AI in Cyber

HNC-CY Days 2023

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Document Markings

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CERT Data Science (CDS)

General Research Areas

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AI for cybersecurity

- Networks (NetFlow, attestation & trust, etc.)
- Threat hunting (traditional and advanced persistent)
- Combatting disinformation (videos, images, text)

Cybersecurity for AI

- Data security (theft, poisoning)
- Model security (theft, extraction, inversion)

Quantum Computing

- Cybersecurity for quantum
- Quantum for cybersecurity

Applied Data Science for Cybersecurity Professional Certificate Program

- Fundamentals of Statistics
- Advanced Analytics: NetFlow
- Advanced Analytics: Malware
- Advanced Analytics: Digital Forensics
- Certificate Examination

Enrollment is easy:
https://www.sei.cmu.edu/education-outreach/

Webcast for more info:
https://resources.sei.cmu.edu/library/asset-view.cfm?assetid=976665

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Recent CERT Data Science Research Examples

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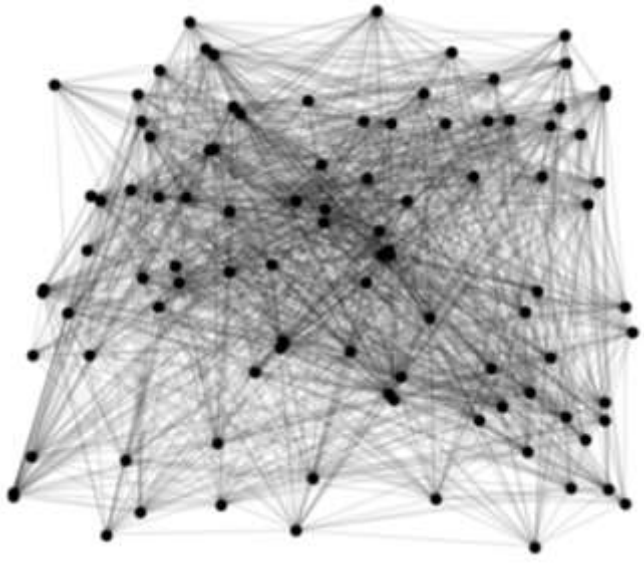
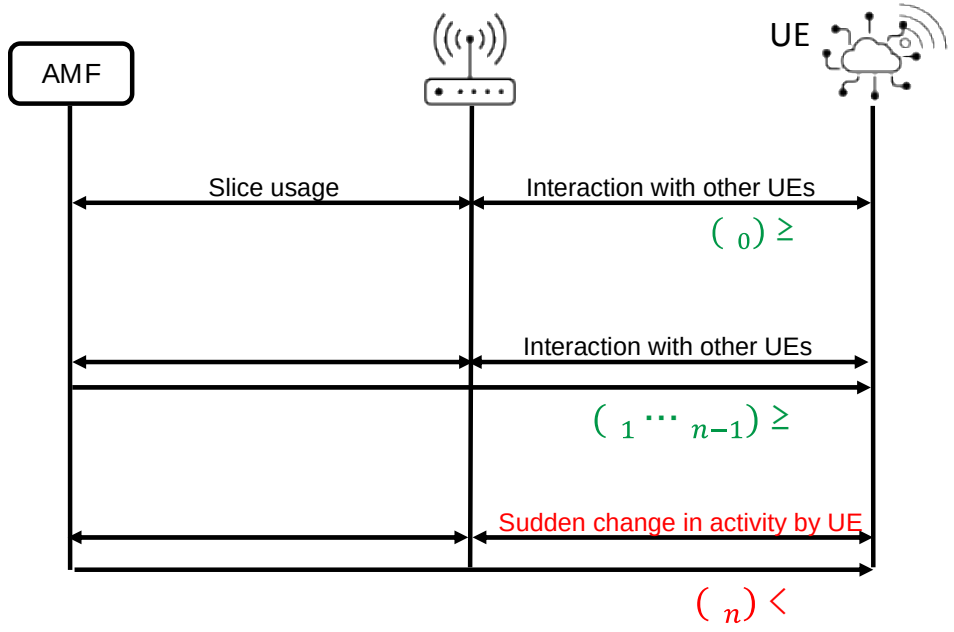
Trust modeling in next generation networks

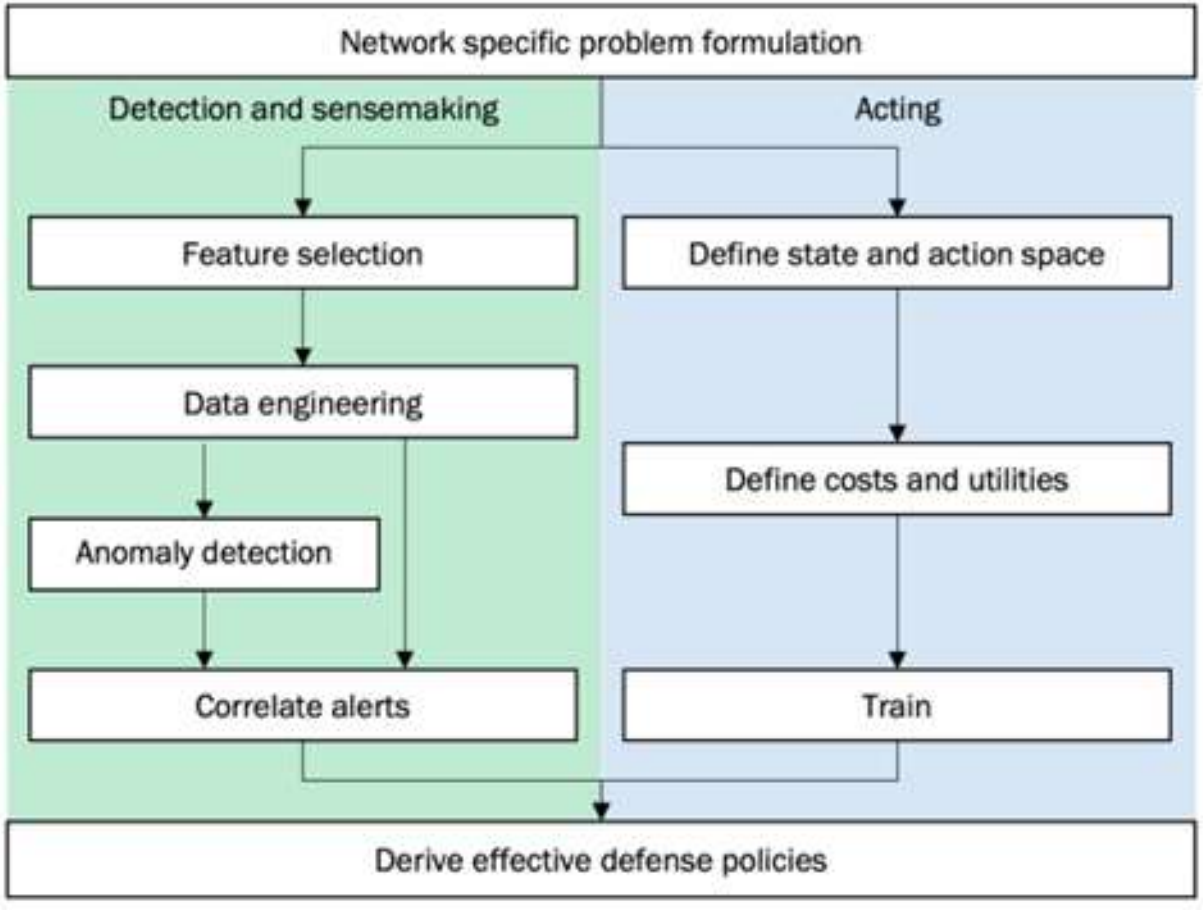




Can we assert how much each device should trust its neighbors?

Our method is risk-informed, reliable, and scalable

Advanced Persistent Threat Detection



Current state of research

- Anomaly detection
- Correlating low-level events
- Designing defenses by gamification

Can AI/ML improve upon, or complement, existing APT detection methods?

Threat Detection across Multiple Networks

- **CyberSentry**
  - CISA-managed threat detection and monitoring
  - U.S. critical infrastructure
  - Risk-informed
- **SEI**
  - Cloud visibility & threat analytics

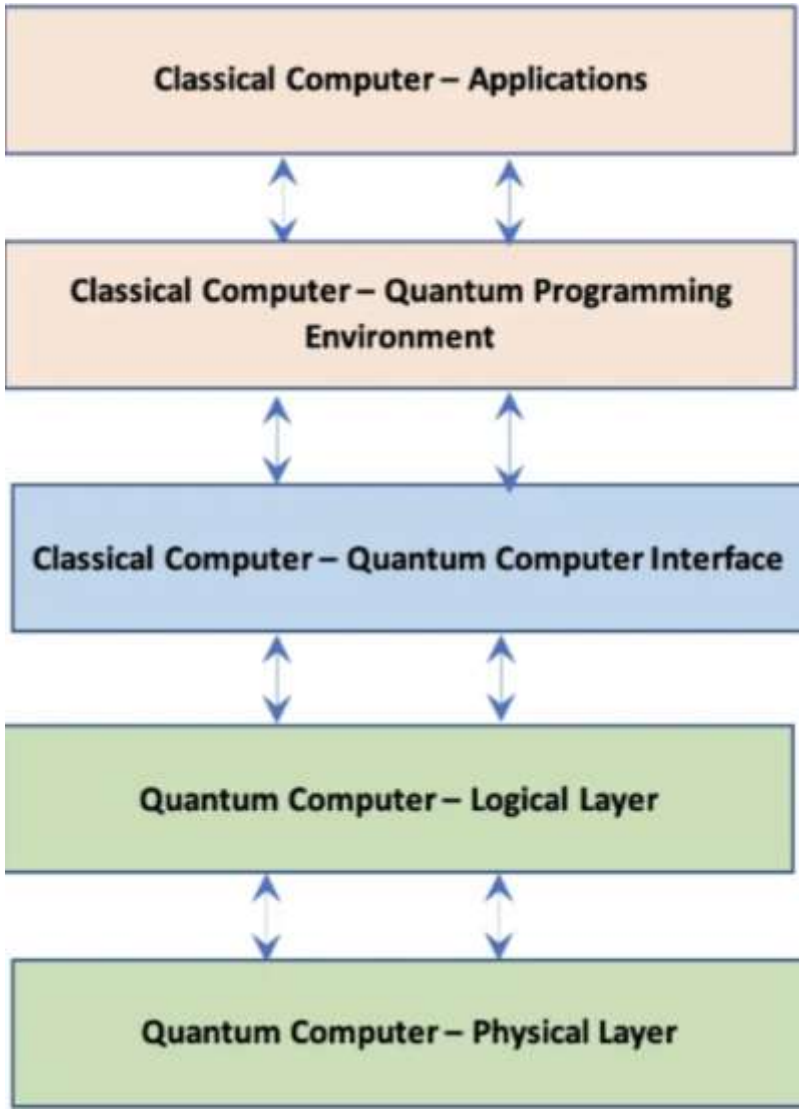
Can AI/ML methods improve threat detection when monitoring across multiple networks, vs. monitoring networks individually?

Quantum Cybersecurity

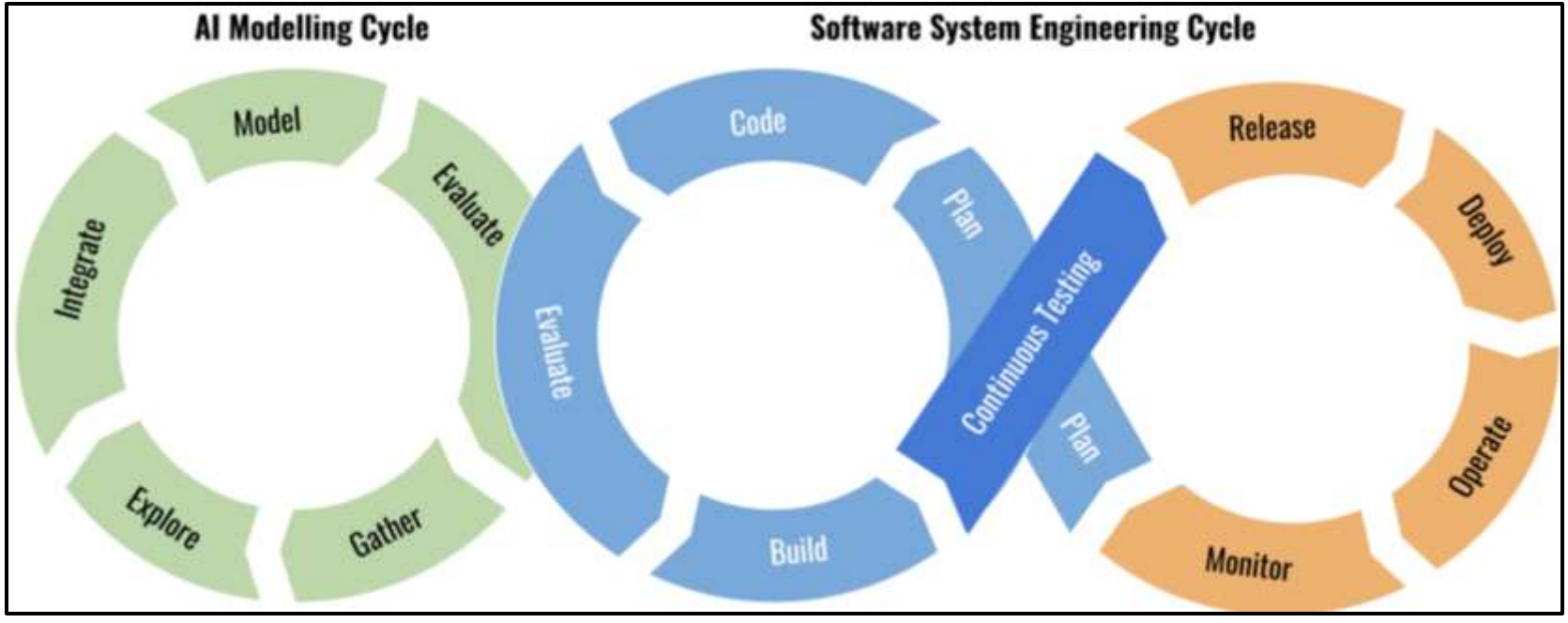
Research needs

- Secure large-scale control systems
- Distributed HP quantum computing
- Quantum computer attack vectors
- Methods for safe quantum systems
- Multi-layered instrumentation framework
- Tools to verify quantum algorithms

How can all this be done securely?



Secure, agile MLOps systems



How can we ensure effective, efficient, and secure ML-enabled software?

We present best-practices and a reference architecture that combines DevSecOps and Agile

Forensic analysis of digital media

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Generative AI allows people to manipulate content at unprecedented speed and scale

We developed a toolbox of methods to detect digital forgeries and manipulation

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Open brainstorming of how SEI CDS could support HNC-CY

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