

PRISME Technical Forum Introduction

Accelerating Disruption

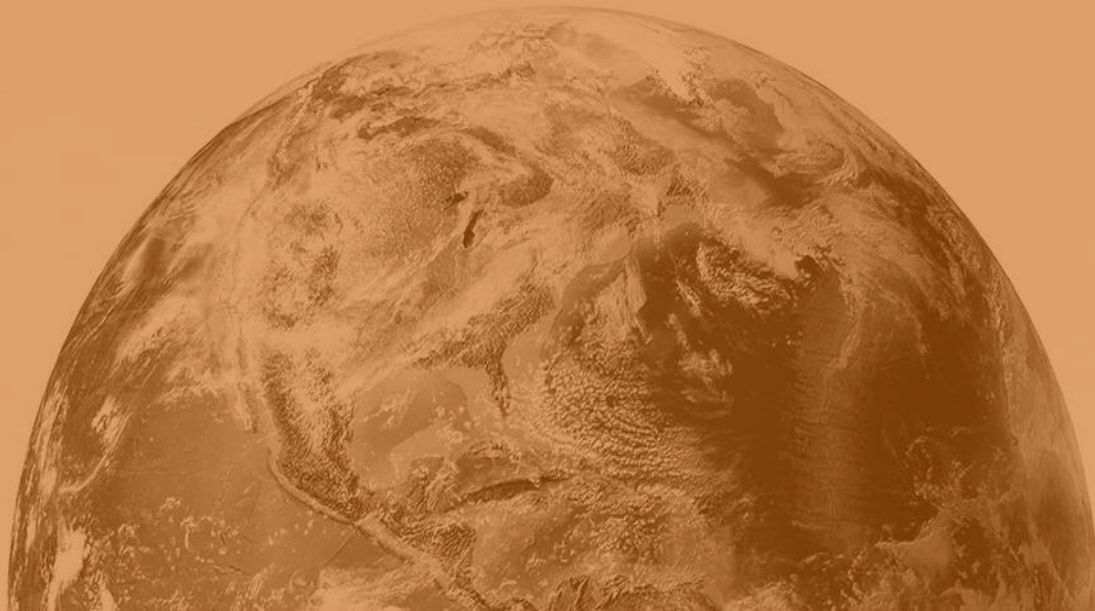
Presenters:
Matthew Rich and Jim
Golden

Agenda

- ◆ **Following the Money: Venture Capital's Influence on Pharma Tech**
- ◆ **Applications and Possibilities of 3D printing in Pharma**
- ◆ **The Rise of Consumer Technologies In Healthcare and the Impact on Pharma**
- ◆ **New Entrants: how non-traditional Life Sciences technology companies are disrupting Pharma tech**

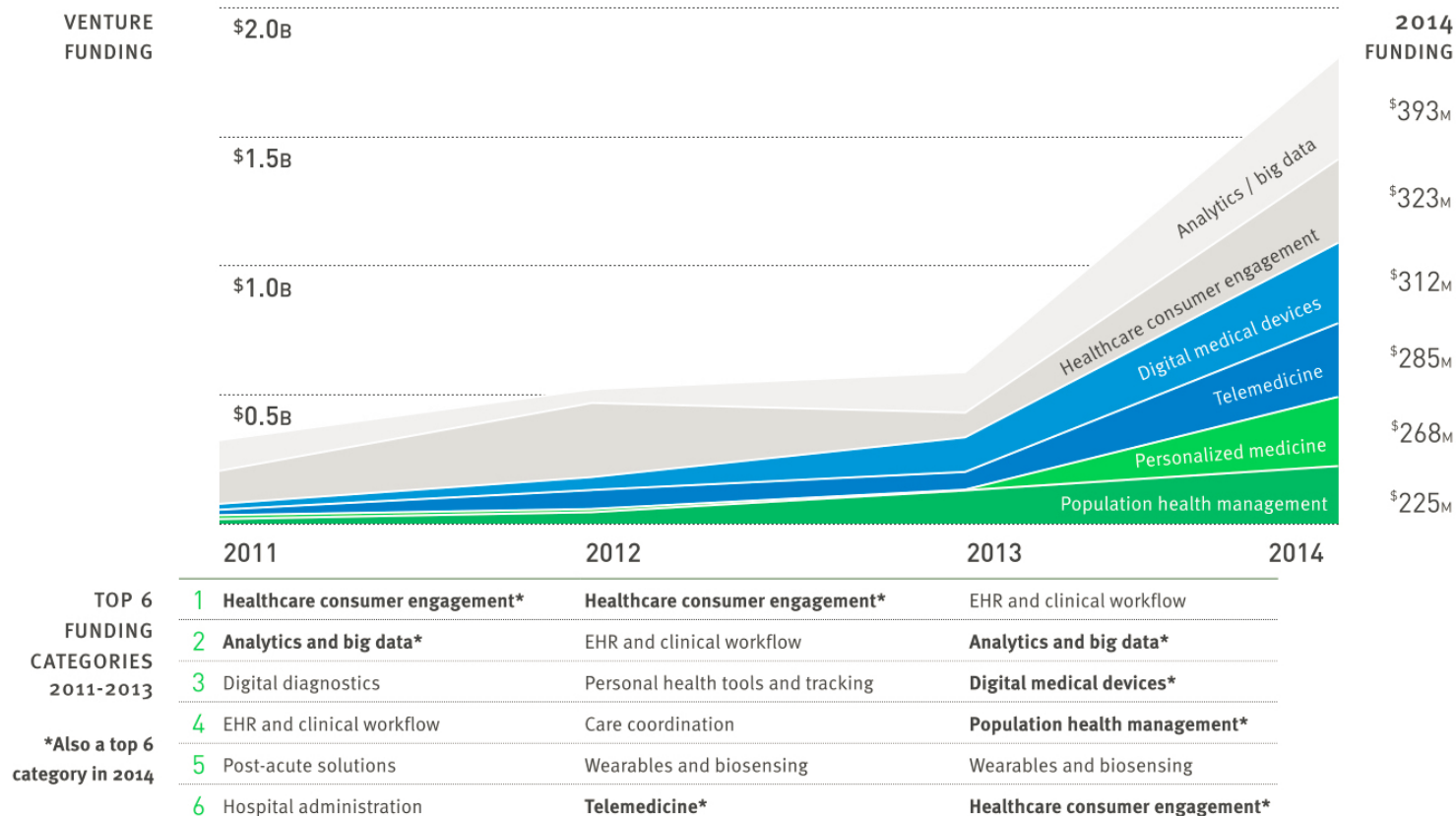
Following the Investments

How Venture Capital is
Disrupting Pharma Tech



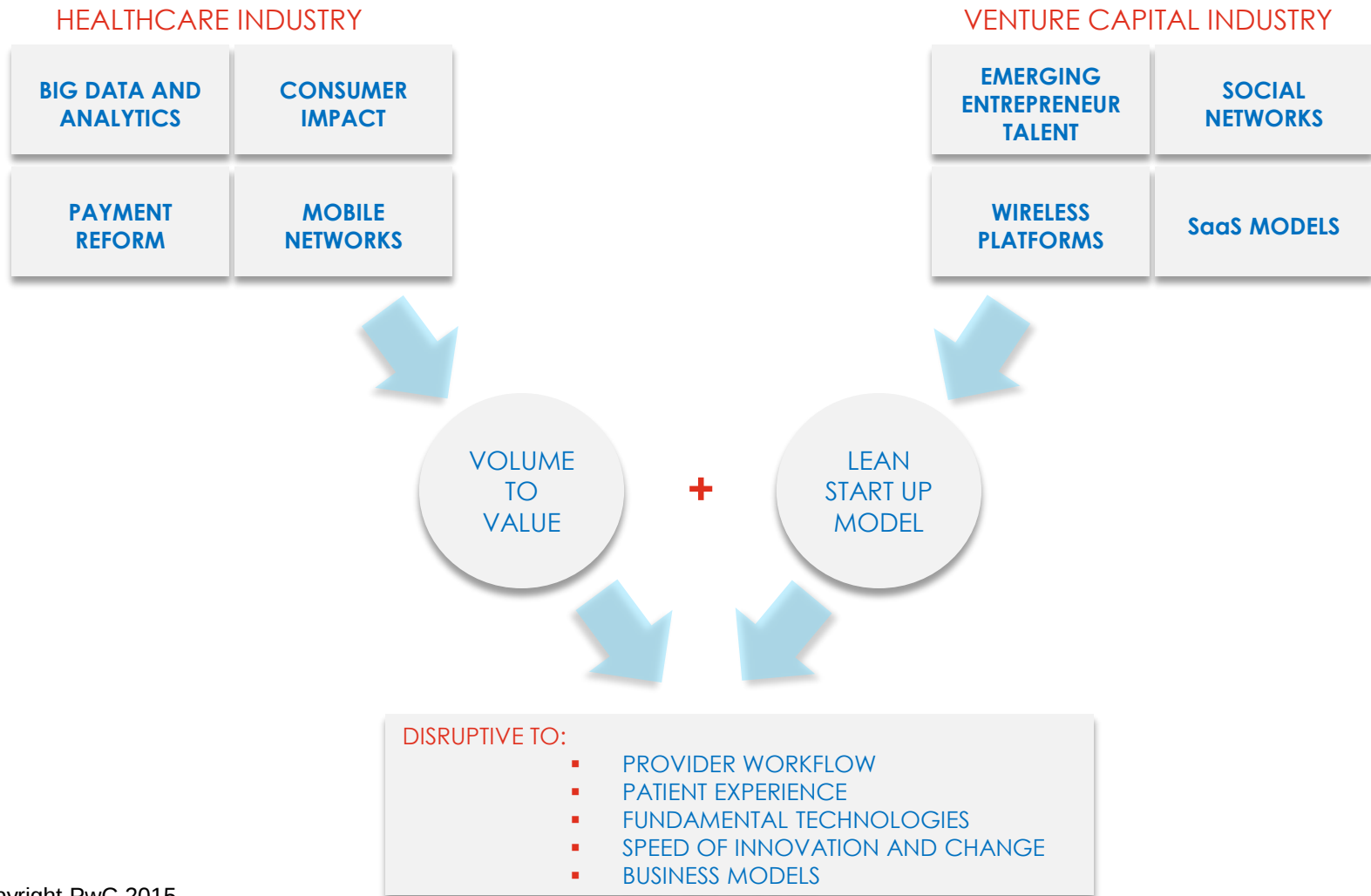
Trends in venture capital funding indicate a shift over the past three years towards companies focused on healthcare consumer engagement and analytics + big data

Funding of Top Six 2015 Categories

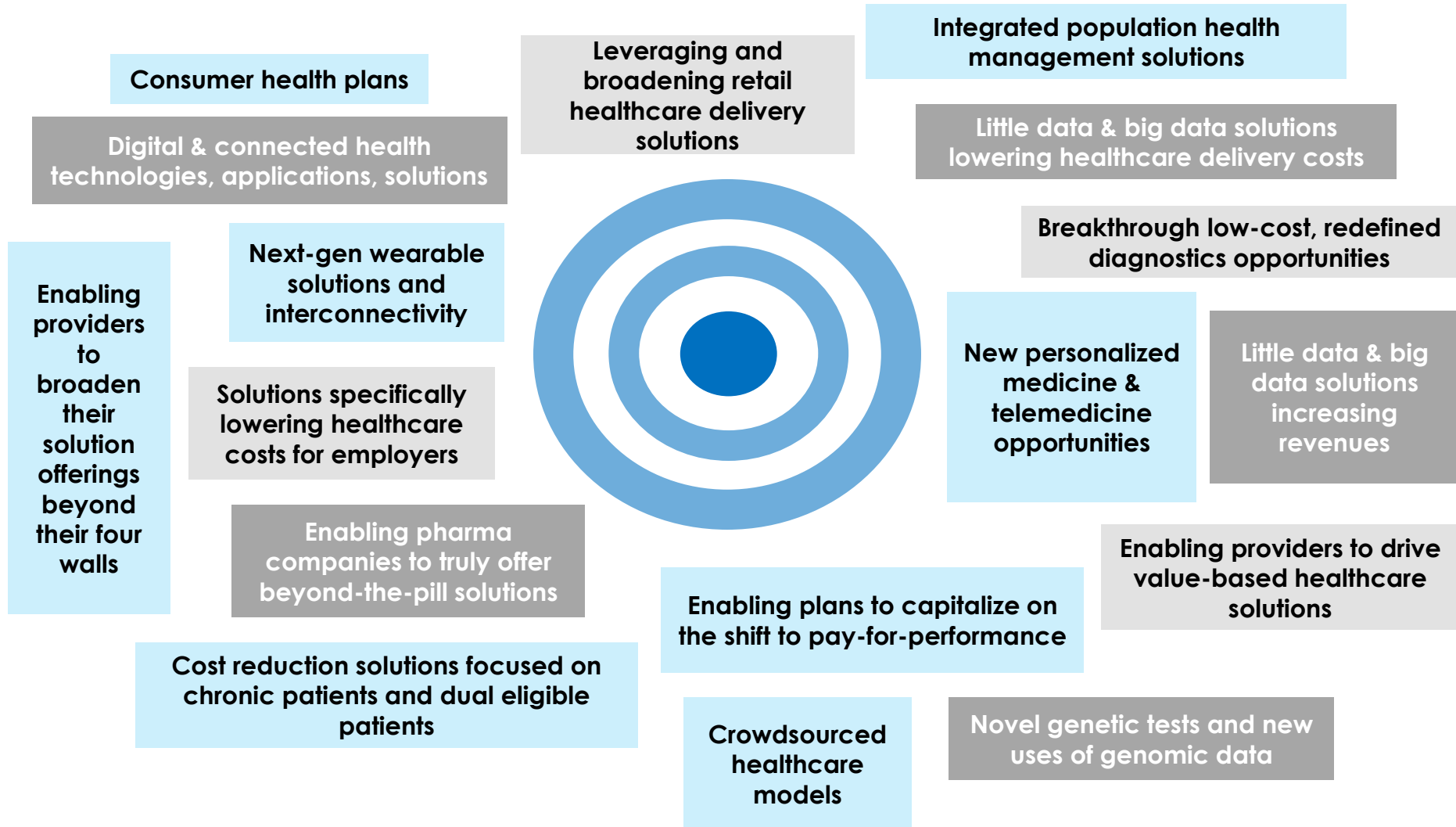


Source: Rock Health Funding Database

We Are Witnessing A Simultaneous Transformation of Healthcare & Venture Capital Industries



Sampling of VC Investment Subsectors Of Interest



What does this mean for Pharma R&D Tech?



The next great
**advance in
healthcare
technology may
come from a
garage!**



VC is a key **leading
indicator** for which
**emerging tech will
“stick”**



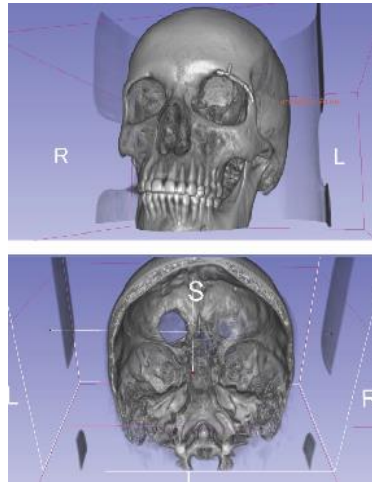
Pharma
**Partnerships with
VCs** to fund startups
may become
commonplace



Applications and Possibilities of 3D printing in Pharma



Emerging Technologies are fueling innovations in healthcare that will revolutionize treatment.....



Michael Balzer saved his wife's eyesight by **3D printing a model of her skull**, with a life threatening tumor inside of it, which allowed a surgeon to perform a delicate and novel operation with minimal invasion

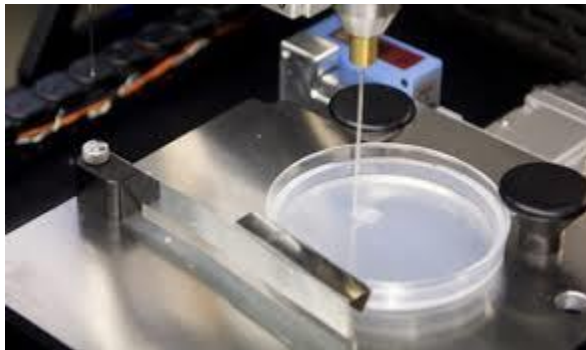
Source: <http://elitedaily.com/news/world/man-helps-save-wifes-eyesight-3d-printing-skull-tumor/907578/>



While some people are using 3D printers to make guns, scientists at Princeton University are using them to create working human ears. By combining "bio-printed organic materials" and electronics, scientists have created an ear that can hear things that regular human ears can't.

Source: http://www.huffingtonpost.com/2013/05/07/bionic-ear_n_3224379.html

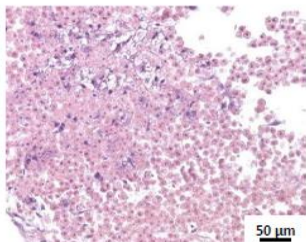
...and help facilitate and accelerate development.



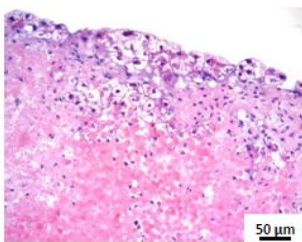
In January of 2015 Organovo Holdings, Inc. ("Organovo"), a three-dimensional biology company focused on delivering breakthrough 3D bioprinting technology, announced that it has performed its first 3D Liver tissue delivery.

Source: <http://www.prnewswire.com/news-releases/organovo-announces-first-delivery-of-3d-liver-tissue-to-key-opinion-leader-242561821.html>

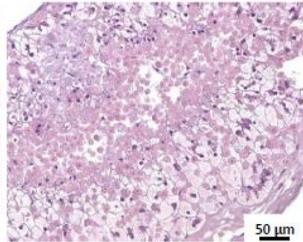
Disruption of cell adhesion



Necrosis



Steatosis



In April of 2015, Organovo enters into a multi-year collaboration agreement with Merck (NYSE:MRK) to develop multiple custom tissue models. The deal includes access to ONVO's exVive3D Human Liver Tissue service.

Source: <http://seekingalpha.com/news/2442606-organovo-inks-collaboration-deal-with-merck-shares-up-17-percent-premarket>

What does this mean for Pharma R&D Tech?



Nanotech will lead to novel drug / device combinations to deliver targeted therapies



More + rapid + complex clinical study data for analysis



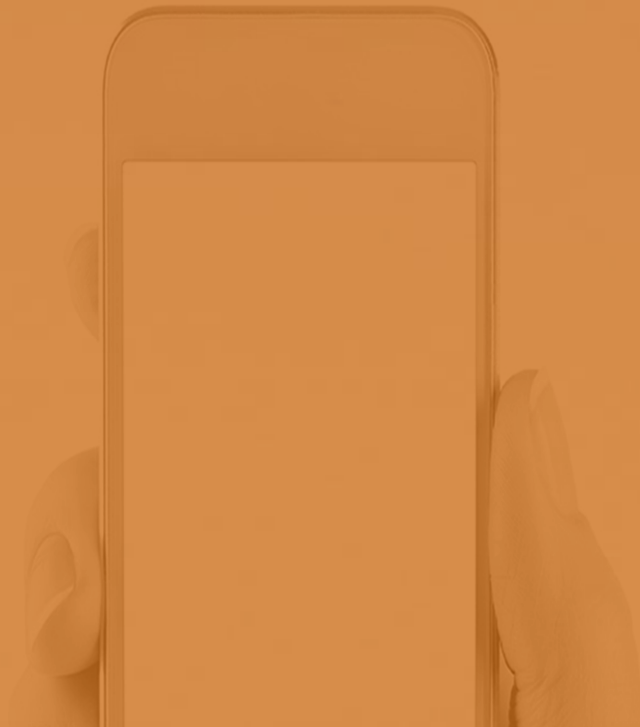
Partially replace pre-clinical and early phase clinical trials



Partnerships with specialized service providers



The Rise of Consumer Technologies In Healthcare and the Impact on Pharma



Do you currently own a wearable device and do you wear it everyday?

21% By the end of 2015, wearable companies shipped ~7.6 million units within the just the US, up **200%** from 2013.

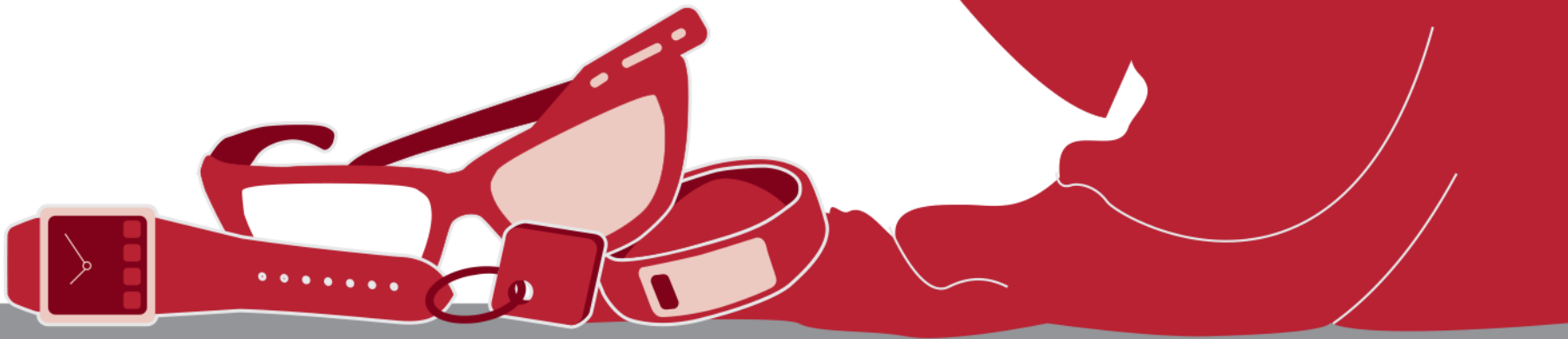
of US consumers currently own a wearable technology product

- 2% no longer use it
- 2% wear it a few times a month
- 7% wear it a few times a week
- 10% wear it everyday

Source: HRI/CIS Wearables consumer survey 2014

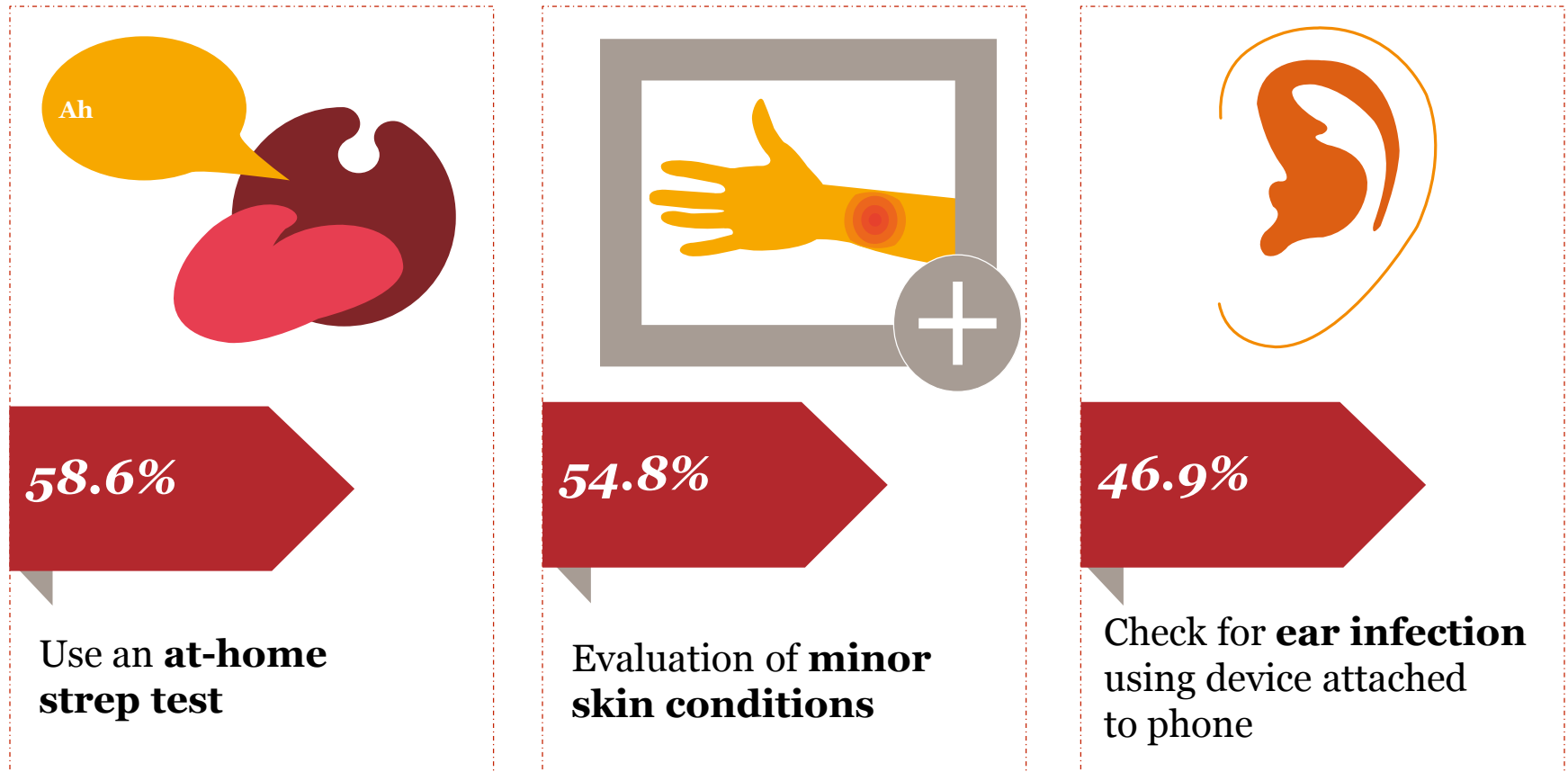
Consumer technology will increasingly become part of the health experience

More than **one million customers** transmit data from fitness trackers to Walgreen Co., in exchange for points that can be used like cash in the company's stores and through its website for many products.



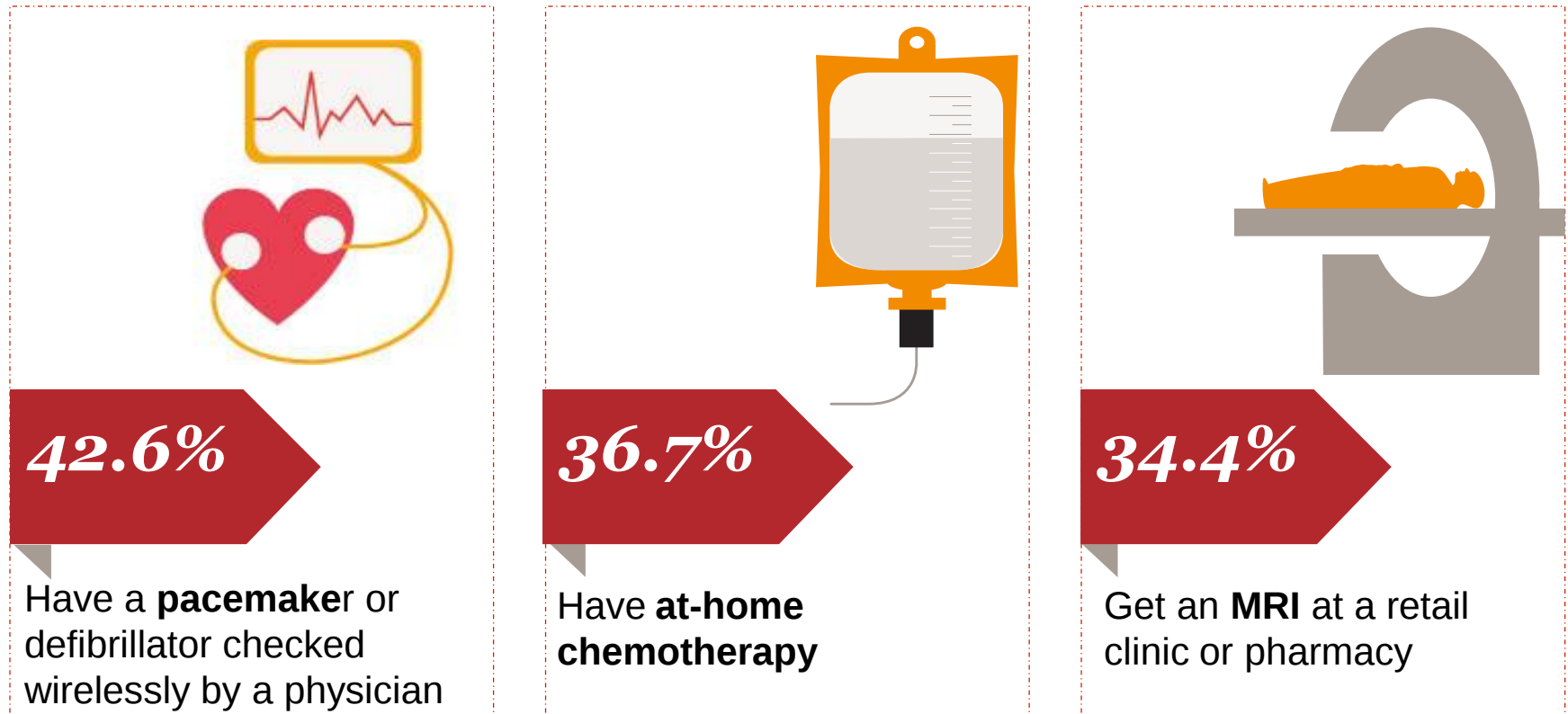
Consumers are ready to abandon traditional care models for more digital, do-it-yourself options

Percent of respondents answering “Very likely” and “Somewhat likely” to consider these alternatives:



Even when it comes to more intensive services, consumers are open to new options

Percent of respondents answering “Very likely” and “Somewhat likely” to consider these alternatives:



...what will happen if your traditional partners or providers become less relevant?

What does this mean for Pharma R&D Tech?



Perception of Pharma –
R&D IT can be
part of the
change



Demand for
transparency
by consumer
and regulators



Constant, **“always
on” data stream**
from patients using a
variety of
technologies and
partners

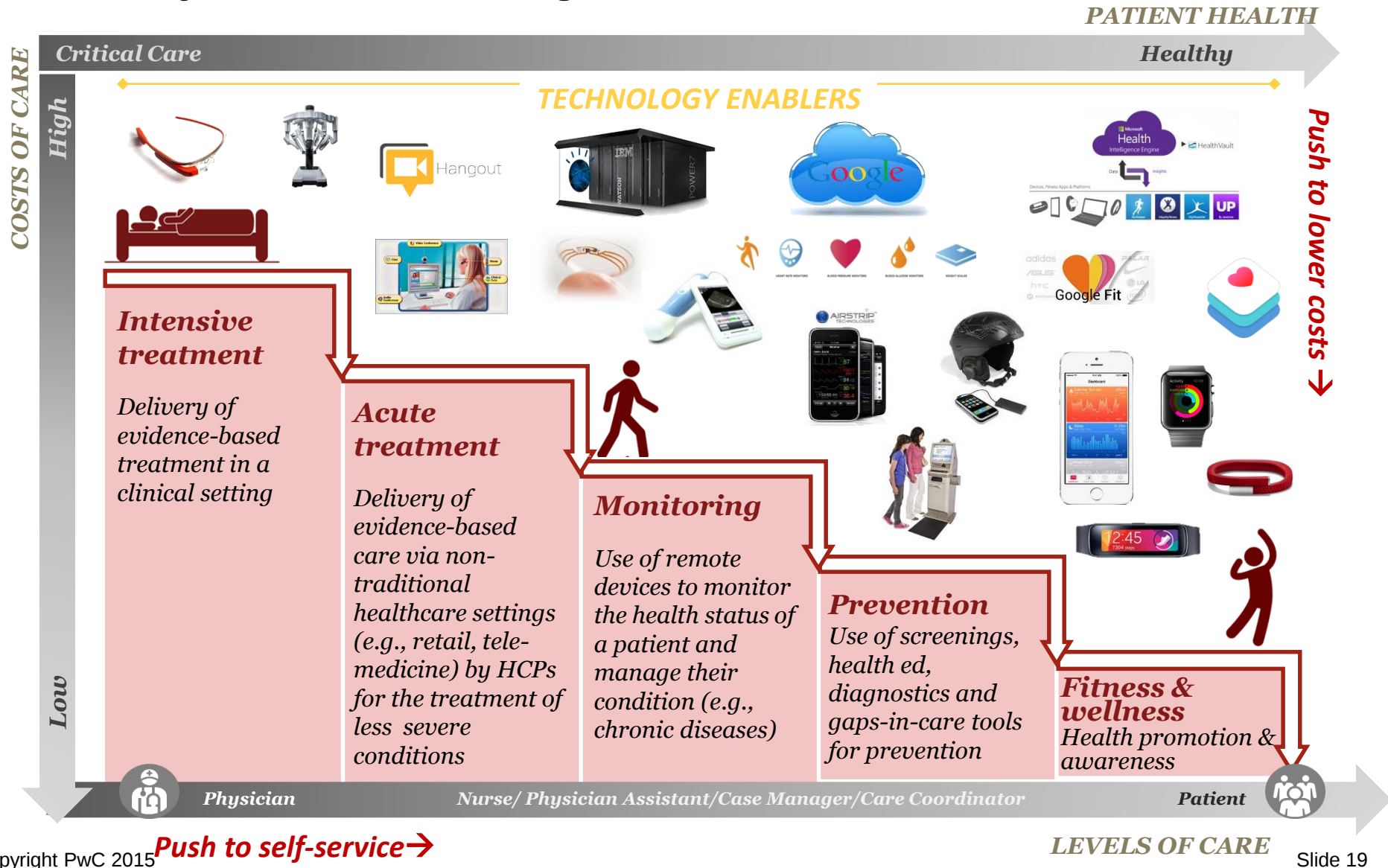


New Entrants

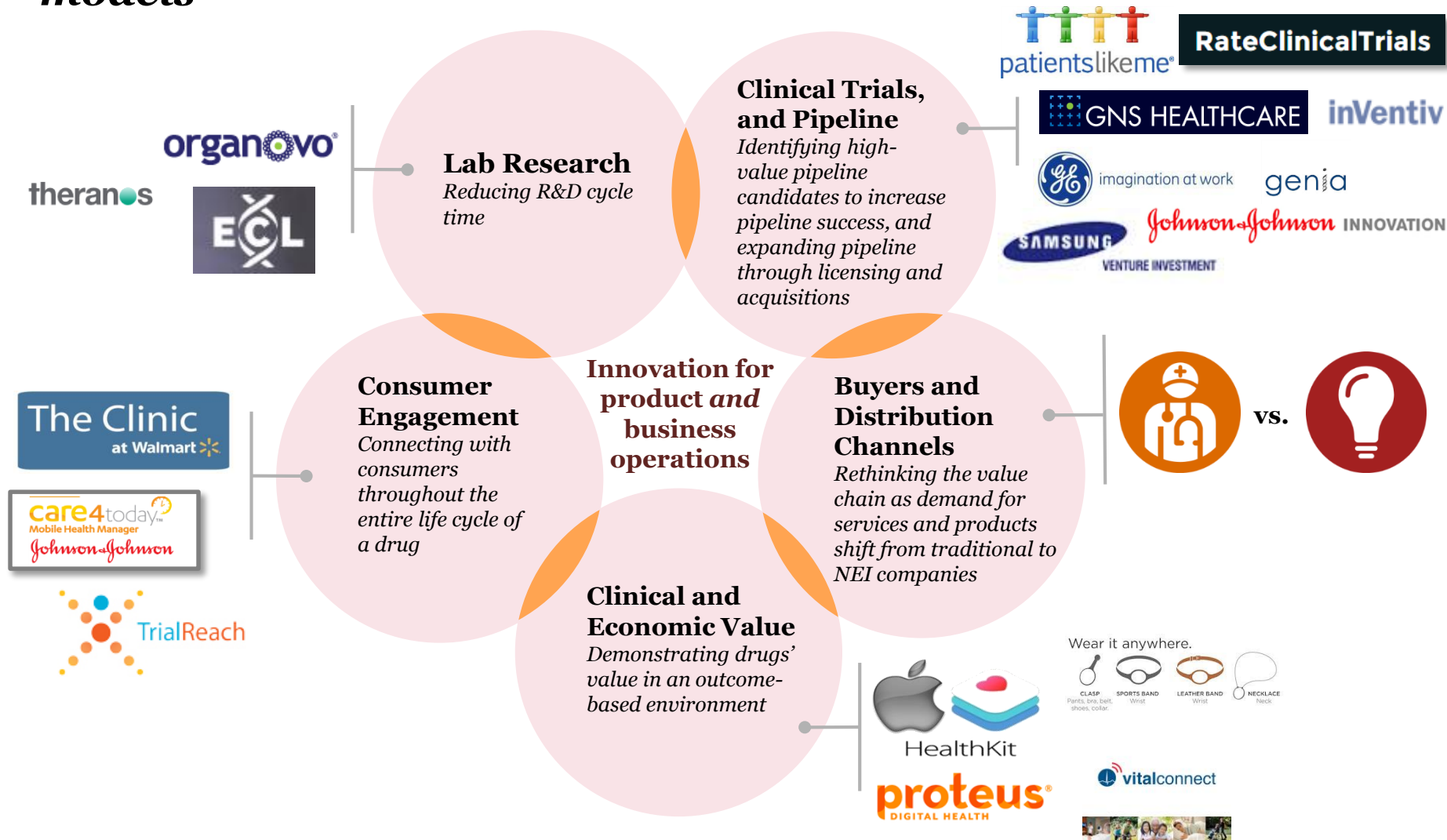
How non-traditional Life
Sciences technology companies
are disrupting Pharma tech



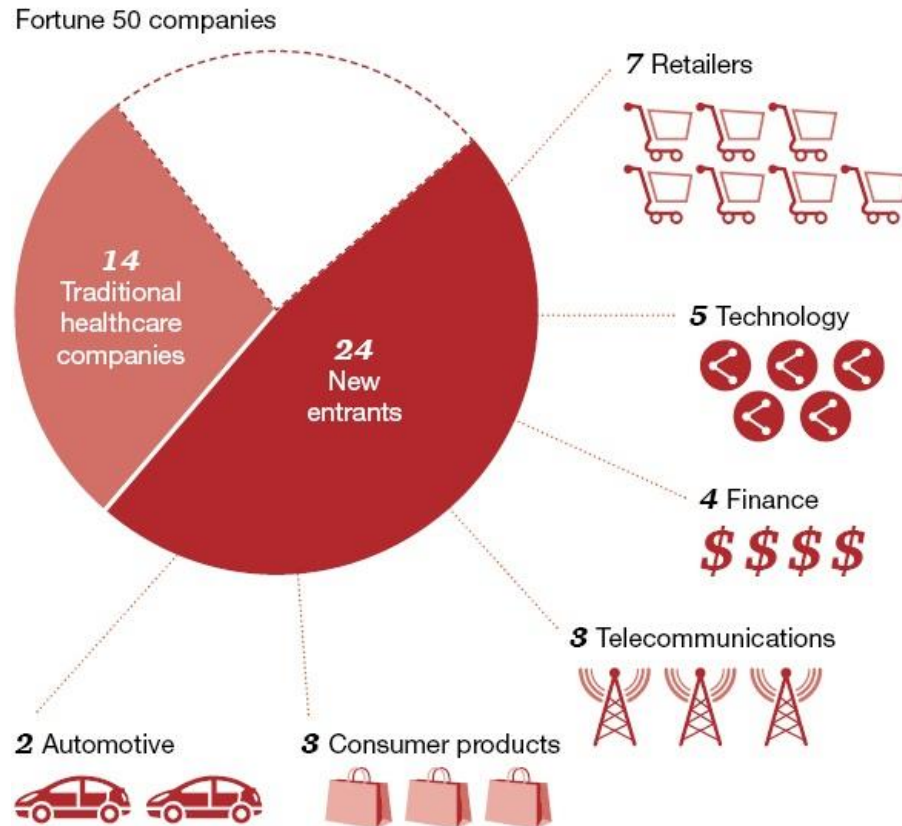
New Entrants are creating new models to deliver health, with a focus on delivering low cost, convenient care...



....and are disrupting traditional R&D and commercial models



Nearly half of Fortune 50 companies are healthcare new entrants or are funding new entrants



Source: Fortune 50, 2013



What does this mean for Pharma R&D Tech?



Shift focus from products to **services**



Collaborate with new entrants to get closer to the patient



Leverage **data & analytics** for new scientific insights



Operate as a **lean startup** while sustaining the core business



Partner with New Entrants & Innovators



An Exciting Day Ahead –

3D Printing of MicroRobots

Human Brain Project

Poster Sessions

NextGen Games for Health

Data Revolutions, AI and Health

...and much, much more!

Thank You

Example: Apple ResearchKit may signal that direct patient engagement by the life sciences industry is becoming a reality



**Announced
March 2015**

ResearchKit overview

- Open source software framework that allows developers and researchers to create apps for medical research
- Gives anyone with an iOS device the opportunity to participate in medical research, join programs that can help them track their symptoms, or share information with their doctors
- Sensors/surveys measures patient's gait, motor impairments, fitness, speech, memory; all of these data points can be sent to researchers to compile and study

Notable partnerships / uses

- 14 of the top 25 hospitals are collaborating with Apple ResearchKit, including:

Mount Sinai (Athasmahealth)

MGH (Glucosuccess)

Stanford (MyHeart Counts)



University of Rochester (mPower)

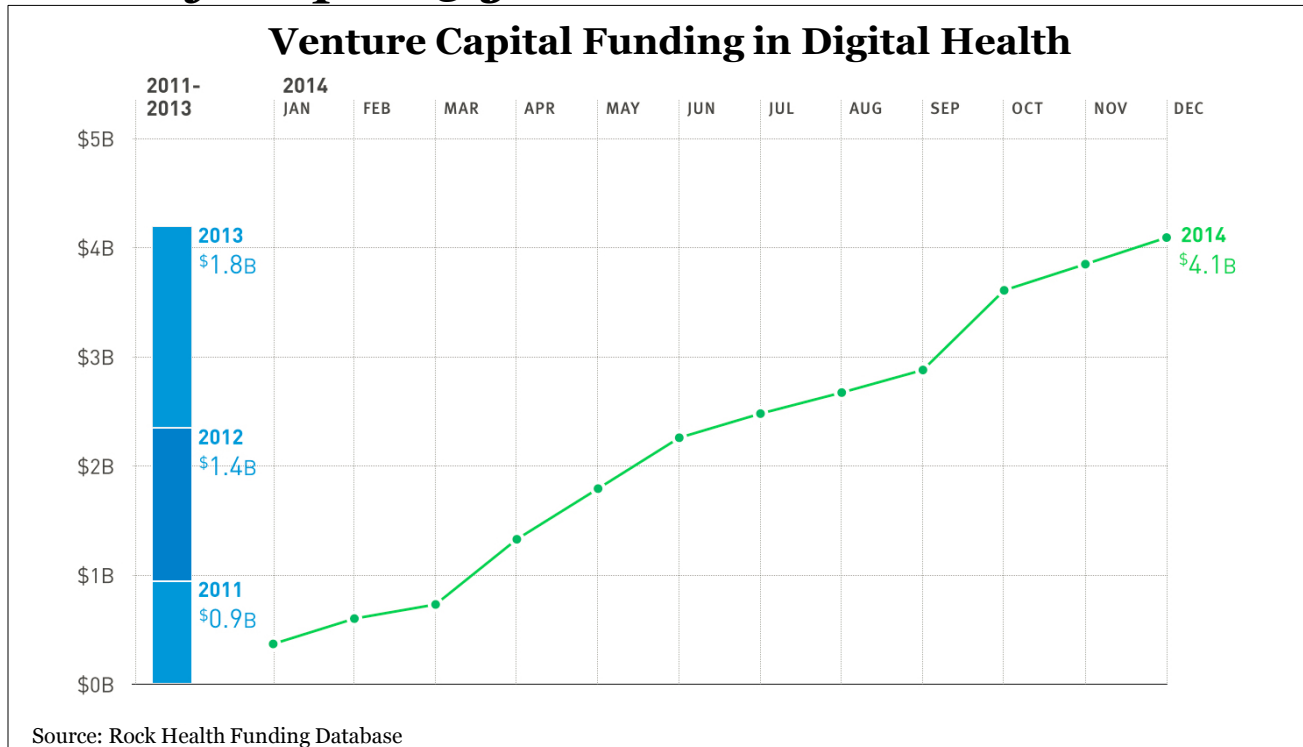
Dana Farber (Share the Journey)



Potential implications

- Transforms a device that millions of people already use into a new medical research channel and a tool consumers can use to improve their health
- Real-time data capture, high frequency and accuracy
- New source / unprecedented scale of patient recruitment for medical trials

Venture capital investments in digital health*, a leading indicator of economic trends, has increased in 2015 to a total greater than that of the past 3 years combined



Digital Health Funding in 2015 exceeded **\$4.1 billion**, which represents a growth of 124% over last year's investment total



\$172 Million



\$135 Million



\$54 Million



\$36 Million



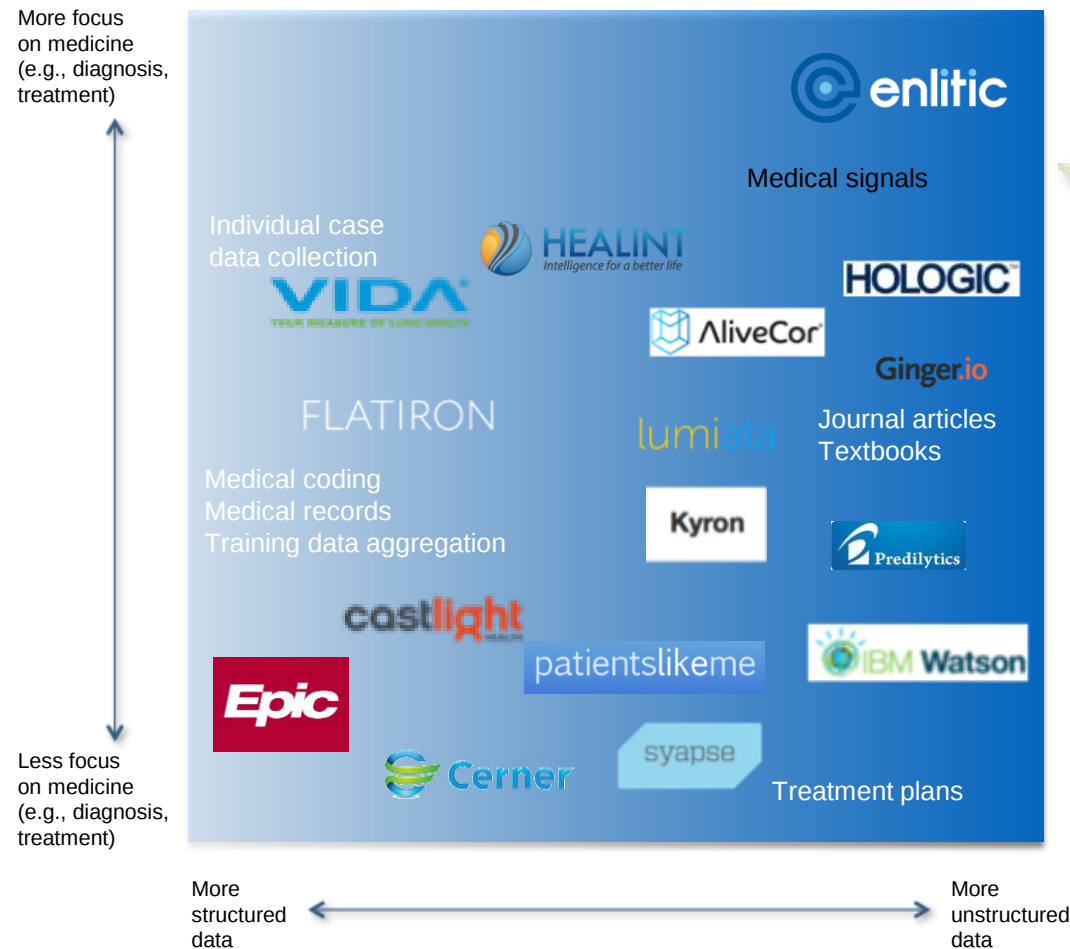
\$29 Million

**Digital health is defined as the intersection of healthcare and technology. Digital health venture funding tracked by Rock Health only includes technology-enabled health companies that build and sell technologies in medicine, wellness, or administration*

Source: Rock Health Funding Database
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Several startups are leveraging machine learning for unstructured data to improve patient outcomes

Example



- Enlitic leverages the **most significant untapped data sources** within healthcare — **medical signals and plain text**
- Medical signal examples: **medical images** (CT, MRI, pathology, ultrasound, x-ray), **EKG, genetics**