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Ethics in Artificial Intelligence

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Workshop Learning Objectives

1. **Understanding Artificial Intelligence:** By the end of this presentation, participants will be able to identify and explain the core ethical principles that should guide the development and deployment of AI systems, including transparency, accountability, fairness, privacy, and beneficence.

2. **Recognize Common Ethical Dilemmas and Challenges in AI:** By the end of this presentation, participants will be able to recognize and discuss common ethical dilemmas associated with AI technologies, such as bias in algorithms, privacy concerns, the impact on employment, and the use of AI in decision-making processes.

3. **Analyze Case Studies to Apply Ethical Principles in AI Contexts:** By the end of this presentation, participants will be able to analyze case studies involving AI applications (e.g., facial recognition, autonomous vehicles, healthcare AI) and apply ethical principles to evaluate the ethical considerations and implications of these technologies.

4. **Where Ethics meets Insurability:** By the end of this presentation, participants will have a better understanding of how utilizing AI could impact the standard of care and insurability with Professional Liability.

Today's Agenda

- ✓ Artificial Intelligence Basics
- ✓ Ethical Dilemmas of AI
- ✓ Analyze AI Case Study
- ✓ Standard of Care & Insurability
- ✓ Summary

Artificial Intelligence by the Numbers

- **5%** are currently using AI in daily some operations.
- **17%** don't currently see any useful applications of AI presently.
- **40%** intrigued by the potential of AI, but don't currently see any practical applications
- **29%** are investigating some potential applications.

- AI - most common activities use; provide design options (conceptual/design development) and for marketing/market development.
- Future, 38% most long-term potential is for design options, marketing/market development (35%), zoning and code compliance (34%), and material/product selection/specification (28%).
- 90% expect increase usage over the next three years.

Examples of AI Utilization

1.) Adaptive remodeling of floor plans.

2.) Optimizing building performance, which may include calculating thermal efficiency or generating myriad combinations for cooling, heating, and lighting systems.

3.) Scanning voluminous drone images for various evaluative purposes.

4.) Summarizing and comparing codes, rules of authorities and jurisdiction, planning policies, different materials, etc..

5.) Optimizing site plans for climate, noise, and energy.

6.) Creating concept level design options.

7.) Creation of 3D models.

8.) Assessing development opportunities for lots.

9.) Rather than conducting experiments, using machine learning to test different building and environmental scenarios.

10.) Simulating airflow.

11.) Modeling climate patterns.

12.) Generating the design of structural beams based on proprietary firm data.

13.) Creating and using digital versions of physical elements or systems for analytical purposes.

14.) Aggregating and analyzing the mass data of large road or highway systems for mission-critical design-making.

15.) Analysis of soil data to plot optimal building location.

AI- 3 stages

- <u>Artificial Narrow Intelligence (ANI)</u> or Weak AI-the stage of AI where machines can only perform a narrowly defined set of specific tools. There is no thinking ability.
- <u>Artificial General Intelligence (AGI)</u> or Strong AI- the stage of AI where machines can think and make decisions like humans. Currently, this does not yet exist.
- <u>Artificial Super Intelligence (ASI)</u>- the stage of AI where computers surpass the capabilities of human intelligence. Currently, this does not yet exist.

- Not quite there…

Ethical Dilemmas

Top 5 Ethical Dilemmas for Engineers

1. **Bias and Fairness**

2. **Accountability and Responsibility**

3. **Job Displacement and Economic Impact**

4. **Long-term Impact and Safety**

5. **Intellectual Property and Ownership**

Bias and Fairness

Bias in AI

- **Definition:** Systematic errors favoring certain outcomes.
- **Causes:**
    - **Training Data:** Reflects historical/societal prejudices.
    - **Algorithm Design:** Decisions that introduce bias.
    - **User Interaction:** Feedback loops reinforcing bias.
- **Prevent biased outcomes through regular system audits.**

Ethical Implications

- **Discrimination:** Unfair treatment.
- **Loss of Trust:** Erosion of public confidence.
- **Legal Risks:** Non-compliance with laws.
- **Social Inequality:** Reinforcement of existing social biases and inequalities.
- **Economic Impact:** Biased AI decisions affecting financial opportunities for marginalized groups

Accountability and Responsibility

Accountability

- **Definition:** Tracing AI outcomes to responsible parties.

- **Best Practices:**
  - **Transparent Documentation:** Keep detailed records of AI development and deployment.
  - **Continuous Monitoring:** Regularly review AI systems and mitigate risks.

Responsibility

- **Definition:** Ethical obligations of engineers to prevents harm and promotes fairness.

- **Regulatory Compliance:**
  - **Adherence to Laws:** Follow relevant laws and stay updated on regulations.
  - **Incident Response Plans:** Have protocols for addressing AI issues promptly.

Job Displacement and Economic Impact

Job Displacement

- **Automation of Tasks**
  - **Routine Jobs:** AI automates repetitive tasks, reducing demand for manual labor.
  - **Skilled Jobs:** AI can also impact roles requiring specialized skills (e.g., CAD design, data analysis).

- **Reskilling and Upskilling**
  - **Training Programs:** Investment in education and training to prepare the workforce for new roles and new AI-related skills

Economic Impact

- **Productivity Gains**
  - Increased Efficiency and Cost Reduction

- **New Job Creation**
  - **Emerging Roles:** New jobs in AI development, maintenance, and oversight.
  - **Interdisciplinary Fields:** Growth in roles combining engineering with AI expertise.

- **Industry Transformation**
  - **Innovation:** AI drives innovation, leading to new products and services.
  - **Competitive Advantage:** Early adopters gain an edge in the market.

Long-term Impact and Safety

Long-term Impact

- **Innovation Acceleration:** Enhanced Capabilities from AI augments engineering skills and new Solutions from advanced technologies.

- **Workforce Evolution:** Shift towards AI-related skills and interdisciplinary knowledge. New career paths in AI system design, implementation, and maintenance.

- **Sustainability**: AI helps in creating more efficient and sustainable engineering processes. Reduced waste and improved energy management.

Safety Best Practices

- **Regular Audits**
  - **Performance Checks**: Regularly audit AI systems for accuracy and reliability.
  - **Compliance**: Ensure adherence to safety standards and regulations.

- **Incident Management**
  - **Preparedness**: Develop and maintain protocols for addressing AI-related incidents.
  - **Response Plans**: Ensure quick and effective response to any safety issues.

Intellectual Property and Ownership

Intellectual Property Challenges

- **AI-Generated Work**
  - **Authorship**: Who owns the rights to creations made by AI?
  - **Legal Precedents**: Few clear guidelines or legal precedents.

- **Collaborative Development**
  - **Joint Ownership**: Issues arise when multiple parties contribute to AI development.
  - **Clear Agreements**: Importance of contracts outlining IP ownership.

Best Practices

- **Documentation**: Maintain thorough documentation of AI development processes and contributions. Keep track of changes and updates to the AI systems.

- **Contracts and Agreements**: Define ownership and IP rights in collaboration agreements.

- **Licensing**: Consider licensing arrangements for shared use of AI technologies.

- **Legal Consultation**: Seek legal counsel to navigate complex IP issues.

- **Stay Informed**: Keep up-to-date with evolving IP laws and regulations related to AI.

Case Study:
Autonomous Construction Equipment

Background

BuildTech Inc. is a leading design-build, engineering firm specializing in innovative construction solutions. They have recently developed an AI-powered system for autonomous construction equipment, including bulldozers, cranes, and excavators. The system is designed to improve efficiency, reduce labor costs, and enhance safety on construction sites.

Scenario

During a major construction project, the autonomous system successfully completes tasks at a faster rate and with fewer errors than human-operated equipment. However, a few incidents occur where the AI system makes decisions that, while not causing any accidents, come very close to creating unsafe situations. These near-misses raise concerns about the reliability and safety of the autonomous system.

Ethical Dilemma

The engineers at BuildTech Inc. must decide how to proceed given the potential safety risks associated with the AI system. They must balance the benefits of increased efficiency and reduced costs with the ethical responsibility to ensure the safety of workers and the public.

Key Questions for Engineers

- How should the engineers address the near-miss incidents to ensure the autonomous system is safe for use on construction sites?

- What mechanisms should be in place to ensure accountability for any future incidents involving the AI system?

- How should the engineers address concerns about job displacement due to the adoption of autonomous construction equipment?

- How can the engineers ensure that the AI system adheres to industry safety standards and regulations?

Potential Actions

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- **Immediate Review:** Conduct a comprehensive review of the incidents to identify any weaknesses or flaws in the AI system.

- **Enhanced Testing:** Implement additional testing and validation procedures to ensure the reliability and safety of the autonomous equipment.

- **Transparent Communication:** Communicate openly with stakeholders about the incidents and the steps being taken to address safety concerns.

- **Safety Features:** Introduce enhanced safety features, such as emergency stop mechanisms and real-time monitoring systems, to mitigate potential risks.

- **Worker Support:** Develop programs to retrain and support workers affected by the transition to autonomous equipment, ensuring they can adapt to new roles.

Conclusion

This case study highlights the ethical challenges faced by engineers in developing and deploying AI systems in high-stakes environments such as construction. It underscores the importance of prioritizing safety, maintaining transparency, and addressing the broader societal impact of AI technologies. By proactively addressing these ethical dilemmas, engineers can contribute to the responsible and sustainable integration of AI in the construction industry.

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Standard of Care and Insurability

AI and the Standard of Care

- **Standard of Care:** performing services in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession under similar circumstances at the same time and in the same or similar locality

- **Asking ChatGPT...**

  - Although there may not be specific regulations focusing solely on AI, design professionals are expected to adhere to the same standard of care as they would when using any other technology.

  - Professional Codes of Conduct: Established codes by professional associations to follow

  - Industry Standards: staying updated on of associations and any guidelines

  - Legal Obligations: In AI-related design, design professional must exercise reasonable care, skill, and judgment when working on projects involving AI. Negligence might occur due to inadequate testing, flawed algorithms, inadequate safeguards, or inadequate consideration of potential consequences.

AI Insurability Concerns

- **Professional Services Definition:** those services performed for others in the practice of architecture, engineering, land surveying, landscape architecture, interior design, construction management and environmental consulting, including…

- **Personal Injury Definition:** injury arising out of false arrest, detention or imprisonment; wrongful entry, eviction or other invasion of a right of occupancy; any libel, slander, utterance, electronic distribution or other publication in violation of a right of privacy; malicious prosecution; or the unintentional infringement of copyright or patent.

- **Network Security Insuring Agreement**: Claims arising out of a network security compromise that causes a network breach or prevents a third party from gaining access to a network.

- **Products Liability Exclusion:** That part of any CLAIM(S) based upon or arising out of the sale or distribution of any product developed by the INSURED or by others under license or trade name from the INSURED for multiple sale or mass distribution, including but not limited to computer programs and software.

To use or not to use... Artificial Intelligence

- **Prohibit Use?**
  - Control the risk by removing the risk
  - Raises concern until AI is better understood
  - Employees tempted to use, without proper oversight or governance
  - Firm could be at competitive disadvantage?
- **Allow Usage?**
  - Adopt a policy which considers the following...

Control, Communication, Approval

- **Control Usage**

  - Clearly communicate to employees the concerns with AI usage- biased datasets, fail to explain basis of conclusions, push limits regarding conventional approaches, fail to encompass currently available data.

- **Communicate clearly with employees**

  - To whom does the policy apply to, under what circumstances should employees engage leadership (GC or CTO), required reporting of violations, compliance with firm's core values, ethics policies, and all laws, violation = discipline

- **Provide an evolving list of acceptable or unacceptable tools**

  - Provide list of approved technologies and for what purpose, or conversely prohibited technologies and why

In Summary...

Artificial Intelligence is here to STAY!!

- **Look out for the Ethical Dilemmas Engineers may face:**

  - Bias and Fairness

  - Accountability and Responsibility

  - Job Displacement and Economic Impact

  - Long-term Impact and Safety

  - Intellectual Property and Ownership

- **Consider implementing new policies to mitigate these Ethical Dilemmas:**

  - Monitor for complex situations that challenge ethical standards and practices

  - Control utilization by staff

  - Regular audits for bias and regulatory compliance

  - Consider the full impact of new AI programs

Thank You.

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