



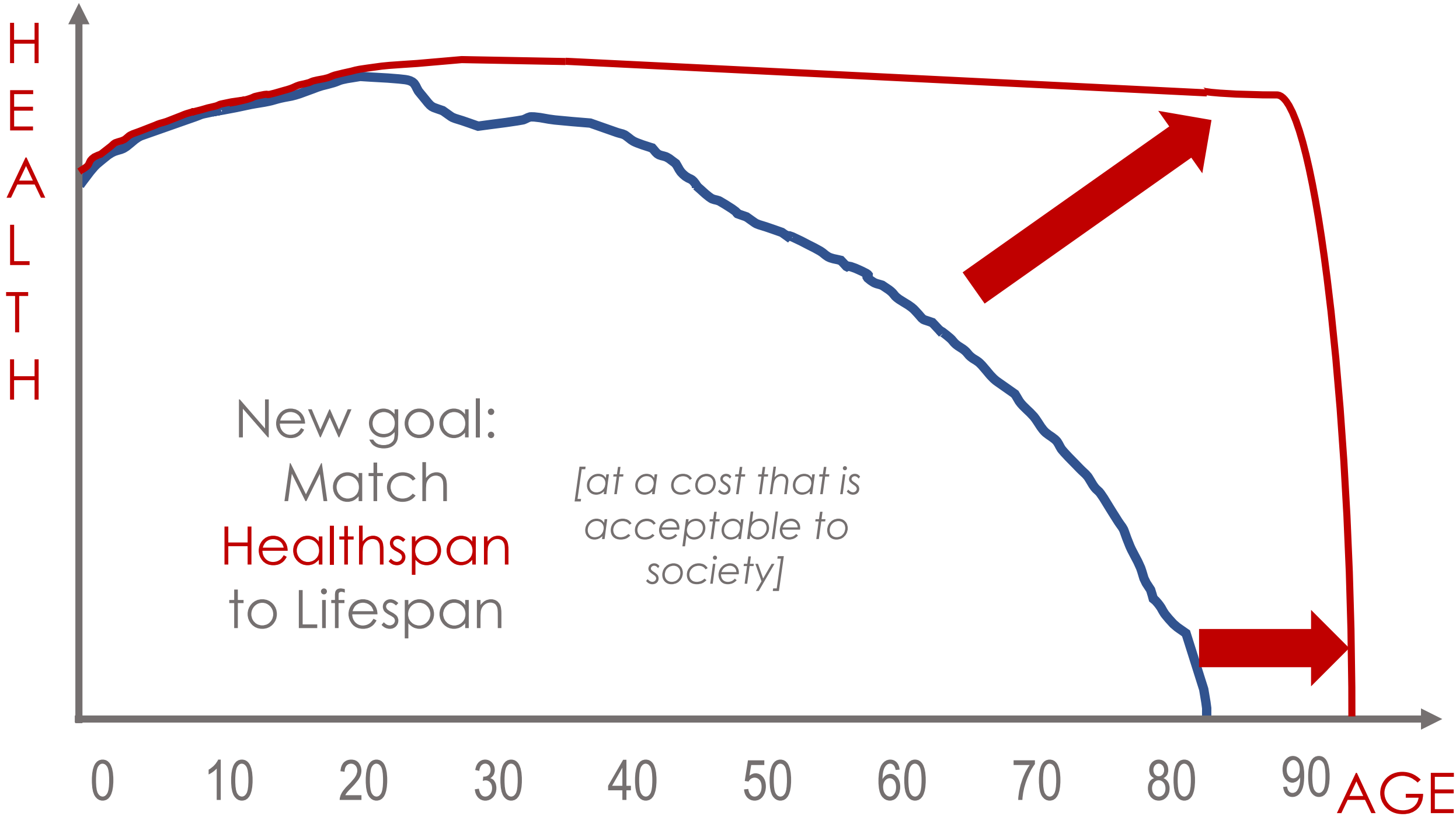
# The Future of Health

Zayna Khayat, PhD  
Future Strategist, SE Health

4 September 2019  
London, Ontario



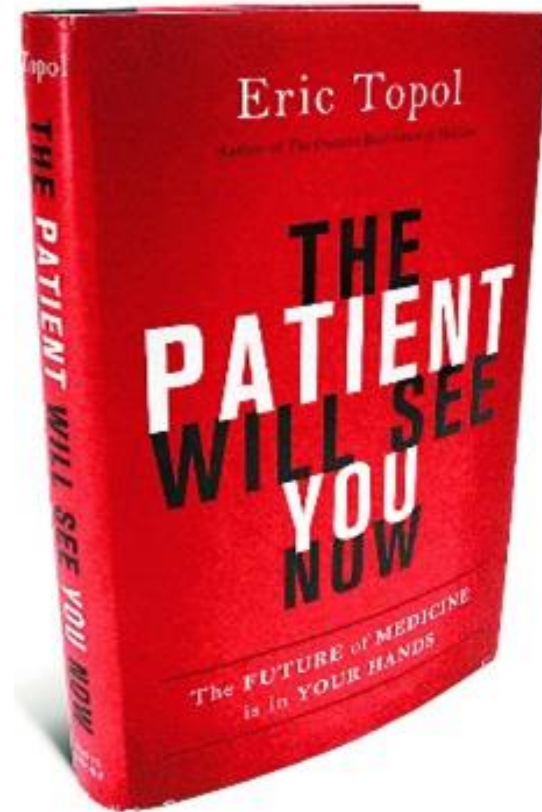
@ZaynaKhayat  
@SEHC\_SEHealth  
@SEFutures



# Future of Health

**New paradigm:**  
The Person

**Central paradigm:**  
The system

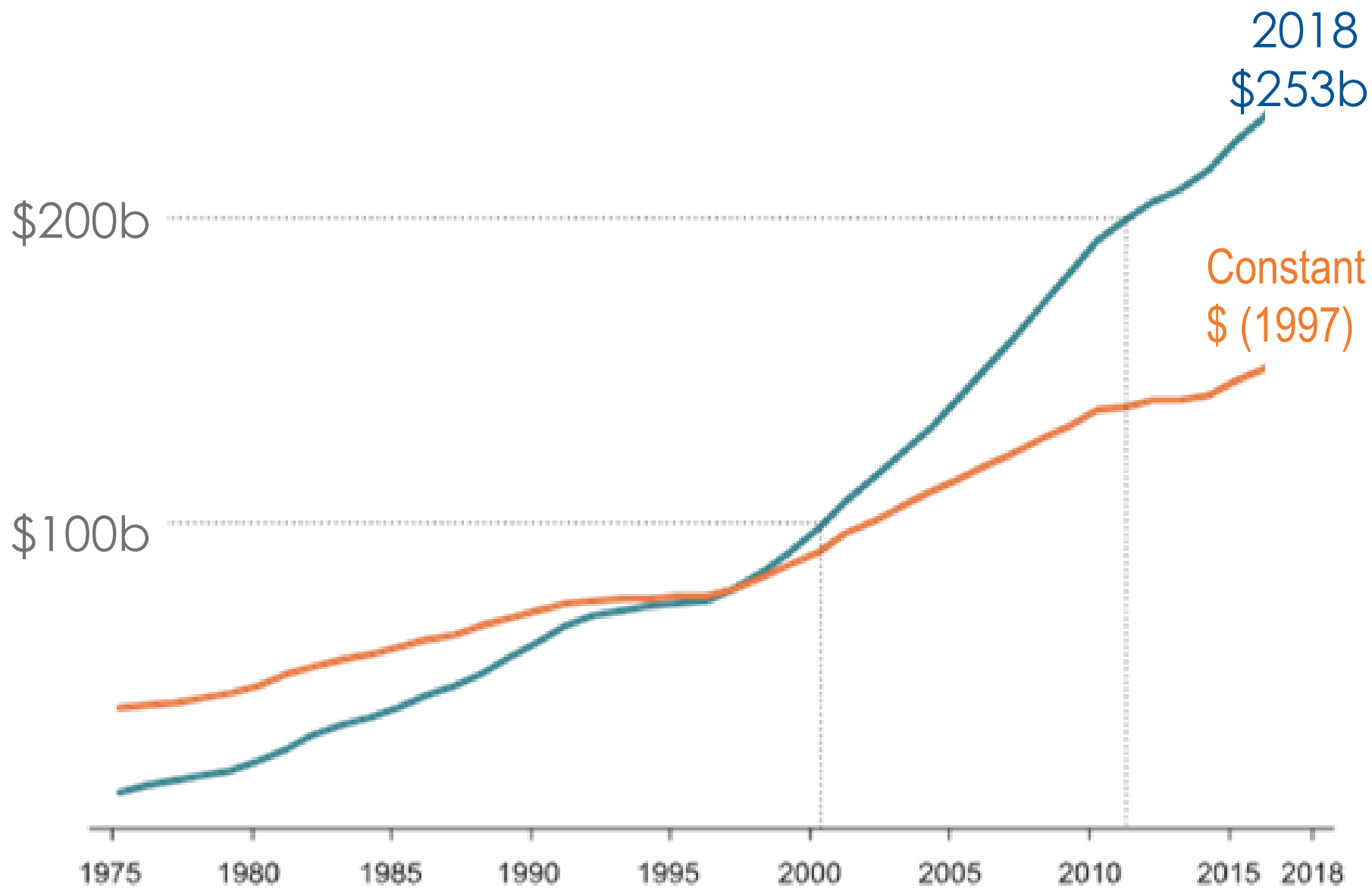


# Future of Health

**Central paradigm:**  
The system

**New paradigm:**  
The Person





~11%  
of GDP

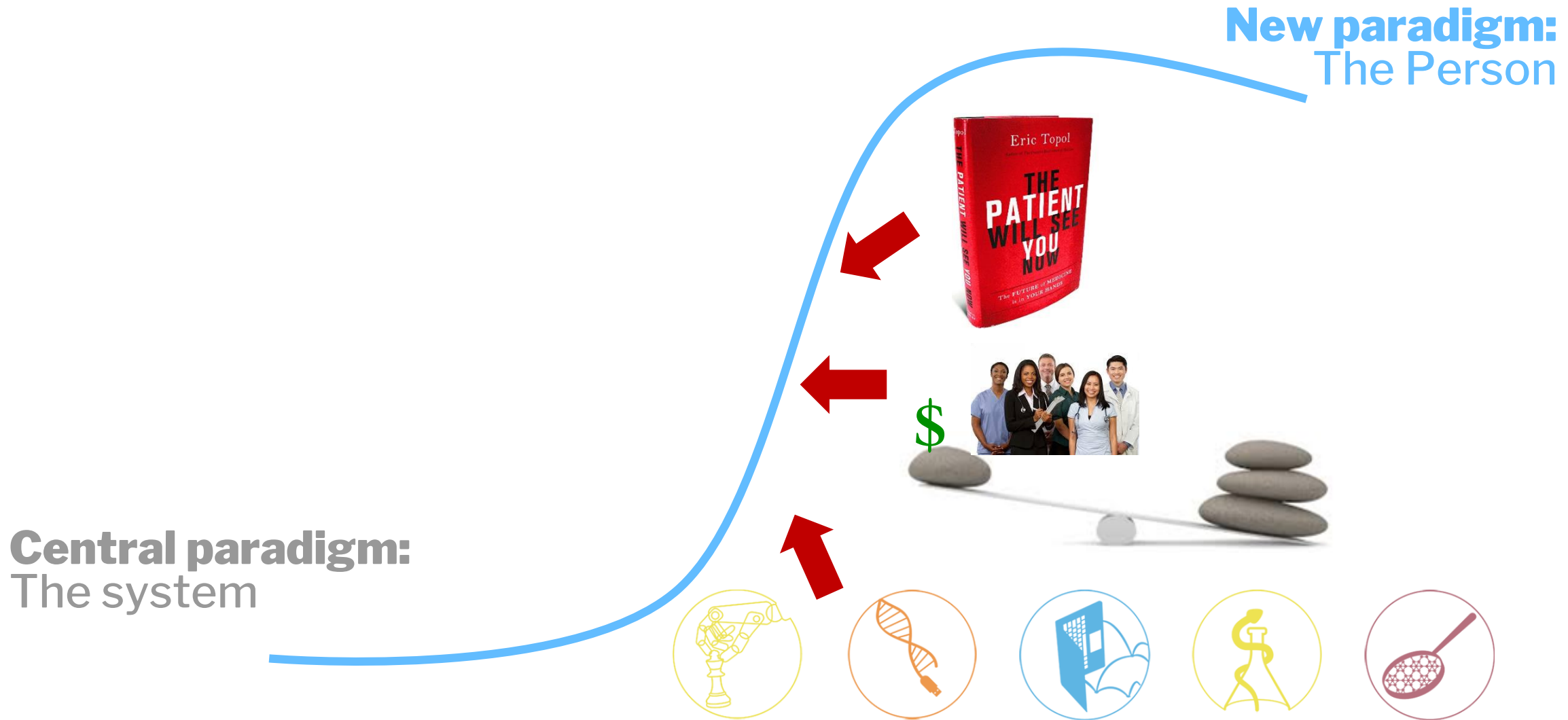


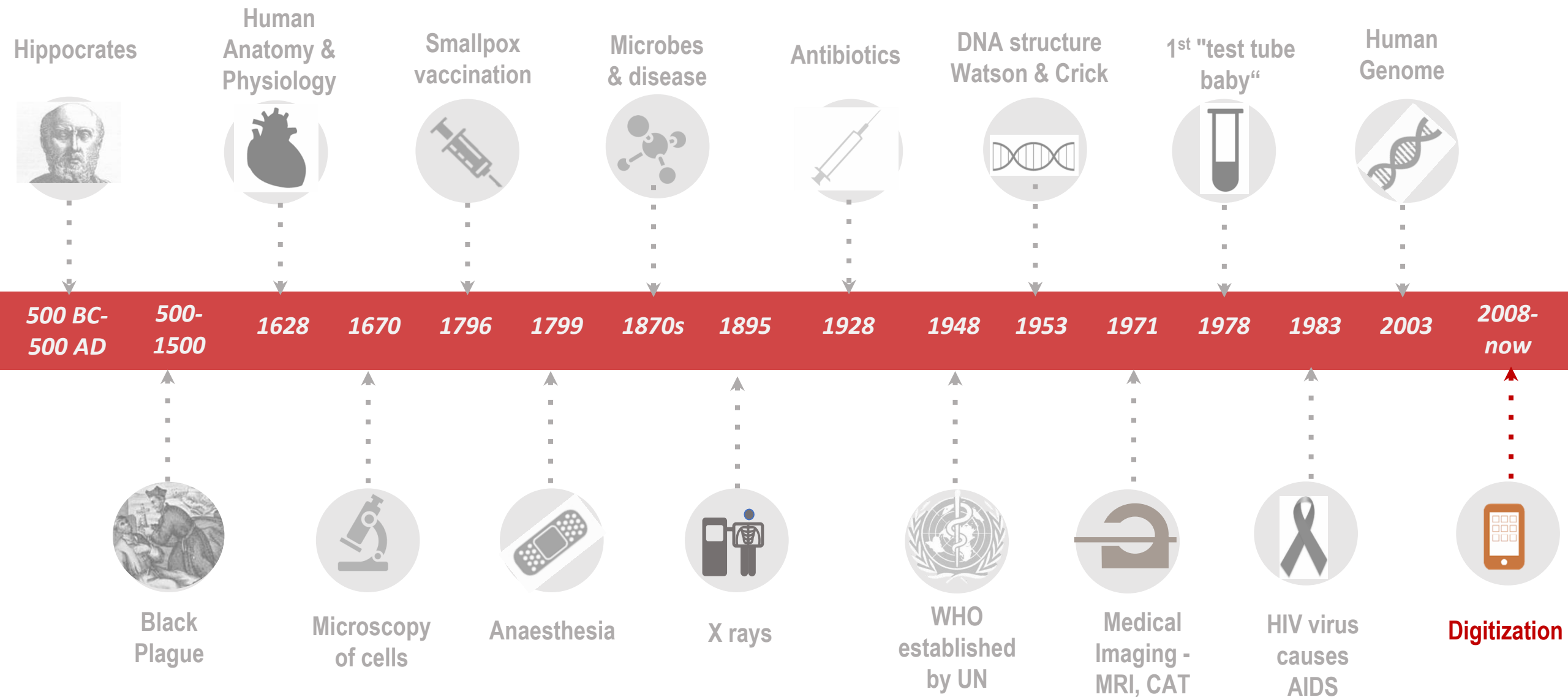
~\$7k  
per person



>2M  
health workers

# Future of Health







# Emerging technologies in health & care

**AI -  
Predictalytics**



**Voice  
Recognition**



**Virtual  
Reality**



**Blockchain**



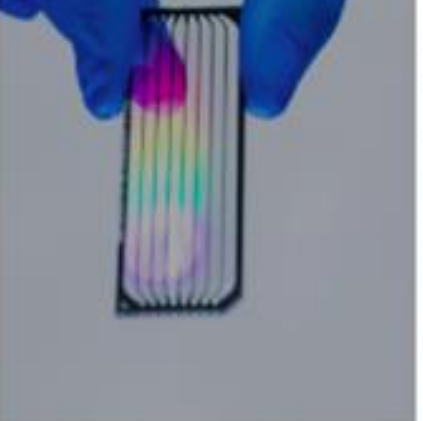
**Sensors –  
IoT**



**3D  
Printing**



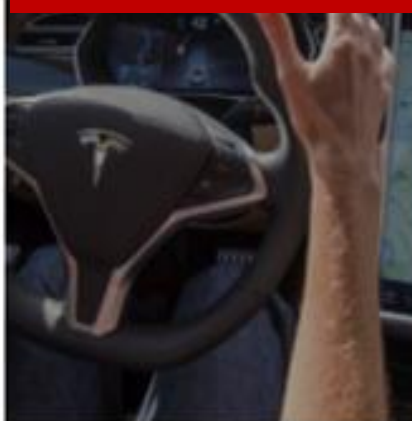
**‘Omics**



**Robotics  
‘bots**



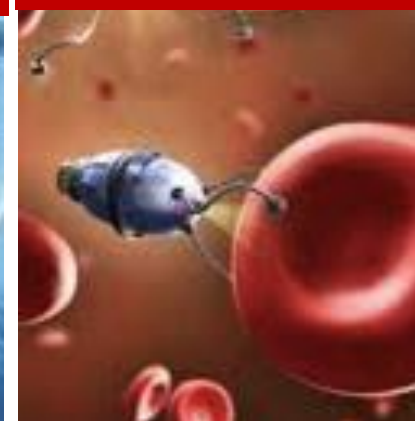
**Autonomous  
Transport**



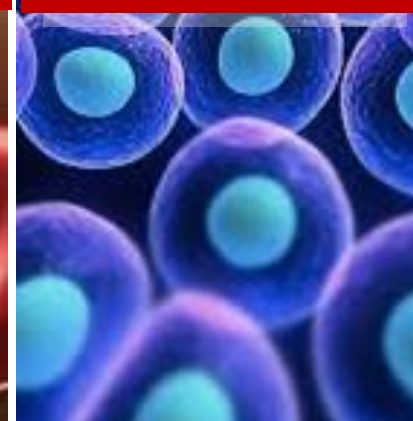
**Neuro  
Tech**



**Nano  
biology**



**Cellular  
Therapy**





# Future of Health(care)

## Today: System

## Future: Person

**TIMING**

Reactive, sick care

Proactive, preventative,  
predictive

**PRECISION**

**MODALITY**

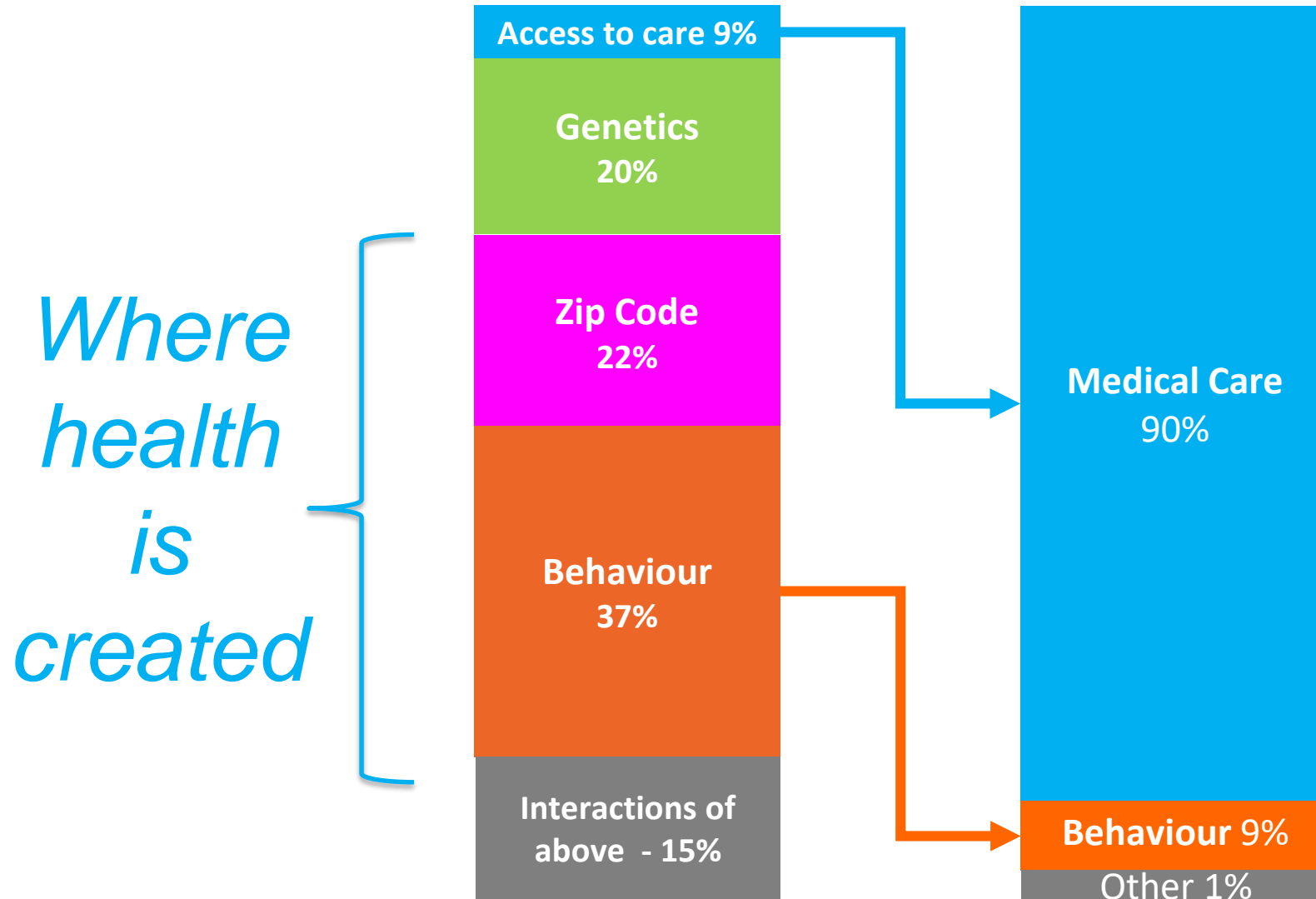
**DURATION**

**POWER**

**CURRENT**

## Drivers of health

## Where we spend [~\$8T]



# From hospital → “health village”



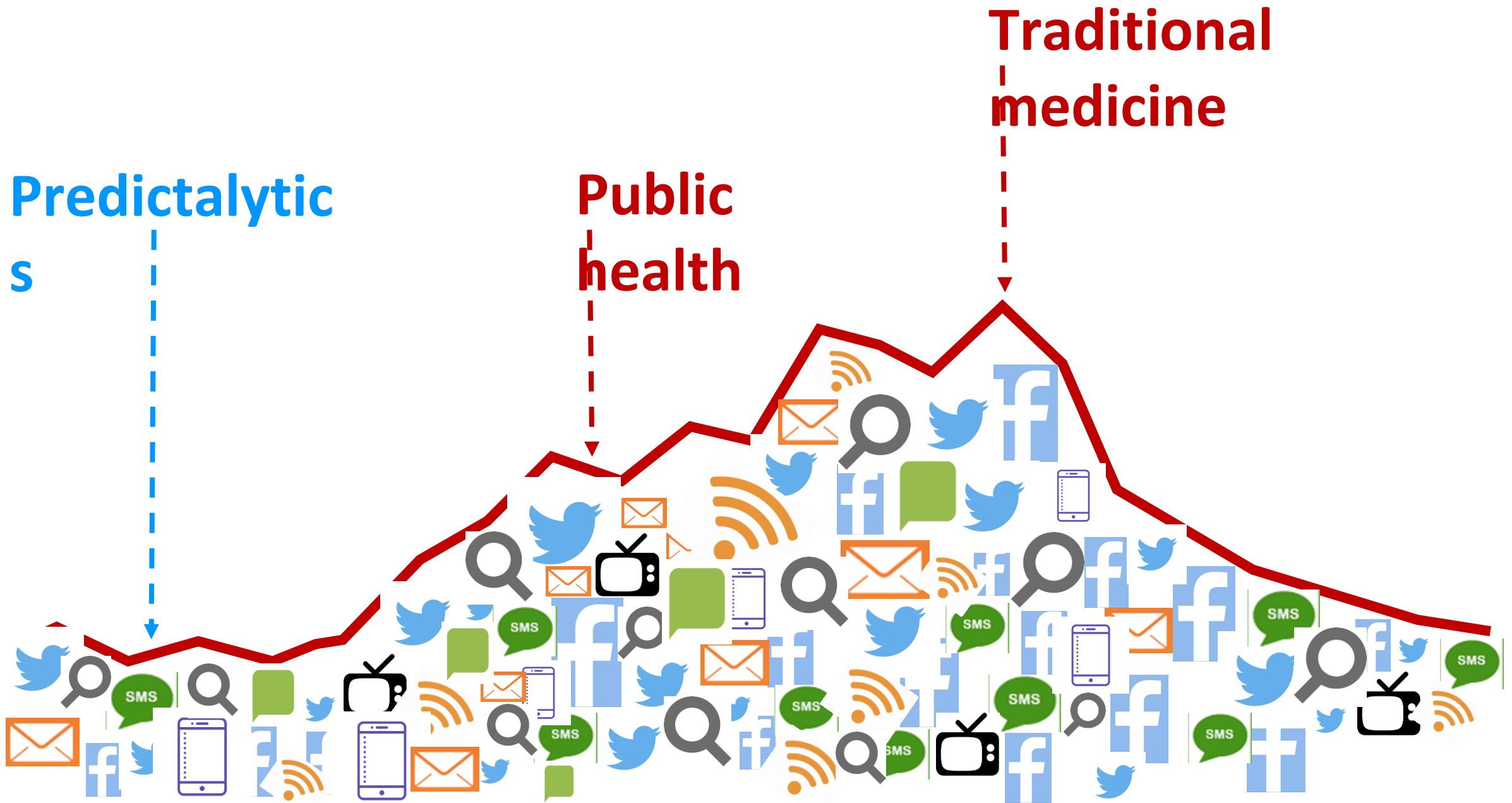
**Farmer's markets**

**Primary care “Plus”** – social determinants

**\$200M Impact Fund** – housing units



Housing | Transportation | Employment



# Future of Health

**TIMING**

**PRECISION**

**Today:  
System**

Reactive, sick care

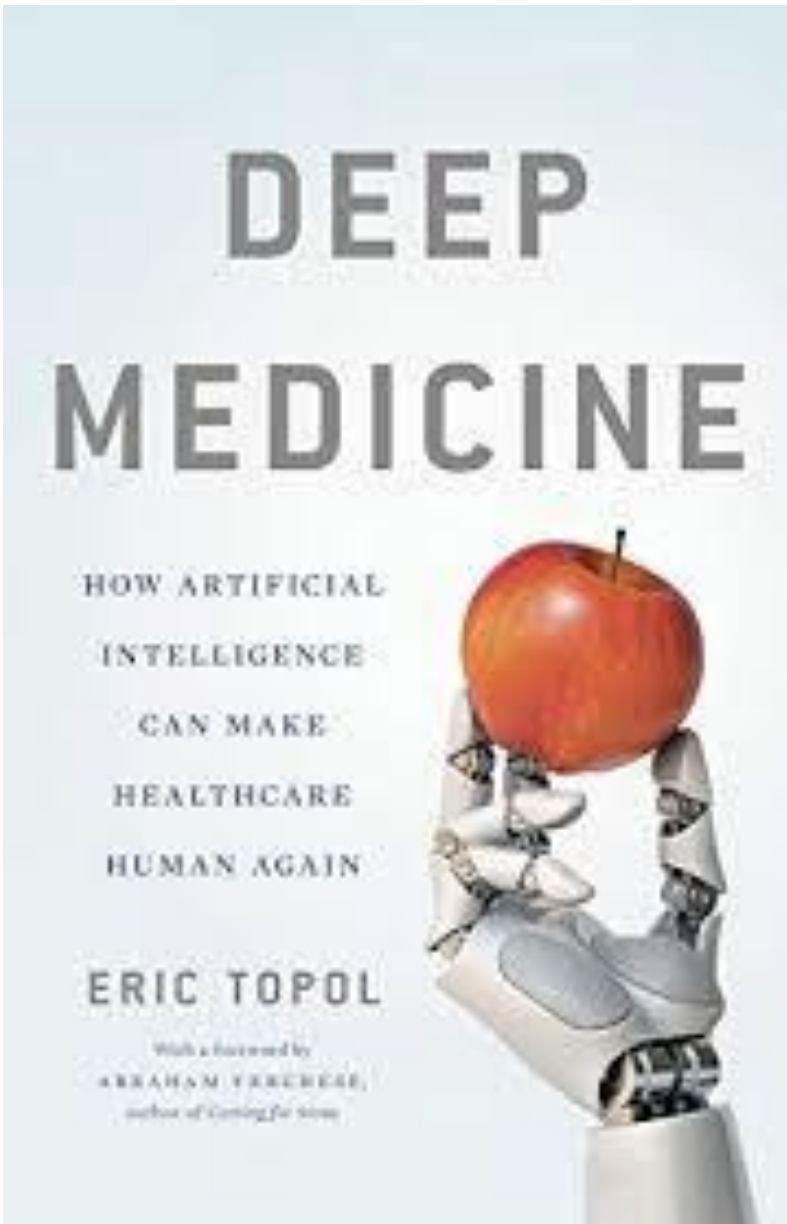
1 size fits all, crude, analog

**Future:  
Person**

Proactive, preventative,

predictive

Personalized, intelligent



	Clinical	Patient-generated	SDOH
Phenomic	Health record <ul style="list-style-type: none"><li>• Chart</li><li>• Images, Rx</li></ul>		
(Gene)omic			



Medicine has been a clinical science,  
supported by data.



Medicine is about to become a data science,  
supported by clinicians.

“for the first time ever in history,

we will be **present** when a person gets sick.

Professionals will **subscribe** to patients’ data

The middle-man will become disrupted “

@lucienengelen

# Future of Health = Care Anywhere

## Today: System

## Future: Person

**TIMING**

Reactive, sick care

Proactive, preventative,

**PRECISION**

1 size fits all, crude, analog

predictive

**MODALITY**

Institution-centred

Personalized, intelligent

Digi-cal | decentralized

De-centralized  
De-physicalized  
Dis-intermediated  
Digi-cal



Brick  
s



Peopl  
e



Paper &  
Pens



Fax  
Machines



Pager  
s



CD  
s

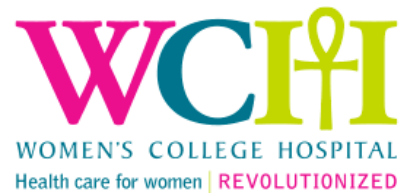
*“Healthcare  
with no  
address”*



*“Care anywhere”*



*“Hospital to keep you  
out of the hospital”*



*“Digital first,  
physical next”*





# “Omni-channel” access to clinicians



Image source: Google images

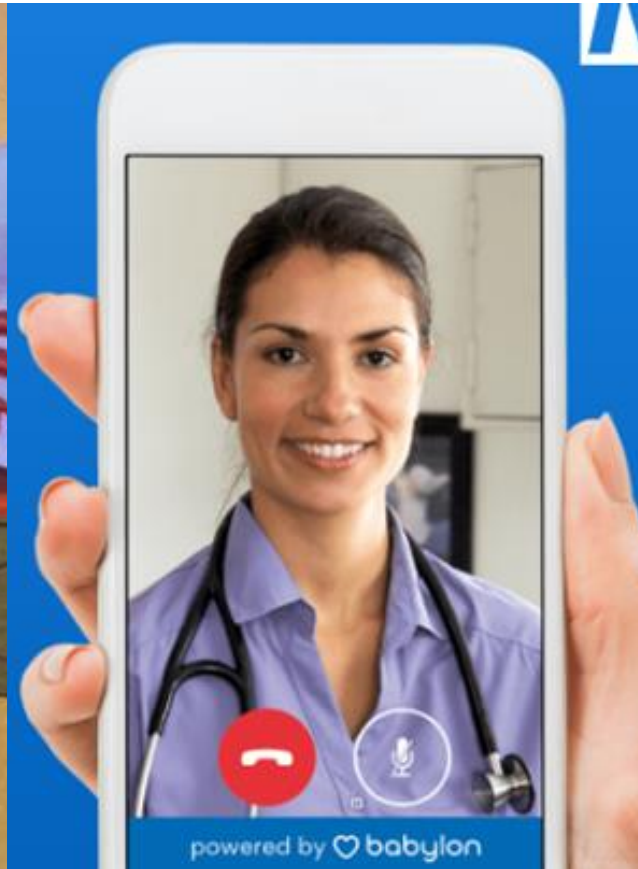


Image source: Babylon Health / NHS



Image source: Microsoft Health



# % virtual medical visits



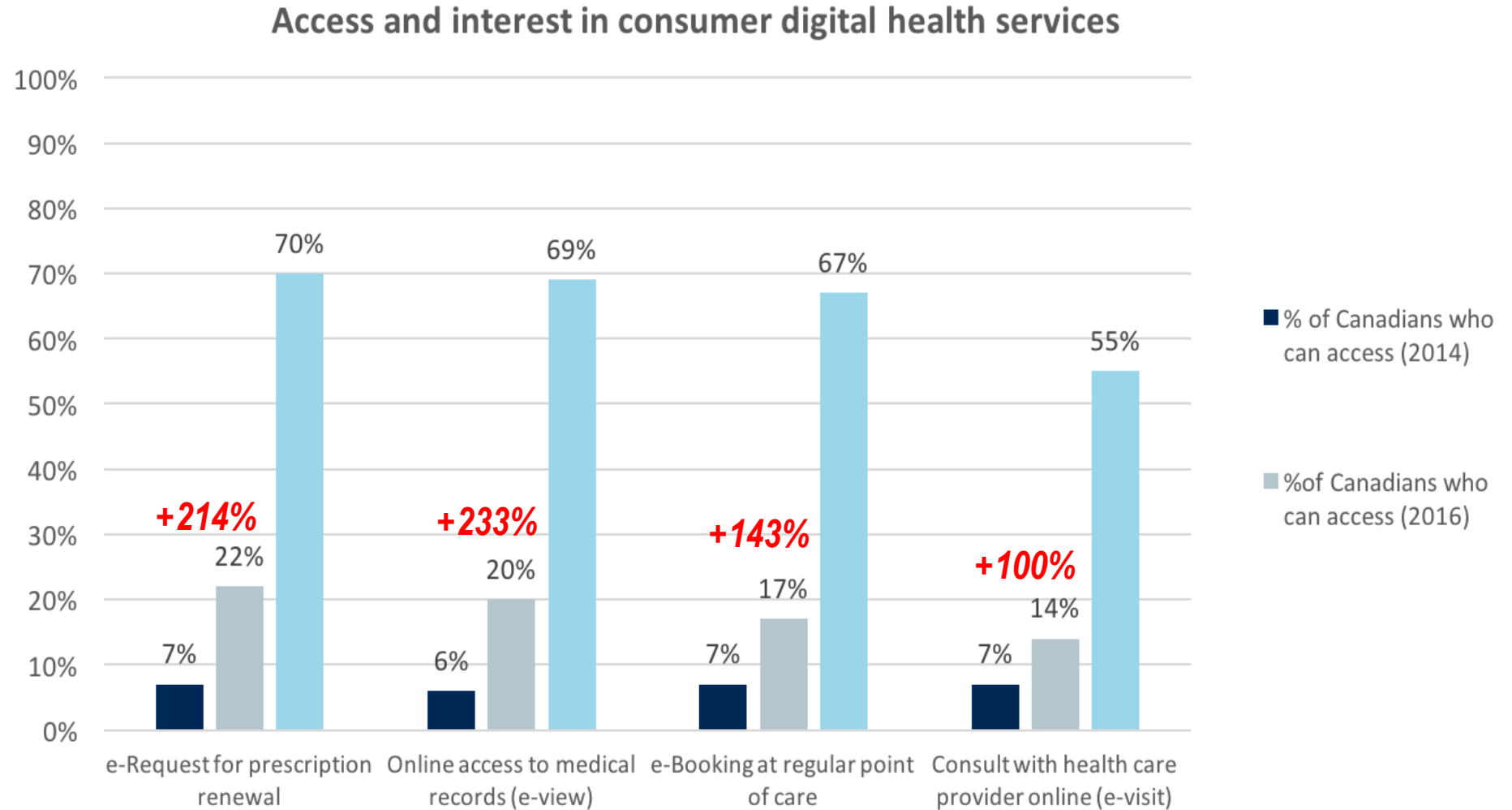
>60%



<0.3%



# Canadians want digital access



# Threshold changes in miniaturization, affordability



# Future of Health

	Today: System
TIMING	Reactive, sick care
PRECISION	1 size fits all, crude, analog
MODALITY	Institution-centred
DURATION	Episodic, intermittent, silo'd

Future: Person
Proactive, preventative, predictive
Personalized, intelligent
Digi-cal   decentralized
Continuous   team

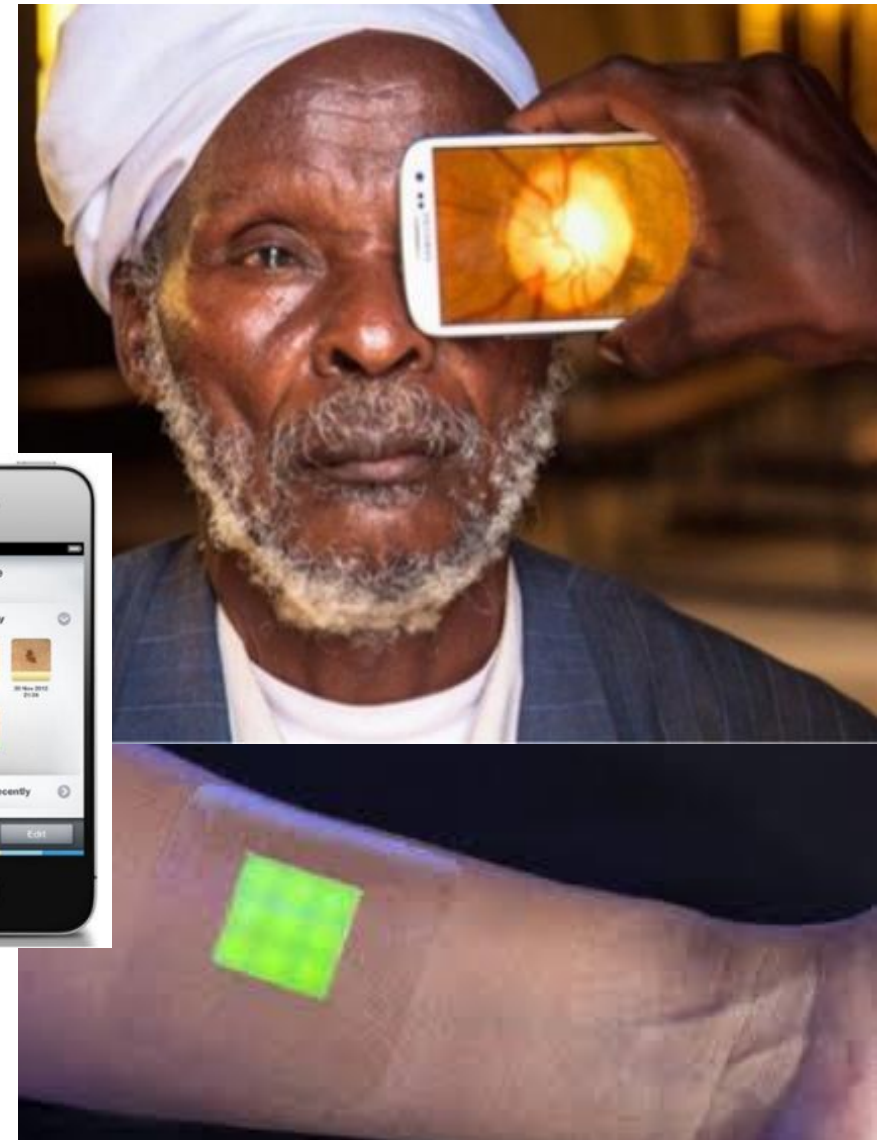




# Personal diagnostics, continuous monitoring

Hours  
accessing  
formal care

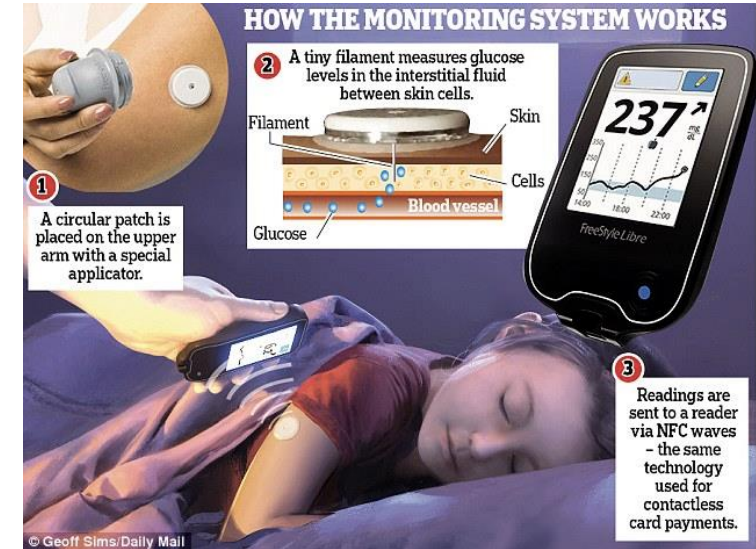
Hours living  
with chronic  
illness  
(5,800 hrs /  
year)



*“Consumer devices in our homes will know more  
about us than the clinic”*



# Sensors: 24/7 remote monitoring





# Future of Health

## Today: System

<b>TIMING</b>	Reactive, sick care
<b>PRECISION</b>	1 size fits all, crude, analog
<b>MODALITY</b>	Institution-centred
<b>DURATION</b>	Episodic, intermittent, silo'd
<b>POWER</b>	Provider

## Future: Person

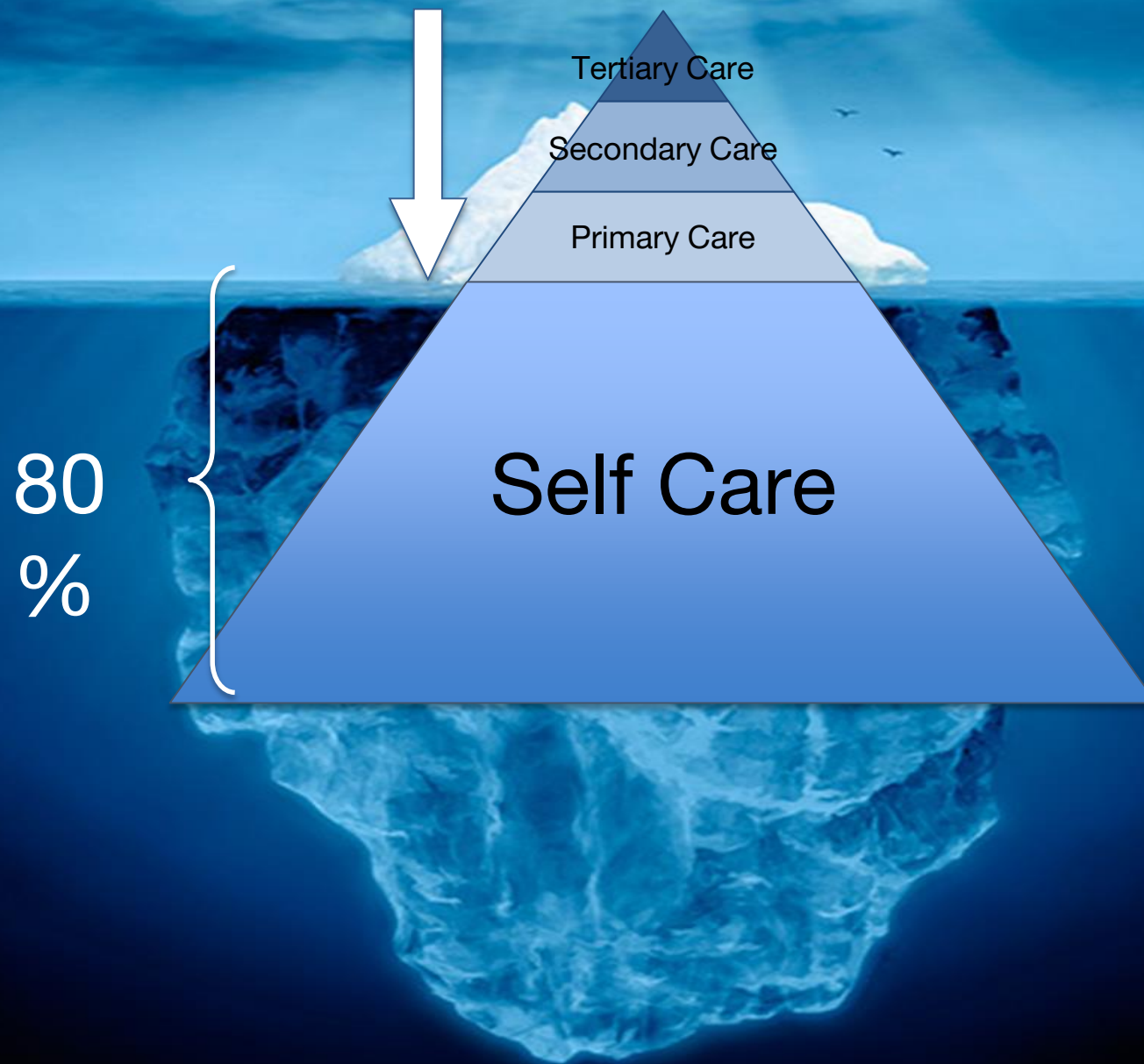
Proactive, preventative,  
predictive  
Personalized, intelligent  
Digi-cal | decentralized  
Continuous | team  
People-powered



Wellcome Images

“The obedience of a patient to the prescriptions of his physician should be prompt and implicit. [The patient] should never permit his own crude opinions as to their fitness to influence his attention to them.”

- AMA's Code of Medical Ethics (1847)



*“untapped renewable resource in healthcare”*  
- Mark Britnell (KPMG)

*“Most exciting innovation of our era is not access to medical information, but access to each other”*  
- Susannah Fox (HHS)

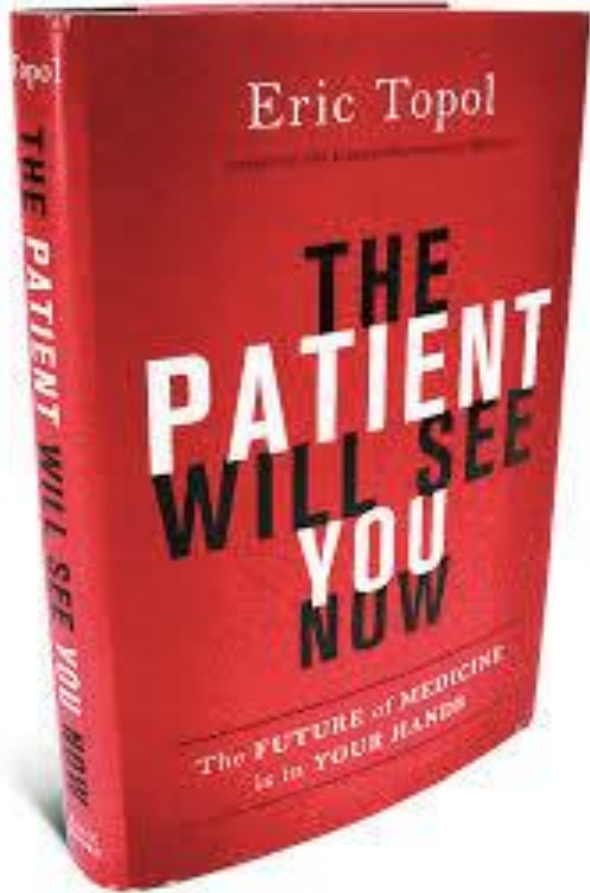




*“If you can have a social network of 1.4 billion people, why can’t you have a medical network of billions of people?”*

- DR. ERIC TOPOL

# Patient uprising; citizen hackers



**Patient Innovation**  
SHARING SOLUTIONS, IMPROVING LIFE



**NIGHTSCOUT**  
#WeAreNotWaiting



**OPEN PROSTHETICS**



3  
1



476 views | Mar 15, 2019, 09:00am

## Emulating Visa's Co-Op Structure, Swiss Entrepreneur Launches Health Data Company



**The global people-owned platform for managing your health and medical data in one secure database**



**Patient Innovation**  
SHARING SOLUTIONS, IMPROVING LIFE



@ZaynaKhayat





# Future of Health

## Today: System

**TIMING**

Reactive, sick care

**PRECISION**

1 size fits all, crude, analog

**MODALITY**

Institution-centred

Episodic, intermittent, silo'd

**DURATION**

Provider

Volume, inputs, costs, fee-4-

**POWER**

service

**CURRENCY**

## Future: Person

Proactive, preventative,

predictive

Personalized, intelligent

Digi-cal | decentralized

Continuous | team

People-powered

Value, outcomes, fee-4-health

# Bundled payments

## PPATH Putting Patients at the Heart Cardiac Surgery Bundled Care



Integrated Care  
Coordinators



Integrated  
Patient Record



Virtual Care &  
Telemonitoring



Virtual Rounds



24/7 Phone line



Follow-up clinic

▼ **2 Days**  
Length of Stay

▼ **38%**  
Readmission Rate

▲ **230%**  
Patients Receiving  
Community Supports

▼ **13%**  
Overall Costs



Trillium  
Health Partners  
Better Together

Saint Elizabeth  
*Well beyond health care*



## How does Omada Health make money?

The company's model is outcome-based: the more weight the patient loses the more money it makes



Like 12

Tweet

2

in Share

338

G+

p Share

304

Innovation series by Steven Loeb

February 3, 2017

Short URL: <http://vator.tv/n/48d9>



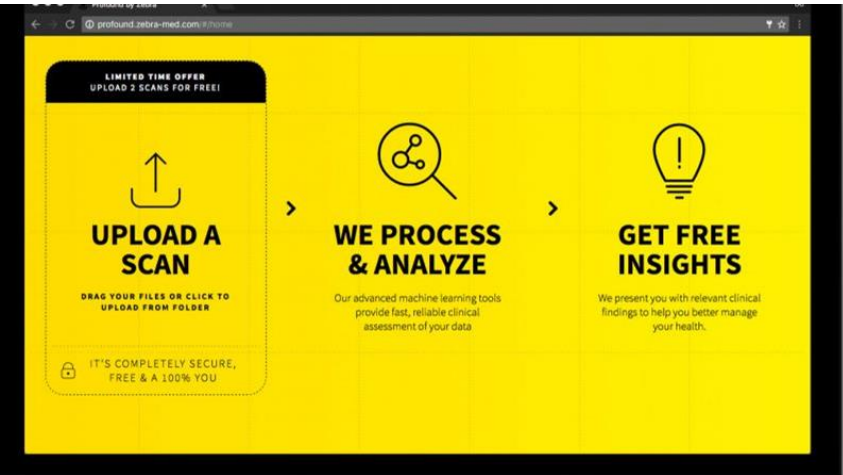


# Zebra Medical Vision offers \$1 AI medical scans on Google Cloud

- Zebra Medical Vision creates AI algorithms that can read medical images and detect anything untoward before humans can
- Zebra has put its algorithms to Google's Cloud to help the start-up scale
- Zebra is a customer of Google's and neither party are working on anything currently for joint customers

Arjun Kharpal | @ArjunKharpal

Published 2:20 AM ET Wed, 8 Nov 2017 | Updated 2:09 AM ET Mon, 13 Nov 2017



# Future of Health = Innovation


	Today: System	Future: Person
TIMING	Reactive, sick care	Proactive, preventative,
PRECISION	1 size fits all, crude, analog	predictive
MODALITY	Institution-centred	Personalized, intelligent
DURATION	Episodic, intermittent, silo'd	Digi-cal   decentralized
POWER	Provider	Continuous   team
CURRENCY	Volume, inputs, costs, fee-4-service	People-powered
		Value, outcomes, fee-4-health



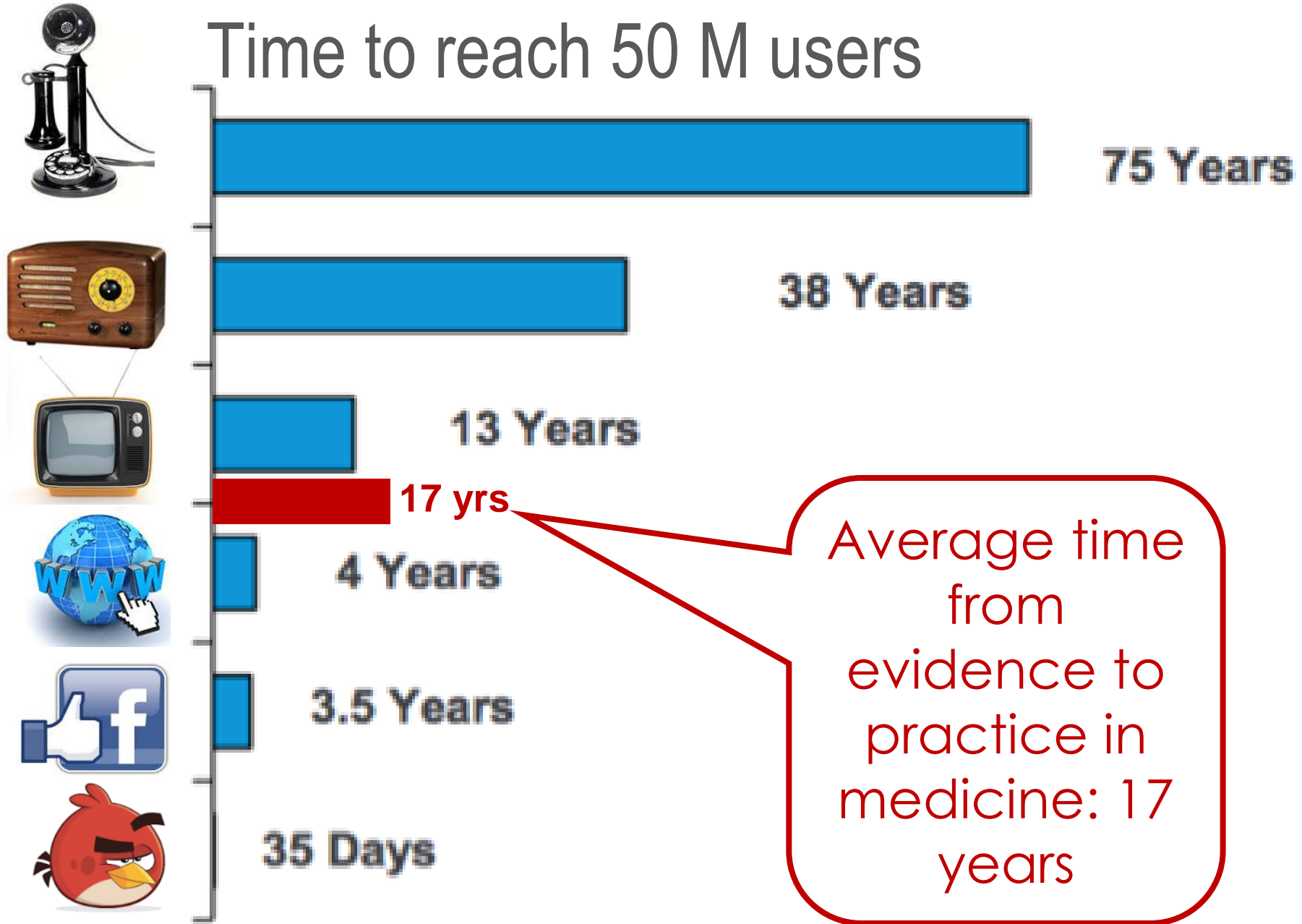


Health Medicine

# Medicine Will Advance More in the Next 10 Years Than It Did in the Last 100

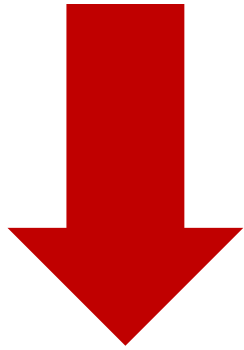
By Vivek Wadhwa - Oct 26, 2016  75,029

# Time to reach 50 M users





*Healthcare  
(in Canada)  
is largely here*



**Digitize**



**Deceptive**



**Disruptive**



**Dematerialize**



**Demonetize**



**Democratize**



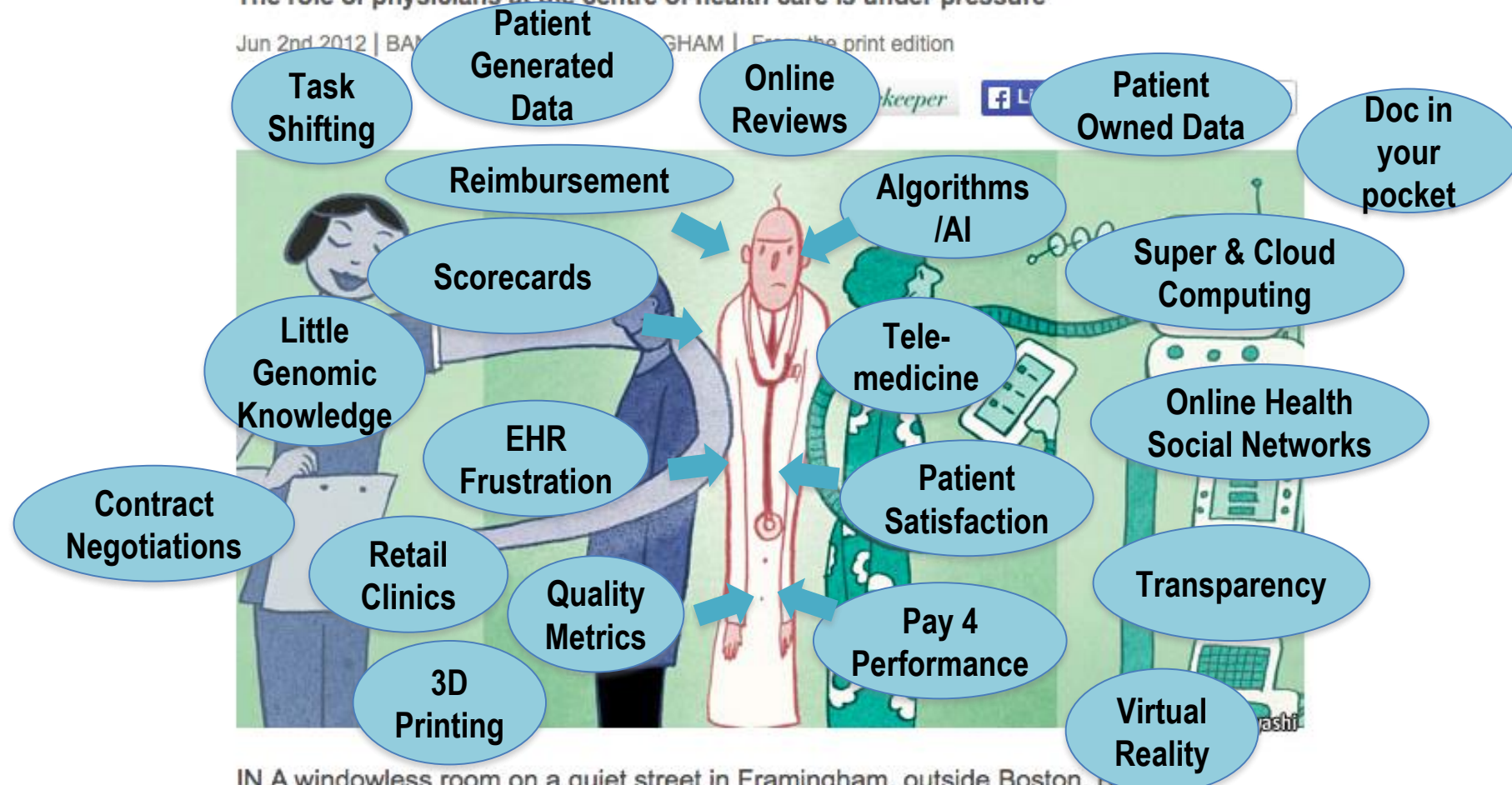
## The future of medicine

# Squeezing out the doctor

The role of physicians at the centre of health care is under pressure

Jun 2nd 2012 | BAHAM

GHAM | From the print edition



IN A windowless room on a quiet street in Framingham, outside Boston, the

Goudswaard and his colleagues are trying to unpick the knottiest problem in health care:

how to look after an ageing and thus sickening population efficiently. The walls are

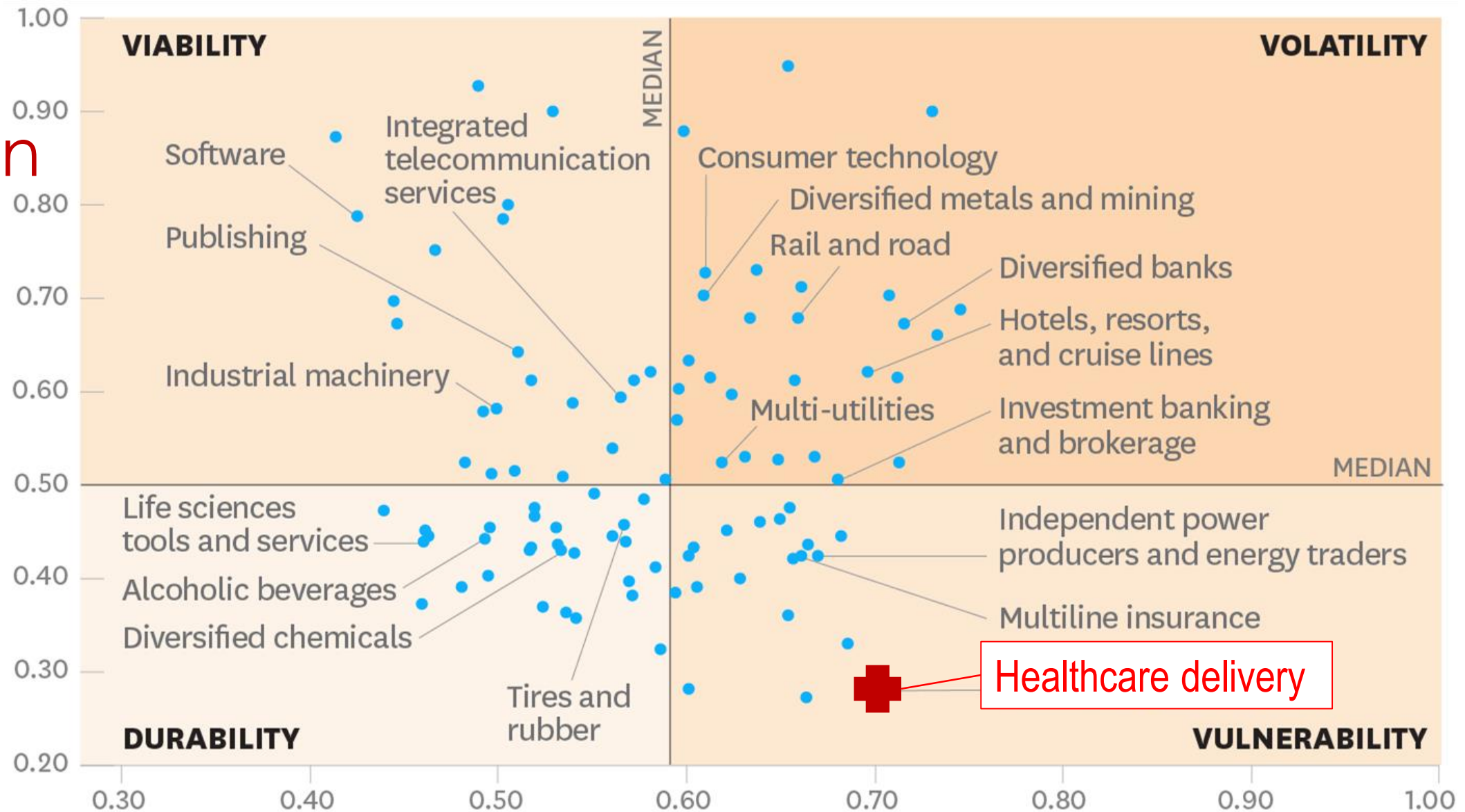


IF THE  
RATE OF CHANGE  
ON THE OUTSIDE  
EXCEEDS THE  
RATE OF CHANGE  
ON THE INSIDE,  
THE END IS NEAR

— JACK WELCH

the  
common  
room

Current  
disruption



Susceptibility to future disruption





# Healthcare's New Entrants





# Postal workers deliver meds and check on health of seniors

An innovative program expands role of mail carriers to look for signs of illness

Oct 2, 2015

By EMS1 Staff

ST. HELIER, Jersey — The postal service of Jersey, an island located between England and France, is finding a new way of taking care of their elderly, preventing the need for emergency or hospital care.

In this new program, called "Call and Check", postal workers, along with their deliveries, offer services and prescription drug drop-offs twice a week at a low cost.

Click through the slideshow to see how the program works:



## Library Offers Homeless People Mental Health Services, And It's Working

Libraries are often the safest place for homeless people.

03/31/2016 09:16 am ET



Eleanor Goldberg  
Impact editor, The Huffington Post



MARCIO JOSE SANCHEZ/ ASSOCIATED PRESS  
John Banks, who is homeless, sits in his wheelchair at the San Francisco Public Library.



HealthPartners®



Minnesota firefighters: home visits

## Welcome to barbershop therapy

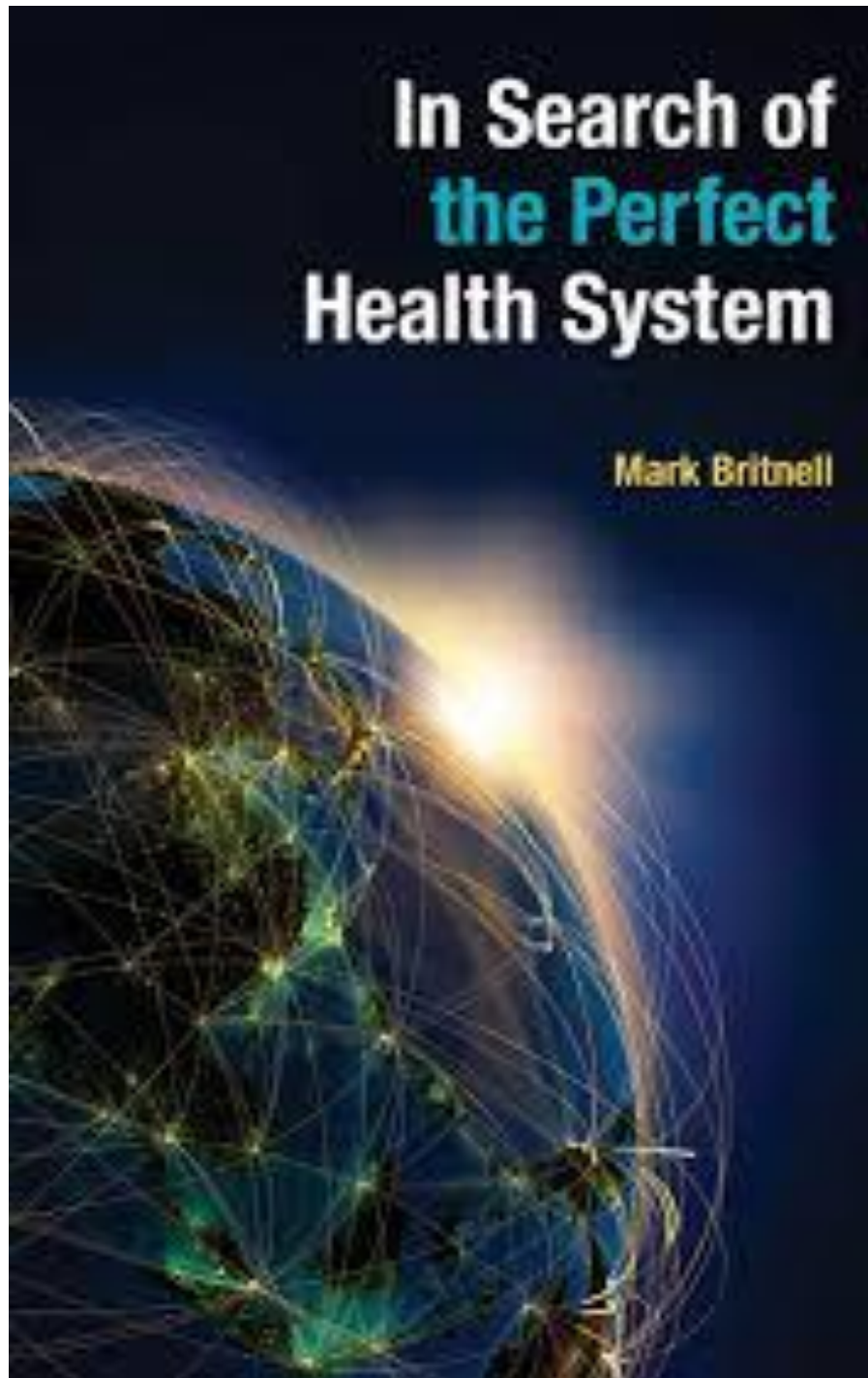
CELESTE HAMILTON DENNIS 20 September 2018

Barbers in the US South are training as first responders to assist men with their mental health concerns.





# Health Innovation: Canada's unfinished business



- “... **perfect health system** would have:
- Values & universal access of **UK**;
  - Primary care of **Israel**
  - Community services of **Brazil**
  - Mental-health system of **Australia**;
  - Health promotion philosophy of Nordic
  - Patient/community empowerment of **Africa**
  - R&D infrastructure of **US**;
  - Innovation, flair & speed of **India**;
  - ICT of **Singapore**
  - Choice offered to patients in **France**

1974

# A NEW PERSPECTIVE ON THE HEALTH OF CANADIANS

a working document

**Marc Lalonde**

Minister of National Health and Welfare

1987

## Achieving health for all A framework for health promotion THE HONOURABLE JAKO EPP Minister of National Health and Welfare



I look at the work in progress in Japan today the quality of life for Canadians. The day of 1987, at the 10th Annual Conference of the Canadian Policy Research Institute, I presented the document by announcing the mandate to explore ideas for the future which would address the changing challenges to health. It was my belief that it was to continue to improve the health of Canadians we would have to share forward with new policies and solutions.

This document represents the ideas that have come forward as a result of our search for a national vision of health. Achieving Health For All, a framework for health promotion defines the direction I am planning to see realized in action across the nation.

It is with pleasure that I have shared the occasion of the International Conference on Health Promotion to share this thinking. I trust that the insights, challenges, and emerging challenges in the framework will serve to inspire, inform, stimulate and action with regard to the health and quality of life of Canadians.

I trust and welcome your comments.

*Jako Epp*

Jako Epp  
Minister of National Health and Welfare  
Ottawa, Canada  
November 1987

# FOUR STRONG WINDS

UNDERSTANDING THE GROWING CHALLENGES TO HEALTH CARE



MICHAEL B. DECTER

JEFFREY SIMPSON

# CHRONIC CONDITION

WHY CANADA'S HEALTH CARE SYSTEM  
NEEDS TO BE DRAGGED INTO  
THE 21<sup>ST</sup> CENTURY

2002

## BUILDING on VALUES

THE FUTURE OF HEALTH CARE  
IN CANADA



ROY J. ROBINSON, P.C.

Chairman

Panel Report

November 2002

## UNLEASHING INNOVATION: Excellent Healthcare for Canada

2015

Report of the Advisory Panel on  
Healthcare Innovation



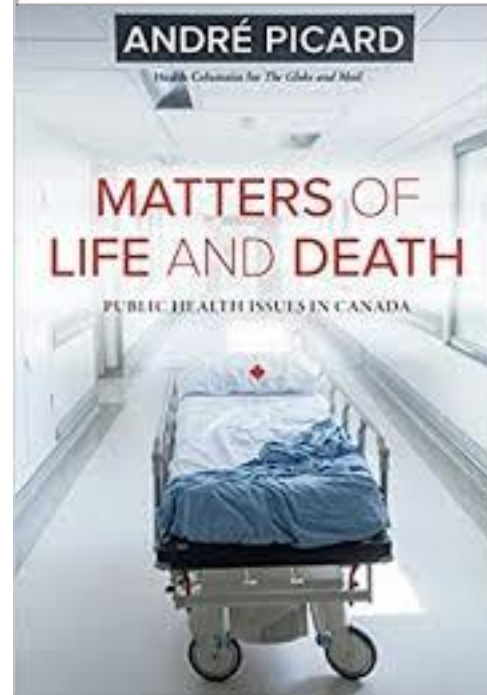
Canada

ANDRÉ PICARD

Health Education for The Elderly and Staff

## MATTERS OF LIFE AND DEATH

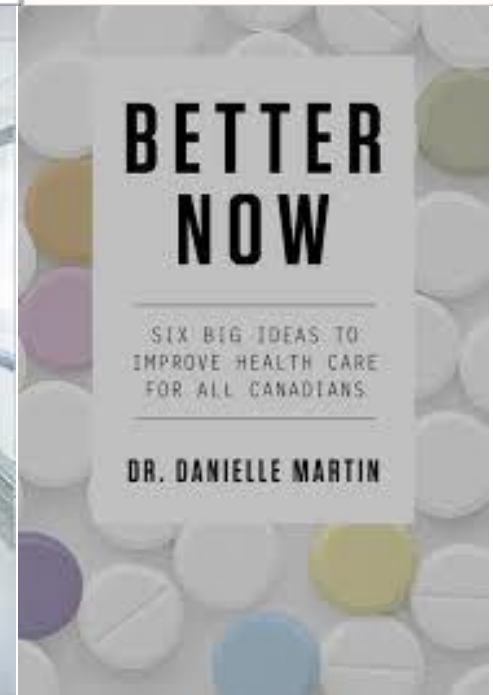
PUBLIC HEALTH ISSUES IN CANADA



## BETTER NOW

SIX BIG IDEAS TO  
IMPROVE HEALTH CARE  
FOR ALL CANADIANS

DR. DANIELLE MARTIN



45 Cdn health  
system reviews

Past 50 years

Same 7 recos

- 1) **Primary Care** get it right; get away from acute care
- 2) **Community Care** treat people where they live, not in hospitals
- 3) **Drugs** universal access
- 4) **Prevention** stop framing as only a medical issue, social determinants play major role in preventing disease
- 5) **Human Resources** right mix of resources and value for money
- 6) **Quality/outcomes** focus too much on the system KPIs and not the outcomes
- 7) **Digital/data** modernize; every Cdn needs to have access to their record



# See an NHS GP in minutes for free\*



**On mobile** in minutes 24/7



**In person** at a choice of locations



**Prescriptions delivered** to your local pharmacy



**An NHS GP Practice** that works around you

[Get Started](#)

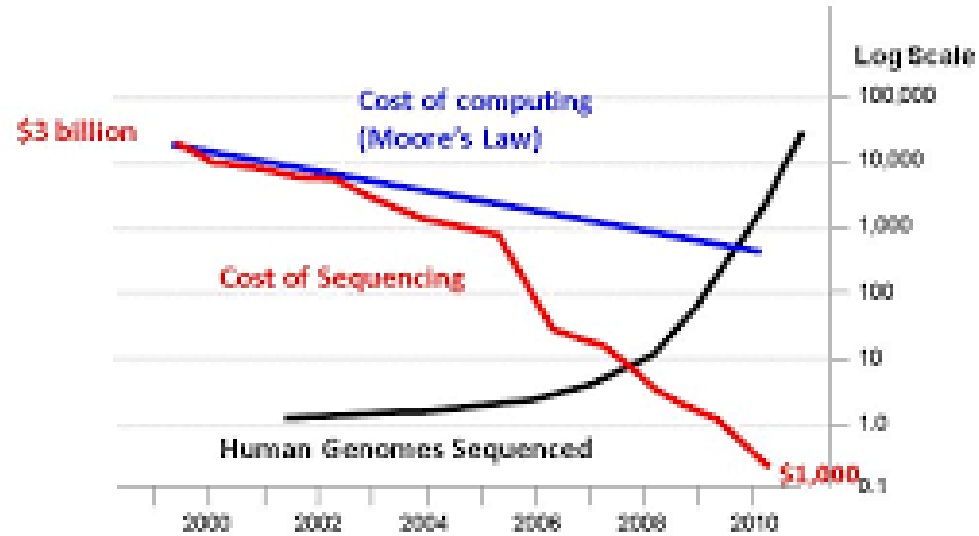
\*To register you will need to switch from your current GP practice. Once an application is made, a registration period will apply before you are able to access the service. Available for people living or working within the catchment area of one of our clinic locations.



Adapted from

The Economist

## The Sequencing Explosion



*“Soon it will cost less to sequence a genome than to flush a toilet”*

Ray McAuley, Singularity University

BIOTECH

## Offering free DNA sequencing, Nebula Genomics opens for business. But there's an itsy-bitsy catch

By SHARON BEGLEY @sxbegley / NOVEMBER 15, 2018



**Started 2015:**

“AI-assisted medical system”

**Dec 2018** the network:

- 265M registered, 25M active monthly users
- 1,200 in-house docs; 5,200 outside docs
- 3K hospitals, 15K pharmacies
- 47K virtual clinics, 1.3K GP clinics, 1.2K dental
- 1.9K other institutions
- 1 hr drug delivery service >70 cities
- Subscription: \$40-\$100 Cdn / year

# The Dutch: Set Big Hairy Audacious Goals

By 2040, all Dutch people will be living in good health for at least 5 years longer; health inequalities between the lowest and highest socio-economic groups will have decreased by 30%

- By 2020, 80% of seniors or people with a chronic disease will have digital access to their full record, can remotely monitor vitals, and can consult with clinicians in the modality of their choice
- By 2030, 50% more care will be organized in one's own living environment (instead of in care institutions), together with the network around people
- By 2030, the proportion of people with a chronic disease or lifelong disability, who can participate in society, will have increased by 25%.
- By 2030, the quality of life of people with dementia will have increased by 25%
- By 2040, the burden of disease as a result of an unhealthy lifestyle and unhealthy living environment will have decreased by 30%



# Low-income seniors in Cleveland will have new primary care option

Updated 9:06 AM; Posted 9:00 AM



**OAK  
STREET  
HEALTH**



Oak Street Health serves more than 45,000 patients in Illinois,





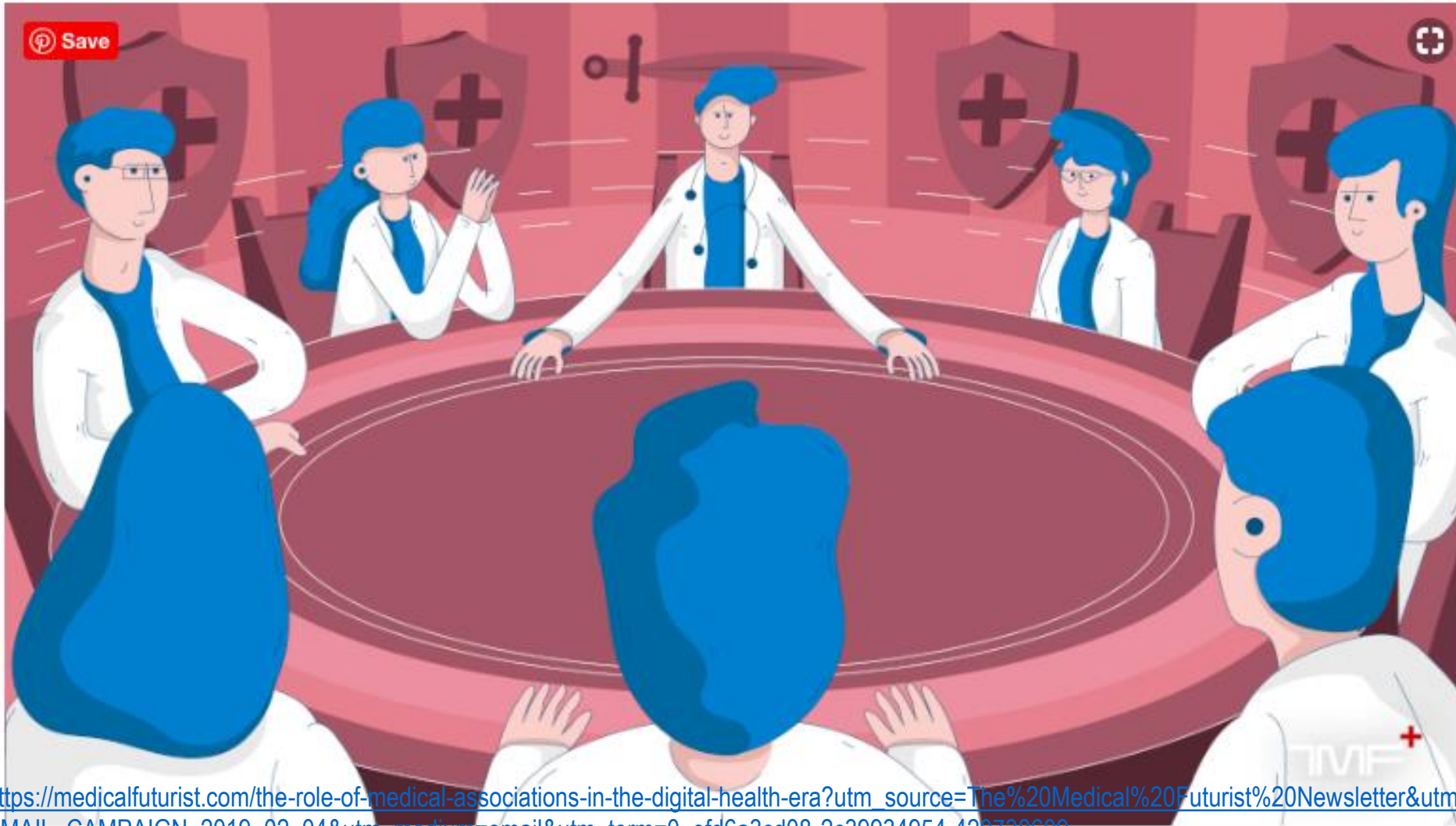
If you see the Ask Me About Digital sticker on your GP's door that means you can

- ask the physician about **websites, apps, online patient communities or sensors**
- **search for information together** – the doctor can recommend you the most useful apps and wearable technology or the best medical forums
- ask the doctor about the **data and results of your health, lifestyle, fitness apps and sensors**
- **share your medical data** originating from personal health records, patient portals, mobile health apps, health wearables, trackers, sensors or health chatbots
- **ask the GP how you can keep in touch**, whether the doctor uses online communication channels (e-mail, Whatsapp, Facebook, ), what rules does he or she follow when conversing online as well as dispensing information online



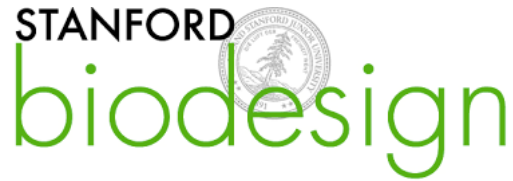
# The Role Of Medical Associations In The Digital Health Era

The Medical Futurist  
29 January 2019



*“We focus on the need to **create new models of care** and to **help physicians transition to these new models of care**” AMA*

# Clinical Entrepreneurship programs proliferating



#MakerMD

*"Physician Intra/Entrepreneurs driven to innovate"*

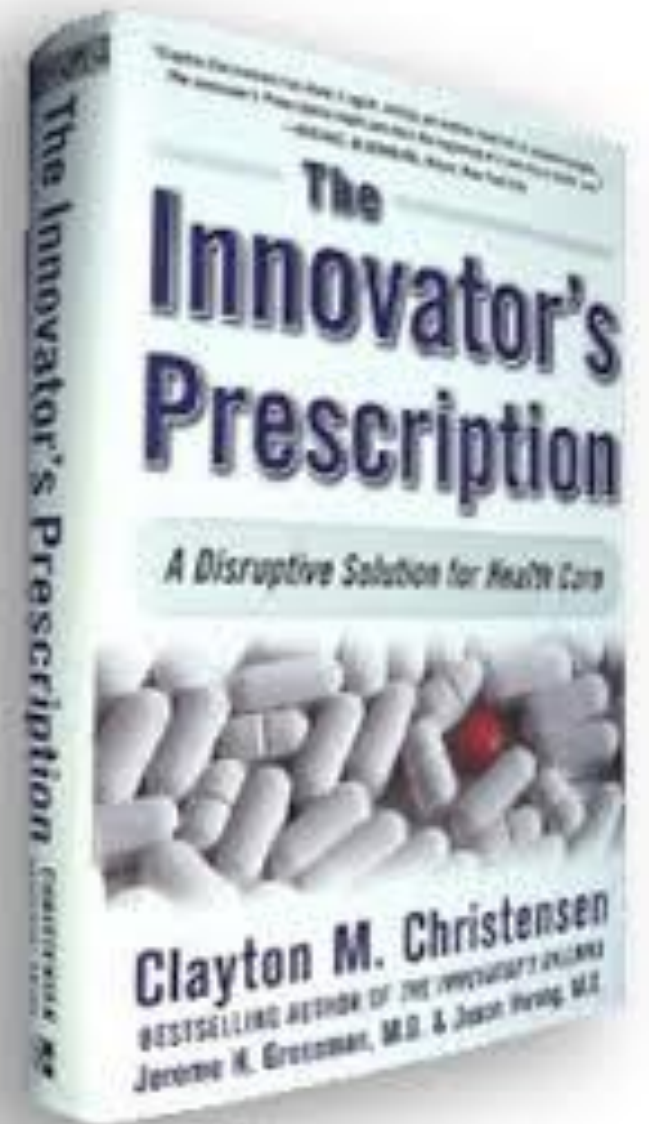




“[Medical education] is structured around a model that was created nearly a century ago that focused around the individual caregiver as the source of solutions.

Now, caregiving is a process in which dozens and dozens of people contribute, yet we teach as if medicine is still focused around the doctor”

Clayton Christensen



# Nouveau medical training



The University of Texas at Austin  
Dell Medical School

Interprofessional from day 1  
Multidisciplinary  
Design thinking  
Leadership skills  
9-month innovation and leadership block

UT Dell Medical School is key to Austin's  
'model healthy city' ambitions



Ralph K.M. Haurwitz - American-Statesman Staff  
Updated 11:50 a.m. Friday, June 24, 2016 | Filed in [News](#)

Orientation for first-year students at UT's Dell Medical School begins Monday, with something of a preview Sunday at the education building, where finishing touches of construction were going down to the wire.

When doors open for the start of classes July 5, UT will have come full circle from Sept. 6, 1881 — the day Texas voters decided that the main university would be in Austin and the medical school in Galveston, at that time the state's largest city.

But beyond educating doctors, the community is looking to the new medical school to help make Austin a

 **KAISER PERMANENTE**  
Kaiser Permanente Is Opening Its Own  
Medical School

Laura Lorenzetti  
Updated: Dec 17, 2015 4:24 PM EST



Kaiser Permanente plans to become the first U.S. insurer to open its own med school.

The [Kaiser Permanente School of Medicine](#) is set to open in 2019. Kaiser has a long history of innovation in health care delivery and wants to use that knowledge to train doctors for today's rapidly changing medical profession. While hospitals and health systems have long been attached to medical schools, this is the only one to be opened by an health insurer to date, according to Kaiser's research. The non-profit insurer also operates hospitals.

"Opening a medical school and influencing physician education is based on our belief that the new models of care mean we must reimagine how physicians are trained," said Bernard J. Tyson, chairman and CEO of Kaiser Permanente.



**Radboudumc**  
university medical center

Digital health  
curriculum for 1<sup>st</sup>  
year med students  
updated every 6  
months



First ever MD  
Master's in Design  
"JeffDesign"

# Discussion: Future of family medicine

## **Starting point:**

- Gaps: Not effectively combining clinical + SDOH; fee-for-service; lack of widespread digital/virtual
- Burning platform: fiscal constraint; burnout; unmet patient need

## **Can step up innovation game** - Past = access, digital; 2020+ = innovation

- Have not kept up with (let alone lead the way through) signals & trends

## **Ideas**

- Salaried staff - lots of opportunities to re-imagine programs
- 24/7 coverage
- Patient/family access to their own data
- Digital first, physical next models
- Be the first group in Canada to officially axe the fax
- Representing vulnerable populations - address needs of high users Financing innovation – pay for results, ETFs, community bonds, etc.

## **Window to act bold is now**

- Previous things that were off limits ... you will now be hugged and kissed



“skate to where the puck is going”

Image source: NY Post



Image source: Canada Post

*“My dream is for people around the world to look up and see Canada like a little jewel sitting at the top of the continent”*

@ZaynaKhayat



Health