Pacific Northwest
NATIONAL LABORATORY

Building an AI-Ready Workforce

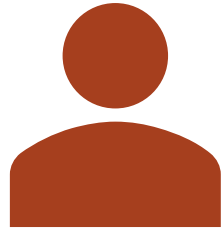**Dr. Corey K. Fallon, Human Factors Psychologist**

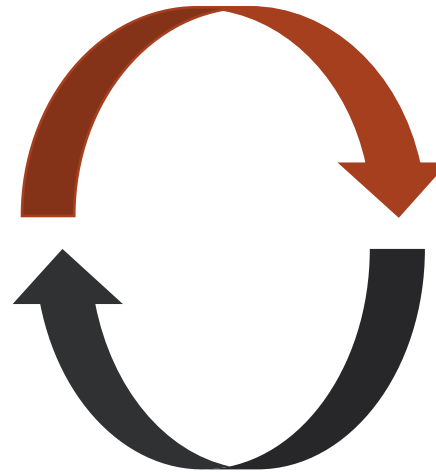**Dr. Eva Brayfindley, Senior Data Scientist**

U.S. DEPARTMENT OF
ENERGY **BATTELLE**

The Effects of AI on Security Professionals

Security Professional

AI

Workload Reduction

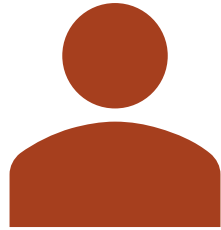Increase Efficiency

More Time for Analysis

Video surveillance and monitoring
Intrusion Detection
Predictive Maintenance
Response
Open-Source Intelligence
Education

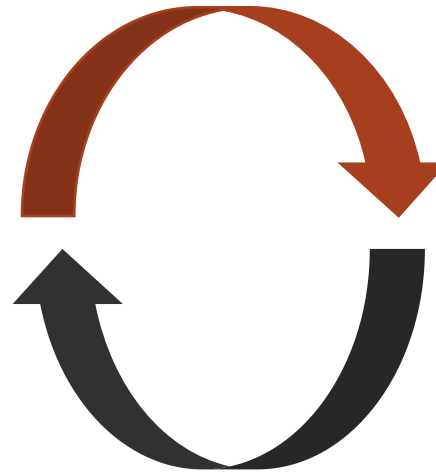# The Effects of AI on Security Professionals

Security Professional

AI

Monitoring AI Performance

Output Evaluation

Providing Feedback

Additional skill sets

Video surveillance and monitoring
Intrusion Detection
Predictive Maintenance
Response
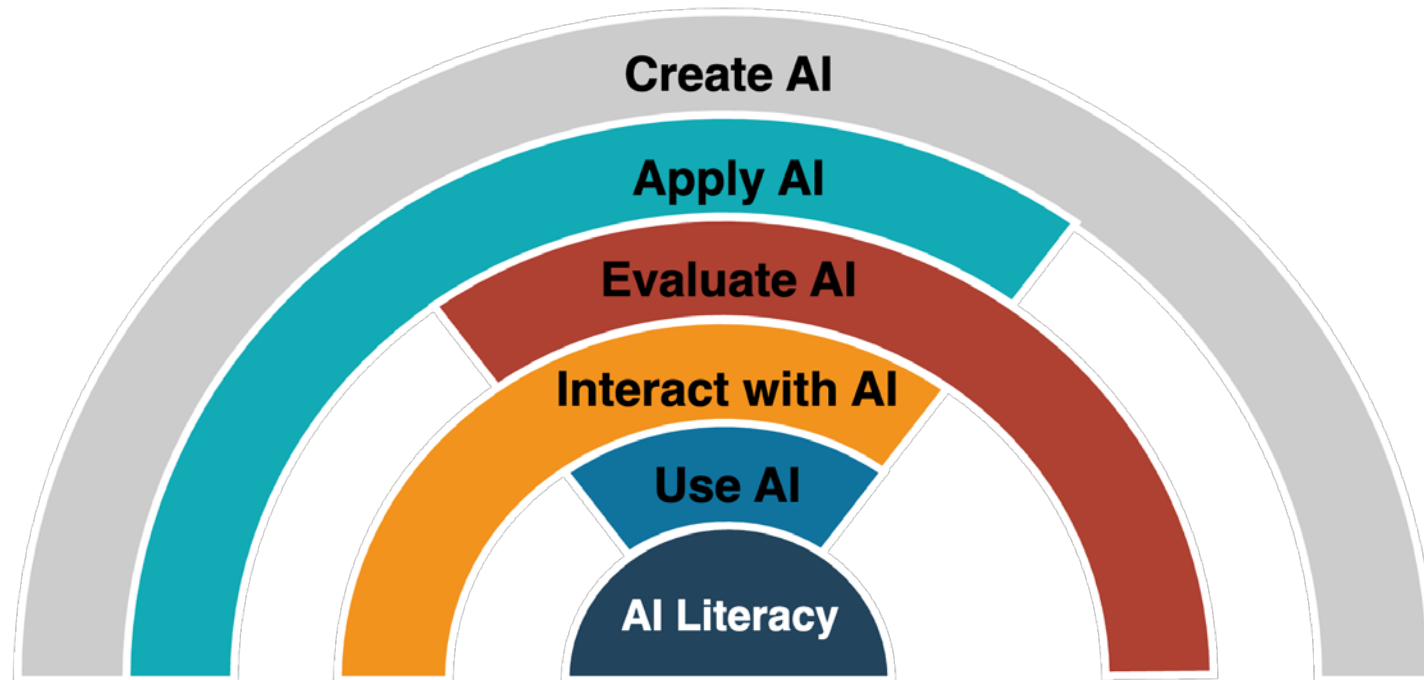Open Source Intelligence
Education

AI Literacy

- "A set of competencies that enables individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI; and use AI as a tool online, at home and in the workplace"
  - Long and Magerko, 2020
- This is not the same as programming literacy
- AI Literacy is a key competency for everyone as the AI landscape continues to evolve

AI Literacy

- There's a spectrum of AI literacy skills staff may need.
  - Different roles will require different levels of AI literacy depending on roles and responsibilities.
  - There may also be new roles that evolve as AI is incorporated.

Figure based on work by Ng et al. https://www.sciencedirect.com/science/article/pii/S2666920X21000357

AI Literacy

- **Create AI**: Know the fundamental theory and operations of AI, how to research and develop novel AI.

- **Apply AI**: Extending novel AI research for implementation and deployment for users; product developers.

- **Evaluate AI**: Understanding the fundamentals of AI enough to evaluate the validity and applicability of an AI product for use.
  - Here, we include ethical evaluation in this category.

- **Interact with AI**: Interface with the AI to generate results in combined, human-in-the-loop workflow. This also includes real-time quality control.
  - Examples: Chatbot interactions for knowledge retrieval

- **Use AI**: Directly use results derived from AI products with limited knowing interaction with the inner workings or underlying concepts of the AI.
  - Examples: Autocorrect, surveillance

New Responsibilities for Existing Roles

- Additional skills for **AI Users**:
    - Understanding how and where AI integrates into larger workflow
    - Appropriately using AI output

- Additional skills for **AI Interactors**:
    - Identifying signs and symptoms of AI failure
    - Understanding AI use case as designed

- Additional skills for **AI Evaluators**:
    - Understanding how and where it makes sense to integrate AI
    - Understanding AI limitations
    - Evaluating AI performance for product selection

Training Management Professionals

- Industry is flooding the market with new AI/ML tools

- Developers may tout benefits while deemphasizing

- Managers must be armed with sufficient knowledge
  - Assess potential risks associated from new AI/ML tools
  - Evaluate validity and usefulness of new AI/ML tools
  - Make sound decisions about promise versus practice

Additional training may be needed to arm non-technical management professionals with the right questions to ask when deciding whether to adopt a new AI tool

New Responsibilities May Require a New Role: AI Assurance Officer

- Monitoring
  - Is there a **mismatch** between the AI's **training data** and the **operational environment**?

- Prediction
  - When is the AI likely to make an **error**?
    - ✓ After technology maintenance?
    - ✓ New objects in the environment

- Feedback
  - What feedback can I provide to developers to accelerate learning?
 - What is the best way to provide this feedback?

AI Assurance Officer Suggested Requirements

- Knowledge of the specific operational environment is very important since a tool's challenges may be unique to that environment

- AI Assurance Officers should . . .
  - Work in the field
  - Use the technology themselves
  - Have regular direct contact with other users

- NOT a requirement
  - Data science background

How do we get there?

- Training *can* and *should* be different for different AI Literacy needs
- New roles, like AI Assurance Officers, may evolve as AI use increases
- Adjusting roles and expected AI core competencies to match with AI interaction will reduce the barriers to understanding and implementation for everyone

Example competency differences between roles
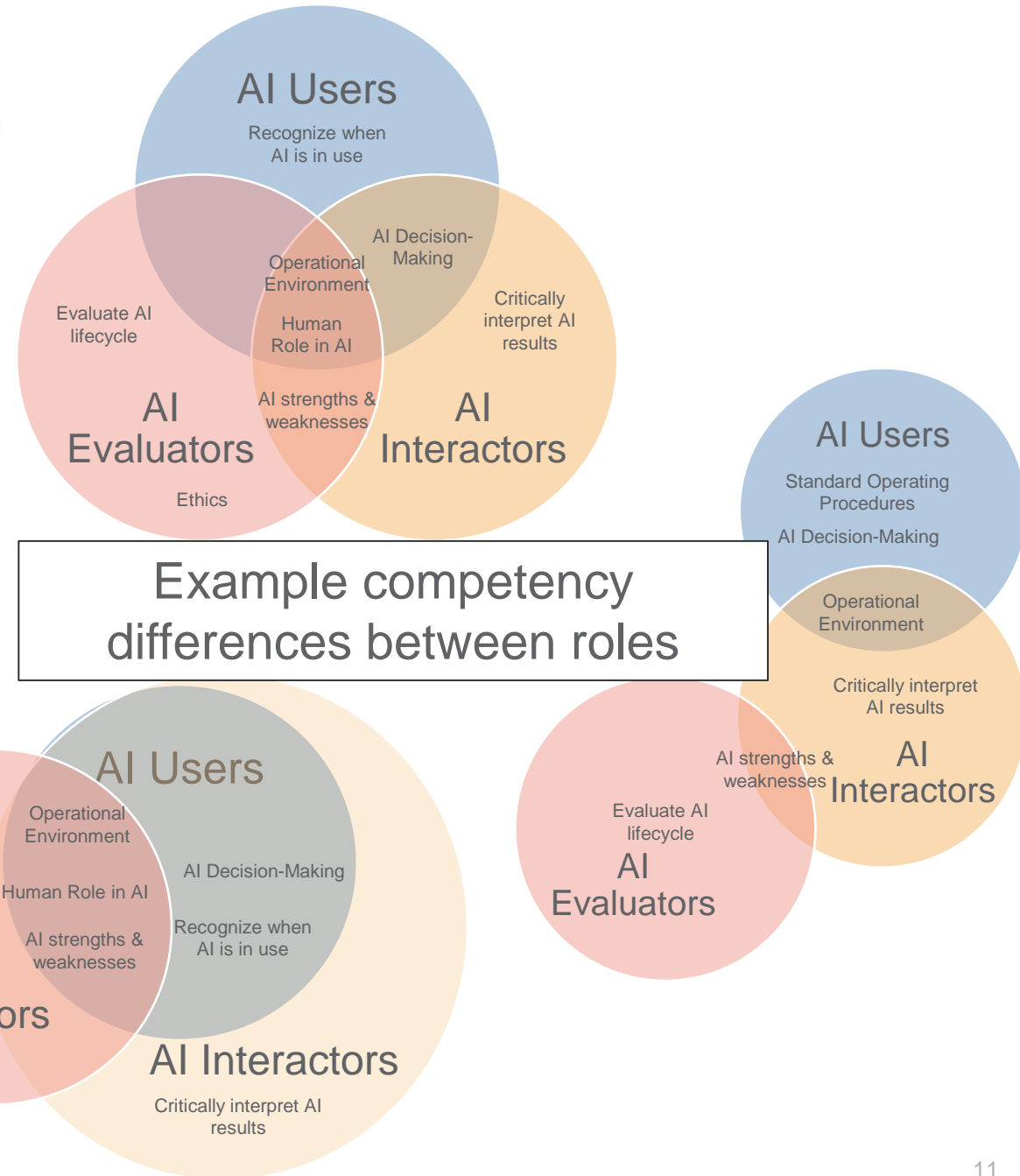
How do we get there?

- **AI Users**:
  - Train in context with hands-on examples
  - Train to identify specific cases of potential AI failure as it applies within user's workflow

- **AI Interactors**:
  - Encourage training via interaction with AI inputs, outputs, and product developers
  - Encourage critical thinking and train to identify signs and symptoms of AI failure
  - Train to pre-empt AI failure by recognizing AI limitations

- **AI Evaluators**:
  - Training should cover a variety of AI topics across the ML lifecycle
  - Encourage critical examination of what defines an AI task versus a human task

Evaluate processes and roles for AI-integration

- Provide a process and infrastructure for feedback from AI users, interactors and evaluators
  - Various types of Feedback to Consider
    - ✓ AI Error Examples
    - ✓ How users are working with the AI: Over reliance? Under reliance? Unexpected benefits?
    - ✓ Any changes that could impact model performance or change operating procedures
- Define challenges that need to be addressed in each role.
  - Does an AI assurance officer make sense for your organization?
  - Identify key knowledge, skills and abilities for integrating AI
  - Redefine standard operating procedures, including the limitations and appropriate use cases for AI-informed tools
- It will take work to implement AI safely and effectively!

Thank you

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