AI on the Frontier

The Critical Role of Rural Broadband in Montana's Future

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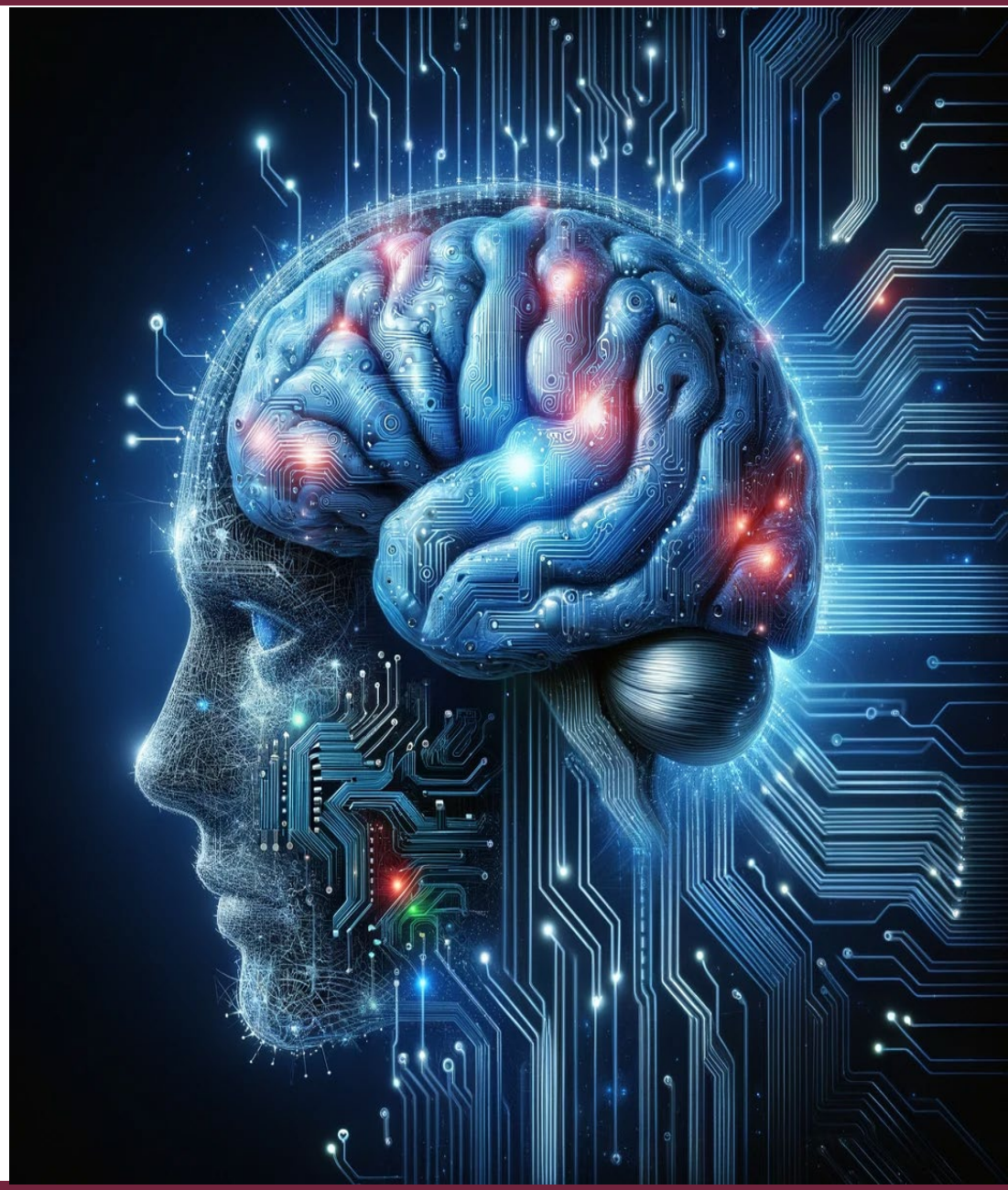
Session: Quick Hits

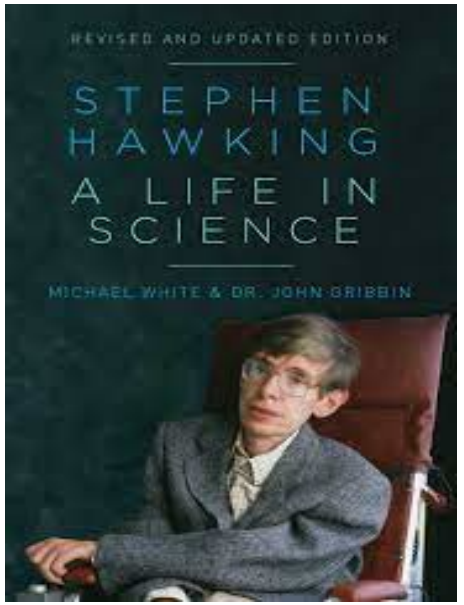
- AI is not the next big thing. It is **THE BIG THING** (it's happening now).
- Tipping point: Data (Big Data as important as AI models like ChatGPT). **AI models require massive datasets.**
- Today, AI training data is primarily text-based (e.g., GPT-4 was trained on ~45TB of text data).
- In the future, AI will increasingly become dependent on other types of data, much unstructured, continuous, and synchronous: Images, audio, video, etc.
- Big question and underlying theme: If AI models simulate the human "brain", what then is the "body"? (Embodied cognition)



AI: Definition and Background

Artificial Intelligence (AI): The simulation of human intelligence processes (thinking) by machines.

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

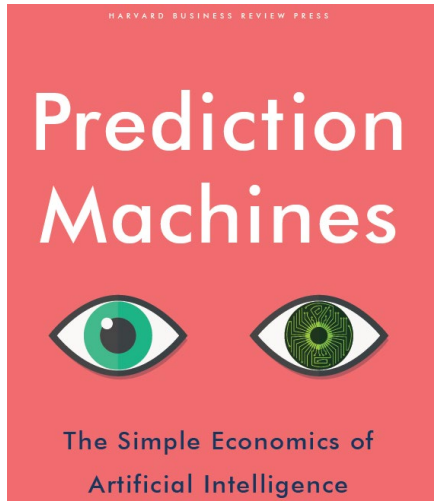


"Everything that civilization has to offer is a product of human intelligence . . . Success in creating AI would be the biggest event in human history."

AI Breakthroughs: A Quick Timeline

1. **1956 - Birth of AI**: The term "Artificial Intelligence" was coined at Dartmouth College.
2. **1965 - ELIZA**: MIT developed ELIZA, an early natural language processing computer program. It was one of the first attempts to simulate a human conversation.
3. **1997 - Deep Blue Defeats Kasparov**: IBM's Deep Blue chess computer defeated the reigning world chess champion, Garry Kasparov.
4. **2012 - Deep Learning Breakthrough**: AlexNet, a deep convolutional neural network, won the ImageNet Large Scale Visual Recognition Challenge. This event marked the resurgence of neural networks and the beginning of the current deep learning era.
5. **2015 - AlphaGo**: Developed by DeepMind, AlphaGo defeated Lee Sedol, a world champion Go player, in 2016. Go, with its vast complexity, was previously thought to be beyond the capabilities of AI for the foreseeable future.
6. **2017 - OpenAI's GPT**: OpenAI released the Generative Pretrained Transformer (GPT), a model that set new standards for natural language processing tasks. Its successors, like GPT-3, further pushed the boundaries.
7. **2018 - AI for Healthcare**: Google's DeepMind developed an AI that could detect eye diseases in scans, demonstrating the vast potential of AI in healthcare and early disease detection.
8. **2020 - Protein Folding Solved by AI**: DeepMind's AlphaFold achieved a breakthrough in predicting protein structures, a problem that had puzzled scientists for decades. This has significant implications for understanding diseases and drug discovery.
9. **2022 - Advanced AI Perception**: The integration of advanced neural network architectures with vast datasets led to a breakthrough in AI's ability to detect, classify, and understand visual data with human-like accuracy.
10. **2023 - LLMs Become Mainstream**: The introduction of language-based thinking models for use among the general public.
11. **2025 - AI-Driven Business and Creativity**: AI systems began to exhibit more developed levels of creativity. These creative feats were not mere imitations but showcased genuine novelty and innovation.

AI is now IA: (It's Arrived)

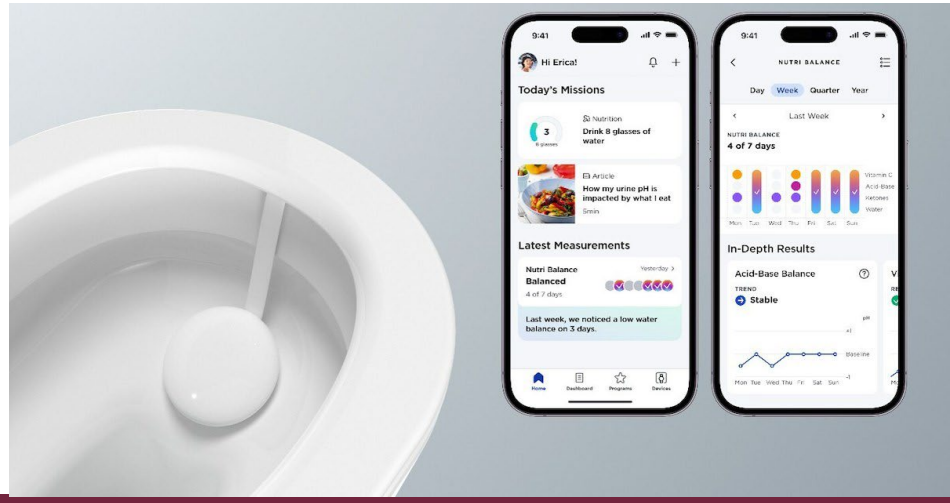


"**AI is everywhere.** In our phones, cars, shopping experiences, romantic matchmaking, hospitals, banks, and all over the media. Corporate directors, CEOs, vice presidents, managers, team leaders, entrepreneurs, investors, coaches, and policy makers are racing to learn about AI…

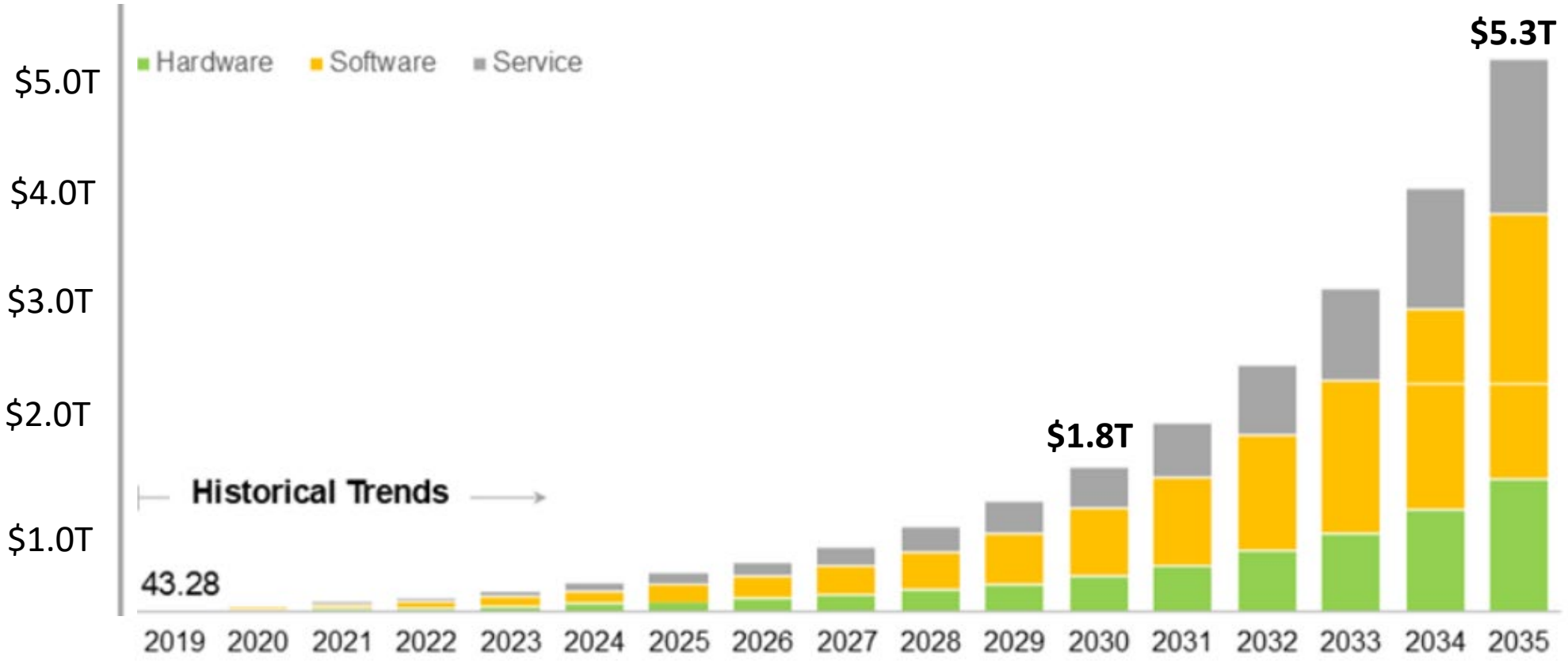
They all realize it is about to fundamentally change business."

Claude

Gemini



AI: The Coming $5.3T Global Industry



30.3% CAGR

2035 Market Projections:

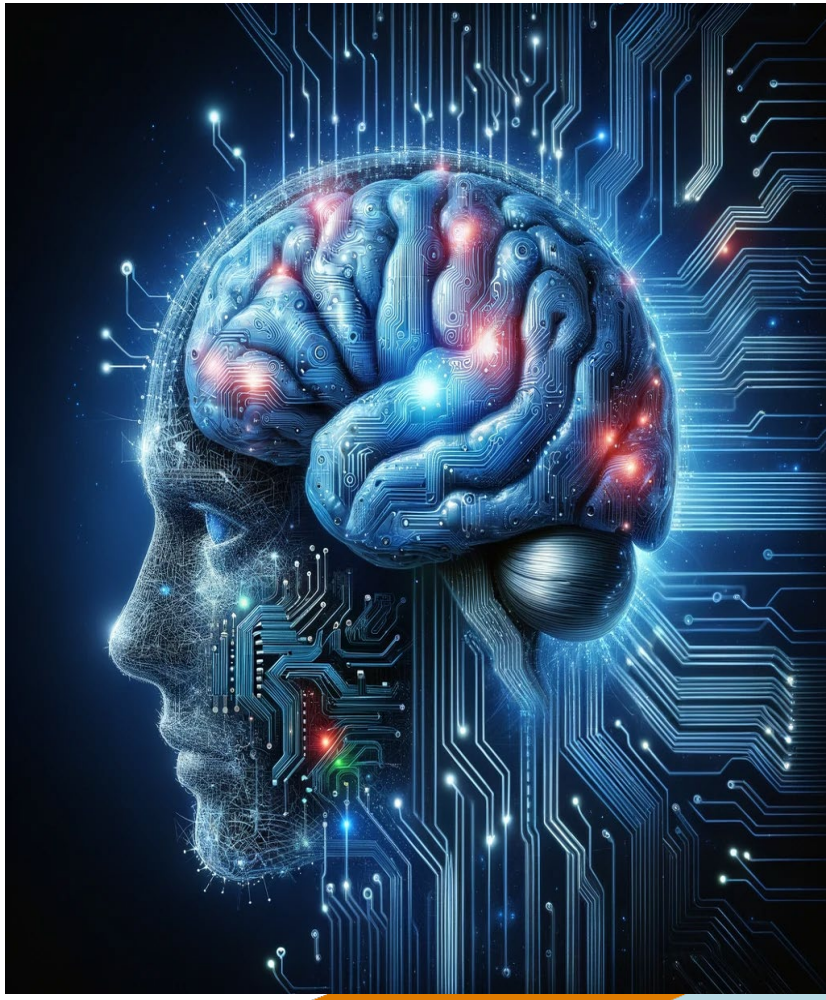
Infrastructure: $1.2T

- **AI-Specific Chips**
- **Data Centers**
- **Data Transmission**
  - **Production**
  - **Consumption**
  - **Distribution**

Bloomberg Intelligence, *Generative AI Market Size* (2023); Research and Markets, *Artificial Intelligence Market* (2025)

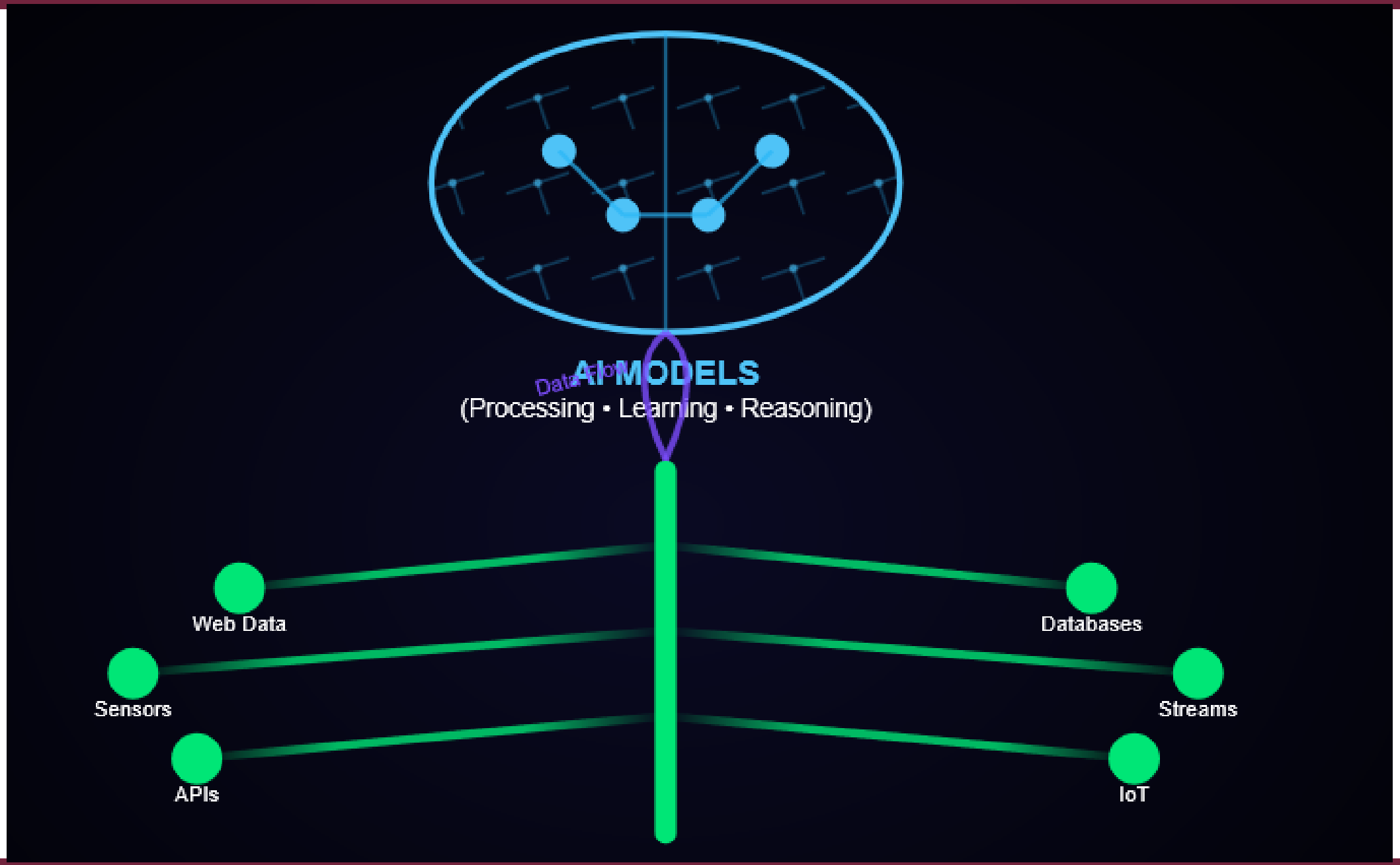
The Tech: The Devilish Details

- **Algorithm:** Step-by-step procedure or set of instructions designed to perform a specific task or solve a particular problem.
- **Machine Learning (ML):** Algorithms that parse data, learn from it, and then apply what they've learned to make informed decisions.
  - Examples: your email's spam filter or Netflix's recommendation engine.
- **Neural Networks:** Systems of algorithms modeled on the human brain that interpret sensory data through a kind of machine perception, labeling, or clustering of raw input.
  - Process and interpret data; Example: ChatGPT



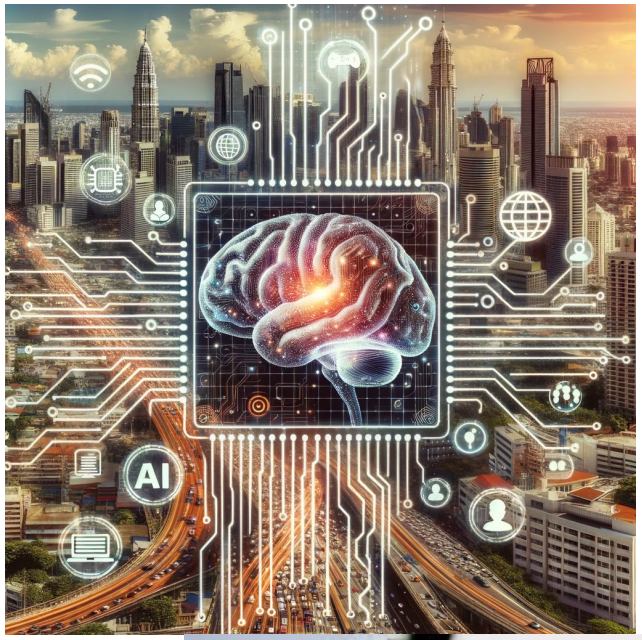
Summary of AI "Thinking"

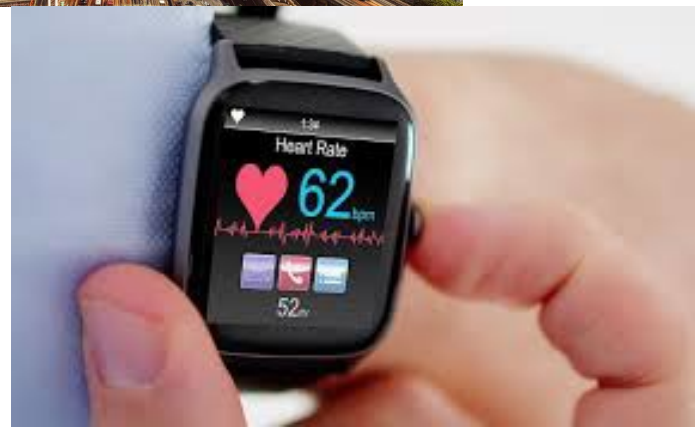
- **Learning**: The acquisition of data and rules (algorithms) for using the data.
- **Reasoning**: Using the rules to reach approximate or definite conclusions.
- **Self-correction**: Adjustments to fine-tune algorithms and correct errors (machine learning).


AI MODELS
(Processing • Learning • Reasoning)
Web Data
Databases
Sensors
Streams
APIs
IoT

The Key to AI: Data, data, and more data

- **The more data** → The more AI systems can learn, adapt, and evolve.
- **Big data (volume, variety, and velocity)** → Fuel for AI's learning engines.
- **Data enables new sophisticated models** → Predict, infer, and decide with an increasing degree of accuracy.
- **Data also unlocks value within big data** → Offers tools to analyze, interpret, and leverage vast datasets to drive decision-making and innovation.





Examples of Key Data Sources: IoT Devices (sensors, wearables, etc.), **Cloud Media** (Reddit, Wikipedia), **Industry Data** (operations, transactions, customer interactions, reports)

AI in Agriculture and Ranching

Precision Farming: Drones and sensors for resource management and yield predictions.

Livestock Monitoring: AI detects illness or stress via sensors.

"Precision Ag could boost yields 20-30%"

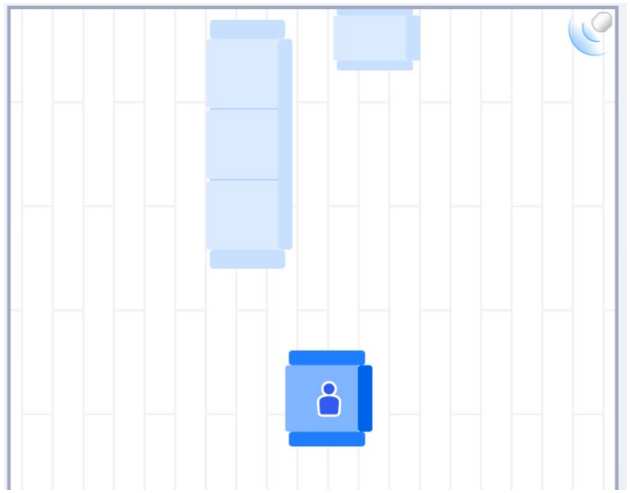
Examples of Data Demands:

- Autonomous tractors: 5-20 GB/day
- Drone imaging: 2-10 GB/flight
- Livestock sensors: 0.5-2 GB/day per 100 cows

Broadband Need: 100+ Mbps fiber for real-time AI analytics

Only 55% of U.S. farms have broadband access

AI for Health and Home Care: Saving Lives with Bandwidth



Medical Imaging and Drug Discovery

Remote Patient Monitoring (RPM): Real-time vitals + AI = proactive care.

84% of rural hospitals use some form of virtual health (NRHA)

Home Care: Supports Aging in Place through radar, sound-aware, and other AI-powered tech.

Impact on Patient and Client Care: Enables predictive and preventive medicine, improve diagnostic accuracy, and specific treatments for individual patients.

AI Diagnostics Data Load:

- **X-rays/MRIs:** 50-500 MB per scan
- **Robotic surgery:** 1-2 GB/hour (needs **<10ms latency**)

Broadband Need: Symmetrical, low latency 100 Mbps-1Gbps for reliable telehealth (video and data transmission).

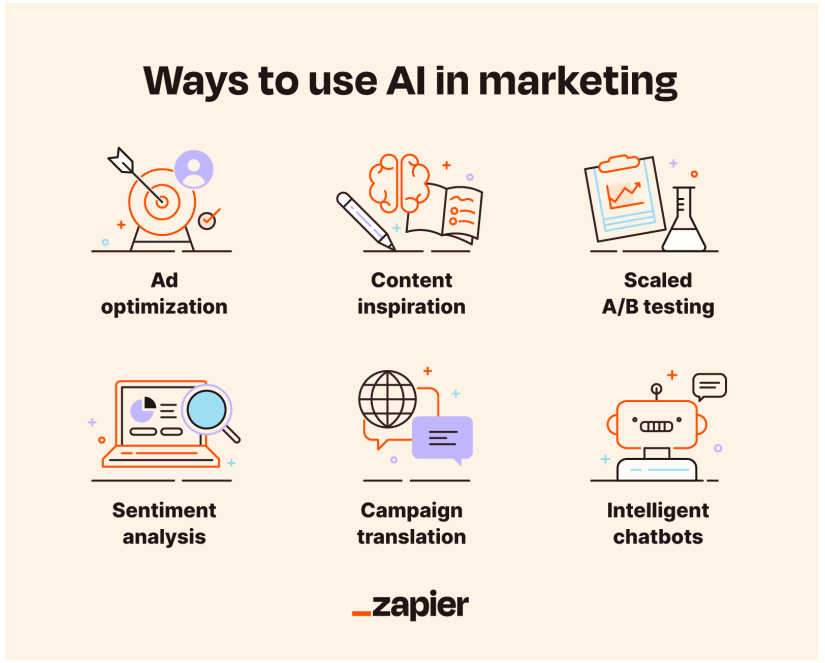
AI in Business

HR, marketing, e-commerce, media development, customer support (chatbots, AI-enabled leads), supply chain management, etc.

- Small retail: POS + AI inventory analytics → steady data flow
- Creative services (video/AI design): 20–100 GB file transfers common
- AI-driven marketing, e-commerce, and customer analytics increase cloud dependence

Rural businesses risk exclusion without high-capacity data

Target: 1 Gbps symmetric for digital competitiveness



AI in Rural Public Services

- **Education:** AI Tutors for individualized learning (Khanmigo)
- **Smart Infrastructure:** Fire, water, traffic, and energy management.
- **Emergency Alerts and Digital Access:** AI requires online presence.

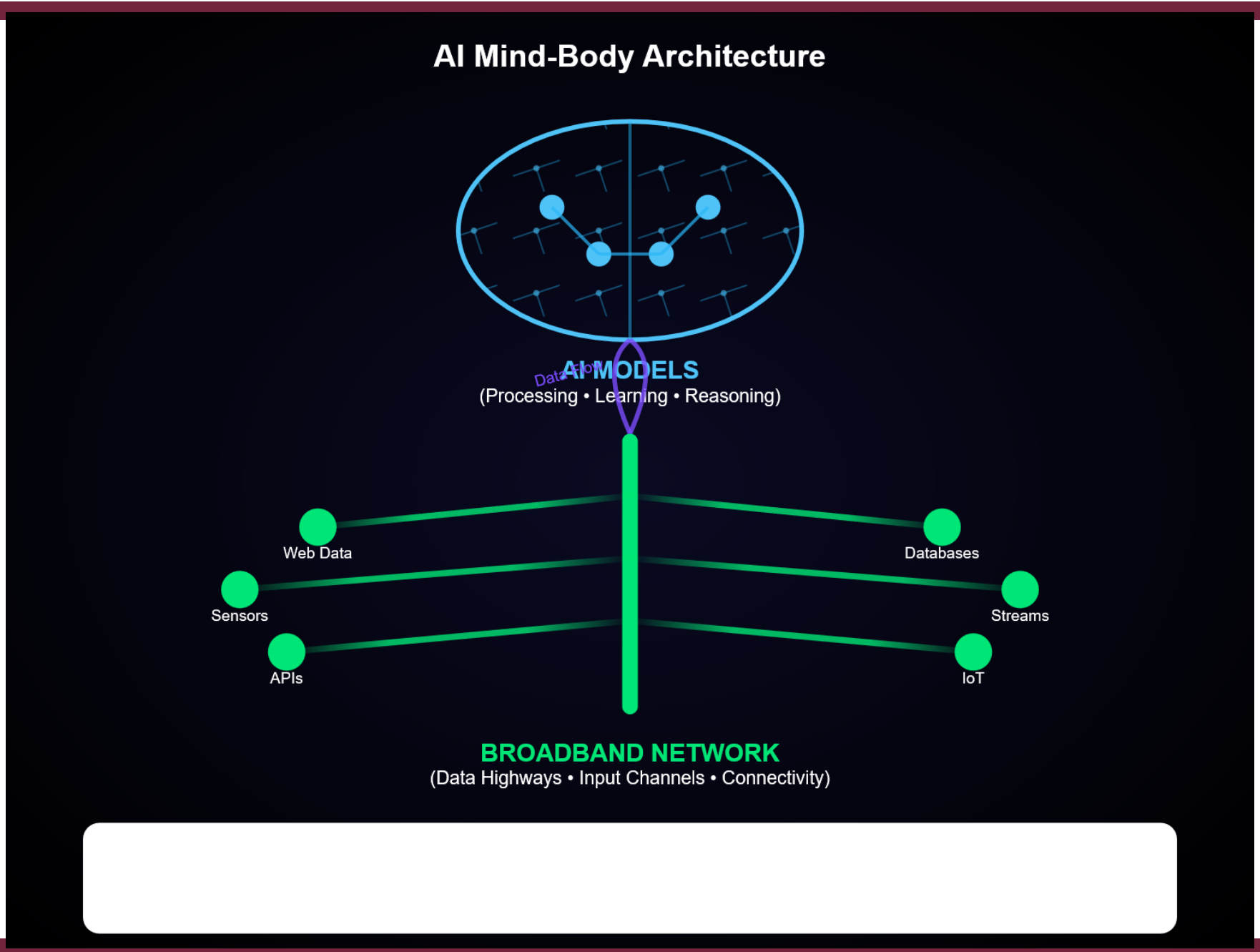
Data accessibility is essential for safety, equity, and innovation.

AI and Data Requirements

Sector	Current Avg. (Rural)	AI Minimum Need	Future Need (2030)
Agriculture	10-25 Mbps	50-100 Mbps	100-500 Mbps (fiber)
Healthcare	25 Mbps	100 Mbps (symmetrical)	1 Gbps for telesurgery
Education	50 Mbps (schools)	100 Mbps per classroom	1 Gbps (VR/AR labs)
Small Business	25-50 Mbps	100 Mbps (symmetrical)	500 Mbps+ for AI growth

Problem: Without data access, rural MT falls behind in AI-driven economy.

AI Mind-Body Architecture



The AI Revolution is Here – But Can Rural Montana Keep Up?

Key Message: AI is transforming industries, but rural areas need broadband to participate.

AI Growth: Global AI market to hit **$1.8T by 2030** (Bloomberg) and **$5.3T by 2035**

Montana's Challenge:

- **~40% of rural Montanans** lack adequate broadband (FCC 2023)
- Current **25/3 Mbps** standard is **not enough** for AI
- Small businesses, farms, and schools are at high risk of being left behind

Closing Thoughts

- Broadband is not just about access—it's the foundation for bringing AI to rural Montana.
- Industries like healthcare, education, agriculture, and ranching are expanding AI adoption—broadband will be a key part of this expansion.
- Broadband companies are a key enabler—and supportive body—of a smarter, more resilient rural economy.

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