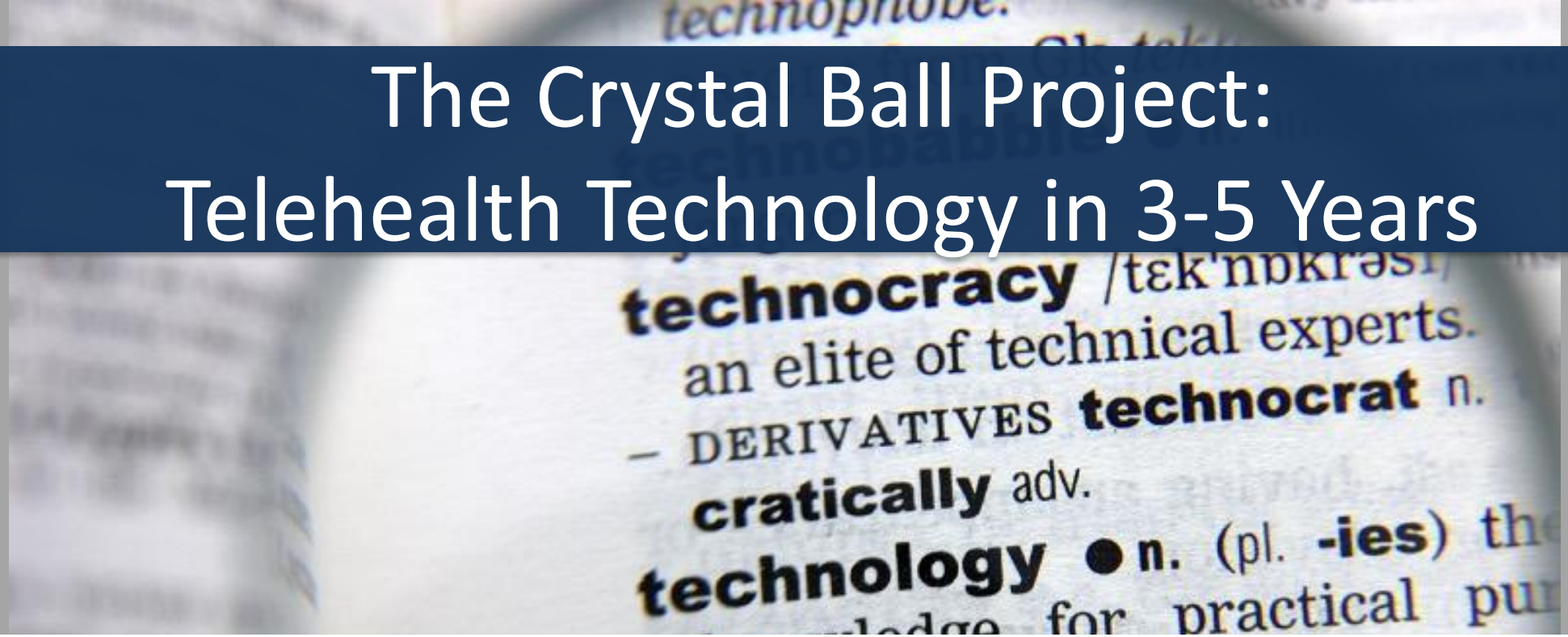
The Crystal Ball Project: Telehealth Technology in 3-5 Years



Jordan Berg
Principle Investigator
Telehealth Technology Assessment Center
jjberg@anthc.org

Presented for
GPTRAC
Telehealth Everywhere 2024 Conference
May 22nd , 2023



Who is TTAC?

- TTAC is federally funded resource center made available through the Office for the Advancement of Telehealth (OAT)
- TTAC provides Technology Assessment services to the 12 regional TRCs as well as the other national TRC.

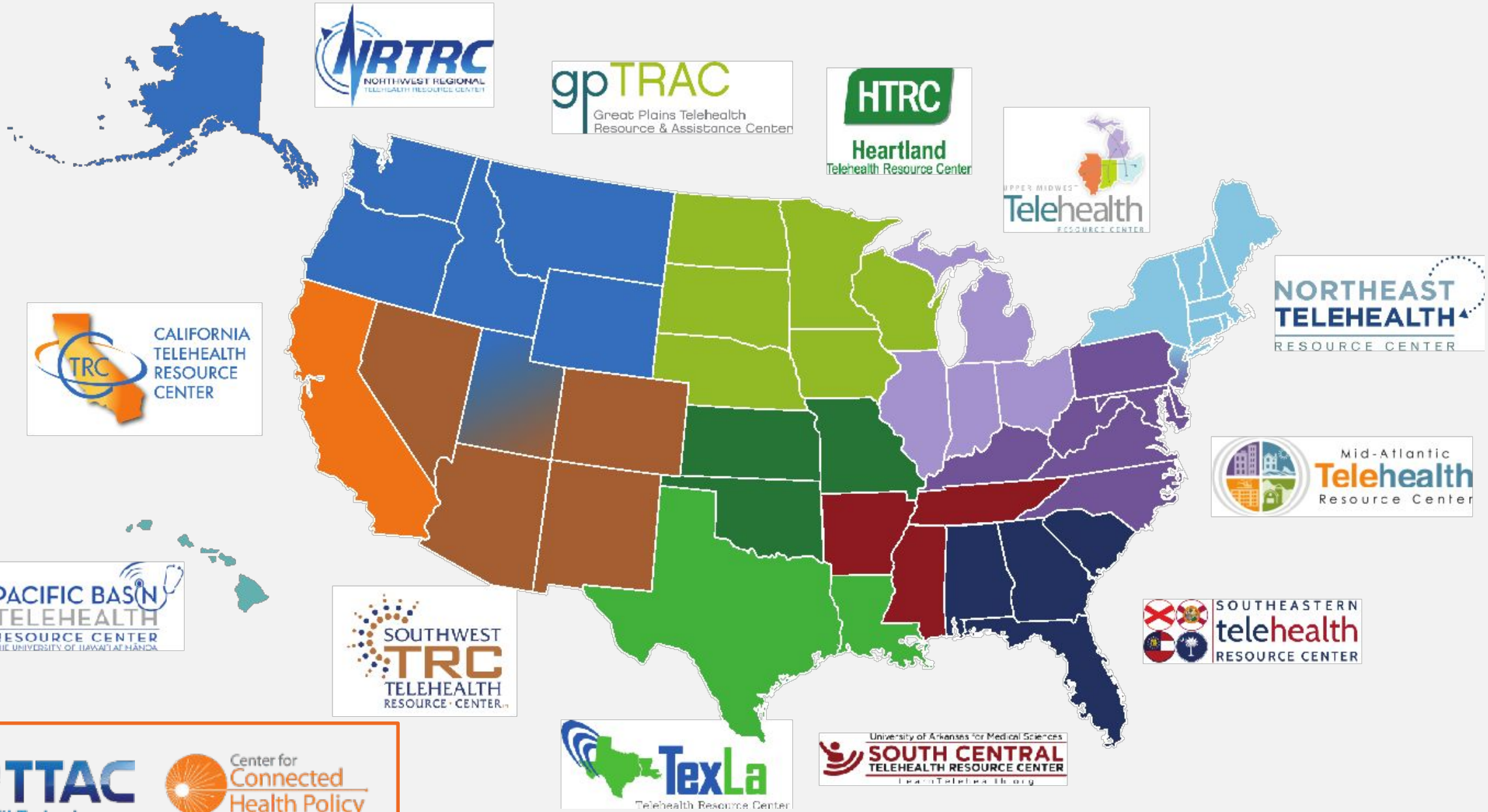




National Consortium of Telehealth Resource Centers

Our website hosts many resources. If you can't find what you're looking for, contact your regional TRC:

www.TelehealthResourceCenter.org


NRTRC
NORTHWEST REGIONAL
TELEHEALTH RESOURCE CENTER
gpTRAC
Great Plains Telehealth
Resource & Assistance Center
HTRC
Heartland
Telehealth Resource Center
Telehealth
RESOURCE CENTER
NORTHEAST
TELEHEALTH
RESOURCE CENTER
CALIFORNIA
TELEHEALTH
RESOURCE
CENTER
TRC
Mid-Atlantic
Telehealth
Resource Center
PACIFIC BASIN
TELEHEALTH
RESOURCE CENTER
THE UNIVERSITY OF HAWAI'I AT HILO
SOUTHWEST
TRC
TELEHEALTH
RESOURCE · CENTER
SOUTHEASTERN
telehealth
RESOURCE CENTER
TexLa
Telehealth Resource Center
University of Arkansas for Medical Sciences
SOUTH CENTRAL
TELEHEALTH RESOURCE CENTER
TTAC
TelehealthTechnology.org
Center for
Connected
Health Policy
The National Telehealth Policy Resource Center

What does TTAC do?



"A particular set of skills…"





Overview

- **Crystal Ball Project Overview**
  - Objective
  - Structure
  - Deliverables
  - Limitations and Disclaimers
- **Six Future Technology Areas**
  - ***AI, Machine Learning***
  - Expanded Telehealth Application
  - Apps, Solution Platforms
  - Virtual and Augmented Reality
  - Drones
  - Robotics
  - Hearables
- **Conclusion**



Crystal Ball Project- Objective

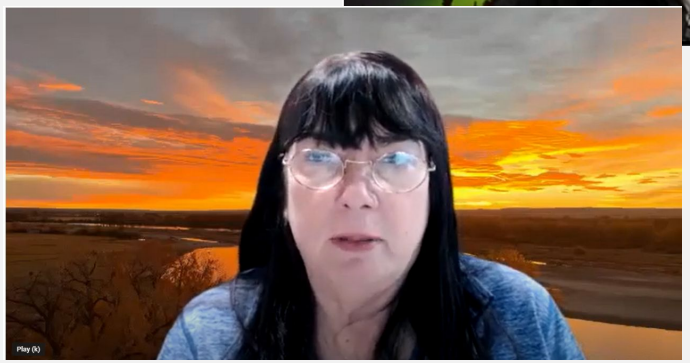
"**Examine digital healthcare technologies** and applications that will have the most impact in the next **three to five years** and provide credible **vision and examples** of near-term advancements in Health related technology."

Crystal Ball Workgroup Structure

- **Bi-Monthly virtual meetings**
  - **Identify Key Tech Areas**
    - **Define Key Attributes**
    - **Compare Current State vs Future State**
    - **Identify Potential Applications**
    - **Identify Potential Challenges**
    - **Key Considerations**
  - **Guest presentations**
- **Crystal Ball Toolkit Document**







Project Deliverables and Limitations

- **Project Deliverables**
  - Toolkit
    - Telehealthtechnology.org
- **Disclaimers and Limitations**
  - The contents of this document represent the thoughts and opinions of the authors. It does not necessarily represent the thoughts and opinions of the Office for the Advancement of Telehealth (OAT), the National Telehealth Technology Assessment Center (TTAC) or the Alaska Native Tribal Health Consortium (ANTHC).
  - Vendors referenced are for illustration purposes and do not indicate an endorsement of any particular technology, service or product.





Future Technology Areas

Six Future Technology Areas

- ***AI, Machine Learning***
- Expanded Telehealth Application
- Apps, Solution Platforms
- Virtual and Augmented Reality
- Drones
- Robotics
- Hearables



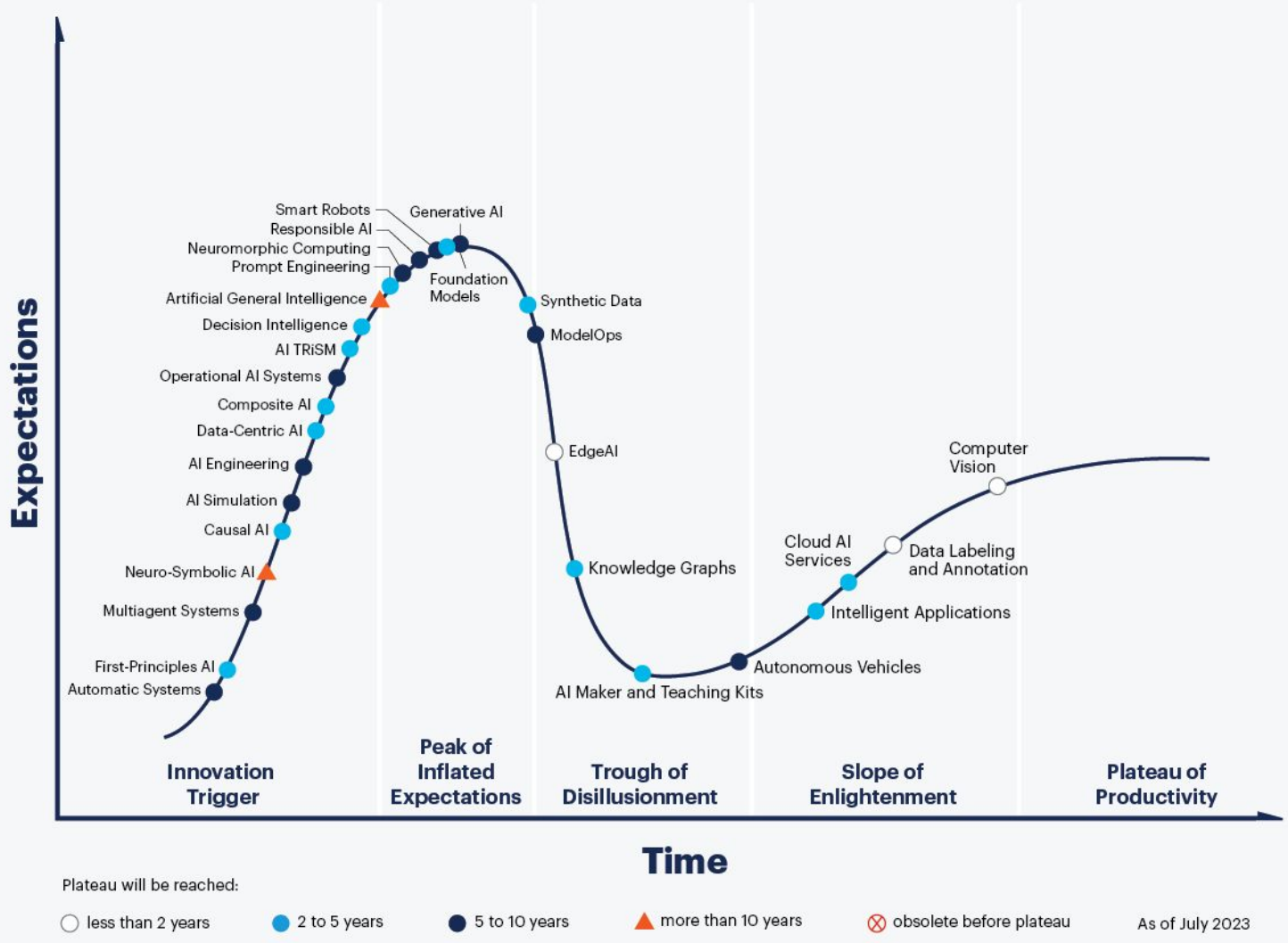
Artificial Intelligence/Machine Learning

Potential Applications

- Personalized and Targeted Medicine
- Differential Diagnosis and Treatment Planning
- Workflow and Revenue Cycle Optimization
- Image and Text Analysis
- Potential for New and Original Concepts



Hype Cycle for Artificial Intelligence, 2023



gartner.com

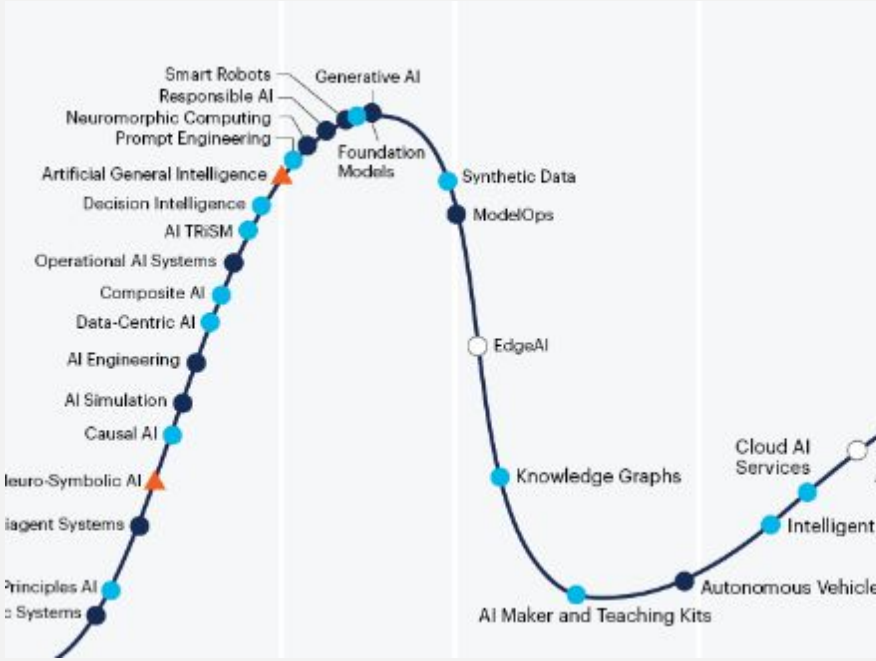
Source: Gartner
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Gartner

Recommended Resource:

Opening Keynote: The Next Era – We Shape AI, AI Shapes Us l Gartner IT Symposium/Xpo

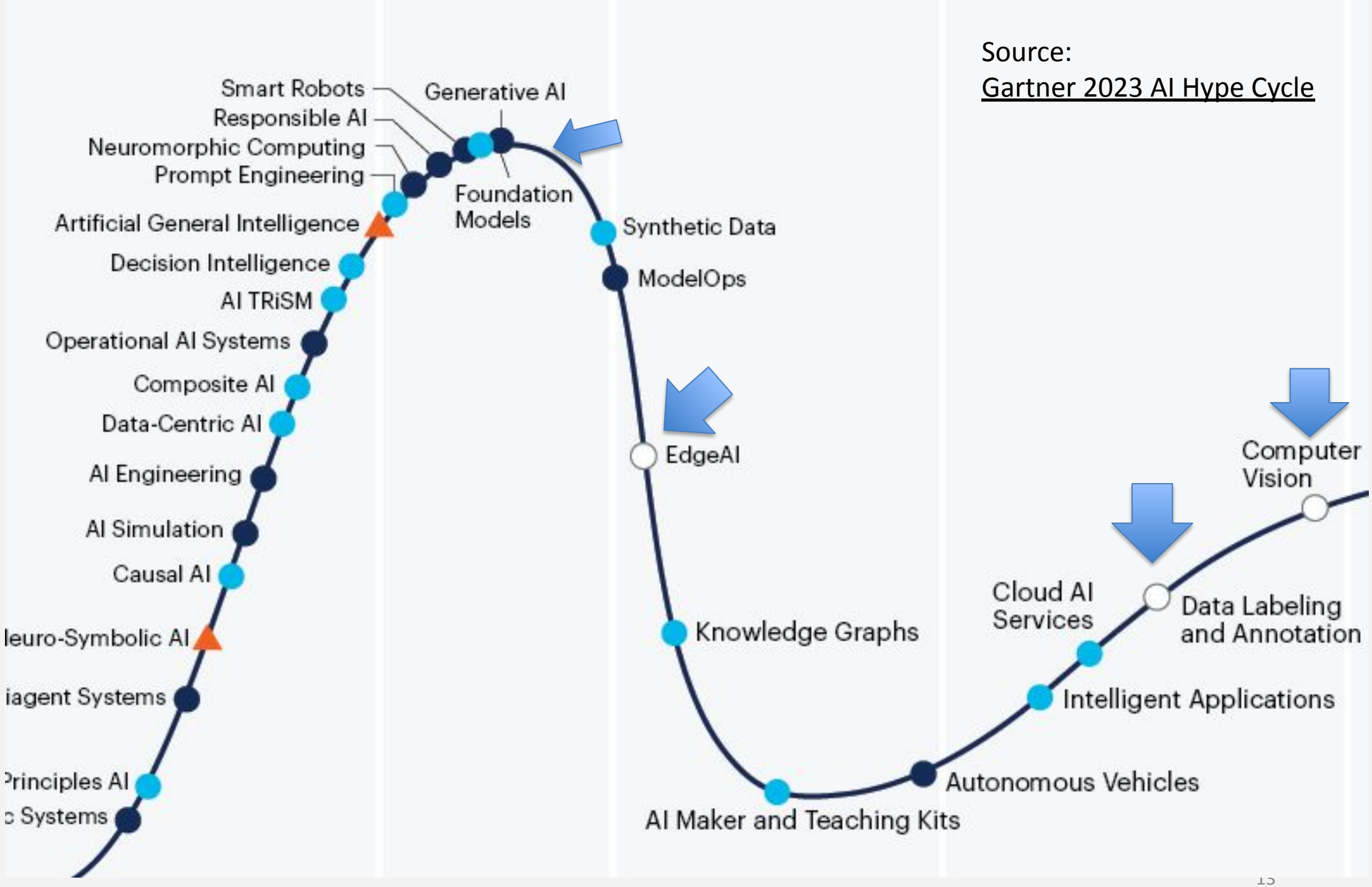
https://www.ibm.com/blog/understanding-the-different-types-of-artificial-intelligence/



Source:

Gartner 2023 AI Hype Cycle

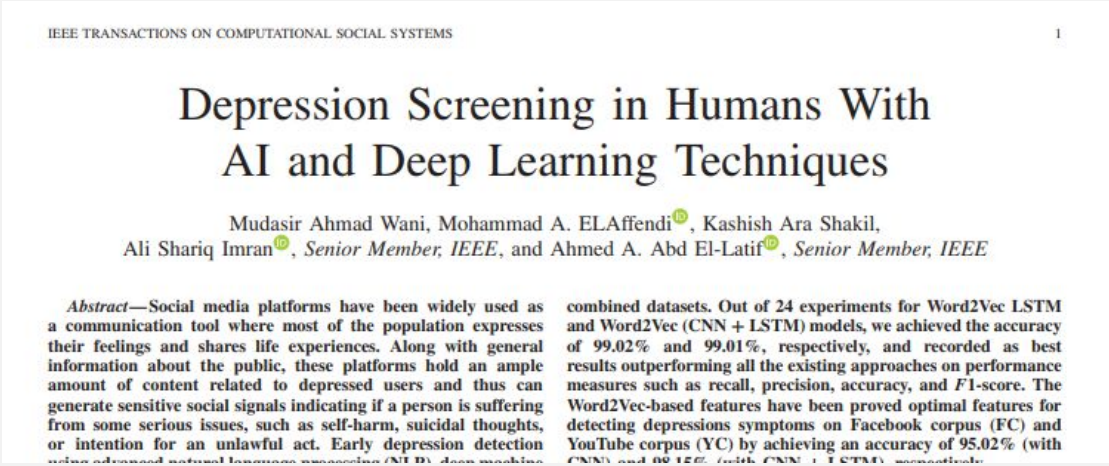
Source:
Gartner 2023 AI Hype Cycle



Artificial Intelligence/Machine Learning (cont.)

Key Considerations

- Quality and Size of data sets
- Bias in data sets
- The “Black Box” problem
- Impact on Jobs and Workflows



IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS 1

Depression Screening in Humans With AI and Deep Learning Techniques

Mudasir Ahmad Wani, Mohammad A. ELAffendi, Kashish Ara Shakil, Ali Shariq Imran, *Senior Member, IEEE*, and Ahmed A. Abd El-Latif, *Senior Member, IEEE*

***Abstract*—Social media platforms have been widely used as a communication tool where most of the population expresses their feelings and shares life experiences. Along with general information about the public, these platforms hold an ample amount of content related to depressed users and thus can generate sensitive social signals indicating if a person is suffering from some serious issues, such as self-harm, suicidal thoughts, or intention for an unlawful act. Early depression detection** combined datasets. Out of 24 experiments for Word2Vec LSTM and Word2Vec (CNN + LSTM) models, we achieved the accuracy of 99.02% and 99.01%, respectively, and recorded as best results outperforming all the existing approaches on performance measures such as recall, precision, accuracy, and *F*1-score. The Word2Vec-based features have been proved optimal features for detecting depressions symptoms on Facebook corpus (FC) and YouTube corpus (YC) by achieving an accuracy of 95.02% (with

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8575242/
https://tinyurl.com/2j4j56ny



Using AI to Support Healthcare Amid a Mental Health Provider Shortage

AI tools cannot replace mental health providers, but they may be able to help close gaps and address dips in care quality by supporting the existing workforce.

https://healthitanalytics.com/features/using-ai-to-support-healthcare-amid-a-mental-health-provider-shortage#:~:text=The%20AI%20tool%20is%20designed,at%2Dhome%20follow%2Dup.

Expanded Telehealth and Telemedicine

Growth in Telemedicine and Home Monitoring

- **Increase in quantity and relevance of patient generated data**
- **Key tool to address access and equity issues**
- **Primary Care to adopt more “Virtual First”**
- **Increase in On-Demand models**

Access to increase for every small hospitals

- **Tele-ICU**
- **Tele-Stroke**
- **Tele-Mental Health in ED**

Hospital to Home



Solutions and Platforms

APPS

- Decision Support Tools for Providers
- Chatbots

EHR Integration

- Automation for Admin Functions
  - Check In
  - Vitals Collection
  - Coding and Billing

Biowear and Biosensors

- Remote Monitoring
- Critical Care Management
- Wearables
- AI enabled monitoring



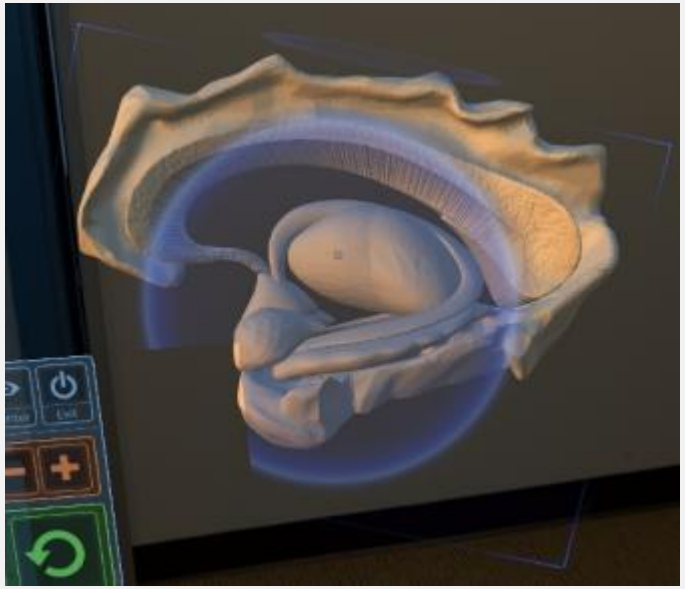




Augmented and Virtual Reality (AR/VR)

- Training
  - More standardized
  - Less costly
  - Providers and Patients
- Mental health
- Surgical Planning





https://www.cdc.gov/injury/fundedprograms/success-story_1.html

Drones

- **Consumer Product Deliveries**
- **US Military**
  - Casualty Transport
  - Logistics
  - Emergency Supplies
- **Non-US**
  - AED Drones
  - Blood/Plasma
- **Regulatory Concerns and Delay**



https://www.wired.com/story/drones-have-transformed-blood-delivery-in-rwanda/



https://www.theverge.com/2023/5/18/23728528/amazon-prime-air-drone-delivery-jeff-bezos



Robotics

- **Prosthetics**
- **Physical Therapy**
- **Surgical**
- **Assistive/Home**
  - Companion
  - Therapeutic
- **3D Printing**
- **Nursing Home and Skilled Nursing Facilities**



https://ptr.blue-ocean-robotics.com/



https://ptr.blue-ocean-robotics.com/



Hearables

- **OTC hearing aid**
- **Better access to screening and customization tools**
- **Mobile “smart” integration**
- **Bio-Sensing tools**
  - Heart Rate
  - Temp
  - Movement
  - Blood Pressure



Historic Barriers:

- Cost
- Purchase Complexity
- User Stigma

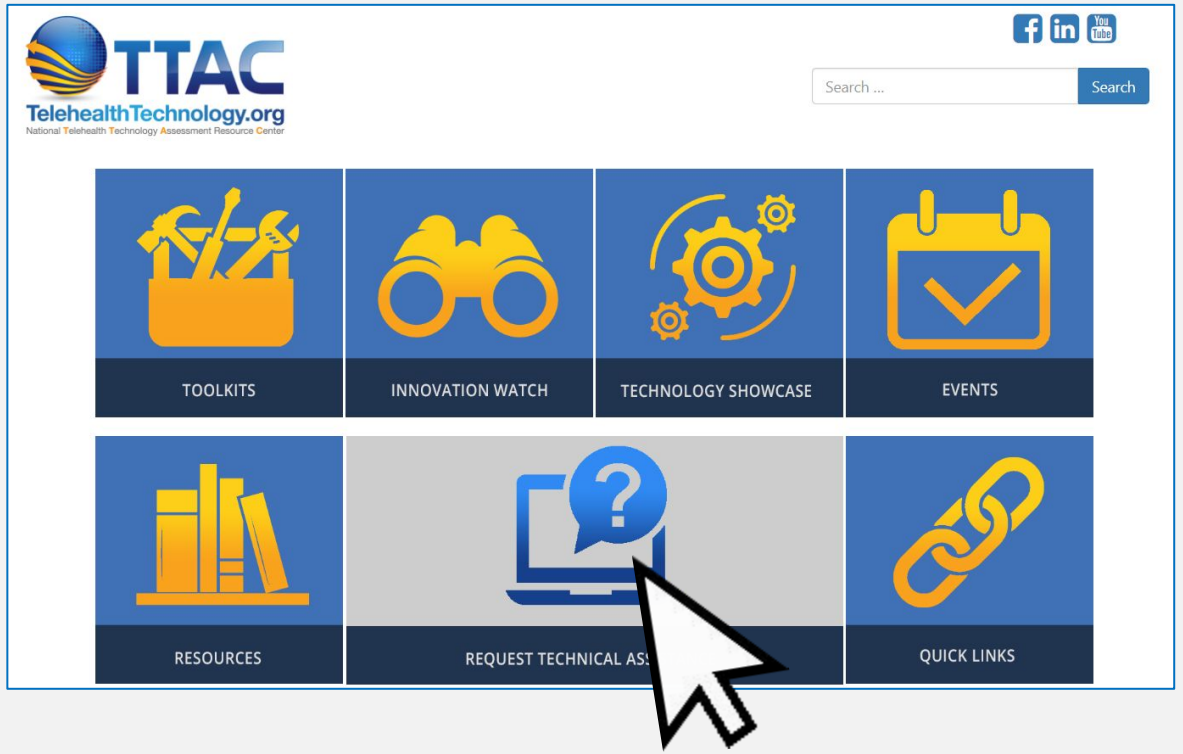
Conclusion

- Technologies in rapid and fundamental change
- Better outcomes at reduced costs
- AI as an underpinning technology supported by:
  - Growing datasets
  - Improved functionality
- Real and serious concerns
  - Technology vs regulation vs policy
  - Broadband accessibility
  - Digital literacy
  - Security and privacy concerns

Have Questions???

1 www.telehealthtechnology.org

2



3 Ask us your technology questions.

Thank You



Contact Us:

www.telehealthtechnology.org

1-844-242-0075