

AI

AI @ Health care

Dr. Nicolaus Henke

Halden, May 3rd 202



What to take away from this talk?

1. Too much hype, but also real potential
2. Healthcare is a good target for AI products, but not a good enterprise AI player
3. Healthcare has some regulatory practices useful for AI products
4. Risks are significant
5. Real players must invest helping regulation else what they build might not be viable



AI @ Healthcare

1. AI Potential

2. Healthcare Challenges

3. AI hype and concerns in healthcare

4. Examples of progress

5. LLMs in Healthcare as per May 3rd,
2023

Nicolaus: Hey GPT-4, what did the McKinsey report on the global potential of AI say?

GPT-4: The McKinsey Global Institute (MGI) report "Artificial intelligence: the next digital frontier?" (2017), identified the biggest opportunities for AI across different sectors. According to the report, the biggest opportunities for AI are:

1. Improving healthcare outcomes: AI has the potential to improve healthcare outcomes by enabling more accurate diagnoses, personalized treatments, and better disease prevention. The report estimates that AI could create \$200 billion in annual value for the healthcare industry by 2026.
2. Enhancing retail operations: AI can improve retail operations by optimizing pricing, inventory management, and customer experience. The report estimates that AI could create \$250 billion in annual value for the retail industry by 2026.
3. Streamlining supply chains: AI can optimize supply chain operations by predicting demand, improving inventory management, and enhancing logistics. The report estimates that AI could create \$1.3 trillion in annual value for the supply chain and logistics industry by 2030.
4. Improving financial services: AI can improve financial services by enhancing fraud detection, risk management, and customer experience. The report estimates that AI could create \$250 billion in annual value for the financial services industry by 2026.
5. Enhancing industrial manufacturing: AI can optimize manufacturing processes, improve product quality, and reduce downtime. The report estimates that AI could create \$3.7 trillion in annual value for the manufacturing industry by 2025.

Nicolaus: Thanks, can you also share the link to the tool they published where people can look up the details?

GPT-4: McKinsey Global Institute (MGI) report "Artificial intelligence: the next digital frontier?" (2017), co-authored by Nicolaus Henke and others, included an interactive tool called the "AI Impact Potential Simulator." This tool allows users to estimate the potential economic impact of AI on their industry, region, and functional area based on MGI's research.

- The tool is available on the McKinsey website at the following link:
- <https://www.mckinsey.com/featured-insights/artificial-intelligence/ai-impact-potential-by-industry-and-function>
- To use the tool, simply select your industry, region, and functional area, and the tool will provide an estimate of the potential impact of AI on your industry in terms of revenue and cost savings by 2030. The tool also provides a breakdown of the key AI use cases and applications for your industry

AI @ Healthcare



1. AI Potential

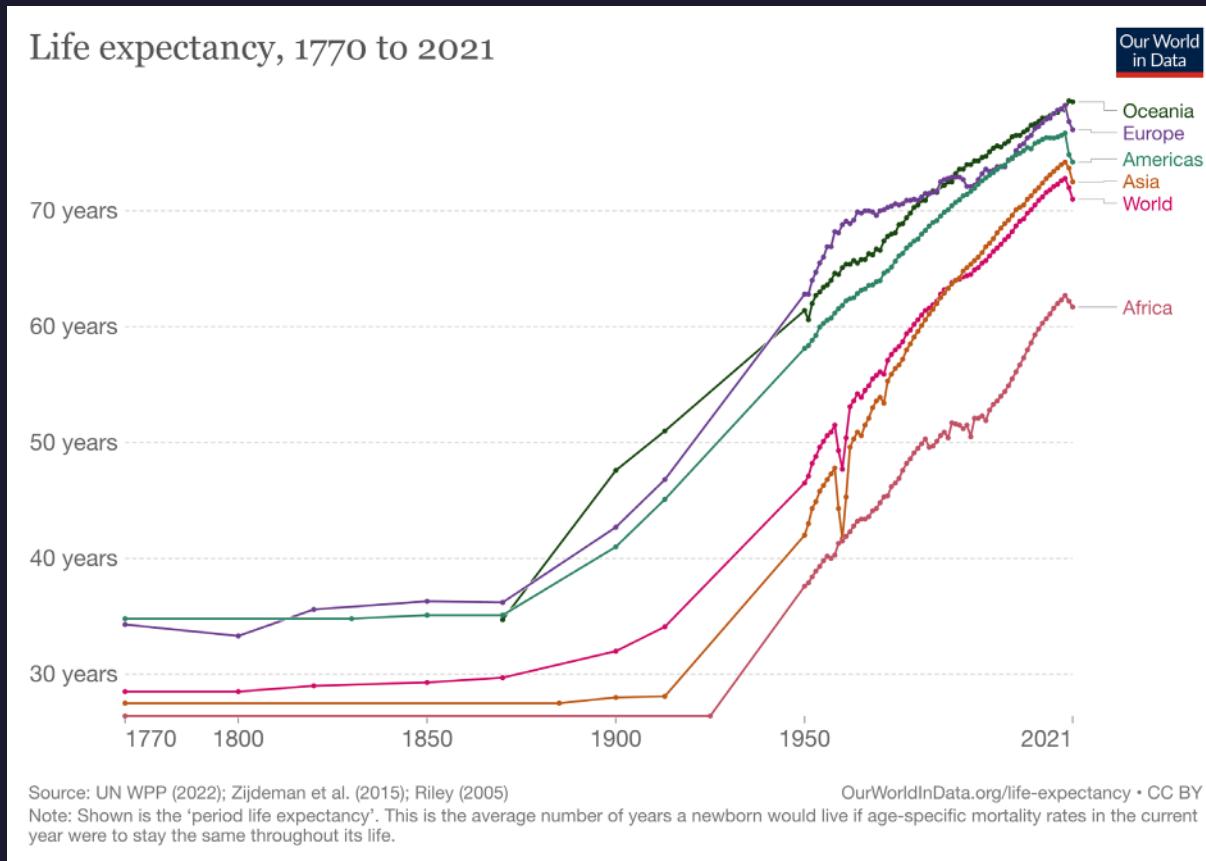
2. Healthcare Challenges

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Healthcare as per May 3rd, 2023

Healthcare Success



Healthcare Challenge (1/2)



 <10%

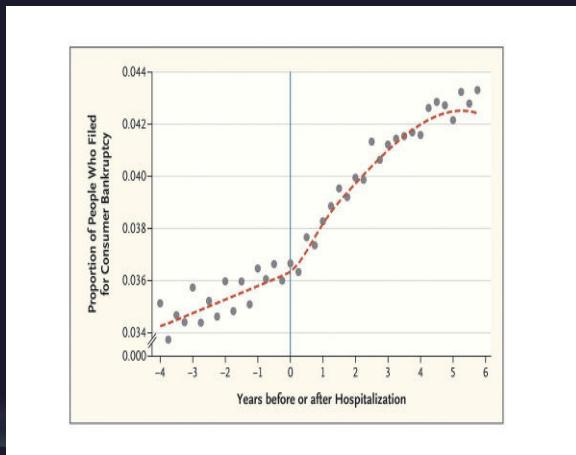
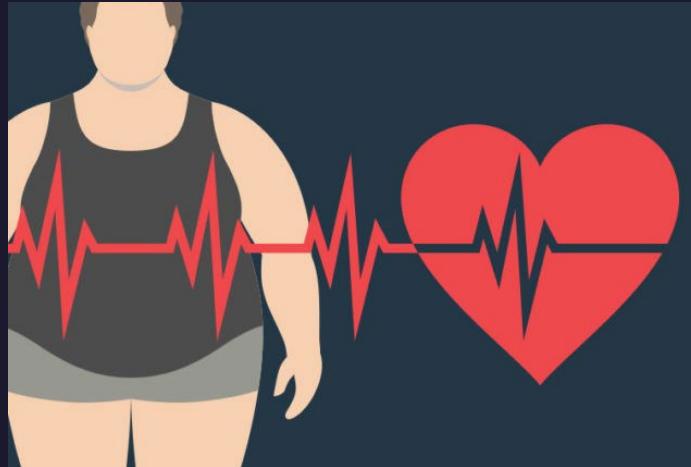
 10-20%

 20-30%

 >30%

Half OECD-historic rate: GDP + 1.0						OECD-historic rate: GDP + 2.0					
OECD	2005	2030	2050	2080	2100	OECD	2005	2030	2050	2080	2100
USA	15.3%	19.5%	23.7%	31.8%	38.7%	USA	15.3%	24.9%	36.7%	65.6%	96.8%
Switzerland	11.6%	14.8%	18.0%	24.1%	29.3%	Switzerland	11.6%	18.8%	27.8%	49.8%	73.4%
France	11.1%	14.2%	17.2%	23.1%	28.0%	France	11.1%	18.0%	26.6%	47.6%	70.2%
Germany	10.7%	13.7%	16.6%	22.2%	27.0%	Germany	10.7%	17.4%	25.6%	45.9%	67.7%
Belgium	10.3%	13.1%	16.0%	21.4%	26.0%	Belgium	10.3%	16.7%	24.7%	44.2%	65.2%
Austria	10.2%	13.0%	15.8%	21.2%	25.8%	Austria	10.2%	16.6%	24.4%	43.8%	64.5%
Portugal	10.2%	13.0%	15.8%	21.2%	25.8%	Portugal	10.2%	16.6%	24.4%	43.8%	64.5%
Greece	10.1%	12.9%	15.7%	21.0%	25.5%	Greece	10.1%	16.4%	24.2%	43.3%	63.9%
Canada	9.8%	12.5%	15.2%	20.4%	24.8%	Canada	9.8%	15.9%	23.5%	42.0%	62.0%
Australia	9.5%	12.1%	14.7%	19.7%	24.0%	Australia	9.5%	15.4%	22.8%	40.8%	60.1%
Iceland	9.5%	12.1%	14.7%	19.7%	24.0%	Iceland	9.5%	15.4%	22.8%	40.8%	60.1%
Netherlands	9.2%	11.7%	14.3%	19.1%	23.2%	Netherlands	9.2%	14.9%	22.0%	39.5%	58.2%
Denmark	9.1%	11.6%	14.1%	18.9%	23.0%	Denmark	9.1%	14.8%	21.8%	39.0%	57.6%
Norway	9.1%	11.6%	14.1%	18.9%	23.0%	Norway	9.1%	14.8%	21.8%	39.0%	57.6%
Sweden	9.1%	11.6%	14.1%	18.9%	23.0%	Sweden	9.1%	14.8%	21.8%	39.0%	57.6%
New Zealand	9.0%	11.5%	14.0%	18.7%	22.7%	New Zealand	9.0%	14.6%	21.6%	38.6%	56.9%
Italy	8.9%	11.4%	13.8%	18.5%	22.5%	Italy	8.9%	14.5%	21.3%	38.2%	56.3%
Luxembourg	8.3%	10.6%	12.9%	17.3%	21.0%	Luxembourg	8.3%	13.5%	19.9%	35.6%	52.5%
UK	8.3%	10.6%	12.9%	17.3%	21.0%	UK	8.3%	13.5%	19.9%	35.6%	52.5%
Spain	8.2%	10.5%	12.7%	17.0%	20.7%	Spain	8.2%	13.3%	19.6%	35.2%	51.9%
Hungary	8.1%	10.3%	12.6%	16.8%	20.5%	Hungary	8.1%	13.2%	19.4%	34.8%	51.2%
Japan	8.0%	10.2%	12.4%	16.6%	20.2%	Japan	8.0%	13.0%	19.2%	34.3%	50.6%
Turkey	7.6%	9.7%	11.8%	15.8%	19.2%	Turkey	7.6%	12.3%	18.2%	32.6%	48.1%
Finland	7.5%	9.6%	11.6%	15.6%	18.9%	Finland	7.5%	12.2%	18.0%	32.2%	47.4%
Ireland	7.5%	9.6%	11.6%	15.6%	18.9%	Ireland	7.5%	12.2%	18.0%	32.2%	47.4%
Czech Republic	7.2%	9.2%	11.2%	15.0%	18.2%	Czech Republic	7.2%	11.7%	17.3%	30.9%	45.5%
Slovak Republic	7.1%	9.1%	11.0%	14.8%	17.9%	Slovak Republic	7.1%	11.5%	17.0%	30.5%	44.9%
Mexico	6.4%	8.2%	9.9%	13.3%	16.2%	Mexico	6.4%	10.4%	15.3%	27.5%	40.5%
Poland	6.2%	7.9%	9.6%	12.9%	15.7%	Poland	6.2%	10.1%	14.9%	26.6%	39.2%
Korea	6.0%	7.7%	9.3%	12.5%	15.2%	Korea	6.0%	9.7%	14.4%	25.7%	38.0%

Healthcare Challenges (2/2)



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AI Hype – we have been here before



Homer's
Autonomous Ship
700 BCE



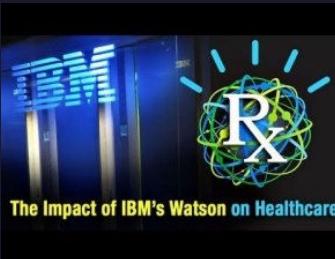
DaVinci
Automaton
1495 AD



Mechanical
Turk
1770 AD



Turing et al
1950s



Cancer diagnosis
automaton 2015



Typical med
sim suite 2023



and we should step back

PAUSE THE EXPERIMENT

Pause Giant AI Experiments: An Open Letter

We call on all in order to immediately pause for at least 6 months the training of AI systems that pose a threat to humanity.

Signatures: 25482 | Add your signature

Published: March 21, 2023

An AI system with human competitive intelligence can pose profound risks to society and humanity, as shown by extensive research^{1,2} and acknowledged by the AI Task^{3,4} as stated in the widely-recommended Definition of AI Principles. Advanced AI could represent a catastrophic change in the trajectory of life on Earth, and should be planned for and managed with commensurate care and resources. Unfortunately, this level of planning and management is not happening, even though recent research has shown AI labs located in an out-of-control race to develop and deploy ever more powerful digital tools that no one – not even their creators – can understand, control, or reliably constrain.

future
of life
INSTITUTE

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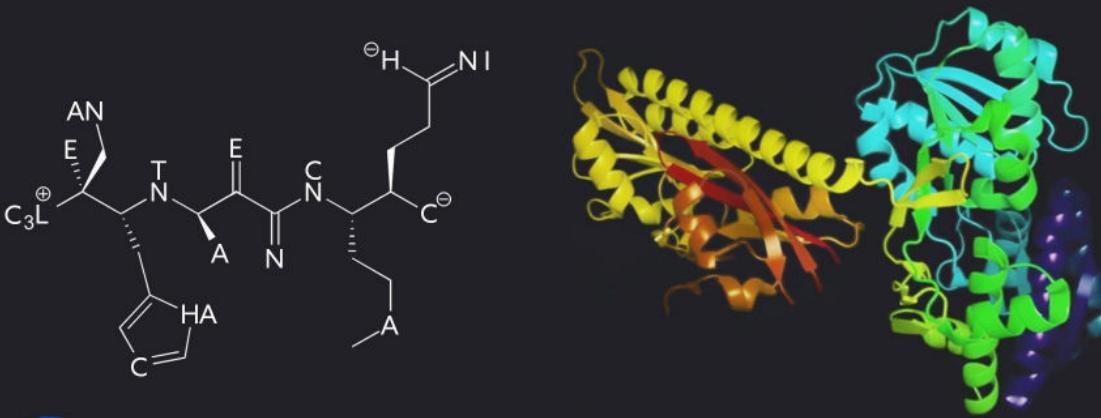
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Examples of progress

Protein Folding AI

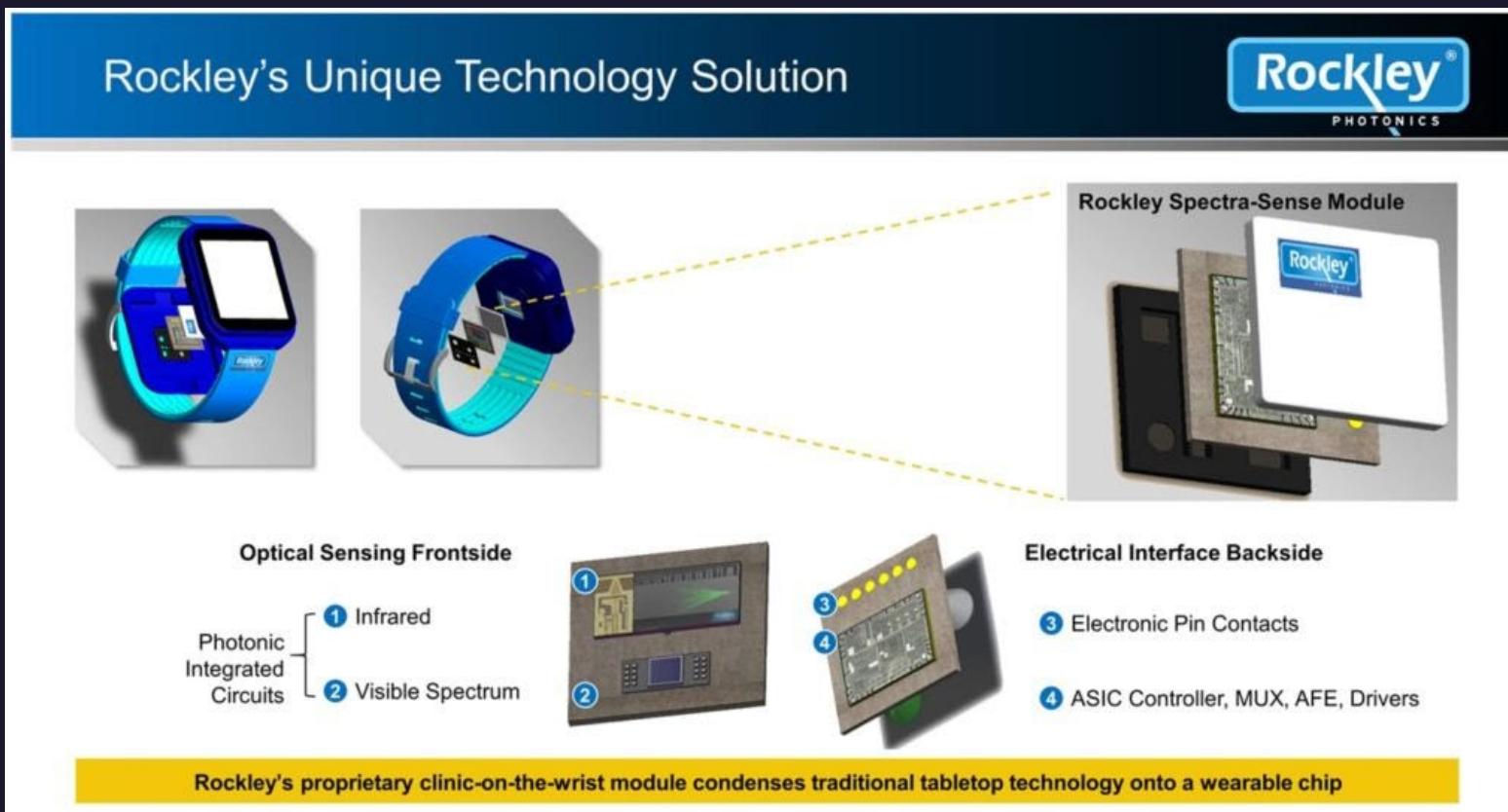


DeepMind Breakthrough



Source: Deepmind

Examples of progress



Source: Rockley Photonics

Examples of progress



Source: Cherish Healthcare

Examples of progress



Source: Little Journey



Examples of progress



Source: Oxford Medical Simulation

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N: So how can LLMs help doctors and nurses to have more time for patients?

GPT-4: Large Language Models (LLMs) like GPT-4 can help doctors and nurses have more time for patients and reduce their workload in several ways. Here are some potential applications:

1. Medical documentation: (abbreviated)
2. Diagnostic support: (abbreviated)
3. Treatment planning: (abbreviated)
4. Medical research: (abbreviated)
5. Medical education and training: (abbreviated)
6. Mental health support: (abbreviated)

By leveraging LLMs in these various ways, doctors and nurses can reduce their administrative burden and focus on providing personalized, high-quality care to their patients. However, it is important to note that the use of LLMs in healthcare should be carefully monitored and regulated to ensure patient privacy, data security, and ethical considerations are adequately addressed.

Human score: 3/10: great headlines and warning, no idea about how hard to do

So, what to say about AI@Healthcare?

1. Hyping about AI is a common condition some well-trained humans and chatbots share. BUT, real opportunities in healthcare are ahead: Workforce capacity building, better and easier workflows, medical error reduction, expanded access. Hopes exist on productivity, but jury is out.
2. Almost no healthcare player will be great at enterprise MLOPs any time soon. But can we build apps or products to solve it for them, often by combining ML with VR, AR, sensors, radar – plus some automated middleware integrations with the most common systems of record (eg EPIC, Cerner, Daedalus).
3. Healthcare has useful regulatory processes in place which could help to keep this safe (1) clinical guidelines, e.g. who can diagnose or treat what condition 2) prospective randomized controlled trials to test safety and efficacy for approval of new products, and 3) ongoing real world evidence tracking.
4. BUT – Healthcare regulation is slow and expensive, while AI is moving very fast. Very significant risks of misuse, misinformation, bad actors, exist, e.g. fraudulent fake medical evidence confusing doctors, payers, patients or regulators which could even kill people
5. Don't wait for AI players to teach alignment to their AI. Tech and healthcare leaders (and their investors like NBIM) have a joint self-interest to help build regulatory capacity as bad actors and fake evidence would destroy the usefulness and adoption of what they themselves are trying to build.