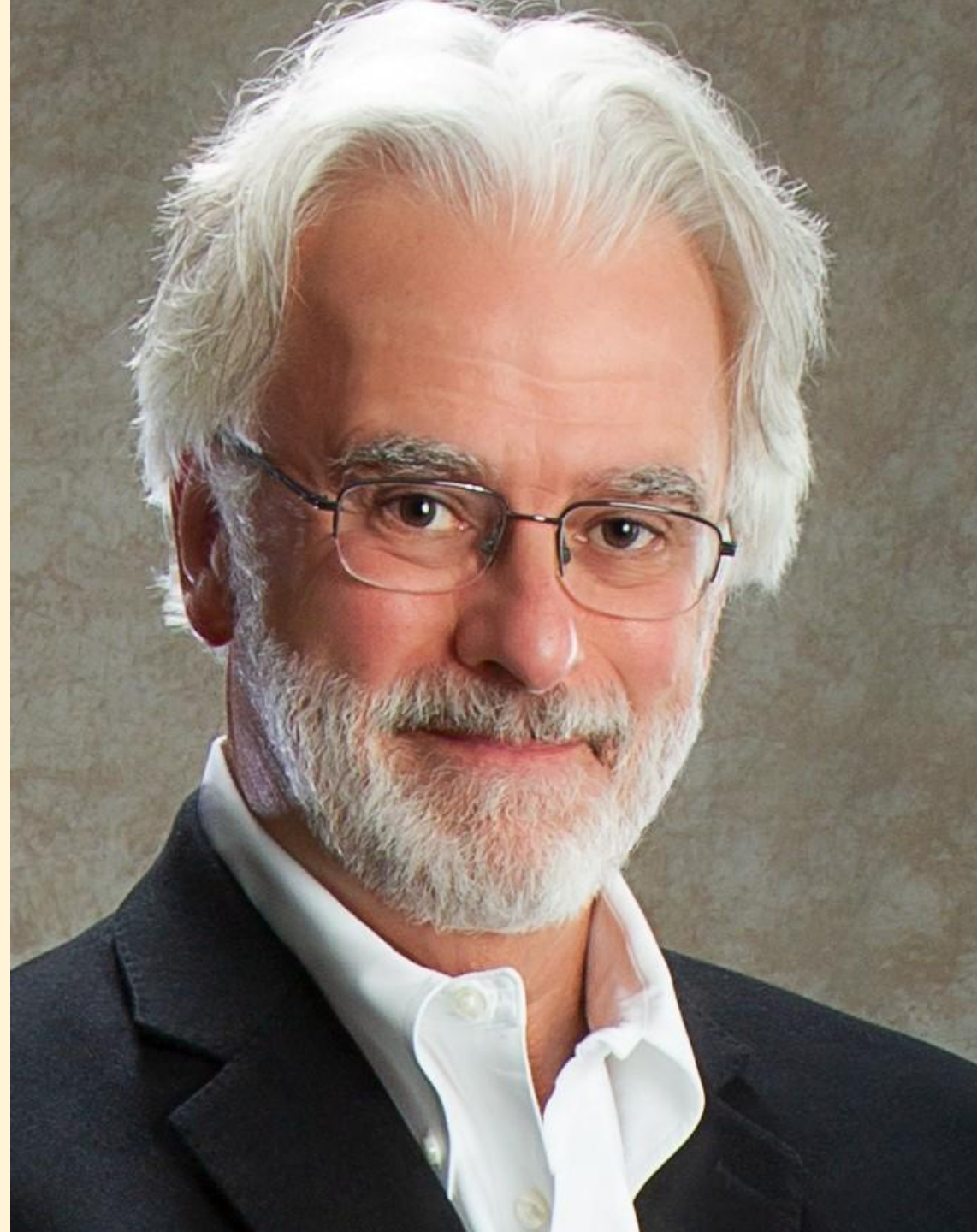


Artificial Intelligence in Behavioral Health Care

Dennis Morrison, PhD
Chief Clinical Officer, Eleos
Founder, Morrison Consulting



Introduction





Why am I showing you this?

Because

It's never too late

and

You're never too old.

Artificial Intelligence

How big is this AI thing really?

*[AI is] likely to be a transformation as influential
as the
industrial revolution...*

Will AI take my job?

AI won't take your job,
It's somebody using AI that will take your job.

Richard Baldwin,
Economist and Professor,
Geneva Graduate Institute

Projected Shortages

Over the next 15 years (through 2036), National Center for Health Workforce Analysis (NCHWA) projects shortages in many key behavioral health occupations, including:

Current need only.

For example: an additional 95,970 psychologists would be required by 2036 to meet all unmet need for psychologists.

*So, by 2036 we will need **500,000 more providers***



87,630 addiction counselors

69,610 mental health counselors

62,490 psychologists*

42,130 psychiatrists

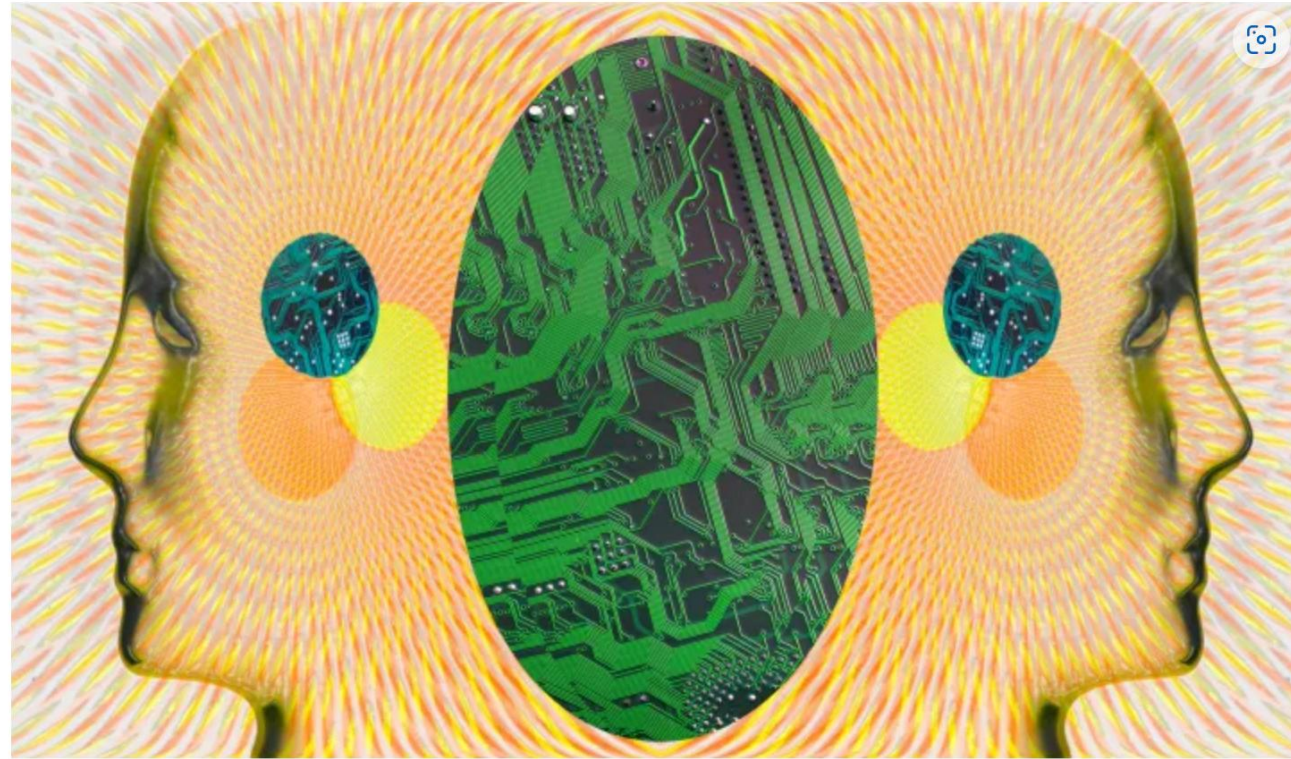
27,450 marriage and family therapists

21,030 school counselors

3.5 Reasons Why AI Won't Take Your Job

1. ALL AI in healthcare is Augmented Intelligence i.e. it assists clinicians in decision making. **It does not make decisions for clinicians.**
2. We are currently projecting ~500,000 unfilled behavioral health provider jobs in the next 15 years
3. AI algorithms are better than humans in defined, stable environments e.g. playing chess, not ill-defined and complex environments.

3.5 Artificial Intelligence ≠ Artificial Humanity



Getty Images

Artificial Intelligence Could Help Solve America's Impending Mental Health Crisis

By Jamie Ducharme

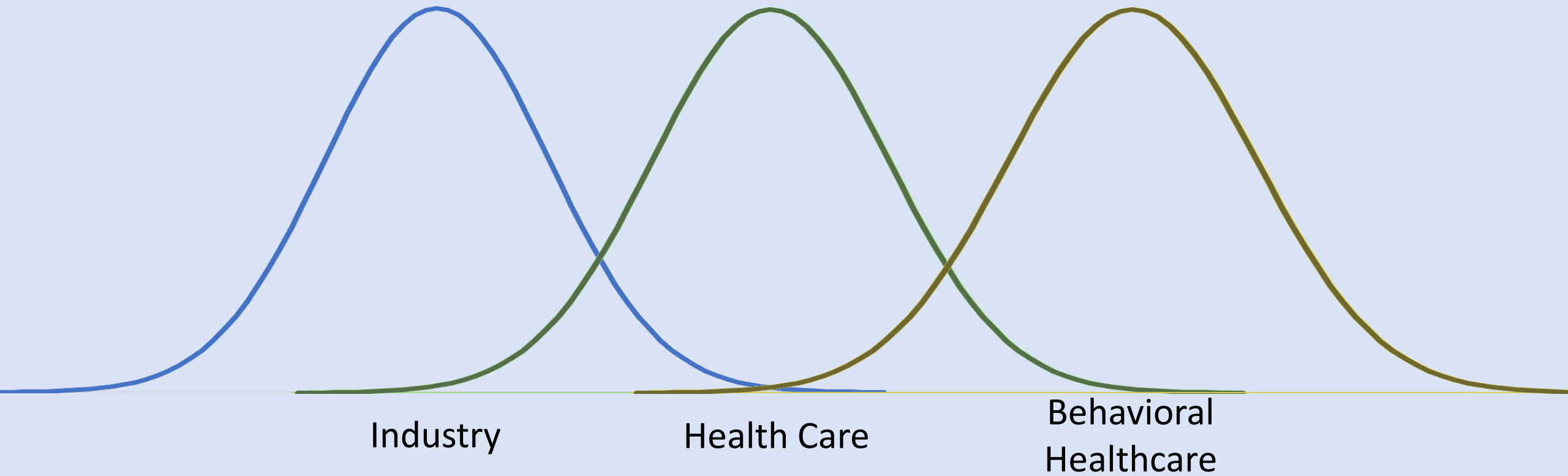
AI Definition

The capacity of computers or other machines to exhibit or simulate intelligent behavior;

the field of study concerned with this.

Abbreviated “AI”

Technology Adoption



Notable Dates in AI

- 1950 Alan Turing proposed a formal model of computing in his classic essay, *Computing Machinery and Intelligence*
- 1966 Joe Weizenbaum from MIT releases ELIZA, the first mental health chatbot
- 1997 IBM Deep Blue computer beats Gary Kasparov at chess.
- *2002 Oakland A's upset baseball by using *SABRmetrics* statistics to turn around a losing team as seen in the book/movie *Moneyball*
- 2011 IBM Watson using NLP and cognitive computing beats three Jeopardy champions with no human intervention.
- 2016 The Obama White House releases *Artificial Intelligence, Automation and the Economy*

Two noteworthy milestones

Chess: DeepMind's AlphaZero revolutionized chess by **teaching itself the game** through reinforcement learning. Unlike traditional engines like Stockfish, **AlphaZero learned by playing millions of games against itself**, discovering creative strategies and **unconventional moves that had never been considered by human players or traditional engines**

Go: AlphaGo's victory over Lee Sedol in 2016 was a historic milestone. Using deep neural networks and Monte Carlo Tree Search, AlphaGo **demonstrated human-like creativity** in one of the most complex board games ever mastered by AI

Its successor, AlphaZero, further refined this approach, **mastering Go without human input and achieving superhuman performance**

[How Machine Learning and Reinforcement Learning Have Transformed Chess and Strategic Games | IoA - Institute of Analytics](#)

[In what ways did AlphaZero's ability to generalize across different games like chess, Shōgi, and Go demonstrate its versatility and adaptability? -](#)

[EITCA Academy](#)

[Beyond Chess and Go: Why AI Mastering Games Could Be Good News For Everyone - Heidelberg Laureate Foundation](#)

Three Eras of Computing



Image 1

●
The Tabulating Era
(1900s–1940s)

If you have ever
used

Alexa

Hey Google

Siri

Uber/Lyft

GPS directions

Amazon Shopping

ChatGPT

Then you have used AI

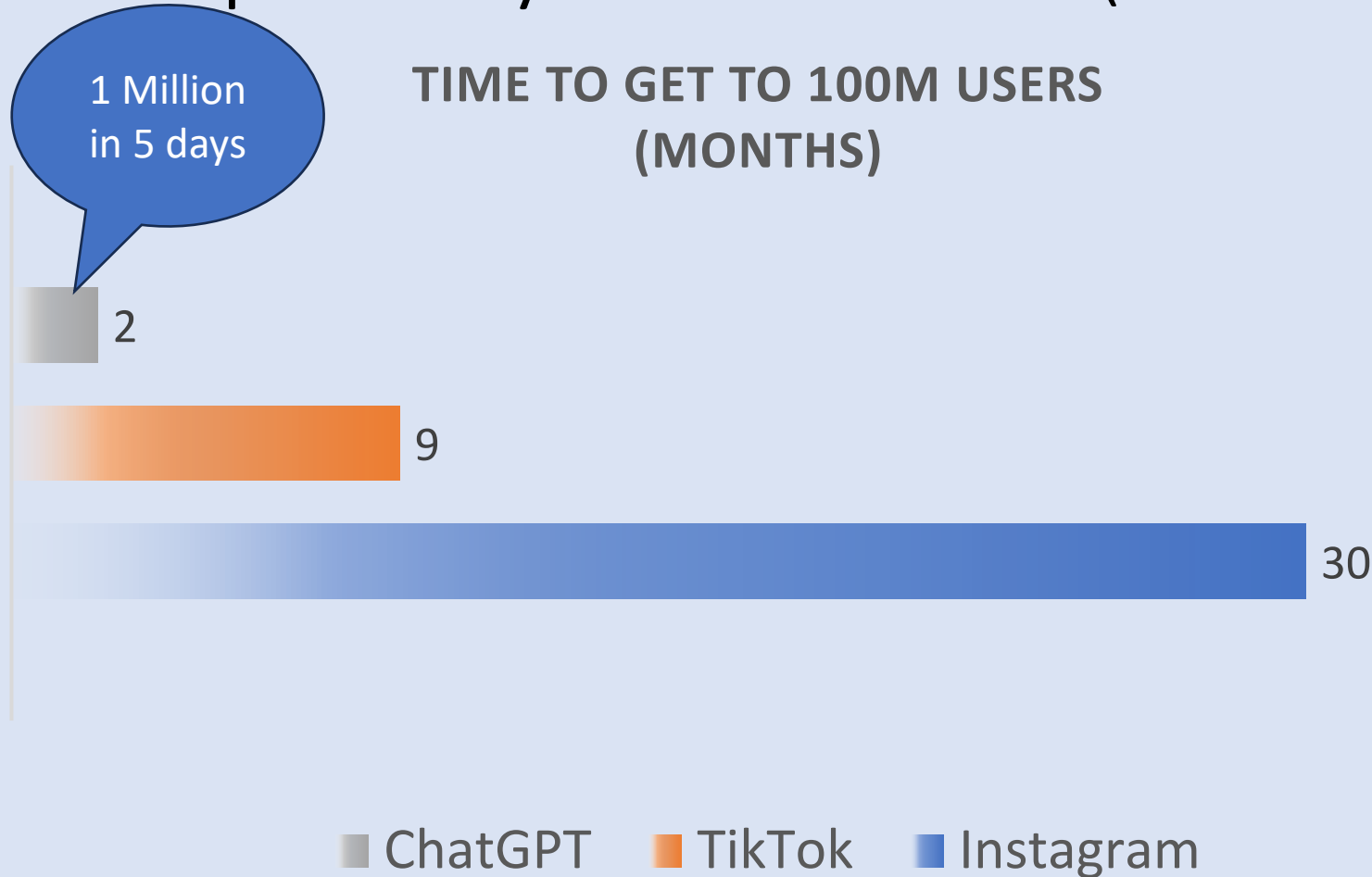
Generative AI

*Generative AI is a branch of computer science that involves **unsupervised and semi-supervised algorithms** that enable computers to **create new content using previously created content, such as text, audio, video, images and code.***

A short peeve about AI “hallucinations”

- AI engines have been described as “hallucinating” when they don’t know an answer.
 - i.e. “bullshitting with extreme confidence”⁽¹⁾
- That’s actually “confabulating”
- According to my wife, it’s also common in men...

Popularity of ChatGPT (released Nov 30, 2022)

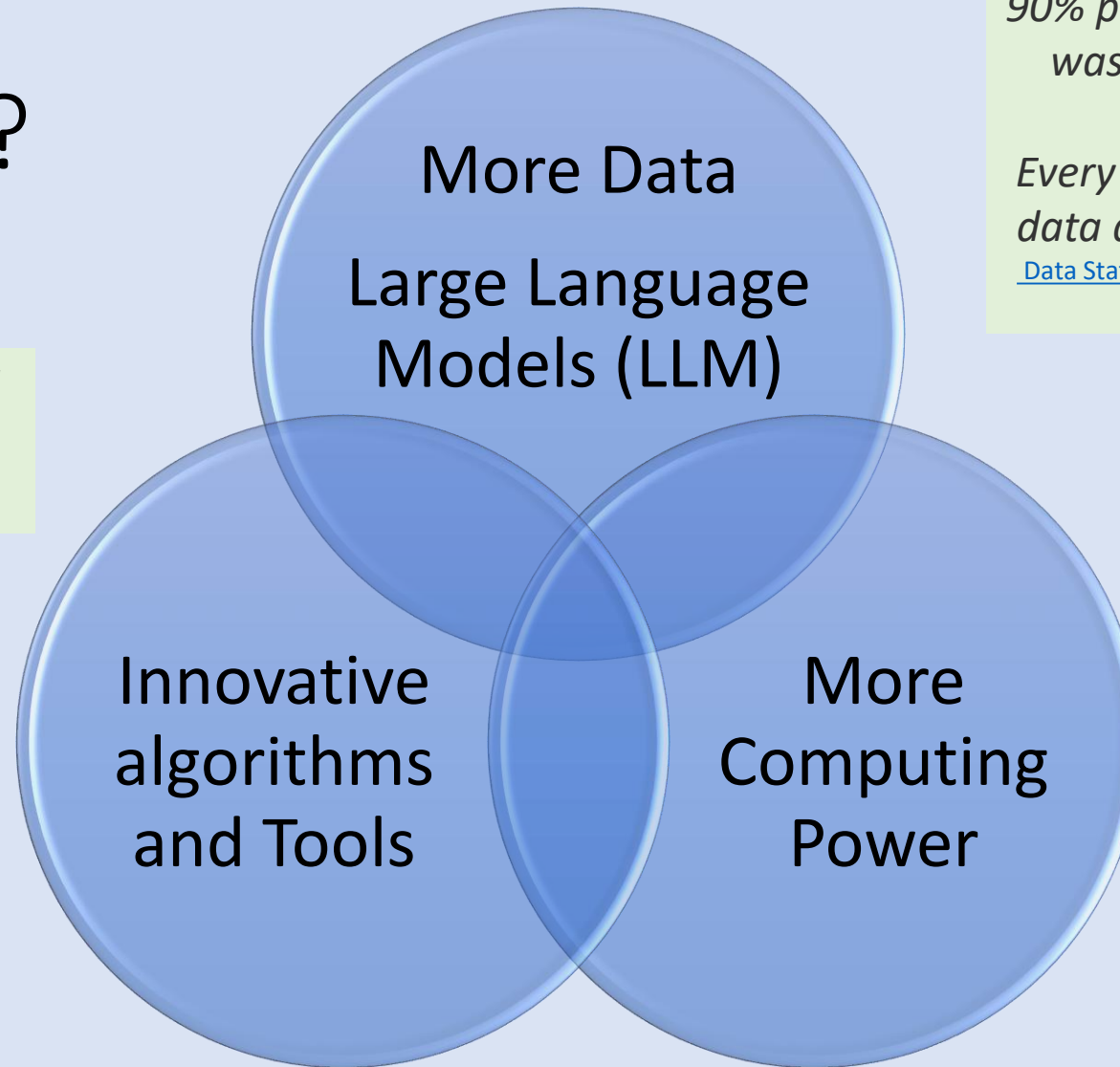


...in 20 years following the internet space, we cannot recall a faster ramp in a consumer internet app.

Swiss Bank UBS

Why Now?

*Machine Learning (ML), Natural
Language Processing (NLP)
Better Training*



*90% percent of the world's data
was created in the last two
years.*

*Every two years, the volume of
data across the world doubles.*

[Data Statistics \(2024\) - How much data is there in the world? \(riverty.io\)](#)

*Computers have increased in
power 1 trillion fold from 1956-
2015*

[INFOGRAPHIC: How Computing Power Has Changed Over Time \(businessinsider.com\)](#)

Large Language Models: Why they matter

ChatGPT:

- *16% of the pre-trained text often comes from books and news articles, and*
- *84% of the text comes from webpages.*

The webpage data includes high-quality text but also low-quality text like spam mail and social media content...

Darlene King, MD,
Chair of the Committee on Mental Health IT,
American Psychiatric Association

Three Levels of LLMs

Types of LLMs	Examples
Purpose Built LLM for Behavioral Healthcare	Eleos, Limbic, Lyssn

Humans excel at:



Common Sense



Dilemmas



Morals



Compassion



Imagination



Dreaming



Abstraction



Generalization

What can ONLY YOU do?

Wisdom

Reasoning

Imagination

Critical Thinking

Common Sense

Empathy

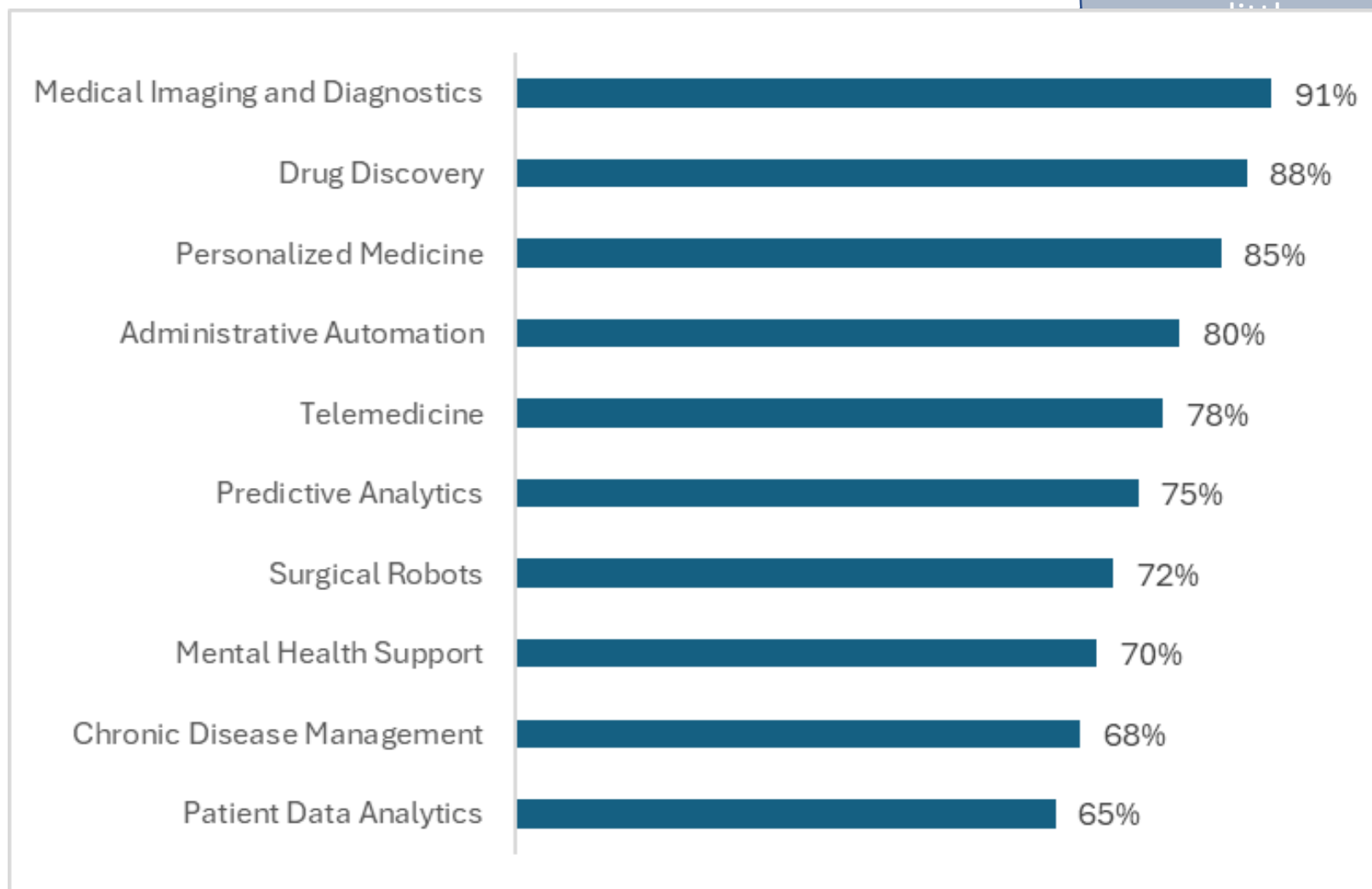


Artificial Intelligence in General Healthcare



Where is AI Being Used?

This got the radiologists ...



Jiang F, et al. Stroke and Vascular Neurology 2017;2:e000101. doi:10.1136/svn-2017-000101
Perplexity AI. Retrieved April 5, 2025

Radiologists

Radiologists today face
the same problem of
most clinicians:

too much data.

Machine learning can
spot patterns humans
might miss.

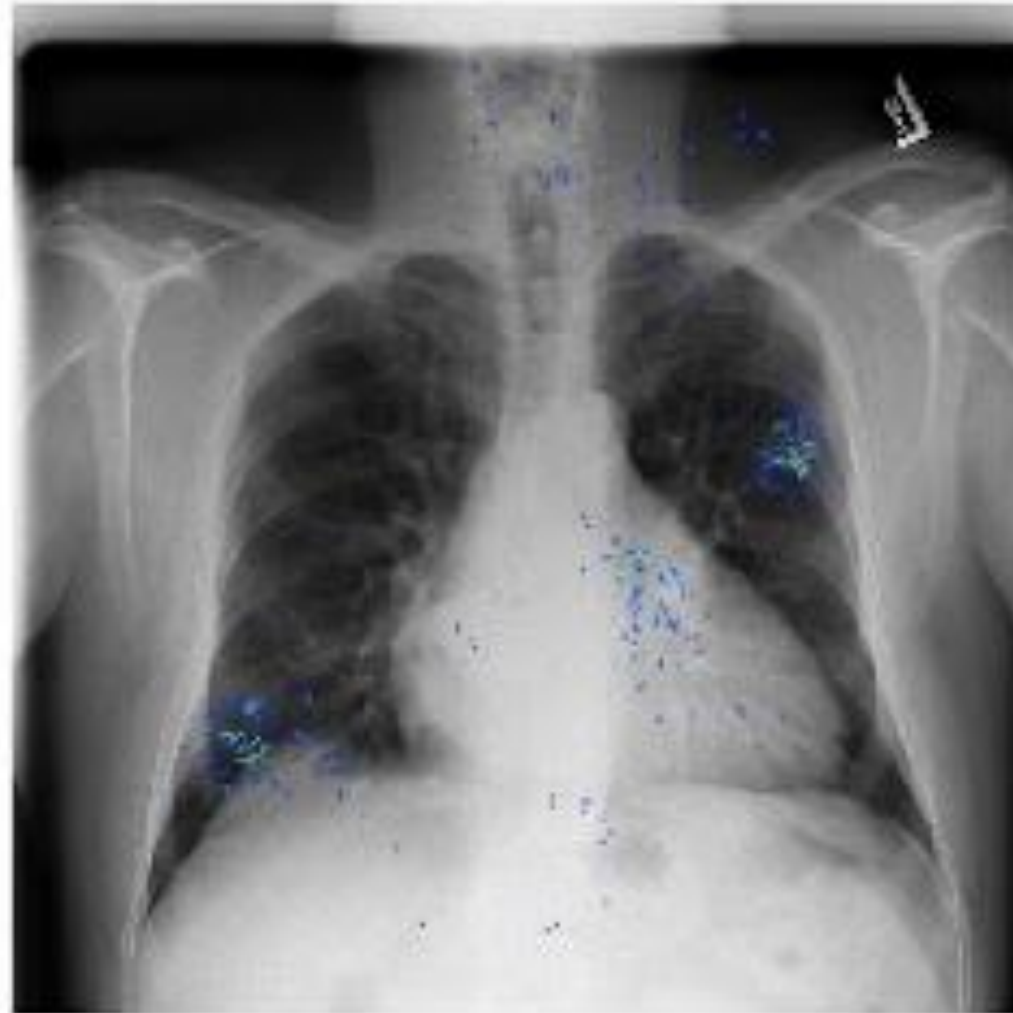
But machines don't know
what to do with that
information—at least not
yet.

Only humans do.



Analyzing Imaging Data

Information provided to clinician to **help them make better decisions.**



Disease Predictions

Risk of a disease.

Name	Healthy	Risk
Atelectasis	✱	
Cardiomegaly		✱
Effusion	✱	
Infiltration	✱	
Mass	✱	
Nodule	✱	
Pneumonia	✱	
Pneumothorax	✱	
Consolidation	✱	
Edema	✱	
Emphysema		✱
Fibrosis	✱	
Pleural_Thickening	✱	
Hernia	✱	



Artificial
Intelligence
vs.
Augmented
Intelligence:

Based in part to concerns raised by the radiology community...

The AMA's House of Delegates uses the term **augmented intelligence** (AI) as a conceptualization of artificial intelligence that focuses on AI's assistive role, **emphasizing that its design enhances human intelligence rather than replaces it.**

Top 10 Disease Types in the AI Literature

Rank	Disease	Frequency in AI Literature
1	Cancer	Very High
2	Cardiovascular Diseases	High
3	Diabetes	High
4	Alzheimer's Disease	Moderate
5	Parkinson's Disease	Moderate
6	Infectious Diseases (e.g., HIV, COVID-19)	Moderate
7	Hypertension	Moderate
8	Chronic Obstructive Pulmonary Disease (COPD)	Low
9	Autoimmune Diseases	Low
10	Epilepsy	Low

What's Missing?

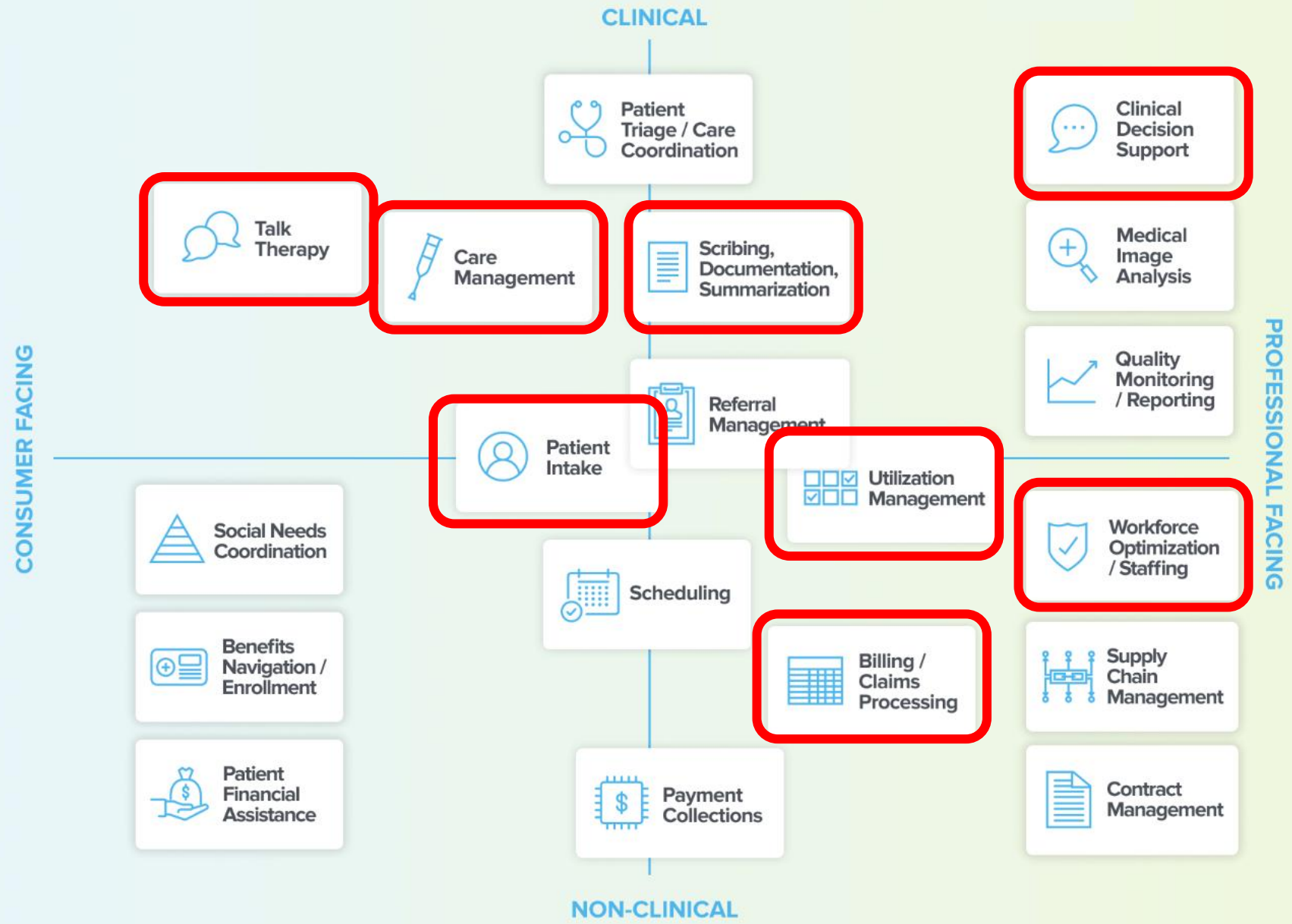
So what does radiology have
to do with behavioral health?

Text and speech is to Behavioral Health
what
Images are to Radiology

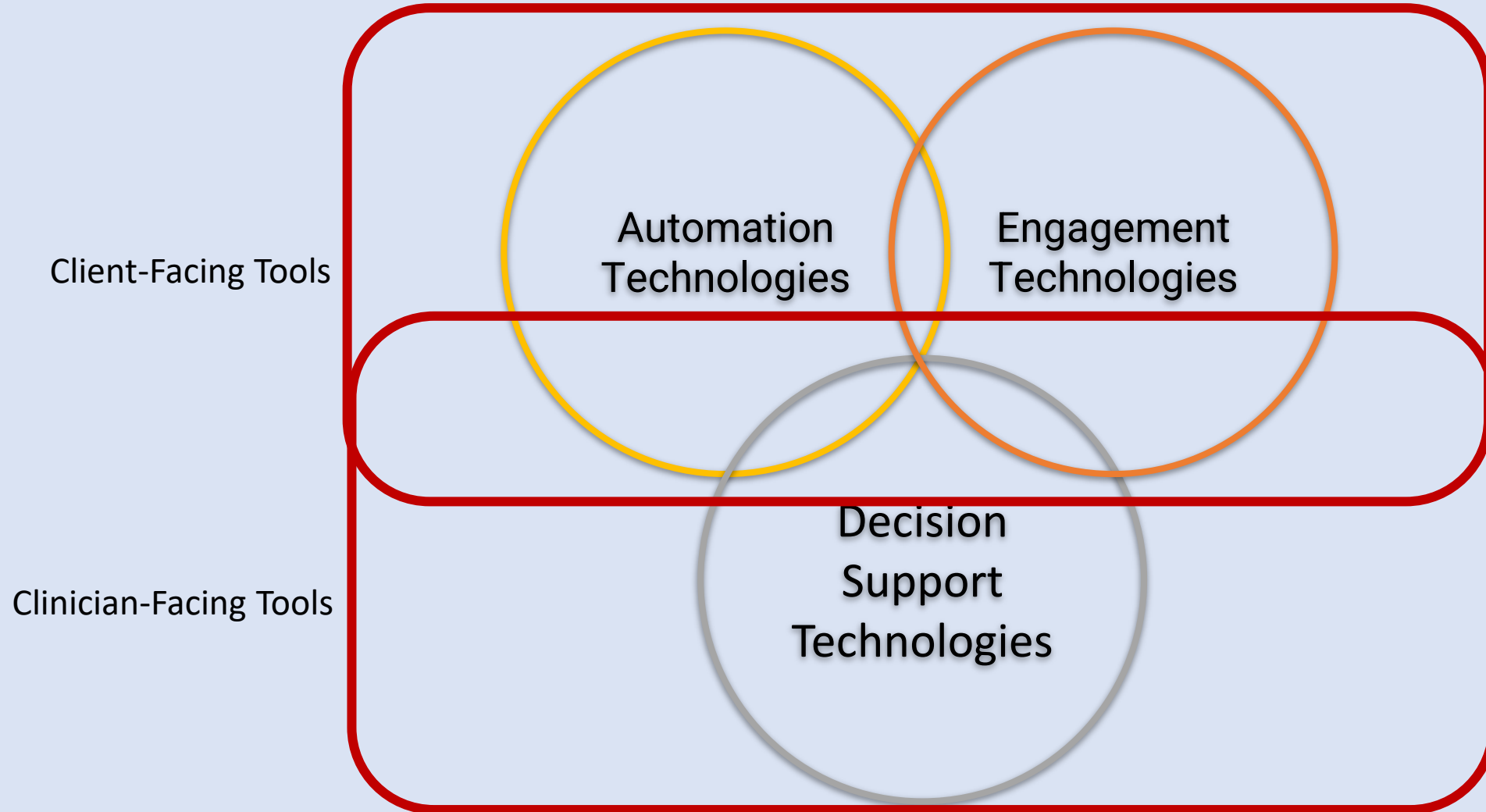


Real-World Use of AI in Behavioral Health





Domains of AI in Behavioral Health

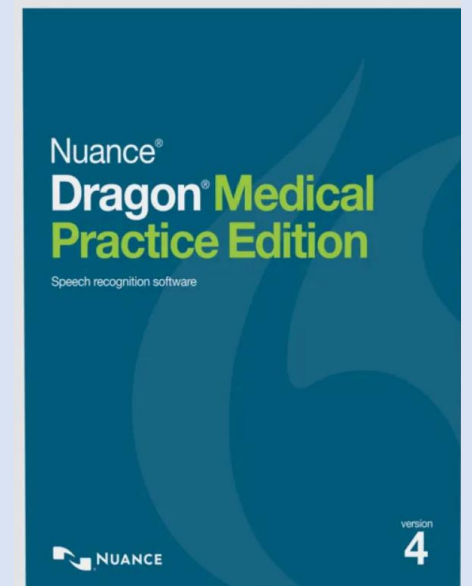


Standard Voice Recognition “Speech toText”

Using Natural Language Processing to transcribe voice inputs with **no contextual insights** offered.

Benefits

- Expedited spoken word transcription to printed word



Automation Technologies

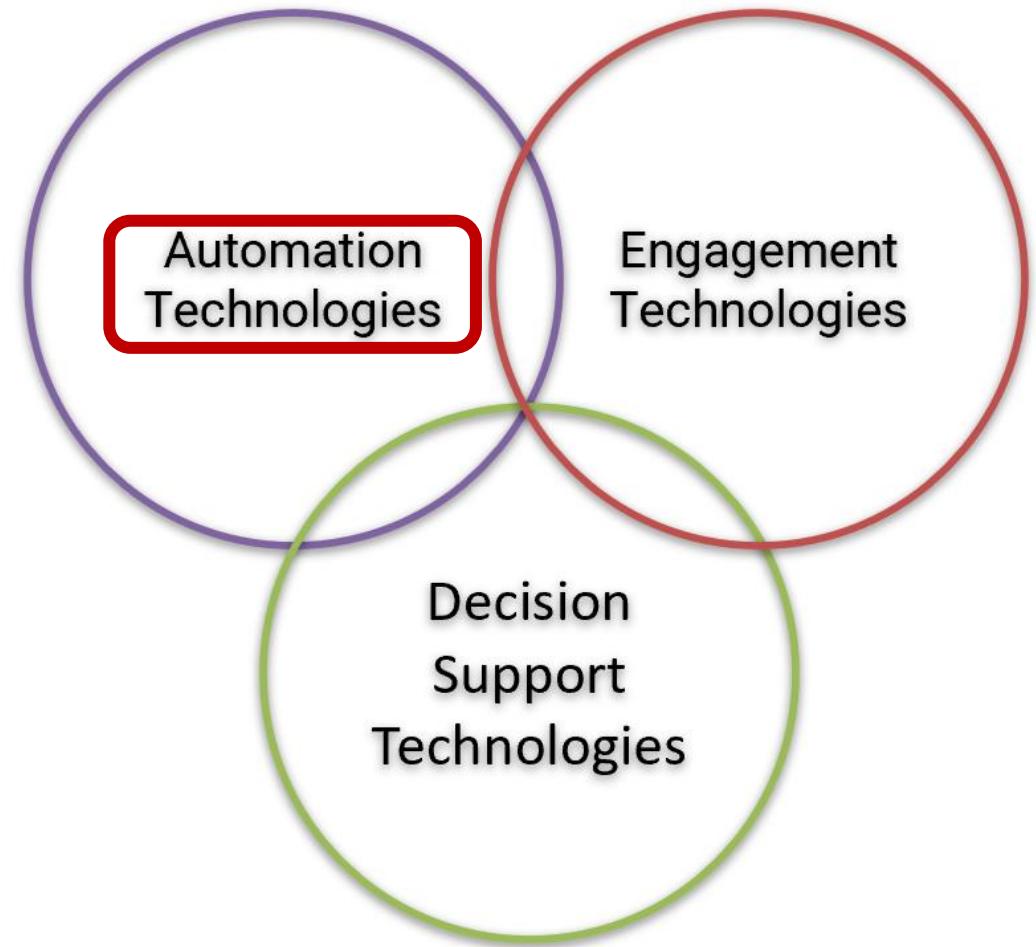
*Automation of healthcare
management processes*

Benefits

- Early Screening
- Increasing client access to healthcare
- Improve staff work life balance
- Improve efficiency and productivity

Examples:

- *Screening for Anxiety and Depression using voice*
- *Social Media Data Mining*

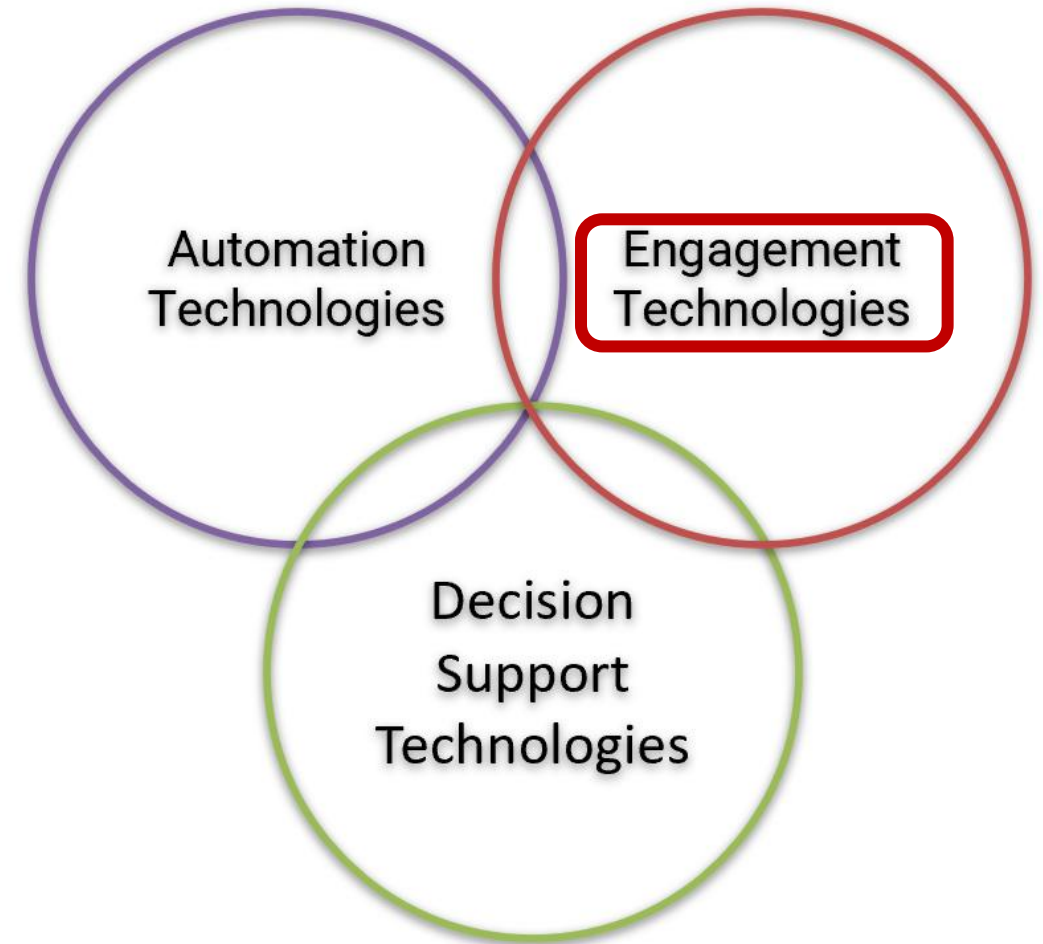


Engagement Technologies

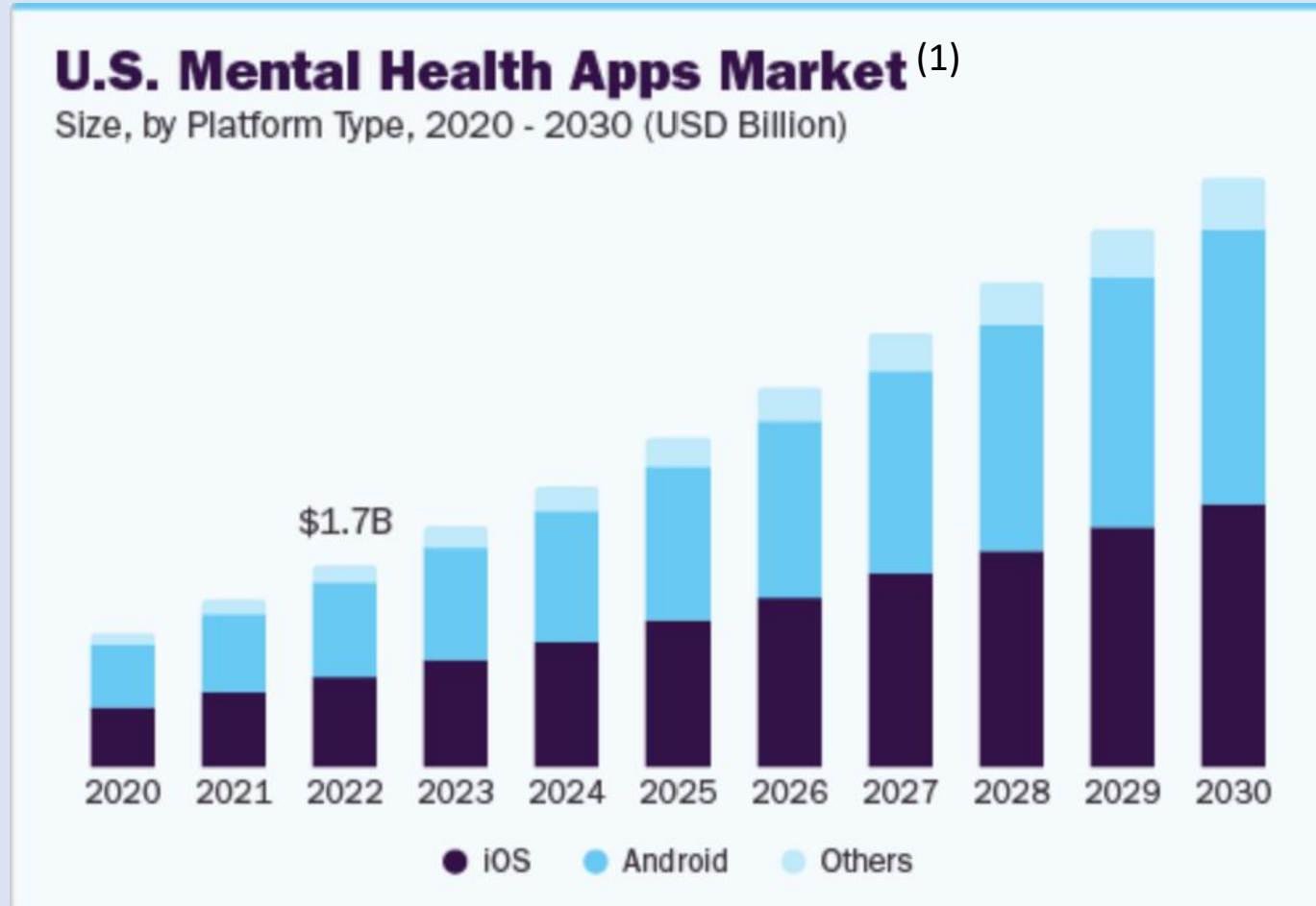
*Allow for **engagement with patients** using natural language processing (NLP) **chatbots** and **intelligent agents***

Benefits

- Increase patient access
- Support treatment between sessions
- Increase patient engagement



Mental Health Apps

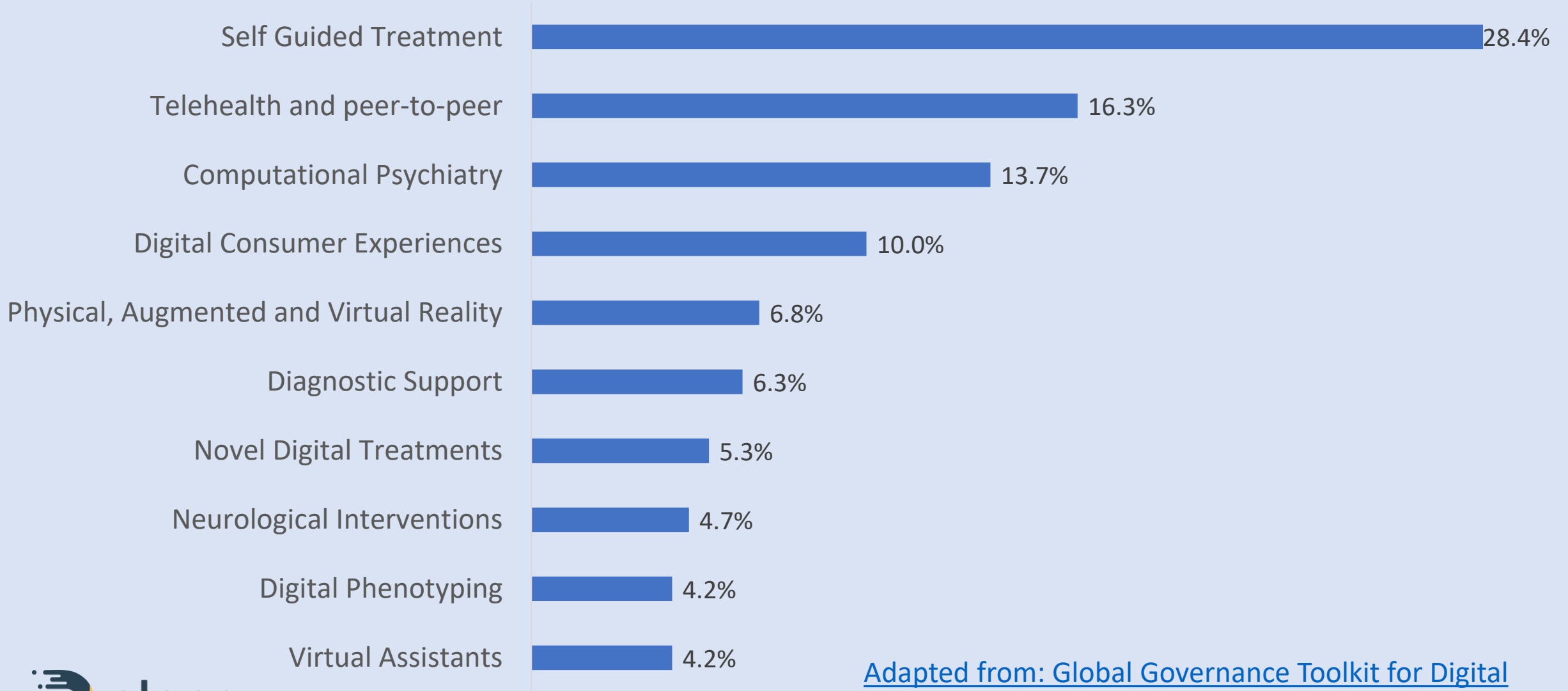


13-20% Growth
per annum ⁽¹⁾

As of 2025,
~20,000 mental
health apps
available ⁽²⁾

Deloitte Survey of Mental Health Apps:

190 examples of apps with >10k downloads



Challenges

Engagement Technologies

- Who owns the data?
- Subtleties of human language
 - “As smart as I may seem, I'm not capable of really understanding what you need”***
- Insufficient capability to handle suicide risk
- Adherence – drop off rates are high
- Overdependence

App Usage



*I'm not too confident that
anything requiring someone to
open an app will be that useful in
a moment of crisis...*

Tom Insel, MD

President, Mindstrong

Former Head of NIMH

The Washington Post
Democracy Dies in Darkness

We keep trying to make AI therapists. It's not working.

Artificial intelligence can play a role in mental health — but only if we don't expect too much.



By [Shira Ovide](#)

February 3, 2023 at 12:30 p.m. EST

Decision Support Technologies

*Assist clinicians in early detection and diagnosis through **extensive analysis of structured data**, most often using ML algorithms, neural networks and NLP*

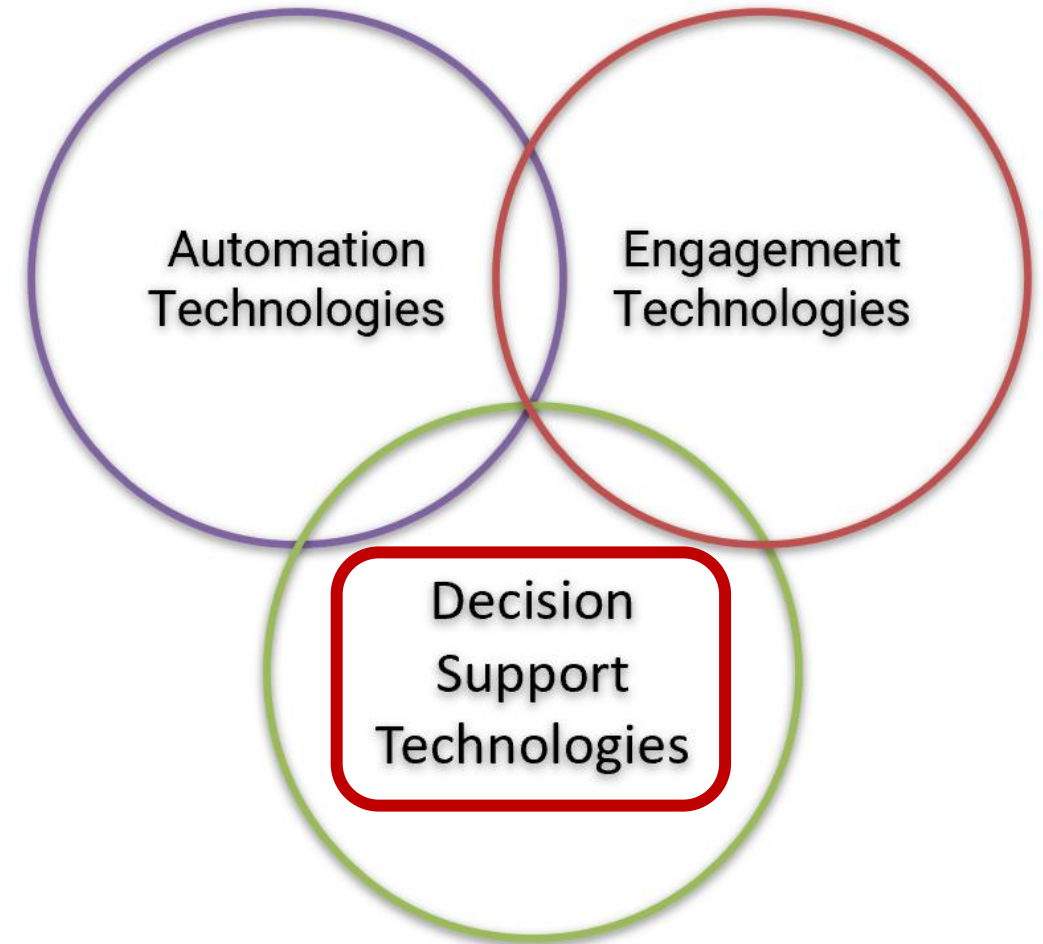
Benefits

Help clinicians identify non-obvious clinical aspects and trends

Diagnostic suggestions

Help clinicians expedite documentation

Clinical Decision Support



Why do we need Clinical Decision Support?

*It is now **humanly impossible** for unaided healthcare professionals to possess all the knowledge needed to deliver medical care with the efficacy and safety made possible by current scientific knowledge.*



www.openclinical.org

Graduate Training

*Medical students who graduate in 2020 will experience
four doublings in knowledge.*

*What was learned in the
first 3 years of medical school will be just 6% of what is known
at the end of the decade from 2010 to 2020.*

*Knowledge is expanding faster than our ability to assimilate and apply it
effectively...*

There's a gap...

45.1% of medicine is not evidence based

It takes 17 years to translate science into practice

- Physicians would have to read 29 hours per workday to keep up with professional insights.
- 80% of data is unstructured
- Each physician will produce 300M books of data in their lifetime

Half-Life of Medical Knowledge



Half-Life of Psychological Knowledge

Psychology (Generally Defined) 7.2⁽¹⁾ - 8.7⁽²⁾ Years

Psychoanalytic Psychotherapy 15.6⁽¹⁾ - 18.4⁽²⁾ Years

Psychopharmacology 4.8 Years⁽¹⁾

Forensic Psychology 7.5 Years⁽¹⁾

Police Psychology 8.3 Years⁽¹⁾

Clinical Health Psychology 7.6⁽²⁾ Years

1. Beltrani, A. (n.d.). The Half-Life of Knowledge for Mental Health. Palo Alto University. <https://concept.paloalto.edu/resources/business-of-practice-blog/importance-of-continuing-education-in-mental-health-careers>
2. Neimeyer, G. J., Taylor, J. M., Rozensky, R. H., & Cox, D. R. (2014). The diminishing durability of knowledge in professional psychology: A second look at specializations. *Professional Psychology: Research and Practice*, 45(2), 92–98. <https://doi.org/10.1037/a0036176>

Knowledge
Without Data
is
Opinion

Behavioral Health Providers

Most common use cases

*I don't know
about you, but
I don't have
any more
passwords
left in me.*



Clinician facing tools benefits

Decision Support

- Talk time
- Adherence to EBTs
- Themes of the session
- “Did you notice?”

Administrative Burden Relief

- Draft version of progress note
- Select quotes
- Smart Audio/Video links

Data-based supervision

- Comparative, quantifiable information on all supervisees
- Eliminates “shotgun” approach to current supervision
- Clinicians who are struggling can get integrated training and/or supervisor intervention
- Smart Audio/Video links

Three Use Cases

- Desk-bound prescribers
- Desk-bound non-prescribers
- Mobile Workers
- +1

A white computer keyboard is partially visible in the top left corner, with keys like 'S', 'D', 'F', 'G', 'H', 'J', 'K', 'L', 'Z', 'X', 'C', 'V', 'B', 'N', 'M', and 'command' visible. A black stethoscope with a silver-colored chest piece and tubing is positioned diagonally across the frame, resting on a light-colored surface. The background is a solid light blue color.

Desk-bound prescribers

- MD, DO, APRN, PA, PhD(rare)
- AI Benefit:
 - Plain Dictation – verbatim transcription “What I said”
 - Virtual Scribe – Interpreted transcription “What I meant to say”
 - Enhanced drug-drug, drug-food alerting (key input)
 - ~~Not a focus for current BHC AI vendors~~

Desk-bound non-prescribers

- PhD, PsyD, ACSW, LCSW, LC
- AI Benefit:
 - Plain Dictation – verbatim transcription
 - Virtual Scribe – Interpreted transcription
 - **Clinical session insights** – “What we said” Themes/trends, Things you might have missed, Adherence to EBTs
 - **Automated Progress Note Generation** – SOAP/DAP etc. format, quotes from session re clinical topics



Mobile workers



- BA, Peer, RN
- AI Benefit
 - Plain Dictation – verbatim transcription
 - **Structured note creation** on mobile platform
 - Note creation guidance – **Golden Thread**
 - Complete
 - Partial – finish in EHR

QI/QA Professionals



100% of Notes Reviewed



6 Common Quality Issues Monitored

- Cloning (Copy/Pasted) Notes
- Missing Therapeutic Intervention
- Lack of Client Progress Documentation
- No Actionable Plan for Next Session
- Missing Interventions
- Link Progress Note to Treatment Plan (Golden Thread)

Benefits of AI in BHC

Source: AI BHC vendors

- Note Completion

- *From 15 minutes to less than 5 minutes to write note*
- *84% improvement in session-to-sign time*
- *67% increase in note-writing speed*
- *From 96 hours to 4 hours to submit note*
- *70% of note is automatically generated*

- Reimbursement

- *2.2 days faster time to reimbursement*
- *16% increase in claims per direct provider*

- Clinician Satisfaction

- Ease of use rating 4.5/5
- Willingness to recommend to a friend 9.5/10

Measured Benefits of AI in BHC

Source: AI BHC vendors

- Clinical Benefit
 - *36% increase in use of EBTs*
 - *3-4x better symptom reduction*
 - *2x higher client engagement*
 - *97% of participants reported AI-generated feedback was **accurate***
 - *Significant **Improvement in CBT competence** following two weeks of practice*
 - ***Training:** GPT-based bot trained to interact like a patient in treatment*

Eleos Randomized Control Study (RCT)

- Clients treated by therapists using Eleos attended 67% more sessions (5.24 v 3.14 in 2 months)
- Depression symptoms in clients treated by therapists using Eleos reduced more than the control group (34% v 20%)
- Anxiety symptoms in clients treated by therapists using Eleos reduced more than the control group (29% v 8%)

Compliance

- 10-20x more notes reviewed automatically
- 1 day feedback cycle (from 6 months)
- 80% of QI professionals time spent reviewing high risk notes
- 17% of progress notes were cloned
- 41% of notes had no plan for next session
- 81% of notes had no therapeutic intervention



Risks/Ethics



*The data sets on which AI
algorithms are trained are
created by human agents*

and are imperfect

[Augmented Intelligence in Health Care policy report \(ama-assn.org\)](http://ama-assn.org)

Inferences from shopping habits

Statisticians at Target were able to infer, from a teenage woman's shopping habits, that she was pregnant, sent her related marketing materials which were viewed by her father before he knew she was pregnant.

It's Official: Cars Are the Worst Product Category We Have Ever Reviewed for Privacy



By Jen Caltrider, Misha Rykov and Zoë MacDonald | Sept. 6, 2023

Types of Risks Using Language Models

- Discrimination, Hate speech and Exclusion
- Information Hazards
- Misinformation Harms
- Malicious Uses
- Human-Computer Interaction Harms
- Environmental and Socioeconomic harms

Confidentiality Issues

...machine-learning algorithms can identify a record “easily and robustly” from as few as three data points ⁽¹⁾

...traditional expectations for health care privacy are simply no longer attainable. ⁽²⁾

Technology can't be uninvented

Disruptive catalysts such as AI require adaptation



AI is about:

- **Tasks not jobs**
- **Helping employees** and clinicians do their jobs, not replacing their jobs
- **Eliminating burdensome tasks** and producing better outcomes
- **Creating a better work life** for employees and clinicians
- **Creating better experiences** for patients/clients/consumers

Adapted from: McGrow, K. (2021). The Future Of Artificial Intelligence & Where it Intersects With Clinical Decision Support. Open Minds. [The Future Of Artificial Intelligence & Where It Intersects With Clinical Decision Support - OPEN MINDS](#)



Home > Academic Programs

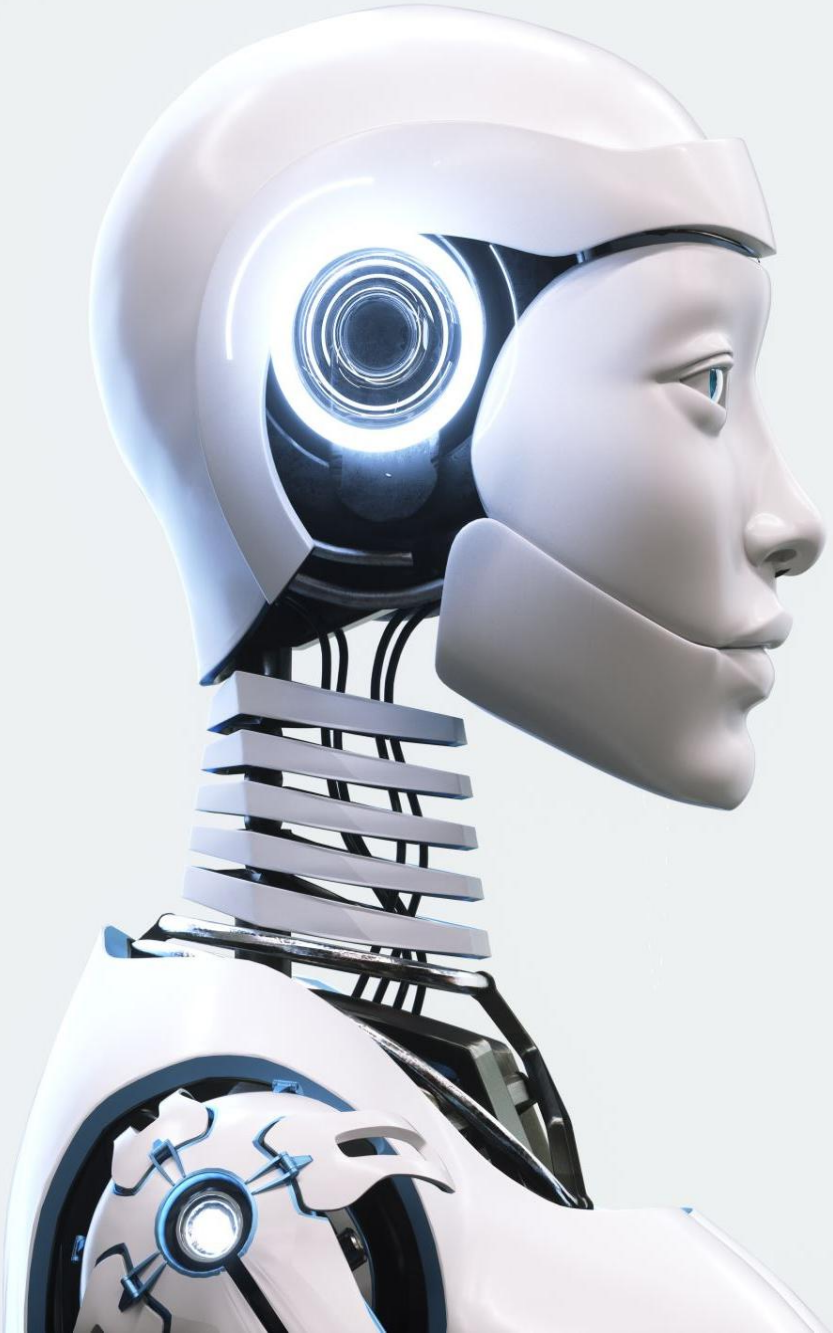
Academic Programs

Master of Arts in Clinical
Mental Health
Counseling

● Master of Science in
Psychology

Technology and Mental Health Concentration

**Launch Your Career in Technology and Mental Health with
an MS in Psychology Degree!**



*Robots and artificial
intelligence may never achieve
full sentience and self-
awareness,
but, hey, we've all had human
coworkers who didn't meet that
standard.*

[Robots Won't Replace You — but They Could Make Your Job a Lot Worse](https://www.businessinsider.com/robots-wont-replace-you-but-they-could-make-your-job-a-lot-worse)
 [\(businessinsider.com\)](https://www.businessinsider.com/robots-wont-replace-you-but-they-could-make-your-job-a-lot-worse)

If you want more...



Denny@DrDennyM.com



[How AI Works in Behavioral Health | Eleos Health Blog](#)



Questions

Clinician facing AI Vendors in BHC



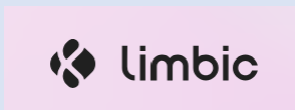
[Eleos Health: Automation & AI for Behavioral Health](#)



[Lyssn](#)



[AI Documentation Assistant | Netsmart \(ntst.com\)](#)



[Limbic | Clinical AI for Mental Healthcare Providers](#)



