Professionalism Considerations for Actuaries Using AI

© Kathy Wong, MAAA, FSA, CERA

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Kathy Wong, MAAA, FSA, CERA



- Member, American Academy of Actuaries' Committee on Professional Responsibility
- Professionalism General Officer, Society of Actuaries (U.S.)

About the Academy



Mission:
To serve the public and the U.S. actuarial profession



Community:
Serving over 20K MAAAs & public stakeholders for 60 years



Standards:
Setting qualification, practice, and professionalism standards



Impact:
Delivering over 300 insight-driven publications & resources annually

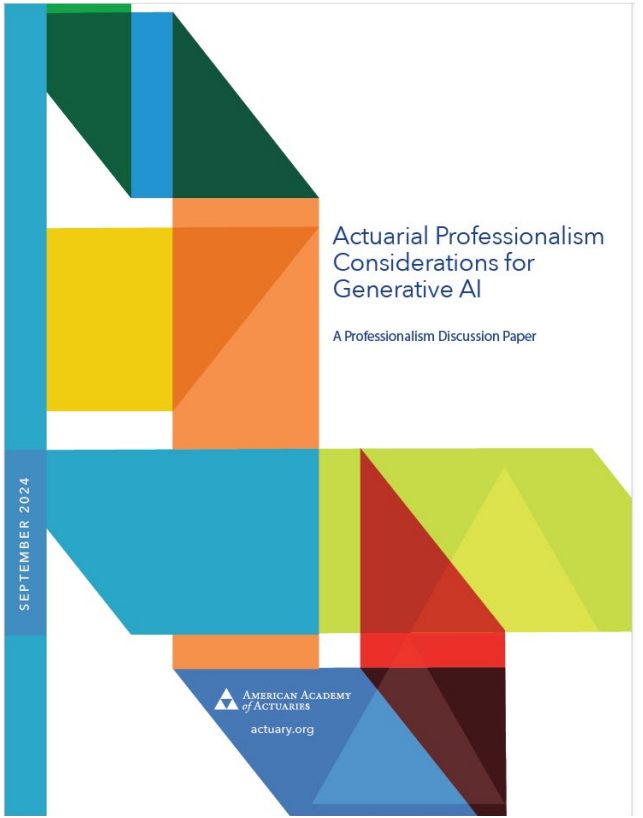
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Purpose and Scope

The starting point for this presentation is a paper published by the American Academy of Actuaries. I was a member of the working group that developed the paper.

The original paper spoke to professionalism considerations for actuaries using generative AI (GenAI) to provide actuarial services.

It focused on professionalism in terms of the rules applicable to US actuaries—the Code of Professional Conduct and Actuarial Standards of Practice.



General Professional Considerations

As we integrate AI tools into actuarial work, we look at two key questions:

- Is using AI appropriate to the assignment, and, if so, how best to use AI?
- How do you meet your professionalism responsibilities when using AI tools ?

Is the Use of AI Appropriate?

- Is it the best model for the assignment?
- Does your employer or client agree to the use of AI?
- If you rely on AI tools, how do you determine that reliance is appropriate? What exactly are you relying on?

Is the Use of AI Appropriate?

- If you are using a public model, how do you take into consideration that the model is not under your control?
- If you did not train the model, do you understand the potential biases in the data or the methodology?
- If results must be reproducible, how are you securing that capability?

How Do You Meet Your Professionalism Responsibilities when Using AI Tools?

Professionalism Responsibilities

Most actuarial organizations have a Code of Conduct that includes requirements similar to these from the U.S. Code:

- Professional Integrity
- Being Qualified and Competent to Perform the Work
- Working with Care and Skill
- Communication and Disclosure
- Control of your Work Product

Professionalism Responsibilities

- Are you using professional judgment appropriately?
- Are you applying appropriate professional review and skepticism?
- Are you qualified to use the AI tool; do you understand what it can and can't do? If you are not qualified to do the work on your own, you are likely not qualified to do it using AI.
- Are you adhering to any applicable standards of practice?
- Have you disclosed the extent of reliance on AI tools? Are you meeting communication requirements?
- Are there confidentiality concerns with using AI?

Practical Considerations

- Responsibility – Professional standards apply whether or not AI is used.
- Agency – Actuaries are responsible for any actuarial services that they provide, including AI model choices.
- Communicating results – Explain why AI is being used.
- Transparency – AI results are not always accurate and reproducible.
- Model selection and configuration – Consider cost, accuracy, cybersecurity, and licensing.

Evaluation and Validation Challenges

GenAI models compared to traditional actuarial models:

- Actuaries may not control GenAI's training data or feature updates
- GenAI may produce incorrect results or calculations, and the model may drift over time
- GenAI model validation may require additional, or differently structured, steps compared to models historically used by actuaries

GenAI Model Evaluation – Data Quality

Consider any relevant Standard of Practice relating to Data Quality, which would likely apply to AI tools' use of data:

- What should an actuary consider when selecting data, including whether the data is appropriate, sufficient, and reasonable?

- What is the quality of the data and what steps can the actuary take to address any deficiencies in the data?

GenAI Model Evaluation – Modeling Standard

The US Standard on Modeling (ASOP 56) suggests appropriate requirements in relation to using AI models:

- Permits actuaries to rely on models, experts, or external sources – thus, AI is permitted
- Gives guidance when the actuary has a limited ability to understand how a model developed by others works
- Requires actuaries to disclose reliance on models developed by others

Model Evaluation—Modeling Standard (contd)

Requires the actuary to evaluate models being used, mitigate model risk, and validate model output

Requires conclusions to be validated

GenAI Model Evaluation

Additional considerations when using opaque GenAI models:

- Be aware that inputs and outputs may continually change
- Benchmark results to prior analyses
- Develop a proxy model and compare outputs
- Conduct sensitivity analysis

GenAI Qualitative Models

Validating Qualitative GenAI recommendations:

- Vet results with subject matter experts
- Complete gap analysis by referencing established standards and research
- Ensure that AI-generated reports meet professional standards including disclosures, limitations, and disclaimers
- Beware of GenAI hallucinations

AI Model Documentation

New challenge for actuaries who may not have built and/or do not control the models they use

When documenting an AI model, documentation may focus on how the actuary:

- Confirmed the model structure meets the actuary's intended purpose
- Evaluated model results
- Evaluated and mitigated model risk

Conclusions

- Professional standards remain unchanged, requiring rigorous validation, credible data sources, and clear communication when using GenAI.
- Apply sound judgment, vet and validate GenAI tools, and account for ethical considerations, recognizing GenAI's biases and limitations.
- Consider transparency and reproducibility, so stakeholders can understand and evaluate actuarial services.
- Actuaries must maintain our professional integrity, adhering to ethical and professional standards for responsible use of this new tool.

QUESTIONS?

For more information, please contact

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Straining the Grids

The Impact of Data Centers

Dorothy L. Andrews, PhD, MAAA, ASA, CSPA
Senior Behavioral Data Scientist and Actuary
National Association of Insurance Commissioners

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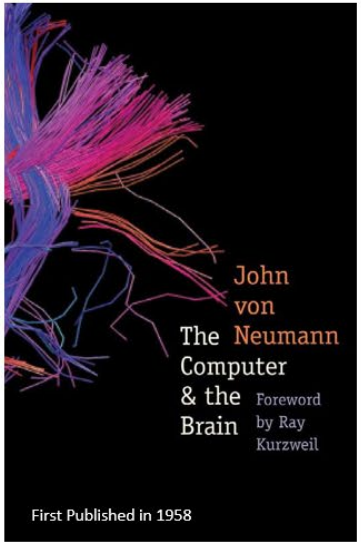
Agenda

- ❑ Introduction
- ❑ The Impetus for Data Centers
- ❑ What is a Data Center?
- ❑ Why are they Needed?
- ❑ Water, Power, Land Challenges
- ❑ Life, Health, & P&C Issues
- ❑ Socio-Environmental Concerns
- ❑ Life Next to a Data Center
- ❑ The False Promise of ChatGPT
- ❑ Questions

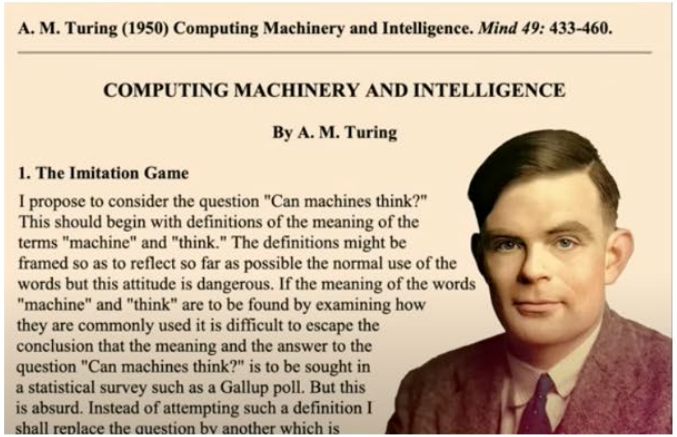


The Impetus for Data Centers

The Brain-Computer Metaphor



"Can a Machine Think?"


A. M. Turing (1950) Computing Machinery and Intelligence. *Mind 49:* 433-460.

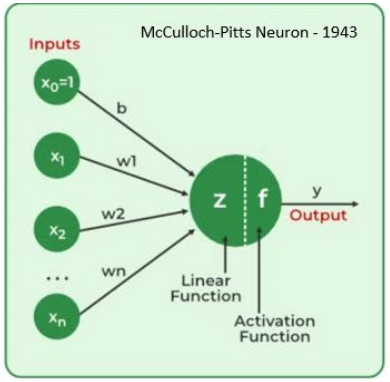
COMPUTING MACHINERY AND INTELLIGENCE

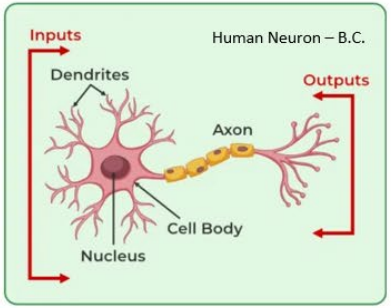
By A. M. Turing

1. The Imitation Game

I propose to consider the question "Can machines think?" This should begin with definitions of the meaning of the terms "machine" and "think." The definitions might be framed so as to reflect so far as possible the normal use of the words but this attitude is dangerous. If the meaning of the words "machine" and "think" are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question "Can machines think?" is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another which is

"The Father of Artificial Intelligence"

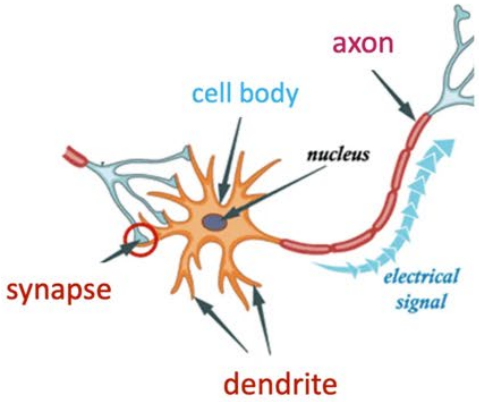




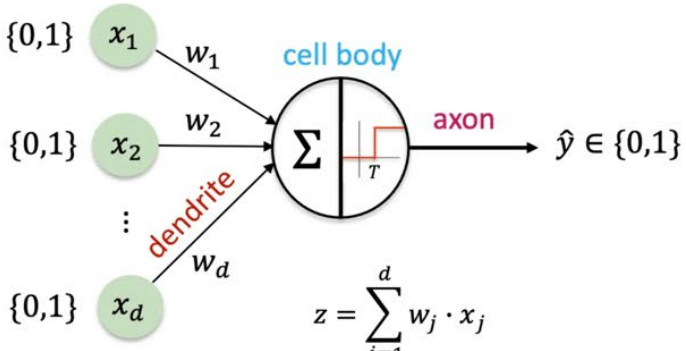
The Impetus for Data Centers

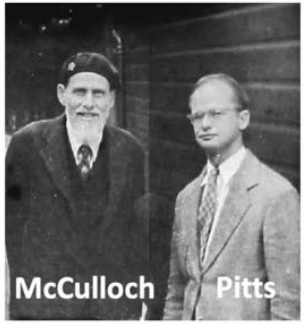
First Artificial Neuron

A Biologic Neuron



A McCulloch-Pitts Neuron





$$z = \sum_{j=1}^{d} w_j \cdot x_j$$

$$\hat{y} = g(z) = \begin{cases} 1 & \text{if } z \geq T \\ 0 & \text{otherwise} \end{cases}$$

Threshold-based Activation Function

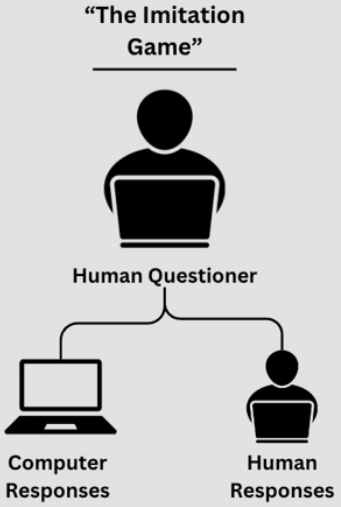
The Imitation Game

I propose to consider the question, "Can machines think?"

COMPUTING MACHINERY AND INTELLIGENCE, 1950



ALAN TURING

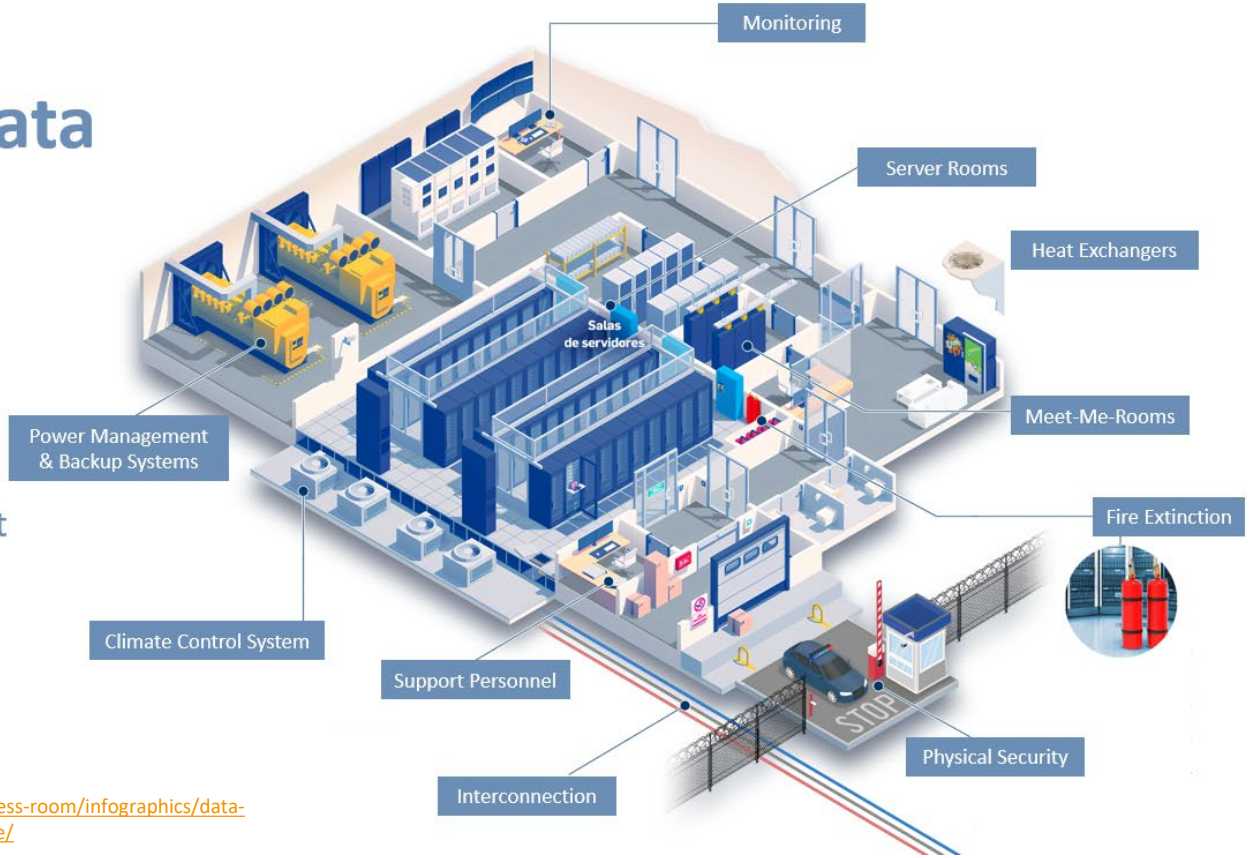




What is a Data Center?

What is a Data Center?

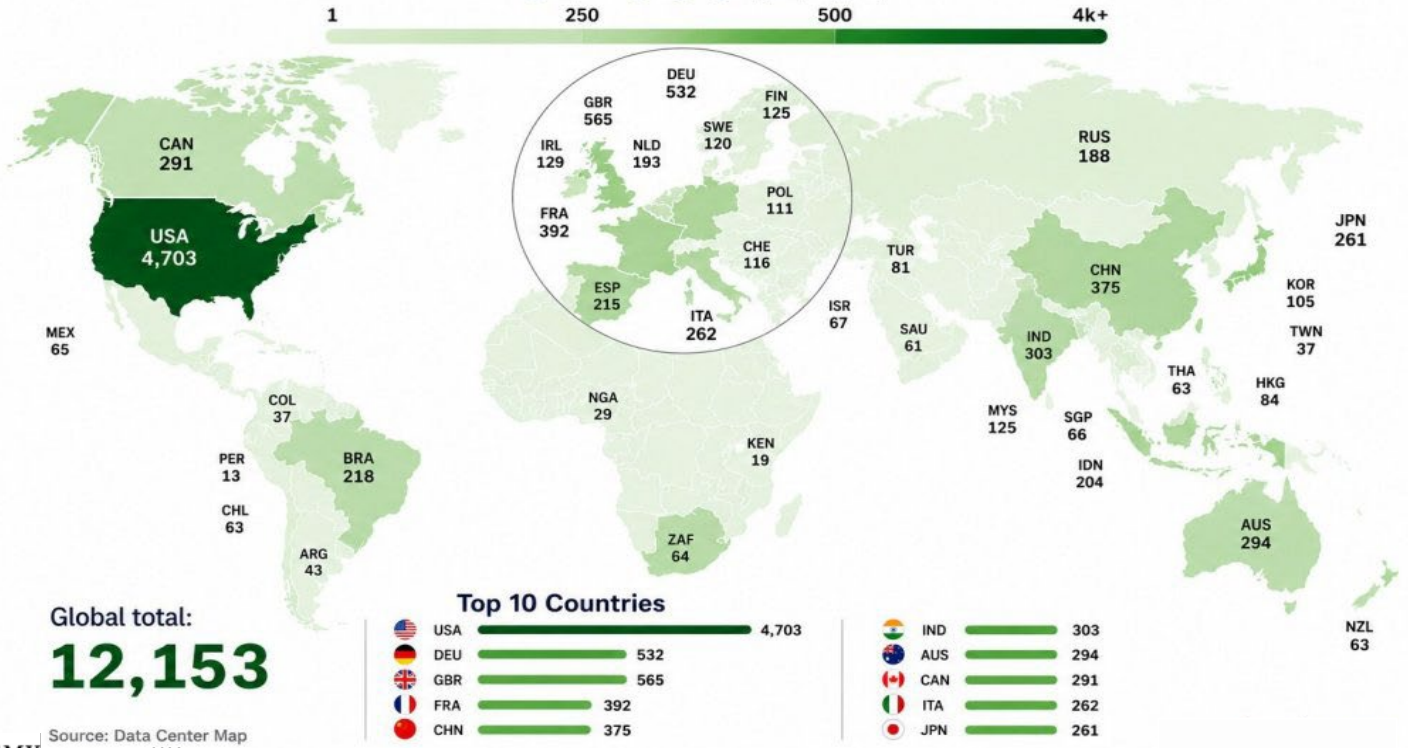
A specialized computer system that combines high-power hardware and availability in a controlled environment for the purpose of storing, safeguarding and processing data on a large scale.



Source: https://www.grupoacs.com/press-room/infographics/data-centers-the-infrastructure-of-the-future/

Data Centers

BY COUNTRY



Source: Data Center Map
August 2026



ICA 2026
Tradition, Diversity, Innovation
TOKYO

We Live Connected!

- Connected Car
- Connected Home
- Connected Work
- Connected Wearables
- Connected Data Storage
- Connected Education
- Connected Financial Activity
- Connected Social Media
- Connected Streaming
- Connected Shopping
- Connected Conferencing
- Connected Generative AI



Source: https://www.chrisdancy.com/

Water Challenges

Waterlogged

A midsize data center uses roughly as much water as about 100 acres of almond trees or three average hospitals, and more than two 18-hole golf courses.

Approximate annual water usage, in gallons*



*Use varies depending on climate and other factors
Sources: California Department of Water Resources (orchards); James Hamilton (data centers); U.S. Department of Energy (hospitals); Golf Course Superintendents Association of America (golf courses)

THE WALL STREET JOURNAL.

Source: https://perspectives.mvdirona.com/2015/06/data-center-power-water-consumption/

Power Challenges

Gartner Says Data Center Electricity Consumption to Grow 26% in 2026

STAMFORD, Conn., June 10, 2026

Data Center Electricity Consumption by Segment, Worldwide, 2025-2027 (Electricity Consumption – TWh)

Segment	2025	2025 Growth (%)	2026	2026 Growth (%)	2027	2027 Growth (%)
Conventional Server	193	0.9	195	1.2	200	2.4
AI-Optimized Server	95	83.6	175	84.2	258	47.8
Cooling and other Infrastructure	159	10.5	195	22.6	243	24.6
All Data Center Power Consumption	**447**	**15.5**	**565**	**26.4**	**702**	**24.1**

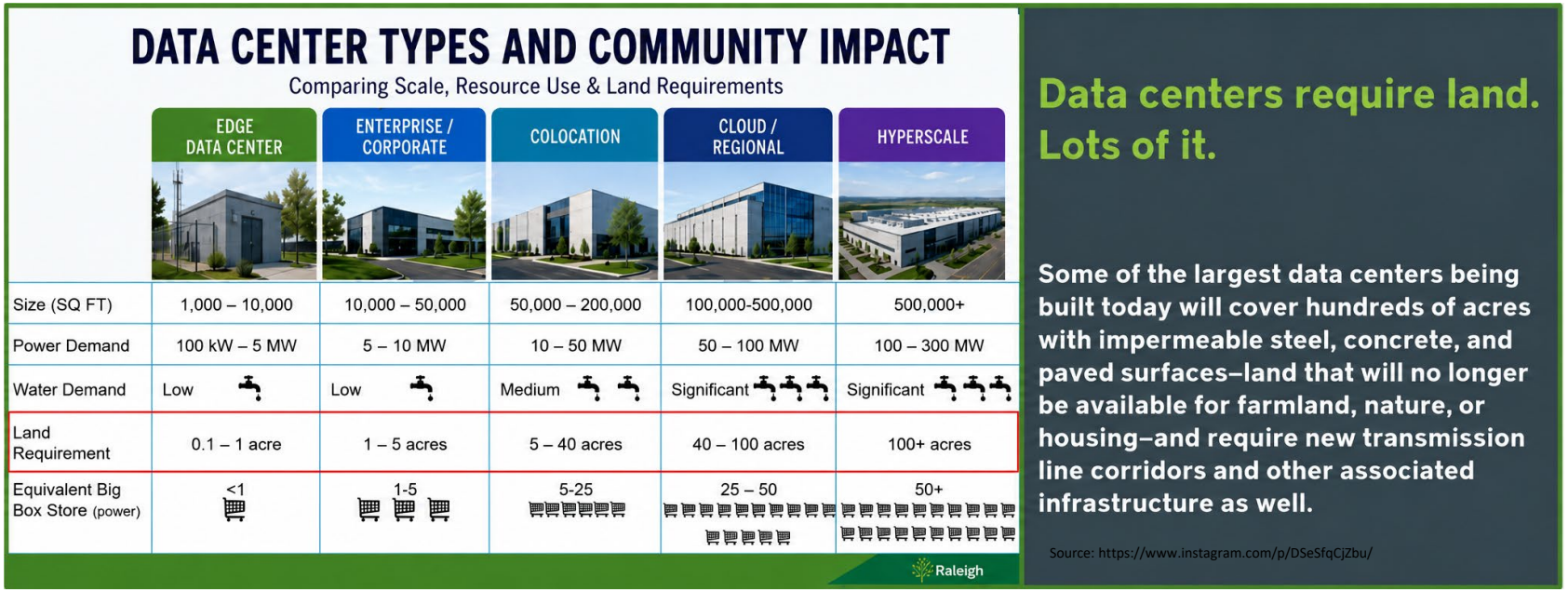
Source: https://www.gartner.com/en/newsroom/press-releases/2026-06-10-gartner-says-data-center-electricity-demand-to-grow-26-percent-in-2026

"Surging demand for compute-intensive AI workloads is driving unprecedented data center power growth, while AI capacity is now constrained by power availability, making data center power security the new battle ground for scaling and protecting margins in the global AI race."

Linglan Wang
Director Analyst at Gartner
June 10, 2026

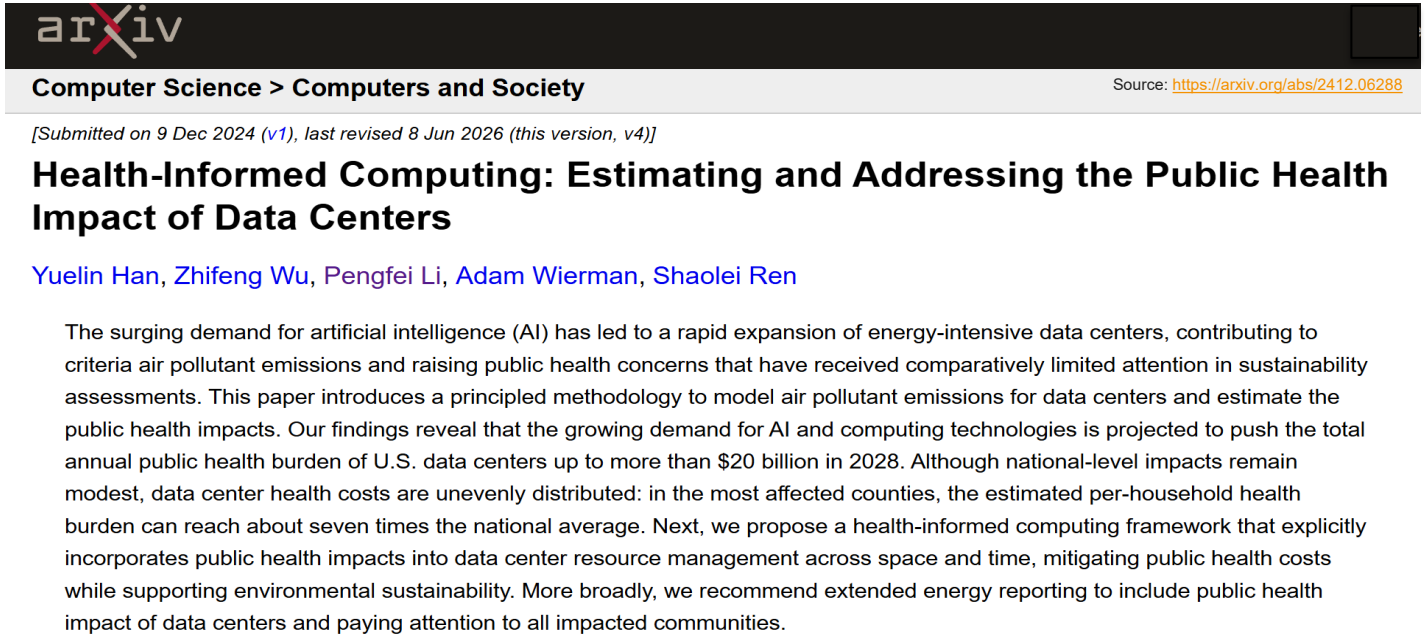
Land Challenges

A Hyperscale data center is a massive data center that provides extreme scalability capabilities and is engineered for large-scale workloads.



Source: https://www.newsobserver.com/news/business/article316344309.html; https://www.ibm.com/think/topics/hyperscale-data-center

Life Insurance Issues:
Air Pollution and the Public Health Costs of AI



arXiv

Computer Science > Computers and Society

Source: https://arxiv.org/abs/2412.06288

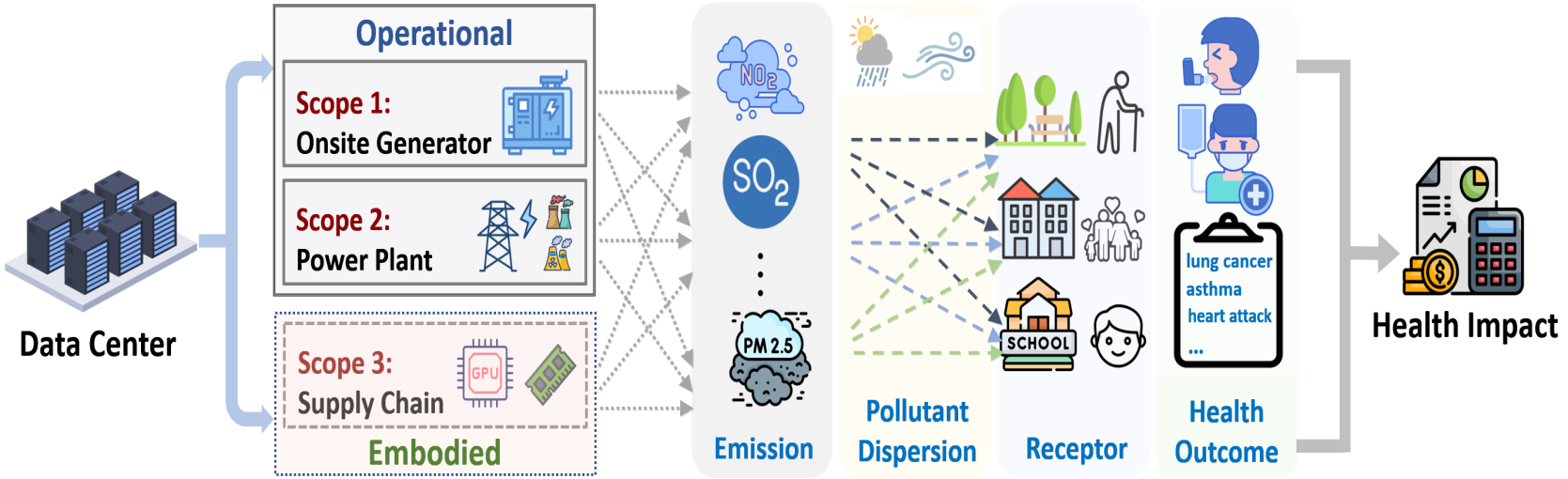
[Submitted on 9 Dec 2024 (v1), last revised 8 Jun 2026 (this version, v4)]

Health-Informed Computing: Estimating and Addressing the Public Health Impact of Data Centers

Yuelin Han, Zhifeng Wu, Pengfei Li, Adam Wierman, Shaolei Ren

The surging demand for artificial intelligence (AI) has led to a rapid expansion of energy-intensive data centers, contributing to criteria air pollutant emissions and raising public health concerns that have received comparatively limited attention in sustainability assessments. This paper introduces a principled methodology to model air pollutant emissions for data centers and estimate the public health impacts. Our findings reveal that the growing demand for AI and computing technologies is projected to push the total annual public health burden of U.S. data centers up to more than $20 billion in 2028. Although national-level impacts remain modest, data center health costs are unevenly distributed: in the most affected counties, the estimated per-household health burden can reach about seven times the national average. Next, we propose a health-informed computing framework that explicitly incorporates public health impacts into data center resource management across space and time, mitigating public health costs while supporting environmental sustainability. More broadly, we recommend extended energy reporting to include public health impact of data centers and paying attention to all impacted communities.

Health Insurance Issues:
Contributions of Data Centers to Air Pollutants & Public Health



Source: Han, Y., Wu, Z., Li, P., Wierman, A., & Ren, S. (2024). The Unpaid Toll: Quantifying and Addressing the Public Health Impact of Data Centers. *arXiv preprint arXiv:2412.06288*.

Property & Casualty Insurance Issue: *Reinsurance Capacity & Concentration Risk*

"Total insured values often exhaust the capacity of any single insurer — and in some cases, stretch the limits of the traditional insurance market altogether."

"Concentration risk is a challenge…. Once data centers are operational it becomes more challenging to know exactly which risks are in which treaties as risks are shared and layered."

Source: https://axaxl.com/fast-fast-forward/articles/reinsuring-data-centres-evolving-challenge
https://www.aon.com/en/insights/articles/risk-management-across-the-data-center-lifecycle

News

Aon increases data centre insurance programme capacity by $1bn

The expansion increases total available capacity to $2.5bn (£1.86bn), at a time when risks across global data centre developments are becoming more complex.

Shubhendu Vimal | January 16, 2026

Share



The increase comes amid rapid growth in investment linked to cloud computing, AI and wider digital infrastructure. Credit: Frame Stock Footage/Shutterstock.com



- ❑ Greenhouse Gas Emissions
- ❑ USA Concentration of Data Centers
- ❑ Electronic and Toxic Waste
- ❑ Resource Strained Communities
- ❑ Disruption to Wildlife & Ecosystems
- ❑ Infrastructure Needs e.g., Power Lines
- ❑ Consequences to Rivers and Streams
- ❑ Increased Cost of Utilities for Hosts
- ❑ Socio-Economic Inequalities
- ❑ Noise & Air Pollution

Source: https://cc-techgroup.com/data-center-environmental-impact/

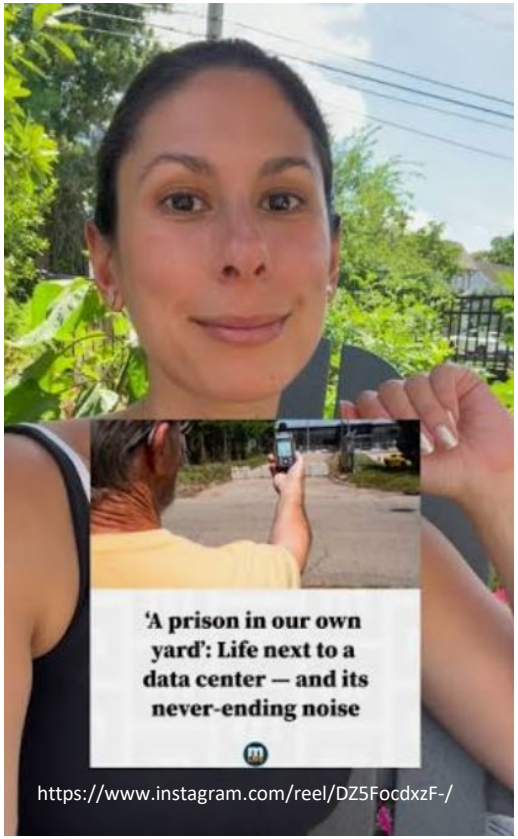
Socio-Environmental Concerns

Life Next to a Data Center

'I can't drink the water'
'How am I going to relax with something buzzing at me 24/7'
'A prison in your own yard'
'We can't sit outside'

"The noise created by the cooling systems can include sleep disturbance, and negative impacts to cardiovascular health, cognitive health, and mental health impact. Data centers also often exceed the EPA-recommended noise limits."

Source: https://web.sas.upenn.edu/pcssm/commentary/no-one-likes-data-center-noise-pollution-the-zoo-animals-wont-either/



Noam Chomsky: The False Promise of ChatGPT

"Let's stop calling it Artificial Intelligence and call it what it is: Plagiarism Software. It doesn't create anything, just copies existing works from artists and alters them sufficiently to escape copyright laws. It's the largest theft of property since Native American lands by European settlers."

The New York Times
March 8, 2023



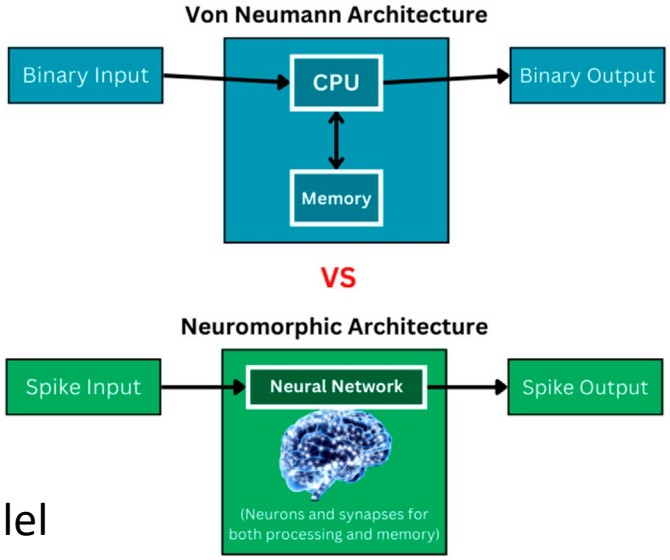
Famed Linguist, Scholar, and Political Activist

Neuromorphic Computing: The Promise for Future AI

Neuromorphic computing is a method of computer engineering in which elements of a computer are modeled after systems in the human brain and nervous system.

Von Neumann architecture uses separate CPU and memory units to carry out program instructions in a sequential fashion.

Neuromorphic computing architecture mimics the parallel processing capabilities of animal brains.



Source: https://www.mdpi.com/2079-9292/13/15/2963



For more information, please contact

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Data Centers

Key Questions to Ask When Considering Data Centers in Your Community | MARCH 2026

1. **What type of data center is it?**
2. **How much energy will the data center use at its peak?**
3. **What is the estimated increase in noise associated with the data center?**
4. **What cooling systems will be used by the data center?**
5. **How much water will the data center use at its peak?**
6. **What are the backup sources of electricity generation?**
7. **How often will NOx, SO2, and fine particulate emissions be measured on site, and will the results be reported publicly?**
8. **How many jobs will the data center create?**

Source: https://www.aaas.org/sites/default/files/2026-03/AAAS_EPI_Center-DataCentersKeyQuestions.pdf

U.S. Regulatory Environment for Artificial Intelligence

Roberto Perez Santiago, MAAA, FCAS, M.Sc., CPCU

National Association of Insurance Commissioners

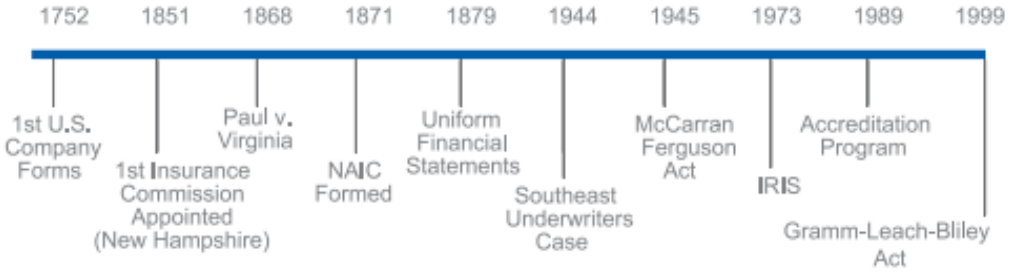
© Roberto Perez Santiago, National Association of Insurance Commissioners
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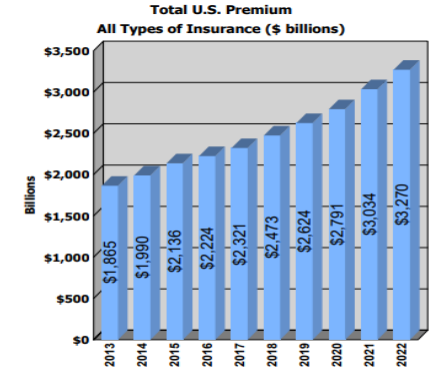
U.S. Insurance Regulation

- State-based (50 states + D.C. + 5 territories)
  - Financial regulation
  - Market regulation
- Commissioners are part of the insurance regulatory system
- All U.S. insurers have to be licensed in at least one state and are subject to regulation in all states where they operate.



Figure 9.1
Insurance Regulation Timeline





(Premiums from Property, Life, Fraternal, Health and Title Annual Statements plus State Funds for Property and Health)
Source: National Association of Insurance Commissioners

NAIC

Private, not-for-profit association of the chief insurance regulatory officials of all 50 states + D.C. + territories.

States acting together. The NAIC serves as a vehicle for the individual state regulators to coordinate their activities and share resources to achieve mutual objectives.



Big Data and Artificial Intelligence (H) Working Group Charge

Researches the use of big data and artificial intelligence (AI) in the business of insurance and evaluates existing regulatory frameworks for overseeing and monitoring their use. Presents findings and recommended next steps, if any, to the Innovation and Technology (EX) Task Force, which may include model governance for the use of big data and AI for the insurance industry.

Objectives

1. Better understand the use and governance of AI in the insurance industry.
2. Collect information that may assist in developing guidance or a potential regulatory framework to support the insurance industry's use of AI.
3. Inform regulators about insurers' current and planned business practices.

Purpose of the NAIC AI/ML Surveys

- Determine how AI/ML is being used and planning to be used in private passenger auto, homeowners, life, and health insurance
- Evaluate AI/ML governance frameworks guiding the use and monitoring of AI/ML in insurance companies
- Identify information that can aid in the development of guidance or potential regulatory framework to support the insurance industry's use of AI

AI Bulletin–Important Definitions

- Artificial Intelligence
- Artificial Intelligence Systems
- Machine Learning
- Degree of Potential Harm to Consumers
- Adverse Consumer Outcome

AI System–*A machine-based system that can, for a given set of objectives, generate outputs such as predictions, recommendations, content (such as text, images, videos, or sounds), or other output influencing decisions made in real or virtual environments. AI Systems are designed to operate with varying levels of autonomy.*

Machine Learning (ML) *refers to a field within artificial intelligence that focuses on the ability of computers to learn from provided data without being explicitly programmed.*

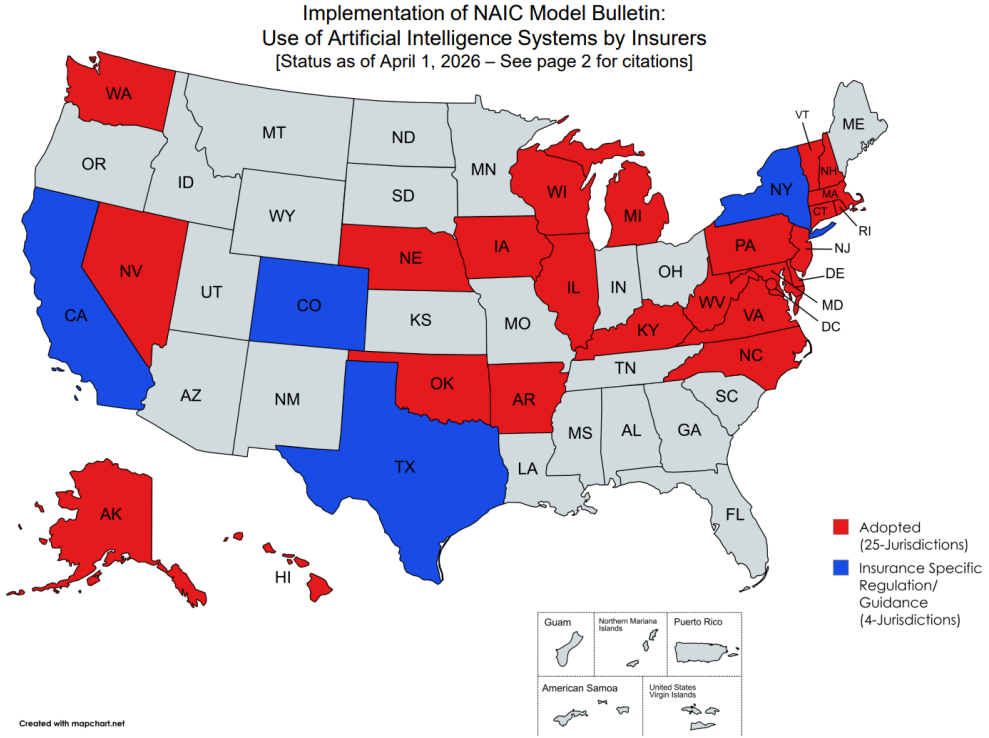
NAIC AI Model Bulletin

Adopted on Dec. 4, 2023

"Decisions subject to regulatory oversight that are made by Insurers using AI Systems must comply with the legal and regulatory standards that apply to those decisions, including unfair trade practice laws"



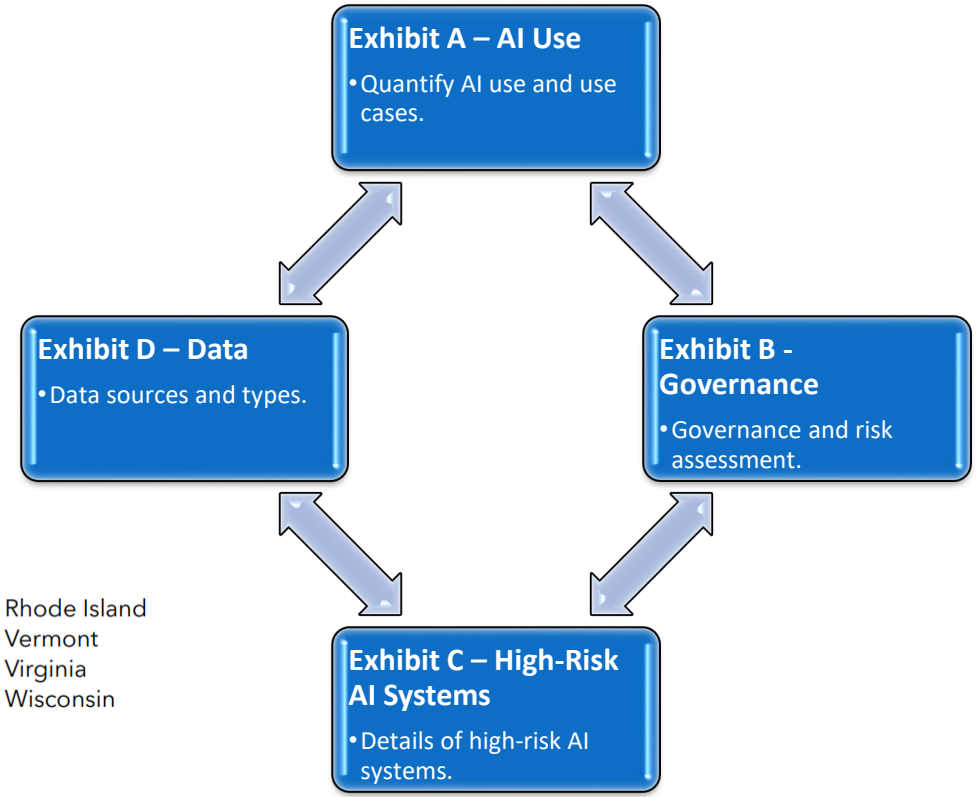
NAIC Model Bulletin Adoption



This map represents state action or pending state action addressing the topic of the model. This map does not reflect a determination as to whether the pending or enacted legislation contains all elements of the model or whether a state meets any applicable accreditation standards. See the reference list on the next page.

NAIC AI Systems Evaluation Tool

Pilot program: Evaluate how the tool can help regulators understand the use of AI systems, assess governance, and inform future improvements.



PARTICIPATING STATES

- California
- Colorado
- Connecticut
- Florida
- Iowa
- Louisiana
- Maryland
- Pennsylvania
- Rhode Island
- Vermont
- Virginia
- Wisconsin

U.S. Actuarial Organizations: AI Initiatives

American Academy of Actuaries:

- AI, DS, and Analytics Committee
- AI Use Cases
- Professionalism Guidance

American Academy of Actuaries

Casualty Actuarial Society (CAS)

- CAS AI Primer
- Research / Education

Casualty Actuarial Society

Society of Actuaries (SOA):

- AI Research Reports
- The Actuarial Intelligence Bulletin

Society of Actuaries®

AI Systems Regulatory Framework Roadmap

2020: AI Principles

NAIC Adopted AI Principles on Artificial Intelligence

2021 – 2025: AI/ML Surveys

Private Passenger Auto

Homeowners

Life Insurance

Health Insurance

2026 ->

Adoption

Implementation

Coordination

2023: AI Model Bulletin

Governance

Risk Management

2025 – 2026: AI Systems Evaluation Tool

Market/Financial Exams

Self-Assessment

Evaluation Metrics

QUESTIONS?

For more information, please contact

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