Deployment of Advanced Technologies at Nuclear Facilities: Ethical and Legal Considerations

April 4, 2019

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Overview

- Whether adopting advanced technologies or establishing security protections against them, it is important to take legal and ethical considerations into account
- Legislative and regulatory framework for advanced technologies at nuclear facilities
  - Remote Operated Weapons Systems
  - State UAV Regulation
- Ethical Considerations
  - Biometrics and Monitoring
  - Human Workforce
  - Responsibilities When Technology Outpaces Regulation

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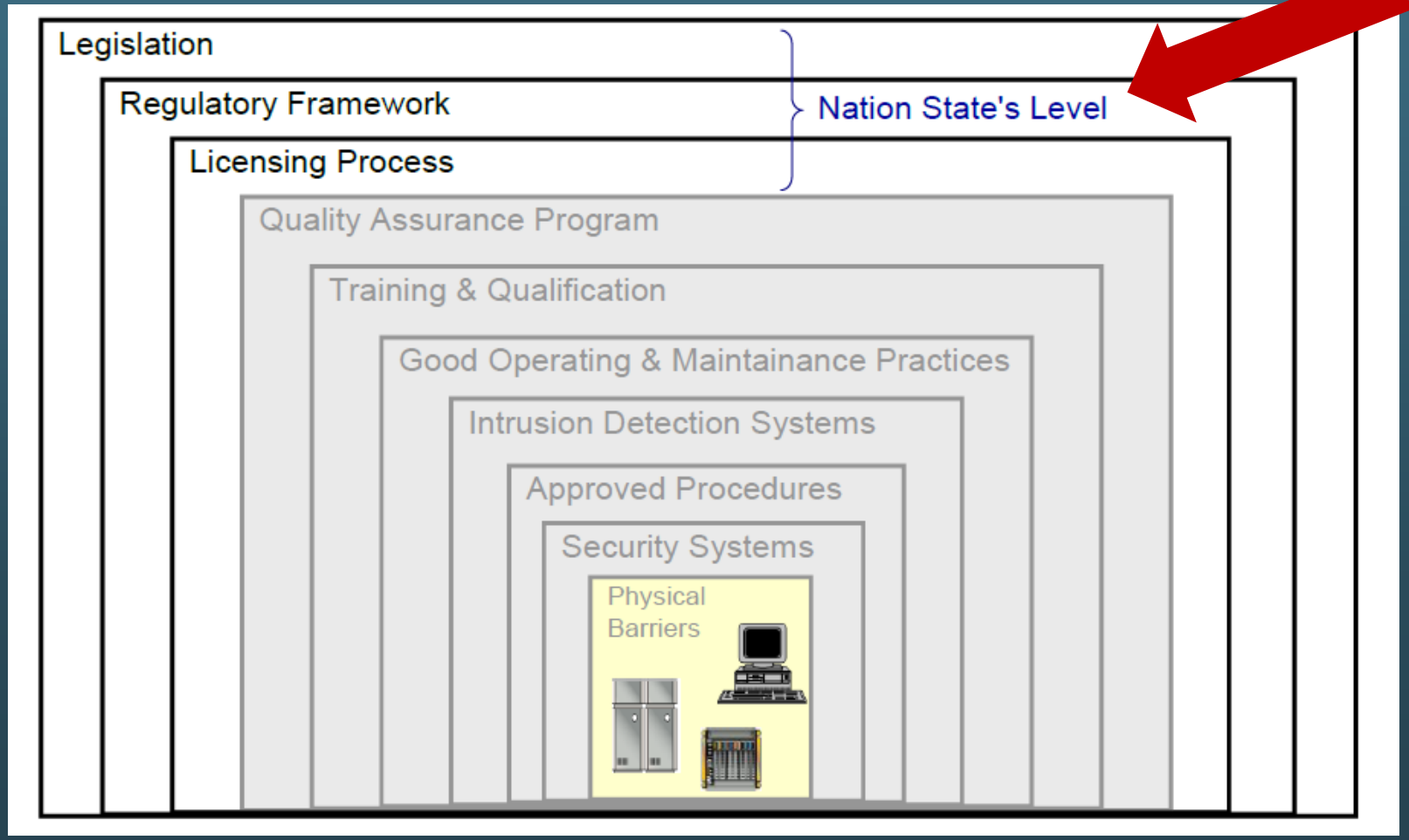
Legislative and Regulatory Framework in Nuclear Security

Defense-in-depth model for cyber security in the nuclear context



We are here.

Source: Institute for Security and Safety, Cyber Security at Nuclear Facilities (2015)

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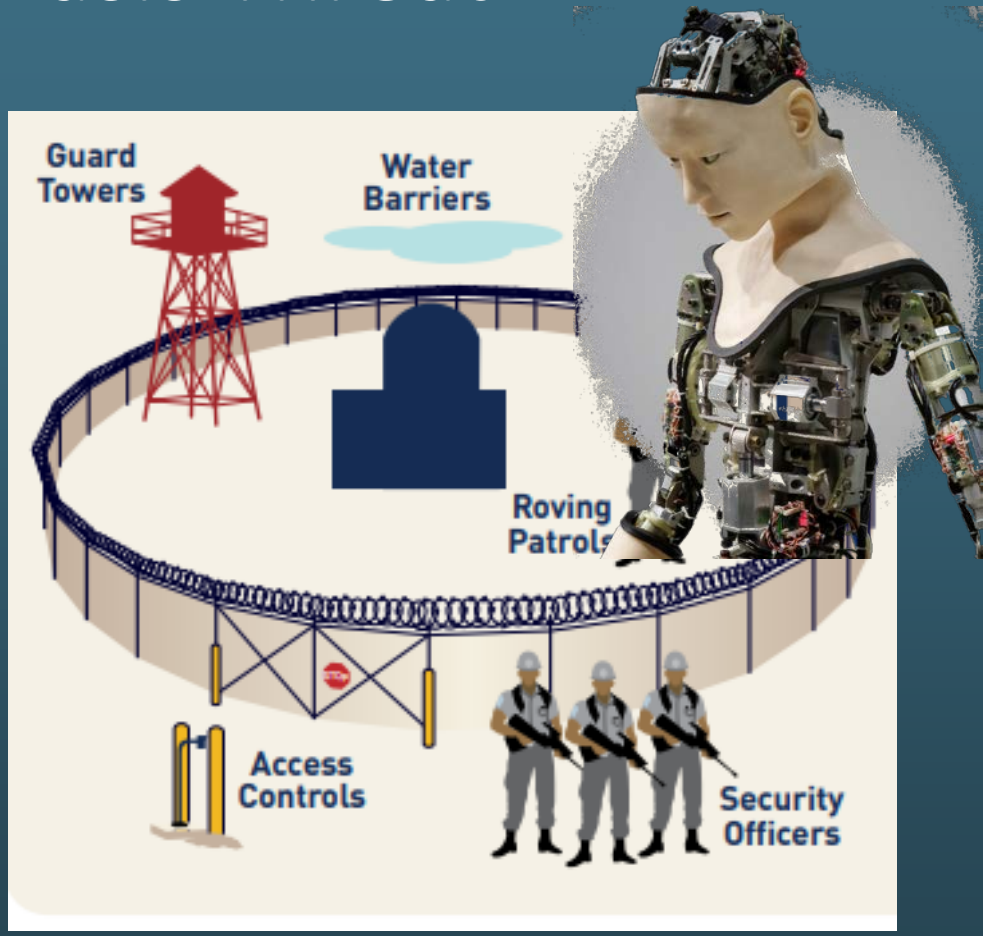
Legislative and Regulatory Framework in Nuclear Security: Establishing the Design Basis Threat

- Nuclear power plants and fuel facilities that handle enriched uranium must be able to defend successfully against a set of threats called “Design Basis Threats” or “DBTs”
- INFCIRC/225/Rev.4, Recommendations for Physical Protection of Nuclear materials and Nuclear Facilities:
  - A DBT is a description of the attributes and characteristics of potential insider and/or external adversaries who might attempt unauthorized removal of nuclear material or sabotage against which a physical protection system is designed and evaluated.
- DBTs need to be continuously evaluated in the face of advanced technologies and new cyber threats
- Gates, Guards, Guns, and ***Robots?***



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Regulation of Remote Operated Weapons Systems (ROWs): Baseline Standard

- In 2008, U.S. Department of Energy developed a baseline standard for ROWs
  - DOE-STD-1047-2008 Safety Function and Other Features of Remotely Operated Weapons Systems
- This standard applies to remotely operated weapon systems that are aimed at specific points in space (e.g., stun guns, machine guns).
- The overall philosophy for safety of remotely operated weapon systems is that no single action or event can cause inadvertent firing of the weapon.
- Remotely operated weapon systems must not fire except upon command of a human operator.

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Regulation of Remote Operated Weapons Systems (ROWs): Regulatory Considerations

- U.S. Nuclear Regulatory Commission: No separate licensing program for ROWs
  - Determined that current regulatory framework was adequate to license ROWs
- August 2012, Nuclear Energy Institute published "Guidance on Submitting Security Plan Changes" for operators who choose to utilize ROW technology (NEI 11-08)
  - Any security plan change must explain how it continues to meet the requirements of 10 C.F.R. § 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage"
- Example: For licensees who are considering a security plan change that will reduce the staffing levels for armed responders (AR) and/or armed security officers (ASO), or will add, modify, or remove a security measure, the licensee must submit information that is sufficient for the NRC to understand the nature of the change, the impacts that the change will have on the licensee's security program, and the impact that the change will have on the continued ability of the licensee to meet regulatory and security plan requirements.

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Regulation of Remote Operated Weapons Systems (ROWs): Regulatory Considerations

- Considerations for Licensing:
  - Protective strategy (e.g., minimum number of armed personnel, timelines, equipment or systems necessary to prevent significant core damage and spent fuel sabotage)
  - Blast analysis; determine the minimum stand-off distance and location of the vehicle barrier system to include the protection of ROWS hardware, ROWS supporting structures, ROWS operators, and personnel or equipment used to compensate for inoperable ROWS.
  - ROWS operator's normal duties, as well as actions, capabilities, and timelines, etc., in the event that the ROWS become inoperable during a contingency event.
  - Type of safety measures or inherent safety features to minimize the potential for the ROWS to inadvertently transition to the firing mode or have an unintentional discharge

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Regulation of Remote Operated Weapons Systems (ROWs): Use of Force

- Individual State Laws
- 10 C.F.R. 73.55(k)(3)
  - The licensee shall train each armed member of the security organization to prevent or impede attempted acts of radiological sabotage by using force *sufficient to counter* the force directed at that person, including the use of deadly force when the armed member of the security organization has a *reasonable belief* that the use of deadly force is necessary in self-defense or in the defense of others, or any other circumstances as authorized by applicable State or Federal law.
- Site's Physical Security Plan
- Site's Firearms Policy based on a Use of Force Continuum
- NRC Information Note 89-05, "Use of Deadly Force by Guards Protecting Nuclear Power Reactors Against Radiological Sabotage"

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State UAV Regulation: Overview

- Understanding what types of UAVs are legally allowed to be in what airspace directly influences the security design and operations decisions for nuclear facilities
- Considerations
  - Definition of civilian UAV (generally defined by weight—less than ~25kg)
  - Whether UAV required to remain in Visual Line of Sight (VLOS) of operator
  - Timing of operations (many are daytime only)
  - Max altitude (~120-150 meters above ground level)
  - Certification of operators

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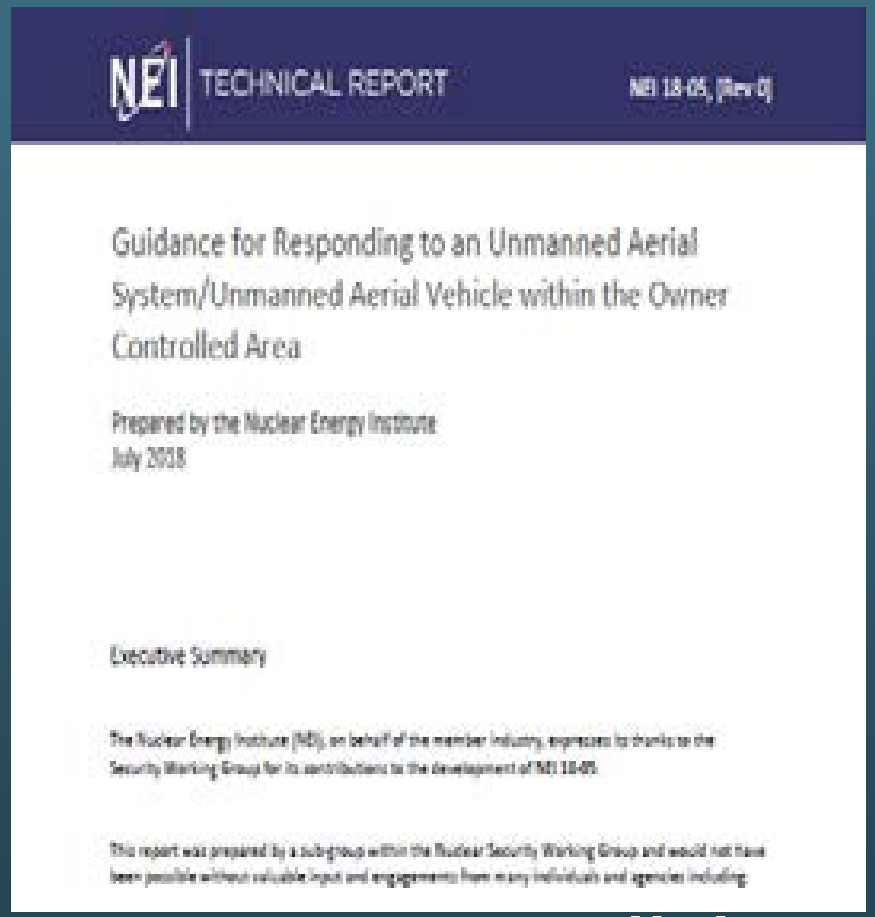
State UAV Regulation: Flyovers of Sensitive Facilities

- What can operators do if a drone flies near a facility?
  - Or, flies over our facility within the Owner Controlled Area?
  - Or, lands or crashes within the Owner Controlled Area ?
    - Detect – Assess – Report
- NEI 18-05: guidance on addressing drone overflights



NEI | TECHNICAL REPORT NEI 18-05, [Rev 0]

Guidance for Responding to an Unmanned Aerial System/Unmanned Aerial Vehicle within the Owner Controlled Area

Prepared by the Nuclear Energy Institute
July 2018

Executive Summary

The Nuclear Energy Institute (NEI), on behalf of the member industry, expresses its thanks to the Security Working Group for its contributions to the development of NEI 18-05.

This report was prepared by a subgroup within the Nuclear Security Working Group and would not have been possible without valuable input and engagements from many individuals and agencies including

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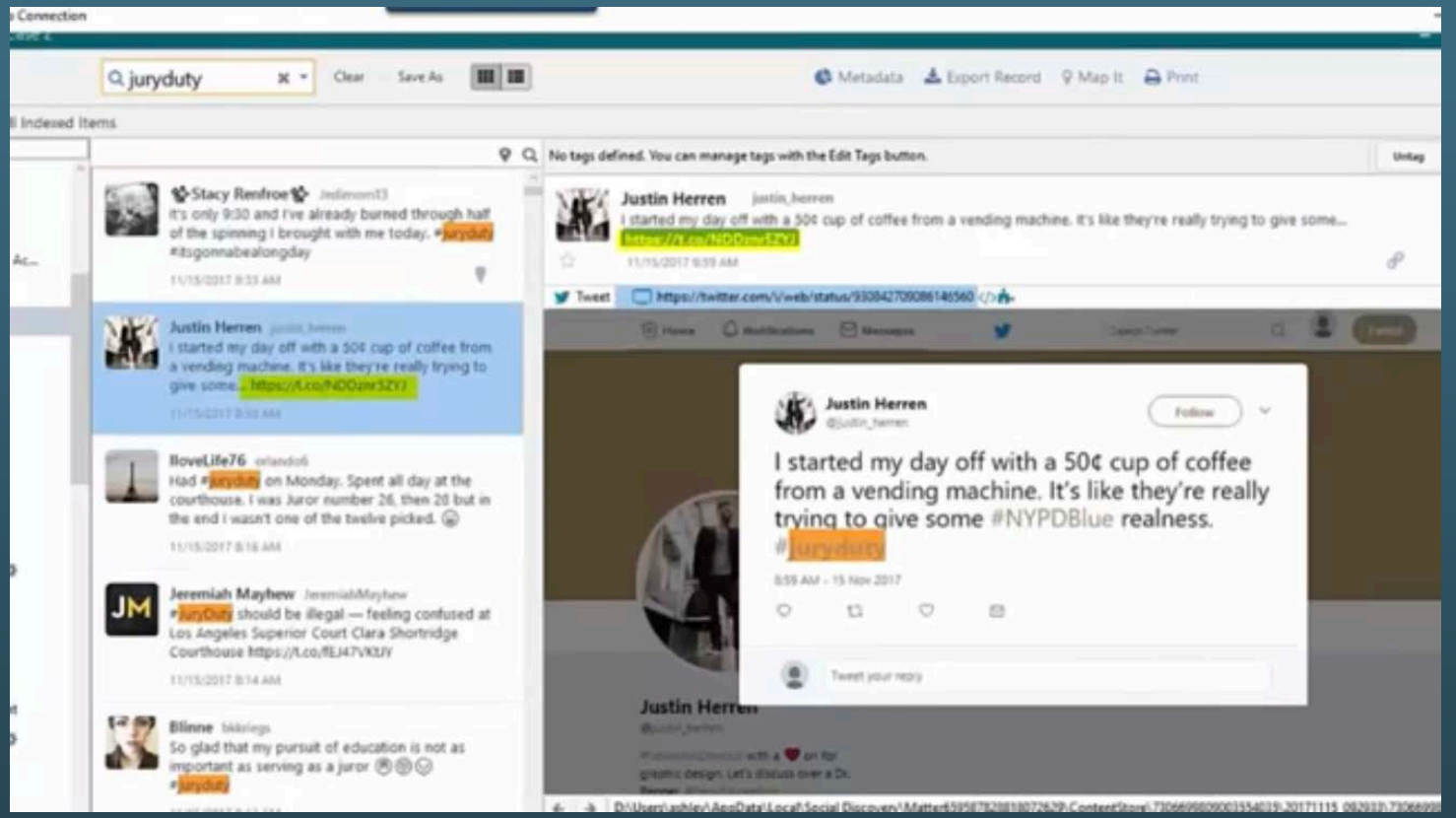
Ethical Considerations: Biometrics and Social Media Monitoring

- Biometrics
  - Ownership of biometric data
  - GDPR identifies biometric data as “sensitive category of personal data”
- Social Media Monitoring
  - Programs can be purchased “off the shelf”
    - Examples: XI Social Discovery, Geofeedia, Dataminr, and MediaSonar
  - Monitored information is publicly available
  - Differing legal regimes for social media monitoring of employees



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Ethical Considerations: Human Workforce

- Pros
  - Less exposure of personnel to potential threats
  - Potential cost reduction
  - No self-preservation instinct—eliminating the need for a "shoot first, ask questions later" attitude
  - Force multiplier
- Cons
  - Reduction of trained human workforce
  - Potential lack of accountability

Advertisement for Remote Operated Weapons System

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Ethical Considerations: Use of Deadly Force

- Even without ROWs, there are still issues regarding the protections that officer receive if they shoot at intruders at nuclear plants who may be armed or unarmed.
  - Is there a threat to the officer that would justify shooting first?
- If you have a well protected officer operating a remote system, that personal risk would be much lower. How does that change the threshold about when you can shoot an armed intruder?

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Ethical Considerations: Responsibilities When Technology Outpaces Regulation

- Legal and ethical regimes are the slowest to respond to changes in technology
- What if regulatory compliance is viewed a baseline?
- Where does the burden lie in terms of government and industry stakeholders to evaluate and assess currently regulations affecting security and ensure they are relevant to current threats
  - License holders must have the organizational capacity to respond swiftly to these developments, and may sometimes be called upon to act beyond regulatory requirements, especially if regulations have not been adjusted to address dynamic threats.
- Compliance does not necessarily equate to security

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Ethical Considerations: Responsibilities When Technology Outpaces Regulation

- In the case of an incident, what might a court consider?
  - Common industry practices such as codes of conduct
  - Voluntary best practice guides developed by authoritative sources such as the IAEA
  - It is in the license holder's interest not only simply to comply with regulations, but also exhibit organizational capacity for continuous improvement, by way of considering best practices outside of regulatory requirements.

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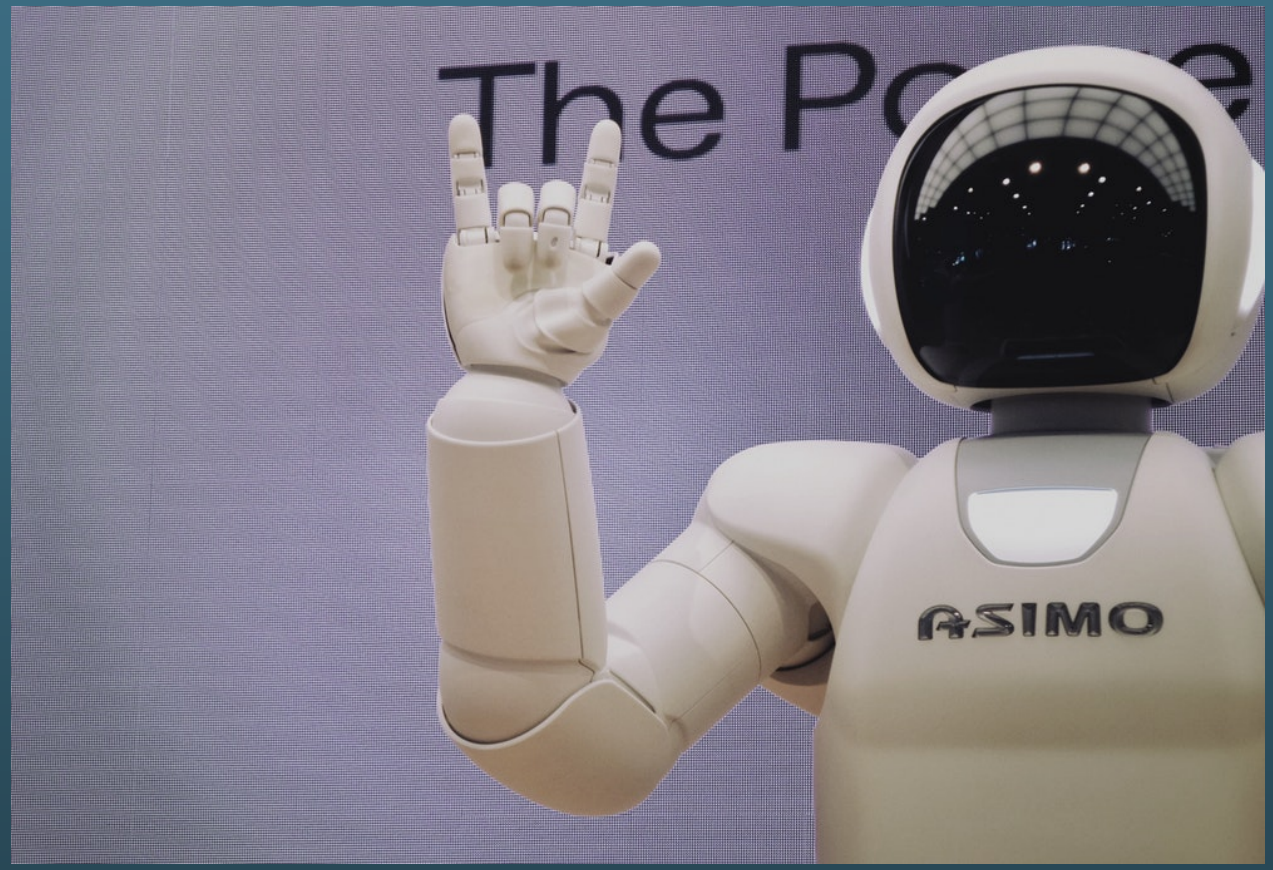
Questions?



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