



Driving the revolution in Personalized Medicine ...

... at Stanford University



Somalee Datta, PhD  
Director of Bioinformatics  
Stanford Center for Genomics & Personalized Medicine  
[@somaleedatta](#)

---

# 1 Human = 2 PB, World = 20B PB !



## Omics

Genome, Epigenome,  
Transcriptome, Proteome,  
Metabolome,  
Antibody-ome, Cytokines...

## Microbiome

Airways, Gut, Urogenital  
Skin, ...

Your body houses  
10x more of them!

## Wearables & Apps

Jawbone, Basis, Pulse Oxygen  
Oximetry,  
Moves\*, Qardio, GastroLyzer,  
MyFitnessPal\*, ...

## Dx & Hx

Family history, Diagnosis

## Imaging

x-ray, MRI, Mammography, CT  
scan, Nuclear Scan, ...

EEG, Video capsule  
endoscopy, ...

## Laboratory Tests & Rx

Metabolic panel, blood count  
panel, stool test, urine test, ...

Prescriptions

13 pp

mo' data, mo' better ...

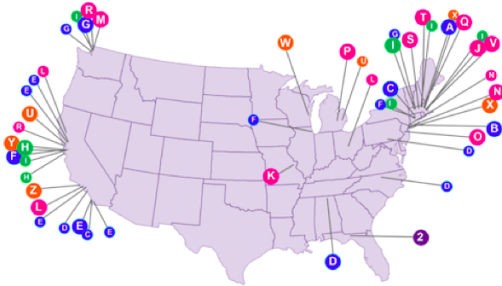
Research

Clinical

# Full Stack Personalized Medicine

## Basic Science

8W

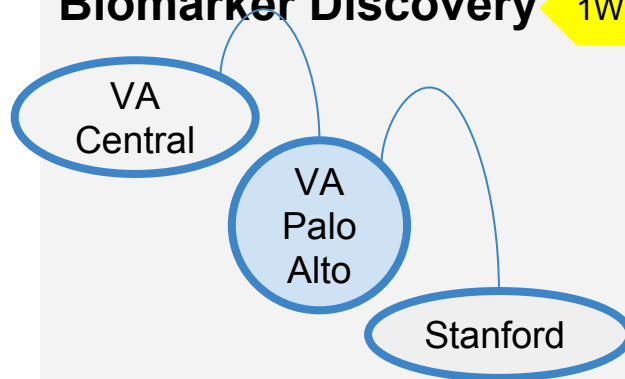


Largest functional genomics initiative - ENCODE:

- 2003-2007: Pilot
- 2008-2012: Tech Dev
- 2013-2018: Production
- Largest Production Lab!
- Data Coordination Center

## Biomarker Discovery

1W



~1M in a research study - MVP:

- Launched in Q2, 2011
- 300,000+ bio-banked
- 200,000+ genotyped
- 20,000+ WES data
- 2000+ WGS data

## Clinical Service

4W

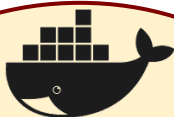


WGS based healthcare - SCGS:

- 2014-2015: Pilot
- 2016+: Production
- Expect to impact lives of 5000 patients / year!

# Technology Challenges

Immature ecosystem



Process  
100,000s of  
genomes

Much of the data in institutional silos, not on a common Cloud

Securely  
collaborate

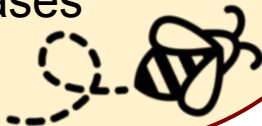
dbSNP, HGMD,  
OMIM, ClinVar,  
PharmGKB, ...

Combine 100s  
of knowledge  
bases

{ Real time }  
data mining  
tools

Immature ecosystem  
in Genomics

...painstaking  
ETLs



want: faster, cheaper, better ...