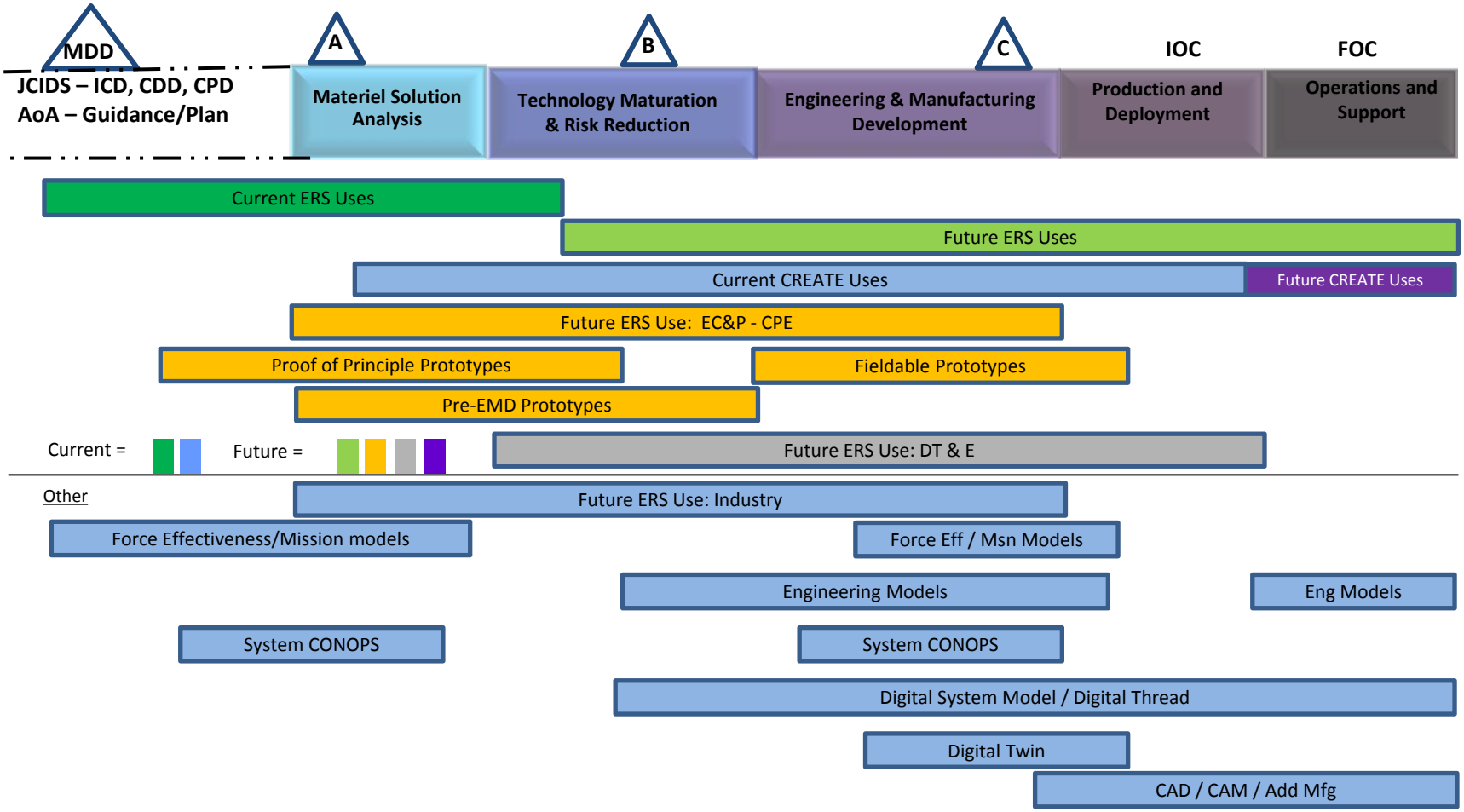
- Immediate use of tools and artifacts from previous phase
- Product support package built from digital descriptions
- Easily updatable technical data package for sustainment activities
- Accurate package of materials used in production and sustainment for disposal purposes

Digital Engineering Strategic Goals

1. Develop and maintain a ***culture*** and ***workforce*** that adopts and supports Digital Engineering across the lifecycle
2. Formalize development and use of models for providing an enduring ***authoritative source of truth***
3. Foster the integration of models and data sources across functional disciplines to inform enterprise and program decision making
4. Establish supporting ***infrastructure & environments*** to perform engineering activities, collaborate, &communicate across stakeholders
5. Leverage advanced tools, computing power, and advanced capabilities to improve system capabilities, automate workflow processes (as applicable) and generate digital artifacts and deliverables using models



Vision for ERS,CREATE & CPE (Draft)



Domains: Air (Fixed & Rotary), Surface, Subsurface, Ground, RF, Meshing, Geometry
Future Domains: Space, Hypersonics, Improved Turbine Engine, EW, Directed Energy, Others?

Final Perspective

- **Dimensions of Digital Engineering**
  - Spanning the acquisition process, compatible with business practice
  - Ensuring the validity of toolset, top-to-bottom
  - Covering domains and/or sub-domains

- **Challenging Questions**
  - Have we properly divided tasks between humans and computers?
  - Can a majority of design teams succeed?
  - How do we capture best practices without becoming overly dependent on the tools?

Systems Engineering: Critical to Defense Acquisition










Defense Innovation Marketplace
http://www.defenseinnovationmarketplace.mil

DASD, Systems Engineering
http://www.acq.osd.mil/se

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