

Plumbers

AI augmenting diagnostics, scheduling, and predictive maintenance, but core manual skills remain irreplaceable.

EXPOSURE 25 Low exposure	WINDOW 10–15 yrs until change lands	ADOPTION TODAY Low	READING AI assists; the work stays human-led. Exposure is the share of today's work AI can plausibly take on within the window.
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§ 01WHAT IS HAPPENING

What is happening to plumbers

Impact	AI tools are assisting with leak detection, predictive maintenance for plumbing systems, optimizing scheduling, and streamlining administrative tasks. This shifts Plumbers' focus towards complex diagnostics, skilled physical repair, client communication, and ethical oversight of AI in smart home systems.
Risk	Moderate augmentation; premium on manual dexterity, problem-solving, and client communication. The Plumber role will be moderately augmented by AI. AI will handle more routine data collection, predictive analytics for system failures, and administrative tasks. Plumbers will need to become experts in leveraging AI tools for efficiency and enhanced diagnostics, critically evaluating AI insights, and focusing on the irreplaceable human elements of the trade: complex physical repair, nuanced problem-solving in unforeseen situations, and direct client communication and trust-building.

Sector readiness	Emerging & Niche Integration The plumbing and skilled trades sectors are cautiously exploring and integrating AI, primarily for administrative efficiency, predictive maintenance in smart buildings, and advanced diagnostic tools. While some robotic tools exist for specific tasks (e.g., pipe inspection), core manual dexterity, complex problem-solving in unpredictable environments, and direct human interaction remain highly resistant to widespread AI replacement.
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§ 02 POSITION

Where you stand

- i

The Plumber role is undergoing moderate augmentation by AI, particularly in diagnostics, scheduling, and predictive maintenance.
- ii

AI will automate routine data analysis and optimize operational efficiencies, allowing plumbers to focus on complex physical repairs, nuanced problem-solving, and direct client communication.
- iii

Success will increasingly depend on Plumbers mastering AI tools for enhanced diagnostics and business management, while fundamentally prioritizing their irreplaceable manual dexterity, on-site judgment, and client trust-building.

§ 03 ACTIONS15 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 Diagnostic Tools for Leaks & Faults.

Plumbers are increasingly leveraging AI-powered diagnostic tools (e.g., acoustic sensors, thermal cameras, computer vision) to rapidly detect subtle leaks, identify pipe blockages, and pinpoint electrical faults within plumbing systems. This speeds up troubleshooting and minimizes intrusive repairs.
- 02

Predictive Maintenance for Plumbing Systems.

Plumbers will benefit from AI systems integrated into smart home or commercial building management systems. These AI tools analyze sensor data from pipes, water heaters, and pumps to predict potential failures (e.g., burst pipes, appliance malfunction) before they occur, enabling proactive repairs.
- 03

Automated Scheduling & Dispatch Optimization.

AI tools are streamlining the scheduling of service calls and optimizing routes for plumbers. AI can dynamically assign jobs based on location, urgency, and plumber availability, improving response times and efficiency for plumbing businesses.

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- 04 **Smart Home & IoT Integration.** Plumbers will increasingly install, configure, and troubleshoot AI-driven smart water systems (e.g., leak detectors, smart sprinklers, water quality monitors). This requires understanding network connectivity and integrating plumbing systems with broader smart home ecosystems.
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- 05 **Generative AI for Client Communication & Quotes.** AI can assist Plumbers in drafting initial versions of client quotes, service descriptions, and follow-up communications. This streamlines administrative tasks, ensuring clear and consistent messaging for customers.
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- 06 **Focus on Complex Physical Repair & Installation.** As AI handles data and routine diagnostics, the core value of Plumbers shifts even more strongly towards highly skilled physical repairs, complex pipe installations, and adapting solutions to unique architectural constraints. This requires irreplaceable manual dexterity and problem-solving.
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- 07 **AI for Inventory Management & Parts Sourcing.** AI tools are assisting Plumbers in optimizing inventory by predicting demand for specific parts, tracking usage, and automating reordering from suppliers. This ensures plumbers have the right parts for the job, reducing return trips and improving efficiency.
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- 08 **AI-Assisted Pipe Inspection & Robotics.** Plumbers may utilize AI-powered robotic cameras for inspecting pipes in inaccessible areas. The AI can identify cracks, blockages, or corrosion, providing detailed visual reports that guide repair strategies without extensive demolition.
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- 09 **Ethical AI in Smart Home Data & Privacy.** Plumbers will need to be aware of the ethical implications of AI use in smart home plumbing systems, particularly concerning data privacy from water usage monitoring. Upholding client trust and privacy in AI-augmented services is paramount.
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- 10 **Human-AI Teaming for Complex Diagnostics.** Plumbers will increasingly collaborate with AI diagnostic tools. AI provides data and suggestions, while the human plumber maintains the ultimate judgment, applies nuanced practical experience, and performs the physical verification and repair.
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- 11 **AI for Training & Skill Development.** AI-powered simulations or virtual reality tools could be used for plumber training, allowing practice in diagnosing complex issues or performing intricate repairs in a virtual environment before real-world application.
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- 12 **Continuous Learning & Trade Adaptability.** The evolution of AI tools in plumbing requires Plumbers to continuously learn about new technologies, smart water systems, and advanced diagnostic equipment. Adapting their trade skills to leverage these advancements effectively is crucial.
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- 13 **AI-Powered Job Costing & Estimating.** AI tools can analyze historical job data, material costs, and labor rates to generate more accurate and competitive quotes for plumbing services. This helps plumbers manage profitability and bid effectively.
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- 14 **Focus on Client Relationship & Trust Building.** As AI streamlines operational tasks, Plumbers can dedicate more time to building strong client relationships, explaining problems clearly, discussing solutions, and fostering trust—essential for repeat business and referrals.
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- 15 **Remote Monitoring of Commercial/Industrial Systems.** Plumbers may oversee AI systems remotely monitoring large commercial or industrial plumbing infrastructure, receiving alerts for potential issues and diagnosing problems before dispatching a team for on-site repair.
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What is pushing this change

- 01

Growth of Smart Home & Smart Building Technology. The proliferation of IoT devices and AI-controlled environments in homes and buildings requires specialized plumbing installation and maintenance.
- 02

Demand for Predictive Maintenance in Infrastructure. Property owners and facility managers seek to anticipate and prevent plumbing failures (e.g., leaks, bursts) to avoid costly damages.
- 03

Advancements in AI/ML (Computer Vision, Sensor Analytics). Breakthroughs in AI fields enable sophisticated analysis of sensor data, acoustic patterns, and visual inspections for plumbing issues.
- 04

Pressure for Resource Efficiency (Water, Energy). AI can optimize water usage, detect leaks early, and manage hot water systems, contributing to conservation.
- 05

Aging Plumbing Infrastructure. Aging pipes and water systems in homes and cities require proactive monitoring and repair to prevent costly failures.
- 06

Shortage of Skilled Tradespeople. There's a significant global shortage of skilled plumbers, driving the need for AI to augment existing workforces.
- 07

Growth of IoT Devices in Home & Commercial Buildings. AI-enabled leak detectors, smart water heaters, and connected irrigation systems generate data for plumbers.
- 08

Demand for Faster & More Accurate Diagnostics. Diagnosing complex plumbing issues can be time-consuming; AI offers tools for faster and more accurate fault identification.
- 09

Focus on Sustainability & Waste Reduction. AI can help identify sources of water waste, optimize water usage patterns, and detect leaks to support environmental goals.
- 10

Global Competition in Building Management. Property management and construction sectors are adopting technology to gain an edge in efficiency and quality.

Impact by sector

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

Residential Plumbers	AI for smart home leak detection, predictive maintenance for water heaters, and optimizing water usage for residential properties. Focus on home comfort and efficiency.
Commercial Plumbers	AI for monitoring commercial building water systems, predictive maintenance for HVAC plumbing, and optimizing water consumption. Focus on efficiency and compliance.

Industrial Plumbers	AI for monitoring complex industrial fluid systems, predictive maintenance for pumps/valves, and optimizing process water usage. Focus on safety and operational continuity.
Hydronic System Specialists (Boilers, Radiators)	AI for optimizing heating/cooling system performance, predictive maintenance for boilers, and identifying inefficiencies in hydronic networks. Focus on energy efficiency and comfort.
Drainage & Sewer Specialists	AI for robotic pipe inspection, identifying blockages/cracks, and optimizing drain cleaning schedules. Focus on efficient problem diagnosis and maintenance.

Skills to build

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

- 01 **Manual Dexterity & Physical Skill.** Expertise in performing complex physical tasks, including pipe cutting, fitting, welding, and working in confined or challenging spaces.
- 02 **Problem-Solving & Troubleshooting.** Ability to diagnose and fix diverse plumbing issues (leaks, clogs, pipe damage) in unpredictable environments, often under pressure.
- 03 **Client Communication & Trust.** Building rapport with clients, explaining technical problems clearly, discussing solutions, and managing expectations to foster trust.
- 04 **AI Tool Proficiency & Digital Literacy.** Proficiency in using AI-powered diagnostic tools, smart water system interfaces, and business management software.
- 05 **Plumbing System Knowledge.** Deep understanding of water supply, drainage, heating systems, and all associated components and their interactions.
- 06 **Adaptability & On-Site Judgment.** Ability to adapt to unforeseen on-site challenges, work with new technologies, and make quick, sound judgments in dynamic situations.
- 07 **Safety & Code Compliance.** Thorough knowledge of plumbing codes, safety regulations, and ensuring installations/repairs meet all standards.
- 08 **Estimating & Business Management.** Skill in accurately estimating job costs, preparing quotes, and managing business operations, sometimes with AI assistance.

Tools in use

KINDS OF TOOL WORTH KNOWING

- 01

AI-Powered Diagnostic Tools (Plumbing). Handheld or software-based tools leveraging AI to more quickly diagnose complex plumbing faults, analyze system behavior, and identify issues like leaks or blockages.
- 02

Smart Water Monitoring Systems (AI-enabled). Sensors and systems for homes/buildings that use AI to monitor water flow, detect leaks, shut off water in emergencies, and track usage patterns.
- 03

AI-Optimized Scheduling & Dispatch Software. Software that uses AI to dynamically schedule service calls, optimize routes for plumbers, and manage workloads efficiently.
- 04

Generative AI for Client Communication/Quotes. Large Language Models (LLMs) used to assist in drafting initial versions of client quotes, service descriptions, or follow-up communications.
- 05

AI for Inventory Management (Parts). AI tools that track plumbing part inventory, predict demand for specific components, and automate reordering from suppliers.
- 06

Robotic Pipe Inspection Cameras (AI-enhanced). Robotic cameras with AI/computer vision capabilities that can inspect the interior of pipes for cracks, blockages, or corrosion, providing detailed analysis.

NAMED TOOLS ALREADY IN USE

- Flume (Smart Water Monitor) / Phyn (Smart Water Assistant)**

VISIT

Examples of smart water monitoring systems that use AI to detect leaks, track water usage, and provide alerts.
- ServiceTitan (with AI features for scheduling/dispatch)**

VISIT

Leading field service management software that integrates AI for optimized scheduling, dispatch, and mobile workforce management.
- ChatGPT / Google Gemini (for drafting)**

VISIT

Generative AI models that can assist plumbers in drafting client quotes, service descriptions, and other communications.
- Field Service Management (FSM) software (e.g., ServiceMax, Oracle Field Service)**

VISIT

FSM software and inventory management systems that leverage AI for optimizing parts inventory and supply chain.
- Proprietary AI models (often developed by large plumbing/HVAC companies for internal use)**

VISIT

AI models developed by large plumbing or HVAC companies for internal use to optimize operations and predictive maintenance.

In practice

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

AI-Assisted Leak Detection EXAMPLE 1	HOW	Plumbers can use a handheld AI-powered acoustic sensor that listens to faint sounds within walls or under floors. The AI analyzes the acoustic signature to pinpoint the exact location of a hidden water leak, reducing exploratory demolition.
	GAIN	Significantly reduces diagnostic time, minimizes property damage from hidden leaks, and increases efficiency of repair.
Predict Water Heater Failures EXAMPLE 2	HOW	Plumbers can install AI-enabled sensors on water heaters in commercial buildings. The AI continuously analyzes temperature, pressure, and usage patterns to predict potential failures (e.g., a burst tank, element malfunction) weeks in advance, allowing for proactive replacement.
	GAIN	Prevents costly and disruptive water heater failures, allows for scheduled replacements, and improves asset management for property owners.
Optimize Service Call Scheduling EXAMPLE 3	HOW	Plumbers managing a service business can utilize AI-powered scheduling software. The AI analyzes real-time technician availability, client locations, urgency of calls, and traffic conditions to create the most efficient daily schedule and routes for the entire team.
	GAIN	Improves response times, increases the number of jobs completed per day, and enhances overall business efficiency and customer satisfaction.
Generate Quotes for Clients EXAMPLE 4	HOW	Plumbers can instruct a generative AI tool to draft a comprehensive quote for a new plumbing installation or a complex repair. By providing job details and material costs, the AI autonomously generates a professional, itemized quote for client presentation.
	GAIN	Saves significant administrative time, ensures consistent and professional quoting, and allows plumbers to focus on the technical aspects of the job.
Inspect Pipes with Robotic Cameras EXAMPLE 5	HOW	Plumbers can deploy an AI-powered robotic camera into a sewer line. The AI navigates the pipe, captures video, and autonomously identifies cracks, blockages, or root intrusions, providing a detailed visual report and pinpointing precise repair locations.
	GAIN	Eliminates the need for manual pipe exploration, provides highly accurate diagnostics, and enables precise, targeted repairs for complex underground issues.

§ 09

CONTEXT

How this role compares

Three neighbouring roles chosen to show the direction of travel.

Routine Plumbing Technicians (Basic fixes, scheduled maintenance) MORE EXPOSED	AI IMPACT High (AI can automate simple diagnostic checks; AI can optimize routine maintenance schedules.) WORK MOVES TO Role redefinition towards overseeing smart systems, handling complex diagnostic exceptions, or specializing in complex installations.
Robotics Engineers (for Plumbing Robots) / AI Smart Water System Developers DIFFERENT SKILLS, GROWING	AI IMPACT Foundational (They design and build the AI algorithms and robotic systems that automate plumbing tasks.) WORK MOVES TO Deep expertise in AI/ML algorithms, robotics, sensor technology, and software engineering, with a focus on plumbing/water systems.
Architects / Construction Managers COMPLEMENTARY, LESS EXPOSED	AI IMPACT Low direct impact (AI assists in design for architects; AI helps with site logistics for construction managers), but core creative design, project leadership, and overall construction oversight remain paramount. WORK MOVES TO Conceptual design, client vision, and aesthetic judgment (Architects); Overall project management, site safety, and human team coordination (Construction Managers).

§ 10

VERDICT

Closing judgement

For Plumbers, AI is not a threat to their core trade but a valuable assistant that will enhance their diagnostic capabilities, streamline business operations, and enable proactive maintenance. While AI will handle data analysis and scheduling, the irreplaceable human skills of manual dexterity, hands-on problem-solving in unpredictable environments, and direct client trust-building will remain paramount. The future Plumber will be a tech-savvy master of their craft.

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

25 (held)

WINDOW

10-15 years (unchanged)

The 4 October 2026 review held the score.

Microsoft's AI applicability score for the matching occupation is 0.07, in the bottom quarter of 785 US occupations; Anthropic's observed exposure (the share of the occupation's tasks already being done with Claude) is 0.01, which is minimal by the standards of the 756 occupations measured; the US Bureau of Labor Statistics places it in the 'moderate' AI-exposure tier; BLS projects employment to grow 6.8% over 2025–35. Taken together this is consistent with our previous figure of 25, which we have held.

MEASURES BEHIND THE SCORE

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

AI-exposure tier: Moderate. Projected employment change 2025–35: +6.8%. Matched to Plumbers, pipefitters, and steamfitters.

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

AI applicability score 0.07 (percentile 22 of 785 occupations) for SOC 47-2152.

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

Observed exposure 0.01 for SOC 47-2152 (percentile 55 of 756 occupations).

PUBLISHERPDF

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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ALSO CITED FOR THIS ROLE

McKinsey Global Institute · *Agents, robots, and us: Skill partnerships in the age of AI* (25 November 2025)

Hands-on trades sit in the robot share of technical potential (~13% of US hours), which depends on hardware costs and is expected to move far more slowly than desk work.

PUBLISHER

Archived copies are served only where the licence permits; otherwise the link goes to the publisher. Full research library:
<https://www.careerguard.ai/sources>

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.
