

AI in Healthcare

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Conflicts of Interest



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MICROSOFT+NUANCE



I WILL MENTION A SPECIFIC PRODUCT IN
THIS PRESENTATION ONLY AS A PERSONAL
EXAMPLE OF AI IN HEALTHCARE.

Agenda

- Define AI
- Brief History of AI
- General uses of AI
- Uses of AI in Healthcare
 - In depth example
- Future of AI??



What is Artificial Intelligence?

Dictionary

Definitions from [Oxford Languages](#) · [Learn more](#)



ar·ti·fi·cial in·tel·li·gence

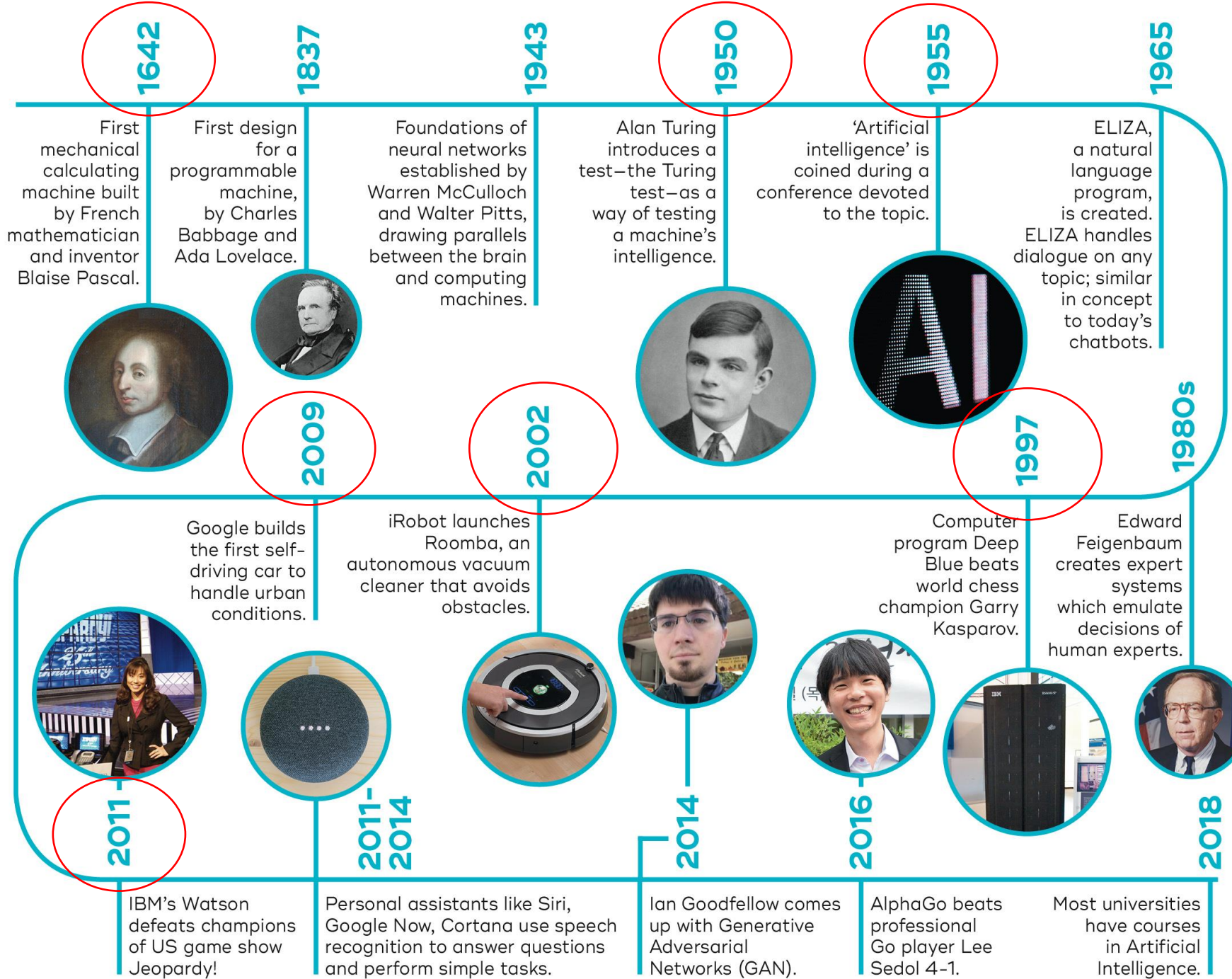
/ˈɑːrdəˌfɪʃ(ə)l ənˈteləj(ə)ns/

noun

the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

What does that mean?

- Machine Learning
 - Algorithms and statistical models to perform tasks
- Neural Networks
 - A series of algorithms that mimic thinking
- Deep Learning
 - Using layers of Neural Networks in large data sets
- Natural Language Processor
 - Enable computers to understand, interpret and generate language
- Computer Vision
 - Ability to interpret and make decisions based on visual input
- Robotics
 - Field assimilating AI to carry out actions
- Expert Systems
 - AI acting as an expert
- Knowledge Representation
 - AI learning from itself



2020’s

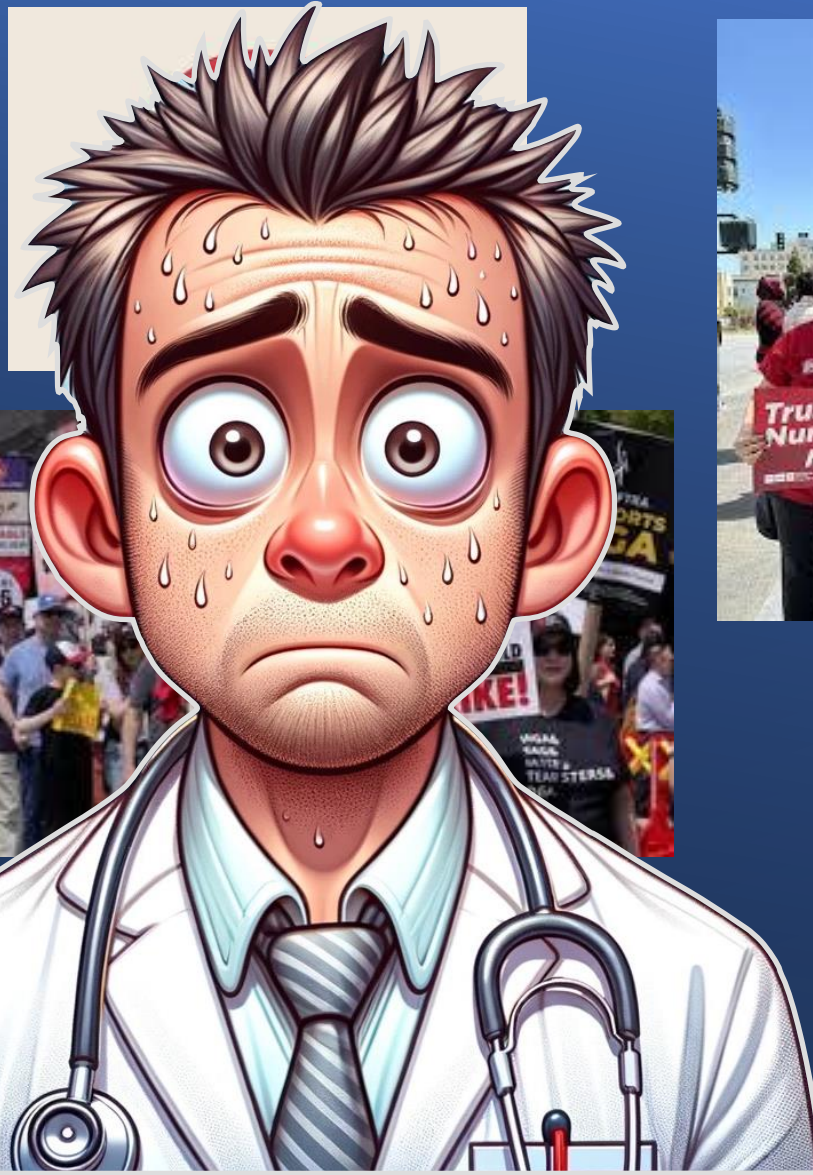
Language and image recognition capabilities of AI systems have improved rapidly

Test scores of the AI relative to human performance



General uses of AI

- Automotive
 - Autonomous driving, navigation, traffic management,
- Finance
 - Fraud detection, algorithmic trading, personal finance
- Retail
 - Inventory management, personalized shopping, price optimization
- Manufacturing
 - Predictive maintenance, supply chain management, robotic automation
- Entertainment
 - Personalized recommendations, gaming, music, content creation, social media
- Education
 - Personalized learning, admin tasks, adaptive learning
- Security
 - Surveillance, threat detection, facial recognition, biometric systems
- Agriculture
 - Crop and soil management, predictive analysis for planting and harvesting



AI PROTEST IN SF

NBC BAY AREA



DON'T PANIC





Uses of Artificial Intelligence on Healthcare

- Draft
- Summation
- Automation
- Translation

AI Uses in Healthcare



Diagnostic Imaging

Uses algorithms to analyze images



Electronic Health Record

Analyzing large amounts of data



Personalized Medicine

Genetic analysis and treatment planning
Comparisons with other patients



AI Assisted Surgery

Time stamping
Deviation alerts
Instrument/Supply count

AI Uses in Healthcare



Virtual Health Assistants

Appointment management
Prescription Refills
Transitions of Care



Predictive Analytics

Predict sepsis, admissions,
hospice, and even mortality



Clinical Decision Support

Amalgamation of data
Incidental Findings



Remote Patient Monitoring

Pressure Ulcers, Fall risks, Vitals



AI Analysis of Pathology

Looking at pixels

AI Uses in Healthcare



Healthcare Operations Optimization

Predict patient flow, resource needs, supplies,



Mental Health Applications

AI powered assessments and therapy??



Drug Discovery

Target ID, Molecular screening, drug design, clinical trials



Epidemiologic Surveillance

Process data for public health records, social media, and other sources to identify and predict public health concerns



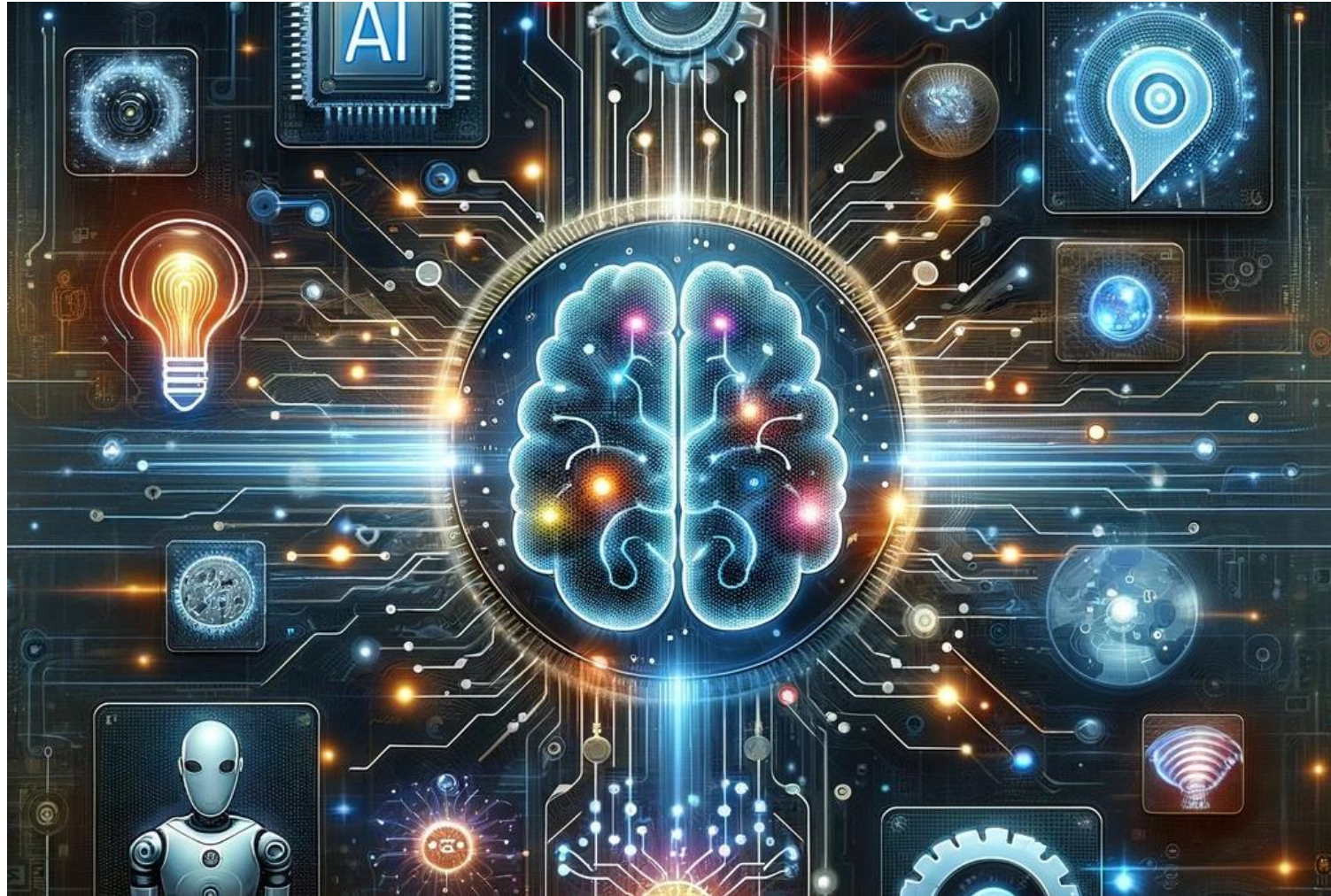
Genomics

Read human genome and compare to mutations

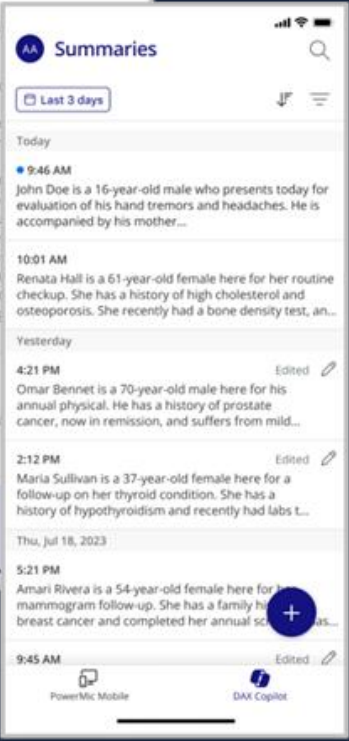
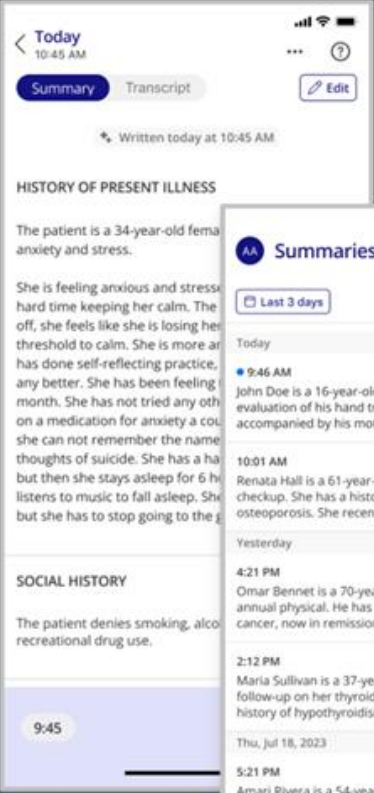


Biometrics

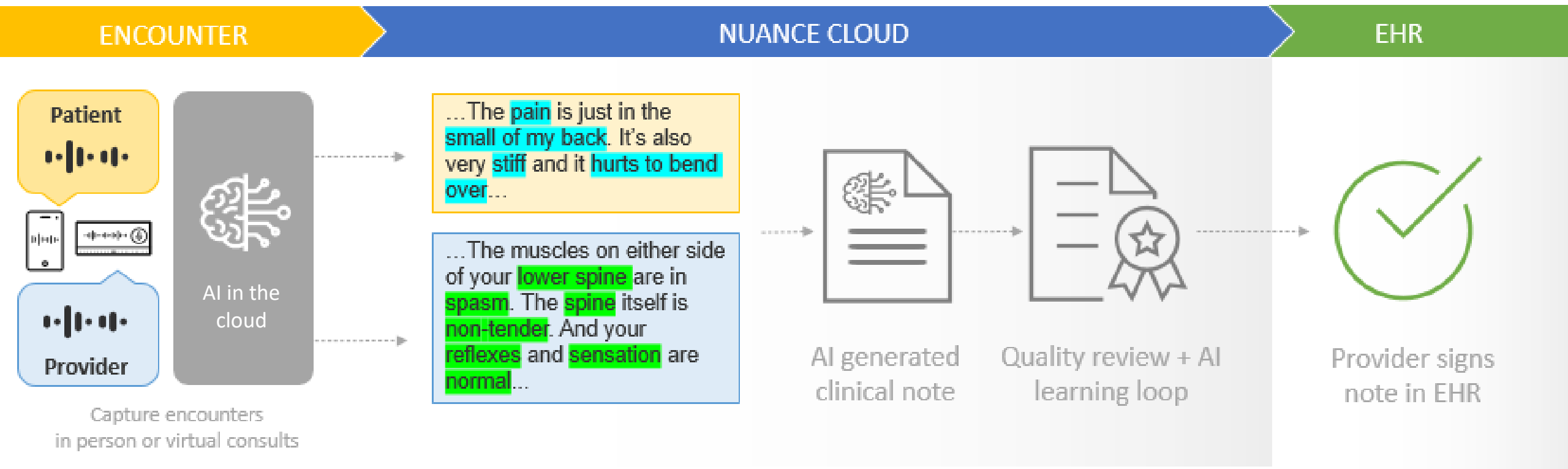
Using human observations to predict disease



A real-life
example



From encounter to note



What providers are saying...

"Using dax has improved my job satisfaction, decreasing my cognitive load and job fatigue to the point that I feel that I can finally keep my head above water." – Hilary Schmid

"DAX has drastically changed my work-life balance and as a result I feel significantly less burnt out with a decreased mental burden. I am now able to be much more mindful and feel fully present during my patient encounters, which has improved my job satisfaction, communication with patients, and I am sure has improved the patient's experience and outcomes as a result." – Kristen Burrows

"I already have added patient slots since starting DAX. I changed my whole scheduling algorithm. Please do not get rid of this service, at least for primary care.." – Elizabeth Albright

"DAX has allowed me to continue to see the number of patients I currently see and also address more complicated and additional complaints in the same office visit. The biggest benefit I have found is the reduced cognitive load during the visit, during the clinic day and when completing patient charting end of day. Since the HPI and plan has been documented less cognitive effort is needed to complete and close charts allowing for improved patient, staff and family interactions." – Gerrit Kleyn

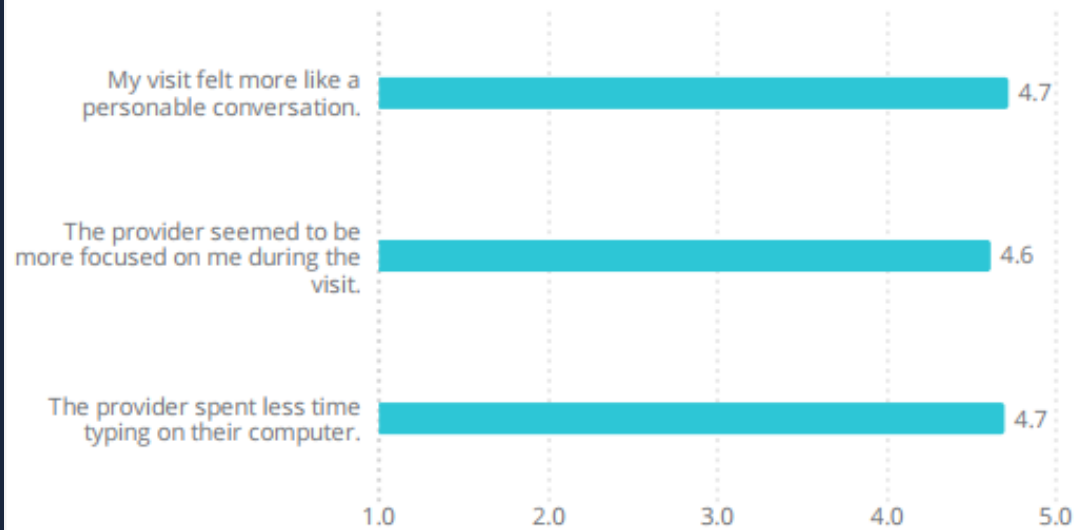
"This is the most powerful and transformative tool in a long period, which eases the administrative burden of creating excellent clinical documentation. Nearly overnight, it has changed my entire clinical practice for the better. My well-being is happier, and the weight of clinical documentation stress has been lifted. I can now focus on what I am trained to do, listen to patient, ask probing and more detailed questions to clarify essential HPI elements, formulate a strategy and plan with the patient, discussion treatment, therapy, and educate. All the while--DAX capturing all the details and doing the documentation." – Dave Albrecht

"It has been a life saver. I no longer dread having to document my visits or facing a patient with numerous concerns because the documentation aspect is so easy now with DAX." – Megan Collison

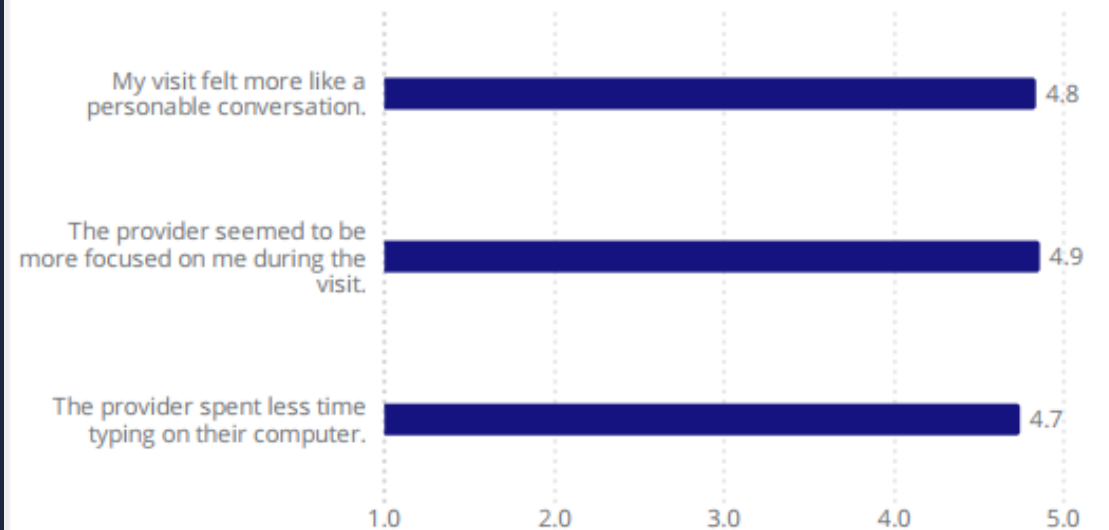
"It makes things easier, but more importantly it gives me more time to think about the patient, I am catching some stuff I don't think I would have caught earlier. For instance, once I saw a patient after they had a laceration treated in the ER, but they had not gotten a tetanus shot in the ER, and this was in the context of a fuller visit with other issues, but since I could sit back and think about what we were talking about I asked the question I would have otherwise not thought of." – John Rajlich

"It's Daxtastic!" – Lance Owens

Rate your visit compared to previous visits with same provider

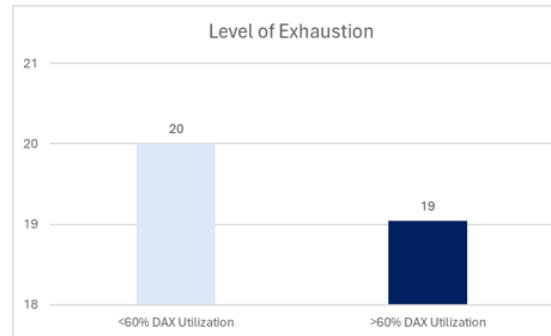
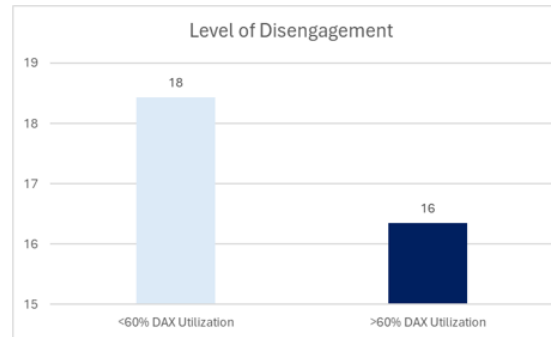
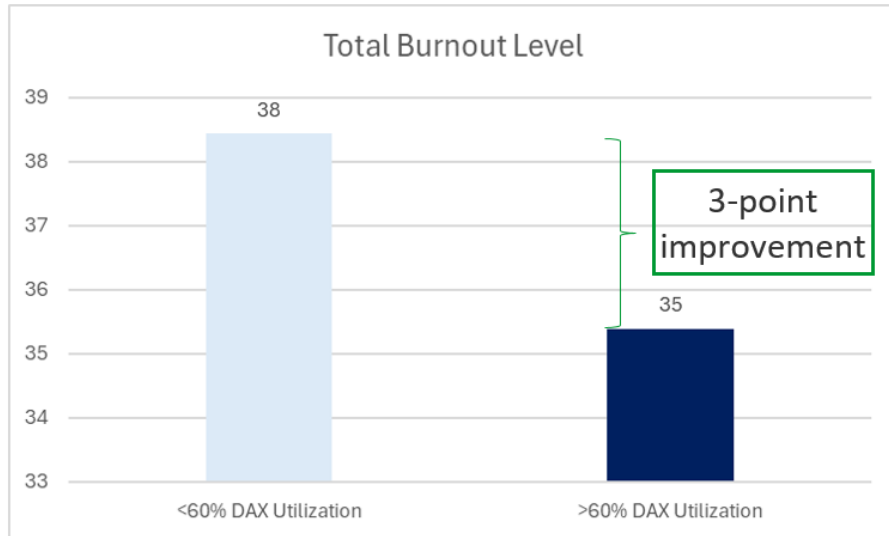


Rate your visit compared to previous healthcare encounters



Providers with high DAX use have less burnout

Provider survey results:

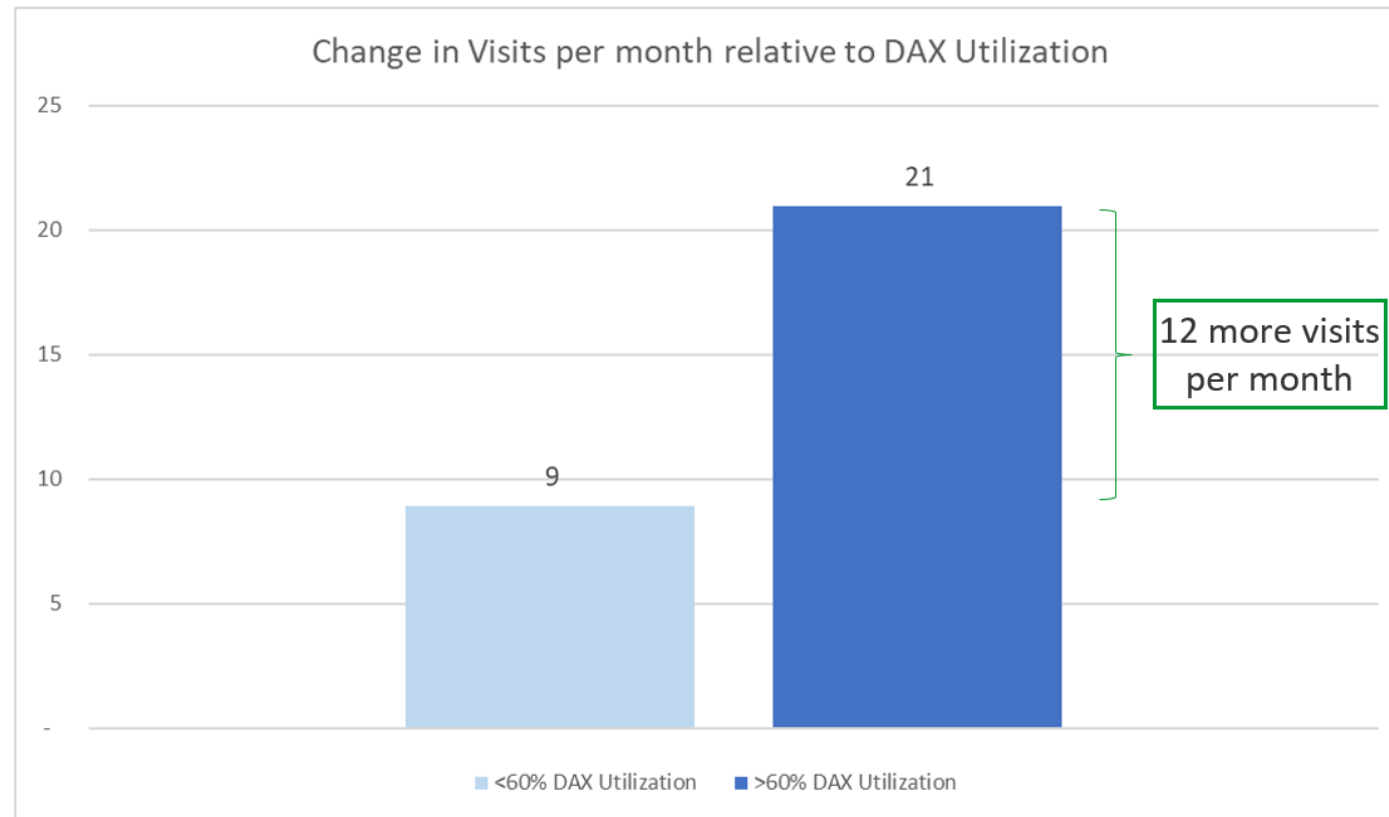


Takeaways:

- Providers with high DAX utilization are taking full advantage of available tools and showing the lowest burnout relative to peers
- Providers with low or no DAX utilization likely have inefficient workflows and struggle with higher burnout
- As a reference, clinicians that go from full-time to part-time have a reduction of 4 points, which is often described as the most impactful intervention

Average change in visits per month by utilization group

Average change in visits per month



Considerations:

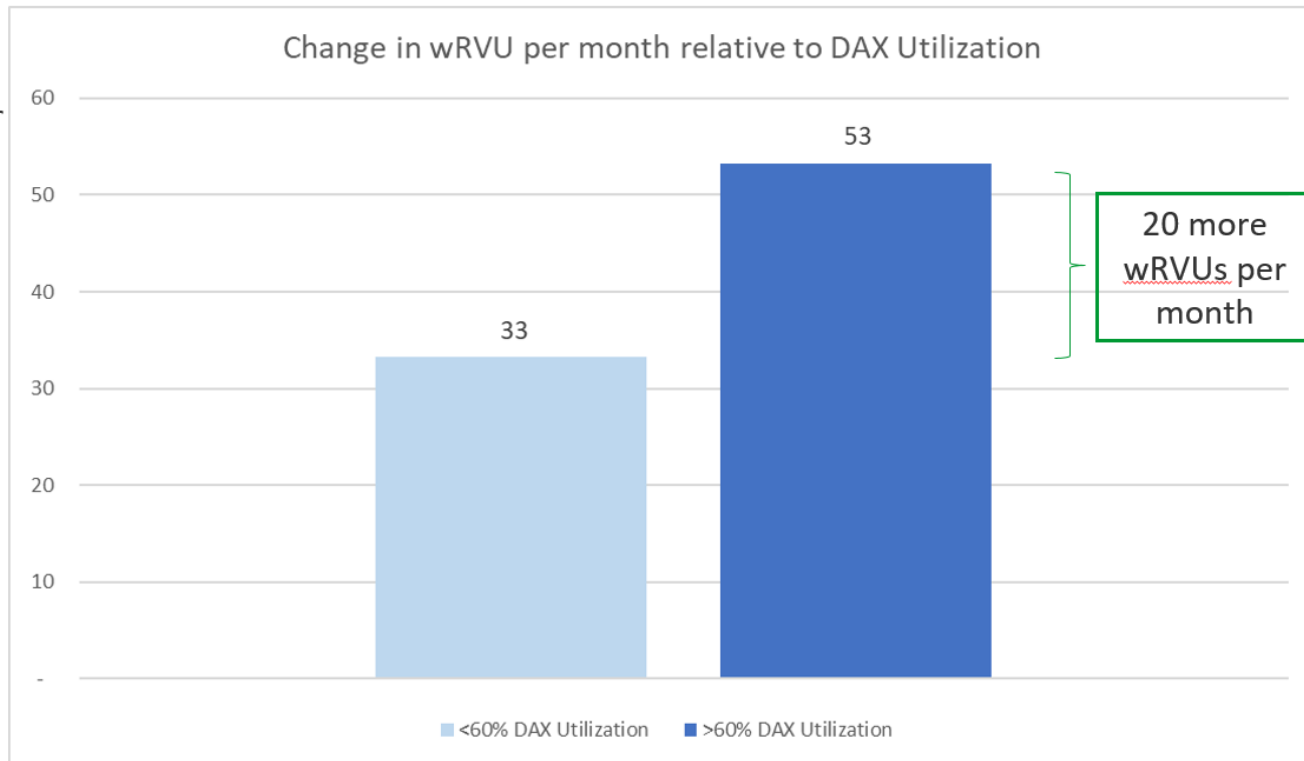
- Data not yet normalized to hours per day
- Includes providers that were live on DAX for at least a year; excludes new providers in guaranty period
- Contact hour requirement changed to 32 from 36 at around the time DAX went live for most providers
- Hypothesis: Range of programs at UMHW enabling providers overall to see more patients; providers that use DAX for majority of encounters are able to make the most of those other programs to support increased visits without being asked

Notes: # of providers by group are 17 providers for <60% utilization and 18 providers >60% utilization

Source: UMHW Data Review of 46 providers live on DAX prior to Feb 2022; excludes new providers and significant leave

Average change in wRVU per month by utilization group

Average change in wRVU per month



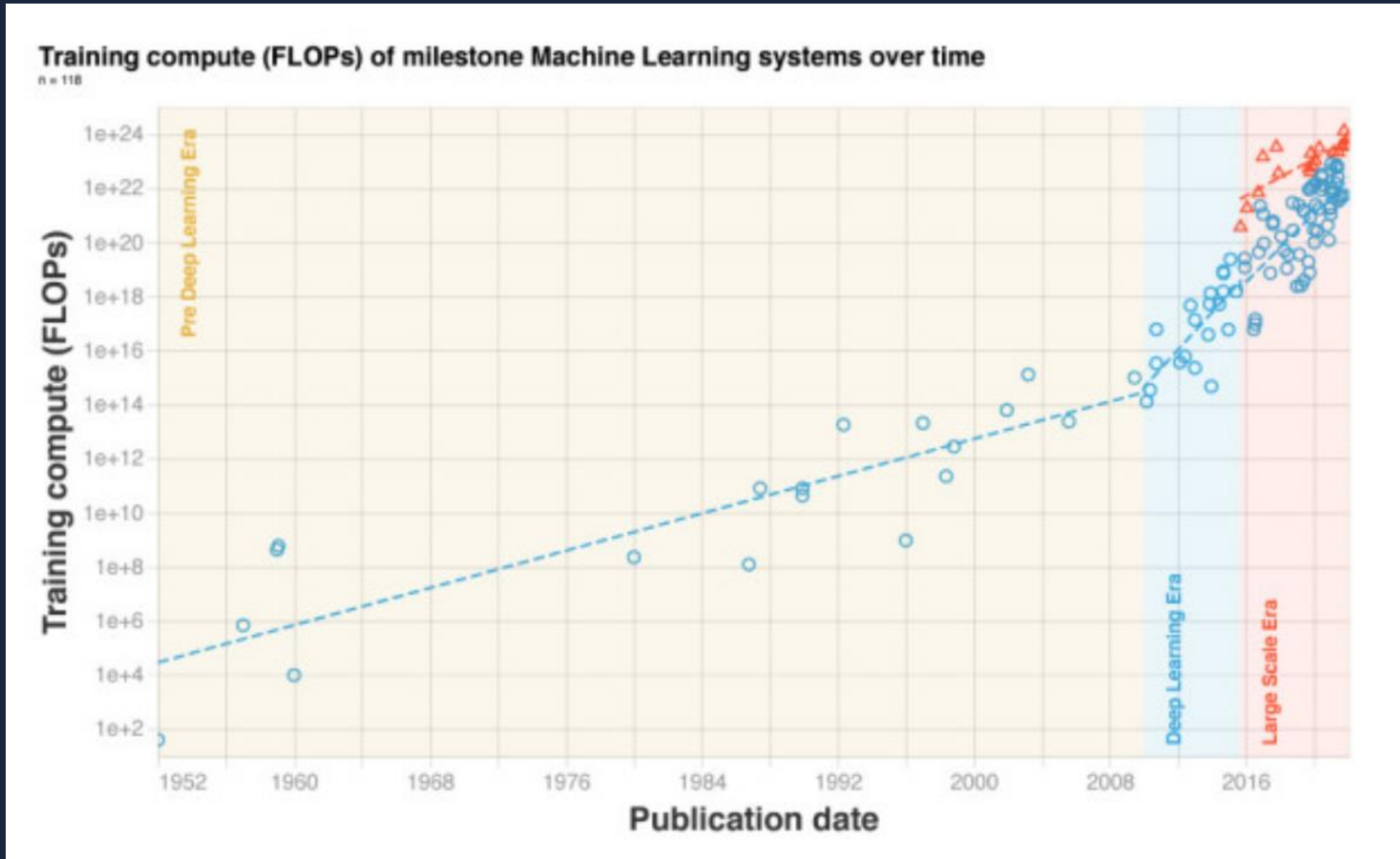
Considerations:

- Data is not yet normalized to hours or days; wRVU per hour is likely a better metric
- Includes providers that were live on DAX for at least a year; excludes new providers in guaranty period
- Hypothesis: Similar to the visits data, providers efficient in documentation can make the most of available programs to improve productivity.



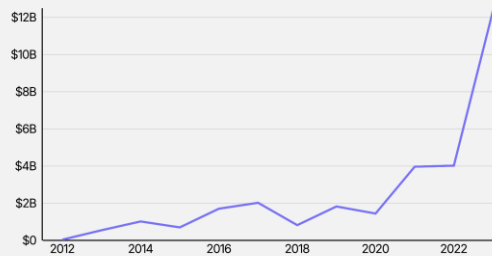
What does
the future
hold?

What does the future hold?



GenAI startup funding is going exponential

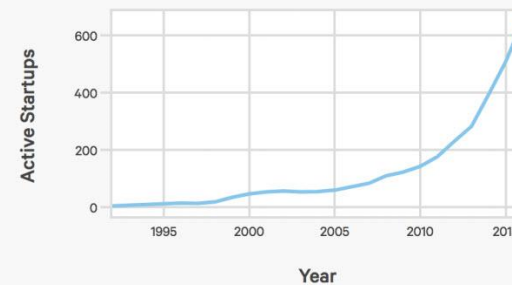
GenAI funding (USD)



Source: Dealroom

exponentialview.co

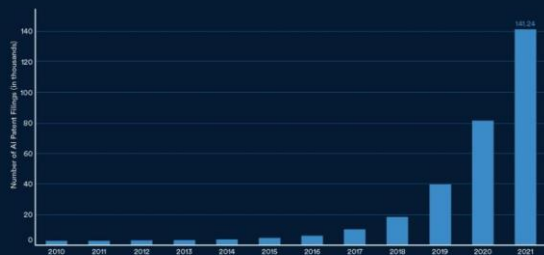
Startups Developing AI Systems



Sources: Crunchbase, VentureSource, Sand Hill Econometrics

AIINDEX.ORG

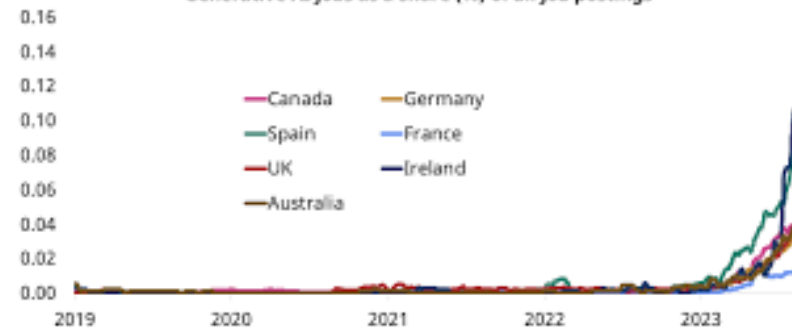
Number of AI Patent Filings



Source: Center for Security and Emerging Technology, 2021 | Chart: 2022 AI Index Report

Sharp cross-country growth in GenAI jobs

Generative AI jobs as a share (%) of all job postings



Source: Indeed



You can't predict AI's future. (Nobody can.)

The massive growth in foundation models ...

GPT-1 (2018): 117 M parameters

GPT-2 (2019): 1.5 B parameters

GPT-3 (2020): 175 B parameters

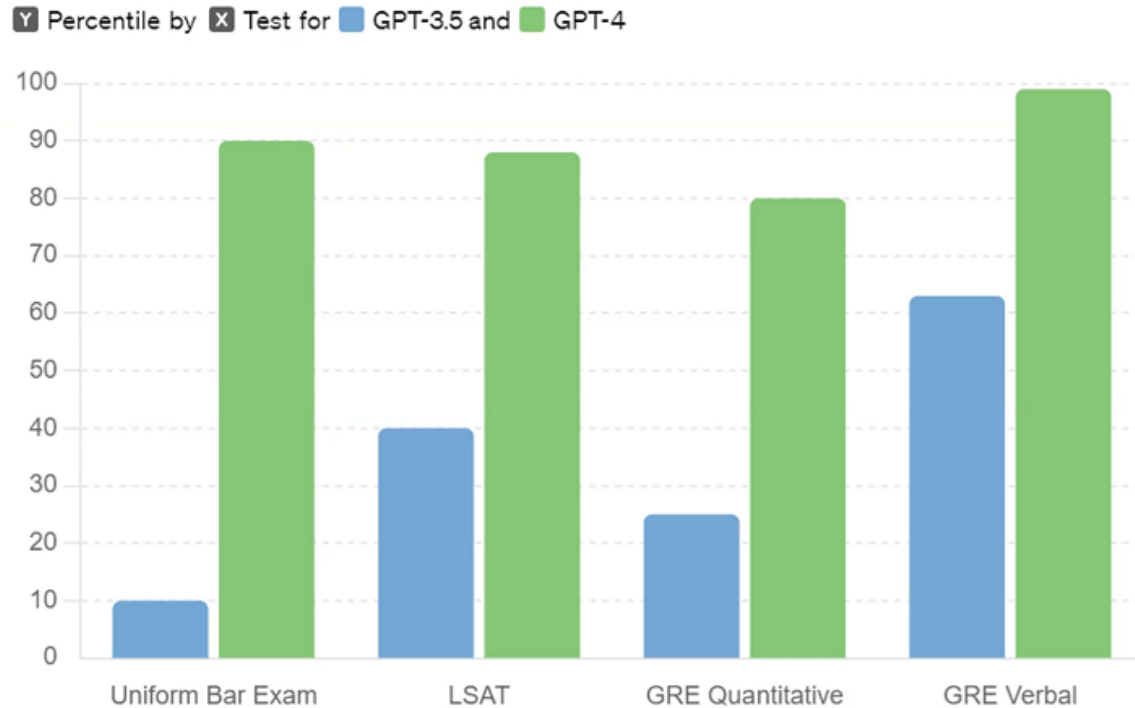
GPT-4 (2023): 1.7 T parameters

GPT-5 (2024?): ???

DEFINITION

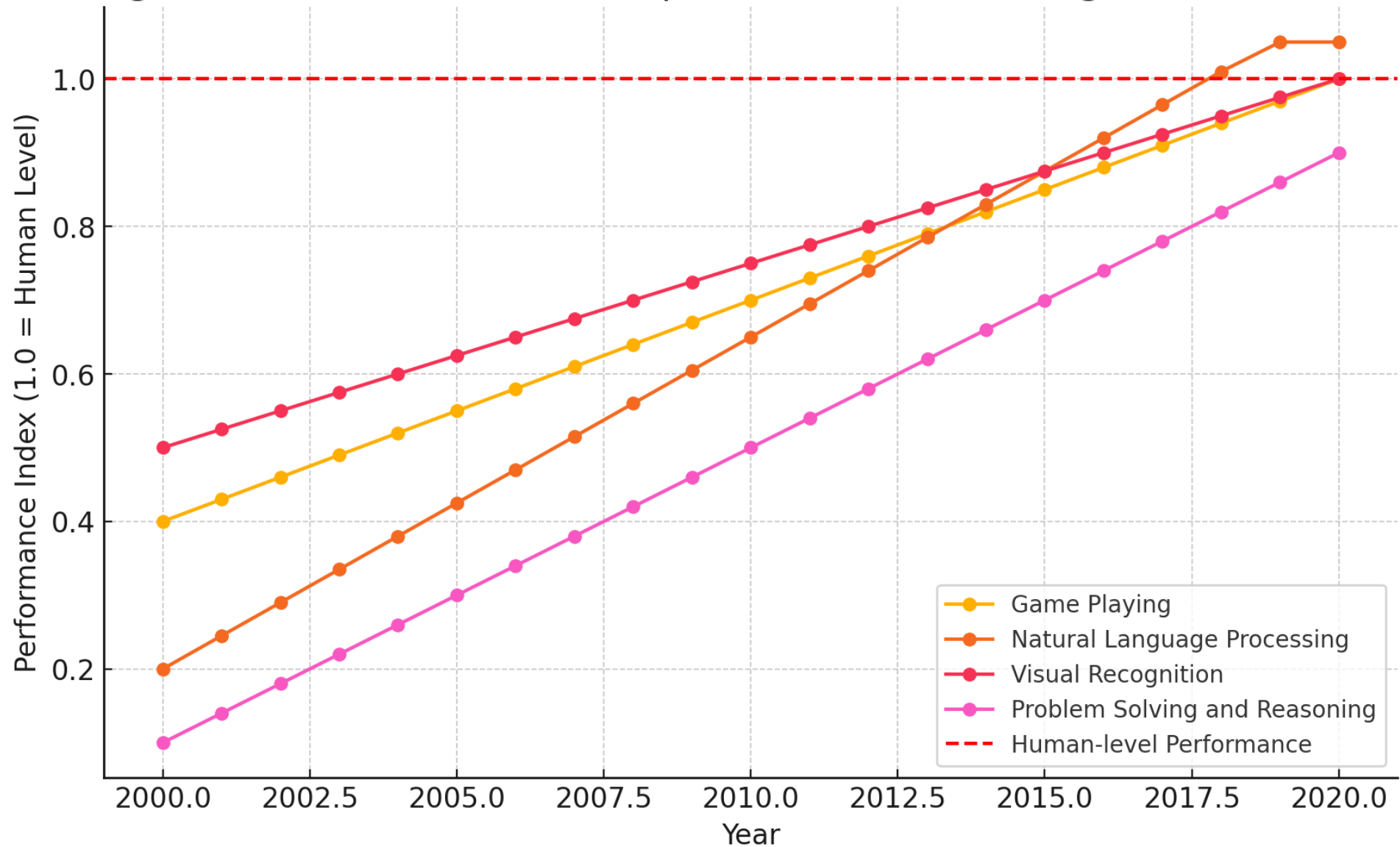
Foundation Model: The very large and versatile deep learning neural network models that power a wide range of other AI-enabled tools.

... aligns with huge gains in capabilities.

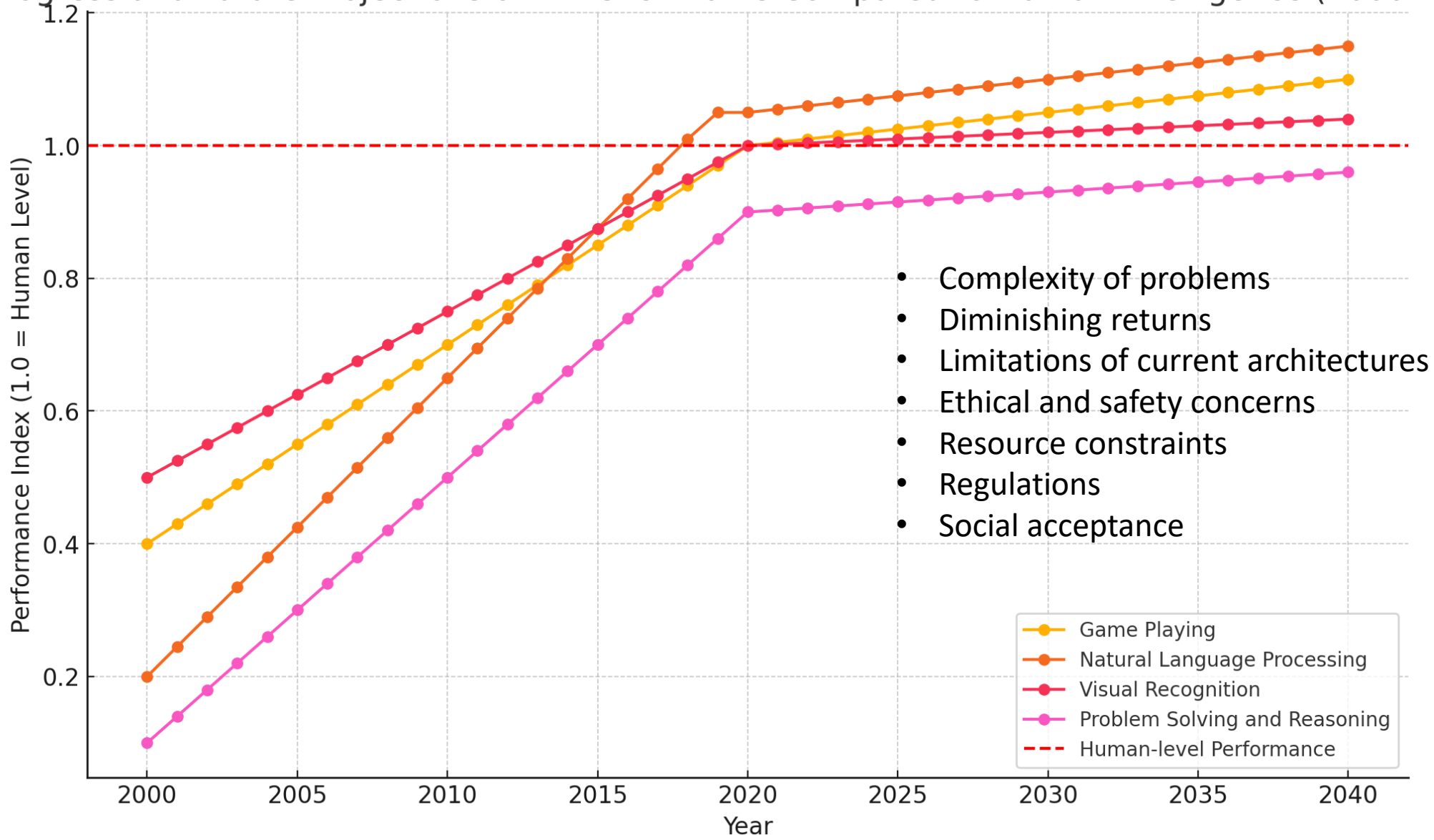


Source: "GPT-1, GPT-2 and GPT-3 models explained"; "GPT-4"; "What are large language models?".

Progress of AI Benchmarks Compared to Human Intelligence (2000-2020)



Progress and Future Projections of AI Benchmarks Compared to Human Intelligence (2000-2040)



So...what can we expect?

Greater integration
and automation

Cross sectional
partnerships

Advanced
personalized
medicine

Improved
predictive analytics

Expansion of
virtual medicine
and remote patient
monitoring

Robotic
interventions

Ethical AI and
Regulation

Global health
equity

Collaborative AI
tools

Get involved!



EXPLORE THE
TECHNOLOGY



DEVELOPMENT AND
TRAINING OF AI
MODELS



IMPLEMENTATION AND
INTEGRATION



ETHICAL OVERSIGHT



RESEARCH AND
CONTINUOUS
IMPROVEMENT



GOVERNANCE



Questions?

