

healthskouts

## Hippocrates 14.10

De lusten en lasten van  
ICT in de zorgverlening

Prof. Dr. Koen Kas  
@kaskoen



October 14, 2017



## Nomophobia

HOW DID YOU FEEL WHEN YOU MISPLACED YOUR PHONE?



## WHATSAPPITIS

Existe, es el mal de los que pasan demasiadas  
horas en WhatsApp

[www.Verdadono.net](http://www.Verdadono.net)

Koen Kas @kaskoen

**“We always overestimate  
change that will occur in the  
next 2 years &  
underestimate change that  
will occur in the next 5-10”**

Bill Gates, Microsoft



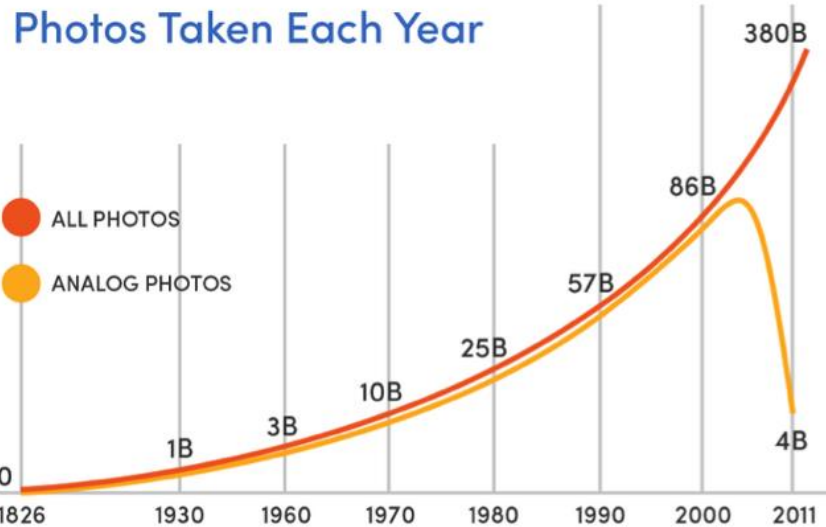
Koen Kas @kaskoen



Koen Kas @kaskoen



# Missing the mark like Kodak did

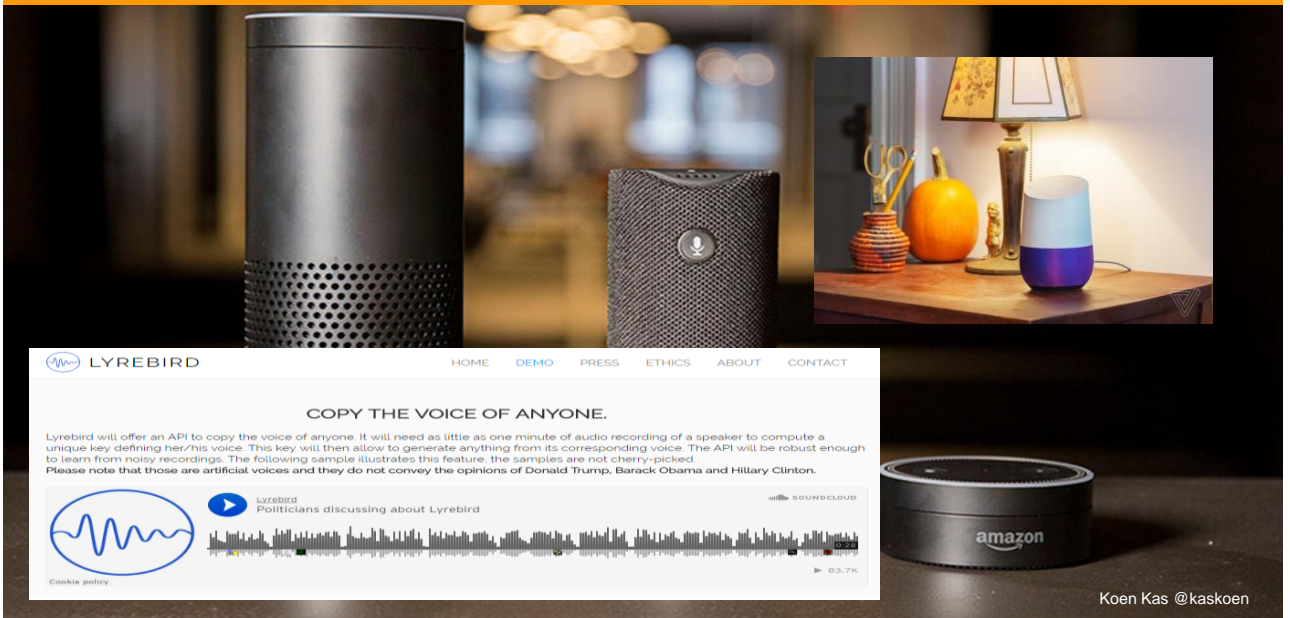


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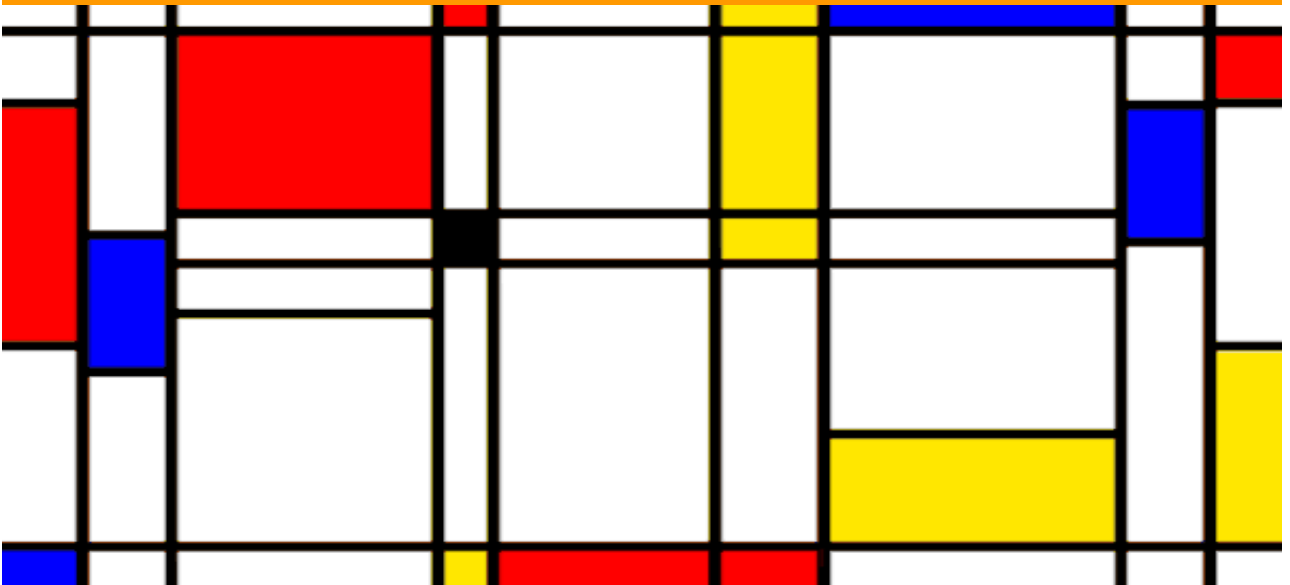
Koen Kas @kaskoen

# Let Amazon / Google Home /... help you (r) patients

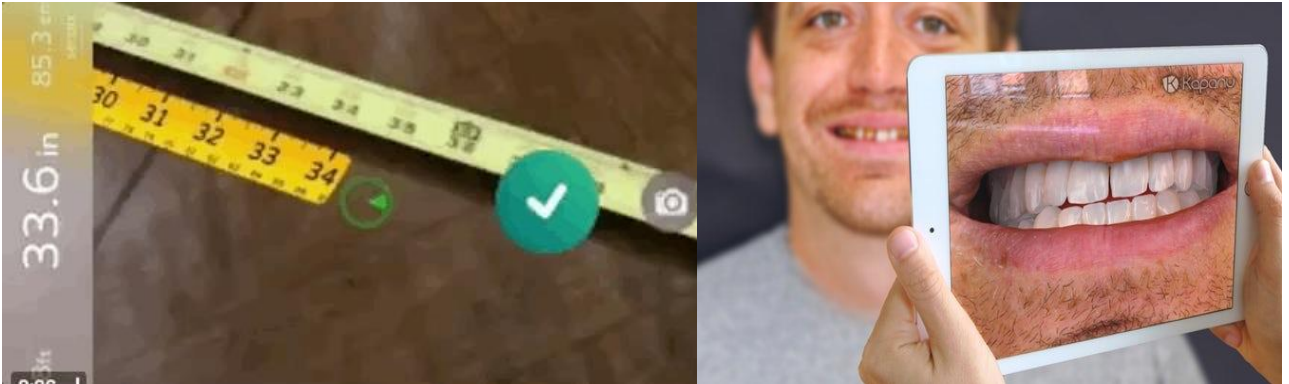


The collage features several smart speakers: a large black Amazon Echo, a smaller black Echo, a blue and white Google Home, and a black Amazon Echo Dot. In the center is a screenshot of the Lyrebird website. The website has a navigation bar with links: HOME, DEMO, PRESS, ETHICS, ABOUT, CONTACT. The main heading is "COPY THE VOICE OF ANYONE." Below it, a paragraph states: "Lyrebird will offer an API to copy the voice of anyone. It will need as little as one minute of audio recording of a speaker to compute a unique key defining her/his voice. This key will then allow to generate anything from its corresponding voice. The API will be robust enough to learn from noisy recordings. The following sample illustrates this feature: the samples are not cherry-picked. Please note that those are artificial voices and they do not convey the opinions of Donald Trump, Barack Obama and Hillary Clinton." Below the text is a waveform visualization and a play button icon. The waveform is labeled "Lyrebird Politicians discussing about Lyrebird" and "SOUNDCLOUD". A "Cookie policy" link is visible at the bottom left of the screenshot. The name "Koen Kas @kaskoen" is written in the bottom right corner of the collage.

# Digital opportunities: customer experience ++

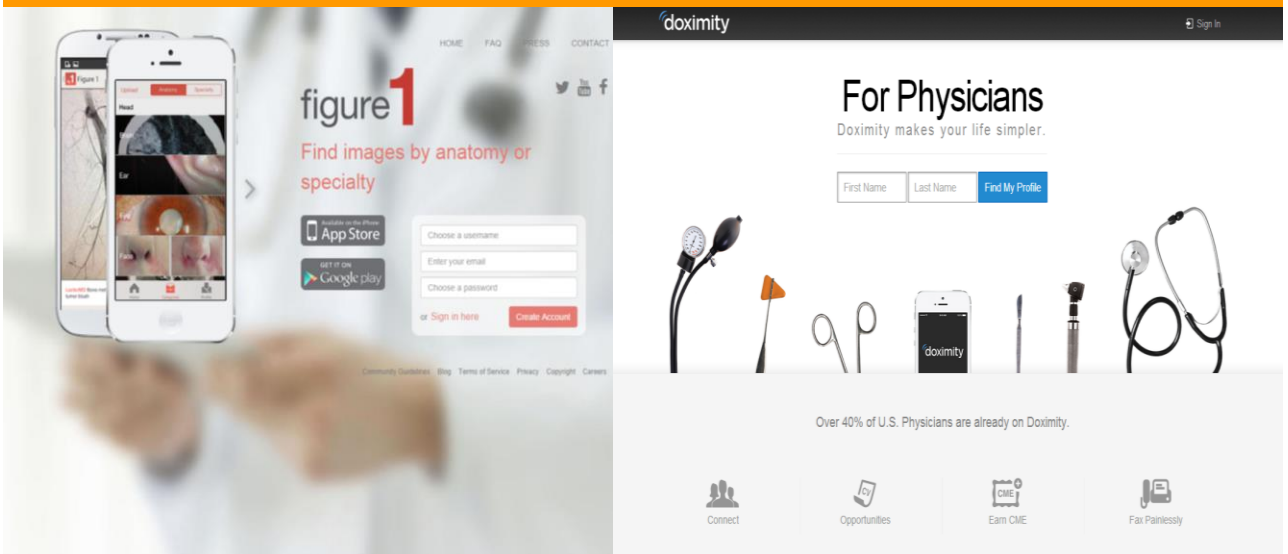


## AR helps me to measure things



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## Instagram & LinkedIn for doctors



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## Top 10 Reasons Doctors Fear Digital Health

"Digital health? Is that like a rectal examination?"

This was the first comment I heard from an audience member after recently delivering a lecture about digital health to a group of doctors at an esteemed academic medical center.

**Time  
Proof  
Liability  
Access  
Age**

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## Straks iedereen dokter met doe-het-zelfgezondheidsapps?

Patiënten krijgen steeds meer controle over hun gezondheid dankzij apps en mobiele toestellen. Binnen twee jaar zijn alle metingen die een arts uitvoert ook thuis mogelijk.

DORINE LUYCKX

Thuis zelf een echografie nemen, selfies checken op huidandoeningen of de hartconditie meten door een vinger op de smartphone te plaatsen. Het zijn maar enkele toepassingen van bestaande digitale gezondheidsapps. Zelfs de 200 jaar oude stethoscoop heeft nu een aan de smartphone gekoppelde thuiversie, zegt molecuulair oncoloog en gezondheidsfuturist Koen Kas.

Er komen steeds meer toestellen op de markt die het mogelijk maken om thuis de eigen gezondheid te meten. Door de mobiele toestellen te verbinden aan de smartphone kunnen de verzamelde data meteen doorgestuurd worden naar de huisarts of de behandelende specialist. Vooral in de Verenigde Staten schieten de MHealth-toepassingen als paddenstoelen uit de grond. En die zullen ook in Europa opgang maken.

Ook in België gaat het met rasse schreden vooruit. Minister van Volksgezondheid Maggie De Block (Open VLD) liet het voorbije jaar 24 MHealth-toepassingen zes maanden lang uittesten. De overheid formuleerde daarnaast een aantal eisen rond gegevensuitwisseling. De transfer van data van het toestel van de patiënt naar de arts en het ziekenhuis moet met respect voor de privacy gebeuren en adequaat beveiligd worden.

'Diabetes on the run' is een



Het Philips-toestel Lumify (boven) biedt echogrammen via de smartphone aan (onder).

### GEZONDHEIDSZORG DEMOCRATISCHER MAKEN

Sinds 'dokter Google' toegang gaf tot een immense hoeveelheid gezondheidsinformatie online, spelen patiënten een steeds actievere rol in hun eigen gezondheidszorg. Mobiele toestellen en gezondheidsapps geven nu de mogelijkheid om aandoeningen zoals hart- en vaatziekten (Fibricheck) en diabetes beter onder controle te houden. De verzamelde data geven artsen ook een totaalbeeld van de patiënt in plaats van een momentopname tijdens een doktersbezoek. Ze helpen ook om de prijs van

dure onnodige consultaties te drukken door een doe-het-zelf-versie voor thuis aan te bieden. Een test via de smartphone voor het kankerverwekkende Piliomavirus kost zo'n anderhalve euro tegenover een prijs van routinebezoek aan de vaak druk bezette gynaecoloog. De Vlaamse overheid bekijkt bovendien ook of het mogelijk is om de mobiele toestellen en apps te laten terugbetalen door de ziekenfondsen. Zo gaat de technologie echt deel uitmaken van onze toekomstige gezondheidszorg.

kansen om met de patiënt tegevens een aardige som te verdienen. Het Amerikaanse bedrijf 23andMe biedt goedkope DNA-analyse aan, maar verkoopt de data wel geanonimiseerd door aan onderzoekers en de farmaceutische industrie. De apps verzamelen gevoelige data en het is aan de ontwikkelaars om daar verantwoord mee om te springen, zegt Kas.

Onderzoek van de medische nieuwsweide MediQuality toont dat 61 procent van de artsen vreest dat de e-gezondheid ten koste van de privacy van patiënten zal gaan. Ze eisen transparantie en verantwoord gebruik van de data. Artsen remmen de evolutie niet af, maar staan wel mee aan het roer.

huisartsenvereniging in Vlaanderen en Brussel.

'We moeten ook vermijden dat de gezondheidsapps entertainment worden', zegt hij. Volgens hem hebben de apps een belangrijke rol te vervullen om gezondheidszorg democratischer te maken. Een uitdaging, dat vrouwen bij de gynaecoloog laten nemen om zich op het kankerverwekkende Piliomavirus te testen, kan via de smartphone voor anderhalve euro in 45 minuten geklaard zijn. Veel mensen vallen uit de boot door de hoge kosten van goede verzorging. Als we goedkopere apps inschakelen, moeten we erop toezien dat zij er toegang toe krijgen.

De huisarts wordt een

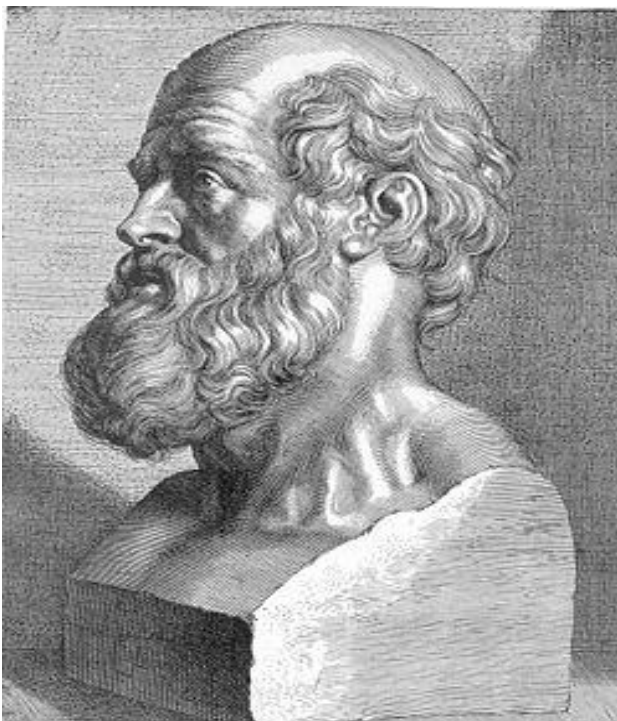
## 'My' guardian angels as lifecoach

### De huisarts wordt een echte levenscoach.

BESTUURSLID DOMUS MEDICA  
HERWIG VAN POTTTELBERGH

<https://healthskouts.com/assets/files/press-23092017-detiid.pdf>

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"It is more important to know what sort of person has a disease than to know what sort of disease a person has."

-Hippocrates

Koen Kas @kaskoen

**“Doctors pour drugs  
of which they know little,  
to cure diseases  
of which they know less,  
into patients  
of whom they know nothing ”**



Koen Kas @kaskoen

## **3 guardian angels to the rescue**

8755hrs



**Genome / Biomarkers  
Sensors  
Internet of Things**

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## Hospital - doctor's office - at home - body



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Cardiosleeve, Rijnven



## A doctor prescribes an App



MobileODT

iExamine,  
Welch Allyn

## An App prescribes my doctor

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# Doctors prescribing an App



AliveCor

Clinical Care/Education/Nutrition/Psychosocial Research  
ORIGINAL ARTICLE

## Cluster-Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Blood Glucose Control

CHARLENE C. QUINN, RN, PhD  
MICHELLE D. SHARDELL, PhD  
MICHAEL L. TERRIN, MD, MPH

ERIK A. BARR, BA  
SHOSHANA H. BALLEW, BA  
ANN L. GRUBER-BALDINI, PhD

**OBJECTIVE**—To test whether adding mobile application coaching and patient/provider web portals to community primary care compared with standard diabetes management would reduce glycated hemoglobin levels in patients with type 2 diabetes.

**RESEARCH DESIGN AND METHODS**—A cluster-randomized clinical trial, the Mobile Diabetes Intervention Cluster, randomly assigned 76 primary care practices to one of three groups:



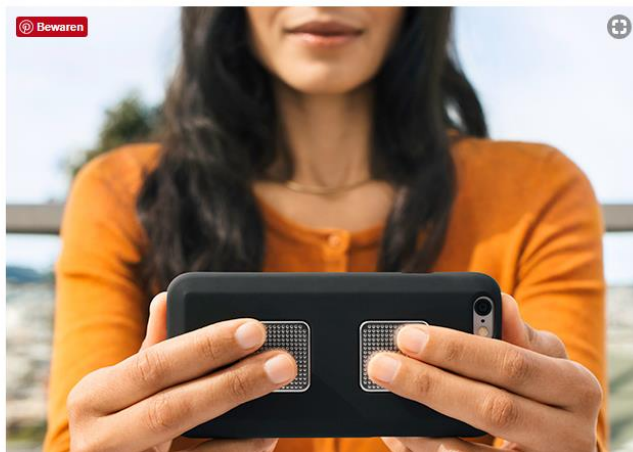
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# App prescribing my doctor

## Smartphone Heart Monitor Beats Doctors at Diagnosing Atrial Fibrillation

By [Eliza Strickland](#)

Posted 21 Sep 2017 | 13:00 GMT



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## App on prescription

<p align="center"><b>PRESCRIPTION FIBRICHECK</b> 30 days</p>	
<p>TO BE COMPLETED BY THE PRESCRIBER</p> <p>Name and surname of the person entitled: .....</p>	
<p align="center"><b>INSTRUCTIONS</b> (Check the back of this prescription for more info)</p> <p>Step 1: Download and open the FibrCheck app</p> <p>Step 2: Create your personal account</p> <p>Step 3: Scan the figure below</p> <p>Step 4: Complete the payment:</p>	
	
<p align="center"><b>RENG GWDI</b></p>	
<p>Measurements: <input type="checkbox"/> 1x/day <input type="checkbox"/> 2x/day <input type="checkbox"/> .../day</p>	
<p>Stamp of the prescriber:</p>	<p>Gate and signature of the prescriber:</p>
<p><small>More info at: <a href="http://www.fibrcheck.com">www.fibrcheck.com</a> or mail to <a href="mailto:support@fibrcheck.com">support@fibrcheck.com</a></small></p>	

<https://fibrcheck.com/>



FibriCheck 



**Partena betaalt Fibrcheck app terug**

**Nieuwsberichten 29 september 2017**

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**LindaCare closes a € 1.5M Series A financing round to launch its activities in Europe**

LindaCare makes tele-monitoring easier for patients with chronic diseases

*Through one single integrated platform, LindaCare is revolutionizing chronic heart disease tele-monitoring*



Prioritization



Health history



Reporting

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# Doc, the Internet says I have cancer

# WebMD®

Convince yourself that you have a terminal illness.

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## The cloud gets a brain - A trusted 1st or 2nd opinion



Koen Kas @kaskoen

# Quantified Self generation 1.0



Nike Fuelband



FitBit Force

1. Step detection
2. Heart Pulse
3. Heart rate variability
4. Blood pressure
5. Blood oxygenation
6. Body temperature
7. Sleep



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Appi@Home



Inform

Tools

Connect

Usage

Monitor

Patient receives Tools with BT tele-monitor devices, Smartphone and unique code known by the Intra Muros Platform / Database for automatic connection and identification.

## Activity tracker



- 20 min
- 1 h 12 min
- 1 h 57 min
- 1 h 23 min
- 7 h 18 min
- 7 h 53 min

## Blood pressure meter



- Systolic
- Diastolic
- Heart rhythm
- Heartbeat

## Balance



- Weight
- BMI

## Sleep monitor



- Sleep time
- Heart rate
- Respiration rate
- Night time events (snoring, bed exists, restless sleep, etc.)

## Oximeter



- SpO2
- Pulse rate

## Pain Diary



- Pain scores

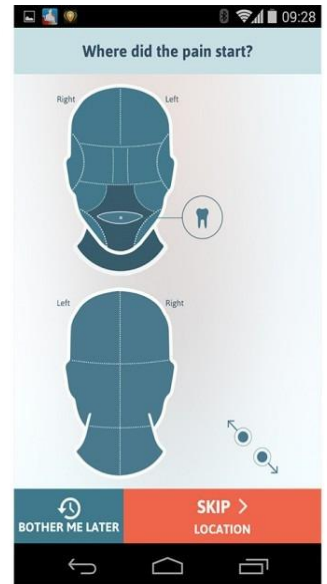


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# Migraine tracking



Migraine Buddy



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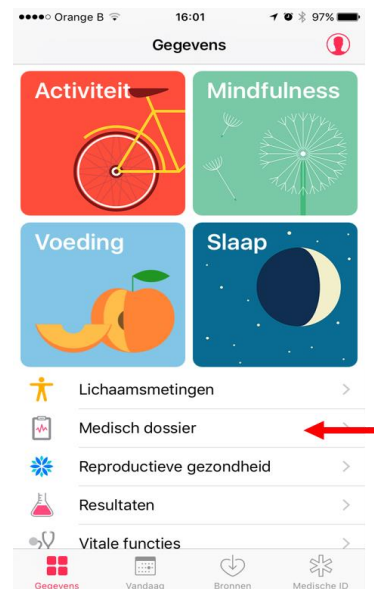
# EHR/PHR = sick data -> relevant health data



Apple Health



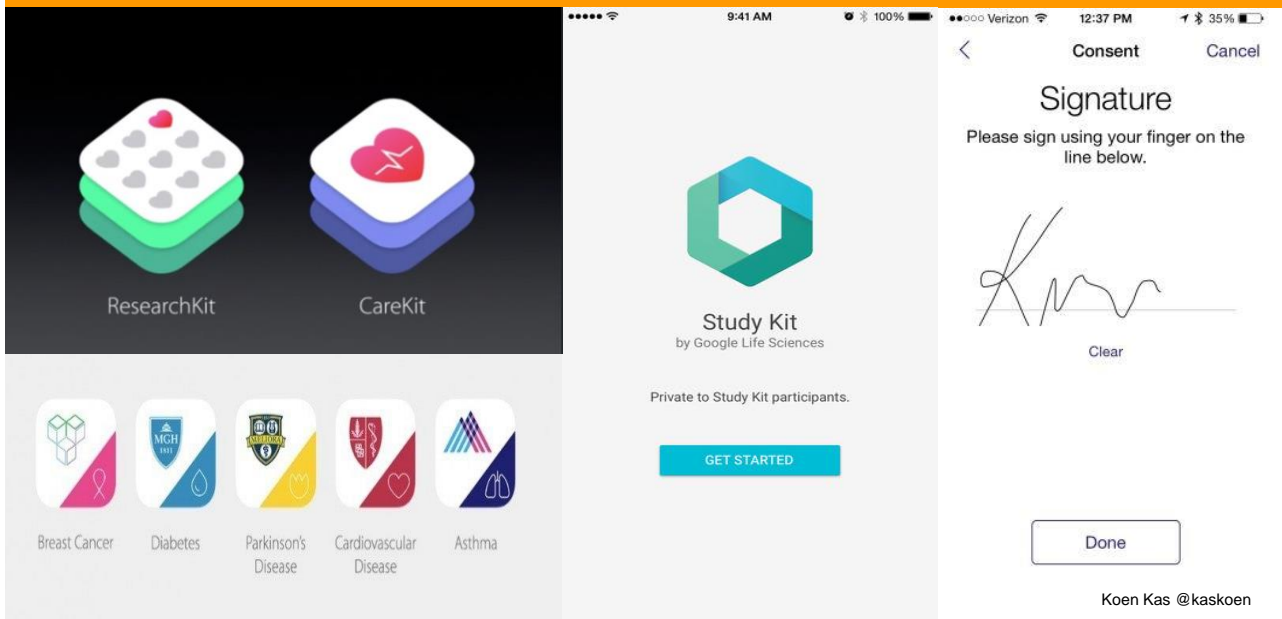
Google Fit



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# Personal medical record -> 10.000 patients in 12h



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Apple Carekit

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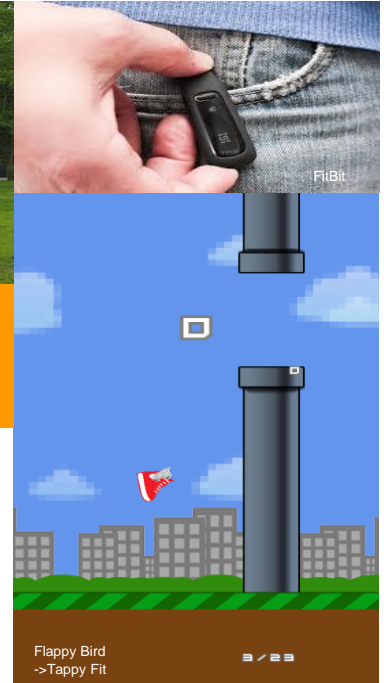
## My doctor prescribes a stepcounter, an App - or a walk in the park

*Lancet*. 2014 Mar 22;383(9922):1059-66. doi: 10.1016/S0140-6736(13)62061-9. Epub 2013 Dec 20.

**Association between change in daily ambulatory activity and cardiovascular events in people with impaired glucose tolerance (NAVIGATOR trial): a cohort analysis.**

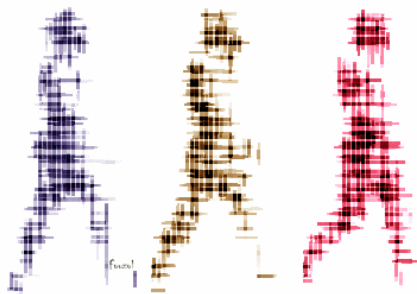
Yates T<sup>1</sup>, Haffner SM<sup>2</sup>, Schutte PJ<sup>3</sup>, Thomas L<sup>3</sup>, Huffman KM<sup>3</sup>, Bales CW<sup>4</sup>, Califf RM<sup>3</sup>, Holman RR<sup>5</sup>, McMurray JJ<sup>6</sup>, Bethel MA<sup>5</sup>, Tuomilehto J<sup>7</sup>, Davies MJ<sup>8</sup>, Kraus WE<sup>3</sup>.

⊕ Author information



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**150 min exercise / week  
-> 35% less likely  
to die prematurely**



### Associations of Accelerometry-Assessed and Self-Reported Physical Activity and Sedentary Behavior With All-Cause and Cardiovascular Mortality Among US Adults

Kelly R. Evenson<sup>\*</sup>, Fang Wen and Amy H. Herring

<sup>\*</sup>Correspondence to Dr. Kelly R. Evenson, 137 East Franklin Street, Suite 306, University of North Carolina, Gillings School of Global Public Health, Department of Epidemiology, Chapel Hill, NC 27514 (e-mail: kelly\_evenson@unc.edu).

Abbreviations: AHR, adjusted hazard ratio; CVD, cardiovascular disease; MVPA, moderate-to-vigorous physical activity; NHANES, National Health and Nutrition Examination Survey; PA, physical activity.

Received September 2, 2015.  
Accepted March 28, 2016.

Koen Kas @kaskoen

# Building novel business on real world evidence



## Cedars-Sinai to use Fitbits in small trial of cancer patients

By **Jonah Comstock** | January 21, 2016

Cedars-Sinai Medical Center is embarking on a small study to see if a Fitbit Charge HR can help oncologists assess whether their patients are active enough for chemotherapy.

"What we know is that individuals who are up and about tend to be more able to tolerate chemotherapy and have a greater potential for benefitting from it," Dr. Arvind Shinde, a faculty physician in the departments of Supportive Care Medicine and Hematology and Oncology at the Cedars-Sinai Samuel Oschin Comprehensive Cancer Institute, told MobiHealthNews. "People who are spending more time in bed usually get harmed by the treatment we give, even if the cancer is responsive to the treatment."

The problem is the status quo for assessing how much patients are moving is just to ask them. And for a number of reasons, that's not always accurate.

"Part of the problem is that physicians really want to



**EHEALTH NEWS, SOUTH AFRICA**

POSTED ON DECEMBER 30, 2015 BY SIBHANGILO HLABANGANE

## Apple Watch Pilot for Breast Cancer Patients Kicks Off

[TWEET THE ARTICLE](#) [SHARE ON FACEBOOK](#)

Breast cancer patients at MD Anderson Cancer Center at Cooper are taking part in a medical-behavioural health pilot project using the Apple Watch.



30 breast cancer patients at MD Anderson Cancer Center at Cooper are taking part in an integrated medical-behavioural health pilot project using the Apple Watch to capture behavioural health data that could affect the courses and outcomes of treatment for breast cancer patients.

Koen Kas @kaskoen

# Motivating exercise



## ANATOMY OF PAVLOK



### ACTIVITY/SLEEP TRACKING

An accelerometer tracks your steps, activity, and sleeping patterns



### REALTIME HAPTIC FEEDBACK

Vibration, sound, and LEDs act as behavioral triggers and notifiers



### LOW ENERGY BLUETOOTH 4.0

Bluetooth 4.0 conserves battery and connects seamlessly



### SHOCK CIRCUIT



### HUMAN DETECTION

Pavlok knows when you're wearing it

Koen Kas @kaskoen



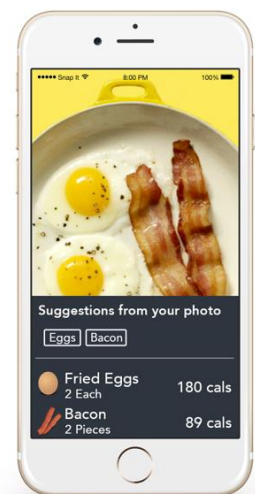
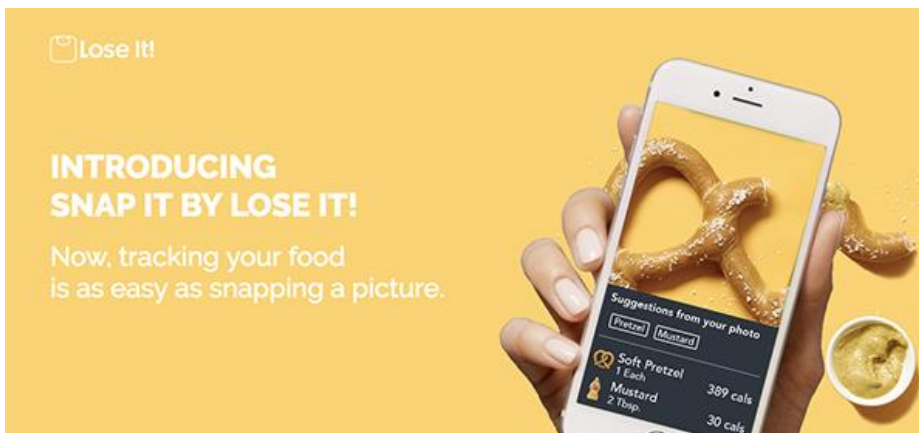


## Sitting is the new smoking



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## Track your calories simply photographing your food



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# EHR/PHR = sick data -> relevant health data



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22393 0.21% S&P 500 F 2520.00 0.16% Stoxx 600 388.88 0.19% U.S. 10 Yr 2/32 Yield 2.326% Crude Oil 50.64 -1.99% Euro 1.1764 -0.42%

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### Clinical Drug Trials May Be Coming to Your Doctor's Office

Electronic medical records make possible a new research model based on real-world evidence.

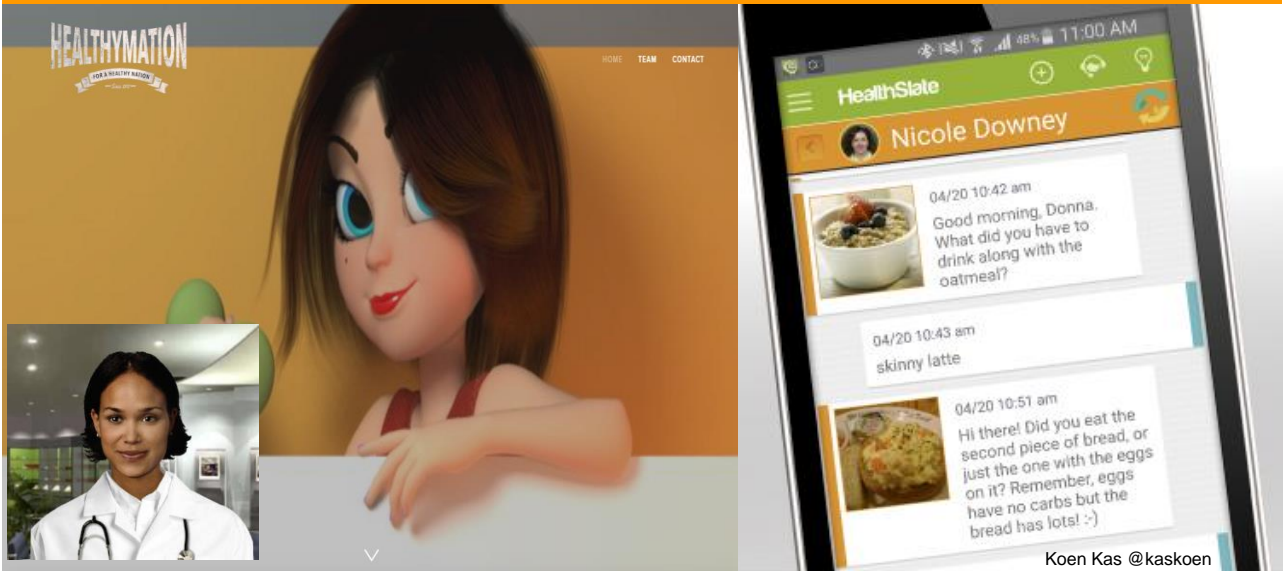
By Amy Abernethy and Sean Khozin

Sept. 12, 2017 6:56 p.m. ET

Roger Pickar was diagnosed with a rare cancer in December 2014. A chef, comedian, husband, father and champion of the local arts community, he was successfully treated for more than a year with standard therapies. When the cancer eventually returned, his oncologist prescribed an "off label" drug—one the Food and Drug Administration had

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## Jobs of the future: health coaches



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## Netflix personal trainer transforms your favorite characters into your coach



Koen Kas @kaskoen



# Soon 1st Personalised prevention App



**1st mobile Health App reimbursement (2013)**

## Medicare to reimburse for Diabetes Prevention Program, including Omada's digital version

By **Jonah Comstock** | March 23, 2016

HHS Secretary Sylvia Burwell **announced today** that Medicare will cover the Diabetes Prevention Program, including digital versions like Omada Health's. This marks the first time a preventative model from a CMS Innovation Center has been expanded into the Medicare program.

"This program has been shown to reduce health care costs and help prevent diabetes, and is one that Medicare, employers and private insurers can use to help 86 million Americans live healthier," Burwell said in a statement. "The Affordable Care Act gave Medicare the tools to support this groundbreaking effort and to expand this program more broadly. Today's announcement is a milestone for prevention and America's health."

HHS reported that, based on pilot studies, participants in the program lost an average of 5 percent of their body weight, 80 percent attended at least four weekly sessions, and, compared to Medicare beneficiaries outside the program, the DPP would save about \$2,650 per enrollee.



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# Participatory = social healthcare



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Propellor Health

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## Virtual reality pain management



Oculus, Facebook



SnowWorld

Koen Kas @kaskoen

## Doctella puts mHealth development in hand of doctors

**Doctella**

TESTIMONIALS

OUTCOMES

GET STARTED

PRICING & PLANS

LOG IN | SIGN UP

Digital Health Studio for Providers that makes creating CareKit Apps or CarePrograms easier than ever!

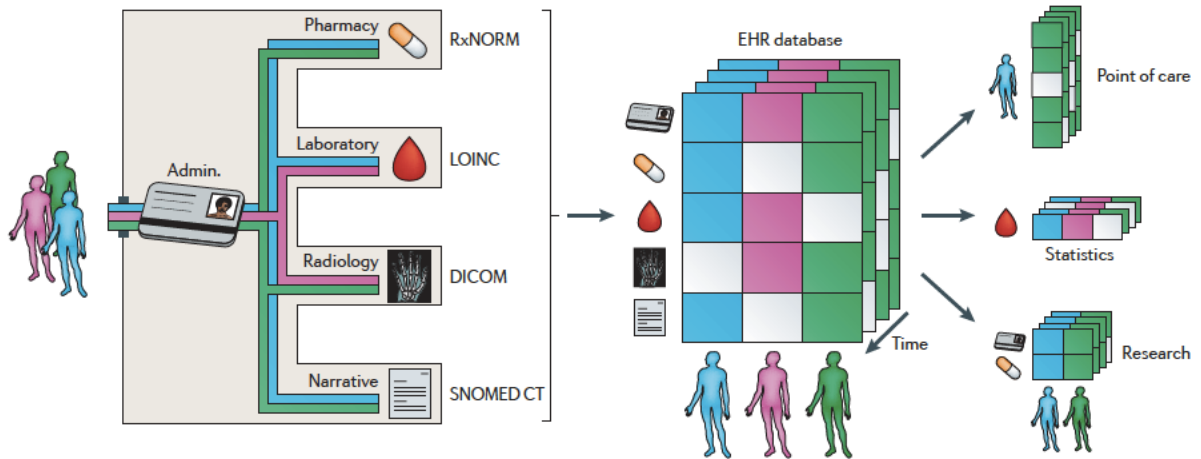
CarePrograms are patient apps designed to improve outcomes and reduce costs.

[Contact us](#) or create your own CarePrograms online using templates. For a limited time test CarePrograms with 25 patients for free! Get Started now!



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# Electronic health record content



*Nature Reviews Genetics*

Koen Kas @kaskoen

 Springer Link




[European Conference on Information Retrieval](#)

ECIR 2016: [Advances in Information Retrieval](#) pp 768-774 | [Cite as](#)

## Deep Learning to Predict Patient Future Diseases from the Electronic Health Records

Authors

[Authors and affiliations](#)

Riccardo Miotto , Li Li, Joel T. Dudley

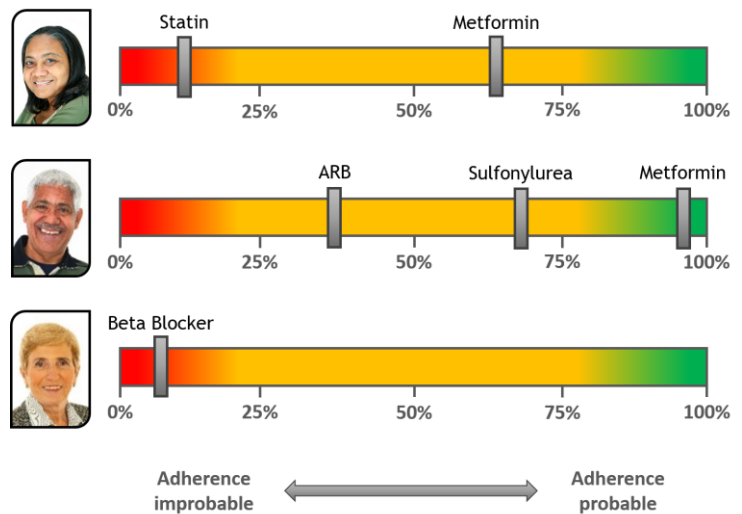
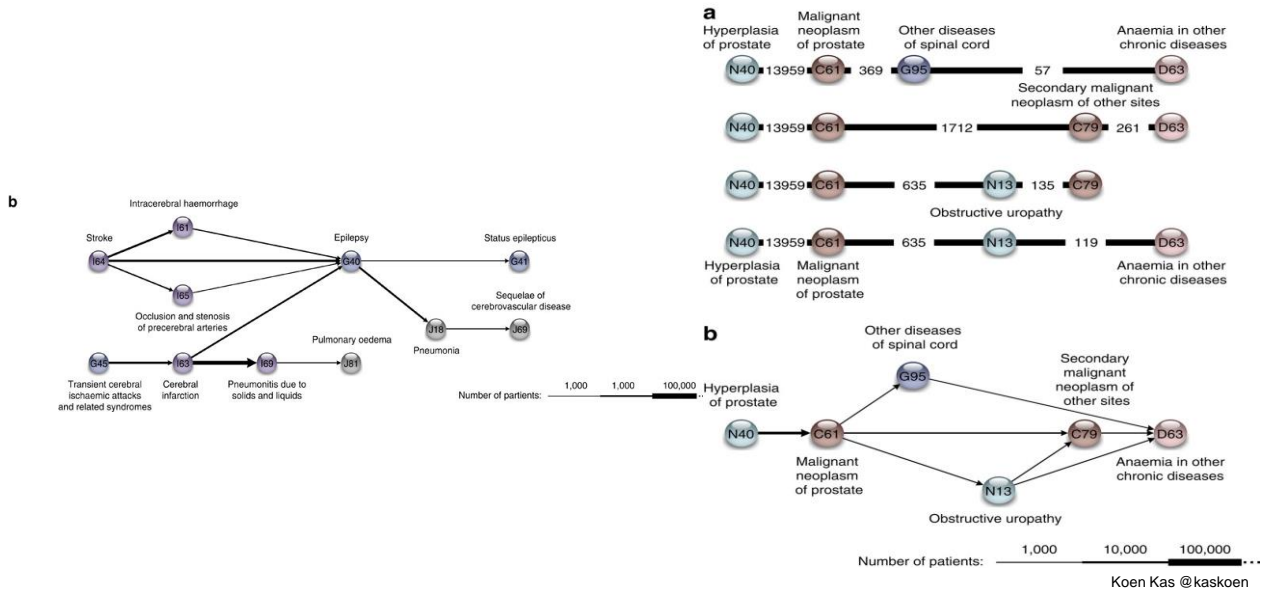


# LYNXCARE

<https://lynxcare.be/nl/>

Koen Kas @kaskoen

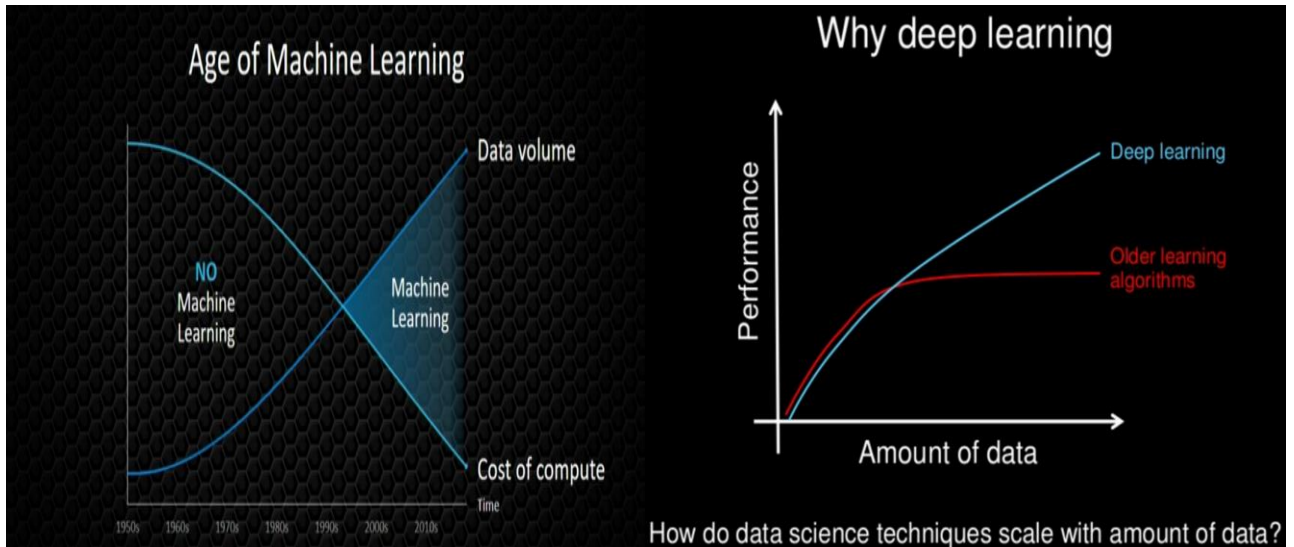
# Big data predict what is next



Koen Kas @kaskoen



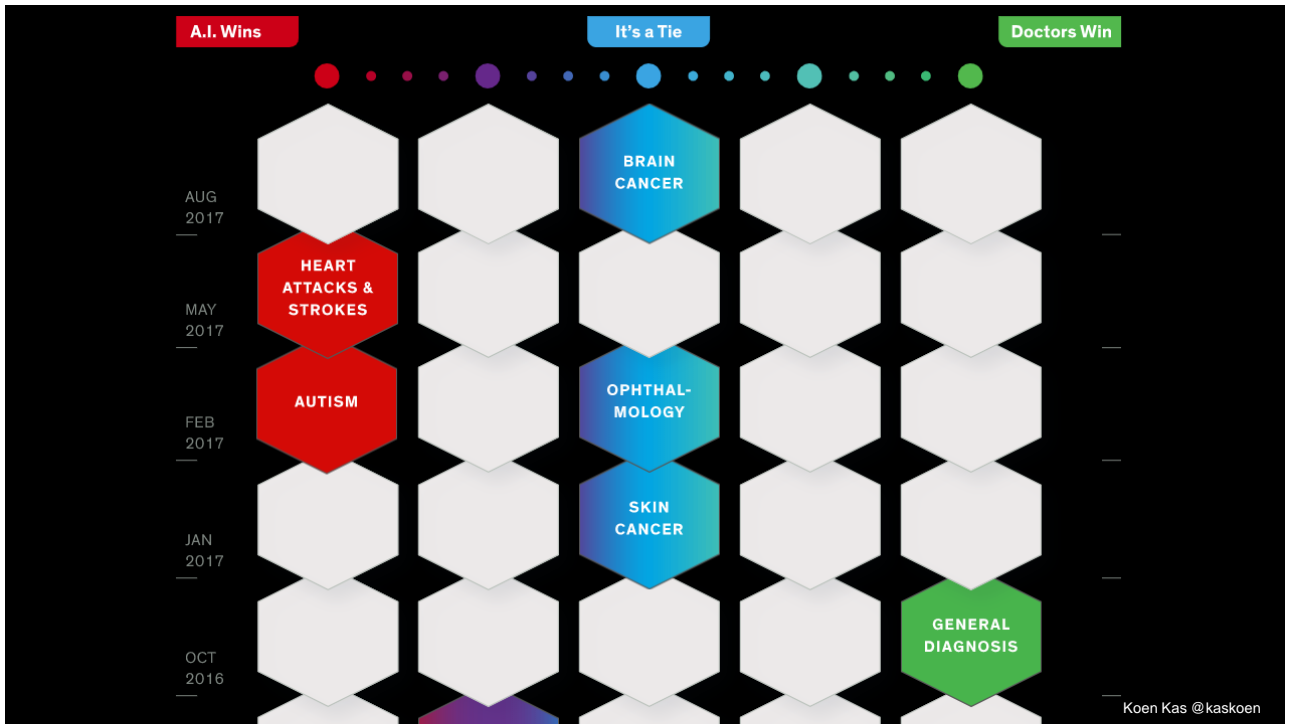
# Machine learning -> Deep learning



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**mediktör** Glossary | Register • Login

How may I help you?

I'm dizzy, my chest hurts...

Discover all our functions and enjoy a better user experience with our app.

Download on the **App Store** | Download on **Google play**

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**Aceptar**

Would you prefer to chat with a specialist?

Likewise! How can I help you today?

I'm not feeling well. 😞

Let me ask you some questions to find out what's wrong with you.

Based on your answers I can find the most likely cause...

...and give you some advice on how to get better.



GYANT

Koen Kas @kaskoen

## Anamnesis 2.0



Home


Nieuws

Contact



Een voorbereide patiënt,  
een geïnformeerde arts

BINGLI stelt al op voorhand de juiste vragen,  
zo bent u meteen voorbereid op uw consultatie



Voor een meetbaar  
betere consultatie

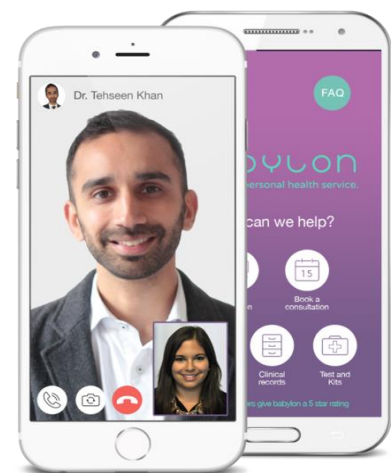
<http://www.mybingli.com/>

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# Telehealth



# Instant ordering





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<http://www.vividocor.com>

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**e-visits increase # appointments made & reduce new patients seen**



Wisconsin School of Business - N=140.000, 2008-2013

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## Focus on meaningful outcomes Demonstrate that digital health applications improve

- Health-related quality of life
  - Patient satisfaction
  - Resource utilization
  - Disease outcomes, and ultimately
  - Survival
- Digital health is a social and behavioral science for patients to change the way they behave

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## Doctors recording appointments for their patients

**MEDICAL MEMORY**

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### Optimize Your Practice with Video

Limit risk and save time with a HIPAA-compliant app that improves patient compliance.

FREE DEMO

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## Everybody on the same page

Today, more than 12 million patients in 36 states can share open notes in medical records. OpenNotes is an international movement that's building better communication, quality of care, patient safety and trust.

## What are open notes?

Written by doctors, nurses, therapists, or other health professionals to describe interactions with patients, notes are part of the medical

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## Simplified Clinical Documentation

Dictate instant notes using your iPhone, increasing your time with patients

[Learn More](#)

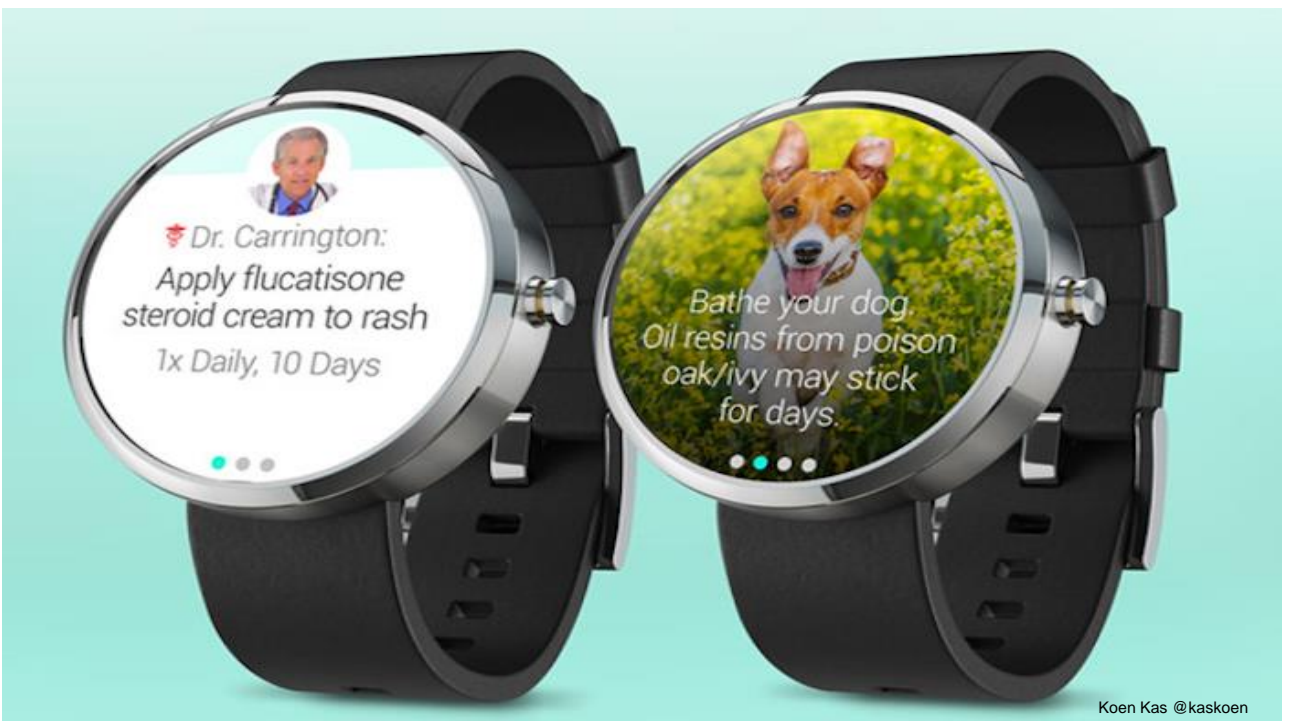
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# Healthcare experience



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## Consumenten ratings / Reputation management



ARCHIMEDIX

Contact Us

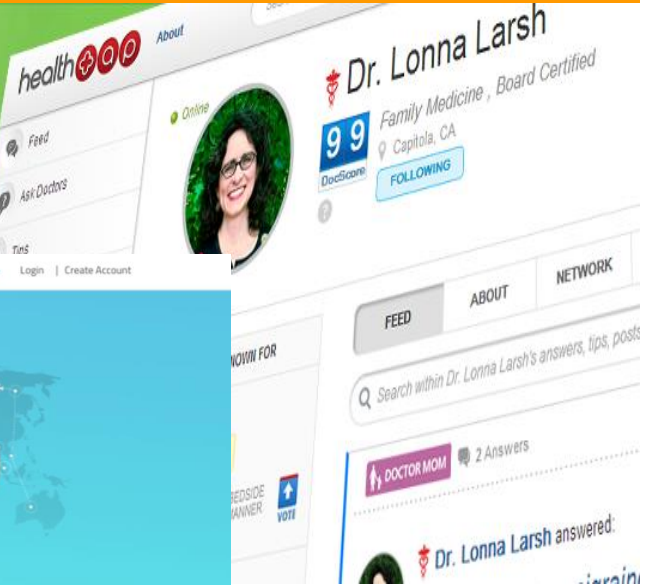
+44 20 36 95 98 52

7:00 - 14:30 GMT

English

Login

Create Account



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Find the Best  
Hospital for Your  
Procedure

Watch video

Enter your required medical procedure

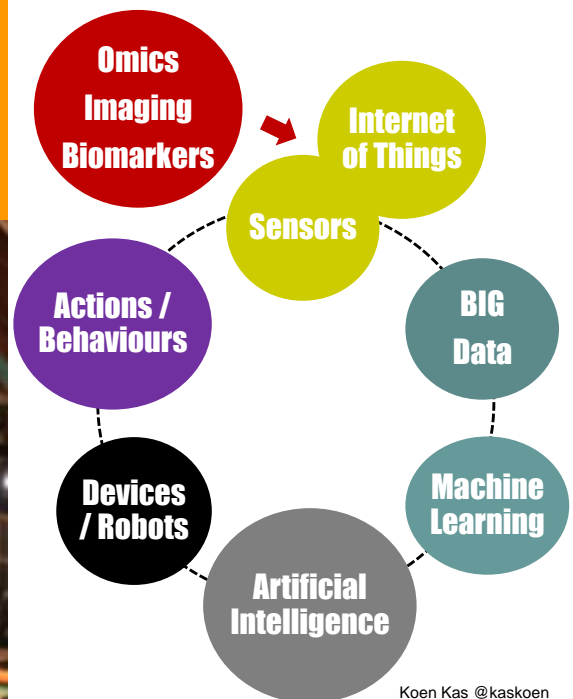
Find Hospitals



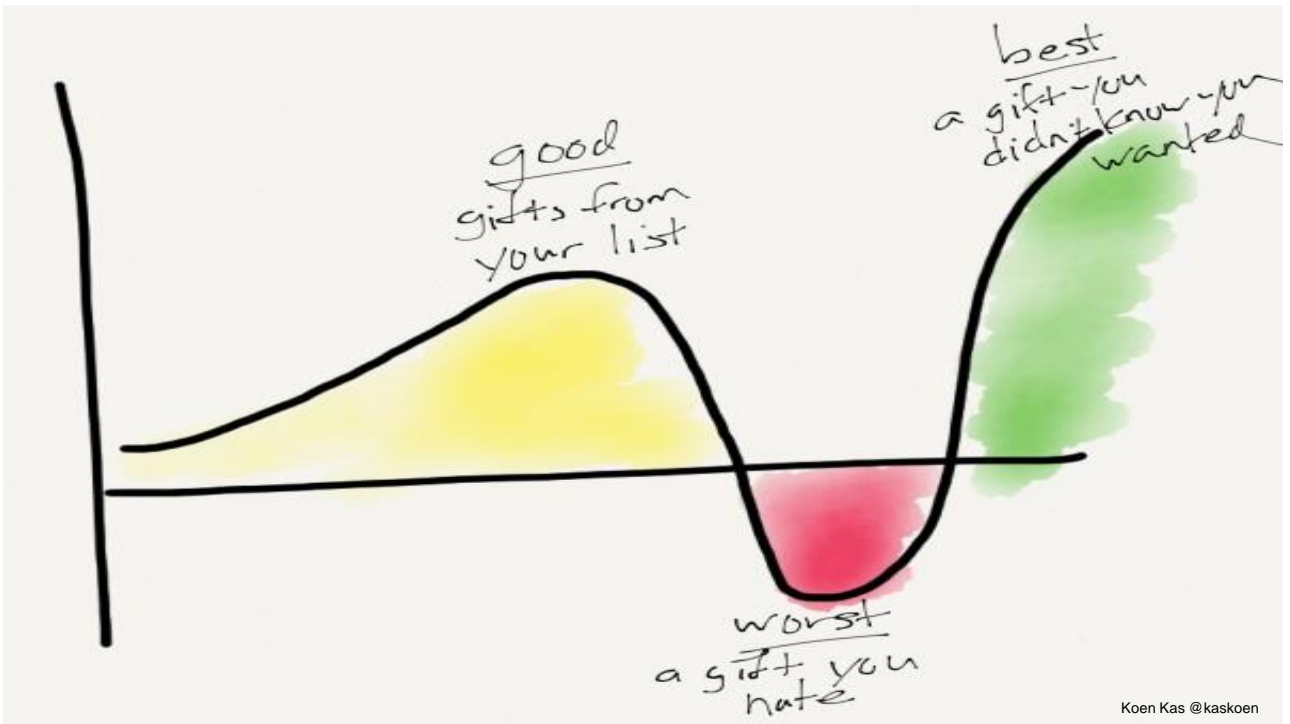
## Sickcare -> Healthcare Precise medicine to Personalised Prevention



Baymax, Big Hero 6



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The top section shows a banner for Weave, a patient communication platform. The banner features a woman talking on a phone and another person working at a computer. The text on the banner reads: "Keep Your Patients Happy and Your Chairs Full", "Weave. The beautifully simple way to strengthen patient communication, streamline daily tasks, and grow your practice's revenue.", and includes buttons for "Schedule Demo" and "Watch the Video".

The bottom section shows the Caldr logo, which consists of a blue circle with a white checkmark and the word "caldr" in black lowercase letters. Below the logo is the URL <http://caldr.be/>.

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# ICT for customer delight

1. Hippocrates patient watch
2. Clinicians trained in statistics & data sciences
3. Domus Medica as glue for Belgian startup scene

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## How can we help you?



Eye-opening,  
inspiring  
Keynotes



Self-learning  
Newsletter  
Unknown unknowns



Connectors  
unlocking  
data silo's



healthskouts

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