

Role of Gen AI and Large Language Models in HealthCare

Vasudeva Varma

Announcement this week:

Microsoft Dragon Copilot

<https://www.microsoft.com/en-us/health-solutions/clinical-workflow/dragon-copilot#Modal-hero>



Customizable documentation

Get documentation done your way.

[Watch the video](#)



Summarize evidence

Get help validating medical decision-making.

[Watch the video](#)



Multilingual encounter capture

Conduct encounters in Spanish and receive documentation in English. Use with a translator for any language.

[Watch the video](#)



Referral letters

Get more from patient conversations without extra work.

[Watch the video](#)



Summarize encounters

Get a quick refresher on a patient before finalizing a note to reduce cognitive burden.

[Watch the video](#)



Orders

Capture more than 12 order types from clinician-patient conversations.

[Watch the video](#)



After-visit summaries

Empower patients without adding to workloads.

[Watch the video](#)



Coaching

Get assistance to produce better clinical notes.

[Watch the video](#)



Inpatient care

Extend the benefits of Dragon Copilot across care settings.

[Watch the video](#)

Focus of this talk:

Role of Gen AI and LLM in **HealthCare**

Experiences with healthcare Apps

- Personalised Diagnosis
- Doctor Patient Communication
- Hospital Management
- Drug Discovery
- Insurance

The other side of the coin

- Risk / accuracy
- Fairness/ Bias
- Accountability
- Transparency
- Ethics
- Safety

**AI can save pharma cos
almost \$54 billion in R&D
annually**

Healthcare costs to go up by 7-10% in 2024-25 - PwC

**40% of healthcare providers'
working hours can be enhanced
with AI
- Accenture**

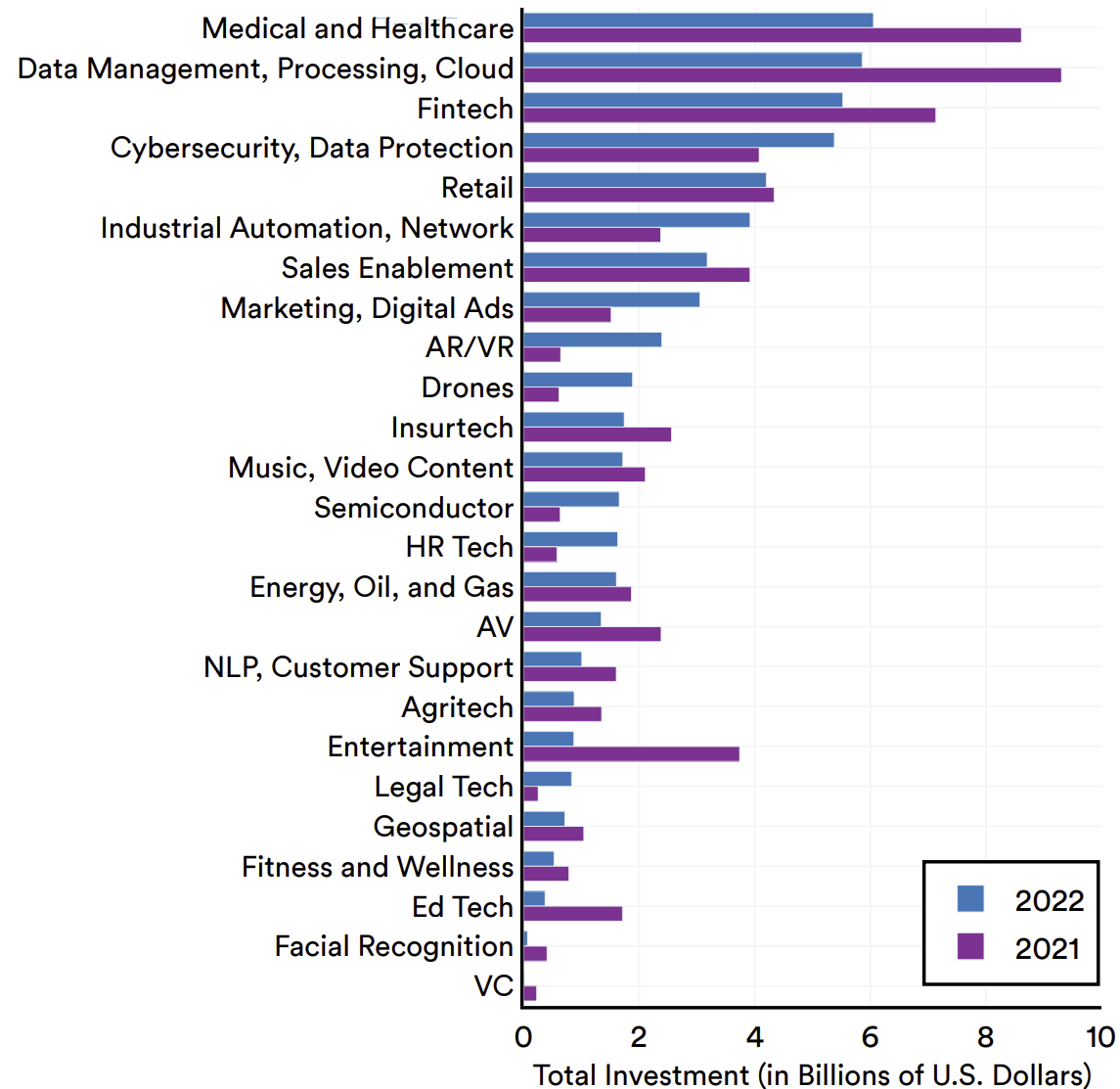
**AI can save the US medical
sector at least \$200 billion in
annual expenses.**

- Forbes

**Burnout rate among
physicians reached 62%
in the US**

Private Investment in AI by Focus Area, 2021 Vs. 2022

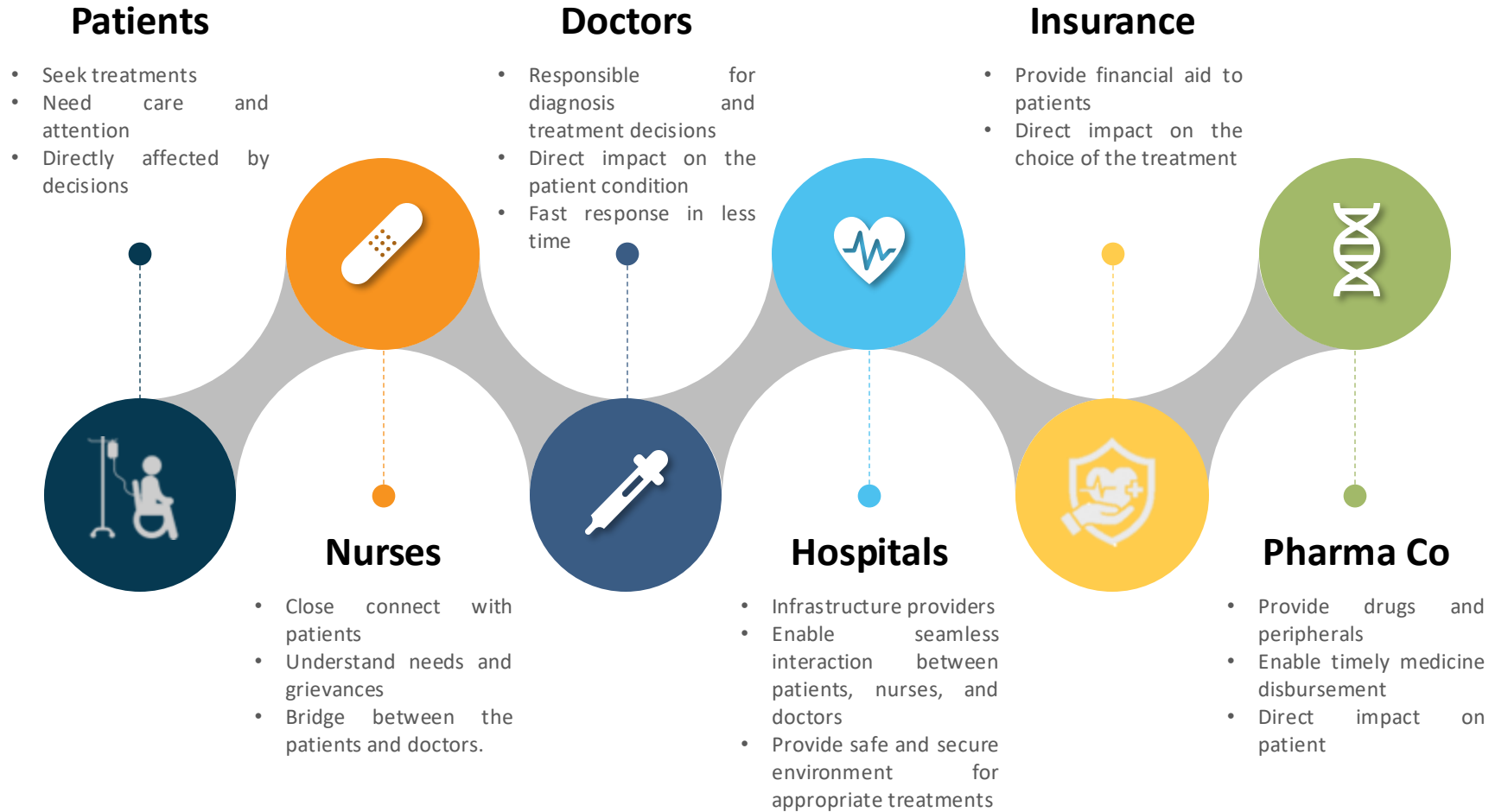
Source: NetBase Quid, 2022 | Chart: 2023 AI Index Report

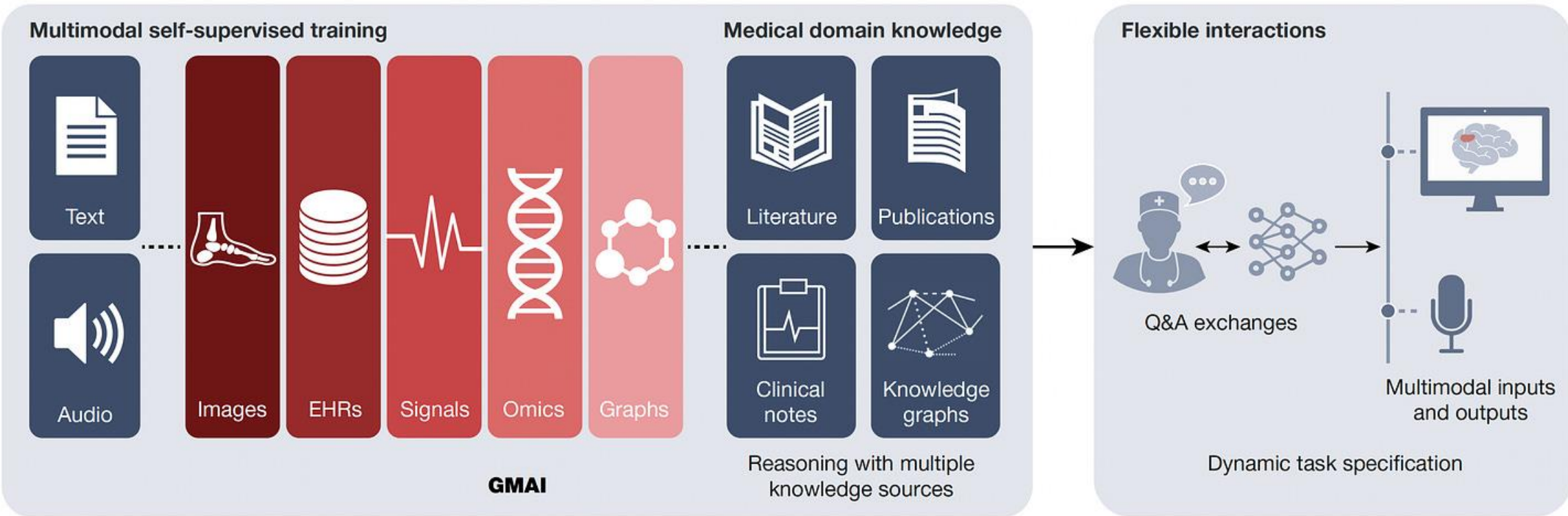
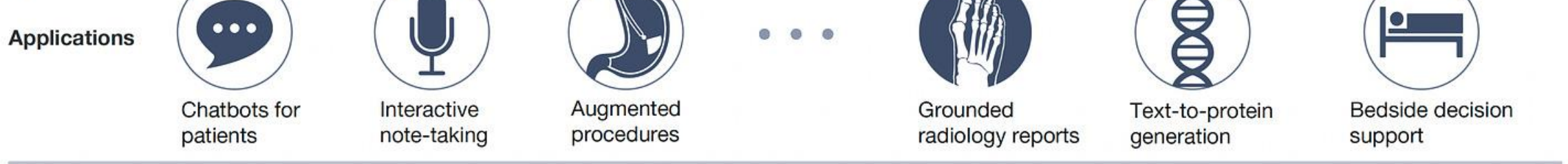


Health care

Most AI related investment across sectors in 2022

Healthcare Stakeholders



a**b**

Regulations: Application approval; validation; audits; community-based challenges; analyses of biases, fairness and diversity

Personalized Diagnosis

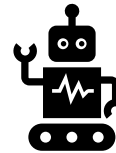
I've been experiencing headaches lately. Can you provide me with some information on what might be causing them?



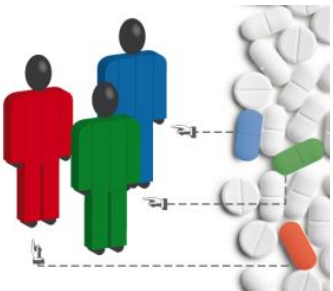
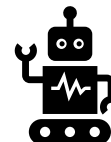
Well, I've been really stressed at work, and **they** usually come in the afternoon.



Sure, I can help with that. Headaches can have various causes, such as stress, dehydration, or even certain medical conditions. To provide more personalized information, could you tell me if you've had any recent changes in your routine or any other symptoms accompanying the headaches?



Thank you for sharing that. Stress is a common trigger for headaches. It's important to manage stress through relaxation techniques and staying hydrated. If the headaches persist or worsen, consider consulting a healthcare professional for a thorough evaluation.

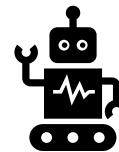


Diagnostic Assistance

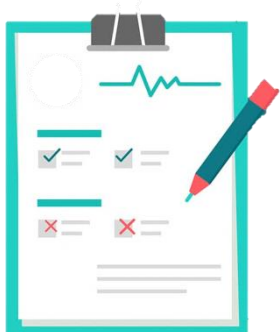
I have a patient with complex symptoms, and I need to make an accurate diagnosis. Can you help me analyze their medical history and symptoms to provide data-backed insights?



Certainly, I can assist with that. Please provide the patient's medical history, current symptoms, any diagnostic tests or results, and any additional relevant information.



Providing Doctors with Data-Backed Insights for Diagnoses

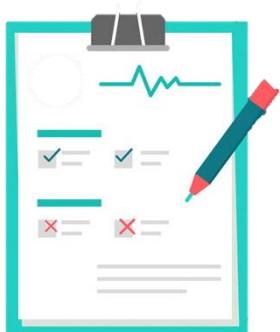


Diagnostic Assistance

The patient, Lisa, has a history of allergies and presents with persistent cough, shortness of breath, and fatigue. We have conducted pulmonary function tests and allergy tests.



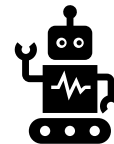
Providing Doctors with Data-Backed Insights for Diagnoses



Thank you for the information. Let's analyze the data:

- Based on Lisa's history of allergies and her current symptoms, it's possible that her cough and shortness of breath could be related to an allergic reaction.
- The results of the pulmonary function tests should provide insights into her lung function.
- The combination of test results and symptoms may suggest a specific diagnosis, such as allergic asthma or a related respiratory condition.

It's important to review the test results in detail and consider consulting with specialists if necessary to arrive at an accurate diagnosis and treatment plan.



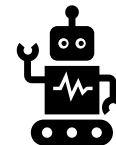
Doctor Patient Communication

I just had a consultation with a patient who is dealing with a chronic illness. I want to send a follow-up email that is both empathetic and informative. Can you assist me with that? The patient, John, is worried about the side effects of the prescribed medication, and we discussed a dietary plan to manage his condition.



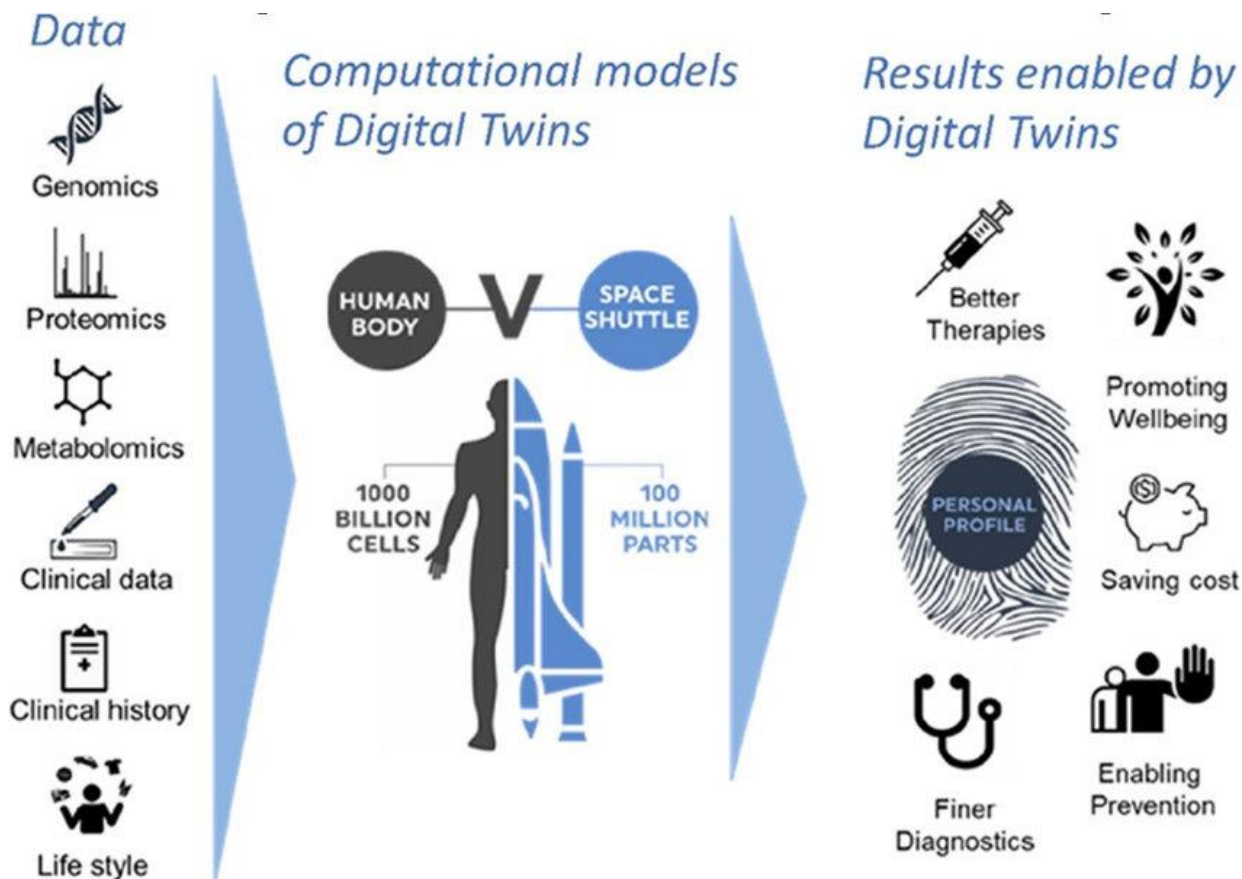
Thank you for sharing that information. Here's a draft email:

"Dear John,
I hope this message finds you well. I understand your concerns about the medication and the dietary plan. Please know that your well-being is our top priority, and we're here to support you every step of the way. In regards to the medication, I'll address your concerns and discuss potential alternatives during our next appointment. As for the dietary plan, I appreciate your commitment to managing your condition, and I'm here to help you make it as effective and enjoyable as possible. Feel free to reach out if you have any questions or further concerns. Your health is important to us.
Best regards,
[Doctor's Name]"



Personalized Follow-up Emails with Empathy





Patient Digital Twin

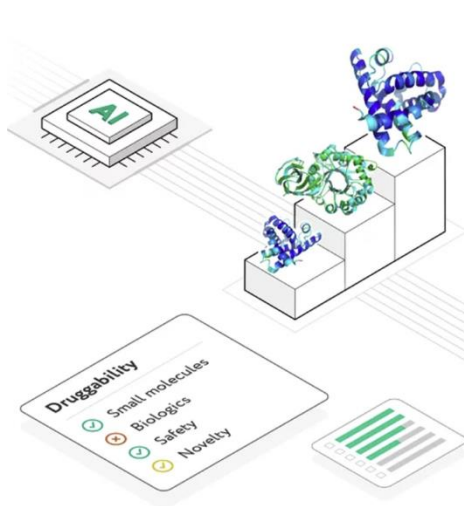
- Integrate molecular, clinical, and imaging data to generate a digital twin of each patient
- Best treatment selected after trying treatments of the digital twin
- Personal treatment plan optimizing operational cost and ensuring recurrence prevention

Drug Discovery

Discover and Prioritize

Novel Targets

Enabling multi-omics target discovery and deep biology analysis engine to considerably reduce required time from several months to the span of just a few clicks



Generate

Novel Molecules

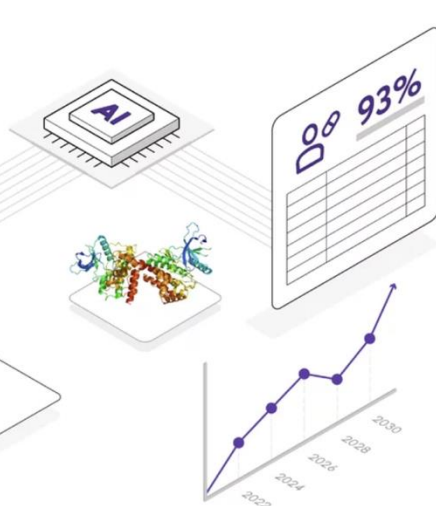
Find novel lead-like molecules in a week through this automated, machine learning de-novo drug design and scalable engineering platform



Design and predict

Clinical Trials

Predict clinical trials success rate, recognize the weak points in trial design, while adopting the best practices in the industry



- Reduced Time, Cost, & Effort required
- Diverse & Novel Results
- High Accuracy

Insurance

01

Summarization

Summarize long insurance documents for better readability

03

Chatbot Assistant

Replying customer queries using available insurance knowledge sources

05

Fraud Detection

Predictive analytics to identify anomalies to detect potential fraud



Claims & Risk Analysis

Evaluate insurance claims with risk assessments

02

Automatic Claims & Settlement Process

Advanced API integration for seamless claim settlements

04

Cost Reduction

Minimized Errors

Faster Processing

Improved Customer
Experience

Timely Intervention

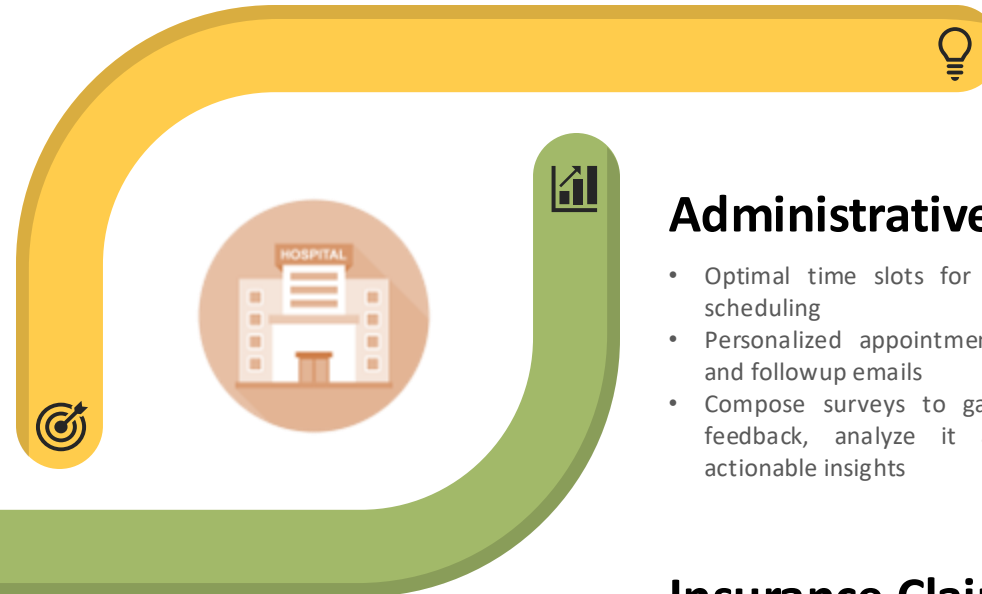
Hospitals

Documentation

- Transcribing conversation with patients
- Convert into medical notes
- Review to populate electronic health records
- Structured health reports

Caregiver Support

- Easy to follow reports on medication changes, lab results, vitals fluctuations
- Fast, accurate, and relevant reports
- Improved diagnosis using advanced medical imaging
- Treatment recommendations



Administrative

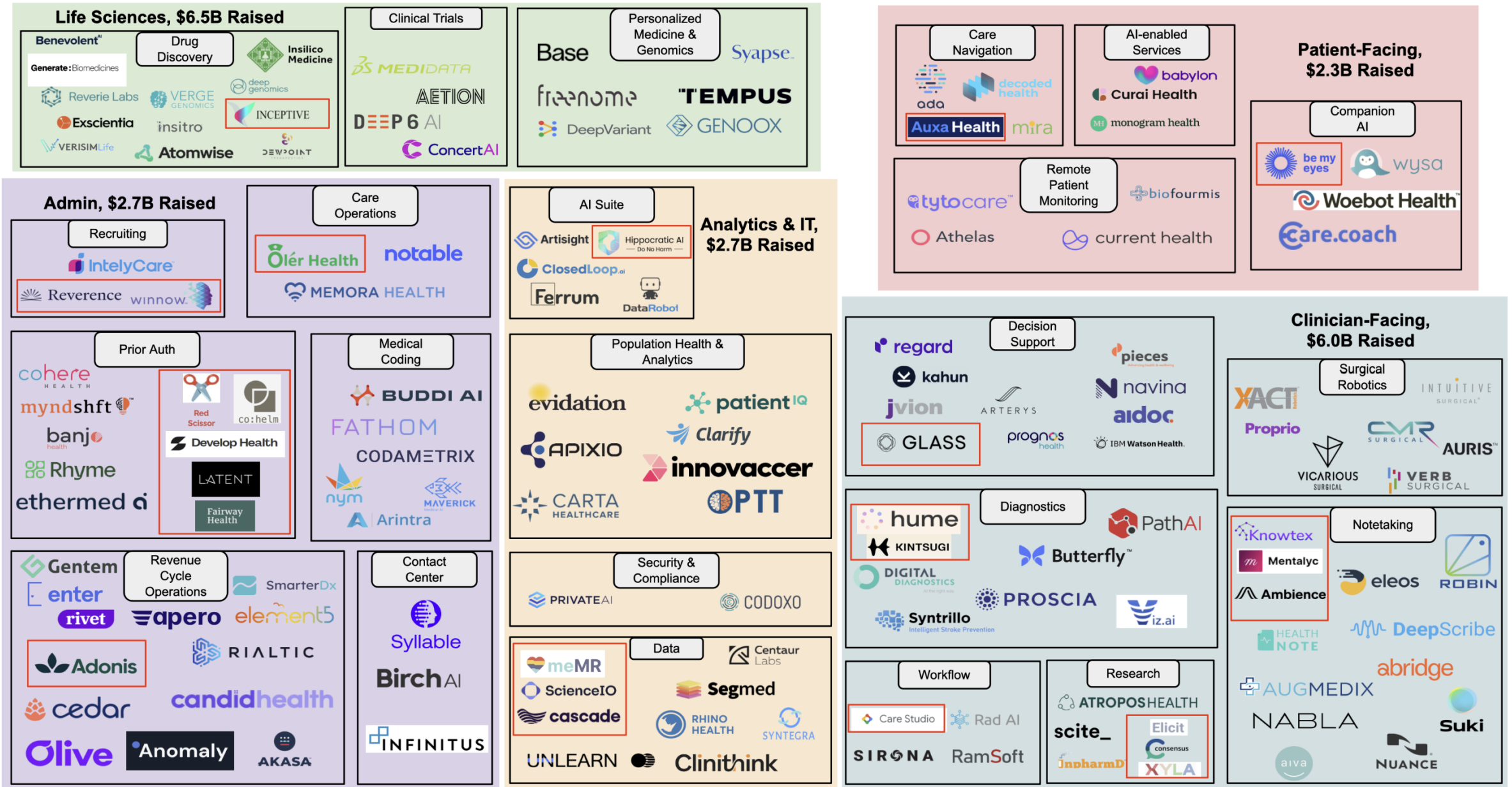
- Optimal time slots for appointment scheduling
- Personalized appointment reminders and followup emails
- Compose surveys to gather patient feedback, analyze it and provide actionable insights

Insurance Claims

- Streamlined process for insurance and healthcare providers
- Review medical insurance claims and predict success/failure

Where Generative AI Meets Healthcare: Updating The Healthcare AI Landscape

red box = launched product after 2020



The Other Side of the Coin



Risks/ Accuracy

- Small variations in prompts result in different outcomes.
- How to control stochasticity?
- Hallucinations in generation



Transparency

- Explaining how and why a certain output is provided?
- These models and subsequently their outputs are difficult to interpret
- Users are generally unclear about what is happening to their input data.



Fairness/ Bias

- Bias in Training data leading discriminatory outputs
- Challenging to detect and mitigate biases to improve fairness



Ethics

- Patients' consent for using their data for training?
- Patients' awareness and approval for using Generative AI in treatment plans and recommendations



Accountability

- Who is responsible for the output generated by GenAI?
- Definite governing policies are not in place yet.



Safety

- Using patients' sensitive data for training custom LLMs
- Data leakage with targeted attacks

Bias in healthcare AI



Racial

- Bias in the dataset of pulse oximetry sensors where they did not accurately measure and detect low blood oxygenation in Black patients



Gender

- Different illnesses have different effects of men and women
- AI algorithms need to incorporate gender differences for accurate outputs



Socio-economic

- Bias of clinicians transfers to training data and subsequently the AI model
- If data is only collected at an expensive clinic, model will be biased



Linguistics

- AI models that use audio data to diagnose diseases such as Alzheimer's.
- If these models are not trained with a wide range of accents, their outputs can be biased

Risks in healthcare AI



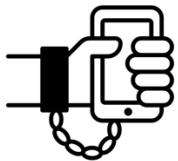
Privacy

- Patient privacy needs to be preserved
- Generative AI models need to be cognizant of the sensitivity of the medical data and the potential unauthorized access to the same



Harmful Decisions

- If not used properly, generative AI models can lead to incorrect and harmful medical decisions



Over-reliance

- Additional risk of health care providers becoming overly dependent on these models and thus losing ability of independent judgement

Accountability in healthcare AI



Transparency

- Transparency of the AI development and usage process (traceability)
- Transparency of the AI decisions themselves (explainability)



Ethics

- If not used properly, generative AI models can lead to incorrect and harmful medical decisions



Regulations

- Current regulatory frameworks for AI do not consider many aspects such as continuous learning of AI models or the algorithmic biases
- Regulatory bodies need to work together to ensure potential misuse, risks, and unfairness are avoided.

Key Messages:

- Generative AI and LLMs are the revolutionary and transformational technologies – but will be commoditized like data/AI
- Gen AI will impact the HealthCare industry the most
- Digital Twin technology is most promising
- There are several issues and challenges – Need to exercise caution



Thank you

Vasudeva Varma
X: @devvarma