

# Embracing Personal Technology into Healthcare Operations

Smart Personal Medical Devices Drive  
the Convergence of Population  
Health and Security

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# Overview

The (r)evolution is here

The business of IoT, PFD's and NMD's

Integrating into population health

Changing behavior to adopt usage

Challenges of security

Putting it all together



# Exciting Smart Medical Technologies

- Implantable Devices
  - Stimulators: Vagus Nerve, Deep Brain, Gastric, Spinal Cord
  - Artificial implants: Foot Drop, Cochlear, Hips, Knees, Elbows
  - Pumps: Insulin, Dental, Drug, Pacemakers
  - Prosthetics/Bionics
  - Electronic Skin Patches



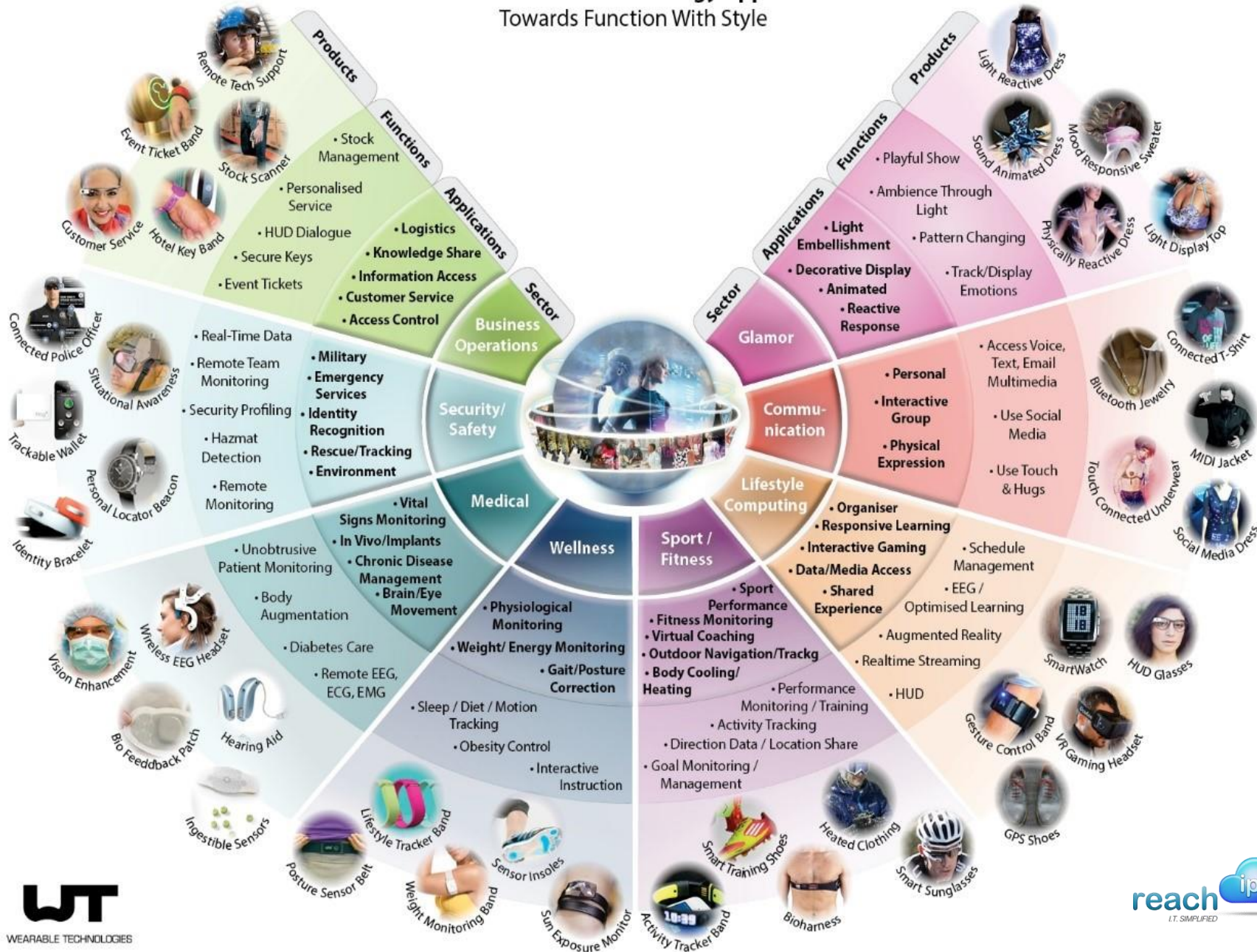
# Exciting Smart Wellness Technologies



- Wellness & Fitness Devices
  - Smartphone: Voice, Text, Email, App, Social Media
  - GPS: Angelsense, Wrist, Ankle, Wearable
  - Measurement: Glucose, Scales, Blood Pressure Monitors, Thermometers,
  - SMART belts, Google Glasses
  - Saliva/DNA
  - Trackers: FitBit, AppleWatch, Garmin, Motorola



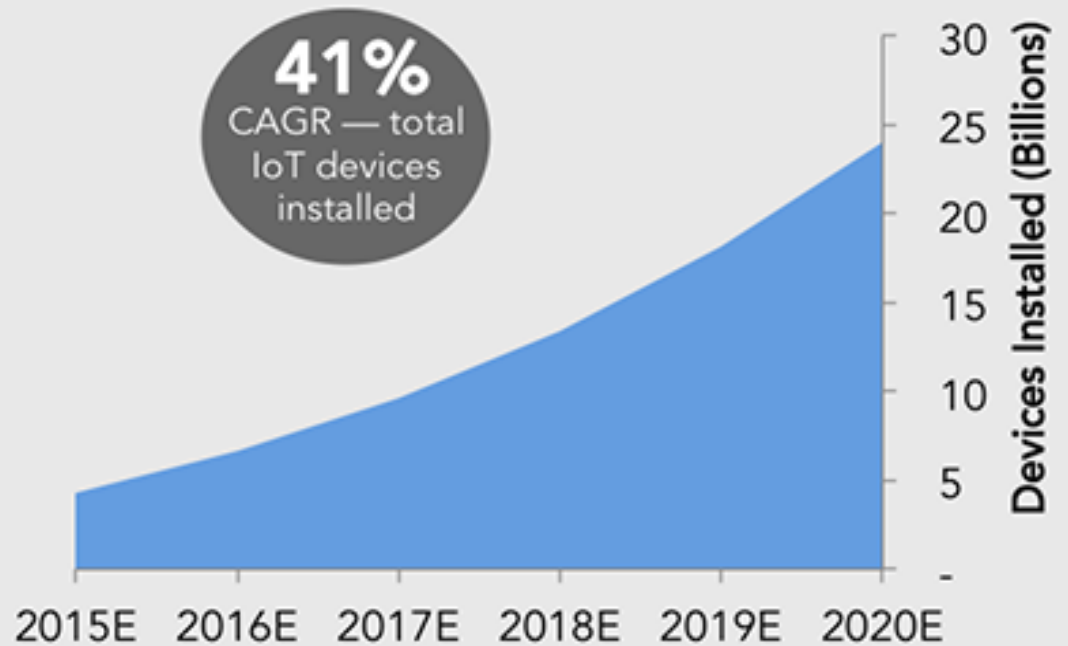
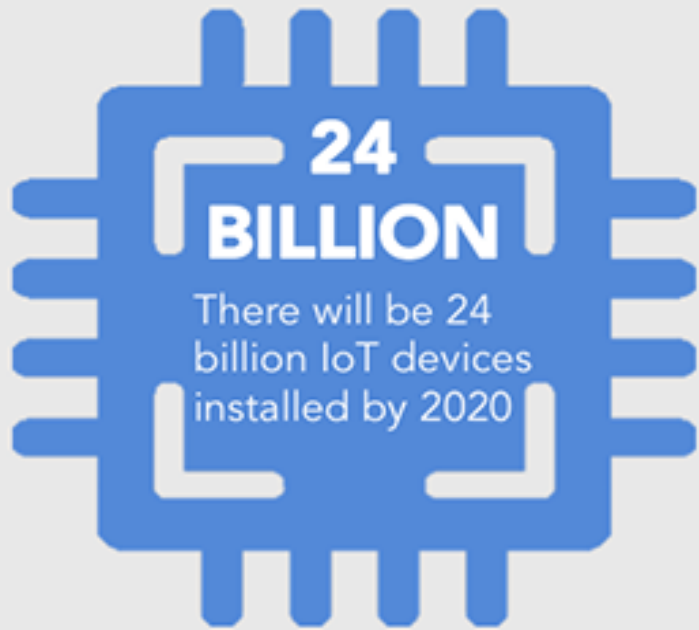
# World of Wearable Technology Applications: Towards Function With Style





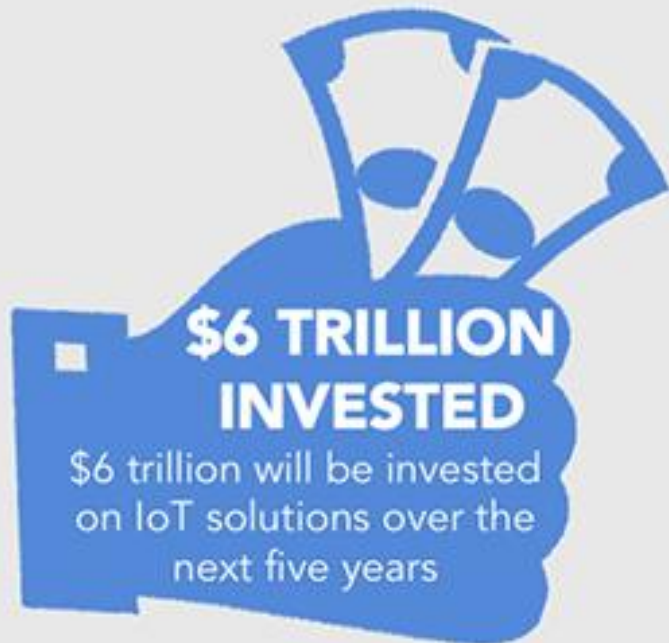
# THE BUSINESS OF IOT, PFD'S, AND NMD'S

# Sizing The Market

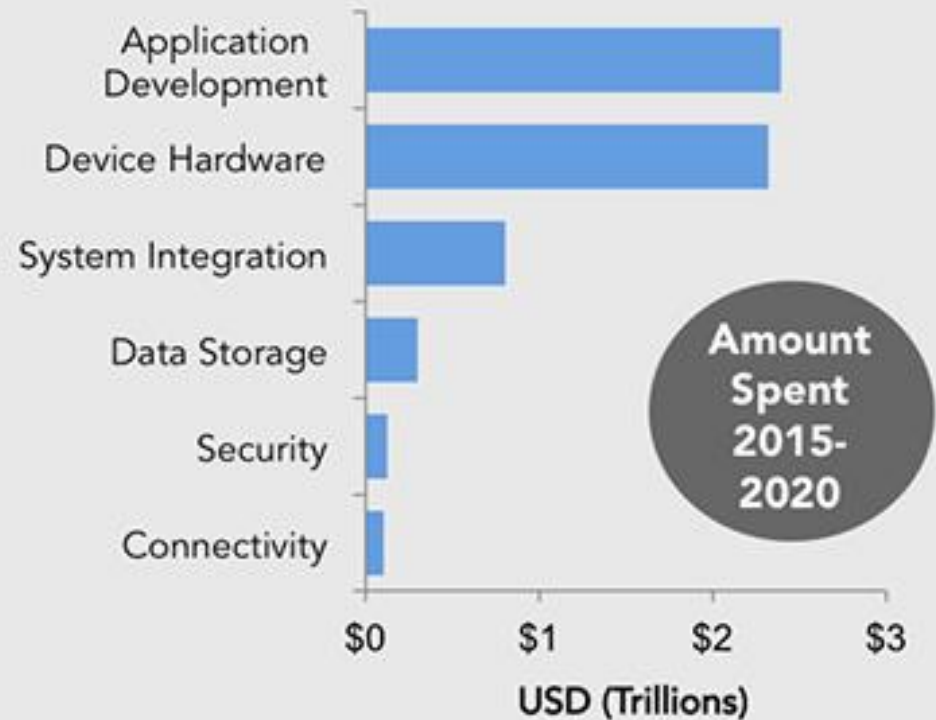




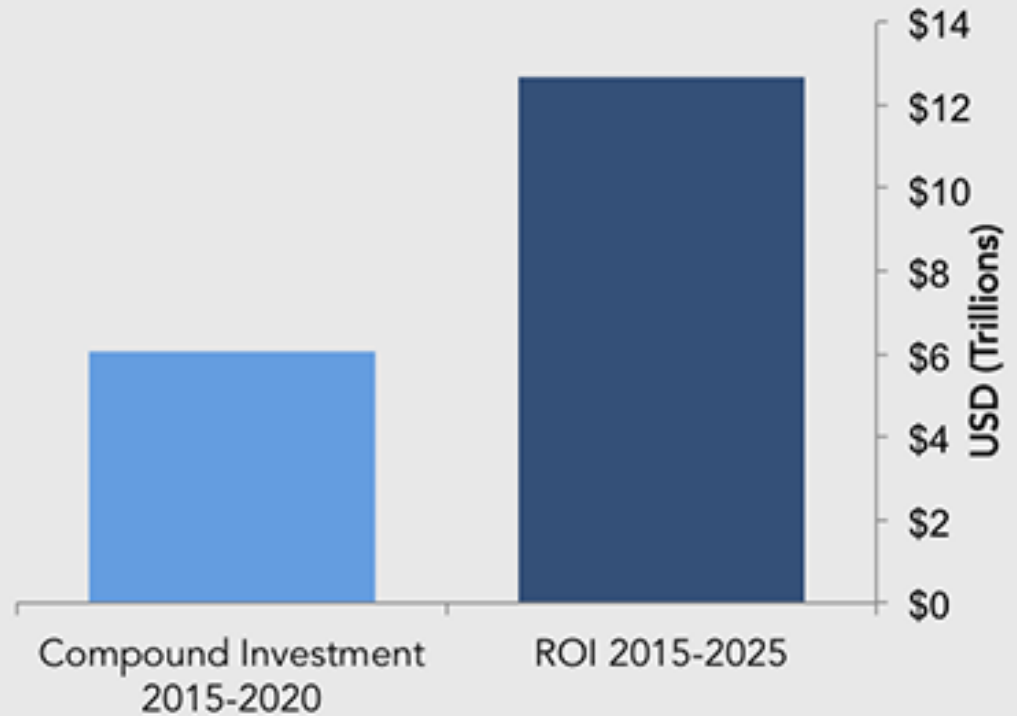
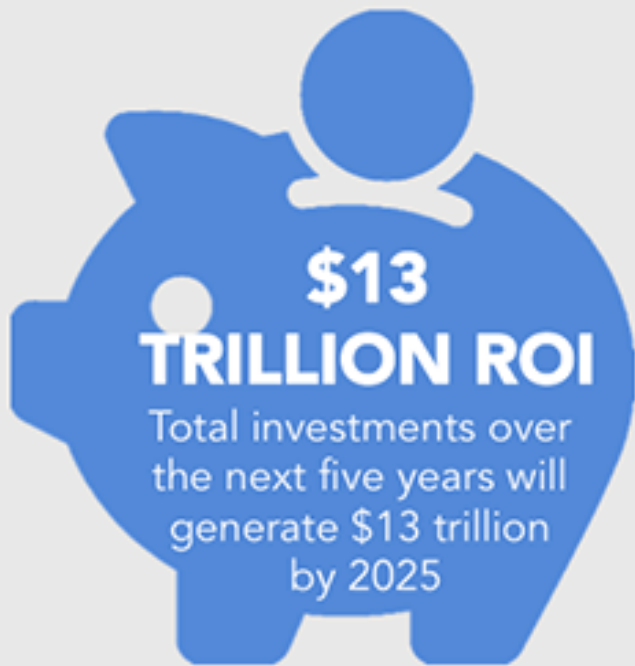
# Sizing The Market



**\$6 TRILLION INVESTED**  
\$6 trillion will be invested on IoT solutions over the next five years



# Sizing The Market



# FDA's Guide to Devices: Medical vs. Wellness vs. Fitness

## Medical

- Treats a condition
- Diagnoses a condition

## Wellness

- Maintains a state of health
- Assists in a healthy lifestyle

## Fitness

- Tracks fitness activity
- Compares activity against goals



# **INTEGRATING WITH POPULATION HEALTH INITIATIVES**

# Devices help your population health initiative



- Accountable care organizations
- Primary and secondary care practices
- Community health collaboration/HIE's
- Integrated delivery to hospital systems and networks



# [ THE AIM OF AN ACO

VALUE-BASED | PATIENT-CENTERED CARE



- Extends the doctor-patient relationship and interactions beyond the clinical walls (improves communication, less visits)
- Provides near real-time status of patient health (risk stratification, preventing medical errors)
- Integrates into EMR/HIS/PMS systems for analytics
- Improves predictive and prescriptive analysis
- Enables coordination among multiple caregivers (devices can broadcast to multiple EMR's or HIE's simultaneously)

# Primary and Secondary Health Practitioners

- Devices can send different data information to specific practitioners
- Data can be sent to in-network and out-of-network providers
- Device is geographic bound, but the data can be distributed locally, regionally, nationally
- Custom apps can be developed per doctor
- Emails, texts, social media, voice calls can be archived and uploaded as attachments to clinical records



# Community Health Collaboration

- Simplifies testing and monitoring of larger population samples
- Enables regionalized statistics
- Data can be aggregated regardless of provider or patient
- Large enough data sets for predictive trending



# Integrated Delivery to Networks



- Data can be securely transferred real time (stream) or batched to hospital, lab and clinical application systems
- Can be part of a core clinical record, attachment or special additional data fields
- Can be integrated into Big Data and Analytics projects



# ADOPTION OF DEVICES



# Current Population Usage



**25.1%** of adults use either a **fitness tracker** or **smartphone app** to track their health, weight, or exercise.

**74.9%**  
do not use these devices.

# Why aren't they using one?

Lack of interest

**27.2%**

— and —

Concerns Over Cost

**17.7%**

are the most common reasons for not tracking fitness or health.



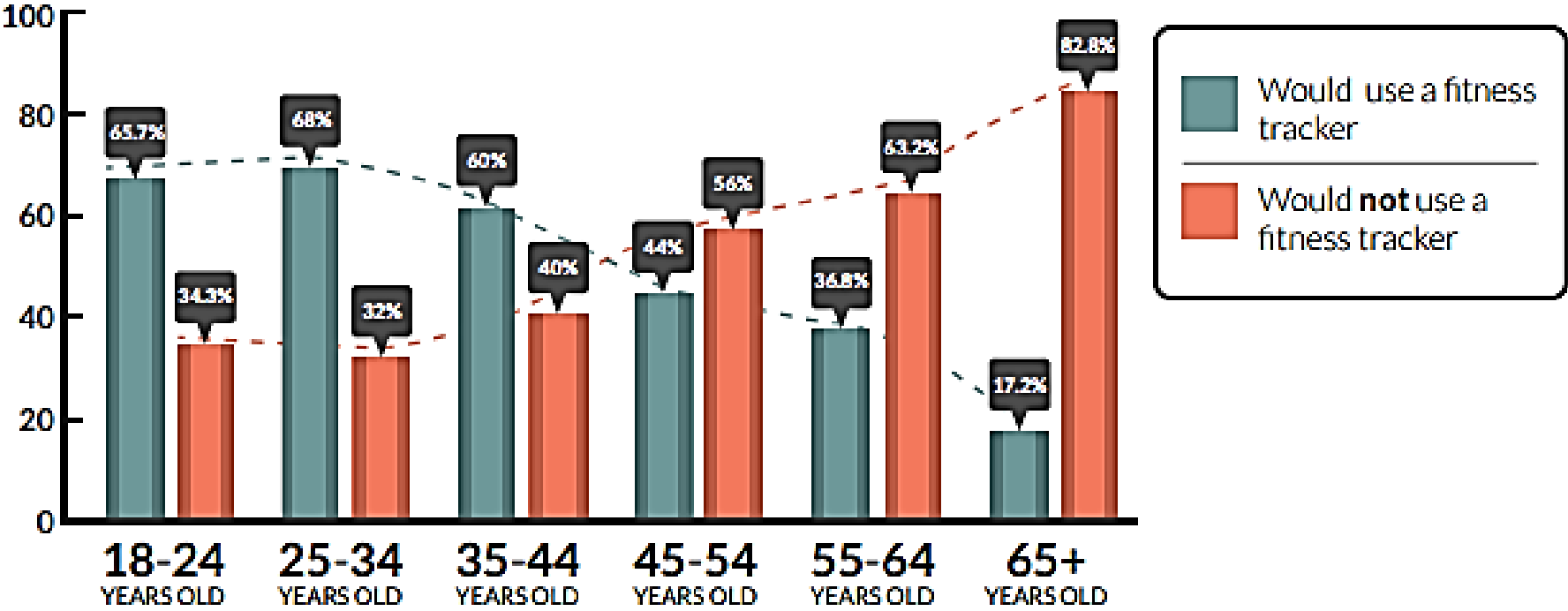
# Potential Market



**48.2%**

of non-tracking adults said  
they would use a fitness  
tracking device provided by  
their physician

# Willingness to Use a Free Fitness Tracker, Provided By a Physician; By Age



# More incentive

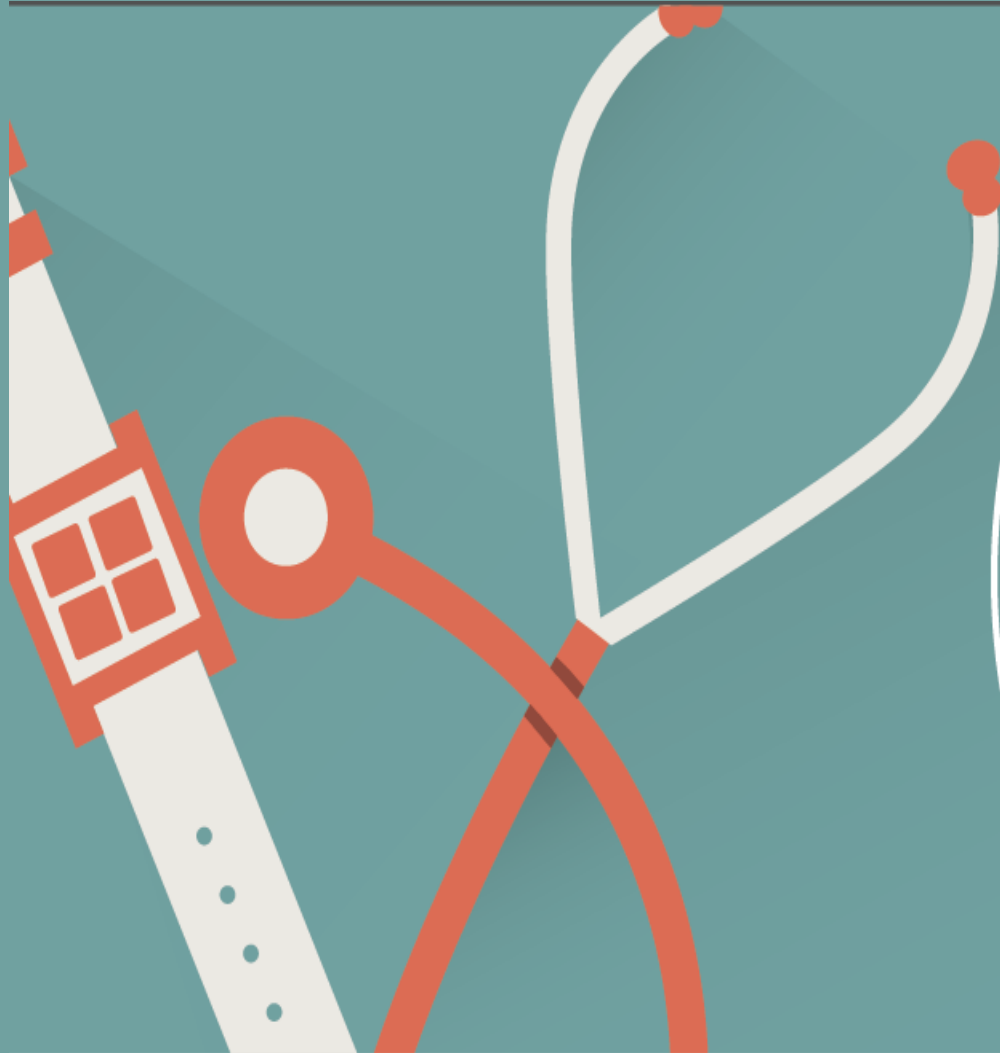
**57.1%**

said that the possibility of lower health insurance premiums **would make them more likely** to use a fitness tracking device.



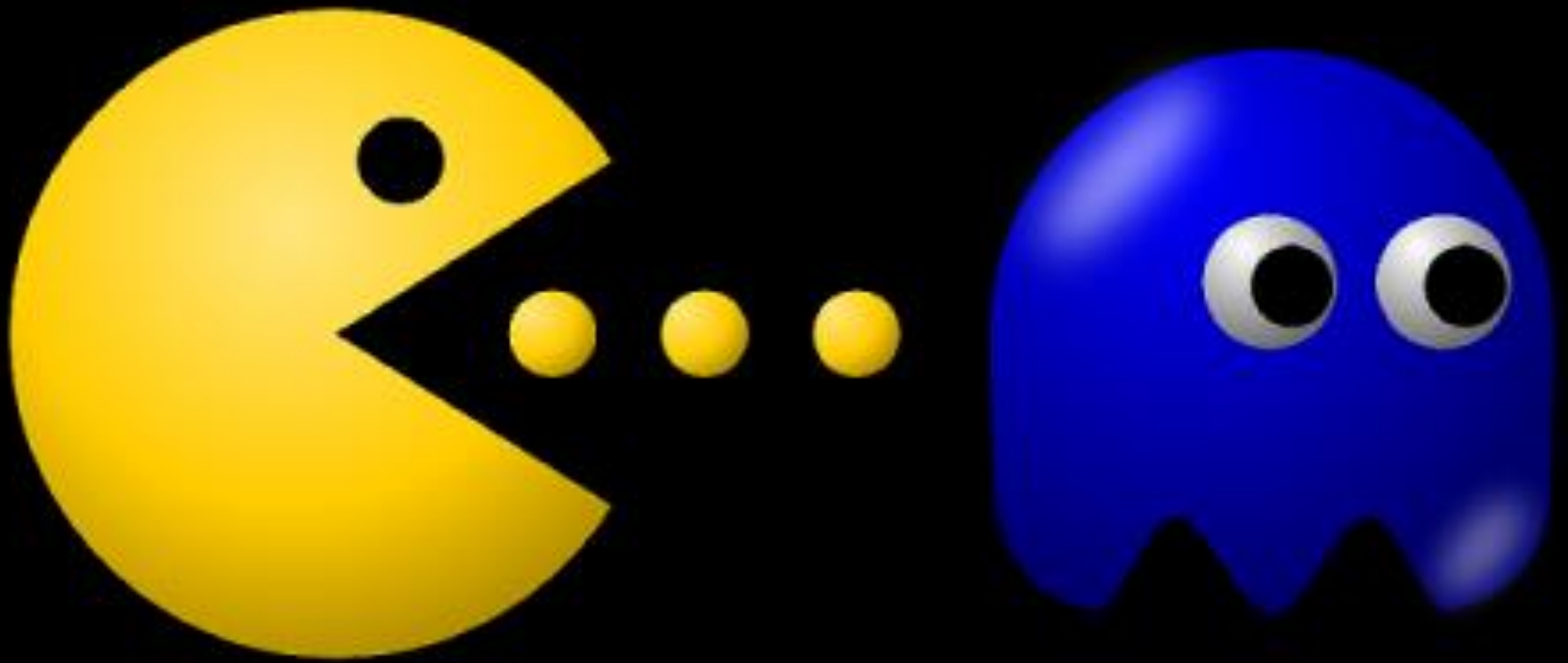


# Your Team Can Make the Difference!



44.2%

said that better healthcare advice from their physician **would be an incentive** to use a fitness tracking device.



**CHASING THE SECURITY OF NMD'S**

# Four Categories of Networked Medical Devices

## 1 Consumer products for health monitoring:

These devices -- such as FitBit, Nike FuelBand, or Withings -- generally communicate using BlueTooth to nearby personal mobile devices.



## 2 Wearable, external medical devices:

This category includes portable insulin pumps which often use proprietary wireless protocols to communicate.



## 3 Internally embedded medical devices:

Pacemakers and other medical devices are implanted in the patient but communicate wirelessly, either with proprietary wireless protocols or Bluetooth.



## 4 Stationary medical devices:

These devices, such as hospital-based chemotherapy dispensing stations or homecare cardio-monitoring for bed-ridden patients, often use more traditional wireless networks, such as WiFi networks in hospitals or patients homes.



# 4 Key Security Concerns

**Device Security**

**User Security**

**Network Security**

**PHI Security**

# Device Security Questions

- What kind of wireless technology does the device support?
- What kind of wireless technology does the patient's home or mobile Internet network support?
- Will this device be used on public networks (Starbucks, Boingo, etc.)?
- What happens if the device is stolen or lost?
- What happens if the battery dies?



# User Security Questions



- How do I know it's really you?
- How do I know this is your device?
- How do I access my app?
- What if I want to loan my device to my daughter?
- What if I want to upgrade or change my device?



# Network Security Questions

- Is the data stream encrypted from the device to the router/cell phone/WAP?
- Is the data stream encrypted from the user's Internet endpoint to the provider network?
- How is the data encrypted within the provider network?





# PHI Security Questions



- How is the device data being stored on my healthcare network?
- How and to what software is the data being integrated?
- Is it a one-to-one or one-to-many integration?
- How is the data being analyzed?

# Security Technologies to Review

## Authentication Security

- CIA – Confidentiality, Integrity, Availability
  - Single Sign On
  - Biometric/Voice
  - Multi-Factor/DRM

## Network Security

- Wireless Body Area Network (WBAN)
  - ANT/ANT (Secure BlueTooth)
  - Zigbee (Personal Mesh)
    - RADIUS
    - WPA2/WEP

## Transmission Security

- SSL/TLS
- VPN/IPSEC
  - FIPS
  - HASH
  - PGP
  - Apollo

## Integration Technology

- HL7
- FHIR (mobile HL7)
  - XML
- REST/SOAP



**PUTTING IT ALL TOGETHER**

# Create a Dedicated Managed Program



**Patients**

**Dedicated Program Team**

# Implement a Behavioral Tracking System



# Behavioral Tracking System



- Habits take at least 21 consecutive days to form
- It's a team effort:
  - Patient
  - Nurses
  - Doctors
  - Support teams (dietitians, fitness trainers, physical rehab, pharmacists)
- Agree and set goals and milestones
- There is no magic. It's repeating a process and communicating consistently



# Partner with, but don't Resell



- Pilot and test devices
- Assure quality
- Develop support model
- Bundle with your services
- Focus on your core competencies
  - They are not a practitioner
  - You are not a manufacturer
- Implement feedback system



# Summary

- No one device does it all.
- No one device by itself changes a patient.
- It's a team effort to realize ROI.
- It's a struggle of people, of behavioral changes of patient, nurse and doctor towards this new "care paradigm".
- Be prepared for changes as the FDA becomes more involved (ala the new Apple Watch is rumored to be a portable EKG device).
- The PFD/NMD train is not going to slow down. Learn to embrace and utilize to achieve the best care results.



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# Credits

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