

ehealthsummit.pt

# Portugal eHealth summit



24th ISfTeH  
International  
Conference

ISfTeH | International Society for  
Telemedicine & eHealth

# Medicina Personalizada

O futuro chegou hoje

Ricardo Encarnação



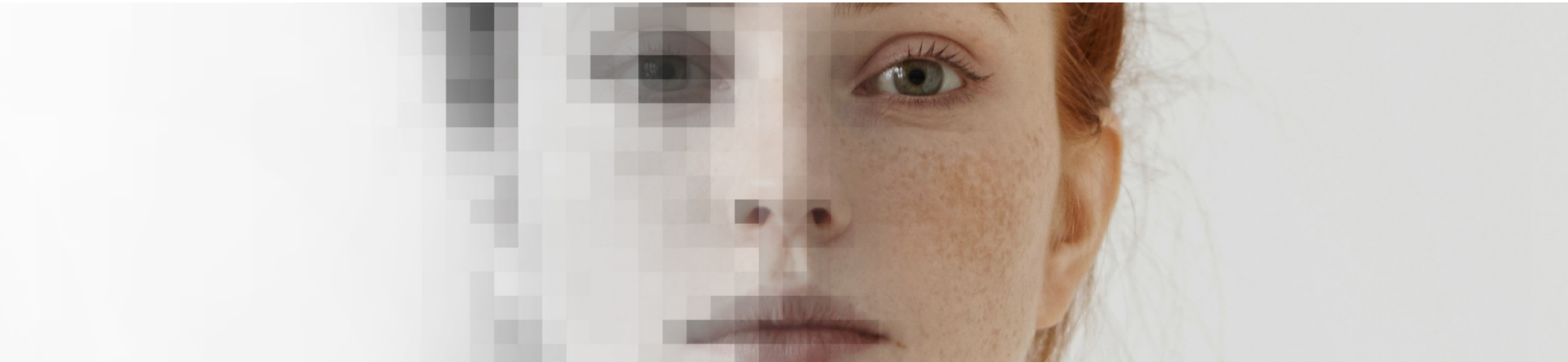






# **Transforming Healthcare**

## *Through a new era of data and analytics*

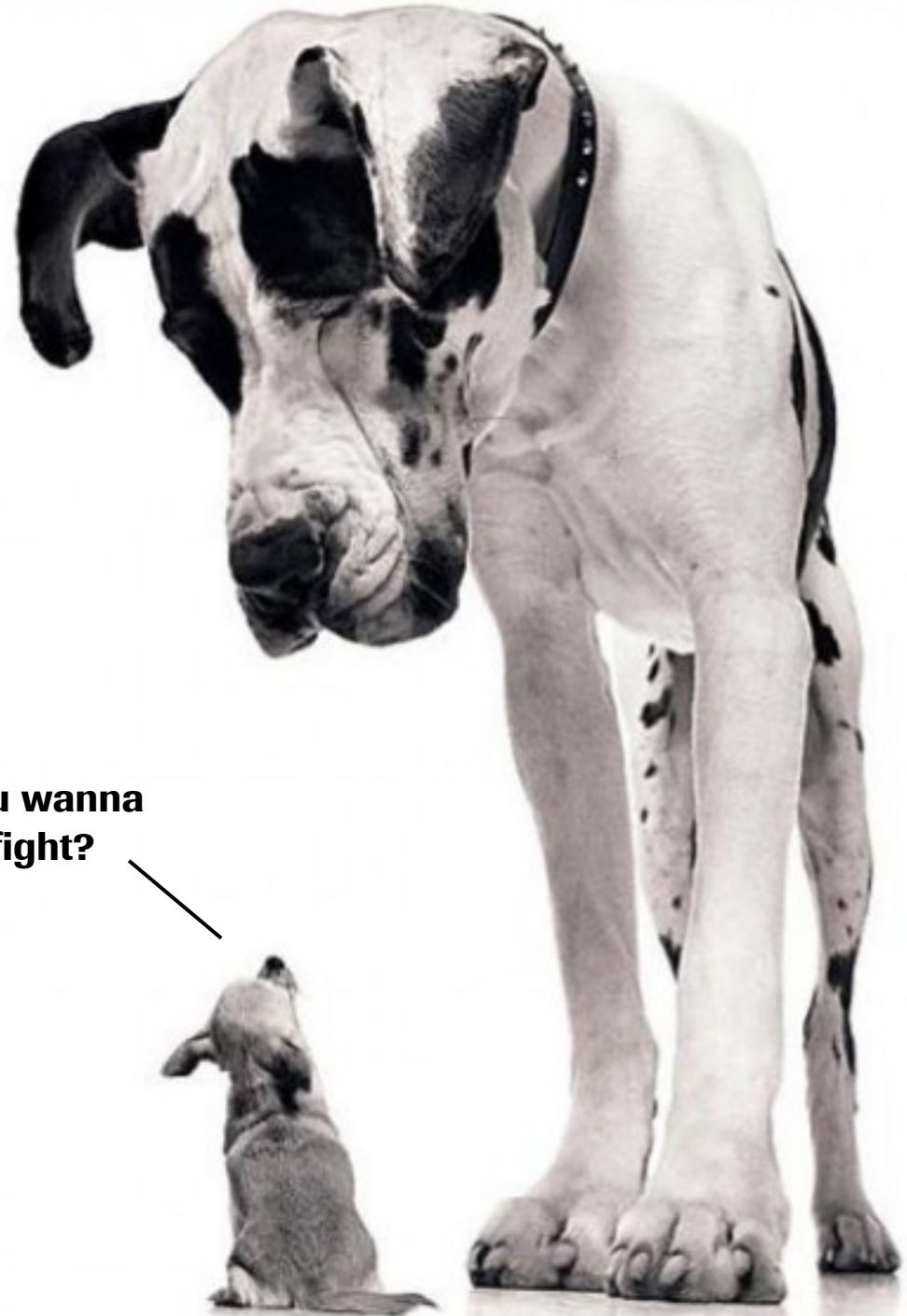




# BIG DATA

Is “**BIG**” good enough?

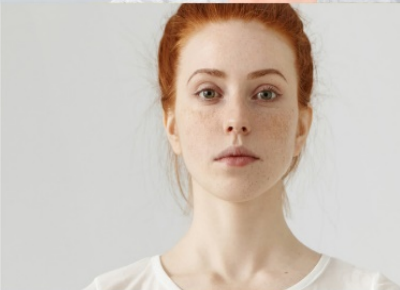
You wanna  
fight?





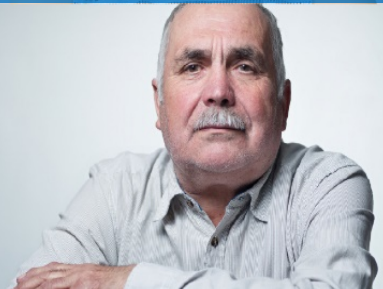
## Meaningful data

High quality data with a purpose:  
to answer key scientific questions



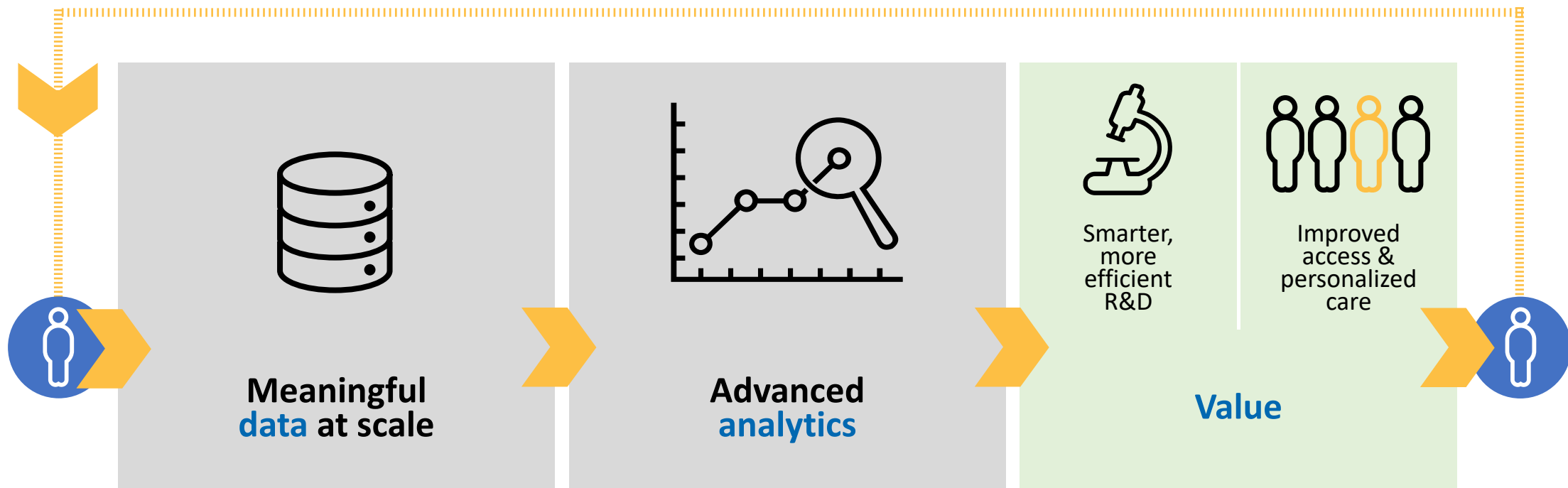
## AT SCALE

Covering enough patients  
to be generalizable



# An holistic approach to driving value from MDAS

*A continuous “engine” that starts and ends with patients*





Genomics



FOUNDATION  
MEDICINE®

EMR / RWD



flatiron

Digital Health

Advanced imaging

Digital pathology

**Deep and  
broad data from  
multiple sources**

# *Integration of digital tools into clinical pathways to improve care & outcomes*

## Digital Outcomes & Biomarkers

Digital Imaging &  
Pathology

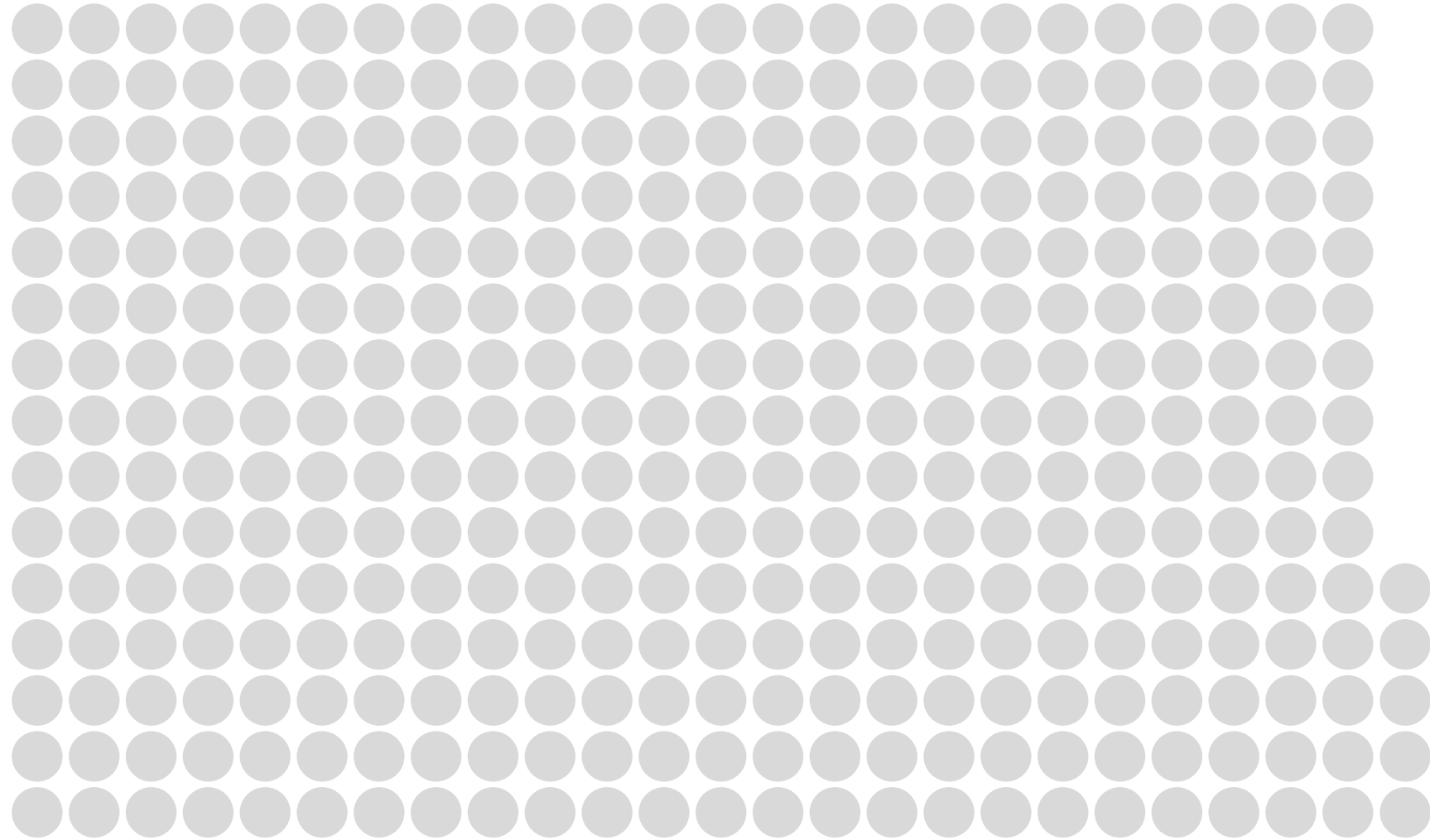
Apps & Wearable  
devices (smartphone,  
smartwatch, ...)

Passive & active  
monitoring

Digital Care Solutions

Digiceuticals (PDT)

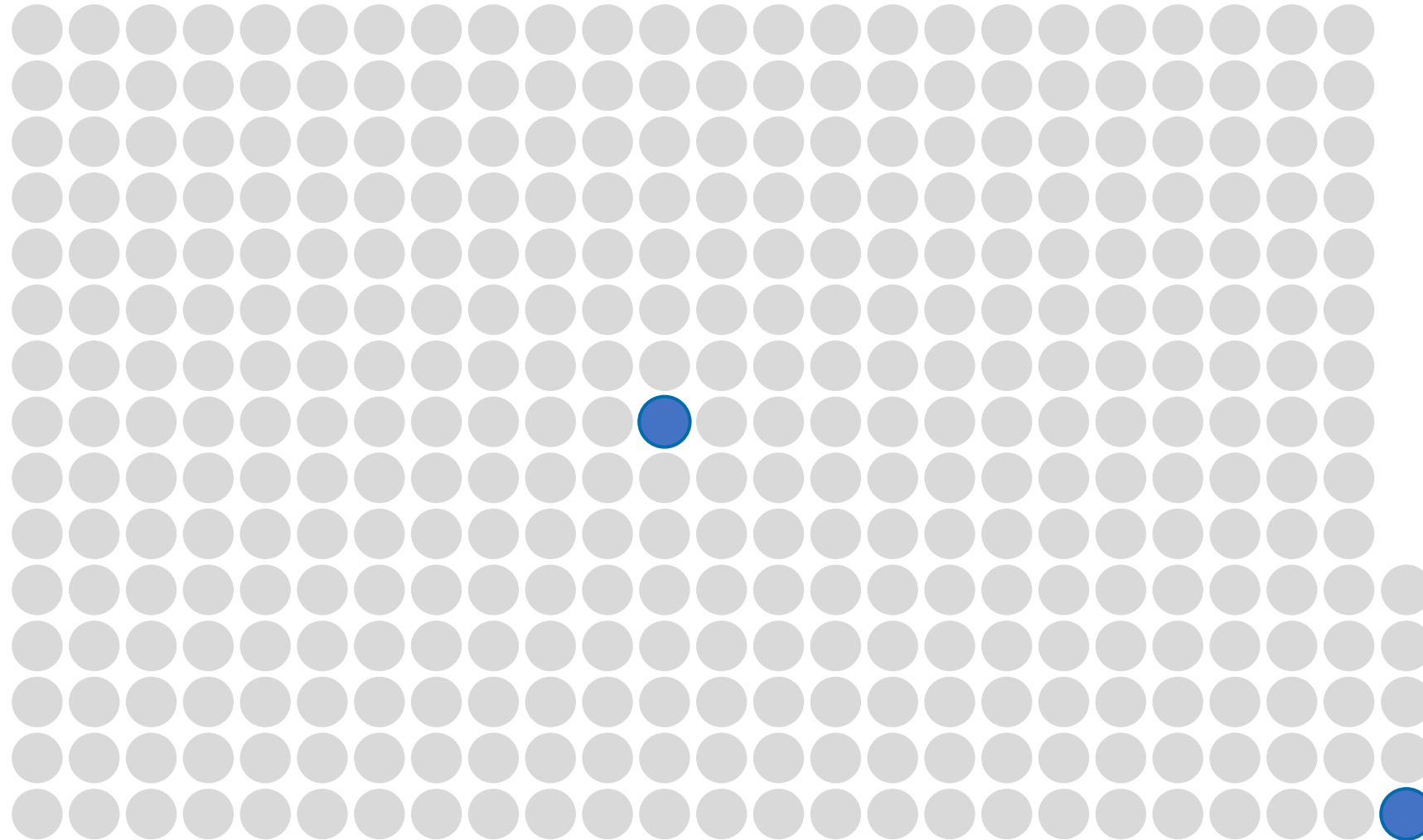




Day in the life of a patient  
with weak symptoms



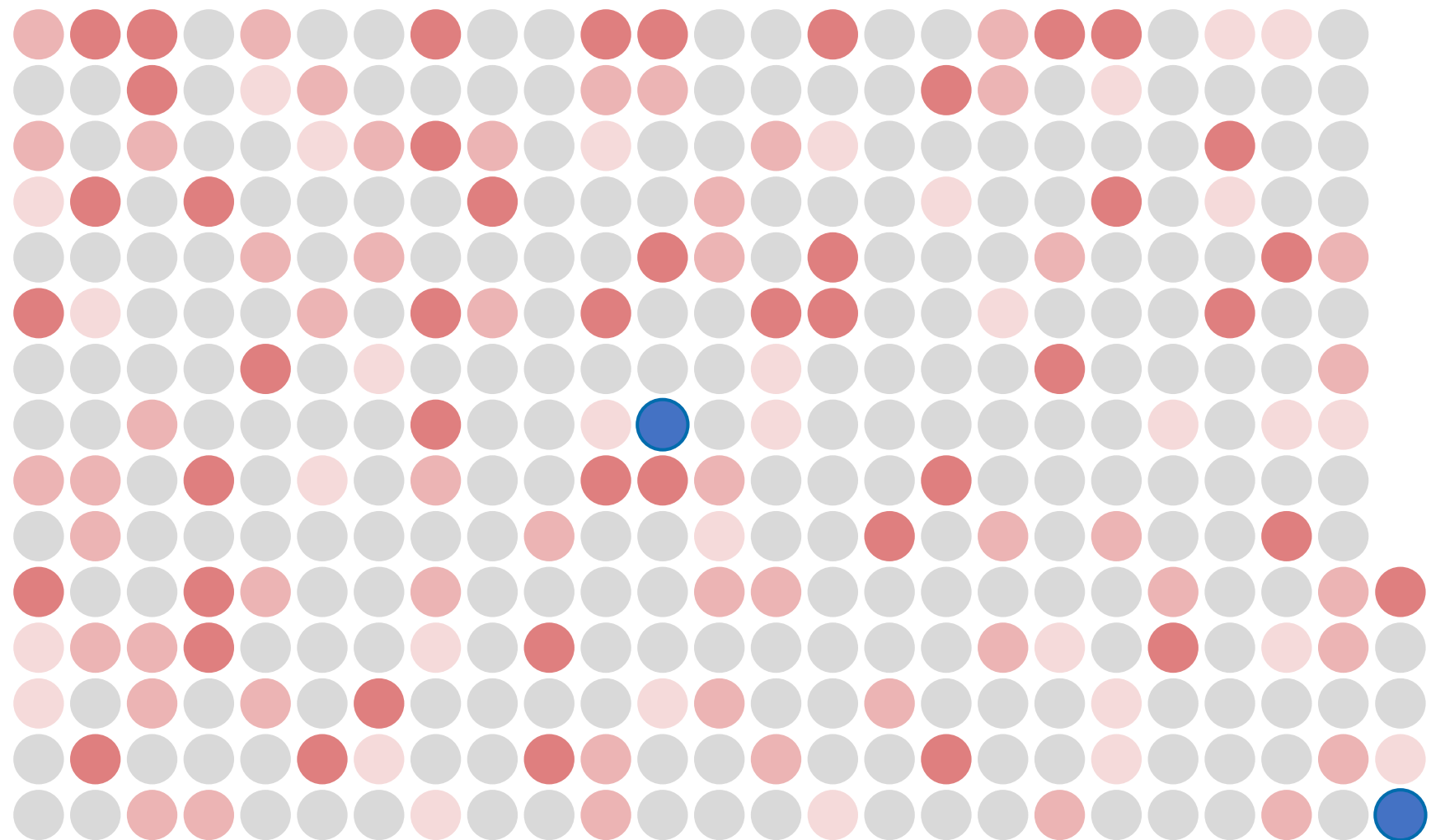




Day in the life of a patient  
with weak symptoms

Day with a visit to the  
clinic/physician



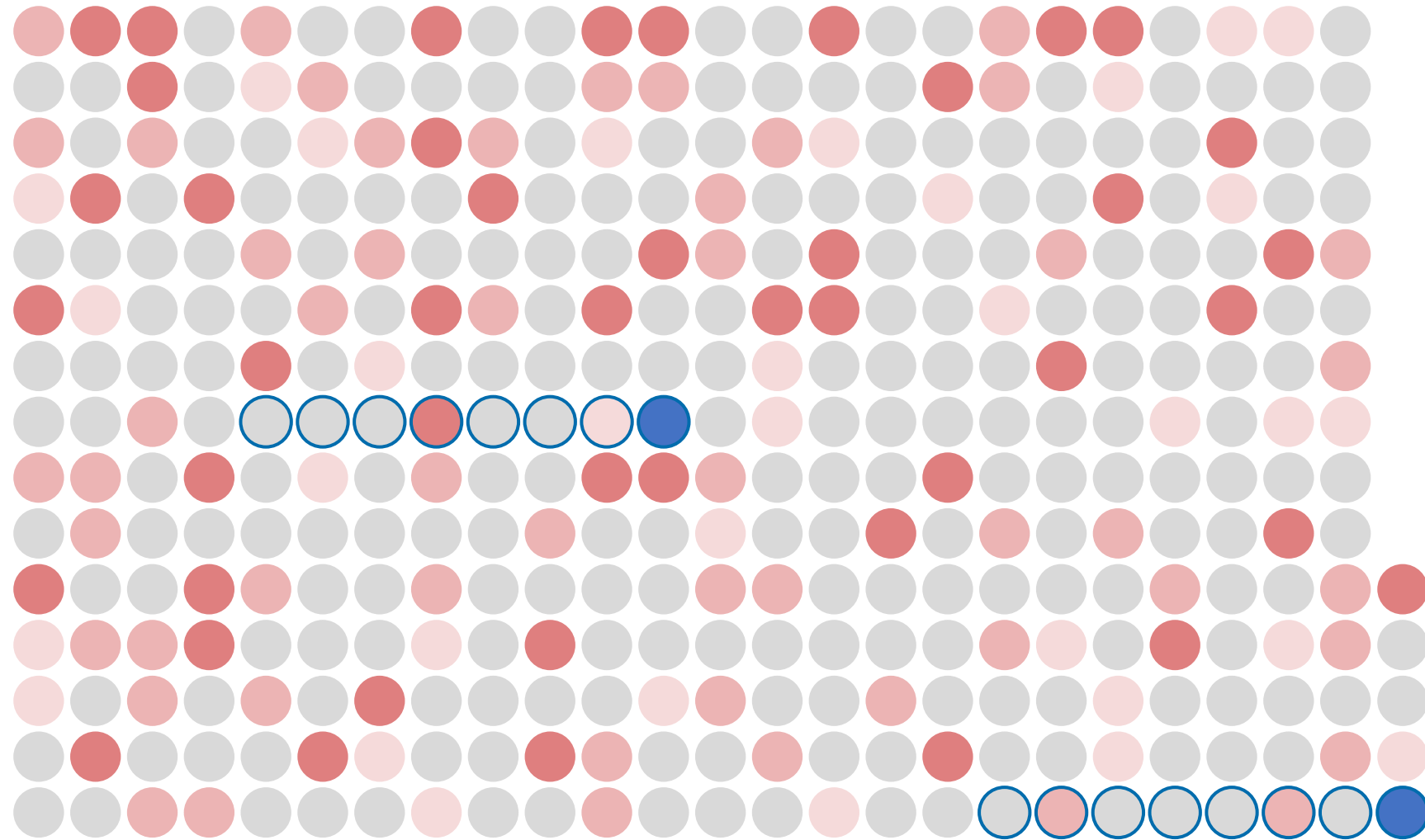


Day in the life of a patient  
with weak symptoms

Day with a visit to the  
clinic/physician

Day with stronger  
symptoms



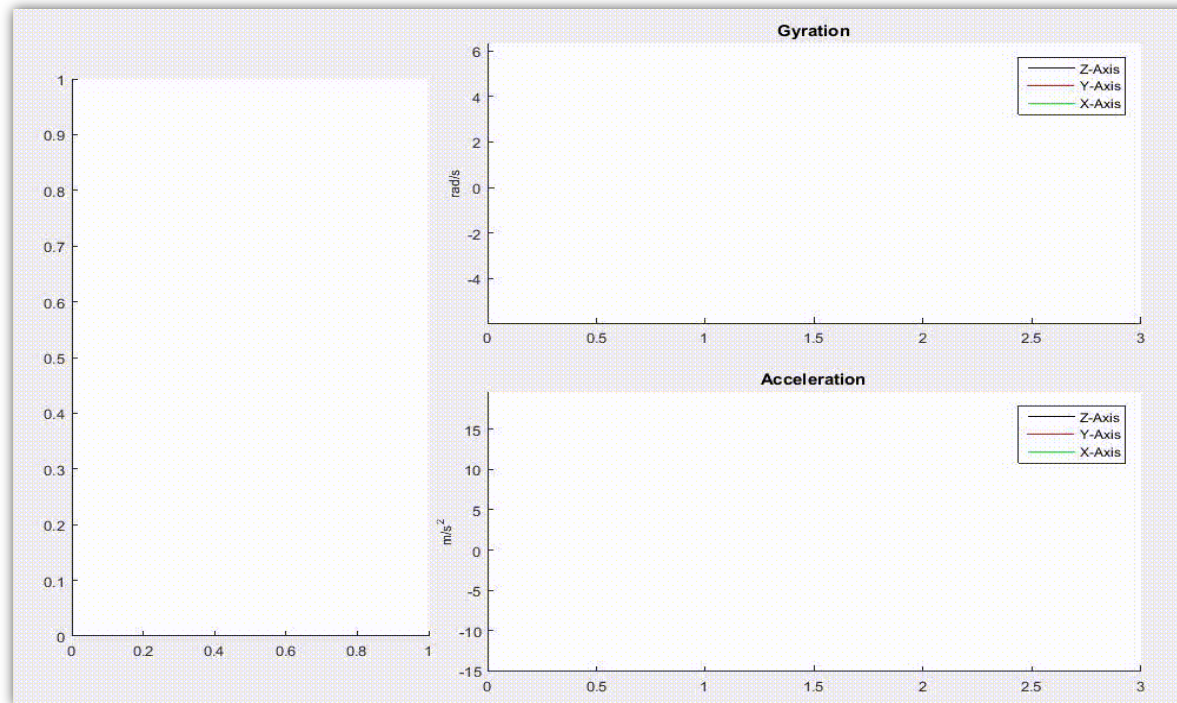


Day in the life of a patient with weak symptoms
  Day with a visit to the clinic/physician
  Day with stronger symptoms
  Patients' recall period





# Consumer-technology enables objective, precise, and continuous active and passive monitoring

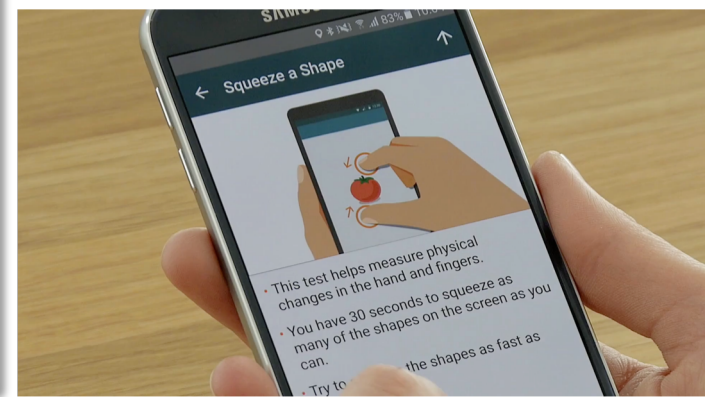
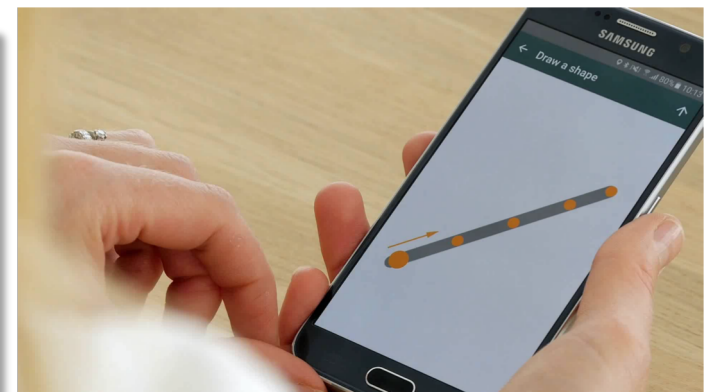
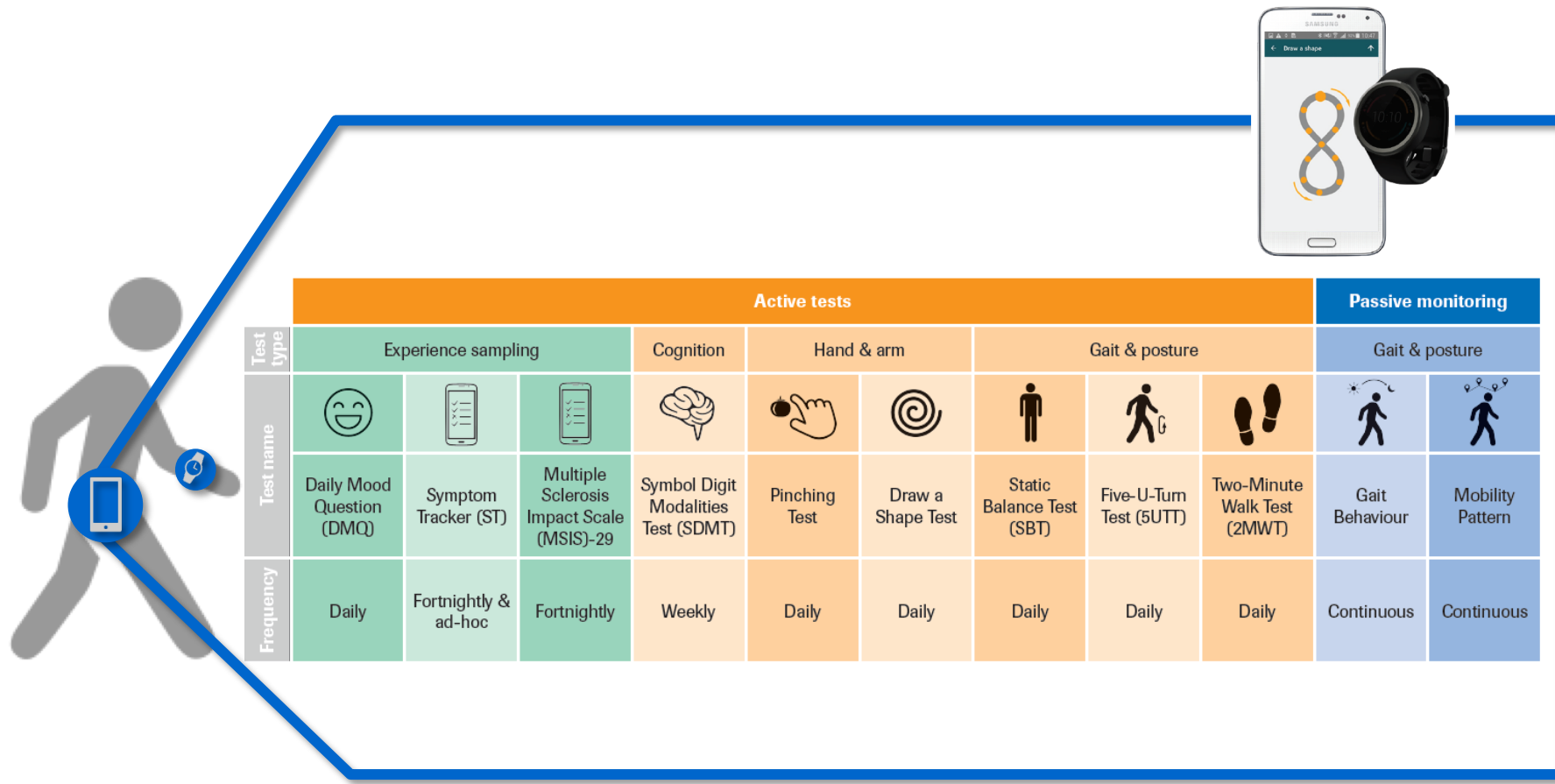


## References

Bove R et al. Neurol Neuroimmunol Neuroinflamm. 2015;2:e162; Savage N. Nature 2015;527:S12-S13; F. Hoffmann-La Roche Ltd. Data on file.

# Smartphone-based self monitoring (SSM) in MS

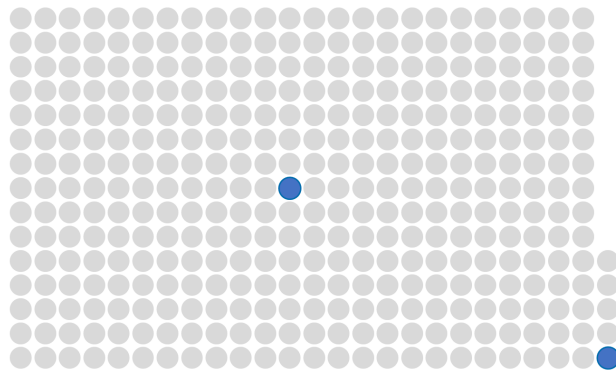
## *Floodlight - Developed with input from clinicians*



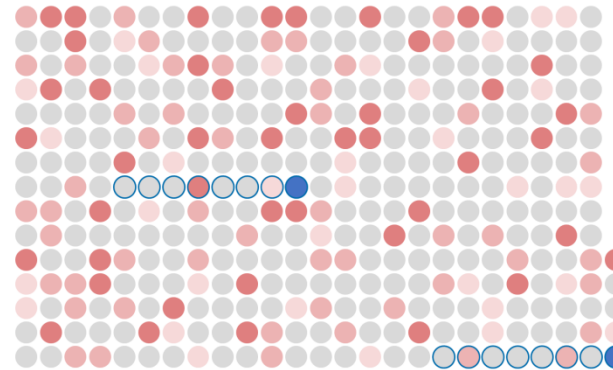
# Identifying sub-clinical disease & progressing MS

## *365 days/year with active tests and passive monitoring*

365 days in the life of a patient with MS: in current clinical practice a patient may only see their physician twice for around 10 minutes.

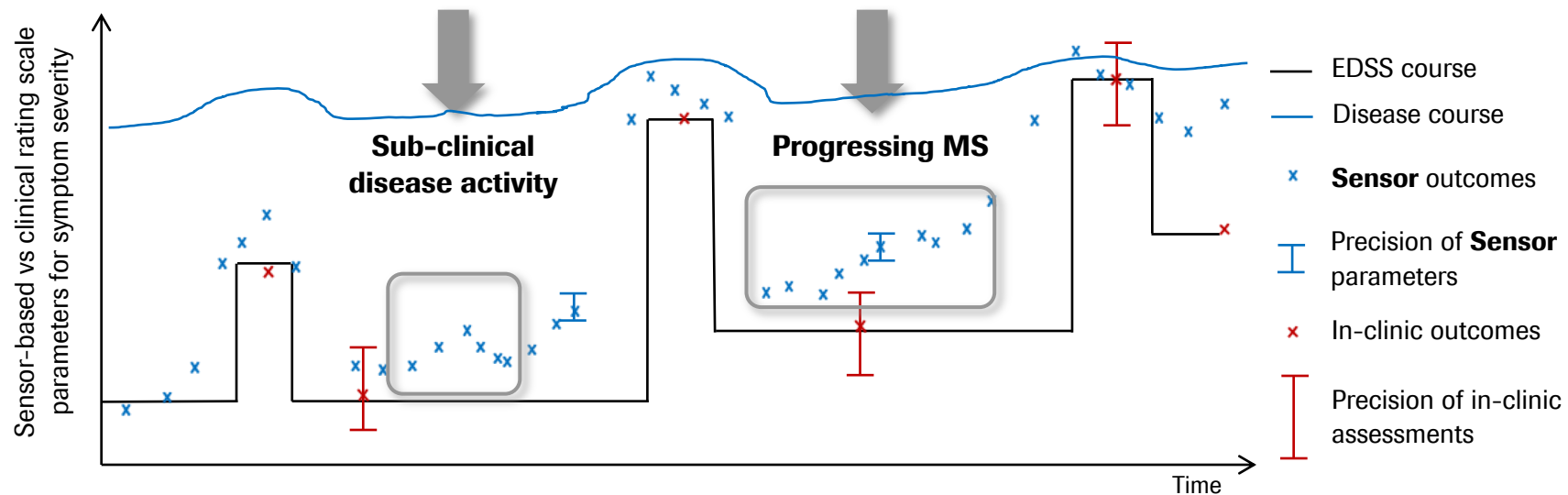


Remote monitoring promises to change this. Disease activity can be measured throughout the year, enabling better-informed treatment decisions.



### Legend

- Day in the life of a patient with chronic stable symptoms
- Day with a **visit** to the clinic/physician
- Day with worsening **symptoms**
- Patients' **recall period**





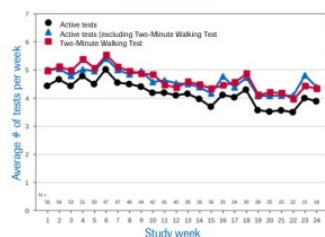
# Towards Digital Endpoints and Biomarkers In MS Clinical Trials

## 1. Adherence

Patient collect digital data regularly

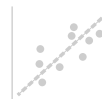


Active tests

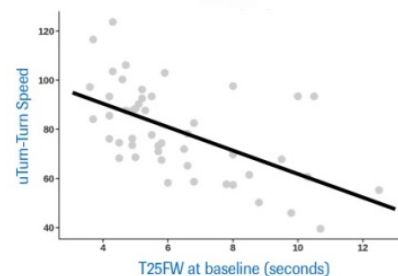


## 2. Agreement

Digital SSM metrics correlate with clinical scales



U-turn speed measured with 5UTT correlates with T25FW



## 3. Augmentation

Digital SSM **outcomes** may measure unique aspects of the disease



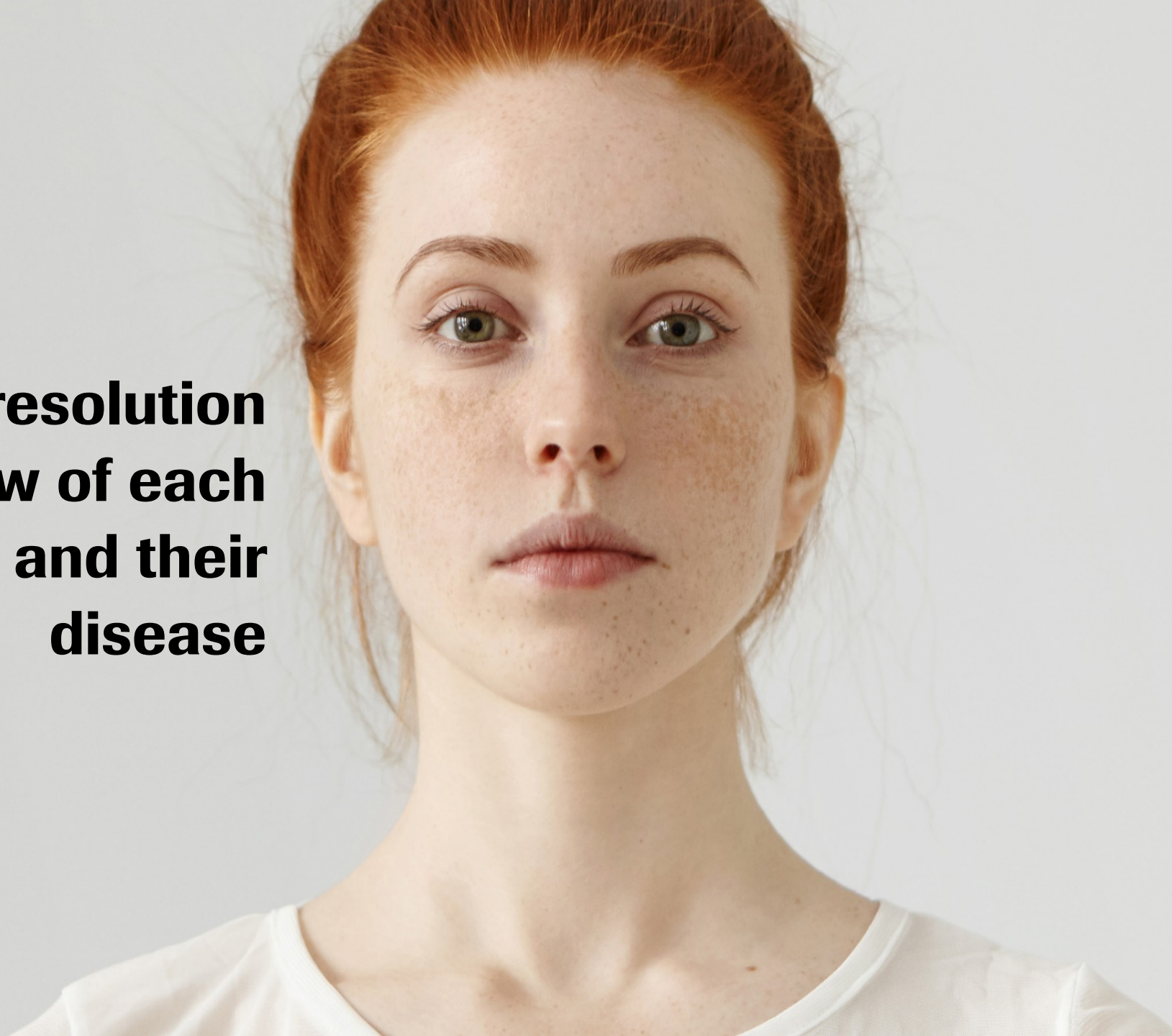
## 3. Prediction

$$y_i = a_i + \sum_{j=1}^n b_{ij} x_j + \varepsilon_i$$

Digital SSM **biomarkers** may predict disease milestones:

Where  $y_i$  is: Time to progression milestones, to MRI activity, treatment failure, or to next relapse

**High resolution  
view of each  
patient and their  
disease**









**1,161+ individuals**  
around the world

more than **10,100,000+**  
**real-world “loop hours”**

# #WeAreNotWaiting

Open Artificial Pancreas System (OpenAPS™)



Reduction in A1c

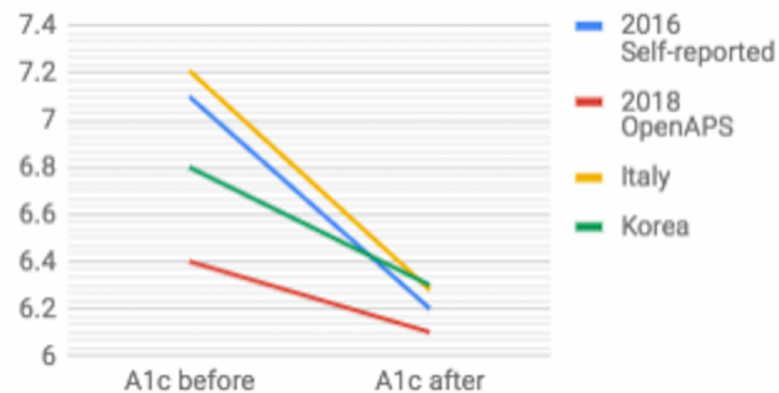


chart by @DanaMLewis

Reduction in Hypo/Hyper

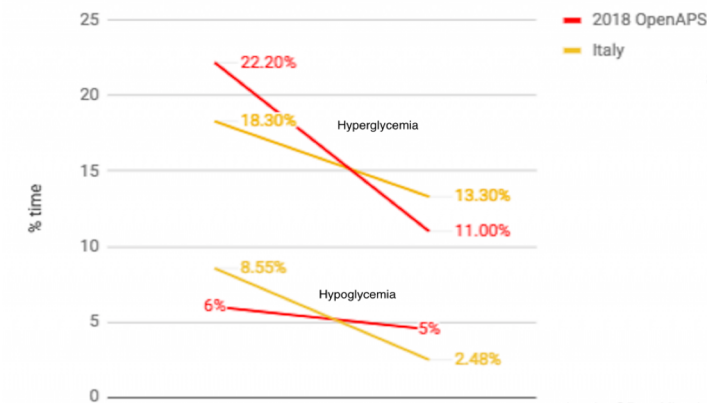


chart by @DanaMLewis

# **#WeAreNotWaiting**

*“I’m just a girl living with type 1 diabetes who got tired of waiting.”*

Dana Lewis



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# OBRIGADO

Ricardo Encarnação  
Roche Farmacêutica Química, Lda