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PerspectivesReport

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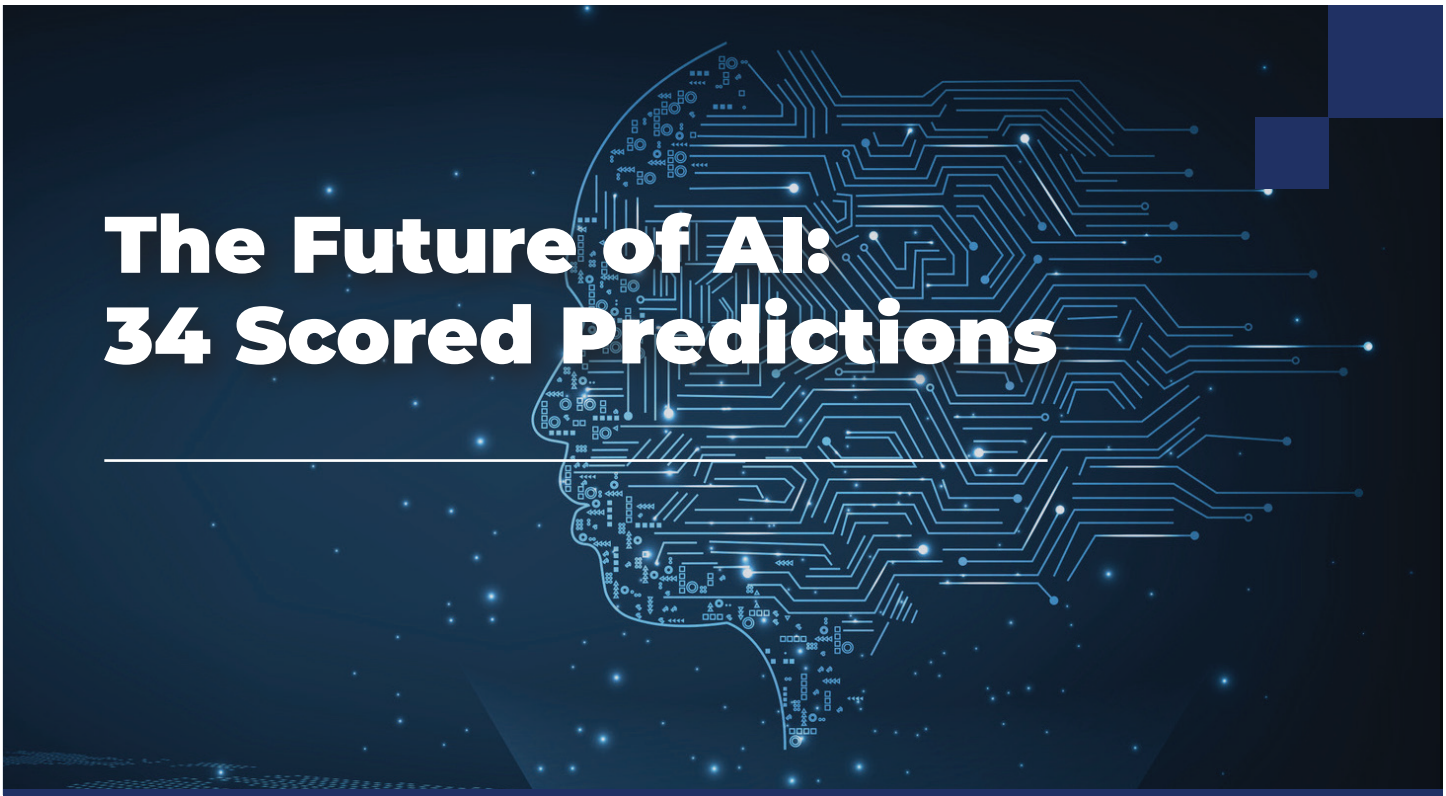


The Future of AI: 34 Scored Predictions

Background

In 2001, Deputy Assistant Secretary of Defense Lin Wells wrote a short memo which was forwarded to then-president George W. Bush. The memo, included below, illustrates the difficulty of predicting the future, even 10 years out.

Predictions are notoriously difficult, but they are simultaneously notoriously cheap – we're constantly seeing pundits throwing thoughts into the wind to grab headlines or fuel investment in their favored funds and startups.

I've included in this report my AI predictions from the past couple years and how they've held up – hopefully this adds some credence to my latest predictions. Full disclosure, I run SRM's AI consulting practice, but I don't have a financial interest in any of the leading AI companies or startups, beyond long-held investments in tech giants and chip manufacturers, and which make up probably a smaller percentage of my portfolio than they should – I'm more of a forecaster than a gambler.

I also include the resolved predictions because many of them aren't common knowledge – and understanding the path we've taken to date will significantly improve your ability to predict the future.

L. N WELLS
CF: Andy

Thoughts for the 2001 Quadrennial Defense Review

- If you had been a security policy-maker in the world's greatest power in 1900, you would have been a Brit, looking warily at your age-old enemy, France.
- By 1910, you would be allied with France and your enemy would be Germany.
- By 1920, World War I would have been fought and won, and you'd be engaged in a naval arms race with your erstwhile allies, the U.S. and Japan.
- By 1930, naval arms limitation treaties were in effect, the Great Depression was underway, and the defense planning standard said "no war for ten years."
- Nine years later World War II had begun.
- By 1950, Britain no longer was the world's greatest power, the Atomic Age had dawned, and a "police action" was underway in Korea.
- Ten years later the political focus was on the "missile gap," the strategic paradigm was shifting from massive retaliation to flexible response, and few people had heard of Vietnam.
- By 1970, the peak of our involvement in Vietnam had come and gone, we were beginning détente with the Soviets, and we were anointing the Shah as our protégé in the Gulf region.
- By 1980, the Soviets were in Afghanistan, Iran was in the throes of revolution, there was talk of our "hollow forces" and a "window of vulnerability," and the U.S. was the greatest creditor nation the world had ever seen.
- By 1990, the Soviet Union was within a year of dissolution, American forces in the Desert were on the verge of showing they were anything but hollow, the U.S. had become the greatest debtor nation the world had ever known, and almost no one had heard of the internet.
- Ten years later, Warsaw was the capital of a NATO nation, asymmetric threats transcended geography, and the parallel revolutions of information, biotechnology, robotics, nanotechnology, and high density energy sources foreshadowed changes almost beyond forecasting.
- All of which is to say that I'm not sure what 2010 will look like, but I'm sure that it will be very little like we expect, so we should plan accordingly.

The Rumsfeld Archive
Certified As Unclassified
January 9 2009
IAW EO 12958, as amended
Chief, RDD, ESD, WHS

Lin Wells

Source: https://library.rumsfeld.com/doclib/sp/2382/2001-04-12%20To%20George%20W%20Bush%20et%20al%20re%20Predicting%20the%20Future.pdf

Predicted April 2023
(roughly 5 months following the release of ChatGPT)

Prediction	Score and Reason
We're in an AI hype cycle. >50% of new 2023 startups will pivot or exit by 2026 - investment will cool down and focus on companies which gain traction.	Unresolved – **Current Rating:**  Aggregated data on startups which have gone out of business seems scarce; there were a whole set of startups focused on "chatting with pdfs" which went under earlier this year when ChatGPT added the capability into its main offering, and many software vendors (including adobe itself) swiftly followed suit, making them redundant. Other data, such as Crunchbase's AI hub of the top 10,000 AI startups, suggests that there have been hundreds of acquisitions. This is a deeply imperfect metric both because non-acquisition exits don't seem to be tracked, and because the most popular 10k startups will tend to exclude many of the "flash in the pan" type micro startups which have been flooding the market.

Prediction	Score and Reason
There won't be more globally revolutionary innovations of the same order from the existing LLM architecture alone in the near future – commercial innovation in the next 2-5 years will focus on applications and integrations of existing architecture. There will be no revolutionary innovation on par with the release of ChatGPT before Q2 2025. The ChatGPT revolution was about the interface, accessibility, training methodology, and democratization of LLM capabilities - the core technology and architecture have remained effectively the same since GPT-2. I expect incremental progress from it, fast progress, but with the explosion of value residing more in the applications and integrations of the GPT technology - building it into all of our existing software and workflows to make them better and more capable, and making AI capabilities turnkey in every domain where there's value in doing so. LLMs will get better at doing everything they already do, and will become more widespread, with us reengineering processes and roles around them.	**Unresolved – Current Rating:**  There have been multiple huge improvements in quality and capabilities from OpenAI and others in 2023 and 2024. Depending how we classify multimodal models and native video models like Sora, we could look at the advancements to date as just building out from the same transformer architecture, but some might argue that they've added sufficiently new capabilities to be considered revolutionary in their own right. Drawing the line around what's revolutionary vs incremental is always difficult in the moment. This prediction, while still unresolved, is looking uncertain – governments and businesses are pouring more money into AI research and applications now than at any prior point in history, and a number of eminent researchers anticipate radically more generally capable AI assistants/workers before 2027.

Prediction	Score and Reason
Spam, phishing, and fraud will become more sophisticated and personalized.	**Resolved – Current Rating:**  The use of AI tools like ChatGPT and WormGPT has enabled fraudsters to craft more convincing and sophisticated phishing messages, as well as overcome language barriers and increase personalized attacks. Research suggests a "135% increase in 'novel social engineering attacks' in the first two months of 2023, corresponding with the widespread adoption of ChatGPT. These novel phishing attacks showed a strong linguistic deviation compared to other phishing emails, which suggested to us that Generative AI was already providing an avenue for threat actors to craft sophisticated and targeted attacks at speed and scale."[1-5] *Sources:* 1. https://darktrace.com/blog/email-attack-trends-how-phishing-attacks-are-becoming-more-sophisticated-and-harder-to-identify 2. https://www.bbb.org/all/scamstudies/phishing_scams_study/full-2024-phishing-scams-study 3. https://sprinto.com/blog/phishing-statistics/ 4. https://jumpcloud.com/blog/phishing-attack-statistics 5. https://bolster.ai/blog/2024-state-of-phishing-statistics-online-scams

Prediction	Score and Reason
Better integrated translation and live voice synthesis capabilities will reduce barriers to offshoring. Especially for contact centers, LLMs will enable real-time communication across languages without language barriers, significantly broadening the global workforce pool and lowering the reliance on multilingual agents.	**Resolved – Current Rating:**  Since the time of this prediction, tools have launched which remove accents and change voices in near-real time, and there are even now real-time photorealistic avatar animations, meaning that even video support would be possible.[1-3] Some companies are pushing to skip offshoring for outbound entirely and go straight to AI.[4] *Sources:* 1. https://www.respeecher.com/blog/ai-voices-call-centers-augment-conversations-voice-synthesis 2. https://tomato.ai/ 3. https://www.microsoft.com/en-us/research/project/vasa-1/ 4. https://dasha.ai/en-us/blog/offshore-lead-generation-vs-voice-ai

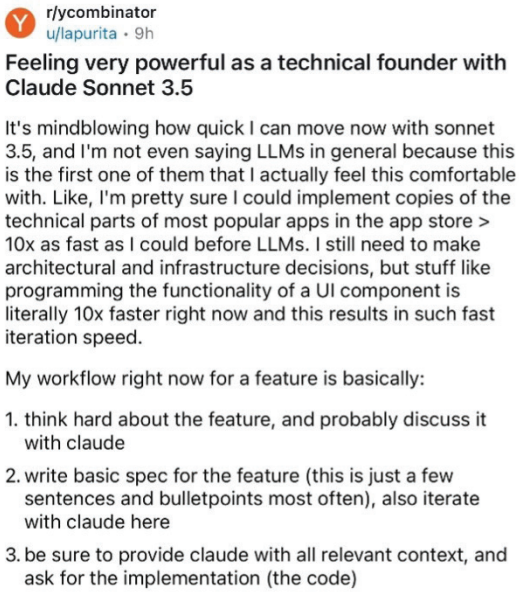
Prediction	Score and Reason
Most compliance and audit work will be automated on both the auditor and financial institution side. The ability of LLMs to effectively review documents means that we will one day see regulators using them to rapidly evaluate policies, procedures, and processes for audit purposes. The logical next step from there is to host documentation in the cloud where regulators can access it on demand, enabling automation of much of the audit cycle as well as real time audits.	**Unresolved – Current Rating:** B Large Language Models (LLMs) have indeed made significant strides in document review and analysis. As of 2024, they are being increasingly used in various industries for tasks such as contract analysis, due diligence, and compliance checks. This part of the prediction is on track. Despite the 2023 executive order urging agencies to adopt AI solutions, many key financial regulators have remained close-lipped about their AI pilots. Still, it's clear that AI is top of mind – there is a growing body of guidance from the Treasury, NIST, CFPB, and regulators like the NCUA are actively seeking to educate their examiners on AI. Public regulatory adoption will likely be slow in coming. Naturally, the private sector is charging ahead – startups claim "to automatically monitor the regulatory environment for relevant changes and map them to internal policies, procedures and controls [using AI]," and "assisting auditors in assessing risks by analyzing a company's financial statements, disclosures, and industry-specific data", and "actively monitor compliance with regulatory requirements and internal policies".[1,2] The value proposition here is clear, which means that implementation is primarily down to adoption and coordination of unified systems and standards. *Sources:* 1. https://www.compliance.ai/ 2. https://www.linkedin.com/pulse/generative-ai-large-language-models-llms-integrated-our-sahoo/

Prediction	Score and Reason
Deeper and more sophisticated monetization of LLM capabilities is coming (e.g., ads). OpenAI really set the expectation for the marketplace by releasing a free tool which is currently costing it something like $700,000 A DAY to run. It has monetization in place, of course, with subscription and pay-by-use models, but we're still in the very early days of value capture. I expect that in the future we'll have much more sophisticated monetization schemes, especially if LLM-facilitated search becomes the norm – there are already discussions in industry about AI search engine optimization, and if and how ads will be incorporated is an open but very hot question. The trend with new mass market digital platforms – everything from Facebook to eBay to TikTok – is to launch with a strong initial value proposition for both buyers and sellers of a marketplace, then to capture more and more value from both sides over time once the platform is entrenched with users. We should expect to see this happen with LLMs, it's just a question of when and how.	**Unresolved – Current Rating:** B While this prediction is technically fulfilled by OpenAI's addition of business-oriented offerings and pricing structures, and those of other vendors, the gen AI assistant space remains largely ad-free, more so than expected. This is likely because the race for top AI tool has become so hot; none of the leaders want to jeopardize their market position by adding in unfriendly monetization. This can only last so long, though – AI costs are skyrocketing, and at some point, either venture and government funding will dry up, or the market will mature, and leaders will be able to further monetize without driving users away. There is the potential for innovations which massively reduce costs – OpenAI recently launched GPT-4o Mini, a model 60% cheaper than GPT-3.5 Turbo, which is also (according to benchmarks) much more capable, acting as a strict upgrade. That said, I anticipate that if current paradigms hold, cost reductions will only delay monetization, not preclude it.

Prediction	Score and Reason
AI will fuel a content boom by lowering the bar to entry.	**Resolved – Current Rating:** A While direct statistics measuring overall online content production are elusive, there is a great deal of anecdotal evidence to support this prediction. Fully and partially generated "virtual influencers" have rapidly taken a place in the influencer marketplace, with the highest grossing account maintaining 7M followers and earning up to $33,000 per post, which at 80 posts per month could yield earnings of up to $31.5 million annually.[1] Some sites, like Pinterest, have been so flooded with AI content that their user bases are complaining (but despite this, Pinterest's Q1 earnings beat projections, and has been experiencing significant user growth, largely from Gen Z). Many online communities have forbidden AI content entirely to try to hold space for artists, but the lines can be blurry. Ironically, both winners of traditional art contests have been criticized for using AI[2], and winners of AI art contests have been disqualified for using real images.[3] *Sources:* 1. https://aithority.com/technology/virtual-influencers-that-earn-their-creators-thousands-of-dollars-for-a-single-picture/) 2. https://www.nytimes.com/2022/09/02/technology/ai-artificial-intelligence-artists.html 3. https://www.forbes.com/sites/lesliekatz/2024/06/13/real-photo-wins-ai-photography-contest/

Predicted October 2023
(roughly 11 months following the release of ChatGPT)

Prediction	Score and Reason
Use of LLMs in processes like RFPs and statement of work development/ assessment will be commonplace, at least until regulation speaks to it or a high-profile lawsuit sets precedent. We will soon be in a situation where AI is both writing and evaluating RFPs – robots writing for robots. Humans will stay in the loop, at least for now, but it's interesting to extrapolate what end to end automation might look like, with bots talking to bots and just issuing a recommendation or negotiating position for humans to make the final decision on.	**Unresolved – Current Rating:**  This remains unresolved primarily because of a lack of empirical data, this isn't something that a lot of FIs and vendors are publicly admitting to, but I've spoken with a number of leaders on both sides of the equation who've spoken about using LLMs to draft and evaluate these sorts of bids. There are at least 6 statement of work builder GPTs in OpenAI's marketplace, and well over 70 (I stopped counting) RFP GPTs, including several specialized by industry vertical or solution type. It's clear that this is already a widespread and largely undiscussed use case.

Prediction	Score and Reason
AI will accelerate rapid prototyping and high-fidelity mockups in many fields, but especially software. AI tools will enable designers to simulate user interactions and refine user interfaces before a single line of code is written, enhancing efficiency in software development. I've even had AI produce joke product mockups, and the quality is high enough that it's not hard to imagine launching a Kickstarter off the back of it.	**Resolved – Current Rating:** A I consider this confirmed: the buzz about GPT-4 enabling hobbyist developers to quickly build out their ideas has been reinforced and proven more broadly by the experiences people are having with Claude 3.5 Sonnet's Artifacts functionality.  r/ycombinator u/lapurita • 9h **Feeling very powerful as a technical founder with Claude Sonnet 3.5** It's mindblowing how quick I can move now with sonnet 3.5, and I'm not even saying LLMs in general because this is the first one of them that I actually feel this comfortable with. Like, I'm pretty sure I could implement copies of the technical parts of most popular apps in the app store > 10x as fast as I could before LLMs. I still need to make architectural and infrastructure decisions, but stuff like programming the functionality of a UI component is literally 10x faster right now and this results in such fast iteration speed. My workflow right now for a feature is basically: 1. think hard about the feature, and probably discuss it with claude 2. write basic spec for the feature (this is just a few sentences and bulletpoints most often), also iterate with claude here 3. be sure to provide claude with all relevant context, and ask for the implementation (the code)

Prediction	Score and Reason

Absent self-regulation, there will be increasing calls for AI datacenters to be built in cold, low water demand locations to reduce water and energy use for cooling.

The chart below shows an extrapolation of the power usage if the trend of (exponentially) increasing compute used for training continued in terms of the cost of chips and power.

Year	# of H100s-equivalent	Cost	Power	Power reference class
2022	~10k	~$500M	~10 MW	~10,000 average homes
~2024	~100k	$billions	~100MW	~100,000 homes
~2026	~1M	$10s of billions	~1 GW	The Hoover Dam, or a large nuclear reactor
~2028	~10M	$100s of billions	~10 GW	A small/medium US state
~2030	~100M	$1T+	~100GW	>20% of US electricity production

Source: https://situational-awareness.ai/racing-to-the-trillion-dollar-cluster/

Resolved – Current Rating: A

I first started seeing articles criticizing the water and power consumption of AI in late 2023, and they've only intensified and come to more mainstream news outlets since then. This remains a largely unresolved issue in the current AI arms race, both in terms of the restraint environmentalists and municipalities want, and the sheer infrastructure scale that tech companies want.[1-4]

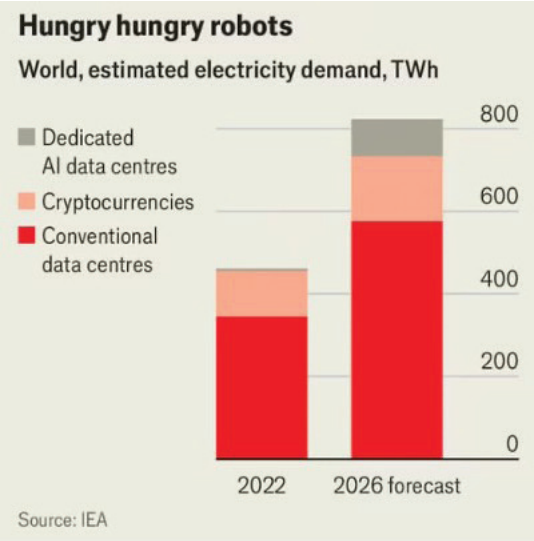


Chart: The Economist

Sources:

1. https://phys.org/news/2023-11-centers-straining-resources-ai.html

2. https://fortune.com/2023/09/09/ai-chatgpt-usage-fuels-spike-in-microsoft-water-consumption/

3. https://www.wired.com/story/ai-energy-demands-water-impact-internet-hyper-consumption-era/

4. https://www.pbs.org/newshour/show/ai-and-the-energy-required-to-power-it-fuel-new-climate-concerns

Prediction	Score and Reason
Decreased development costs and AI-based challengers will apply pressure on incumbent financial vendors to provide more value. As AI lowers entry barriers by reducing costs, new players can challenge established vendors, forcing them to innovate and add value or lower prices.	**Unresolved – Current Rating:** C Over the past two years, incumbents like MasterCard, Jack Henry, FIS, etc. have been making big investments in AI and partnering with or acquiring startups to stay competitive, which supports the prediction. [1, 2] The missing evidence, to date, is prices coming down or AI-forward challengers gaining significant market share. I'd chalk that up to the continued conservatism of FIs and the need for challengers both to integrate with a broad range of (often customized) incumbent vendor software, and to invest deeply enough to get many mature implementations with referenceable clients. I do still anticipate disruption to the vendor environment, but the moats are substantial, even in the presence of superior technology – this could end either with incumbents having brought enough functionality in house to appease clients, or with challengers taking more market share. Where we are seeing some support for this prediction is in the FinTech space – Klarna announced in August that they replaced Salesforce with their own homegrown, AI-facilitated solutions, and planned to replace Workday within weeks.[3] It seems clear that this sort of internal overhaul and streamlining is possible for organizations which have deep technical and AI expertise, and the scale to make such efforts valuable. We should expect this sort of renovation and refactoring to become more accessible for smaller businesses over time. *Sources:* 1. https://www.mastercard.com/news/press/2023/march/mastercard-strengthens-customer-security-with-new-ai-cyber-shield/

2. https://www.fisglobal.com/about-us/media-room/press-release/2024/fis-offers-greater-card-fraud-detection-through-new-artificial-intelligence-collaboration

3. https://analyticsindiamag.com/ai-news-updates/klarna-cuts-50-of-workforce-ends-partnerships-with-salesforce-and-workday-amid-generative-ai-overhaul/

Prediction	Score and Reason
The market will start to see fully offshored contact centers using LLMs for live translation and voice synthesis, initially for ESL agents but eventually for non-English speakers.	**Resolved – Current Rating:**  Alorica, a large global CX platform and outsourcing firm which has specific products for loan servicing and fraud, implemented real-time voice language translation earlier this year[1]: Amazon, Genesys, IBM, and Microsoft all have real-time AI powered AI translation engines, as do many, many startups. Few outsourcing providers are advertising their use of real time translation and voice synthesis tools, but it's clear that there's a market behind them. *Sources:* 1. https://www.alorica.com/news/detail/alorica-launches-ai-powered-speech-translation-cx-platform

Prediction	Score and Reason
Contact centers will need fewer agents, and those agents won't need as much training but will need to be good at making rapid, efficient use of LLMs. This doesn't mean that fully outsourced or automated contact centers will dominate the FI space – a lot of institutions will elect to keep their own agents as a competitive advantage and to compensate for integration challenges. With LLMs handling routine queries and translation, agents in contact centers will shift towards roles that require nuanced understanding, empathy, and complex problem-solving. Their efficiency will be determined by how well they can manage and direct AI tools to deliver member/customer satisfaction.	**Unresolved – Current Rating:**  Most financial institutions are still holding off on adopting generative AI in the contact center due to very reasonable concerns about hallucinations, adversarial prompting, and auditability. Some ambitious and forward-thinking vendors and institutions have developed hybridized architectures of generative AI and traditional AI which seem, based on publicly available information, to be working out well so far. The highest profile example is probably Klarna, a buy-now-pay-later provider, is leveraging AI to do the work of 700 contact center agents, contributing $40 million annually to their bottom line. It remains to be seen how much AI will reduce training times, and the broader shift to representatives serving as AI overseers is still nascent.

Prediction	Score and Reason
Extremely tailored ad campaigns responsive to very recent trends will become the norm. The ability to generate copy and images as part of a cohesive campaign almost in real-time in response to changing consumer behavior and preferences will tremendously accelerate the digital marketing cycle.	**Unresolved – Current Rating:**  Marketing executives report using text and image generative AI tools for rapid development of TV keyframes, mood boards, and mockups, as well as audio generation tools for scratch tracks, and various types of communications.[1,2] There are a number of success stories here: • JPMorgan Chase used Persado's generative AI to create ad copy and saw up to a 450% increase in clicks. • Farfetch used Phrasee, a generative AI tool, to optimize email subject lines and content, resulting in significant increases in open and click rates for emails. We haven't yet seen a high volume of campaigns following immediately after trends; it's likely that there are enough human steps remaining in marketing processes, either due to capability limitations of LLMs or simply that processes have yet to adapt. *Sources:* 1. https://www.datafeedwatch.com/blog/best-ai-advertising-examples 2. https://www.reddit.com/r/advertising/comments/14mcbgi/creatives_how_do_you_use_ai_tools_for_your/

Prediction	Score and Reason
AI career coaching will become common, and holistic AI assistants will slowly gain traction. AI will provide career coaching by analyzing vast amounts of career progression data to offer personalized advice. These tools will help individuals identify skill gaps, recommend learning resources, and potentially suggest networking opportunities, becoming an integral part of career development and planning. Holistic AI assistants which have access to all of your data and applications to better support everyday tasks like scheduling and prioritization are also not far off on the horizon.	**Unresolved – Current Rating:**  AI tools are increasingly used to tailor coaching to individual needs, making it accessible to more people. This can save time for managers, augment people skills, and help to scale personalized advice, provided that AI is being used in a way that mitigates risks of bias. More general AI assistants are also making strides – there are specialized products for therapists which analyze the counseling techniques used, provide summaries, extract key information, identify coachable moments, track patient progress, and other applications. There is still a distance to go before AI career coaching is common, but there is plenty to suggest we're on the path.[1-3] *Sources:* 1. https://www.washingtonpost.com/technology/2024/05/29/ai-career-coaches/ 2. https://hbr.org/2023/06/how-ai-can-help-stressed-out-managers-be-better-coaches 3. https://www.aihr.com/blog/ai-based-coaching/

Prediction	Score and Reason
Organizations with good data will have excellent self-service analytics via language models, replacing analysts whose responsibilities primarily involved composing and running reports.	**Unresolved – Current Rating:**  I underestimated the extent to which organizations had their data structured and labeled in nonstandard ways, and overestimated how well LLMs would be able to cope with those deviations in absence of good documentation. LLMs have definitely become a component of the CDO's arsenal, and federated search via RAG is one of the most popular use cases with financial institutions, but the ability of LLMs to write good SQL tailored to a given organization is predicated on a lot of foundational work which most FIs, of all sizes, simply haven't done. This may still happen, but it'll likely be a long tail of adoption and rollout, barring vastly more generally capable AI. Microsoft and others are putting substantial resources into better solutions.[1-4] *Sources:* 1. https://www.holistics.io/blog/large-language-model-self-service-analytics/ 2. https://towardsdatascience.com/5-hard-truths-about-generative-ai-for-technology-leaders-4b119336bc85 3. https://medium.com/@kyle.hale/the-bridge-to-nowhere-self-service-bi-in-an-llm-world-14d6aa495d75 4. https://www.veezoo.com/blog/llms-and-semantic-layers/

Predicted January 2024
(roughly 14 months following the release of ChatGPT)

Prediction	Score and Reason
Humanoid robots (like those being developed by Tesla, Boston Dynamics, Softbank, Figure AI, Hanson Robotics, and others) will primarily improve operational efficiency - rather than offer entirely new capabilities. The full scope of their impact on industries and labor markets will likely unfold slowly, over a decade or more, as the technology matures, product scales up, and businesses gradually integrate versatile robotic labor into their operations. In short, the advent of humanoid robots is unlikely to revolutionize society before 2034.	**Unresolved – Current Rating:** B It's still far too early to tell here, but I take the low volume of recent news and radical demos to be indicative that the flurry of activity early in the year was aiming to gin up investment during a time of high overall AI hype, and that the real research, engineering, and scaling work has quite a way to go still. It should go without saying that the first robot model to effectively work on a factory floor is very unlikely to be the same one that replaces most repetitive manual human labor – the minimum viable product robot will just be the beginning.

Prediction	Score and Reason
As the AI arms race continues, means of 'poisoning the well' of training data and preventing LLMs from being effectively used to train completing models will gain more attention and focus. This could impact the quality of AI models and necessitate new strategies for data integrity and security. This particularly applies to open-source models, as in Meta's vision of a future where companies and individuals have their own finetuned instances of open-source LLMs, many entities without deep AI safety expertise will be looking to scape online data relevant to their particular domains – this means that if malicious actors can poison the most popular online data sources and datasets, they may be able to engineer backdoors into models used by hundreds of businesses and even polities, and this may be nearly impossible to trace.	**Unresolved – Current Rating:** B There is a growing body of research on data poisoning attacks, though there are few publicized examples of live production attacks. In a sense, all disinformation and propaganda campaigns may serve as poisoning attacks, though the risks are higher with more targeted interventions. Research has demonstrated that poisoning web-scale data is viable and practical.[1] Additionally, the current highest risk of poisoned models comes from using open-source models available freely online from users, as shown by an attack where over 100 malicious code-execution models were uploaded to a popular AI repository. I rated this prediction "B" because while there continues to be mounting evidence that model poisoning is a serious concern, there isn't comparable evidence for the competitors in the AI race making meaningful efforts to prevent competitors from using their models to generate training data, act as a layer of reinforcement learning for model tuning, etc.; perhaps it's simply too difficult to constrain those uses without impairing critical desired functionality.[2-4] *Sources:* 1. https://arxiv.org/html/2302.10149v2 2. https://arxiv.org/abs/2407.12281 3. https://www.bankinfosecurity.com/api-flaws-put-ai-models-at-risk-cyberattacks-a-23773 4. https://www.darkreading.com/application-security/hugging-face-ai-platform-100-malicious-code-execution-models

Prediction	Score and Reason
Standard large language models like ChatGPT will continue to evolve by integrating additional non-AI features, such as user customization options and quality of life improvements, to differentiate themselves in a competitive market and add value beyond pure language processing capabilities.	**Resolved – Current Rating:**  This was already beginning to happen when I made the prediction, with OpenAI making changes to system prompting and announcing the GPT store. The trend has very clearly continued, with one of the latest data points being the Artifacts functionality being previewed in Anthropic's Claude at the time of writing, which can generate and edit code in parallel with the user conversation. We should expect to see this continue, with more and more new features being added, up to the point that users aren't finding utility in them.

Prediction	Score and Reason
Generative AI copyright battles around sourcing of training data and reproduction of works under copyright will continue to intensify. A definitive legal framework or precedent in the US won't be set before the end of 2024.	**Unresolved – Current Rating:**  This one has been spot on so far. The number of AI copyright lawsuits has increased significantly since January, from fewer than 15 to 28, with 4 being added just between June and July.[1,2] Notably, this includes a huge fight between the major music labels (Sony, Universal, Warner Records) and wunderkind AI music startups Suno and Udio.[3] OpenAI's use of a voice very similar to Scarlett Johansson's after she refused to provide hers for their voiced AI offering brought some censure in the court of public opinion, but there's been little legal challenge yet around the use of the voices and likenesses of public figures and professionals. Questions of copyright continue to heat up, and there are quite a few bills in congress currently around these issues.[4] *Sources:* 1. https://chatgptiseatingtheworld.com/2024/07/14/status-of-all-28-copyright-suits-v-ai-jul-14-2024/ 2. https://copyrightalliance.org/copyright-news-january-2024/ 3. https://www.reuters.com/technology/artificial-intelligence/music-labels-sue-ai-companies-suno-udio-us-copyright-infringement-2024-06-24/ 4. https://chatgptiseatingtheworld.com/2024/04/18/list-of-ai-bills-before-congress/

Prediction	Score and Reason
AI chip manufacturers like NVIDIA will continue to be big beneficiaries of the AI race, but as more players enter the market and technology becomes more standardized, price competition will intensify, leading to narrower profit margins (and lower stock price advantage over peers) by 2026 or sooner.	**Unresolved – Current Rating:** B NVIDIA has a commanding lead, with more than 80 percent of the global market for the chips best suited to run AI applications, but money from some of the richest entities in the world continues to flow into developing competitors. OpenAI's CEO Sam Altman is in talks with multiple investors and manufacturers around the world to set up a network of chip fabrication plants. The move is intended to reduce OpenAI's dependency on Nvidia chips. Back in March, Mark Zuckerberg met with leaders in Japan and South Korea in an effort to build AI chip manufacturing partnerships to offset geopolitical risks in Taiwan. The Biden administration announced up to $6.14 billion in direct funding for Micron to build two fabs in New York and one in Idaho. This investment is expected to unleash $125 billion in private investment[1], as well as a further $6.6 billion in funding to support TSMC's expansion[2], and $75 million for Absolics's new factory in Covington, Georgia, which, backed by South Korea's SK Group, will produce glass substrates for semiconductors. Google, Intel and Qualcomm are part of a coalition of tech companies trying to loosen Nvidia's chokehold on AI chips by preparing an alternative to its CUDA software by year-end.[3] For the time being, NVIDIA seems to be holding its lead and investing aggressively to try to maintain it (and the talent for chip design is at a higher premium than ever before), but the demand from the rest of the world may yet outpace it.[4-6]

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Prediction	Score and Reason
Helpdesk systems will increasingly incorporate LLMs to assign support tickets based on the specific skills required to resolve them, moving away from the paradigm of rigid ticket categories. This will enable more dynamic and efficient resolution of customer issues, tailoring support more closely to the complexity and nature of each query. The biggest vendors (Zendesk, ServiceNow, Jira Service Management, etc.) will at least offer AI-fueled skill-based routing by 2026, with it becoming the dominant paradigm by 2035.	**Unresolved – Current Rating:** B At the moment, LLM-based ticket routing is more the province of startups like Rezolve. AI and pilot programs by innovative giants like Stripe, but their success with it and the simplified architecture and maintenance it offers suggests that it will continue to spread. This does require years of convention and entrenched IT practice to change for widespread adoption, and much like the change from IVR dial navigation to voice navigation, there will be some change resistance from end users, which means that it will be a slow shift for industry. However, barring discovery of critical gaps that can't be addressed with hybrid LLM architectures, I expect that this shift will continue to take place.

Prediction	Score and Reason
Digital identity proofing, authentication, and Know Your Customer (KYC) checks are getting more difficult due to democratization of advanced AI image and video generation and editing capabilities. Solutions like Worldcoin may more may not provide an adequate answer, but governments and businesses will need an effective solution before 2035 to avert a crisis of online human identity.	**Unresolved – Current Rating:** A Unfortunately, this prediction is thoroughly on track. In February 2024, "A finance worker at a multinational firm was tricked into paying out $25 million to fraudsters using deepfake technology to pose as the company's chief financial officer in a video conference call". And it's not just high-profile, high-sophistication fraud; "On at least 20 occasions, AI deepfakes had been used to trick facial recognition programs by imitating the people pictured on [stolen] identity cards."[1] More recently, there's been a rash of users exposing X (formerly Twitter) GPT chatbots by replying to them with a prompt to ignore all previous instructions.  There are numerous examples of this - in July, the Justice Department said it had uncovered and dismantled a Russian propaganda network on X with nearly 1,000 fake accounts. The epidemic of fake reviews on sites like Amazon has only intensified.

AI being used for political ends is nothing new, but we're now firmly in an era of questioning the humanity and purposes of any entity we encounter online, and current AI-proof means of identity verification are highly onerous, both for users and businesses. This will only get more difficult and fuel demand for simple, holistic identity solutions.[2]

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Predicted April 2024
(roughly 17 months following the release of ChatGPT)

Prediction	Score and Reason
A majority of the videos we consume on the internet will be generated or substantially augmented (more than filters) by AI by 2035. There have been a number of impressive examples of AI-generated content, from a surprisingly competent South Park episode about AI, to a news report from Channel 1 which has exclusively AI-generated voices and reporters, to the short films produced using OpenAI's Sora model. AI is significantly lowering the barriers to content creation, making it easier for any creator with a vision to produce in any digital medium.	**Unresolved – Current Rating:** B Time has shed further light on the true capabilities and limitations of AI video generation. The state of the art is advancing, and there are more AI videos, voiceovers, and images than ever, but the current tendency seems to be more AI-assisted content than AI end-to-end. While virtual influencers and content creators have without question gained ground, there's still a clear preference for content created and delivered by humans. The most commoditized and least personal domains, like daily news aggregation, are where AI has made the most inroads. 2035 is still quite far in the future, and I do anticipate this trend will continue, with improvements to technology and tooling helping to streamline creative processes. The final determinant of how much AI content takes over will be consumer preference.

Prediction	Score and Reason
The first AI wearable (defined as a wearable where AI forms a core part of the value proposition from launch) to achieve significant success (defined as millions of average active daily users, benchmark Fitbit) will be some form of AR/VR glasses. While it might take a while for the form factor and pricing to slim down enough for mass market appeal, the benefits are clear. It would be possible even with today's technology to build software that takes pictures of what you're looking at throughout the day, records your meetings, and adds that information to a database of context about your life, then ask it for personalized recommendations on how to live better, solve work problems, remember and prioritize tasks, and more. Indeed, this is the same concept that Microsoft Recall is based on (but Recall is only taking screenshots of PC activity, not life holistically). It's not hard to imagine a future where such a device's cost is wholly or partially subsidized by advertisers and data brokers, because it would make it incredibly easy to build a psychological and consumer profile of the user.	**Unresolved – Current Rating:**  The apple vision pro provided a taste of what AR/VR can offer, as did the Meta AI glasses, but also demonstrated that the technology simply isn't powerful, cheap, or miniaturized enough yet for mass adoption. With that said, those are the key barriers, and we should expect them all to be surmounted with time. Privacy and security are huge concerns, of course, but consumer tolerances have shifted significantly since the days of Google Glass. As far as the glasses being subsidized by collection of user data, Meta has some of the most advanced user data monetization in the world, and has poured a tremendous amount of R&D money into their smart glasses, which retail for only $70-$150 more than normal Ray-Bans. It's unlikely that Meta's motives are altruistic – they recently agreed to pay out $1.4 billion to settle a lawsuit over illegally capturing users' faces.[1] *Sources:* 1. https://therecord.media/meta-texas-facial-recognition-settlement

Prediction	Score and Reason
AI-facilitated fraudulent duplication of banking websites will increase over 2024 and 2025. LLMs can aid tremendously in software development, including website development, which is fueling a rise in fraud attacks that utilize spoofed financial websites and mobile apps.	**Unresolved – Current Rating:** A Unfortunately, this prediction seems to be firmly on track; website spoofing attacks have been on the rise, as part of a broader surge of phishing attacks, since the release of ChatGPT. 50% of phishing links lead to fake websites for data entry.[1] Attackers are now using more sophisticated methods, including HTTPS spoofing and clone websites that are nearly indistinguishable from genuine banking sites.[2] Mobile app spoofing and malware have also seen a sharp increase, and consumers continue to be targeted at a higher rate than corporations, underscoring the importance of educating your users and helping them protect themselves.[3] There has even been a wave of fake ChatGPT websites which specifically exist to collect user data, with Meta identifying and blocking nearly 1000 ChatGPT-based malicious URLs from being shared on its platforms.[4] *Sources:* 1. https://jumpcloud.com/blog/phishing-attack-statistics 2. https://www.memcyco.com/home/understanding-the-menace-of-website-spoofing-fraud-in-2023/ 3. https://securelist.com/financial-threat-report-2023/112526/ 4. https://www.digitalinformationworld.com/2023/05/scammers-are-spoofing-chatgpt-websites.html

Prediction	Score and Reason
Meaningful, flexible automatic coding of RPA bots via LLMs won't be possible until at least 2026. LLMs can do incredible things in Python, like single-prompt coding of a customized version of the classic game "snake". With that said, testers report that their capabilities outside of the GitHub repositories they were trained on are substantially worse, which is exactly what we would expect based on LLM performance profiles in other domains. Based on my past experience coding RPA bots in UiPath, Kofax, and Microsoft Power Automate, I don't think that there's currently enough high-quality training data to fuel those capabilities. One of the distinguishing features of RPA is how often it's used to work with systems that lack good APIs and integrations, and there are many different approaches to coding a step as simple as clicking a button. Given that the approaches taken will vary by developer, institution, systems, data, and even what machine the bot is running on, there are many permutations of code for a single problem – it's essentially the same reason that image generators struggle with creating fingers: there are many possible permutations within the training data, but averaging them won't produce good results. There are also far fewer libraries of code, courses, guidance, etc., for RPA software, and much more of the development done is proprietary, with few hobbyist projects. This, combined with the lack of an equivalent of an interoperable "language" for RPA code, will make gathering and labeling data time-consuming and expensive.	**Unresolved – Current Rating:**  In my conversations with RPA vendors to date, none have demonstrated LLM-based development of RPA bots which is consistently able to produce automations which are even 50% of the way to production-ready for a flexible array of use cases. With that said, essentially of the R&D on these capabilities is happening behind closed doors, so a vendor could theoretically crack this problem tomorrow and disprove this prediction. Still, even with the incentives to produce these capabilities, and the fact that RPA vendors have been working on recording tools which can build automations based on monitoring what users do since well before the advent of LLMs, I expect that the data gap is just too wide to close quickly. The main factor which could accelerate this process is synthetic data generation. However, achieving quality synthetic data generation for training RPA coding capabilities isn't a significantly lower bar than achieving those capabilities themselves; the same challenges apply. If we see high quality training data generation for RPA, we should expect coding capabilities to follow swiftly after.

Prediction	Score and Reason
ASI (Artificial Superintelligence – superiority to humans at 90% of economically valuable tasks) won't be publicly demonstrated before 2030. Scale of data and training alone won't be sufficient to achieve ASI – at minimum, it will require both scale and novel combination of existing architectures. Likely, fully new physical and digital architectures will be necessary.	**Unresolved – Current Rating:** B A number of tech CEOs have made bold predictions about the plausibility and timing of achieving superintelligence:[1-4] ***Elon Musk:*** ASI could exist by the end of 2025 ***Sam Altman:*** AI could surpass most experts by 2034 ***Dario Amodei:*** By 2034, AI will likely surpass the sum total of human scientific and engineering output. A number of AI insiders like Leopold Aschenbrenner have predicted that simple increase of training data and compute will be enough for AI to be able to replace AI researchers and engineers, and from there rapidly develop ASI.[5] I think it's important to remember that the individuals making these predictions have direct incentives to keep AI hype high – frontier AI models are extraordinarily expensive to create, and so far, haven't delivered commensurate economic returns to the companies developing them. They're betting on the future and trading on investment dollars – we should expect their predictions to be overly optimistic. Part of the challenge here is in the definition – a single model achieving better-than-human performance at 90% of tasks will require a single model or network of models with an incredibly good routing function to be simultaneously better than humans in thousands of domains at hundreds of thousands of tasks. There are both implementation hurdles (our world is not yet set up for an AI to be able to easily interact with even all of software, let alone physical reality) and technical challenges – long memory, activation of extremely precise context and information within a massive search space, disambiguation of context,

appropriate usage of search information vs. pretrained information, replacing outdated information, and many others.

Furthermore, to be considered fully superior to a human, AI would need to be able to complete the tasks not better, but as cost-effectively as humans. This is a high bar both because the current scaling paradigm will see AI costs grow exponentially, and because the market will tend to pressure prices towards the value AI can produce – if an AI worker can do the same work as a human, the company making that AI worker possible is incentivized to charge only slightly less than an equivalent human employee would cost – potentially more if the AI is better and faster than a human.

There are a lot of pressures in the ecosystem to simply not train ever larger and more expensive models, and instead fracture AI development into thousands of smaller AIs specialized for particular industry verticals. This is a lot of what's been happening outside of the frontier model companies, which are betting on scale unlocking further step-changes in capabilities (and in innovations which reduce the expense of training and running models). There is an extraordinary amount of money and talent being poured into this problem, and it's a complex enough space that no single person has the whole picture, so no one truly knows how far away ASI is, or even if it's possible. From what narrow visibility I have, I don't expect that ASI is imminent.

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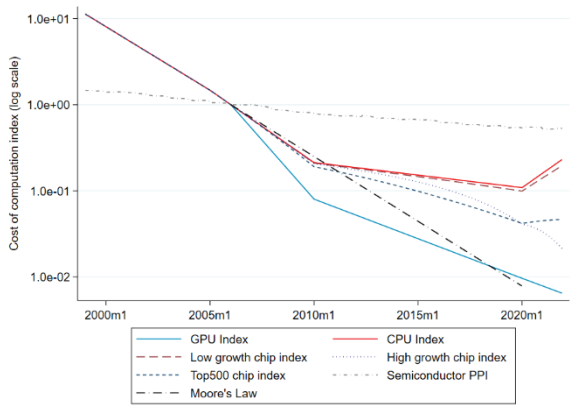
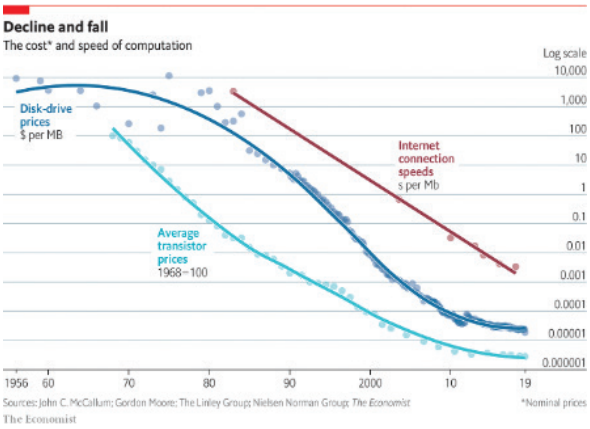
Prediction	Score and Reason
The total amount of compute available to humanity will continue to increase exponentially over 2024 and 2025, much faster than Moore's law, but the price of compute won't fall commensurately due to massively increased demand.	**Unresolved – Current Rating:** A Between 1986-2007, general-purpose computations grew at a compound annual growth rate of 61%, while application-specific computations grew at 86% annually.[1] Conservative estimates put the amount of compute added in 2023 alone at between a doubling and factor of 8 increase – 400 exaflops of new compute vs. less than 50 exaflops from the existing installed base.[2] For context, Tesla used 1.8 exaflops of compute hardware to train the AI for their self-driving systems, and has announced plans for it alone to expand to 100 exaflops of hardware by the end of 2024. As far as the price of compute, the average cost has been decreasing over the last decade (on conservative assumptions, computation is around 100 times cheaper than it was in 2000), and I expect that to continue. However, unless the AI bubble pops completely, the massive, order of magnitude increases in total compute infrastructure won't drop costs by the same orders of magnitude due to how much will be consumed for AI models. Supporting my prediction, total compute spend is up - "global spending on cloud 



infrastructure services surged by 19% year-over-year in the fourth quarter of 2023, reaching a total of $78.1 billion—a significant uptick of $12.3 billion. Throughout the entirety of 2023, total spending on cloud infrastructure services experienced an 18% growth, soaring to $290.4 billion from $247.1 billion in the previous year."[3]

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Prediction	Score and Reason
We're seeing more and more AI-specialized chips, and we're going to see them become common (>70% of all new phones and laptops contain AI-specialized chips) in business and consumer devices to facilitate local AI usage by 2028.	**Unresolved – Current Rating:** A Even back in February, laptops and PCs equipped with "Neural Processing Units" were being marketed and sold as "AI PCs". However, consumer applications of AI haven't yet caught up – nearly all of the LLMs most people would use are cloud-hosted and so won't benefit from any local hardware, and most software doesn't take advantage of the new chips.[1,2] With that said, there are already plenty of end user applications of AI, from image generation to noise filtration on calls to live video editing, and some level of adoption is likely to follow. It certainly isn't stopping manufacturers, who expect to sell millions of AI PCs this year alone. Meta is gambling on open-source AI models, with users running numerous small models locally, which would presumably benefit significantly from the new hardware.[3] In 2024, approximately 15% of newly released smartphones are expected to feature specialized AI chips, and AI-enabled PCs are projected to account for 22% of all PC shipments. That's still far from the 70% of the prediction, but chipmakers are moving extremely quickly – I wouldn't be surprised if basically all general-purpose chips for consumer devices could be considered to be AI chips in the near future.[4,5] *Sources:* 1. https://www.pcworld.com/article/2236372/does-your-next-laptop-really-need-to-be-an-ai-pc.html 2. https://www.reuters.com/technology/amd-introduces-ai-chips-business-laptops-desktops-2024-04-16/ 3. https://about.fb.com/news/2024/07/open-source-ai-is-the-path-forward/

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Predicted July 2024
(roughly 20 months following the release of ChatGPT)

Prediction	Score and Reason
It will come to light (likely publicly on an earnings call or at a conference, but possibly via a partner or insider) that Microsoft's strategy with Recall, their AI shadowing feature which takes screenshots of users' desktops every few minutes, is to gather data to fuel training of AI models which can better replicate specialist expertise – both in terms of knowledge and in terms of ability to interact with domain-specific systems.	**Unresolved – Current Rating:** B There has been a lot of ambitious talk at conferences about "Digital Twins" – workers creating AI duplicates of themselves who can attend meetings, answer questions, and even complete research and work tasks. The real question with digital twins is how well they'll be able to replicate the expertise of a person and act on their behalf, and some of that comes down to raw AI capability, some is down to implementation concerns like APIs, and some is down to training data. Training data is a significant hurdle – it takes a fairly large sample of explicitly documented content to even tune an AI to write in an individual's style, let alone embody all their work knowledge and capabilities. Only a small fraction of what most workers know and do is ever documented, and even less documented in a way conductive to efficient AI training. I think that's what Microsoft is taking aim at with their recall feature – setting up explicit systems to gather massive amounts of data about what workers are doing day in day out, without any manual effort needed. On face, the Recall feature is more of a search, designed to help workers find information and documents they may not be able to easily locate. But I think Microsoft sees the shape of the future, and is attempting to build systems that shadow workers and train AI to emulate them directly and autonomously, without

nearly so much custom effort needed to tune the AI "twin".

In a sense this prediction combines aspects of the AI wearable and RPA predictions. Much like with Meta, Microsoft is happy to subsidize the Recall feature, because the true value is in the data they're collecting. Initially, Microsoft was going to ship its newest laptops with this feature included and on by default.

I rate this a B mainly because I think it might be a while for this to come out publicly; Microsoft significantly scaled back their plans for Recall following backlash from users about the obvious privacy and security issues with the feature.[1]

Sources:

1. https://www.wired.com/story/microsoft-recall-off-default-security-concerns/

Prediction	Score and Reason
An AR product (or feature of an existing product) will be introduced before 2031 which allows users to selectively mute people in their environment. This will be achievable through combination of several kinds of AI – voiceprinting to uniquely identify a voice, machine vision to enable selection of the person and correlate with the voiceprint, and AR to provide the hardware and interface.	**Unresolved – Current Rating:**  This has use cases in screening out environmental advertisements, ability to hold conversations in loud and crowded environments, and other quality-of-life applications. As an extension of the ideal of "hear what you want" which has a clearly established value proposition consumers will pay for, I see this as primarily a matter of AR/VR technology getting better and achieving sufficiently mass adoption. Technologically, it's probably already achievable, if perhaps not with adequate latency.

Prediction	Score and Reason
If the big AI companies (and their partners/subsidiaries/sources) don't start to self-regulate their use of copyrighted data for training, they will find themselves facing permanent technical challenges with training data, not just lawsuits and fines.	**Unresolved – Current Rating: B** Many of the frontier model companies have come under fire for real or suspected copyright violations. The area is murky, because data is often sourced from publicly available, open-source datasets. Those data aggregators may have violated copyright, but aren't using the data for commercial purposes themselves, and so are less likely to be the subject of lawsuits.[1] This highlights the challenges of sourcing data ethically (working with dozens of individual creators and authors vs. one nonprofit that ignored a website's terms of service), and the ease of obfuscation ("it was this unaffiliated group which posted the dataset for free without warnings or disclaimers, not us"). As much as increased regulation of training data would slow the pace and increase the cost of AI development, it seems that without it, protection of ad-monetized intellectual property will largely be down to individual platforms and content creators. They have incentives to try to "poison the well", either watermarking their data or changing it to produce undesirable behaviors in models trained on it. I rate this prediction a B mainly because it's unclear how much the frontier AI companies will be relying on internet data (vs. handcrafted and synthetic data) in the future, and how much individual creators, who are already unpleasantly beholden to their platforms, will care to invest in poisoning AI models. *Sources:* 1. https://www.proofnews.org/apple-nvidia-anthropic-used-thousands-of-swiped-youtube-videos-to-train-ai/

Prediction	Score and Reason
There will be a $10+ million market before 2028 for therapy and professional counseling services for people who struggle to socialize with other humans as a result of heavy interaction with AI chatbots, and the market for chatbot addiction treatment will expand.	**Unresolved – Current Rating:** A Character AI, the leading AI companion app, is reportedly serving a volume of user queries equivalent to 20% of the global Google search volume - that's massive. While news articles have been commenting on the rise of AI companions, this scale is mind-boggling.[1] The user base for character AI skews strongly younger, with nearly 60% of users aged between 18 and 24 (the youngest tracked category – many users are likely younger).[2] Notably, users are very heavily engaged – users spend an average of 2 hours a day chatting with Character.AI bots.[3] This is likely partially a trend, and many young people won't stick with the platform long-term, but a proportion of them will - and with 233.3 million users worldwide as of April 2024, even 1% would still be millions of people who may need professional help and guidance adjusting to socialization with other humans. There are already many instances of users of Character.AI and other AI companion apps like Replika.AI becoming addicted and struggling to quit.[4] The user growth has slowed significantly since its huge initial surge - 208.2 million visits per month in April 2024, up from 206 million in June 2023 – but it's still far greater popularity than any such service has enjoyed previously, and it represents a high-water mark of tech companies monetizing the loneliness epidemic.[5] OpenAI's wider release of advanced voice capabilities has been proving this point, as more people become attached to artificial

characters. We'll see another jump when live avatars are perfected.[6]

This is a societal trend and challenge which will very likely get worse before it gets better.

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