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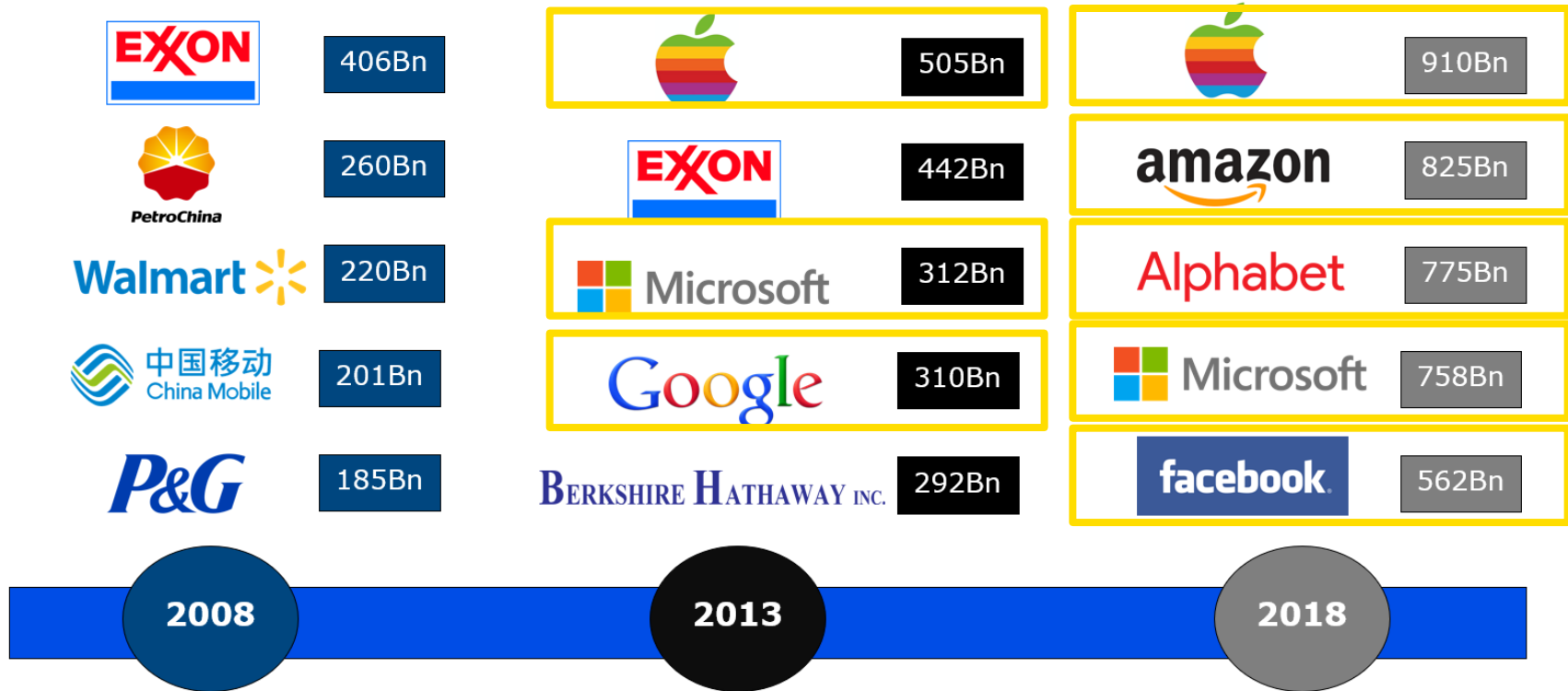
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# Technology is Disrupting Every Industry

Top 5 publicly traded companies (by market cap)

Tech Company



# Big Tech in Healthcare



- Apple Health Mobile App
- Apple Watch
- Apple Health Records
- ResearchKit & CareKit



- Medical supplies & equipment
- Employee health with J.P. Morgan and Berkshire Hathaway
- Voice technologies (Alexa)



- Over 190 healthcare patents filed
- Google Glass
- Body sensors and monitors
- HIPAA cloud platform
- \$375 million investment in Oscar Health



- Healthcare NExT
- Azure for health data
- Microsoft Genomics
- AI Network Project
- Empower MD with UPMC
- Project InnerEye



- Data share with top hospitals
- AI for suicide predictions and drug addiction
- Healthcare marketing

Hasselberg, 2019

# “The Amazon Effect”

**Convenience**



**Experience**



**amazon**

**Value**



# Innovators Focus on the Ends of an Value Chain: Creators & Consumers



**Clinicians &  
Caregivers**



**Health  
Systems**



**Insurance  
Companies**



**Employers**



**Patients**



Credit: Aaron Martin  
MANAGING GENERAL PARTNER, PROVIDENCE VENTURES  
EXECUTIVE VP, CHIEF DIGITAL OFFICER

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**Health Lab**



**Clinicians &  
Caregivers**



**Health  
Systems**



**Insurance  
Companies**



**Employers**



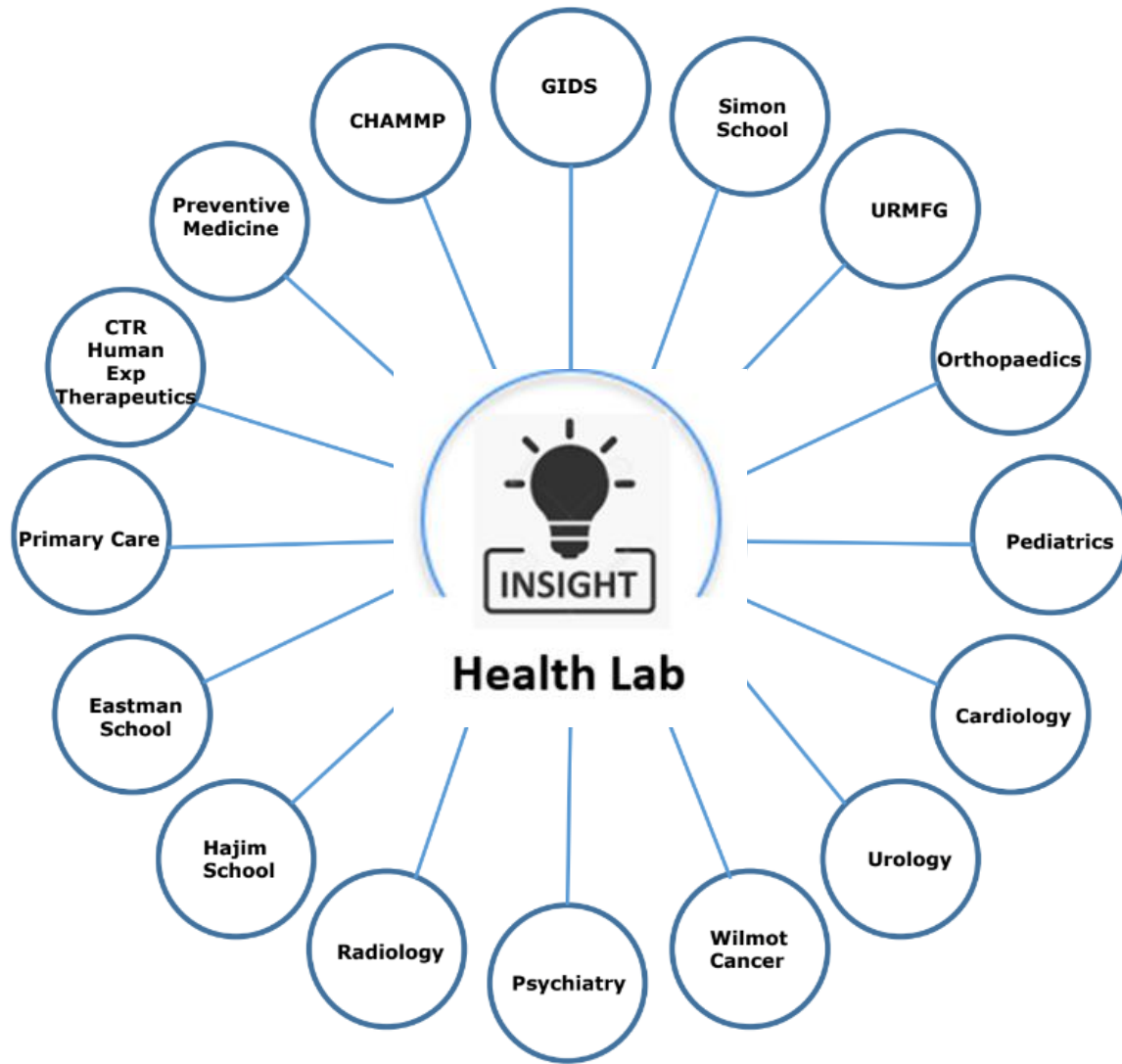
**Patients**

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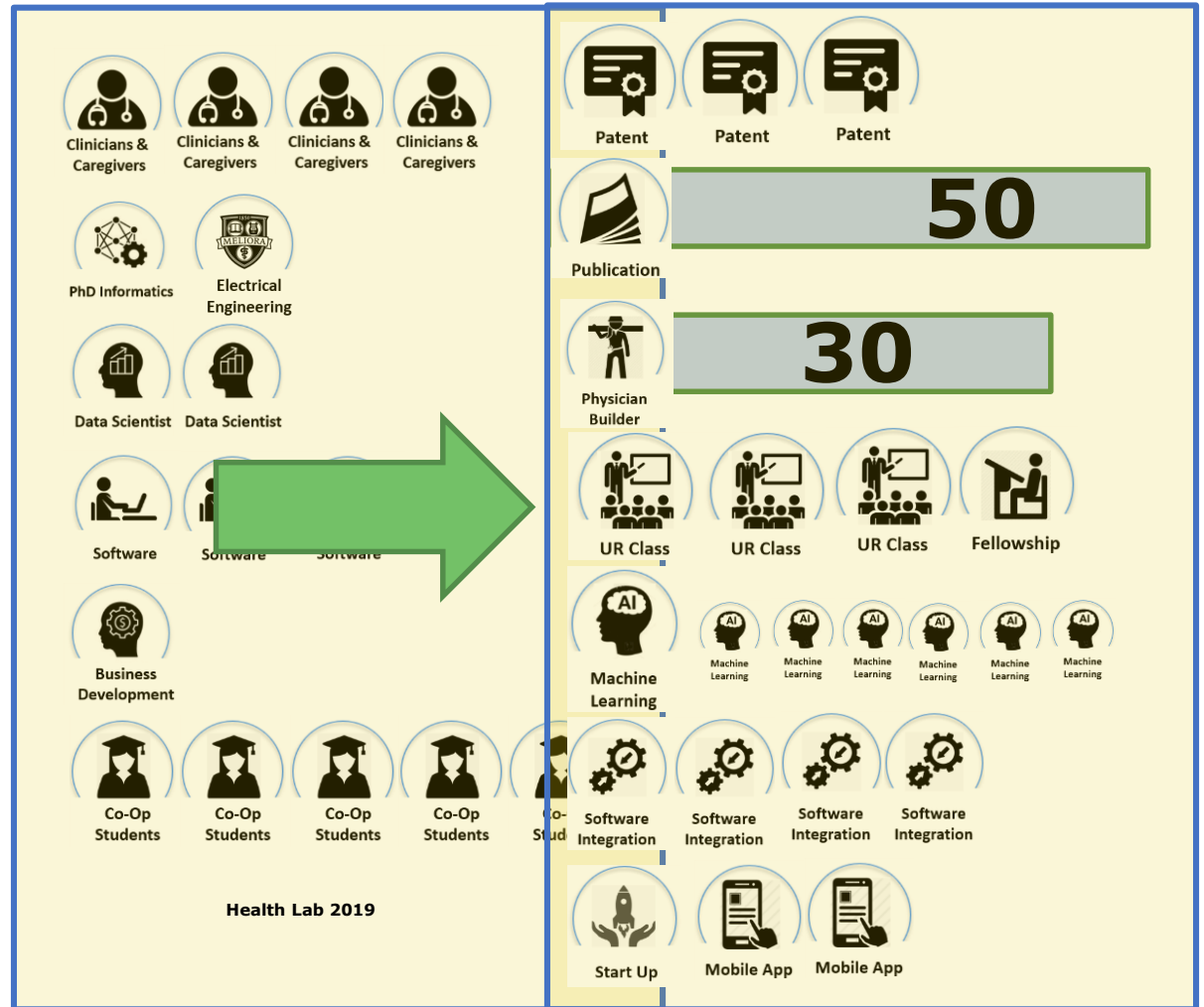




**Clinicians &  
Caregivers**



**Patients**

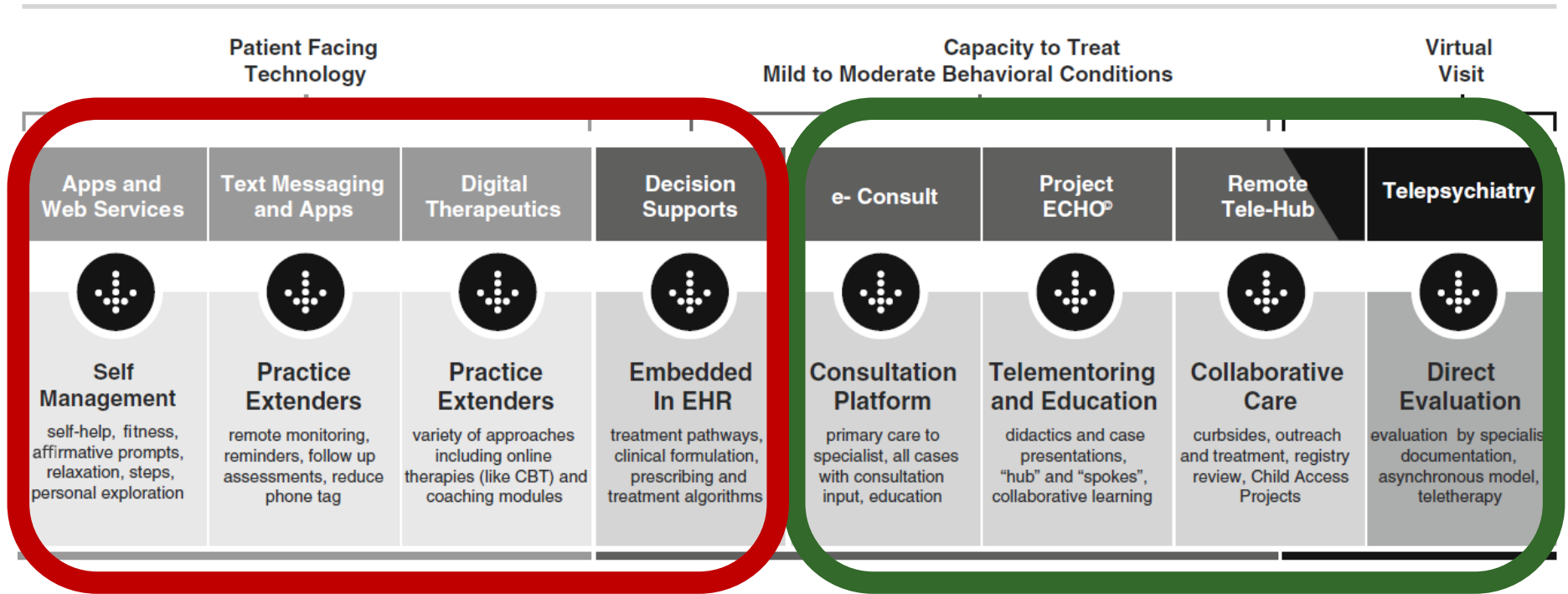


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# Innovation in Behavioral Health

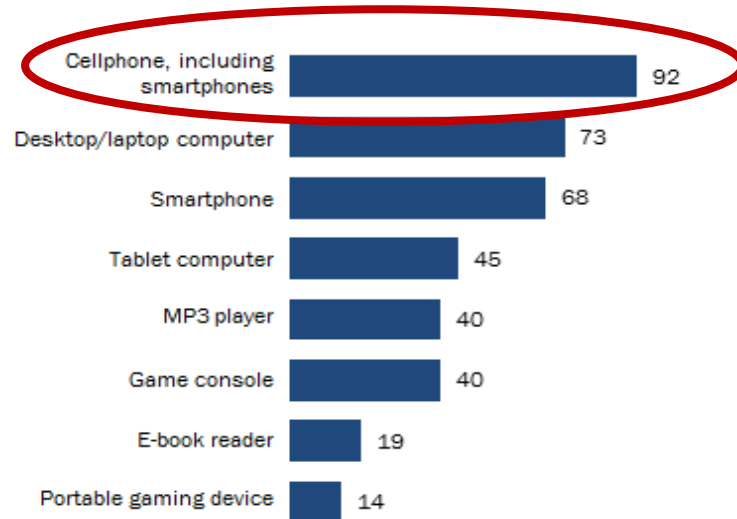


Raney, Bergman, Torous, & Hasselberg, 2017

# Moving Towards Direct-to-Consumer

## Cellphones, Computers Are the Most Commonly Owned Devices

*% of U.S. adults who own each of the following devices*

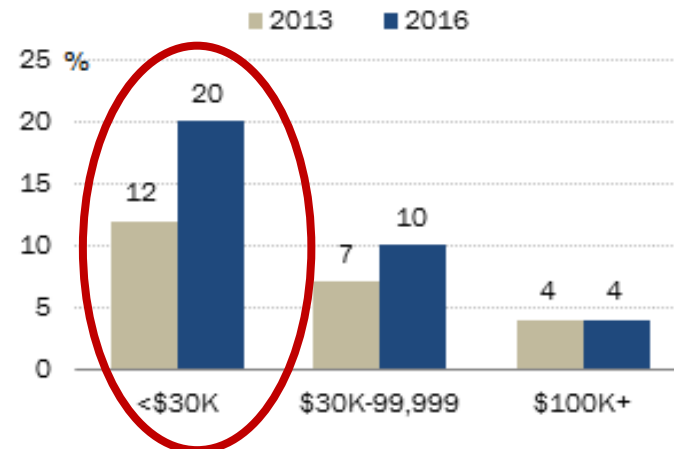


Source: Pew Research Center survey conducted March 17-April 12, 2015. Smartphone data based on Pew Research survey conducted June 10-July 12, 2015.

PEW RESEARCH CENTER

## Growing share of low-income Americans are smartphone-only internet users

*% of U.S. adults who have a smartphone but no broadband at home, by annual household income*



Source: Survey conducted Sept. 29-Nov. 6, 2016. Trend data from previous Pew Research Center surveys.

PEW RESEARCH CENTER

# Behavioral Health Mobile Apps

**Over 10,000 available to download today**

- Track symptoms
- Offer access to education
- Deliver adjunctive therapy treatments
- Provide mindfulness and meditation exercises



# Rapid Growth in Self Wellness Apps

Top Wellness Apps by Revenue ▶ Q1 2018



United States			Worldwide		
1		Calm	1		Calm
2		Headspace	2		Headspace
3		10% Happier	3		10% Happier
4		Simple Habit	4		Simple Habit
5		Breathe	5		Breathe
6		YogaGlo	6		Yoga Studio: Mind & Body
7		Yoga Studio: Mind & Body	7		Zen
8		Abide - Christian Meditation	8		The Mindfulness App
9		Pacifica	9		7Mind Meditation
10		Stop, Breathe & Think	10		Abide - Christian Meditation

Note: Does not include revenue from third-party Android stores in China or other regions.

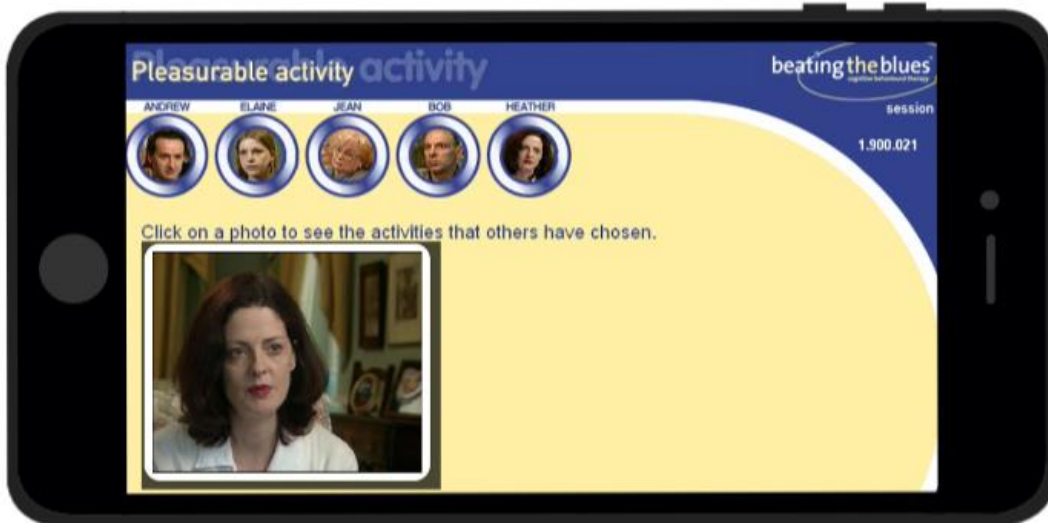
# Need for Care Delivery Apps

## Cognitive Behavioral Therapy (CBT)

- Focuses on the relationships among cognitions (thoughts), emotions (feelings), and behaviors
- Module-based and time-time limited psychotherapeutic approach
- Efficacious across numerous health conditions (i.e. depression, anxiety, substance use disorder, insomnia, pain, etc.)

# “Best of Breed”

- Mild to moderate depression / anxiety
- 8 weekly sessions of 50 minutes in length
- Video-vignettes and interactive menus
- Evidence-based



**UPMC**  
LIFE CHANGING MEDICINE

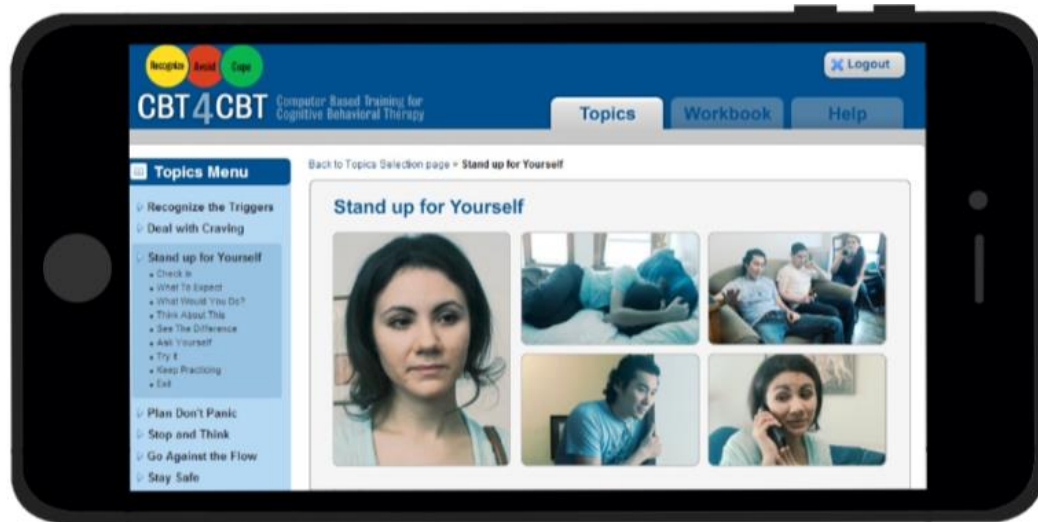


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# “Best of Breed”



- Substance use disorders
- 7 module self guided web-based program
- Video-vignettes and interactive menus
- Evidence-based

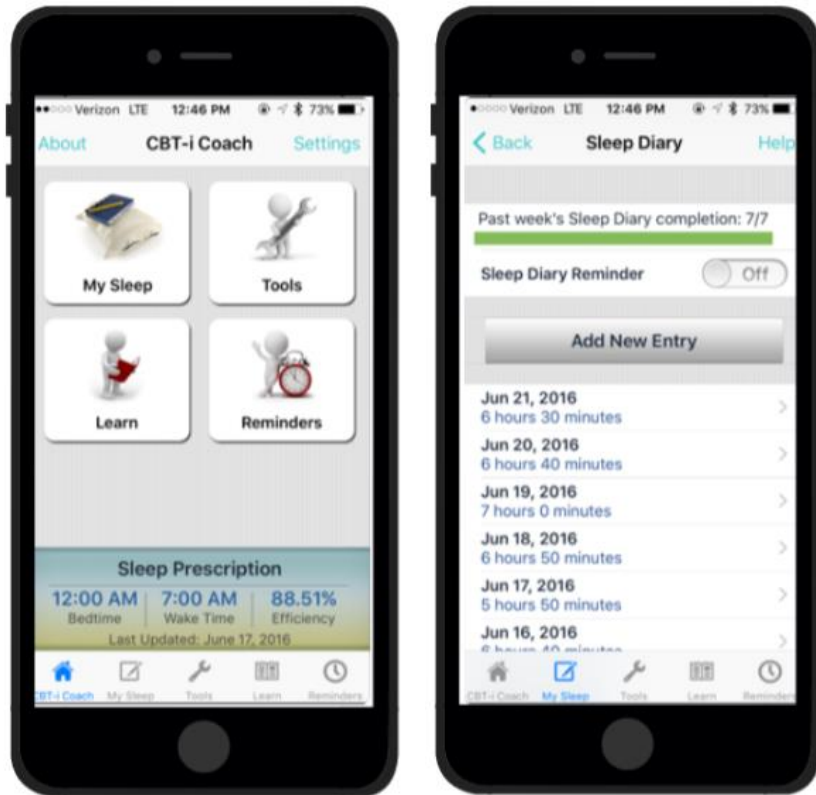


Yale University



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# “Best of Breed”



- Insomnia
- Provides educational information
- Self reported sleep diary
- Teaches sleep hygiene strategies
- Evidence-based

**VA**



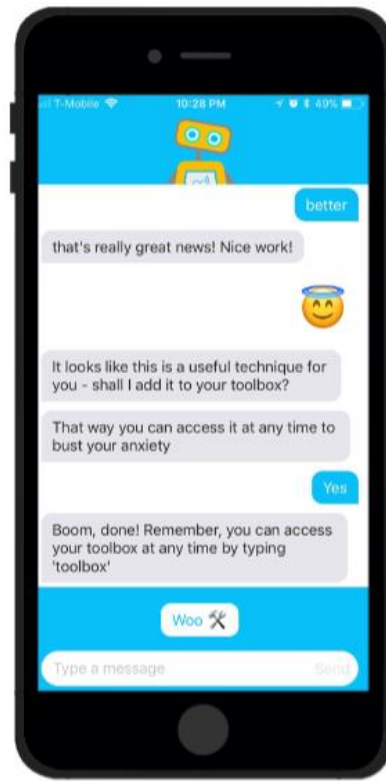
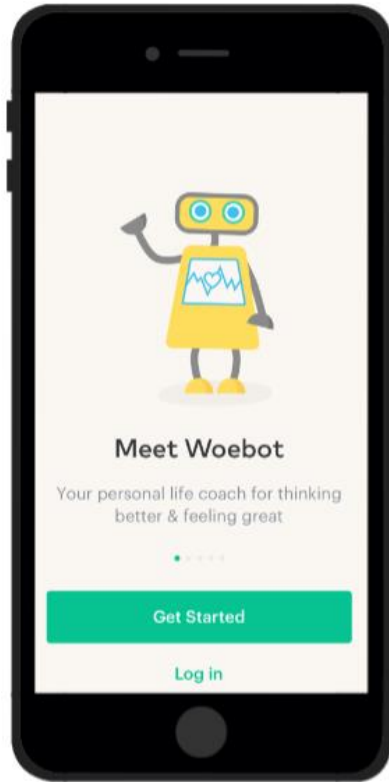
U.S. Department  
of Veterans Affairs



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# “Best of Breed”



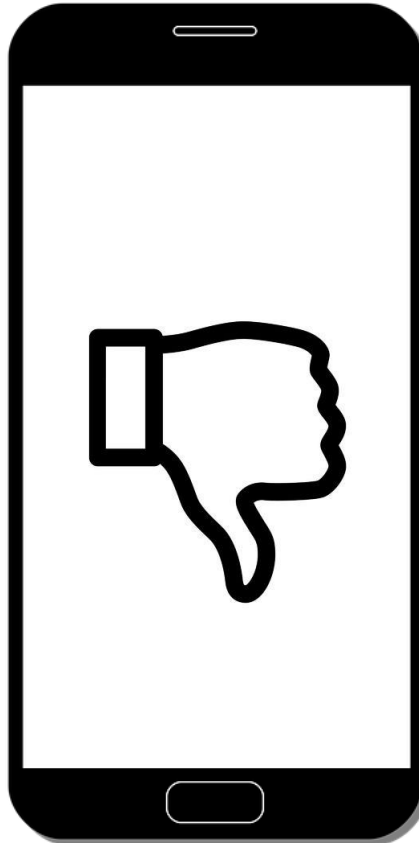
- Distressing thoughts and feelings
- AI-powered chatbot
- Communication through text messages
- Daily check-ins
- Evidence-based



# Current Behavioral Health Mobile App Limitations

**Poor  
Usability**

**Lack of  
User-  
centered  
Design**



**Lack of  
Trust**

**Disconnect  
From  
Therapist**

# UR Development of CBT Mobile App

## **Lead - UR Medicine Health Lab**

- Expertise in technology innovation to improve delivery of care

## **Co-lead - Department of Psychiatry**

- Expertise in cognitive behavior therapy, and implementation science

## **Eastman School of Music**

- Expertise in visual and audio therapeutic functions

## **Art, Science, & Engineering**

- Expertise in computer science and smartphone sensors

# cCBTvr

- Uses evidence-based CBT treatment protocols for anxiety and stress
- Consists of 8 modules arranged in a sequence
  - Progressively build upon the previous lesson



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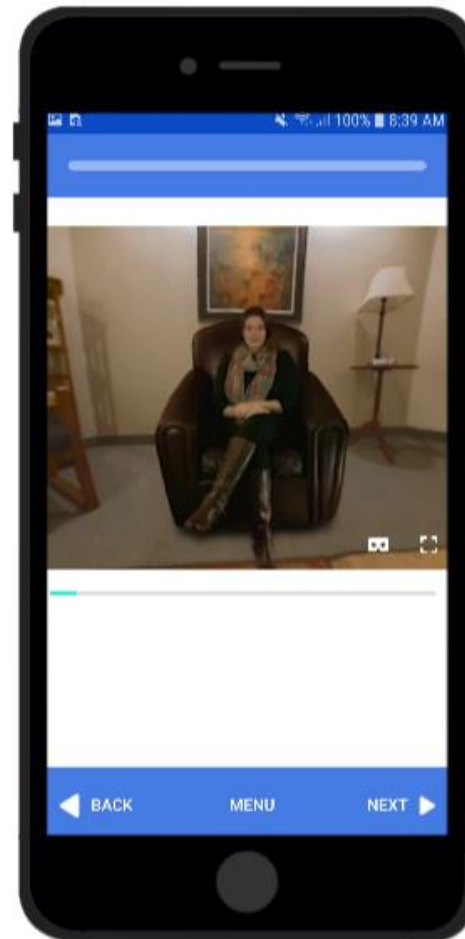
# Electronic Health Record Integration

- Secure data transmission
- Allows the user's health care providers to monitor progress within the mobile app



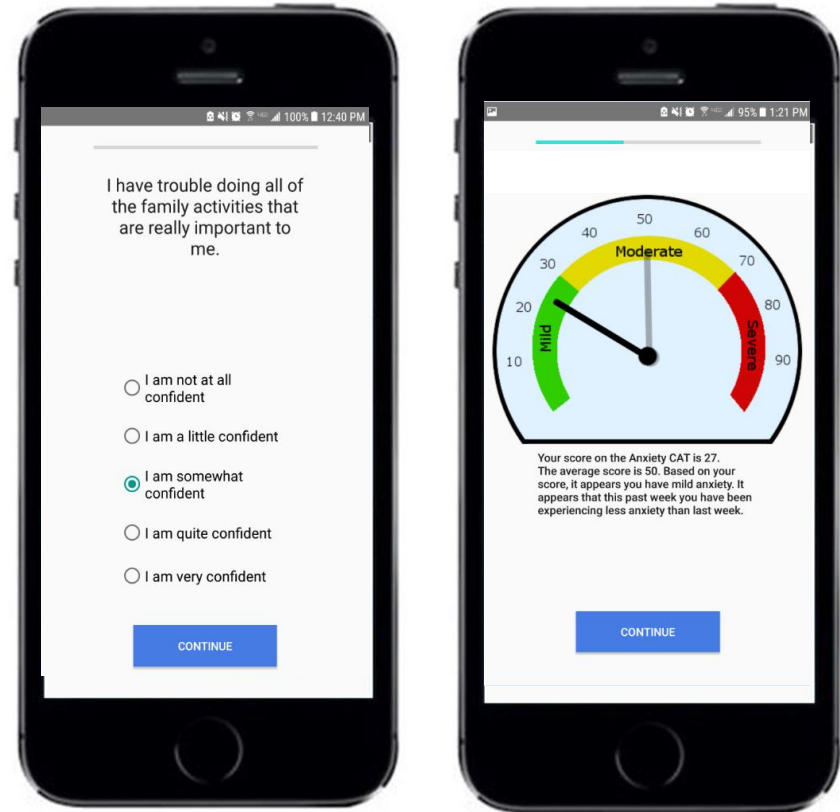
# Virtual Reality Psychotherapy

- Virtual reality (VR) experience with psychotherapist designed to give the illusion that the user is “there” in the therapy office



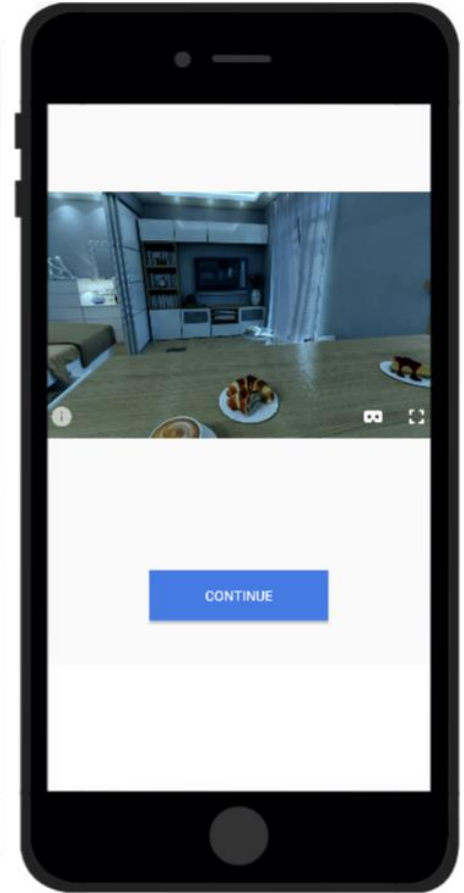
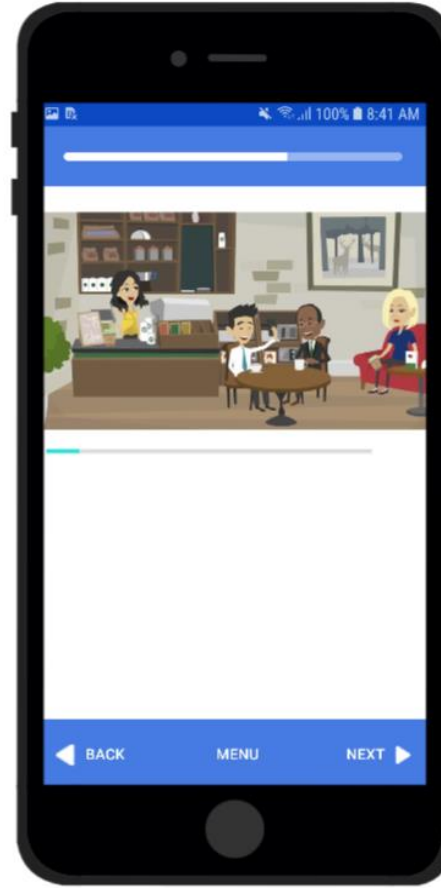
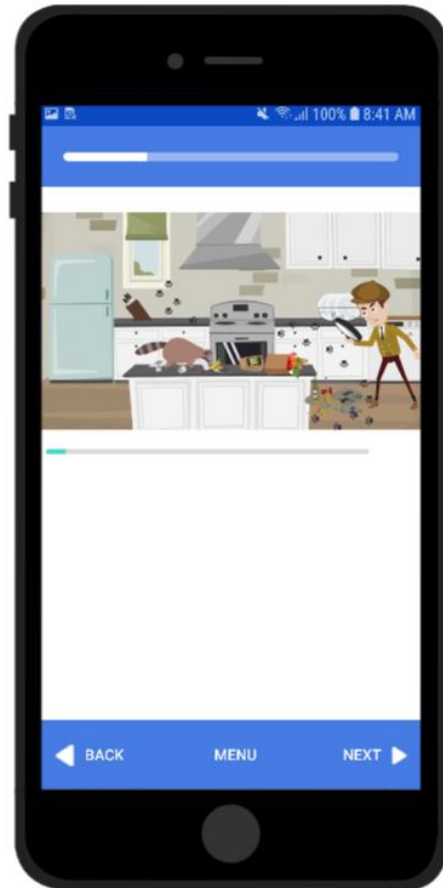
# Symptom Tracking with Real-Time Data Visualization

- Use of National Institute of Health computer adaptive testing tools to track anxiety symptoms
- User data drives the application program interface (API) creating a personalized experience



# Interactive Therapeutic Activities

- Case-enhanced learning examples to illustrate CBT principles
- Interactive animated and VR tasks to practice CBT skills





# Individualized Immersive Experience

- Personalized VR  
Mindfulness and Meditation
- User chooses:
  - Therapist
  - Length of session
  - Music
  - VR Location



# Next Steps

- Feasibility / efficacy testing in UR clinical service lines
- Institutional Review Board protocol in submission
- Partnerships with external organizations

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