Building an AI-Enabled Cybersecurity Workforce

Eman El-Sheikh, Ph.D.
Associate Vice President and Professor
Center for Cybersecurity, University of West Florida
eelsheikh@uwf.edu
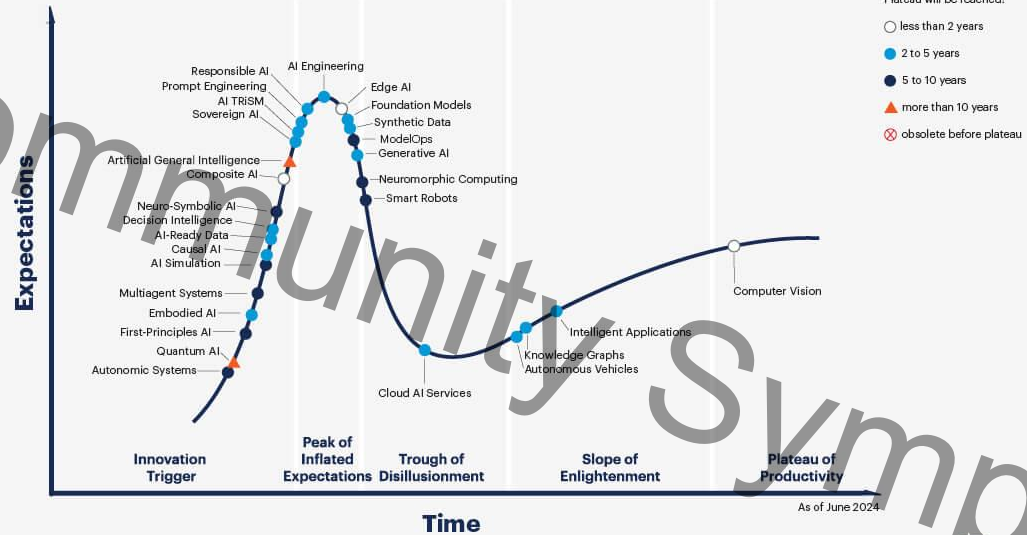
UWF Center for Cybersecurity Highlights

- ✓ Designated by the NSA as a National Center of Academic Excellence in Cybersecurity (NCAE-C)

- ✓ Leads the **National Cybersecurity Workforce Development Program**, **cyberskills2work.org**, funded by NSA ($11.5M) and CISA ($2.9M)
    - ✓ Train 3300+ personnel for cybersecurity roles across 5 years and 10 institutions

- ✓ Received the CAE-CD Community Outreach Award (2022: 1st place and 2023: 2nd place) among 450+ institutions

- ✓ Recognized by the White House Office of the National Cyber Director and highlighted as an exemplar in the National Cybersecurity Workforce and Education Strategy

- ✓ Founded the Women in Cybersecurity Florida Affiliate

- ✓ Served as the Southeast CAE Regional Hub

AI Hype Cycle

- AI is shifting from broad, general applications to more practical, focused implementations.

- Focus on agentic AI, responsible AI governance, and the integration of AI into existing workflows.

Hype Cycle for Artificial Intelligence, 2024

Plateau will be reached:
- ○ less than 2 years
- ● 2 to 5 years
- ● 5 to 10 years
- ▲ more than 10 years
- ⊗ obsolete before plateau

Labels on curve: Responsible AI, Prompt Engineering, AI TRiSM, Sovereign AI, AI Engineering, Edge AI, Foundation Models, Synthetic Data, ModelOps, Generative AI, Artificial General Intelligence, Composite AI, Neuromorphic Computing, Smart Robots, Neuro-Symbolic AI, Decision Intelligence, AI-Ready Data, Causal AI, AI Simulation, Multiagent Systems, Embodied AI, First-Principles AI, Quantum AI, Autonomic Systems, Cloud AI Services, Intelligent Applications, Knowledge Graphs, Autonomous Vehicles, Computer Vision

X-axis (Time): Innovation Trigger, Peak of Inflated Expectations, Trough of Disillusionment, Slope of Enlightenment, Plateau of Productivity

Y-axis: Expectations

As of June 2024

Gartner

AI and Generative AI Trends

- The Generative AI market may exceed $66 billion by 2025 ([Statista](#)) and become a $1.3 trillion market by 2032 ([Bloomberg Intelligence](#))

- 92% of Fortune 500 companies have adopted Generative AI ([Financial Times](#))

- 94% of business executives believe that AI is a key to future success ([Deloitte](#))

- 25% of companies are using AI to tackle labor shortages ([IBM](#))

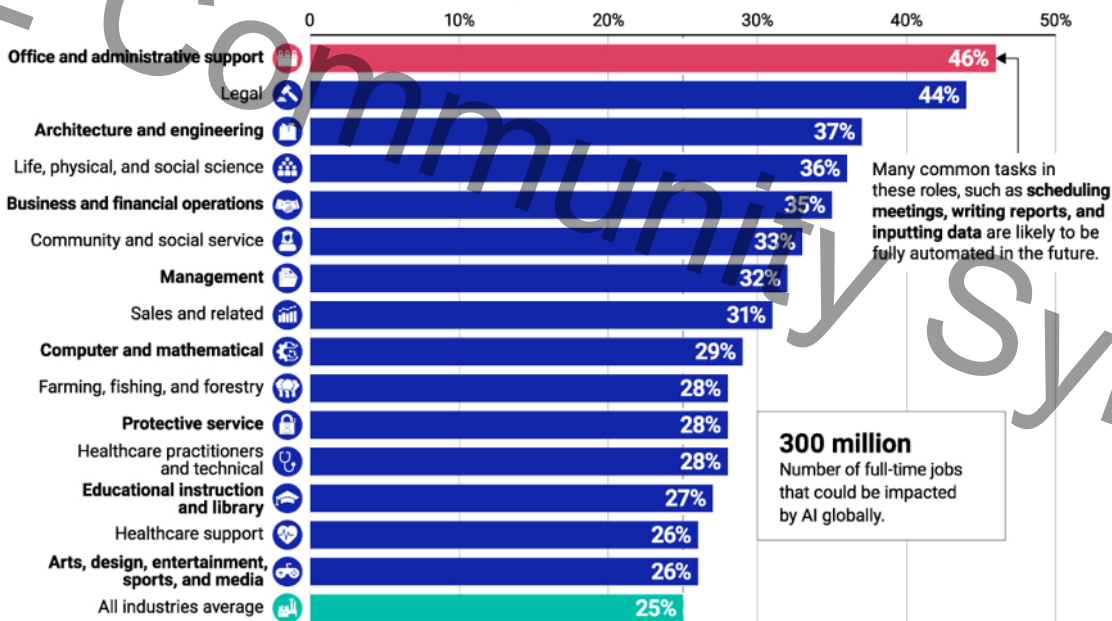- AI may create up to 97 million jobs by 2025 ([We Forum](#))

Impact of AI

By 2030, AI could:

- drive a 7% or ~ $7 trillion increase in global GDP
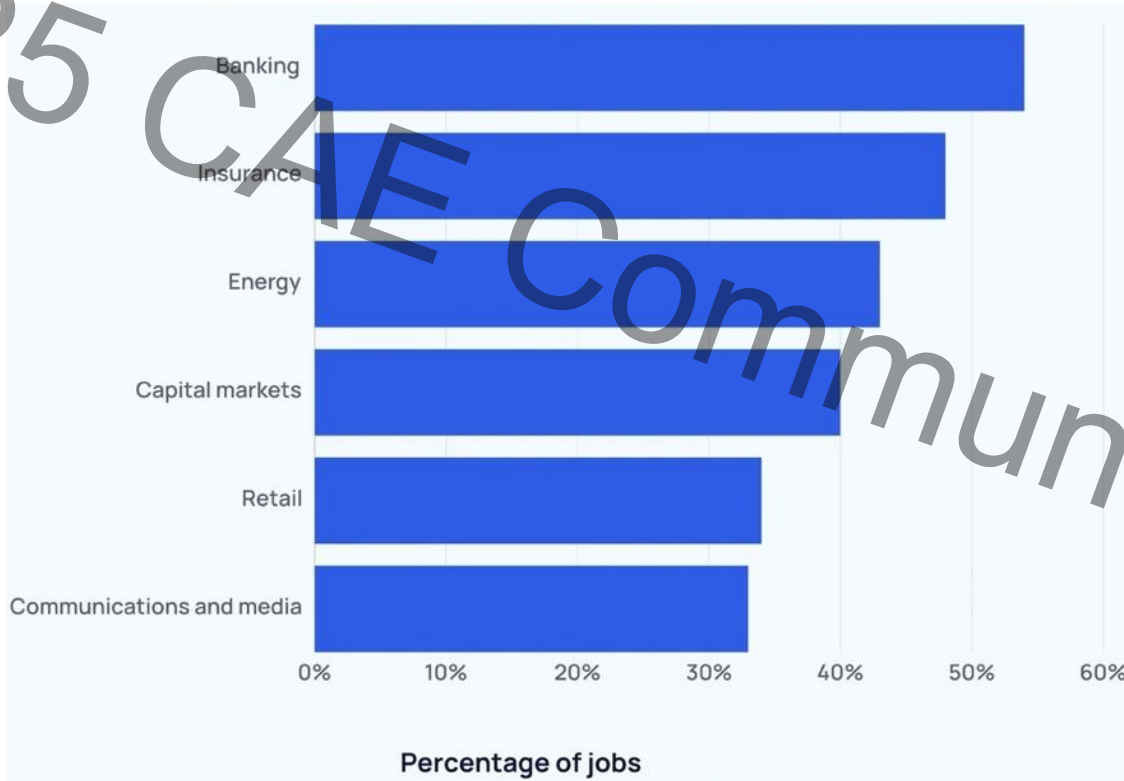
- replace 300 million jobs (Goldman Sachs)

Estimated Share of Employment Exposed to AI Automation

Occupation	Exposure
Office and administrative support	46%
Legal	44%
Architecture and engineering	37%
Life, physical, and social science	36%
Business and financial operations	35%
Community and social service	33%
Management	32%
Sales and related	31%
Computer and mathematical	29%
Farming, fishing, and forestry	28%
Protective service	28%
Healthcare practitioners and technical	28%
Educational instruction and library	27%
Healthcare support	26%
Arts, design, entertainment, sports, and media	26%
All industries average	25%

Many common tasks in these roles, such as **scheduling meetings, writing reports, and inputting data** are likely to be fully automated in the future.

300 million
Number of full-time jobs that could be impacted by AI globally.

Impact of AI on the Workforce

Percentage of jobs

Impact of AI on jobs:

- Optimize job functions

- Reshape existing positions

- Eliminate certain roles

- Create new opportunities

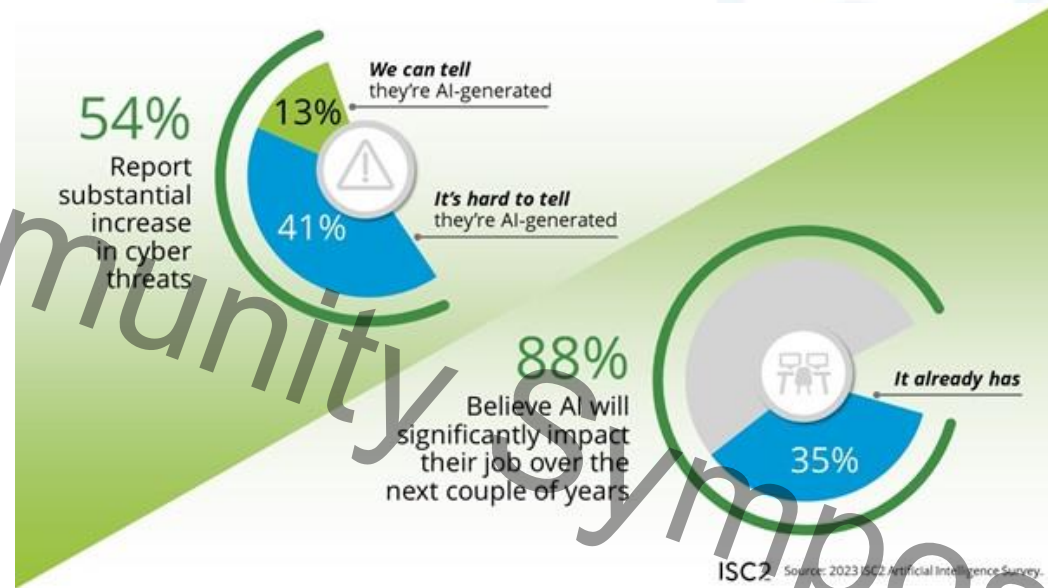Key Industries with Potential for AI Automation, We Forum

Impact of AI on Cybersecurity Workforce

AI is Transforming the Workforce

By 2030...

- AI Could Replace 300 Million Jobs (Goldman Sachs)

- 12 Million Occupational Transitions (McKinsey)

- 30% of Hours Worked Today Could be Automated (McKinsey)

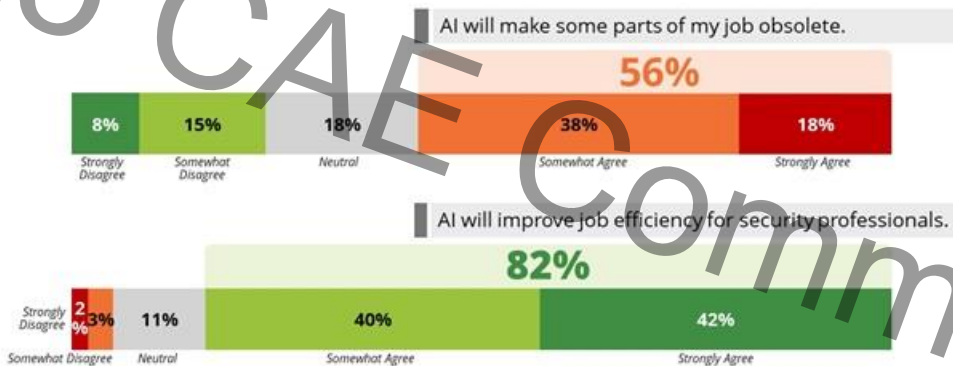**54%** Report substantial increase in cyber threats

13% We can tell they're AI-generated

41% It's hard to tell they're AI-generated

88% Believe AI will significantly impact their job over the next couple of years — It already has

35%

ISC2 Source: 2023 ISC2 Artificial Intelligence Survey.

Source: ISC2 Report

Impact of AI on Cybersecurity Workforce

How will AI affect cybersecurity jobs?

AI will make some parts of my job obsolete. — 56%

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
8%	15%	18%	38%	18%

AI will improve job efficiency for security professionals. — 82%

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
2%	3%	11%	40%	42%

ISC2 Source: 2023 ISC2 Artificial Intelligence Survey.

Source: ISC2 Report

How can AI— including machine learning and generative AI— help cybersecurity professionals?

Analyze user behavior patterns	81%
Automate repetitive tasks	75%
Monitor network traffic and detect malware	71%
Predict areas of weakness where breaches may occur	62%
Detect and block threats	62%
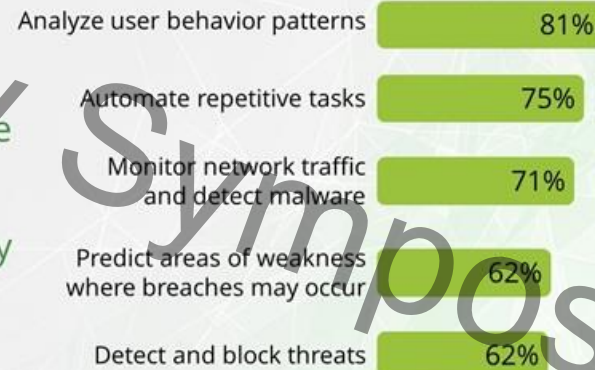
ISC2 Source: 2023 ISC2 Artificial Intelligence Survey.

Essential Skills for an AI-Enabled Workforce

1 Analytical Judgement — 30%

2 Flexibility — 29%

3 Emotional Intelligence — 27%

4 Creative Evaluation — 24%

5 Intellectual Curiosity — 23%
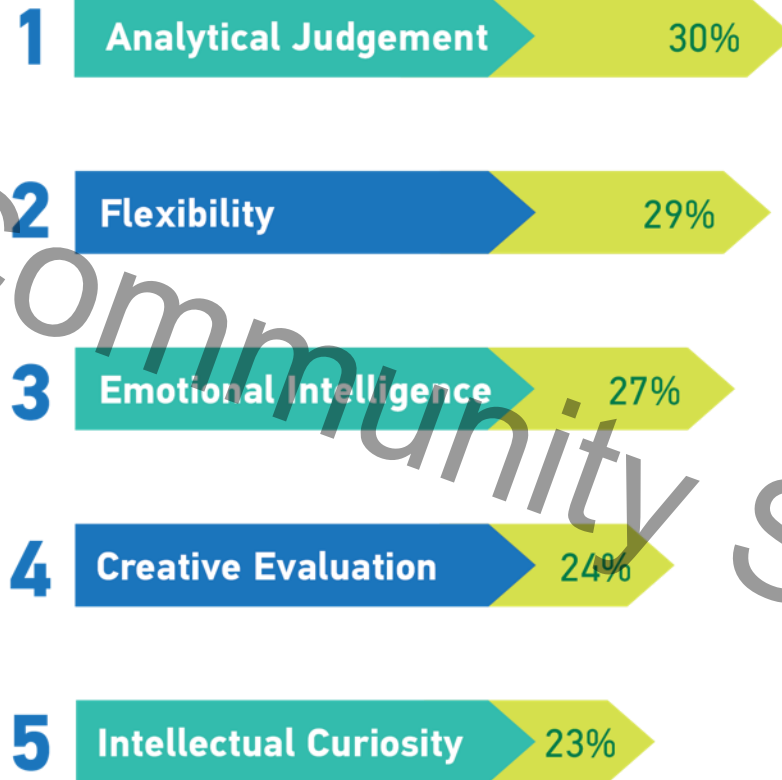
Source: Microsoft, Work Trend Index Report

How Can We Prepare the Future Workforce?

- Infuse AI into everything!

- **Use an agile, layered approach**

All people: **AI Generalist (AI-informed human)**

- Understand AI evolution, benefits, and risks

- Learn about common AI tools and uses, e.g., ChatGPT, Gemini, Dall-E 3

- Infuse basic AI into camps, outreach activities, etc.

- Integrate essential skills for AI

  - Analysis, evaluation, problem solving, intellectual curiosity

AI Generalist

How Can We Prepare the Future Workforce?

- Infuse AI into everything!

- **Use an agile, layered approach**

All majors: **AI Professional**

- Leverage AI tools to improve productivity (project management, communications, meetings, research, reports, etc.)

  - theresanaiforthat.com

  - Top Generative AI tools

- Use AI to enhance different domains, e.g., business, coding, cybersecurity, education, graphic design, healthcare, manufacturing, marketing, law, etc.
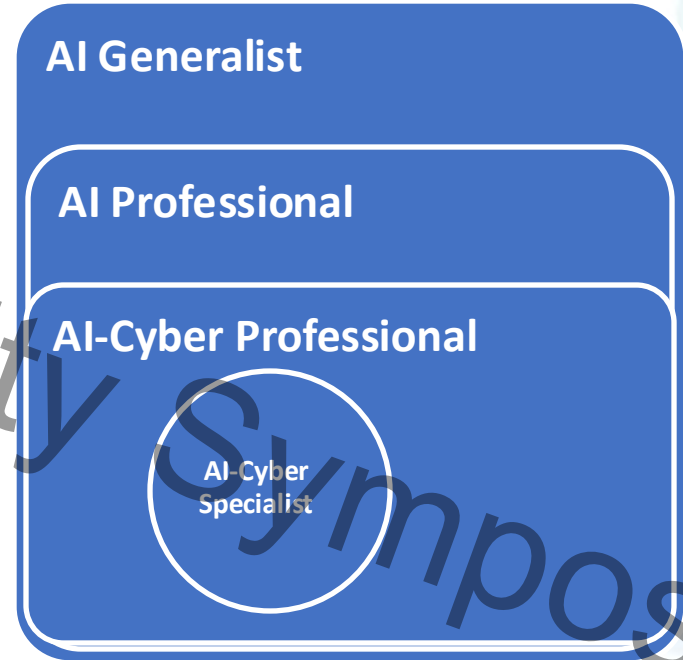
> **AI Generalist**
>
> > **AI Professional**

How Can We Prepare the Future Cyber Workforce?

Cyber and related majors: **AI-Cyber Professional**

- IT and Cybersecurity majors: **AI-Cyber Specialist (AI for Cybersecurity)**
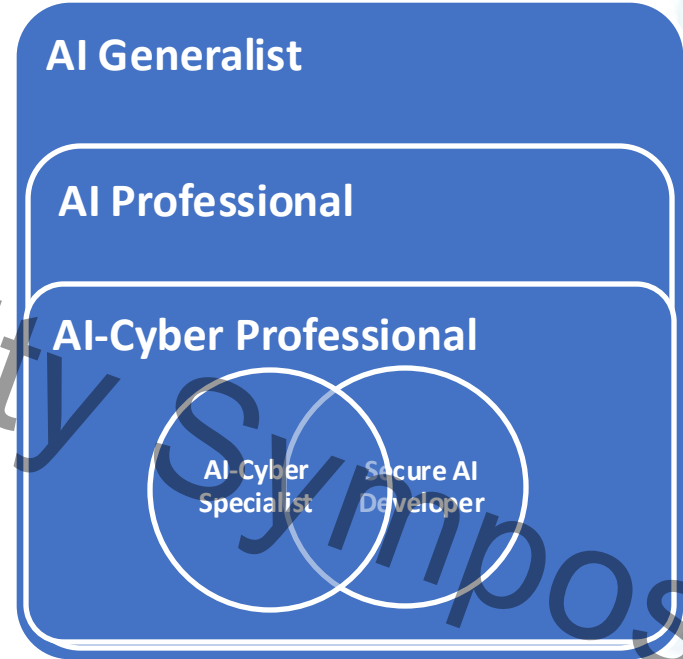
  - Leverage AI to enhance cybersecurity:
    - Semi-automated network monitoring
    - Threat detection
    - Incident response
    - Malware analysis

  - Use ML and DL to solve cybersecurity problems
    - Authentication
    - Anomaly detection

AI Generalist

AI Professional

AI-Cyber Professional

AI-Cyber Specialist

How Can We Prepare the Future Cyber Workforce?

Cyber and related majors: **AI-Cyber Professional**

- Computer Science and Software Development majors: **Secure AI Developer (Security of AI)**

  - Use Secure AI frameworks

  - Develop secure AI applications and systems

  - Adopt standards and tools to ensure that AI systems are safe, secure, and trustworthy

- NSF/NSA CyberAI Project:

  - https://towson.edu/cyberai

  - AI-Cyber and Secure AI Programs of Study

AI Generalist

AI Professional

AI-Cyber Professional

AI-Cyber Specialist   Secure AI Developer

How Can Higher Education Adapt?

<u>Use a Phased Approach</u>

Embed AI topics and modules into courses

Develop AI courses or certificates
- **Embed essential AI skills**

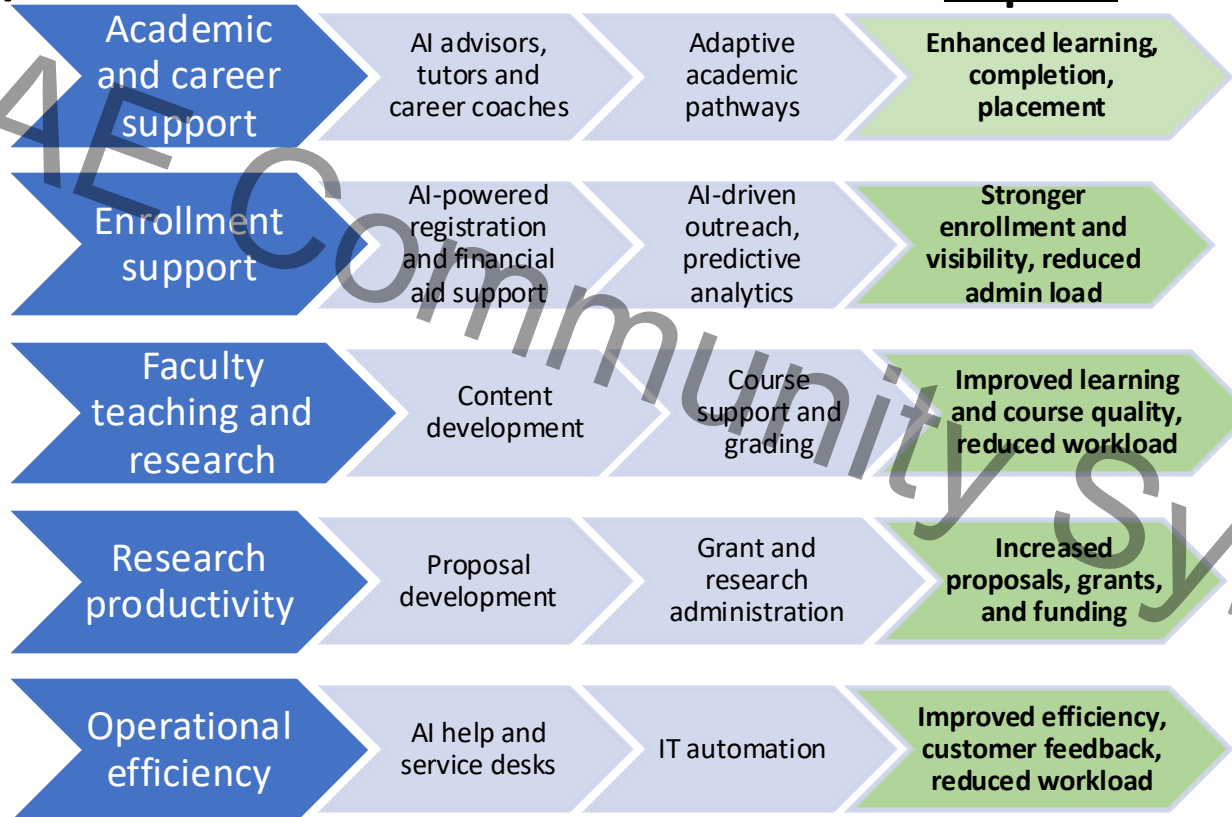**Develop multidisciplinary AI pathways**
- **Leverage institutional strengths**

Develop upskilling and reskilling programs

How Can Higher Education Adapt?

Enhance Operations and Services

Impacts

Academic and career support	AI advisors, tutors and career coaches	Adaptive academic pathways	**Enhanced learning, completion, placement**
Enrollment support	AI-powered registration and financial aid support	AI-driven outreach, predictive analytics	**Stronger enrollment and visibility, reduced admin load**
Faculty teaching and research	Content development	Course support and grading	**Improved learning and course quality, reduced workload**
Research productivity	Proposal development	Grant and research administration	**Increased proposals, grants, and funding**
Operational efficiency	AI help and service desks	IT automation	**Improved efficiency, customer feedback, reduced workload**

How Can Higher Education Adapt?

Leverage Existing Frameworks and Resources

- AI Tools: theresanaiforthat.com

- Generative AI Tools: https://www.eweek.com/artificial-intelligence/generative-ai-apps-tools/

- NIST AI Risk Management Framework (AI RMF): https://www.nist.gov/itl/ai-risk-management-framework

- Intel AI courses and certifications: https://www.intel.com/content/www/us/en/developer/topic-technology/artificial-intelligence/training/overview.html

- NSF/NSA CyberAI Project: https://towson.edu/cyberai

- CLARK Curricular Repository: https://clark.center

- Coalition for Secure AI (CoSAI): https://www.coalitionforsecureai.org/

- Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence: https://www.whitehouse.gov/briefing-room/statements-releases/2023/10/30/fact-sheet-president-biden-issues-executive-order-on-safe-secure-and-trustworthy-artificial-intelligence/

Thank you!

Eman El-Sheikh, Ph.D.

University of West Florida Center for Cybersecurity

eelsheikh@uwf.edu

www.linkedin.com/in/emanel-sheikh

uwf.edu/cybersecurity