

Enabling Systems Engineering Technical Review (SETR) Modernization

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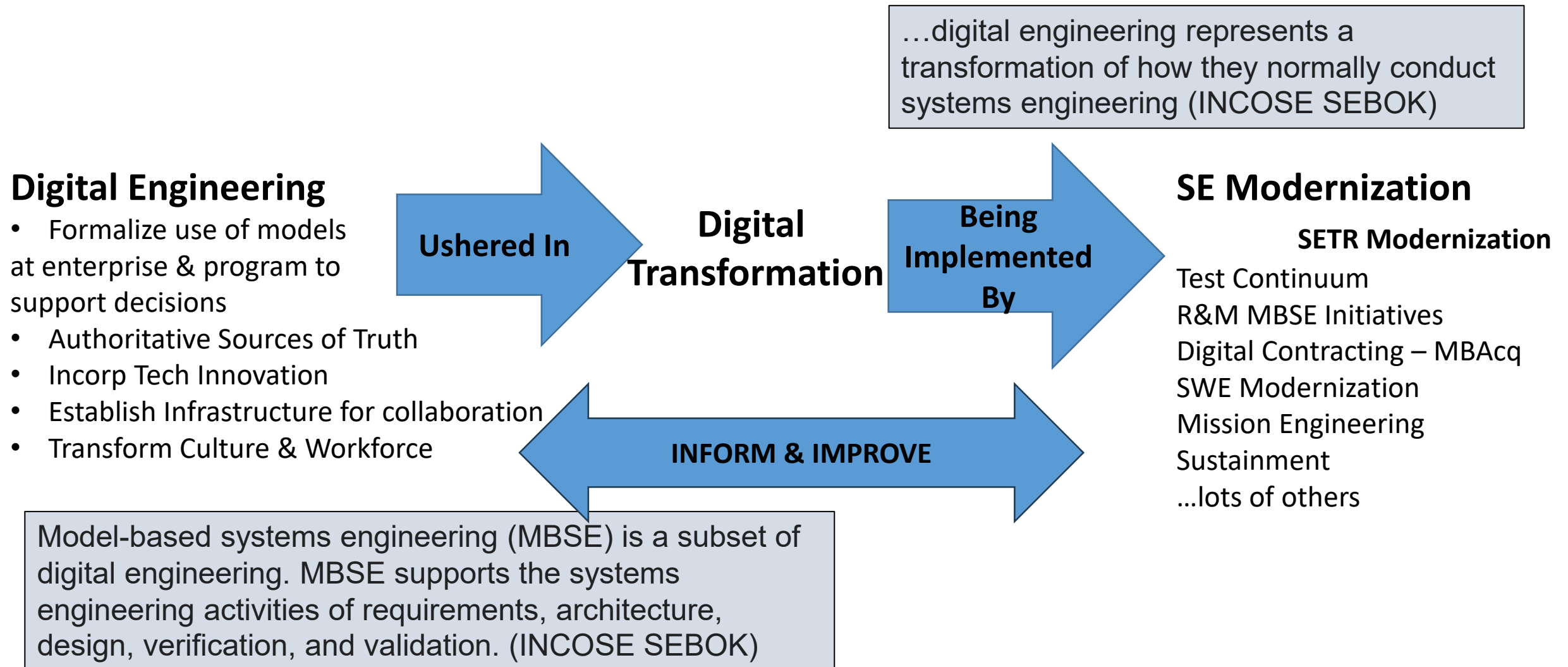
Director, Systems Engineering | Office of the Executive Director, Systems Engineering and Architecture

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SE - DE Industry Accepted Relationships





SETR Modernization Abstract: Problem Statement & Outcomes

BOTTOM LINE:
Systems engineering processes remain valid, but practices and methodology need to change to take advantage of the digital transformation that supports Agile system development. (SERC, 2023)

PROBLEM STATEMENT

- There is a lack of guidance regarding shared data and models used to enable agile and continuous data & model development approaches (SE Digital Thread) that support the systems engineering workflow WRT technical and technical management decisions and reviews.

WHY THIS MATTERS

- Continuation of document centric methods does not support the full integration of ongoing important initiatives related to the digital transformation to include: MOSA, SW Modernization and Agile program development methods.
- Lacks Agility in iterative development cycles

INTENDED OUTCOMES

- Guidance for implementing model based SETR processes
- Model based SEP/SETR processes that enable agile continuous data and model development
- Recommended digital artifacts usage and management
- Exemplars for governance/oversight/sharing of model-based artifacts
- Recommended approach to SETR use of Agile principles for continuous data/models - Standard Approach/Best Practices



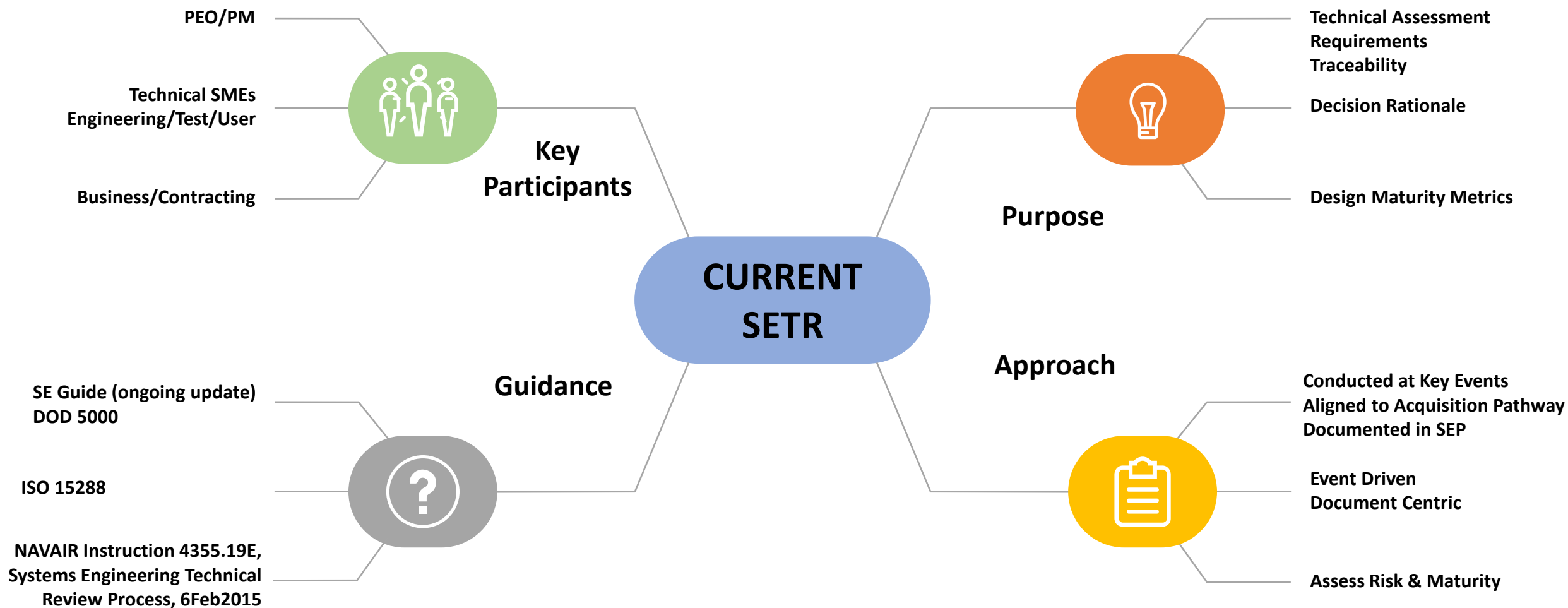
SETR Modernization: Research Questions

Table 1 - RESEARCH QUESTIONS

- (1) How do we implement the digital transformation into the current systems engineering technical review (SETR) process?
- (2) What are the key artifacts that should be modeled?
- (3) How do we share and manage model-based artifacts and the associated data during the SETR process?

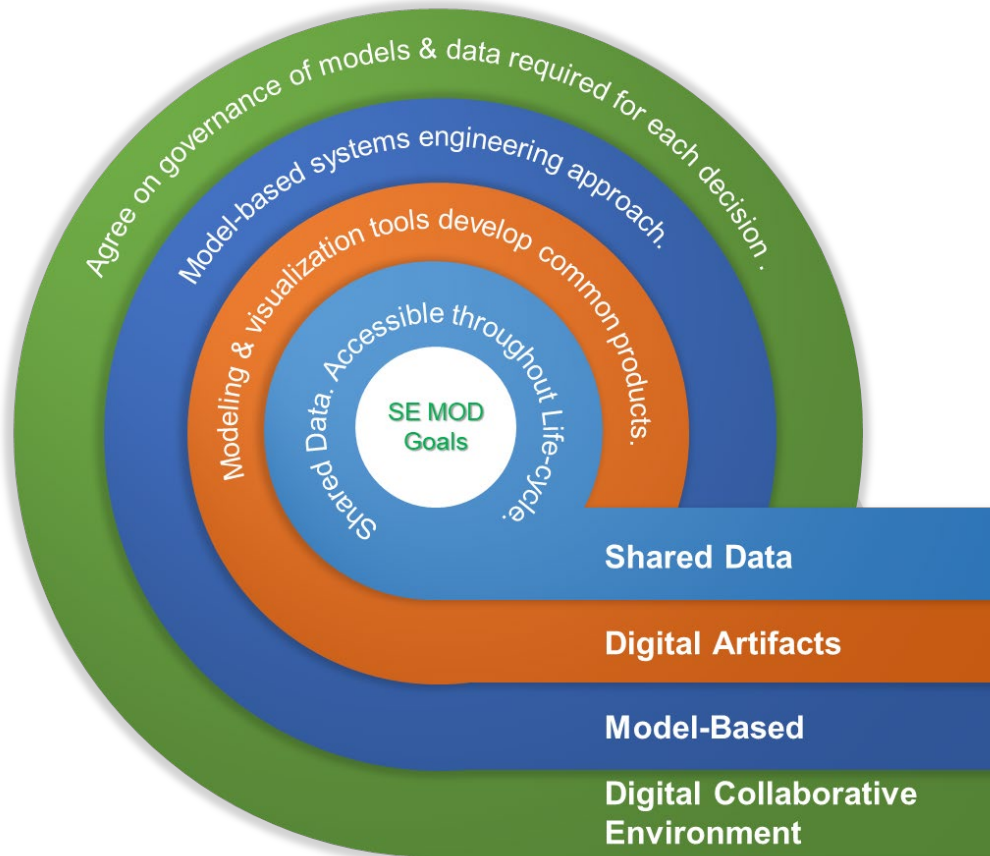


Traditional SETR





SE Modernization Goals & Lines of Effort (LOEs)



Requires
SE - DE
Transformation

LOE 1 - SEMOD BoK*located in DEBoK
DAU COP – under update

LOE 2 - Policy & Guidance Review & Update

SETR Modernization

LOE 3 - Model Based Artifacts, Data Workflow

LOE 4 - Roadmaps & Framework
(Iterative Mental Model)

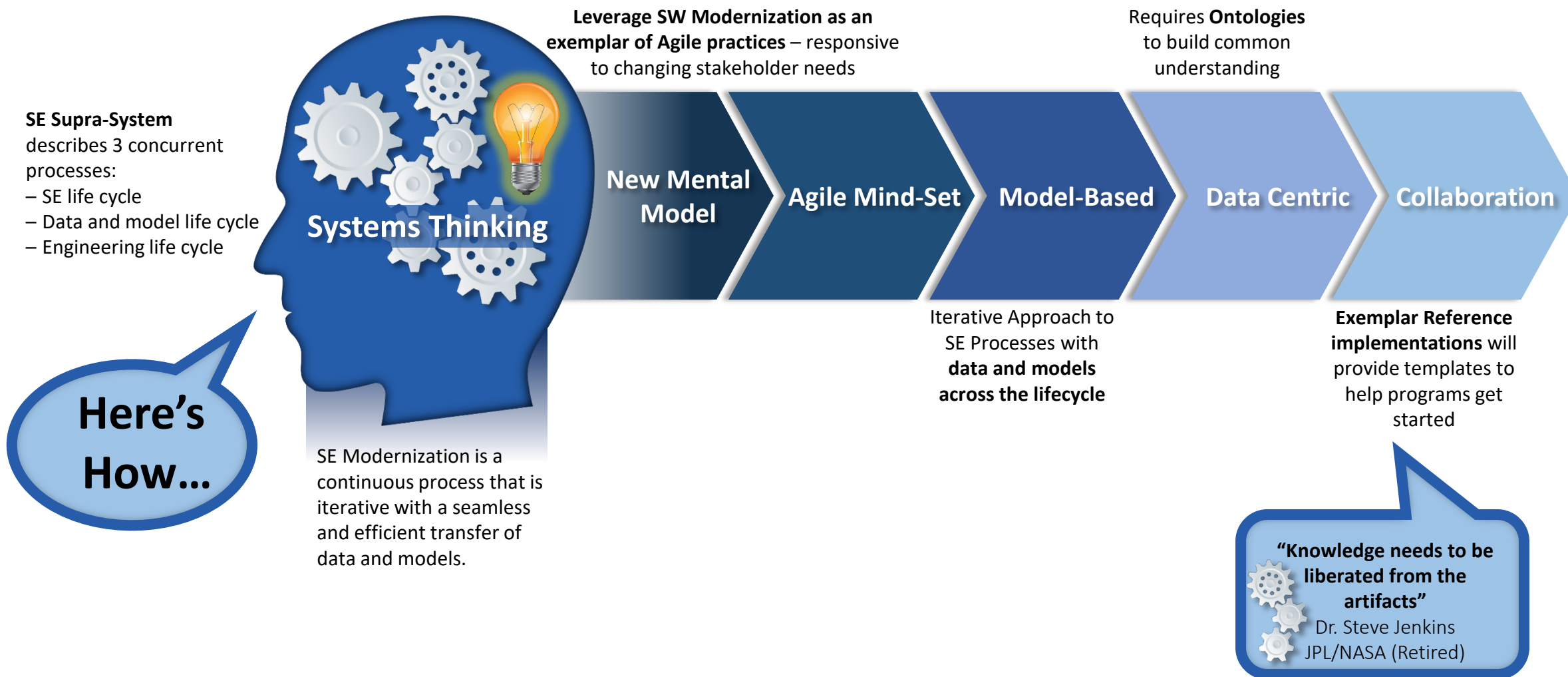
LOE 5 - Digital Acquisition Thread Exemplar

LOE 6 - Workforce: DE/SE Topic Workshops &
Webinars

“The vision of SE Modernization is to use data and models to create a more agile and responsive acquisition system that can quickly and effectively meet the needs of the warfighter.” WRT-1058 Final Technical Report: Systems Engineering (SE) Modernization



So...How Do We Enable SE Modernization?



SE Supra-System
describes 3 concurrent
processes:
– SE life cycle
– Data and model life cycle
– Engineering life cycle

Here's
How...

Systems Thinking

SE Modernization is a
continuous process that is
iterative with a seamless
and efficient transfer of
data and models.

Leverage SW Modernization as an
exemplar of Agile practices – responsive
to changing stakeholder needs

**New Mental
Model**

Agile Mind-Set

Model-Based

Data Centric

Collaboration

Requires **Ontologies**
to build common
understanding

Iterative Approach to
SE Processes with
data and models
across the lifecycle

**Exemplar Reference
implementations** will
provide templates to
help programs get
started

**“Knowledge needs to be
liberated from the
artifacts”**
Dr. Steve Jenkins
JPL/NASA (Retired)

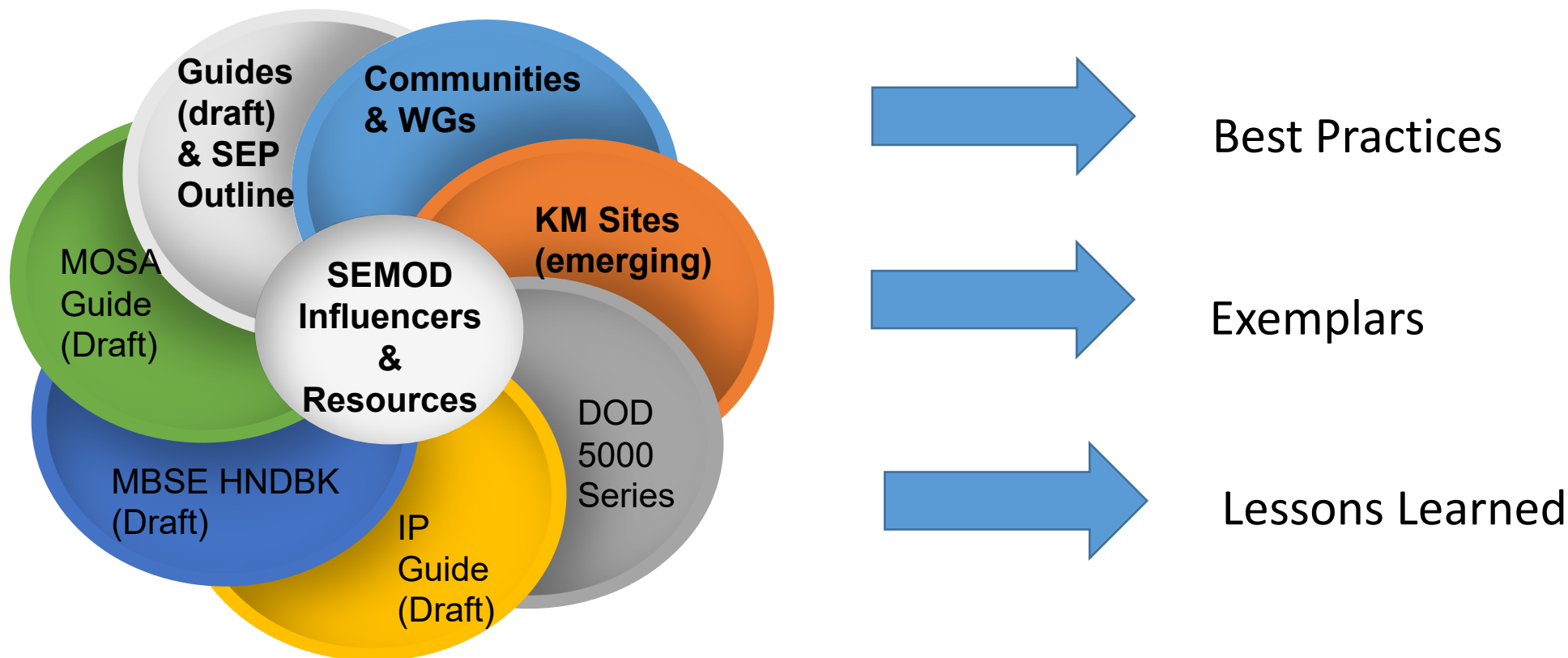


SETR Transformation Aligned to – Digital Transformation





Evolving The SE-DE Transformation Ecosystem

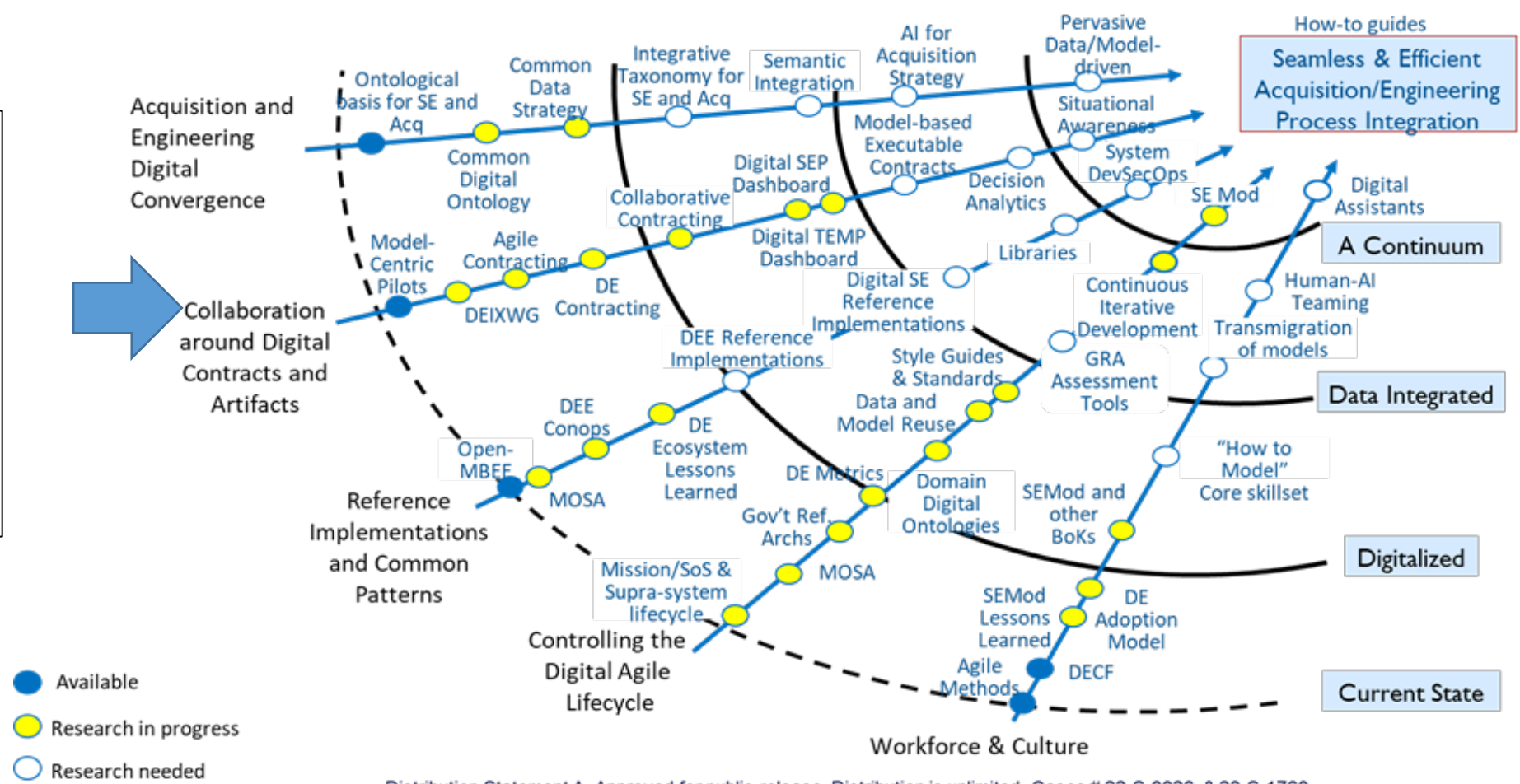


CHALLENGE: Several SE guidance documents provide “emerging content” with key information to support the **SE Workflow (SETR)** that guides the planning & execution for acquisition programs but not all are complete or mature enough to be included in guidance.



SE Modernization – Research Roadmap

Ongoing: Systems Engineering Plans (SEP) and Test and Evaluation Master Plans (TEMP) conversion to digital artifact driven formats

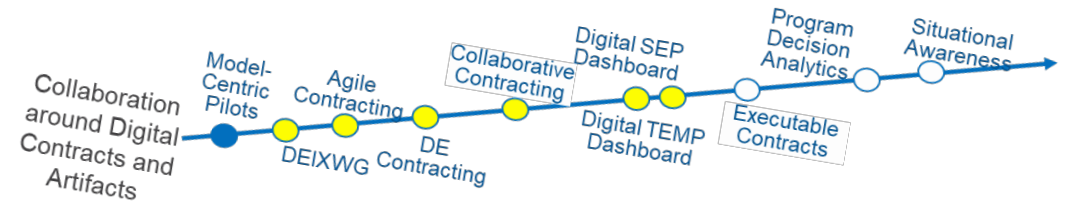


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Collaboration around Digital Contracts

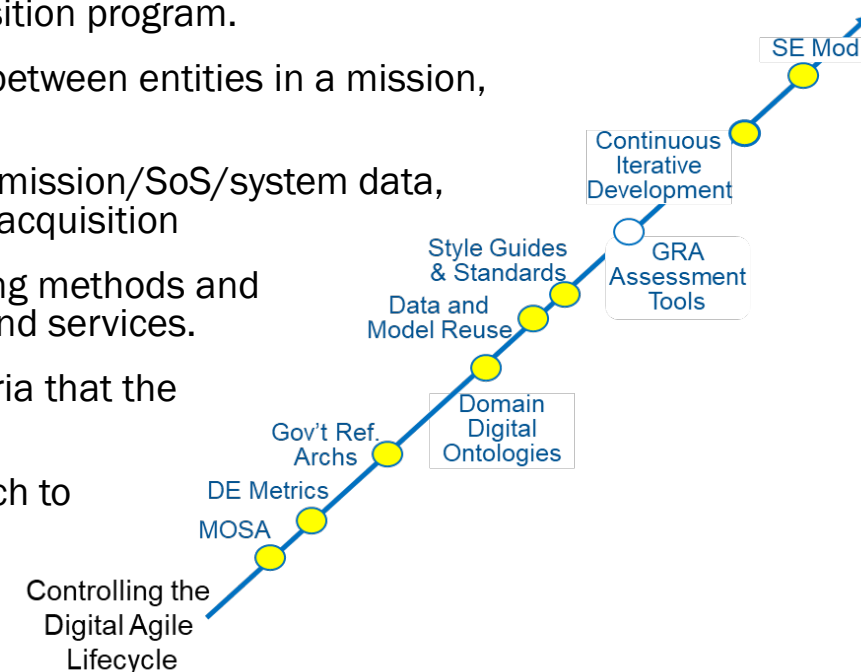
- **Model-Centric Engineering:** Demonstration pilot programs exploring the art of the possible to achieve a full set of SE and Acquisition activities 100% “in the model”
- **Digital Engineering Information Exchange Working Group (DEIXWG):** a community activity to develop a set of “common views” for executing digital, model-based engineering & technical reviews
- **Collaborative Contracting:** flexible contracting approaches for collaboration around data and models
- **SEP Dashboard:** A digital version of the Systems Engineering Plan (SEP) that provides an interactive dashboard for a program office to plan, monitor, and control the SE development process
- **TEMP Dashboard:** A digital version of the Test & Evaluation Master Plan (TEMP) that provides an interactive dashboard for a program office to plan, monitor, and control the systems integration, developmental test, and operational evaluation processes
- **Executable Contracts:** bridging the gap between current legal language and digital data exchange using declarative (outcome-based) transaction models, and software orchestration (dynamic workflows for multiple task automation)
- **Program Decision Analytic Tools:** common digital ontologies and data strategies enable development of new digital decision analysis tools using emerging artificial intelligence and visualization technologies to improve acquisition decision making
- **Program Situational Awareness:** digitally connected visualization dashboards that achieve full near real time situational awareness and measures of performance across all engineering, technical, and management activities





Controlling the Digital Agile Lifecycle

- **MOSA**: a complete government business and technical approach to manage adaptability and affordability of defense systems over time, managed at the portfolio level. Title 10 U.S.C. 2446a.(b) and 2320(e) provide a basis for better government definition and control of the systems they acquire.
- **Digital Engineering Metrics**: measuring and improving efficiency and quality of defense systems development to improve deployment, cost, and schedule outcomes.
- **Government Reference Architectures**: government developed, owned, and maintained authoritative sources of data and models that guide system design, development, production, and sustainment in an acquisition program.
- **Domain Digital Ontologies**: the digital graph of domain-specific models and relationships between entities in a mission, SoS, or system. Necessary for constructing data models underlying authoritative sources.
- **Data and Model Reuse**: development of government maintained and provided libraries of mission/SoS/system data, models, and reference architecture templates to reduce ambiguity and increase speed of acquisition
- **Style Guides and Standards for Systems Models**: guides for consistency in system modeling methods and design as well as tools to improve interoperability and reuse across programs, portfolios and services.
- **GRA Assessment Tool**: What data is needed to say a GRA is acceptable, what are the criteria that the data and models need to meet?
- **Continuous Iterative Development**: both an architecting and development process approach to manage risk by separately architecting platforms and capabilities and more frequently deploying and validating capabilities.
- **Systems Engineering Modernization (SEMod)**: evolution of SE lifecycle processes and digital tools to improve the efficiency and quality of defense systems development.



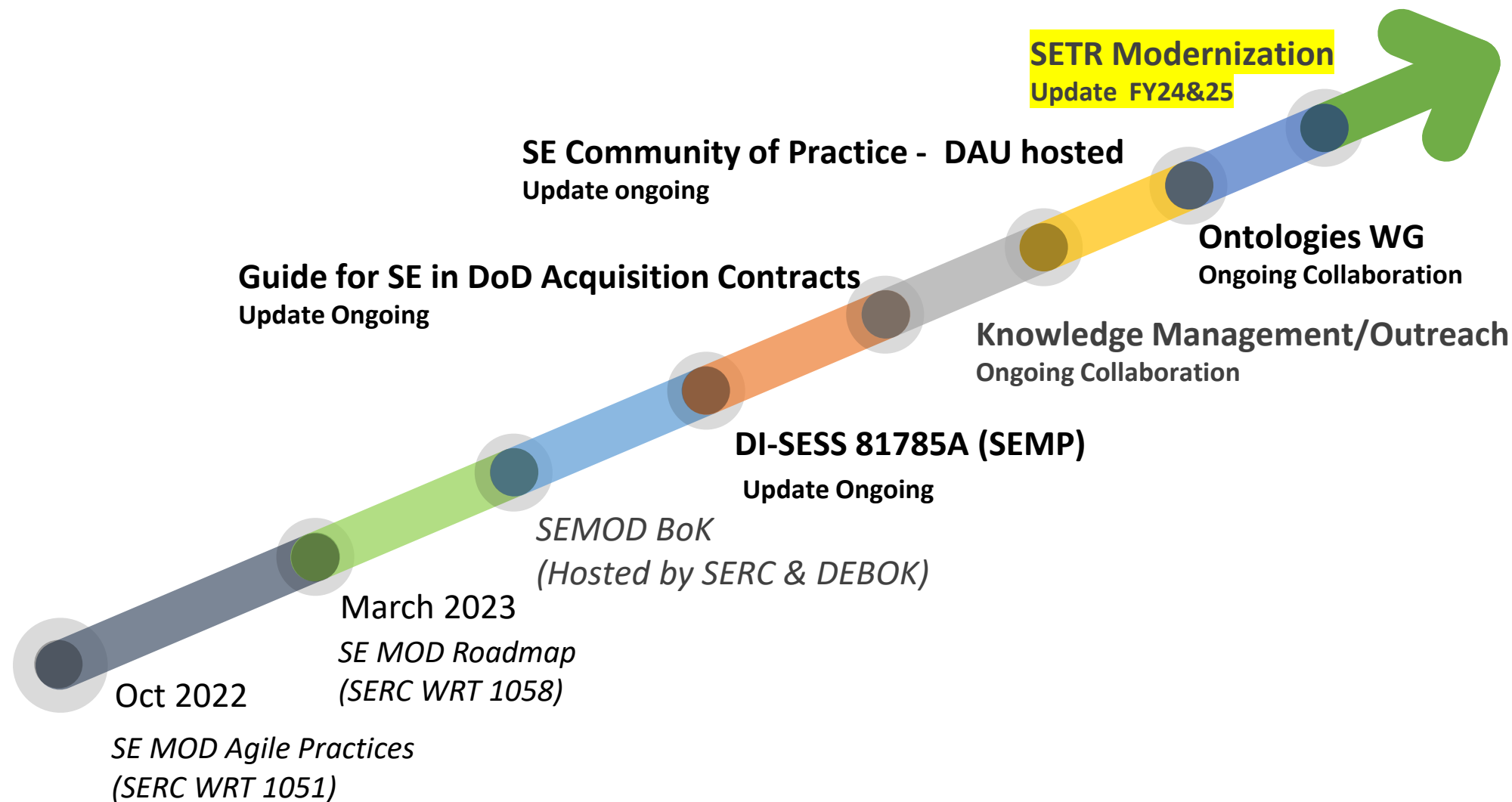


SETR Modernization – Next Steps

INTENDED OUTCOME	Ongoing Activities
Guidance for implementing model based SETR processes workflow	SE Modernization Service Modernization/Transformation
Exemplars for governance and oversight of model-based artifacts	MBTEMP, MBSEP, OMG MBAcq WG, DEM&S COP
Recommended approach to Agile and continuous data and model development to support the SETR	SERC Roadmap Research Activities SE Emerging
Recommended digital artifacts usage and management during the SETR	SERC Roadmap Research Activities, Service Use Cases, Industry Collaboration



SE Modernization Activities





Contact

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