An Element of Digital Engineering Practice in Systems Acquisition

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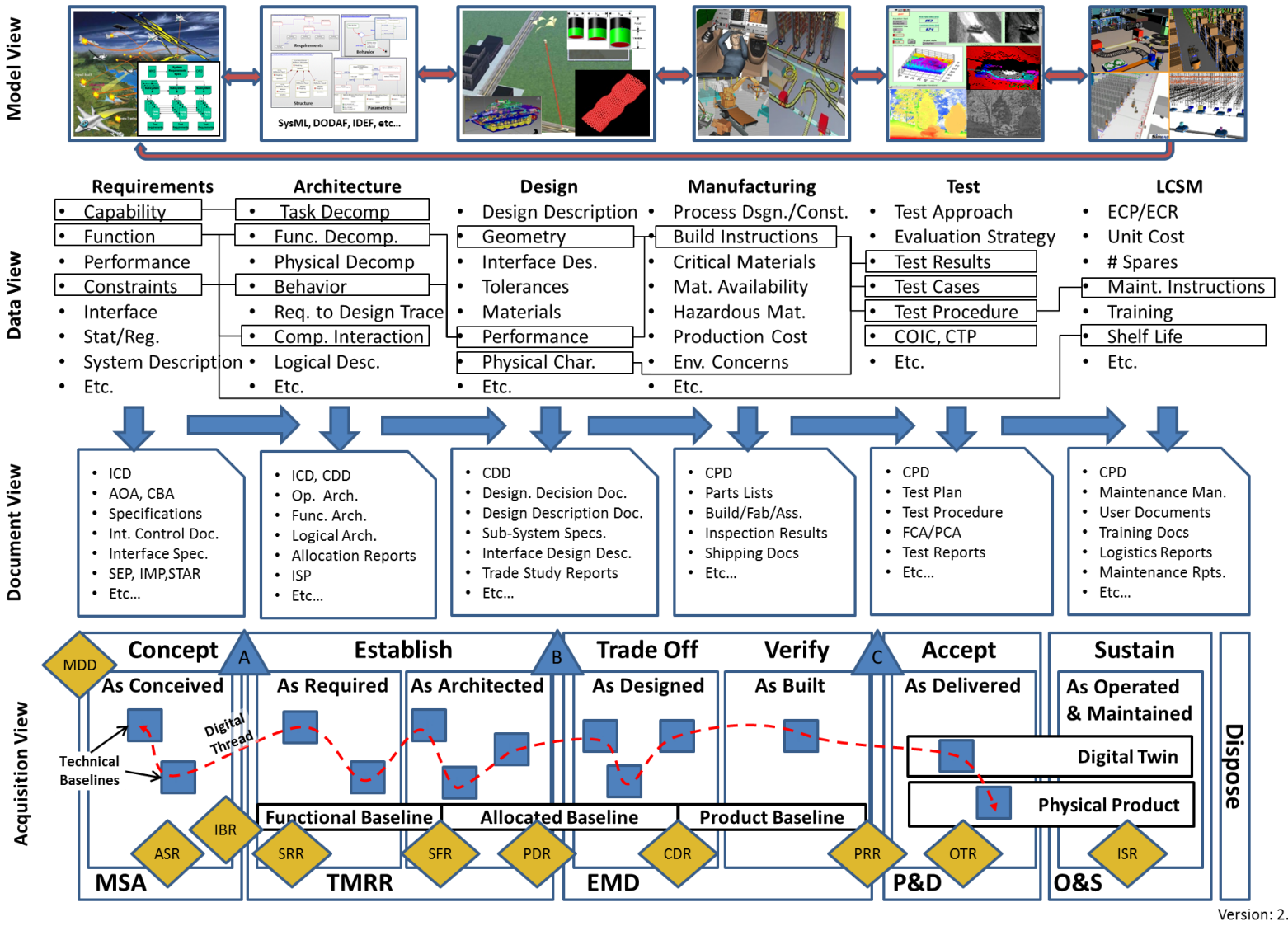
Transition to Digital Engineering – Generalized Acquisition Process



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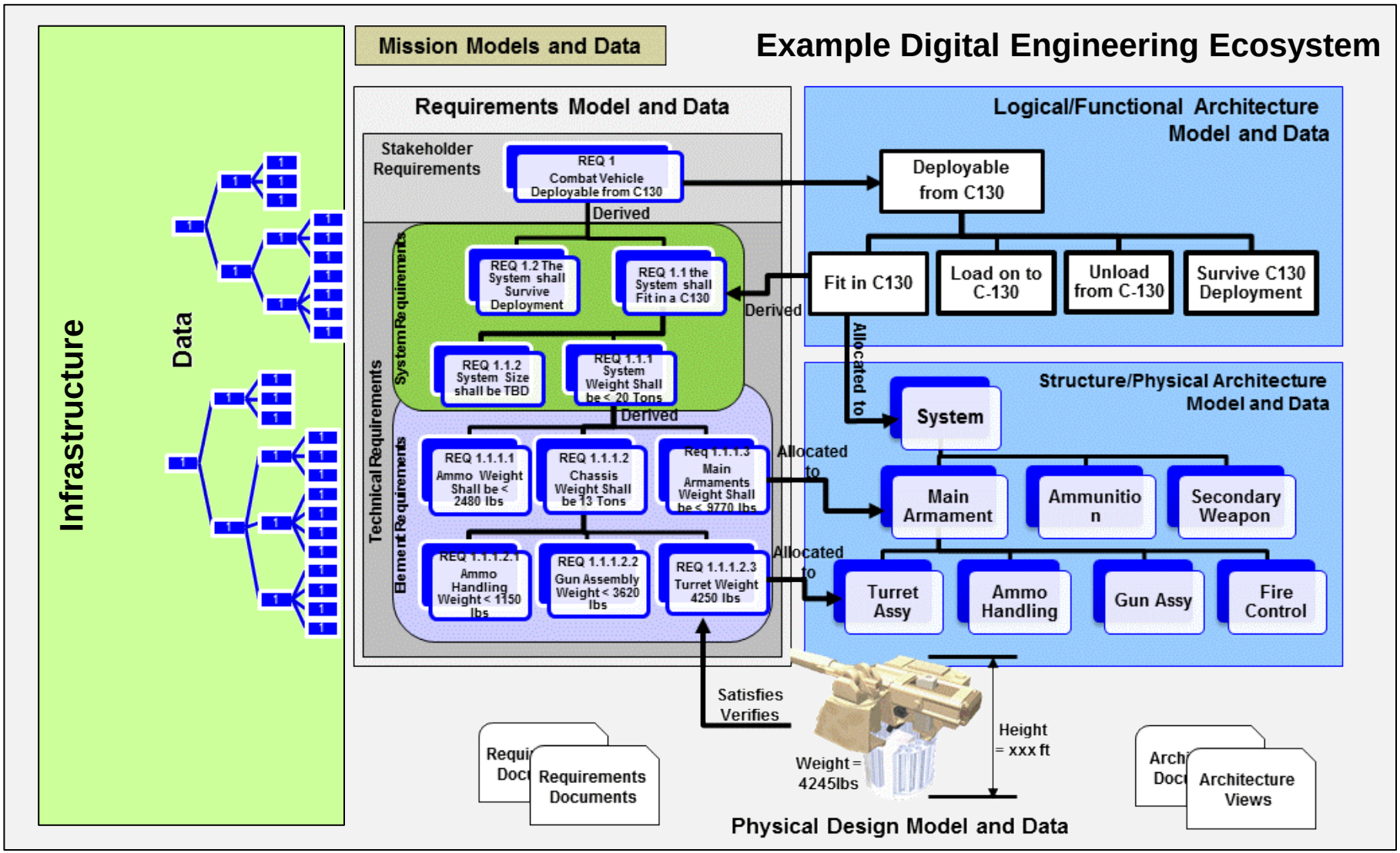
Digital Artifact Example



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5000.02 Generic Acquisition Phases and Decision Points

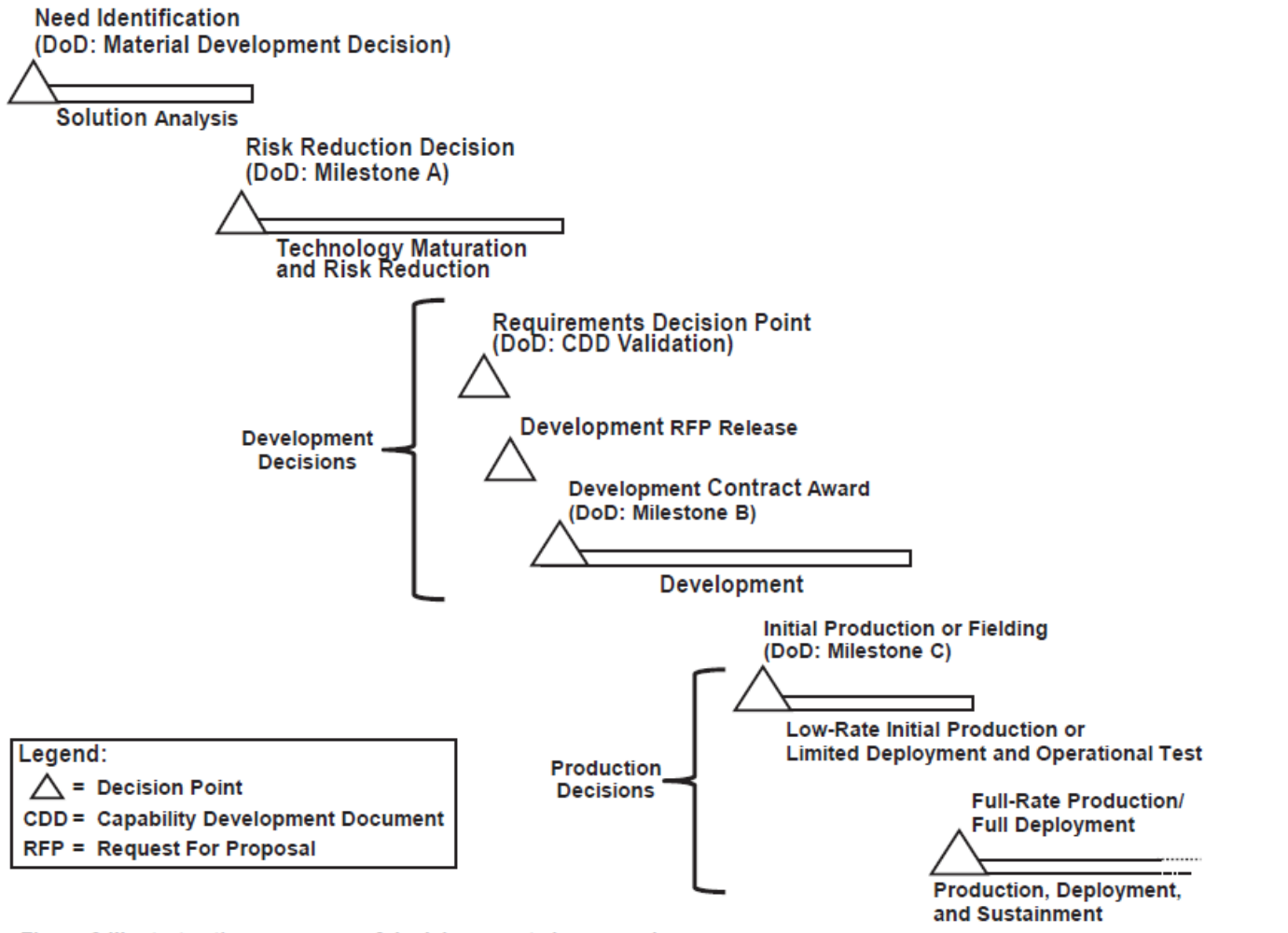

Figure 2 illustrates the sequence of decision events in a generic program. It is not intended to reflect the time dedicated to associated phase activity.

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

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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

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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

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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

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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

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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

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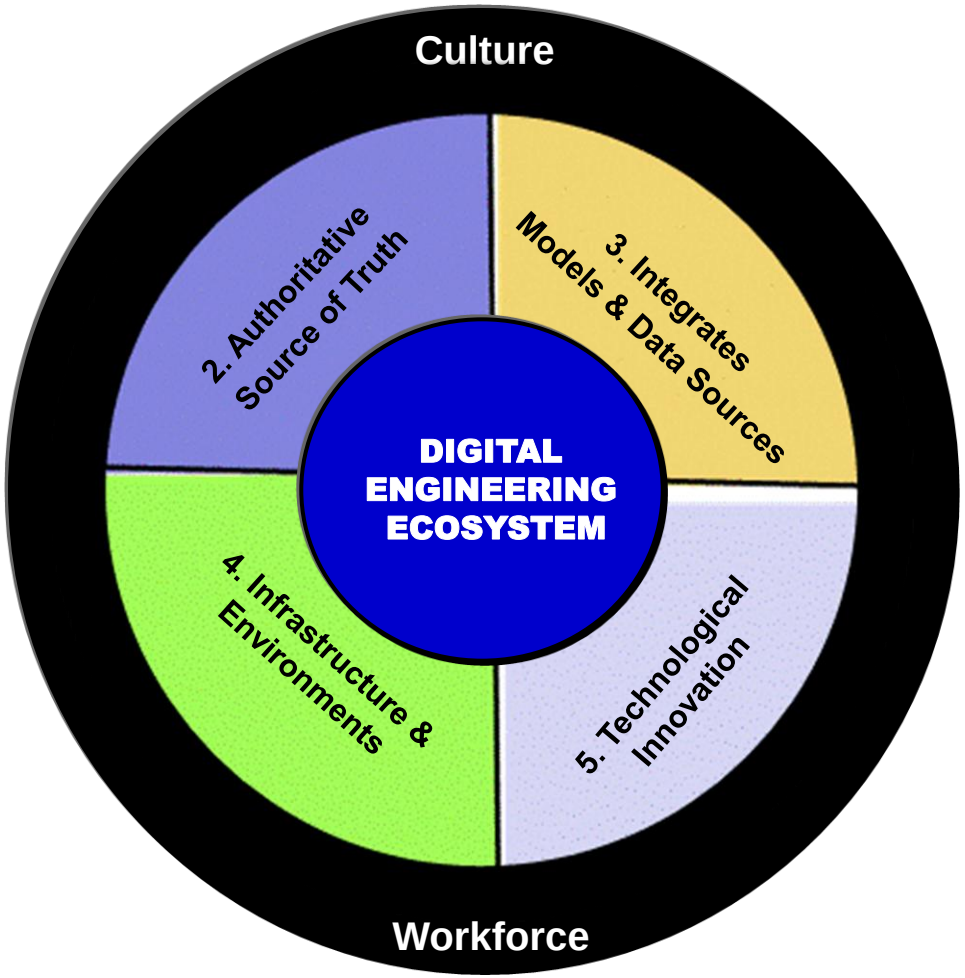
Digital Engineering Strategic Goals

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



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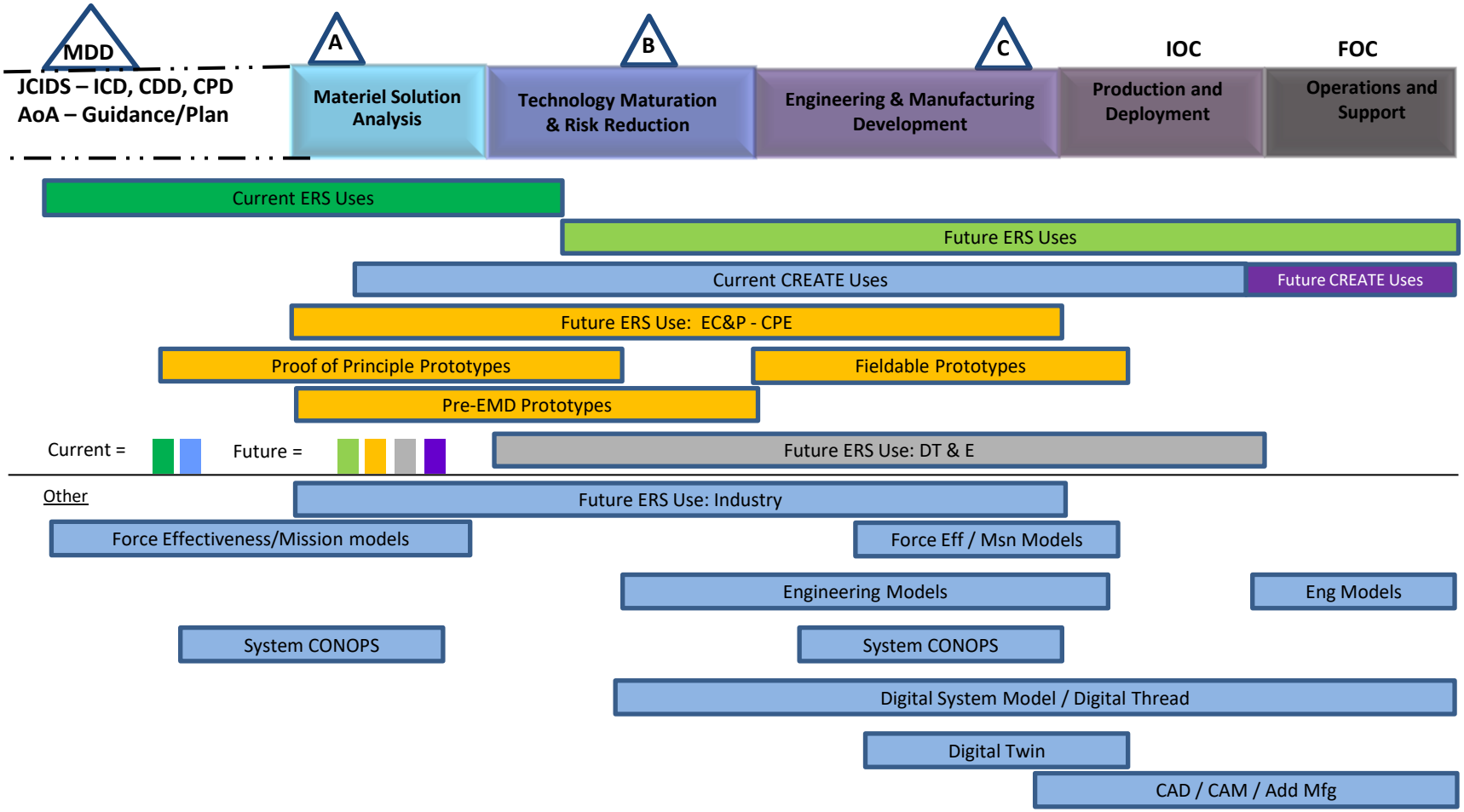
Vision for ERS,CREATE & CPE (Draft)



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

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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?

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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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For Additional Information

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