

The logo for Carnegie Mellon University, featuring the text "Carnegie Mellon University" in a white, serif font. The background of the slide is a dark blue grid of lines in red, green, and yellow, creating a perspective effect.

**Carnegie
Mellon
University**

**Software Engineering
Institute**

Establishing the AI Engineering Discipline

A National Initiative

APRIL 2021

Legal

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DM21-0386

Who is here?



Dr. Rachel Dzombak
Lead, Digital Transformation
CMU Software Engineering Institute
Emerging Technology Center

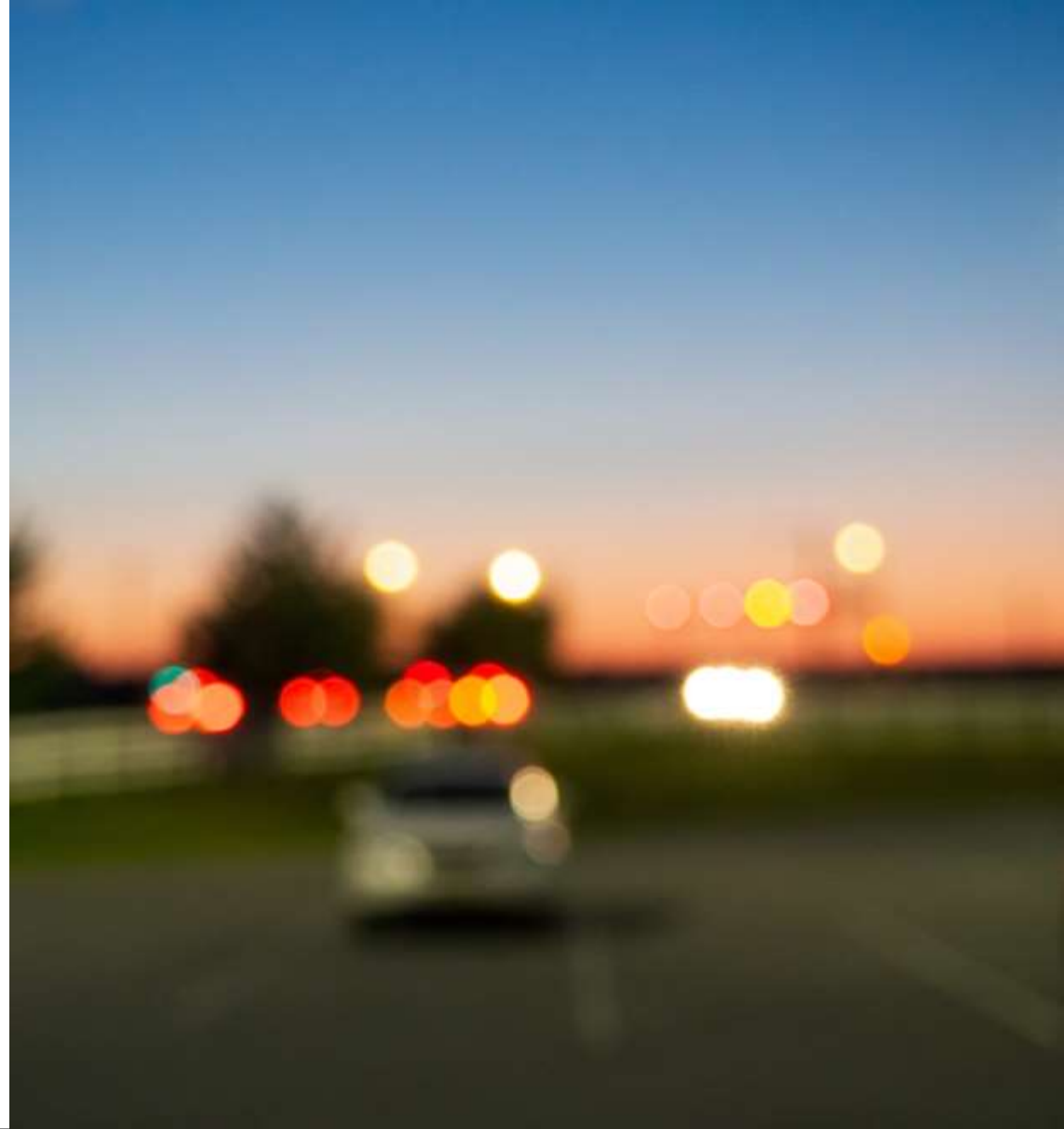


Dr. Matthew Gaston
Director & Head of AI
CMU Software Engineering Institute
Emerging Technology Center



Frank Redner
Program Development Manager
CMU Software Engineering Institute
Emerging Technology Center

We want to progress AI from individual tools to human-centered, robust and secure, and scalable systems.



Gap Analysis:

What is your level of understanding in how to leverage AI for real-world outcomes?

1. Wait, what is AI?
2. I know what AI is, no idea how it will be implemented
3. I have a lot of guesses on how to leverage AI
4. I have some direct experience implementing AI
5. I am currently working on doing exactly this and have answers

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How do we move toward implementation of AI systems?

“There is no book of spells, there’s just magic.”

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... of course, AI isn't magic.

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... of course, AI isn’t magic.

We believe there are best practices, processes, tools, and frameworks that can improve deployment of AI and enable trust and confidence – this National Initiative aims to define and share them.

What is AI Engineering?

AI engineering is a field of research and practice that integrates the principles of software engineering, systems, computer science, and human-centered design to create and implement AI systems in accordance with human needs for mission outcomes.

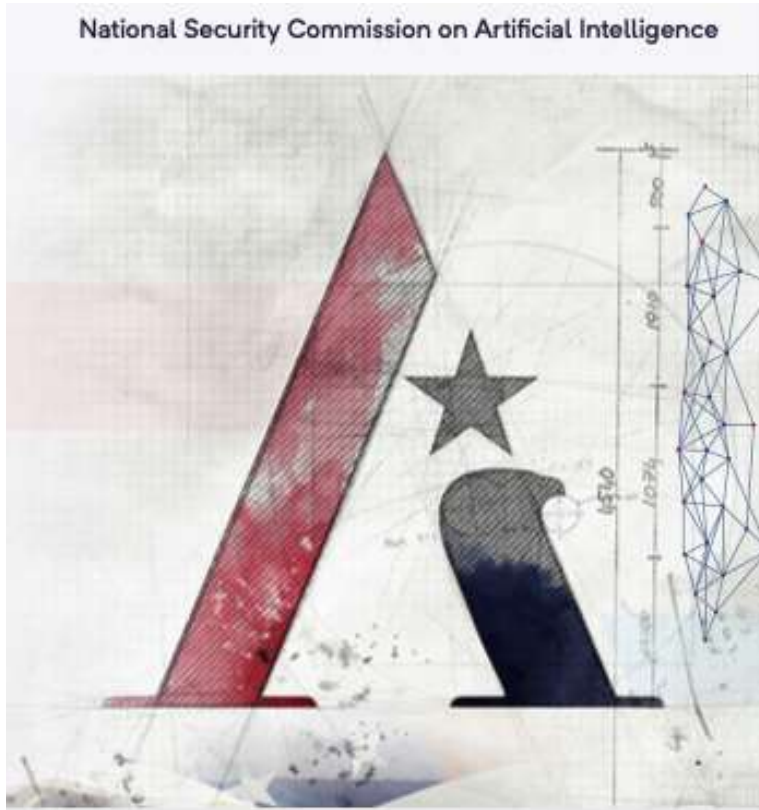


What is the National AI Engineering Initiative?

The National AI Engineering Initiative is a committed partnership towards evolving a discipline that seeks to develop an ecosystem to support applied research, community exchange, and a pipeline of promising AI engineering solutions and tools.



Our Motivations



March 1, 2021

“This new era of competition promises to change the world we live in and how we live within it. We can either shape the change to come or be swept along by it.”

Our Goals

- *Define the Discipline:* To articulate and iterate the processes and practices for framing and solving AI engineering problems
- *Cultivate the Workforce:* To identify and cultivate mindsets and skillsets that are necessary for AI engineering
- *Steer the Ship:* To identify and direct energy of other researchers towards critical AI engineering growth areas
- *Do the Work:* To contribute thought leadership and work in the space of AI engineering
- *Grow the Ecosystem:* To create ecosystem opportunities for researchers and stakeholders to share, learn, and evolve the field

AI Engineering Pillars

Our AI engineering pillars come from stakeholders across the defense and intelligence communities.

Area of Interest	Needs and Challenges
Scalable AI	<ul style="list-style-type: none">• Scalable oversight for complex applications• Data and model management and sharing• Available, scalable, and adaptive AI infrastructure
Robust and Secure AI	<ul style="list-style-type: none">• Tools to build robustness and security into AI systems• Tools for testing, monitoring, and mitigating AI system robustness• Sharing of AI “incidents”
Human-Centered AI	<ul style="list-style-type: none">• An AI-ready workforce• Mechanisms and frameworks to enforce ethical principles• Instrumentation, monitoring, evidence production, and interpretability

Overall Recommendation: Where possible, the DoD and related organizations should identify opportunities to build, share, evolve, and mature processes, practices, tools, and technologies for reliably engineering AI systems.

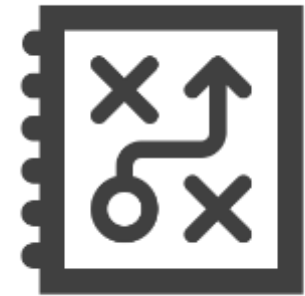
How do you envision the community getting involved?



Advocate for
AI Engineering



Collaborate to
Build the Discipline



Support the
Research Agenda

Opportunities to Engage

- Meet to talk about partnership opportunities: **<https://bit.ly/ai-eng-office-hour>**
- Point us to your research and work
- Sign up for newsletter: **<https://bit.ly/ai-eng-join>**
- Stay tuned for white papers
- Get in touch: **ai-eng@sei.cmu.edu**