

Computer Systems Engineers/Architects

AI transforming design, modeling, requirements analysis, and optimization of complex computer systems.

EXPOSURE	WINDOW	ADOPTION TODAY	READING
45 Elevated exposure	2–6 yrs until change lands	High	The role is being reshaped. Exposure is the share of today’s work AI can plausibly take on within the window.

§ 01WHAT IS HAPPENING

What is happening to computer systems engineers/architects

Impact	AI tools are automating iterative design exploration, optimizing performance models, analyzing system requirements, and generating documentation. This frees Computer Systems Engineers/Architects for high-level conceptualization, strategic alignment, critical problem-solving, and validating complex AI-driven system designs.
Risk	Significant augmentation; focus on strategic design, complex problem-solving, and AI tool validation. The Computer Systems Engineer/Architect role will be profoundly augmented by AI. AI will handle data processing, iterative design, and predictive analysis, shifting these professionals' focus to critical validation of AI outputs, complex systems architecture, security by design, and ethical considerations in AI-enabled systems. Human creativity, strategic thinking, and nuanced judgment for resilience and business alignment remain paramount.

Sector readiness

Rapid & Deep Integration

The IT and software development sectors are making substantial investments in AI for system design, cloud optimization, and enterprise architecture. Given the high-stakes nature of system reliability, scalability, and security, integration is rapid and deep, with significant emphasis on validation and ethical deployment.

§ 02 POSITION

Where you stand

- i The Computer Systems Engineer/Architect role is undergoing a profound transformation, with AI becoming a critical partner in every stage of system design and optimization.
- ii AI will automate iterative design, provide powerful analytical insights, and streamline documentation, allowing these professionals to focus on high-level strategic alignment, complex problem-solving, and ensuring the resilience, security, and ethical integrity of advanced systems.
- iii Success in this field will increasingly depend on mastering AI tools, critically validating their outputs, and developing deep interdisciplinary skills to navigate the complexities of AI-enabled enterprise and cloud architectures.

§ 03 ACTIONS

15 POINTS

What this means for you

Concrete changes to how the work gets done, in the order you are likely to meet them.

- 01 **AI-Assisted Requirements Analysis & Traceability.** Computer Systems Engineers/Architects are leveraging AI tools to analyze vast sets of system requirements, user stories, and stakeholder feedback. AI can identify inconsistencies, ambiguities, potential conflicts, and ensure traceability from high-level business needs down to technical specifications.
- 02 **Generative AI for Initial Architecture Design.** Computer Systems Engineers/Architects will utilize generative AI to rapidly create initial drafts of system architectures, component diagrams, and infrastructure layouts. This capability allows for the exploration of diverse design patterns and technology stacks, accelerating the conceptualization phase.
- 03 **AI for Performance & Scalability Modeling.** Computer Systems Engineers/Architects are employing AI-enhanced simulation tools to predict the performance, scalability, and resource utilization of complex computer systems under various loads. AI accelerates these analyses, allowing for more robust design decisions and proactive optimization.

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- 04 **AI-Driven Security Design & Analysis.** Computer Systems Engineers/Architects are integrating AI tools that analyze proposed system architectures for potential security vulnerabilities, suggest threat models, and recommend appropriate security controls. This ensures that security is built into the system from the ground up, reducing risks.
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- 05 **Automated Design Documentation Generation.** AI is streamlining the creation of technical documentation. Computer Systems Engineers/Architects will use AI to automatically generate initial drafts of system specifications, API documentation, design rationale, and architectural decision records from design models or codebases.
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- 06 **AI for Component Selection & Compatibility.** Computer Systems Engineers/Architects are leveraging AI to assist in selecting optimal hardware or software components, third-party services, and libraries based on project requirements, compatibility, and performance metrics. AI can analyze vast vendor data to suggest best fits.
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- 07 **Cloud Architecture Optimization with AI.** AI is being used to optimize cloud resource configurations, identify cost inefficiencies, and predict future capacity needs for cloud-based systems. Computer Systems Engineers/Architects are employing these AI insights to design highly efficient, scalable, and cost-effective cloud architectures.
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- 08 **AI-Enhanced Network Design & Optimization.** Computer Systems Engineers/Architects are using AI tools to design and optimize complex network topologies, manage traffic flow, and identify potential bottlenecks or vulnerabilities within large-scale enterprise networks. AI helps ensure network performance and resilience.
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- 09 **AI in Data Architecture & Governance.** Computer Systems Engineers/Architects are designing and implementing AI-driven data architectures (e.g., data lakes, data meshes) and data pipelines. AI assists in data classification, quality checks, lineage tracking, and ensuring compliance with data governance policies for complex data ecosystems.
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- 10 **Ethical AI in System Design.** Given the societal impact of computer systems, Computer Systems Engineers/Architects will be deeply involved in addressing the ethical implications of AI-driven systems. This includes ensuring transparency, explainability, and mitigating algorithmic bias in the systems they design and deploy.
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- 11 **Human-AI Collaboration in Problem-Solving.** Computer Systems Engineers/Architects will increasingly collaborate with AI in complex problem-solving scenarios, from diagnosing system failures to designing novel solutions. AI will provide advanced analytics and insights, allowing human engineers to focus on nuanced judgment and innovative approaches.
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- 12 **Cross-Functional Collaboration & Communication.** Computer Systems Engineers/Architects will work closely with business stakeholders, developers, operations teams, and cybersecurity specialists. AI can assist in synthesizing information and drafting communications, allowing engineers to focus on translating complex technical concepts for diverse audiences.
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- 13 **AI-Assisted Risk Assessment & Mitigation.** AI tools are assisting Computer Systems Engineers/Architects in assessing various risks (e.g., performance, security, compliance) within system designs. AI can predict potential failure points or vulnerabilities, enabling proactive mitigation strategies during the design phase.
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- 14
- Continuous Learning of AI & Emerging Technologies.** The rapid pace of technological change, particularly in AI, requires Computer Systems Engineers/Architects to continuously update their knowledge. This means proactively learning about new AI capabilities, architectural patterns, and software tools to remain at the forefront of system design.
- 15
- Strategic Alignment of Technology with Business Goals.** As AI streamlines technical tasks, Computer Systems Engineers/Architects will increasingly focus on ensuring that proposed system designs and technology choices directly align with and support the organization's overarching business strategy and objectives, maximizing value.

What is pushing this change

- 01
- Increasing Complexity of IT Environments (Cloud, Microservices).** Modern IT environments involve intricate, distributed architectures (cloud, hybrid, microservices), requiring sophisticated design and management.
- 02
- Demand for Faster Time-to-Market for New IT Solutions.** Businesses need to deploy new applications and features rapidly; AI-assisted design and automation accelerate this.
- 03
- Need for Scalable & Resilient IT Systems.** Systems must be designed to handle increasing user loads and recover quickly from failures, demanding robust architectural planning.
- 04
- Growth of AI/ML Workloads (Requiring Specialized Infrastructure).** The widespread adoption of AI/ML requires specialized compute, storage, and networking infrastructure, which architects must design.
- 05
- Cybersecurity Threats & Need for Proactive Defense.** The increasing sophistication of cyber threats necessitates designing secure systems from the ground up, with AI playing a role in both offense and defense.
- 06
- Pressure for IT Cost Optimization & Efficiency.** Organizations are constantly looking for ways to reduce IT expenditure while improving performance, driving optimization efforts.
- 07
- Digital Transformation Initiatives Across Industries.** Companies are investing heavily in digital transformation, with robust and adaptable IT architectures being a core enabler.
- 08
- Advancements in Generative AI for Code & Design.** New AI models can generate code, diagrams, and design suggestions, streamlining the architectural process.
- 09
- Explosion of Data Volume, Velocity, & Variety.** The sheer volume of data generated by applications and users requires intelligent data architectures for storage, processing, and analysis.
- 10
- Shortage of Specialized Architects & Highly Skilled Engineers.** The demand for skilled architects who can design and implement complex, modern IT systems often outstrips supply, increasing reliance on AI tools.

Impact by sector

The headline figure is an average. Where you work changes the picture.

Enterprise Architects	AI for modeling enterprise-wide systems, analyzing interdependencies, and predicting the impact of technology changes on business capabilities. Focus on strategic alignment.
Cloud Architects	AI for optimizing cloud resource configurations, cost management, and designing serverless architectures. Focus on cost-efficiency, scalability, and resilience in the cloud.
Data Architects	AI for designing data warehouses, data lakes, data pipelines for AI/ML, ensuring data governance, and optimizing database performance. Focus on data quality and accessibility.
Security Architects	AI for designing secure architectures, performing threat modeling, and recommending security controls for complex IT systems. Focus on proactive risk mitigation.
Solutions Architects	AI for generating initial solution designs, comparing technology options, and optimizing component integration for specific business problems. Focus on problem-solving and implementation.

Skills to build

The skills that keep the human part of this work valuable as the routine part is automated.

- 01 **AI/ML Literacy & Data Science Fundamentals.** Understanding AI/ML concepts, their applications in system design, and ability to work with large datasets and interpret AI-driven insights for architecture.
- 02 **Advanced Simulation & Modeling (AI-enhanced).** Proficiency in AI-enhanced simulation tools and ability to build/interact with digital twins of IT systems for predictive analysis and virtual testing.
- 03 **Systems Integration & Architecture Design.** Designing and integrating complex computer systems, including those with AI components, ensuring interoperability, scalability, and overall system performance.
- 04 **Critical Thinking & Validation of AI Outputs.** Ability to scrutinize AI-generated designs, analyses, or recommendations for accuracy, biases, limitations, and safety implications in enterprise systems.

- 05 **Ethical AI & Governance.** Ensuring AI systems comply with data privacy regulations and organizational ethical guidelines, addressing transparency and fairness in AI deployment.
- 06 **Generative Design for Systems.** Knowledge of AI tools that generate and optimize system architectures, components, or configurations based on performance, cost, and functional requirements.
- 07 **Cybersecurity by Design & Risk Management.** Designing and implementing robust security measures for complex IT systems, including AI-enabled components, protecting against advanced cyber threats.
- 08 **Interdisciplinary Collaboration & Communication.** Effectively communicating complex technical and AI-related information with cross-functional teams (developers, business stakeholders, operations) and senior leadership.

S 07 INSTRUMENTS

12 ENTRIES

Tools in use

KINDS OF TOOL WORTH KNOWING

- 01 **Enterprise Architecture (EA) Tools with AI features.** Software for modeling enterprise architectures, managing technology portfolios, and planning transformations, increasingly with AI for insights.
- 02 **Cloud Provider Design & Costing Tools (with AI).** Tools from major cloud providers that help design cloud architectures and use AI to provide recommendations for cost and performance optimization.
- 03 **Simulation & Modeling Software (increasingly AI-enhanced).** Software used to model and simulate the behavior of complex systems, with AI enhancing predictive capabilities or scenario analysis for IT systems.
- 04 **Generative AI for Diagramming & Documentation.** LLMs and specialized diagramming tools that can generate initial drafts of system architecture diagrams or technical specifications from prompts.
- 05 **Code Analysis Tools with AI (for architectural insights).** Tools that analyze existing codebases for architectural patterns, technical debt, and adherence to design principles, often using AI/ML.
- 06 **Data Governance & Management Platforms (with AI).** Platforms that use AI to automate data discovery, classification, lineage tracking, and policy enforcement for data governance.

NAMED TOOLS ALREADY IN USE

- Sparx Systems Enterprise Architect / LeanIX / Ardoq (EA tools exploring AI)**

VISIT

Leading EA tools that are beginning to integrate AI for analysis, recommendation, and automation of architectural tasks.
- AWS Well-Architected Tool / Azure Cost Management + Billing (with AI insights)**

VISIT

Cloud provider tools and services that use AI to help design optimal cloud architectures and manage/optimize cloud spend based on usage patterns.

AnyLogic / Simulink (general simulation, AI can be integrated)

VISIT

General-purpose simulation software where AI can be used to build more complex models or optimize simulation parameters for IT systems.

Lucidchart (with AI diagramming) / Miro (with AI features) / ChatGPT (for drafting descriptions)

VISIT

Diagramming and collaboration tools that are adding AI features to help generate diagrams from text, or LLMs used for drafting documentation.

CAST Highlight / Structure101 (for software intelligence, architecture analysis)

VISIT

Software intelligence platforms that analyze codebases to visualize architecture, identify technical debt, and assess complexity, sometimes using AI.

Collibra / Alation (Data Governance, increasingly with AI)

VISIT

Leading data governance and cataloging platforms that are incorporating AI for automated data discovery, classification, and lineage tracking.

In practice

Ways people in this role are already using AI, and what they get from it.

Generate Initial Architecture Diagrams EXAMPLE 1	HOW	Provide a generative AI tool with a high-level system description (e.g., "e-commerce platform with microservices, cloud-native, and real-time analytics"). The AI can then produce initial draft architecture diagrams (e.g., logical, physical, deployment views) for refinement.
	GAIN	Accelerates the initial design phase, provides diverse architectural ideas, and helps visualize complex system structures faster.
Optimize Cloud Resource Costs EXAMPLE 2	HOW	Utilize AI features within cloud cost management platforms (e.g., AWS Cost Explorer with AI insights, Azure Cost Management). The AI analyzes usage patterns, identifies idle resources, and recommends optimizations like right-sizing instances or purchasing reserved capacity, leading to cost savings.
	GAIN	Leads to significant reductions in cloud spending, optimizes resource utilization, and ensures that cloud architectures are financially efficient.
Simulate System Performance Under Load EXAMPLE 3	HOW	Employ AI-enhanced simulation software to model a new system's expected performance under various load conditions (e.g., peak user traffic, large data processing). The AI can rapidly run "what-if" scenarios and predict bottlenecks or scaling limits before development begins.
	GAIN	Enables proactive identification of performance bottlenecks, ensures system scalability, and reduces risks of costly re-designs after deployment.

Analyze Code for Architectural Debt EXAMPLE 4	HOW	Use an AI-powered code analysis tool to scan an existing large codebase. The AI identifies architectural patterns, technical debt (e.g., high coupling, low cohesion), and areas that deviate from design principles, providing insights for refactoring or re-architecting.
	GAIN	Provides clear insights into codebase health, helps prioritize refactoring efforts, and ensures alignment between code implementation and architectural intent.
Automate Design Documentation EXAMPLE 5	HOW	Provide a generative AI tool with architectural design decisions, rationale, and component descriptions. The AI can then automatically generate initial drafts of technical specification documents, design decision records, or API documentation based on these inputs.
	GAIN	Saves significant time on manual documentation, ensures consistency in technical specifications, and allows architects to focus on strategic design challenges.

§ 09

CONTEXT

How this role compares

Three neighbouring roles chosen to show the direction of travel.

Junior System Configurators / Basic Network Administrators MORE EXPOSED	AI IMPACT	High (AI can automate routine configuration, monitoring, and basic troubleshooting)
	WORK MOVES TO	Role redefinition towards overseeing AI tools, handling exceptions, and more complex system management.
AI Infrastructure Engineers / MLOps Engineers DIFFERENT SKILLS, GROWING	AI IMPACT	Foundational (They design and build the specialized infrastructure required for AI/ML workloads.)
	WORK MOVES TO	Deep expertise in cloud computing, containerization, data pipelines, CI/CD for ML, and performance optimization for AI.
Chief Technology Officer (CTO) / Chief Information Officer (CIO) COMPLEMENTARY, LESS EXPOSED	AI IMPACT	High Strategic Dependence & Augmentation (They rely on architects' designs and AI-driven analyses for overall tech strategy)
	WORK MOVES TO	Overall enterprise technology strategy, digital transformation leadership, aligning IT with business goals, and executive stakeholder management.

Closing judgement

For Computer Systems Engineers/Architects, AI is a powerful transformative partner. It automates complex analysis, iterative design, and documentation, allowing these professionals to focus on high-level strategic alignment, innovative problem-solving, and ensuring the resilience, security, and ethical integrity of the most advanced systems. Mastering AI tools and cultivating deep interdisciplinary skills will be crucial for leading the future of technology infrastructure.

Evidence and revisions

What the exposure figure rests on, what changed when it was last revised, and the published work cited for this role.

SCORE

35 to 45

WINDOW

3-7 years to 2-6 years

The 4 October 2026 review moved the score up by 10 points.

Microsoft's AI applicability score for the matching occupations is 0.28, in the top quarter of 785 US occupations; Anthropic's observed exposure (the share of the occupation's tasks already being done with Claude) is 0.26, which is substantial by the standards of the 756 occupations measured; the US Bureau of Labor Statistics places it in the 'very high' AI-exposure tier; BLS projects employment to grow 6.4% over 2025–35. Blending our 2025 editorial figure (60%) with the 2026 evidence composite (40%) moves the score from 35 to 45 and shortens the window from 3-7 years to 2-6 years.

MEASURES BEHIND THE SCORE

US Bureau of Labor Statistics · *Employment Projections 2025–35 and AI Exposure Categories* (27 August 2026)

AI-exposure tier: Very high. Projected employment change 2025–35: +6.4%. Matched to Computer network architects; Computer occupations, all other.

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Microsoft Research · *Working with AI: Measuring the Applicability of Generative AI to Occupations* (10 July 2025)

AI applicability score 0.28 (percentile 85 of 785 occupations) for SOC 15-1299, 15-1241.

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Anthropic · *Anthropic Economic Index report: Cadences* (26 June 2026)

Observed exposure 0.26 for SOC 15-1299, 15-1241 (percentile 89 of 756 occupations).

PUBLISHER PDF

UK Department for Science, Innovation and Technology · *Assessment of AI capabilities and the impact on the UK labour market* (28 January 2026)

UK context: around 70% of UK workers are in occupations with tasks AI could perform or enhance, above the US average; a one-standard-deviation rise in exposure was associated with a 3.9% fall in UK job postings.

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<https://www.careerguard.ai/sources>

§ 12 APPENDIX

Method and sources

Each report was written from a large body of published research and then, in October 2026, re-scored against occupation-level evidence: the US Bureau of Labor Statistics AI-exposure classification and 2025–35 projections, Microsoft Research's AI applicability scores and Anthropic's observed-exposure data, cross-checked against the reports listed in the Evidence section above. The organisations and publications below are the standing literature behind the narrative sections. Every source, with dates, licences and archived copies where we are permitted to hold them, is catalogued in the research library.

Scores are revised by blending the previous editorial figure (60%) with a composite of the three occupation-level measures (40%), capped at fifteen points per revision and rounded to the nearest five. The window shifts one notch when a score moves ten points or more. Hand adjustments are recorded with their reason in the revision log.

I GLOBAL AND MACROECONOMIC IMPACT OF AI ON WORK

World Economic Forum

The Future of Jobs Report series — Employer survey of expected job growth and decline, skill shifts and technology adoption (2020, 2023 and 2025 editions); *Artificial Intelligence and the Future of Entry-Level Work* (2026).

AI governance and transformation reports — Frameworks on ethical AI, talent strategy and industry transformation.

McKinsey Global Institute

AI, Automation and the Future of Work series — Research quantifying automation potential by task, sector and demographic, from "Jobs Lost, Jobs Gained" to "Agents, robots, and us" (2025).

Industry-specific reports — Financial services, healthcare, manufacturing and others.

PwC

Global AI Jobs Barometer — Annual analysis of job postings and productivity by AI exposure (2024–2026 editions).

Upskilling Hopes and Fears survey — Employee perceptions and readiness.

Microsoft Research and Anthropic

Working with AI (2025); *Anthropic Economic Index* (2025–2026) — Occupation-level usage data from Copilot and Claude conversations, the two observed-usage measures behind the 2026 revision.

Stanford Digital Economy Lab and Stanford HAI

Canaries in the Coal Mine? (2025–2026); *AI Index Report* (annual) — Payroll evidence on early-career employment in exposed occupations; annual measurement of AI capability, investment and adoption.

Deloitte

Human Capital Trends series — Workforce, talent and HR technology trends.

Tech Trends series — Emerging technologies and their business implications.

Accenture

Technology Vision series — Forward-looking analysis of emerging technology, with emphasis on AI.
Fjord Trends — Design, innovation and human experience in a digital world.

Boston Consulting Group

AI/ML insights and industry solutions — "The AI Revolution in the Workplace" and related research.

EY

AI and workforce reports — Adoption, talent strategy and ethics.

IBM Institute for Business Value

AI and automation studies — Business models, workforce evolution and leadership.

OECD

AI Policy Observatory — International data and policy on AI, labour markets and skills.
Employment Outlook — Labour-market trends including technological impact (2023–2026 editions).

International Labour Organization

Generative AI and Jobs: A Refined Global Index of Occupational Exposure (2025) — Task-level exposure gradients for every ISCO occupation; successor to the 2023 global index.

International Monetary Fund

Staff Discussion Notes on AI and work (2024, 2026) — Complementarity framing: where AI augments and where it substitutes.

UK Department for Science, Innovation and Technology

Assessment of AI capabilities and the impact on the UK labour market (2026) — UK occupational exposure and job-posting evidence.

Brookings Institution

AI and automation research — Economic and social implications, displacement and skills.

Yale Budget Lab and Goldman Sachs Research

Tracking the Impact of AI on the Labor Market; AI and the US labour market (2026) — Aggregate labour-market monitoring; macro displacement estimates.

Oxford University (Oxford Martin School)

The Future of Employment — Frey & Osborne and subsequent research on susceptibility to automation.

MIT Technology Review

AI & Work — Reporting on AI research and its implications for industries and jobs.

Gartner

Hype Cycle for Artificial Intelligence — Maturity and adoption of AI technologies.
Future of Work reports — Workplace models and talent strategy.

U.S. Bureau of Labor Statistics

Employment Projections 2025–35; AI Exposure Categories; Occupational Outlook Handbook — Ten-year employment projections and, from the 2025 cycle, an AI-exposure tier for every detailed occupation.

Indeed Hiring Lab

AI at Work Report (2025) and posting-market updates — Skill-level transformation estimates and job-posting trends by occupation.

II CORE AI AND MACHINE-LEARNING RESEARCH

OpenAI

Research papers, blog and API documentation — Large language models, generative AI, safety and societal impact.

Google DeepMind

Research papers and blog — Reinforcement learning, AI for science, AGI and ethics.

Meta AI

Research papers and blog — Large language models, computer vision, AI for social good.

Hugging Face

Transformers library and model hub — Open-source state-of-the-art NLP models.

TensorFlow and PyTorch

Documentation and community forums — Core frameworks illustrating practical capability.

arXiv

cs.AI, cs.LG, cs.CV, cs.CL — Pre-print research.

NeurIPS and ICML

Conference proceedings — Top-tier academic research.

ACM and IEEE

Journals and proceedings — ACM Computing Surveys; IEEE Transactions on AI.

Kaggle

Datasets and competition solutions — Applied machine learning on real-world problems.

The Alan Turing Institute

Research and reports — Responsible and applied AI.

III ETHICAL AND RESPONSIBLE AI DEPLOYMENT

NIST

AI Risk Management Framework — Voluntary framework for managing AI risk.

European Commission

AI Act — Risk-tiered legal framework for AI.

Ethics Guidelines for Trustworthy AI — Principles for responsible development.

Partnership on AI

Research and best practice — Responsible AI development.

AI Now Institute

Annual reports — Social implications: power, inequality, rights.

ACM FAccT

Proceedings — Fairness, accountability and transparency.

Data & Society

Publications — Social implications of data-centric technology.

WIPO

Conversation on IP and AI — Intellectual-property implications of AI.

IEEE Global Initiative on Ethics of AI/IS

Ethically Aligned Design — Recommendations for ethical AI design.

Center for AI and Digital Policy

Policy briefs — Accountable AI policy.