

# Diner innovation 7 décembre 2018

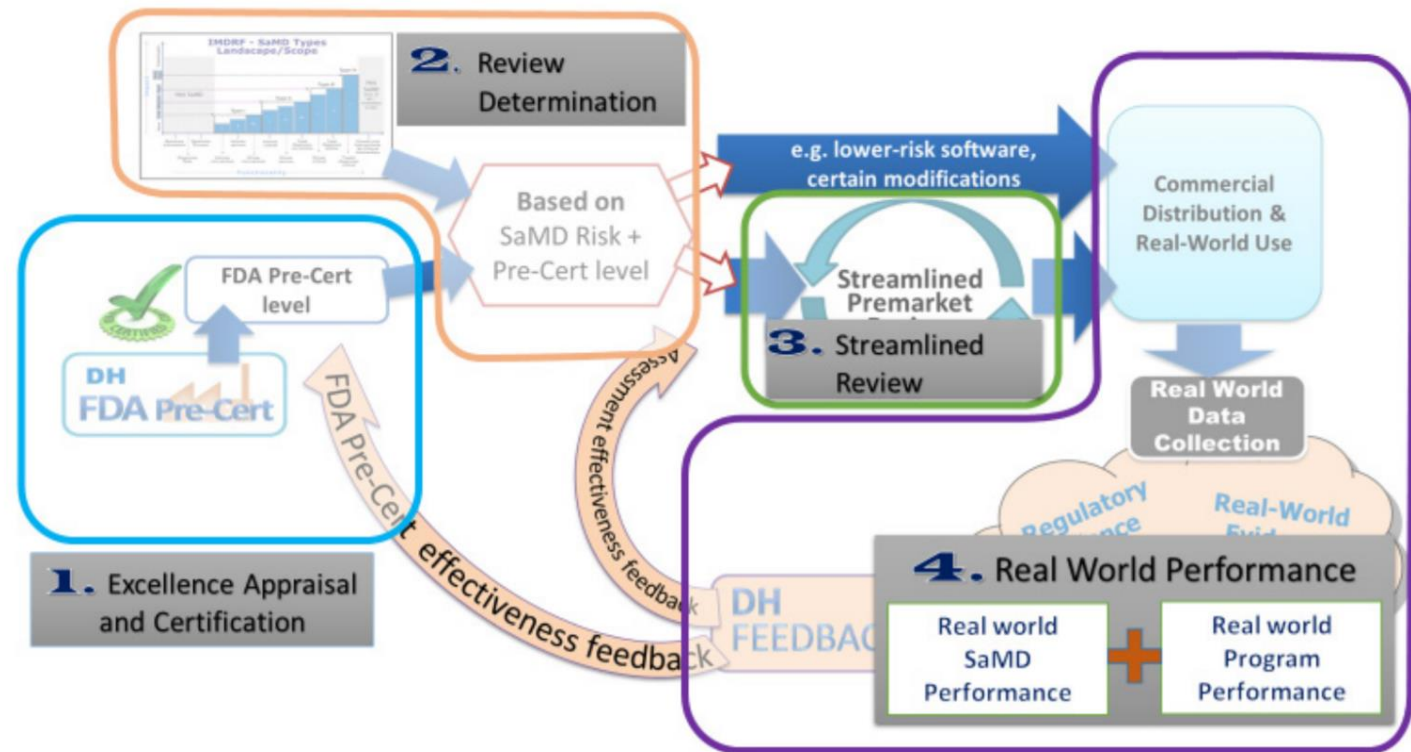
Petits signaux par petits signaux

# Réglementation



# Pre-certification FDA

- Il y a un an, 9 sociétés sélectionnées sur 100 pour un projet pilote de réglementation du software as medical device (SaMD) & du software in a medical device (SiMD) :
  - Apple, Fitbit, Johnson & Johnson, Pear Therapeutics, Phosphorus, Roche, Samsung, Tidepool, Verily



# Jusqu'au Medical device de sous type 6, il n'y a pas de review

State of Healthcare situation or condition	Significance of information provided by SaMD to healthcare decision		
	Treat or diagnose	Drive clinical management	Inform clinical management
Critical	IV (9)	III (7)	II (4)
Serious	III (8)	II (6)	I (2)
Non-serious	II (5)	I (3)	I (1)

# Healthcare everywhere & all the time

**ECG on your wrist.  
Anytime, anywhere.**

Apple Watch Series 4 is capable of generating an ECG similar to a single-lead electrocardiogram. It's a momentous achievement for a wearable device that can provide critical real-time data for doctors and peace of mind for you.

ECG app coming later this year.



# “Timely availability of solutions to patients”

	End user	Business	FDA	Payor	Investor
	<i>Patients, Providers, Caregivers</i>	<i>SaMD Developer</i>	<i>Agency Reviewer</i>	<i>Insurance Provider</i>	<i>Venture Capitalist</i>
<b>Enhanced confidence in organizations developing SaMD products</b>	+		+	+	+
<b>Improved quality/safety/proactivity to address known and emerging risks</b>	+	+	+	+	
<b>Timely availability of solutions to patients</b>	+	+	+	+	+
<b>Enhanced regulatory simplicity and experience</b>		+	+	+	+
<b>Business simplicity - faster/timely market access</b>	+	+	+		+



## Facebook language predicts depression in medical records

Johannes C. Eichstaedt, Robert J. Smith, Raina M. Merchant, Lyle H. Ungar, Patrick Crutchley, Daniel Preotjuc-Pietro, David A. Asch, and H. Andrew Schwartz

PNAS October 30, 2018 115 (44) 11203-11208; published ahead of print October 15, 2018  
<https://doi.org/10.1073/pnas.1802331115>



## Amazon patents Alexa tech to tell if you're sick, depressed and sell you meds

Echo could analyze your voice to detect a "physical or emotional abnormality."

ION BRODKIN - 10/11/2018, 7:13 PM



An Amazon Echo.

## Walmart, Amazon patents could take biometric monitoring to a new level

Recently granted patents show a shopping cart that monitors your heart rate, Alexa listening for coughs.

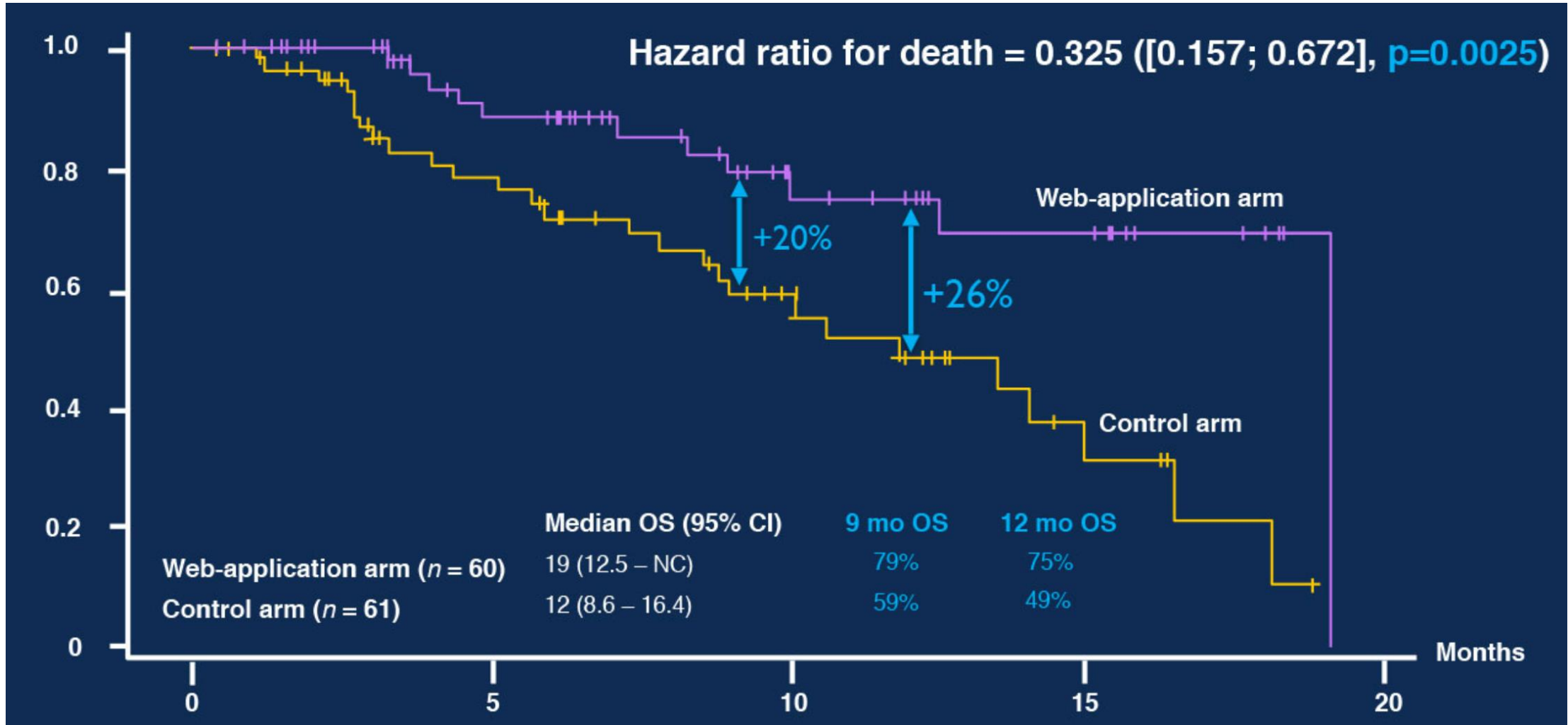
# Passive Health monitoring & timely availability of solutions for patients!

L'étude de Moovcare présentée l'  
ASCO en 2017:

*PFS médiane de 7 mois observée  
avec une App de suivi de patients  
atteints de NSCLC & SCLC*



# Overall survival improvement



# Cost-effectiveness of follow-up

Follow-up	Survival benefit	ICER QALY
<b>CT-scan</b> for Lung Cancer	4 weeks	<b>265.000 \$</b>
<b>CT-scan</b> for Lymphoma	2 w	<b>800.000 \$</b>
<b>PET</b> for cervical Cancer	1 w	<b>1.000.000 \$</b>
<b>Web-app</b>	30 w	<b>&lt;10000 \$</b>

*Van Loon et al, Eur J C 2010*

*Huntington et al, JCO 2015*

*Auguste P al, BJOG 2014*

# Biomarqueurs – Capteurs – Data

A dark, monochromatic photograph of a cityscape at dusk or dawn. The scene is dominated by silhouettes. On the left, a large, ornate statue stands on a pedestal. In the center and right, several street lamps of different designs are visible against the dim sky. The overall atmosphere is quiet and historical.



# Vinod Khosla

- Créateur de Sun Microsystems
- Investisseur chez Kleiner, Perkins
- Il gère 1,3Mrds,
- Le guru dit qu'il y a 3 types de projets:
  - Markers
  - Sensors
  - Data
- Un des plus gros investisseurs dans le domaine de la santé aux US!
- Il a investi dans Eligo Bioscience ! (son premier invest en France)

# Markers

- Proxy biomarkers et markers composite
  - Ex: 200 patterns pathologiques peuvent être lus sur un ECG par un Algo et peuvent-être des proxy markers ou combinés à d'autres markers

npj | Digital Medicine

[www.nature.com/npjdigitalmed](http://www.nature.com/npjdigitalmed)

**BRIEF COMMUNICATION** **OPEN**

## Digital biomarkers of cognitive function

Paul Dagum<sup>1</sup>

To identify digital biomarkers associated with cognitive function, we analyzed human–computer interaction from 7 days of smartphone use in 27 subjects (ages 18–34) who received a gold standard neuropsychological assessment. For several neuropsychological constructs (working memory, memory, executive function, language, and intelligence), we found a family of digital biomarkers that predicted test scores with high correlations ( $p < 10^{-4}$ ). These preliminary results suggest that passive measures from smartphone use could be a continuous ecological surrogate for laboratory-based neuropsychological assessment.

*npj Digital Medicine* (2018)1:10; doi:10.1038/s41746-018-0018-4

## Preview the Future of Intelligent Care

Qualcomm Life is highlighting the cost savings that can be achieved through intelligent integration of patient data across care settings.

LEARN MORE >



# Sensors





Tricorder

**EMPOWERING  
PERSONAL  
HEALTHCARE.**

# \$10 MILLION

Prize Purse

The Qualcomm Tricorder XPRIZE was a \$10 million global competition to incentivize the development of innovative technologies capable of accurately diagnosing a set of 13 medical conditions independent of a healthcare professional or facility, ability to continuously measure 5 vital signs, and have a positive consumer experience.



## **DIAGNOSE**

Accurately diagnose  
13 health conditions



## **CAPTURE**

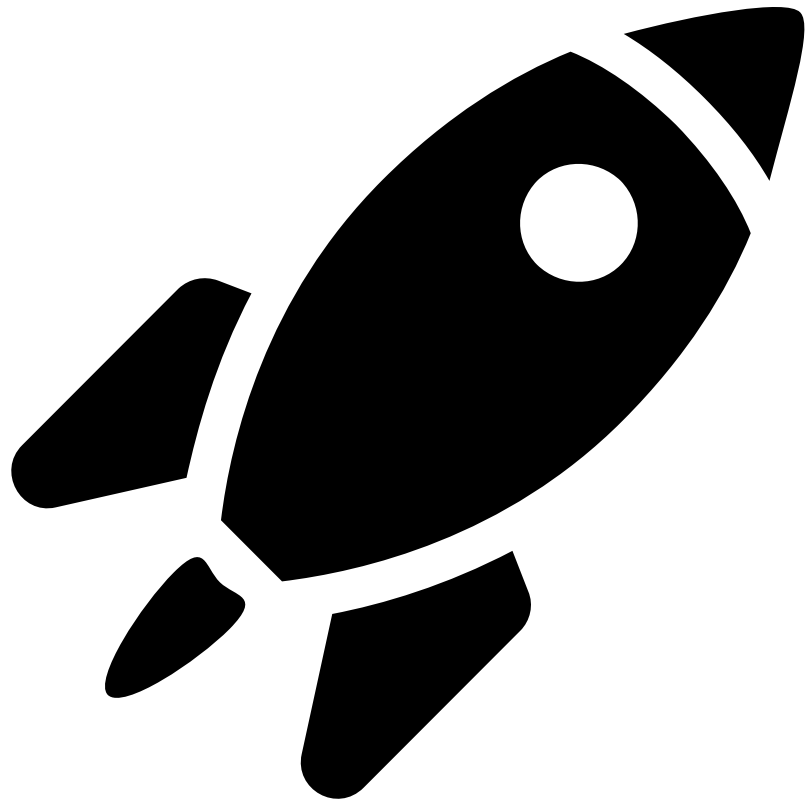
Capture 5 real-time  
health vital signs



## **EXPERIENCE**

Provide a compelling  
consumer experience

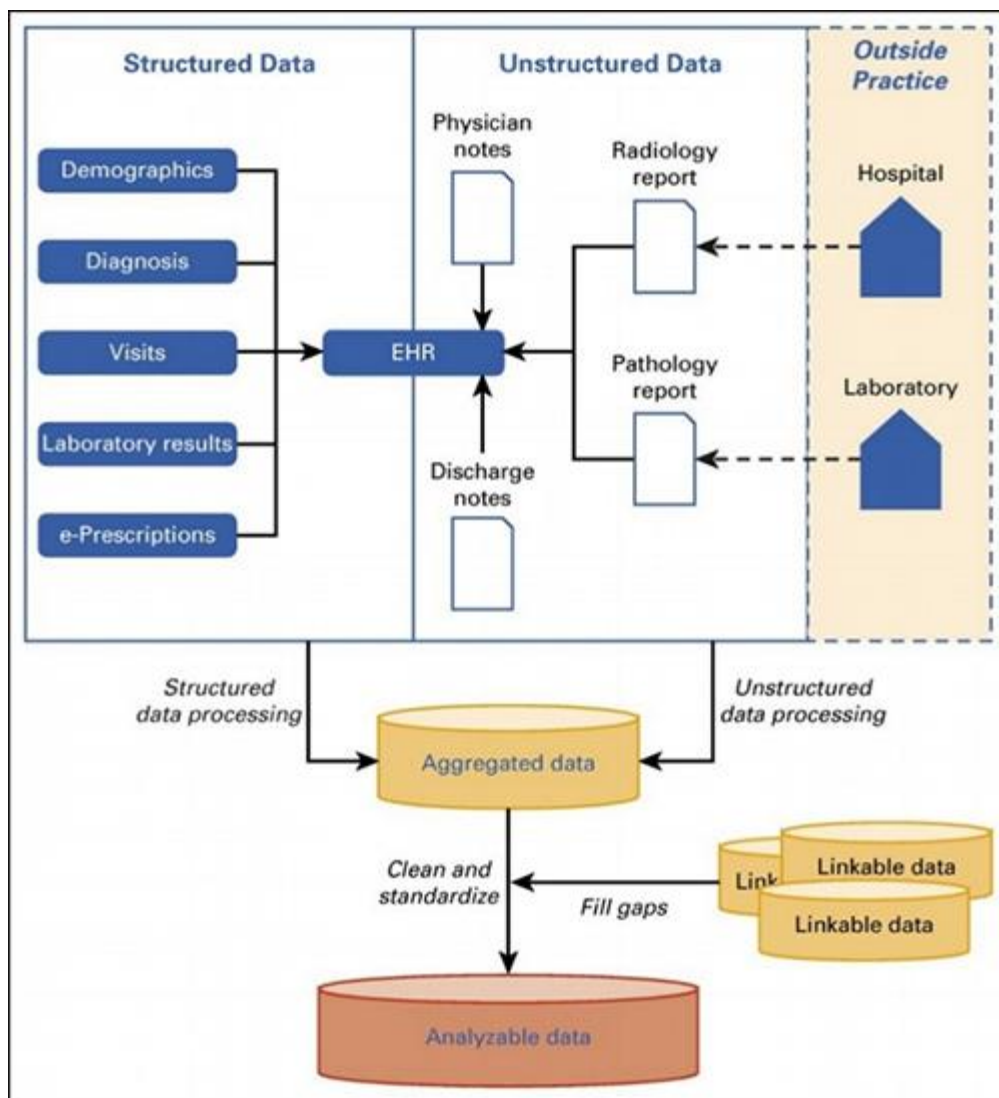




Data

# Flatiron

- Créée en 2012,
  - 2013 série A 8M\$,
  - 2014 série B de 130M\$, invest de GV,
  - 2016 série C de 1 000M\$
  - 2018 acquisition par Roche 1 900M\$
  - En 18 mois ils installent gratuitement leur EMR pour oncologues dans 2500 cliniciens américains, contre consentement à céder les droits d'exploitation de la data
  - Ils constituent une base de 2 000 000 dossier patients: résultats d'analyse + décision médicale
- 1 000\$ le dossier patient ;)
- 
- ```
graph TD; A[2018 acquisition par Roche 1 900M$] --> B[En 18 mois ils installent gratuitement leur EMR pour oncologues dans 2500 cliniciens américains, contre consentement à céder les droits d'exploitation de la data]; B --> C[Ils constituent une base de 2 000 000 dossier patients: résultats d'analyse + décision médicale]; C --> D[1 000$ le dossier patient ;)
```



- « In such a critical business situation, the company is in dire need of utilizing **real-world evidence and analytics** solutions to fast track its clinical trials. Research suggests that only **3-5%** of clinical trial enrollment yields desired results. The Flatiron platform is able to help identify the right patient cohorts for almost 15 types of cancer conditions for clinical trials, which can help save developers millions of dollars”
- “Using that information, **it can create virtual clinical studies** to try to see if what happens in randomized trials matches with what happens in the real world. In one study presented earlier this year, for instance, Bristol worked with Flatiron to put together a **virtual control group** for a single-arm study and a small study with a placebo group testing the company’s drug **Opdivo** in a rare form of esophageal cancer. The conclusion? The drug may have benefit in that rare disease.”

Les algo



**IDx** *Transforming healthcare  
through automation*

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[Pipeline](#)

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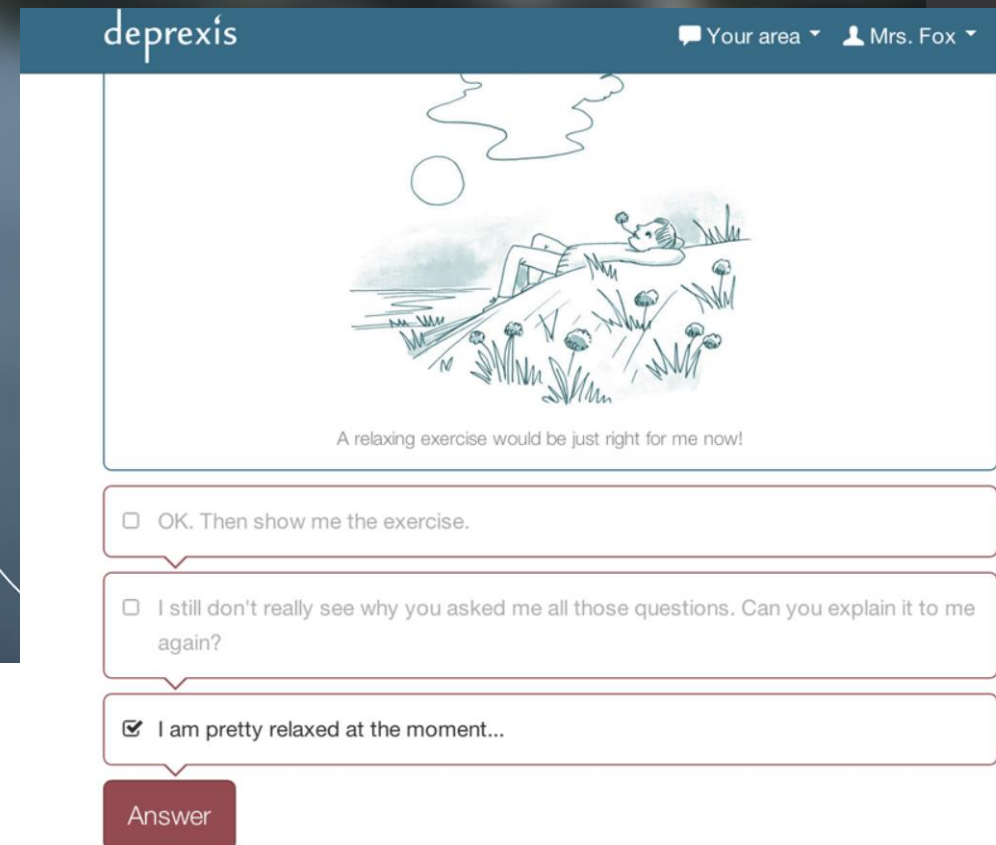
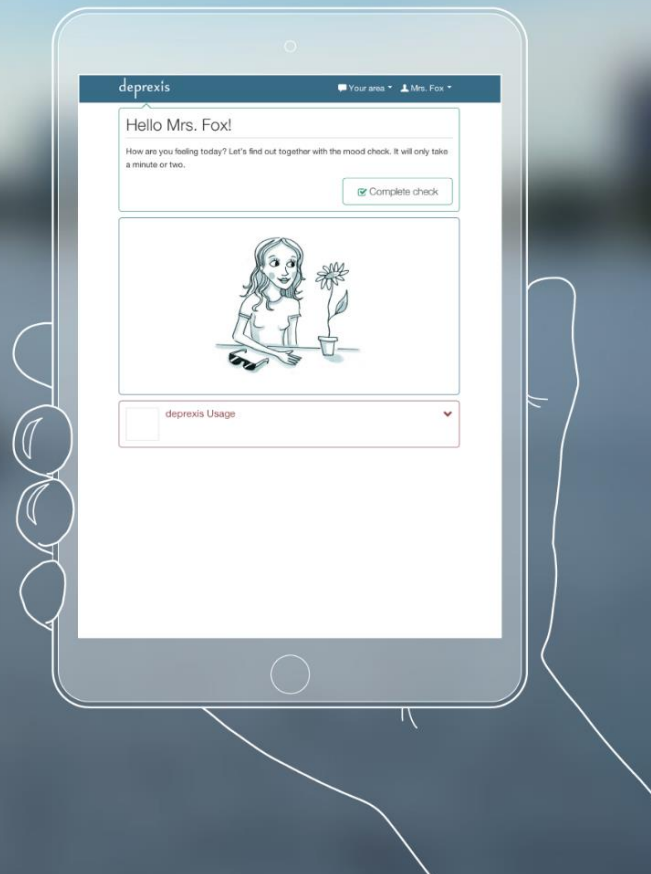
[Contact](#)

# Autonomous AI that instantly detects disease

Increase patient access to  
early disease detection

[Our first solution](#)

**IDx : first fully autonomous AI for Dx, FDA approved**

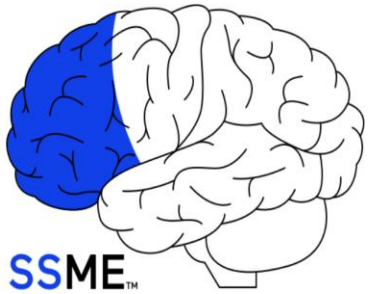


- Approved and reimbursed treatment for depression
- Deprexis = nom de marque



**Akili**  
**and Me**

## Our core technologies



### Selective Stimulus Management (SSME™) engine

- Prefrontal cortex-based cognitive control, via interference processing (multitasking).
- Key functional dependency for attention, working memory & executive function.
- Major disorders suffer from inability to process, filter & respond to competing stimuli

- Akili : Créée en 2011, 141M\$ levés
- Secteur: études cliniques et Diagnostic médical
  - ADHD
  - Autism
  - Multiple Sclerosis
  - Major Depressive disorder

## Attention Deficit/Hyperactivity Disorder (ADHD)

Our lead candidate, AKL-T01, is an investigational digital medicine being evaluated as a potential prescription treatment for children with ADHD. AKL-T01 is currently under regulatory review to ensure it meets strict standards for efficacy, safety, and manufacturing before being prescribed by physicians.

Feasibility



Pilot


Pivotal



Letter | Published: 04 September 2013

## Video game training enhances cognitive control in older adults


J. A. Anguera , J. Boccanfuso, J. L. Rintoul, O. Al-Hashimi, F. Faraji, J. Janowich, E. Kong, Y. Larraburo, C. Rolle, E. Johnston & A. Gazzaley 

*Nature* **501**, 97–101 (05 September 2013) | [Download Citation](#) 

Original Article | [OPEN](#) | Published: 20 September 2016

## Characterizing cognitive control abilities in children with 16p11.2 deletion using adaptive ‘video game’ technology: a pilot study

J A Anguera , A N Brandes-Aitken, C E Rolle, S N Skinner, S S Desai, J D Bower, W E Martucci, W K Chung, E H Sherr & E J Marco 

*Translational Psychiatry* **6**, e893 (2016) | [Download Citation](#) 

### Abstract

Assessing cognitive abilities in children is challenging for two primary reasons: lack of testing engagement can lead to low testing sensitivity and inherent performance variability. Here we

# Mais aussi ...



- Opiod addiction!

# Redefining Medicine

PRESCRIPTION DIGITAL THERAPEUTICS  
FOR THE TREATMENT OF  
SERIOUS DISEASE

# En fait, c'est pas qu'un truc de ricain

FR  EN

ACCUEIL

ODYSIGHT



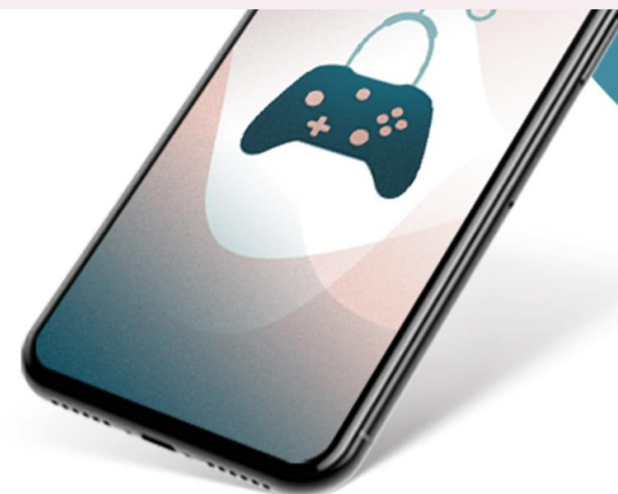
CARRIÈRES

À PROPOS

Connexion médecin

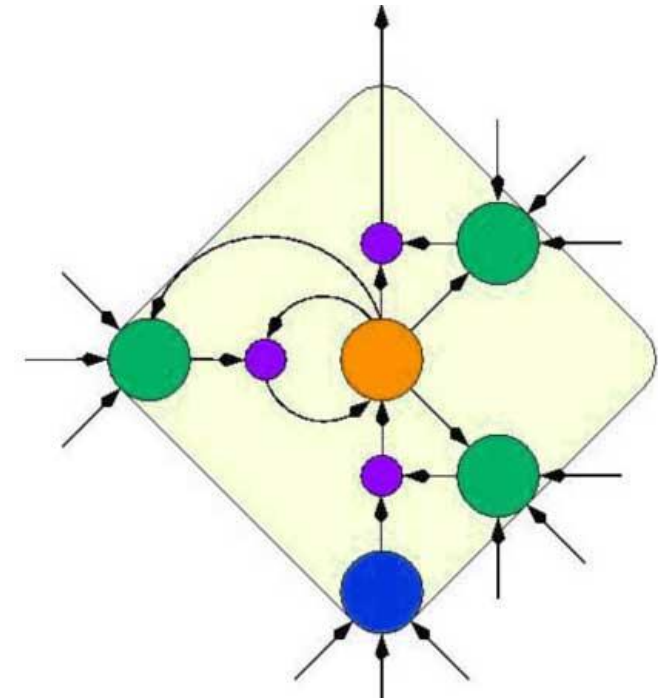
**unique** en son genre spécialisé dans la création de jeux mobiles médicaux ludiques, destinés au **suivi de patients atteints de maladies chroniques.**

## MISSION



# LSTM : long term short memory

- C'est l'agence tout-risque de l'algo, quand la data est en bordel et impossible à nettoyer, on peut l'utiliser, il a un jeu de data pour s'entraîner et un jeu de data sur lequel il agit. Il fait du sur-mesure à chaque fois.
- Robot control, Time series prediction, Speech recognition, Rhythm learning, Music composition, Grammar learning, Handwriting recognition, Human action recognition, Sign Language Translation, Protein Homology Detection, Predicting subcellular localization of proteins, Time series anomaly detection, Several prediction tasks in the area of business process management, Prediction in medical care pathways, Semantic parsing, Object Co-segmentation





# A2IC 2018

## ARTIFICIAL INTELLIGENCE INTERNATIONAL CONFERENCE

NOVEMBER 21-23, 2018

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CONFERENCE

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## Artificial Intelligence International Conference – A2IC 2018

The A2IC conference aims to establish an international forum of reference for the latest advances in the field of Artificial Intelligence (AI). This first edition aims at joining both academy and industry by covering not only basic applied research, but also philosophical and ethical issues regarding the future of humanity in an AI world.

### Featured speakers



Des nombres

- 845 oncologues !
- 1200 anatomo-cytopathologistes
- 700 cardiologues rythmologues – 1% de la population

C'est pas mal grand

Home > Search Results

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1201 Studies found for: **PD1**

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Recruitment ⓘ:

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| Row | Saved                    | Status     | Study Title                                                                                                                                | Conditions                   | Interventions                                                |                                |
|-----|--------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------|--------------------------------|
| 1   | <input type="checkbox"/> | Recruiting | <a href="#">CTLA-4 and PD-1 Antibodies Expressing MUC1-CAR-T Cells for MUC1 Positive Advanced Solid Tumor</a>                              | • Advanced Solid Tumor       | • Biological: Anti-CTLA-4/ <b>PD-1</b> expressing MUC1-CAR-T | • Ningbo N Hospital) Ningbo, Z |
| 2   | <input type="checkbox"/> | Unknown †  | <a href="#">Evaluation of PD1 / PDL1 Expression on Blood Cells &amp; Tumor Tissue, Their Role as a Prognostic Target in NSCLC Patients</a> | • Non-Small Cell Lung Cancer | • Other: Evaluation of <b>PD-1</b> /PDL-1 expression.        | • Instituto I Mexico, M        |
| 3   | <input type="checkbox"/> | Recruiting | <a href="#">PD-1 Antibody Expressing mesoCAR-T Cells for Mesothelin Positive Advanced Solid</a>                                            | • Advanced Solid             | • Biological: <b>PD-1</b> antibody expressing                | • China                        |

Google



# GV – actif depuis 10 ans dans la santé depuis moins...

- Alector,
- Aledade
- Arcus Biosciences \*
- ARMO BioSciences \*
- Arsanis \*
- Aspire Health
- Autolus \*
- BlackThorn Therapeutics
- Cambridge Epigenetix
- Carrick Therapeutics
- Celsius Therapeutics
- ClassPass
- Clear Labs
- Clover Health
- Collective Health
- Compass Therapeutics
- Decibel Therapeutics
- Denali Therapeutics \*
- DNAnexus
- Doctor On Demand
- Evelo Biosciences
- Evox Therapeutics
- FitStar \*
- FLX Bio
- FogPharma
- Forty Seven \*
- Freenome
- Genomics Medicine Ireland
- Grail
- Gritstone Oncology
- Ideaya Biosciences
- insitro
- LifeMine Therapeutics
- Magenta Therapeutics \*
- Metabiota
- Obsidian Therapeutics
- Oration \*
- Oscar
- OWKIN
- PatientPing
- Quartet
- Rani Therapeutics
- Relay Therapeutics
- Rise \*
- Rodin Therapeutics
- Science 37
- Spero Therapeutics \*
- Spruce Health
- SQZ Biotech
- TinyRx
- Transcriptic
- Verana Health
- Viz.ai
- Wingu \*
- ZappRx
- Zephyr Health

“While working on my Ph.D. at Stanford, I was exposed to some incredible developments in biotechnology. I’m amazed at how quickly these technologies are coming out of the lab and into the market. Gene editing, cell therapy, rapid analysis of genetic data—these advances will help millions of people, and they’re quickly becoming a reality.”

— Blake Byers, General Partner at GV

# WE'VE MAPPED THE WORLD. NOW LET'S MAP HUMAN HEALTH.

## MY MOOD TODAY



Enthusiastic

80%

Scared

20%

## MY SLEEP LAST NIGHT



Times awakened

2

Sleep duration

7.5 hr

## MY HEARING TEST



Left ear

Normal

Right ear

Normal

## MY ECG TODAY



Heart rate

72 bpm

PR Interval

0.17

## MY DIET TODAY



Coffee

2 cups

Water

8 oz

## MY IMMUNIZATION RECORD



Tetanus

Yes

Pertussis

Yes

## MY MOVEMENT TODAY



Strenuous activity

Often

Minutes walked

45 min

Avec Duke university & Stanford

# In-person visits

Through in-person visits, we'll dive deep into a wide range of measures—from your genetics to your mental health, and everything in between.

## Annual site visit

Once a year, you will come to a Baseline study site near you for one to two days of health tests. (Note that these are for research purposes and do not serve as medical care.)

You can expect to:

- Do standard tests, such as reviewing your medical history and assessing your physical strength
- Do specialized tests, such as an echocardiogram, eye exam, and chest x-ray
- Give blood, saliva, and other samples
- Answer detailed questionnaires about topics related to your health and lifestyle

## Short quarterly appointments

In addition, we will ask some people to do three short appointments per year (one to two hours each) to gather more frequent information about health profiles that we are especially interested in.

We also may ask you to come in for an appointment following a significant life event, so that we can see if and how your health changes.

## Leadership Team

We build cross-functional teams made up of research scientists, hardware and software engineers, physicians and commercial experts. Our multidisciplinary teams have access to advanced research tools, large scale computing power and unique technical expertise.



Andy Conrad, Ph.D.  
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Oncology Programs  
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## Hal Barron, M.D.

Hal V. Barron, M.D., joined GSK as chief scientific officer and president, R&D on in January 2018. He is a member of the board and the corporate executive team. His previous role was president, R&D at Calico (an Alphabet-backed life sciences company). Prior to this, Hal was executive vice president, head of Global Product Development, and chief medical officer of Roche, responsible for all the products in the combined portfolio of Roche and Genentech. At Genentech, he was senior vice president of Development and chief medical officer. Hal was previously a non-executive director and chair of the Science & Technology Committee at Juno Therapeutics, Inc. He is associate adjunct professor, Epidemiology & Biostatistics, University of California, San Francisco. Hal holds a B.S. degree in Physics from Washington University in St. Louis and a medical degree from Yale University. He completed his training in Cardiology and Internal Medicine at the University of California, San Francisco. He has been issued several patents for his work in thrombosis and angiogenesis and has published more than 90 papers in peer-reviewed scientific journals.

## Eric Topol, M.D.

Eric J. Topol is executive vice president of the Scripps Research Institute, professor of Molecular Medicine, and the founder and director of the Scripps Translational Science Institute. He has published over 1100 peer-reviewed articles, with more than 200,000 citations, elected to the National Academy of Medicine, and is one of the top 10 most cited researchers in medicine. He started a new medical school in 2004 and is currently a leader of the NIH Precision Medicine Initiative of 1 million Americans. He has published 2 bestseller books on the future of medicine: *The Creative Destruction of Medicine* and *The Patient Will See You Now*.



# Dernière slide pour vous convaincre qu'on ne prend peut-être pas assez le digital au sérieux :P



## Practical innovations in health care delivery

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### Machine-learned epidemiology

The objective of this study is to test the efficacy of a machine-learned model of foodborne illness detection in a real-world setting. Read the paper in full.

Review Article | 08 November 2018 | [OPEN](#)  
**Reflecting health: smart mirrors for personalized medicine**  
Riccardo Miotto, Matteo Danieletto [...] Joel T. Dudley

Article | 24 October 2018 | [OPEN](#)  
**DeepTag: inferring diagnoses from veterinary clinical notes**  
Allen Nie, Ashley Zehnder [...] James Zou

Announcement  
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