

WEBINAR SERIES

Digital Engineering Strategy

System of Systems Engineering Collaborators Information Exchange (SoSECIE) 2018 Webinar Series

Speaker: Ms. Phil Zimmerman Office of the Deputy Assistant Secretary of Defense for Systems Engineering, Deputy Director of Engineering Tools & Environments

September 11, 2018, 1100-1200

Online DCS Portal & Phone Conference For Web Access: Defense Collaboration Services (DCS): https://conference.apps.mil/webconf/SoSECIE2018

For Audio Access: Toll-free dial-in number (U.S. and Canada): (877) 249-2489 International dial-in number: (214) 556-4127 Passcode: 9202079157

Welcome to the 2018 System of Systems Engineering Collaborators Information Exchange (SoSECIE)





We will start at 11 am Eastern Time For audio: Toll-free number (U.S. and Canada): (877) 249-2489 International number: (214) 556-4127 Passcode: 92020 79157 #

You can download today's presentation from the DASD(SE) Website:

https://www.acq.osd.mil/se/outreach/sosecollab.html

To add/remove yourself from the email list or suggest a future topic or speaker, send an email to <u>osd.atl.asd-re.se@mail.mil</u>

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Co-sponsored by the

 Office of the Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE))

and

- National Defense Industrial Association (NDIA) Systems Engineering Division System of Systems SE Committee
 - Industry Chairs:
 - Mr. Rick Poel, Boeing
 - Ms. Jennie Horne, Raytheon
 - OSD Liaison:
 - Dr. Judith Dahmann, MITRE

NDIA System of Systems SE Committee

Mission

- To provide a forum where government, industry, and academia can share lessons learned, promote best practices, address issues, and advocate systems engineering for Systems of Systems (SoS)
- To identify successful strategies for applying systems engineering principles to systems engineering of SoS

Operating Practices

- Face to face and virtual SoS Committee meetings are held in conjunction with NDIA SE Division meetings that occur in February, April, June, and August
- SoS Track at NDIA 21th Annual Systems Engineering Conference, Grand Hyatt Tampa Bay, Tampa, FL, October 22-25, 2018
 - Conference Info: http://www.ndia.org/events/2018/10/22/9870---21st-systems-engineeringconference
 - Call For Papers Extended to July 3, 2018: http://www.ndia.org/events/2018/10/22/9870---21st-systems-engineeringconference/call-for-papers

Simple Rules of Engagement

- I have muted all participant lines for this introduction and the briefing.
- If you need to contact me during the briefing, please use the CHAT feature on DCS.
- In the event you have trouble with DCS, you can download the presentation so you can follow along on your own. [Hint: Try using Chrome if having trouble with Internet Explorer or Edge.]
- We will hold all questions until the end:
 - I will start with questions submitted online via the CHAT window in DCS.
 - If we have time, I'll take questions via telephone; State your name, organization, and question clearly.
 - Use #6 to mute and unmute your line.
- If a question requires more discussion, the speaker(s) contact info is in the brief.

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2018 System of Systems Engineering Collaborators Information Exchange Webinars Sponsored by DASD(SE) and NDIA SE Division

October 16, 2018

System of Systems Architecture Feasibility Analysis to Support Tradespace Exploration MAJ Stephen Gillespie, PhD, U.S. Military Academy

October 30, 2018

Scaling Model-Based System Engineering Practices for System of Systems Applications Dr. Aleksandra Markina-Khusid and Ms. Janna Kamenetsky, The MITRE Corporation

> November 6, 2018 Model Based Systems of Systems Engineering Mr. Francis McCafferty, Vitech Corporation

> > November 27, 2018

Emergence as a Subject of Research, Research Methods, and Engineering Knowledge and Practice Dr. Timothy L.J. Ferris, Centre for Systems Engineering, Cranfield University, Defence Academy of the United Kingdom

Visit our website: https://www.acq.osd.mil/se/outreach/sosecollab.html

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Digital Engineering

Ms. Philomena Zimmerman Deputy Director, Engineering Tools and Environments OUSD(R&E)/Systems Engineering

SoSECIE Webinar September 11, 2018



The World Today Technology is Transforming the Battlespace



Easy proliferation of knowledge and technology has eroded U.S. historic advantages

- Increasing systems capabilities
- Advanced production capabilities
 - Driving lower costs
 - Decreasing the "time to market"
- Increased rate of investment in military Research & Development (R&D) from nearpeers
- Increasingly Competitive National Security Technical Environment
- Speed and cycle time become the discriminator

- 2017 GLOBAL R&D FUNDING FORECAST WINTER 2017 Industrial Research Institute, R&D Magazine



- NSF 2015 data predicted R&D investment parity with China in 2020
 - Feb 2018 National Science Board (NSB) estimates China R&D investment parity with U.S. by end of 2018







Digital Engineering and the National Defense Strategy





Remarks by Secretary Mattis on the National Defense Strategy January 19, 2018

"We will modernize key capabilities, recognizing we cannot expect success fighting tomorrow's conflicts with yesterday's weapons or equipment. Investments in space and cyberspace, nuclear deterrent forces, missile defense, advanced autonomous systems, and resilient and agile logistics will provide our highquality troops what they need to win."

"To keep pace with our times, the department will transition to a culture of performance and affordability that operates at the speed of relevance. Success does not go to the country that develops a new technology first, but rather, to the one that better integrates it and more swiftly adapts its way of fighting. Our current bureaucratic processes are insufficiently responsive to the department's needs for new equipment. We will prioritize speed of delivery, continuous adaptation and frequent modular upgrades."



Digital Engineering Overview



• What is Digital Engineering?

- Combines model-based techniques, digital practices, and computing infrastructure
- Enables Delivery of high pay off solutions to the warfighter at the speed of relevance

Reforms Business Practices

- Digital enterprise connects people, processes, data, and capabilities
- Improves technical, contract, and business practices through an authoritative source of truth and digital artifacts



Modernizes how we design, operate, and sustain capabilities to outpace our adversaries

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Leveraging Multiple Activities



Infusion in Policy & Guidance ODASD(SE) Initiatives **Partnerships** http://www.acq.osd.mil/se/pg/guidance.html Armed Services Digital Engineering **DoD Digital Engineering** Working Group Working Group (DEWG) DoDI 5000.02. Enclosure 3. Section 9: Modeling and Simulation **Digital Engineering Strategy** U.S.ARMY **DoD Components Digital System** Defense **Defense Acquisition** Model (DSM) Acquisition Taxonomy: **Guidebook Chapter 3** Guidebook **Defining categories** of data across acquisition Interagency **DoD Digital** Engineering **Fundamentals** ··· ··· ··· ··· System Engineering **Research Center** -(SERC): Model Centric Research Defense Industry/OEMs/ Industrial Orgs **Engineered Resilient** Acquisition Systems: Adapting to Universitv changing requirements INCOSE NASA – National Aeronautics and Space Administration NNSA - National Nuclear Security Administration High Performance Computing NDIA – National Defense Industrial Association Modernization Program (HPCMP) Academic INCOSE – International Council on Systems Engineering **Computational Research and** AIA - Aerospace Industries Association **Engineering Acquisition Tools and** AIAA - American Institute of Aeronautics and Astronautics **OEMs – Original Equipment Manufacturers** NASA: Sounding Rocket **Environments (CREATE) : Physics** ENGINEERING Program **Based Modeling**

Advancing the state of practice for Digital Engineering

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Model: A Day in the Life





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Model: A Day in the Life





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- Digital Engineering Strategy (Video link)
 - Basic capabilities needed by Services and Agencies to begin use of Digital Engineering practices

Objective

 Guide the planning, development, and implementation of digital engineering across the services and agencies

Expected Impact

- Increase technical cohesion and awareness of system in lifecycle activities
- Reform the Department's business practices for greater performance and agility

Coordination

 Approved by USD(R&E), DASD(SE), and each Service

https://www.acq.osd.mil/se/docs/2018-DES.pdf

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Formalize the development, integration, and use of models to inform enterprise and program decision making

- 1. Formalize the planning for models to support engineering activities and decision making across the lifecycle
- 2. Formally develop, integrate, and curate models
- 3. Use models to support engineering activities and decision making across the lifecycle







Provide an enduring, authoritative source of truth

- 1. Plan and develop the authoritative source of truth
- 2. Govern the authoritative source of truth

3. Use the authoritative source of truth across the lifecycle







Incorporate technological innovation to improve the engineering practice

- 1. Establish an end-to-end digital engineering enterprise
- 2. Use technological innovations to improve the engineering practice



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Establish a supporting infrastructure and environments to perform activities, collaborate, and communicate across stakeholders

1. Develop, mature, and use digital IT infrastructures

2. Develop, mature and use digital engineering methodologies

3. Secure IT infrastructure and protect intellectual property







Transform the culture and workforce to adopt and support digital engineering across the lifecycle

- 1. Improve the digital engineering knowledge base
- 2. Lead and support digital engineering transformation efforts
- 3. Build and prepare the workforce





Digital Engineering to Service Secretaries and DEPSECDEF





THE UNDER SECRETARY OF DEFENSE 3030 DEFENSE PENTAGON WASHINGTON, DC 20301-3030

JUN 2 5 2018

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Digital Engineering Strategy

I approved the Digital Engineering Strategy as an important step forward in modernizing the Department of Defense's engineering and acquisition practices. The Strategy sets a new vision for the way we conceive, build, test, field, and sustain our national defense systems. It also transforms how we must train and shape the workforce to use digital engineering practices.

We are transitioning from strategy to action. In light of our current and future challenges, technical and operational complexity, as well as our increasingly capable adversaries, we are charged with integrating new capabilities, adapting warfighting approaches, and changing our business practices. You, the Services, and your engineering commands, are in a unique position to help the Department move the needle on developing and modernizing these new digital practices to achieve greater performance and affordability in our warfighting systems. Thank you for your continued efforts to advance the state of Digital Engineering practice. I look forward to seeing your implementation plans and pilots by the end of the calendar year.

We will convene a Digital Engineering Summit at the National Defense Industrial Association's 21st Annual Systems Engineering Conference in Tampa, Florida, from October 22, 2018 to October 25, 2018. We invite the Services and agencies to share information about their Digital Engineering implementation initiatives and to demonstrate your capabilities. My digital engineering lead is Ms. Philomena M. Zimmerman at 571-372-6695 or philomena.m.zimmerman.civ@mail.mil. She will coordinate the Digital Engineering activities, implementation plans, and the Summit.

cc: SAEs

"The strategy sets a new vision for the way we conceive, build, test, field and sustain our national defense systems. It also transforms how we must train and shape the workforce to use digital engineering practices...."

"We will convene a Digital Engineering Summit.....We invite the Services and agencies to share their Digital Engineering Implementation initiatives...."

Separate memo to DEPSECDEF:

"I expect the first implementation plans from each Service by end of December 2018"

- US Army Lead: Dr. Nancy Bucher nancy.m.bucher.civ@mail.mil



Digital Engineering Way Ahead





Strategy & Service Plans



Service Implementation Plans

U.S. AIR FORCI

Next Steps

- Service Delivery and Execution of Implementation Plans
- Foundational & Cross-Cutting Challenges
 - **o Data Patterns/Digital Artifacts**
 - Data Rights/Access and Intellectual Property
 - \circ Model Trust / Curation
 - Model Improvement (e.g., from test data)
 - Critical Technology Protection
 - Determine Additional Efficiencies / Measurement
 - Tool Characterization
 - \circ Workforce Development

Implementing Digital Engineering Across the Services



Systems Engineering: Critical to Defense Acquisition





Defense Innovation Marketplace https://defenseinnovationmarketplace.disa.mil

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





Digital Engineering website: https://www.acq.osd.mil/se/initiatives/init_de.html

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