csem

gateone PROJECT

BASEL AREA. SWISS

Innovation action

Workshop
Get ready to be part of the medicine digital revolution from drug discovery to e-health

European Commission

Project ID: 644856

H2020-ICT-2014-1

6 July 2016

Digital medicine – bankable challenges

With support of IMI presentation

What are the main drivers for innovation in the health field ?

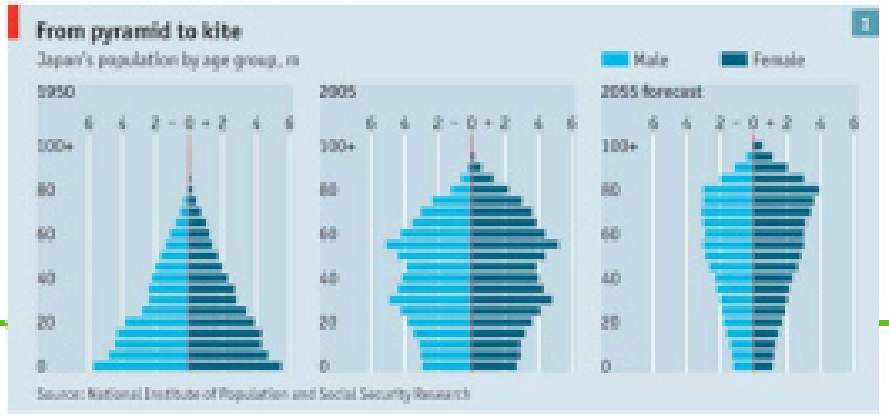
BLUMORPHO

- Global population age 60+ will more than double
  - 2000 – 605 million
  - 2050 – 2 billion
- Developing countries with large aging populations

Country	2010	2040
Asia	279 million	773 million
Europe	119 million	183 million
North America	45 million	90 million
Middle East	21 million	29 million (by 2050)
Africa	36 million	99 million

Population age 65+

World Population Aging 1950-2050, Population Division, DESA, United Nations
- United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2010 Revision*, New York, 2011
- The New Arab Consumer 2012
- Aging Population Challenges in Africa", November 2011, African Development B
- United Nations, Department of Economic and Social Affairs, Population Division



Complex medical problems create unmet needs

- **Alzheimer's Disease**
  - Number of people with AD will double by 2030 – more than triple by 2050
  - 2030 – Worldwide cost - $1.8 trillion
- **Diabetes**
  - Number of people with diabetes will increase 37% from 2000-2030
  - 2030 - Worldwide cost - $486 million
- **Cancer**
  - Number of people with cancer and number who die from it will nearly triple between 2010 and 2030
  - 2030 – Worldwide cost – $1+ trillion

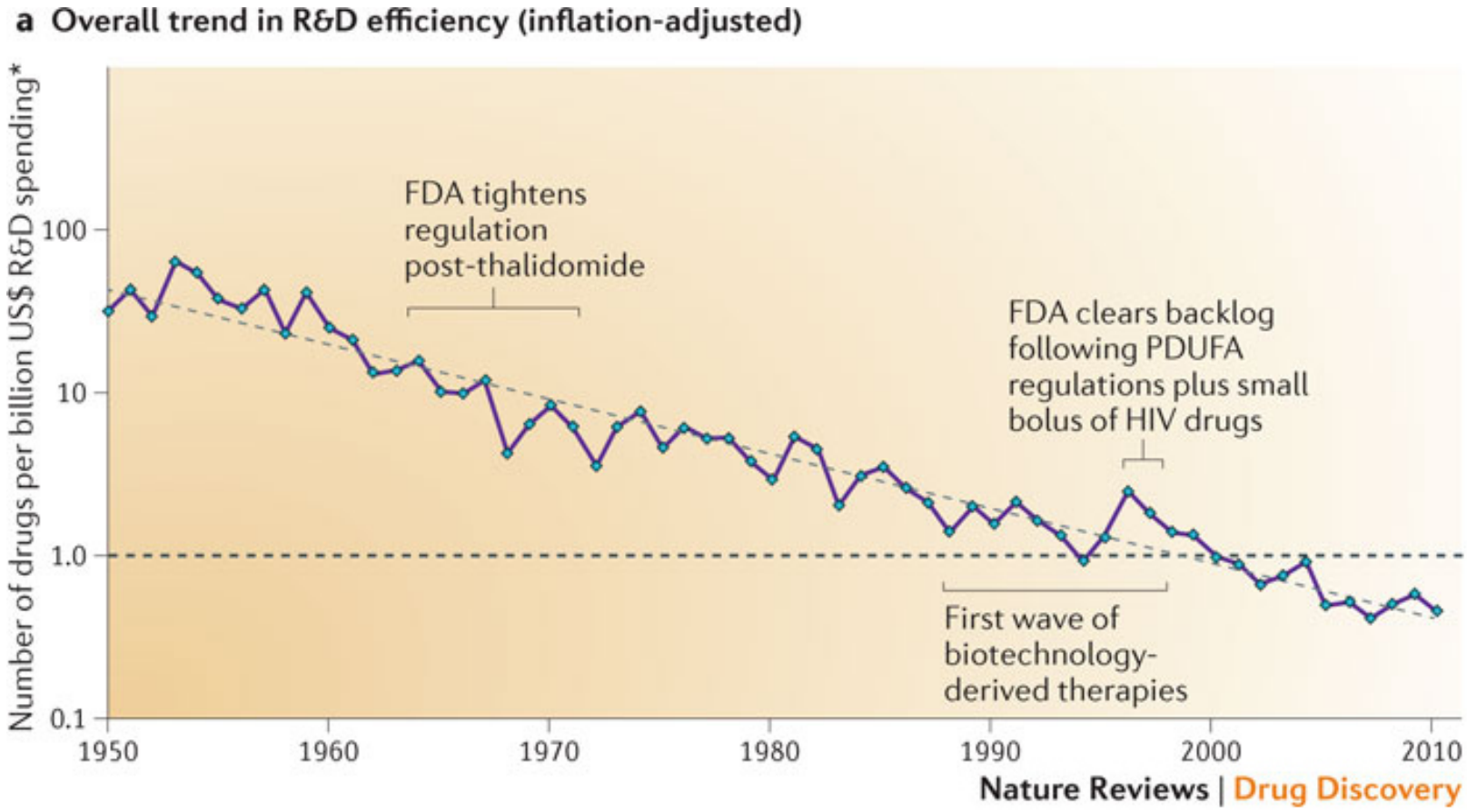
World Alzheimer's Report 2010, The Global Economic Impact of Dementia, Alzheimer's Disease International - International Diabetes Federation, World Economic Forum

B. W. Stewart and P. Kleihues, *World Cancer Report*, WHO-IARC. Lyon: IARC Press,

Peter Boyle, AACR Translational Cancer Medicine Meeting, Singapore 2007

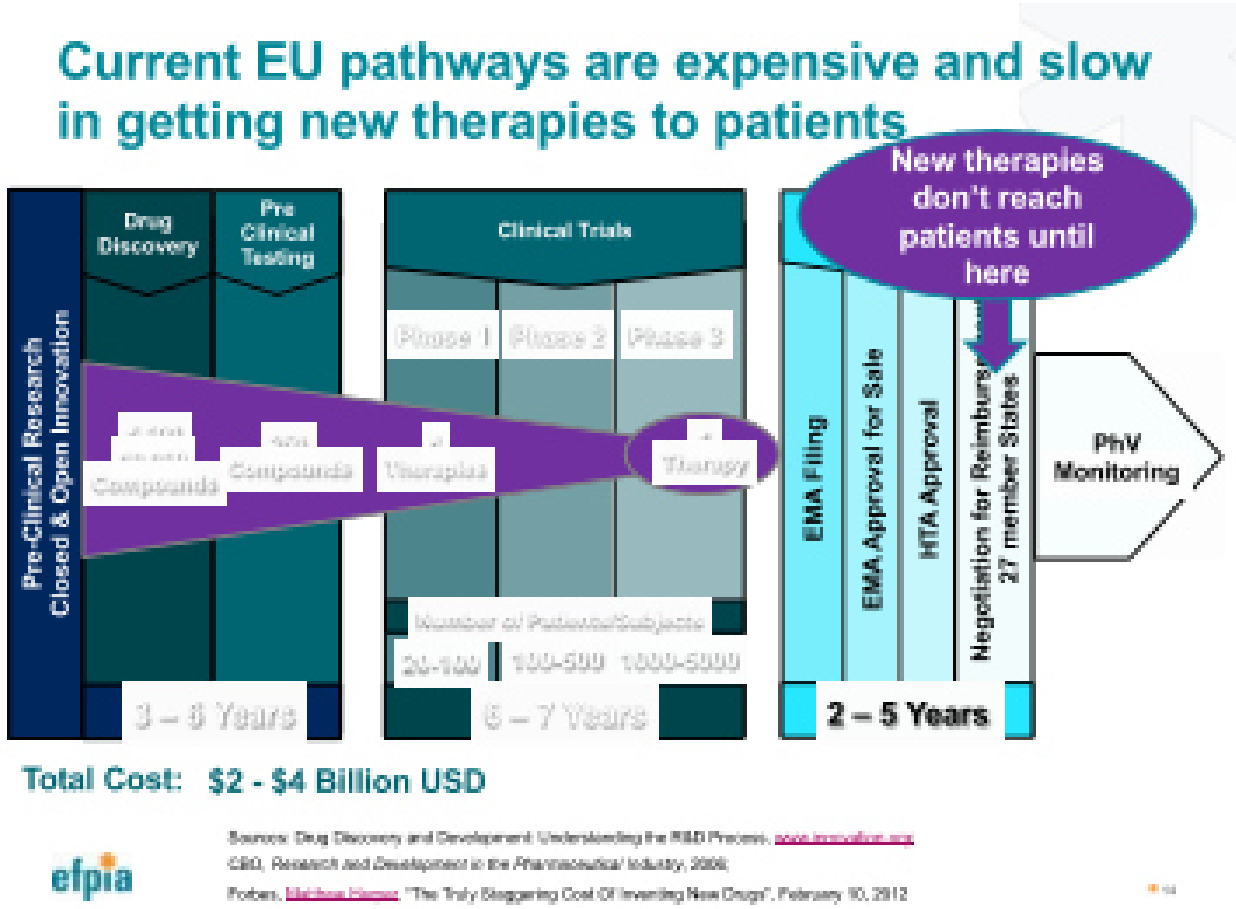
Kaiser Health News Daily Report," September 27, 2011

Eroom's Law



Scannell *et al,* NRDD 11, 191-200 (March 2012)

Drug discovery costs



What are the trends towards innovation

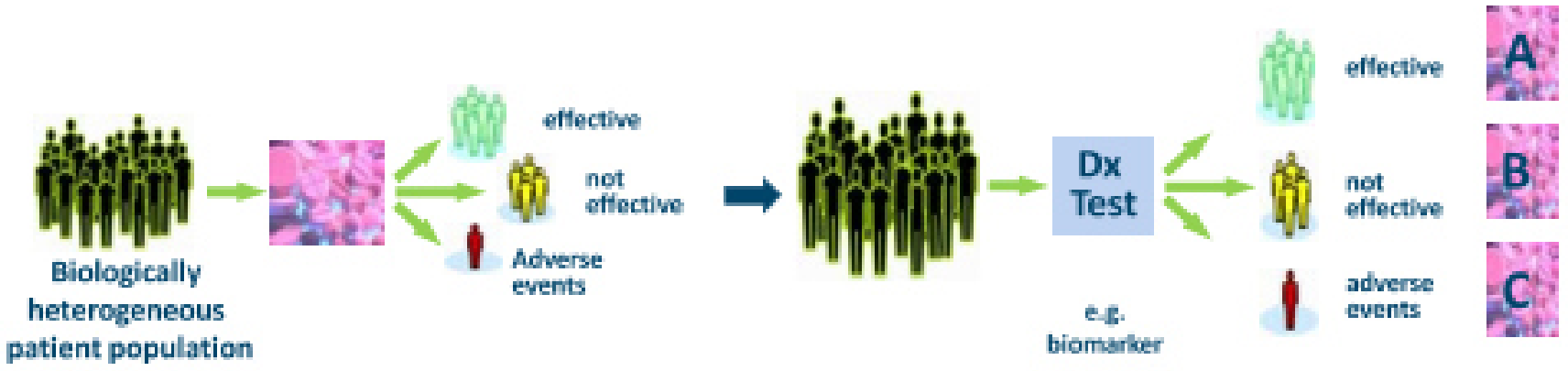
Challenges in managing chronic diseases

- Physician visits are **time-limited evaluations** based on **subjective observations** of both the patient and the physician or psychiatrist

- **Changes in disease state** for each of these diseases can occur on timescales **much shorter than the interval between physician visits**

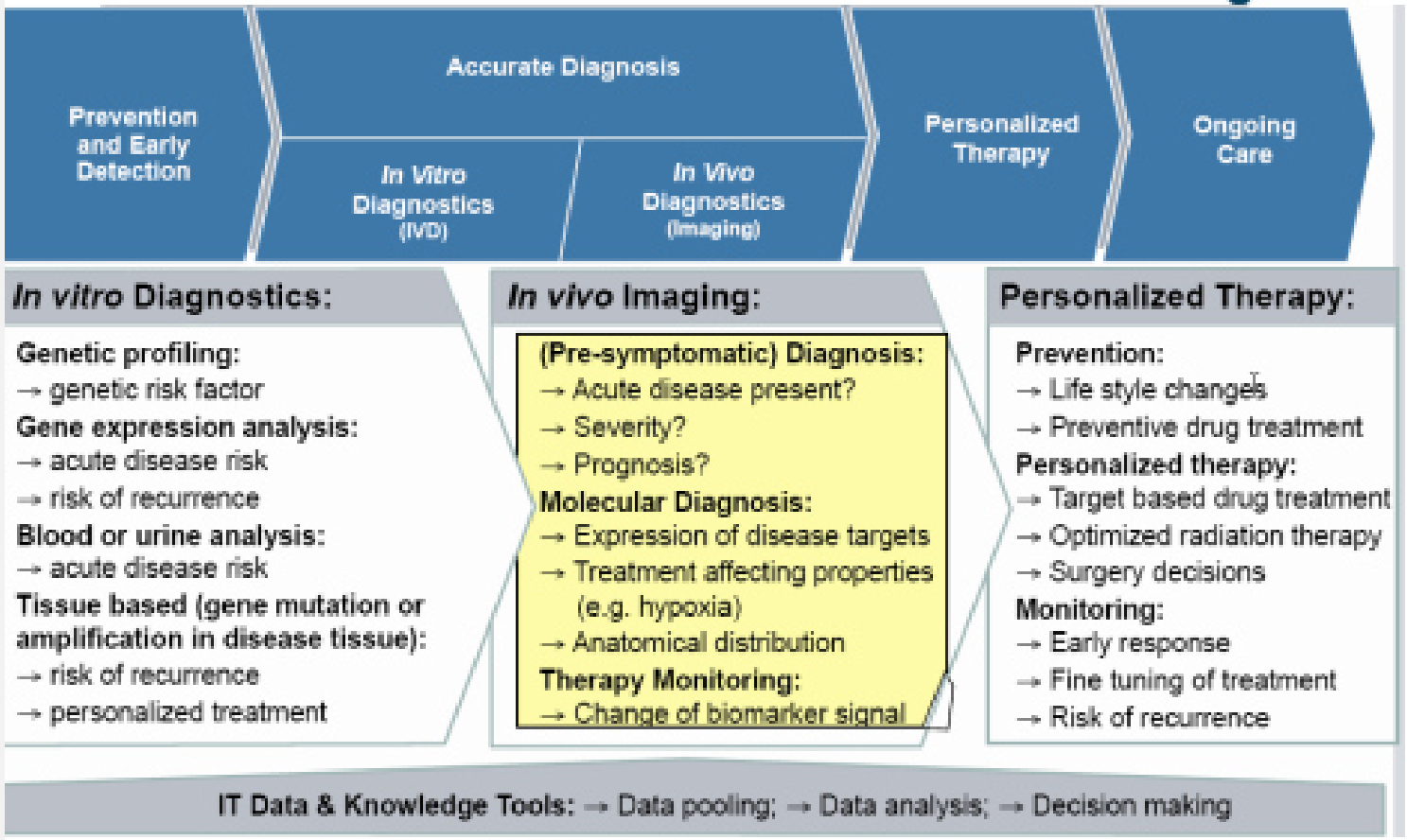
- Through technological advances over the last decade it is now possible to **objectively, remotely, and continuously** measure aspects of patient **physiology, behavior and symptoms**

Vision: the right prevention and treatment for the right patient at the right time



Trial and Error *vs* **Information based treatment decisions**

Need for Integrated solutions…



Using the power of Integrated Informatics & various external networks to create real value

Extended Information Sources

Biological Networks

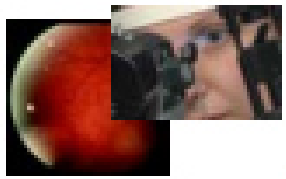
- Pathways
- GO Categories
- Domain co-occurrence
- Human and Mouse phenotype
- Protein- and Drug-Gene Interactions

Remote Sensing

EMR Data

Epic
Allscripts
Centricity Physician's Office
NEXTGEN

Ocular Imaging

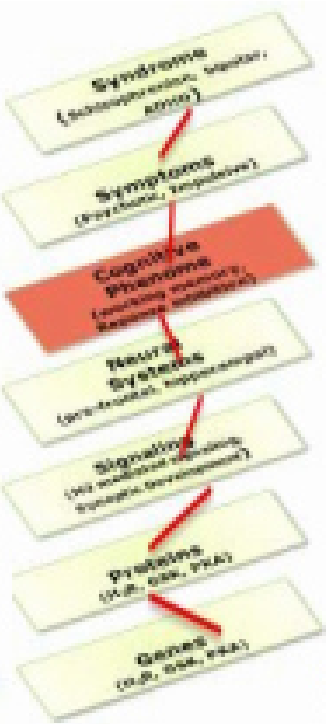


Knowledge Compendia

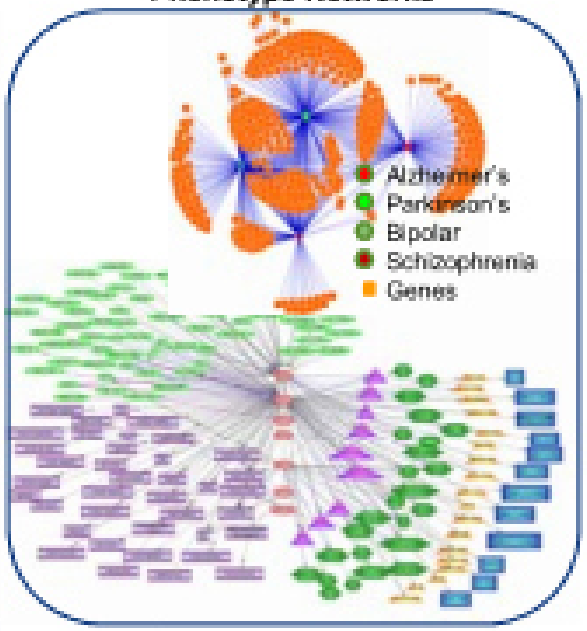
PubMed

Social Media

Systems-Level Analytics



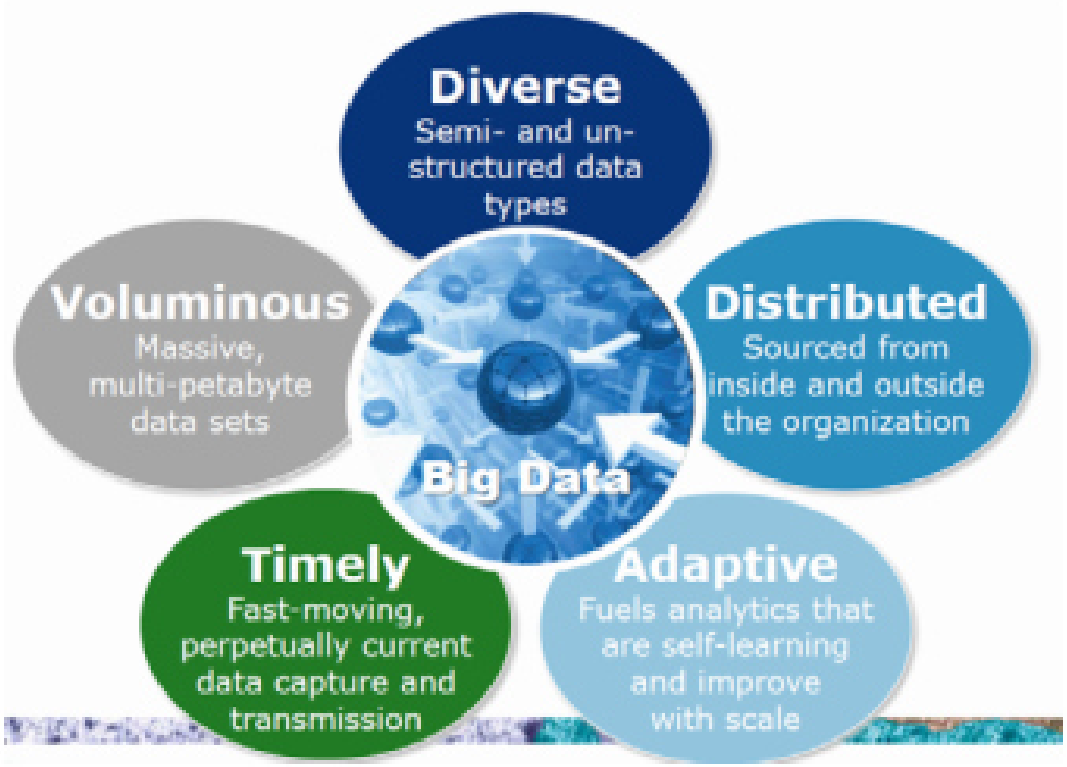
Genotype-Endophenotype-Phenotype Networks



Multi-Scale Disease Models

Big Data Defined

What is it ? Why is it different ?... Its Real World Data



Big Data offers value to the pharma industry

Research	▪ In silico target screening ▪ Genomic diagnostics ▪ Toxicity prediction	
Development	▪ Trial simulation ▪ Patient recruitment ▪ Trial design ▪ Asset prioritization	▪ Competitive insights ▪ Unmet need ▪ Reimbursable dossier development
Market Access	▪ Formulary/ protocol negotiation ▪ Value-based pricing ▪ Payor collaboration (e.g., patient selection, adherence)	
Commercial	▪ Customer insights (e.g., consumer data, social media) ▪ Multichannel optimization ▪ Launch excellence ▪ Brand positioning	
Medical	▪ Safety monitoring ▪ Targeted physician/ patient education	
Operations	▪ Quality analytics ▪ End-to-end supply chain forecasting/ planning ▪ Externalization ▪ Distribution channel strategy	

Innovation currently under development

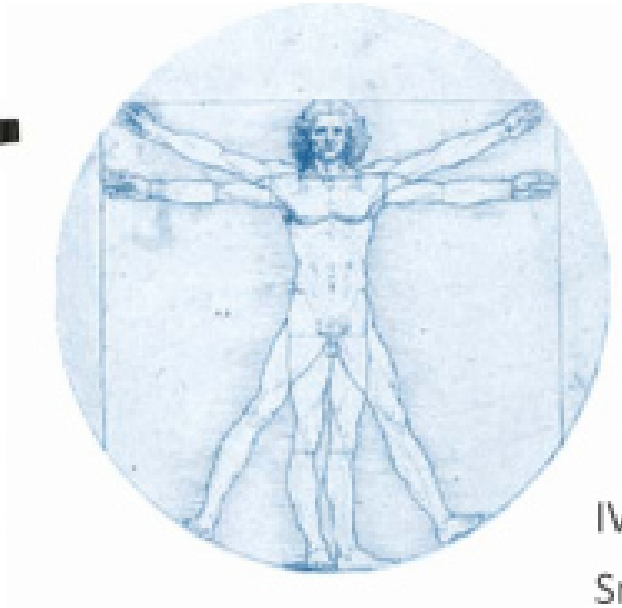
BLUMORPHO

Emerging Technology for Continuous Patient Assessment

imi

Physiology

ECG
HR/HRV
Respiration
Skin temp
Activity/Sleep
O2 sat



Behavior

GPS
Talk patterns
Text patterns
Activity/Sleep

Symptoms

IVR

Smartphone
Symptom
assessment

Escalating Data Challenge: From Discrete Information Events To……

Discrete Centralized

Discrete Decentralized

Non-Discrete Decentralized

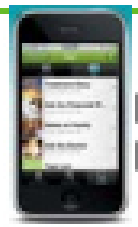
- 'Point-of-Facility'
- Discrete, Structured, Information Events
- Controlled Populations (clinical trials, longitudinal disease studies)

- 'Point-of-Need'
- Real-Time Multiplexed Read-Outs (Diagnostic, Prognostic, Drug Monitoring)
- Distributed Populations in Physician Settings

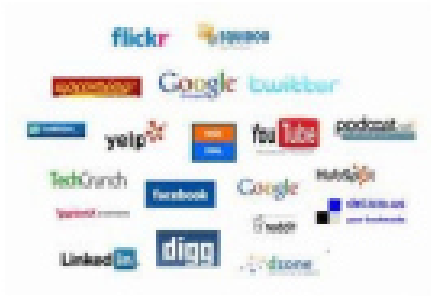
- Semi-Continuous
- Semi-Structured data
- Multiple sources

..Continuous Streams of Information

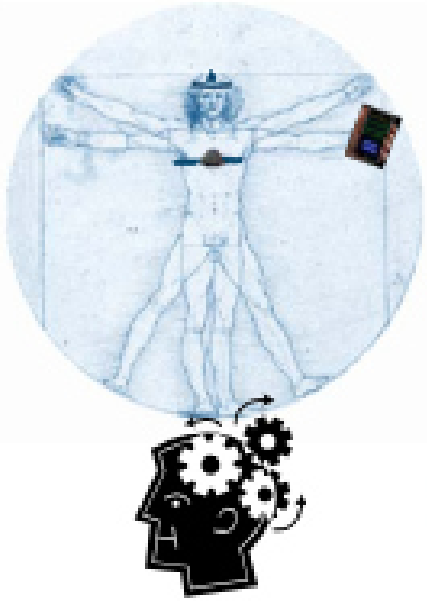
'Quantification of Man'



Mobile Computing Devices



Social Media



Brain Fitness Centers

Remote Monitoring Sensors

New Data Types, New Tools for:	Integration
Information Extraction	Mining
Knowledge Representation	

On-Patient	Off-Patient
- Actigraphy	- Fixed cameras
- Speech	- Bed embedded sensors
- Eye movement	- Computer usage
- EKG, HR, HRV	- Phone usage
- EEG	- Refrigerator usage
- Sleep	- Motion sensors
- Galvanic skin response	
- O2 Sat	
- Skin temperature	

CONSUMER MARKET TREND

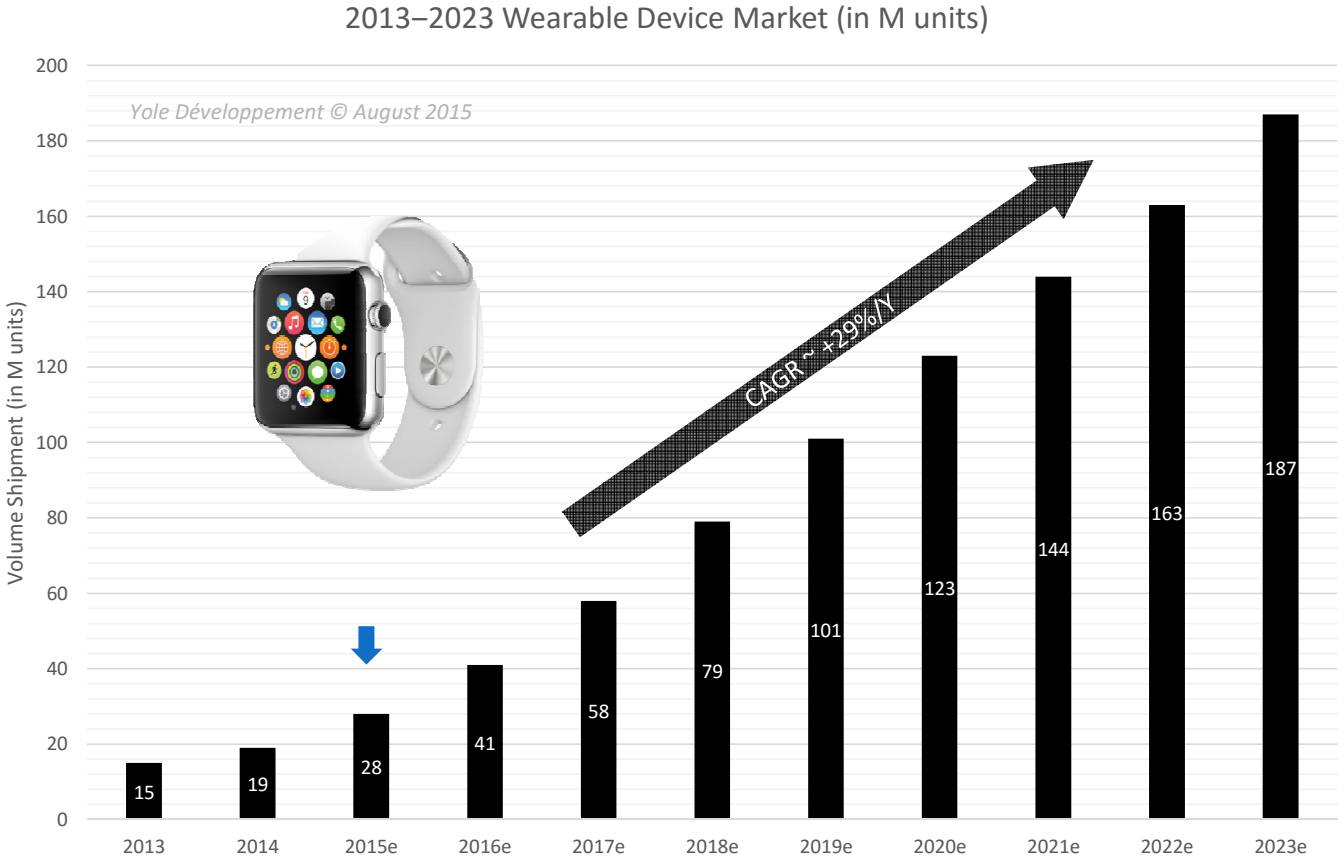
Wearable market estimate

Wearable market growth is ahead of us

A volume of 28 Million units of wearable devices was expected to be shipped in 2015.

With a CAGR of 29% from 2013 to 2023, wearable devices units shipped should reach 186 Million units by 2023.

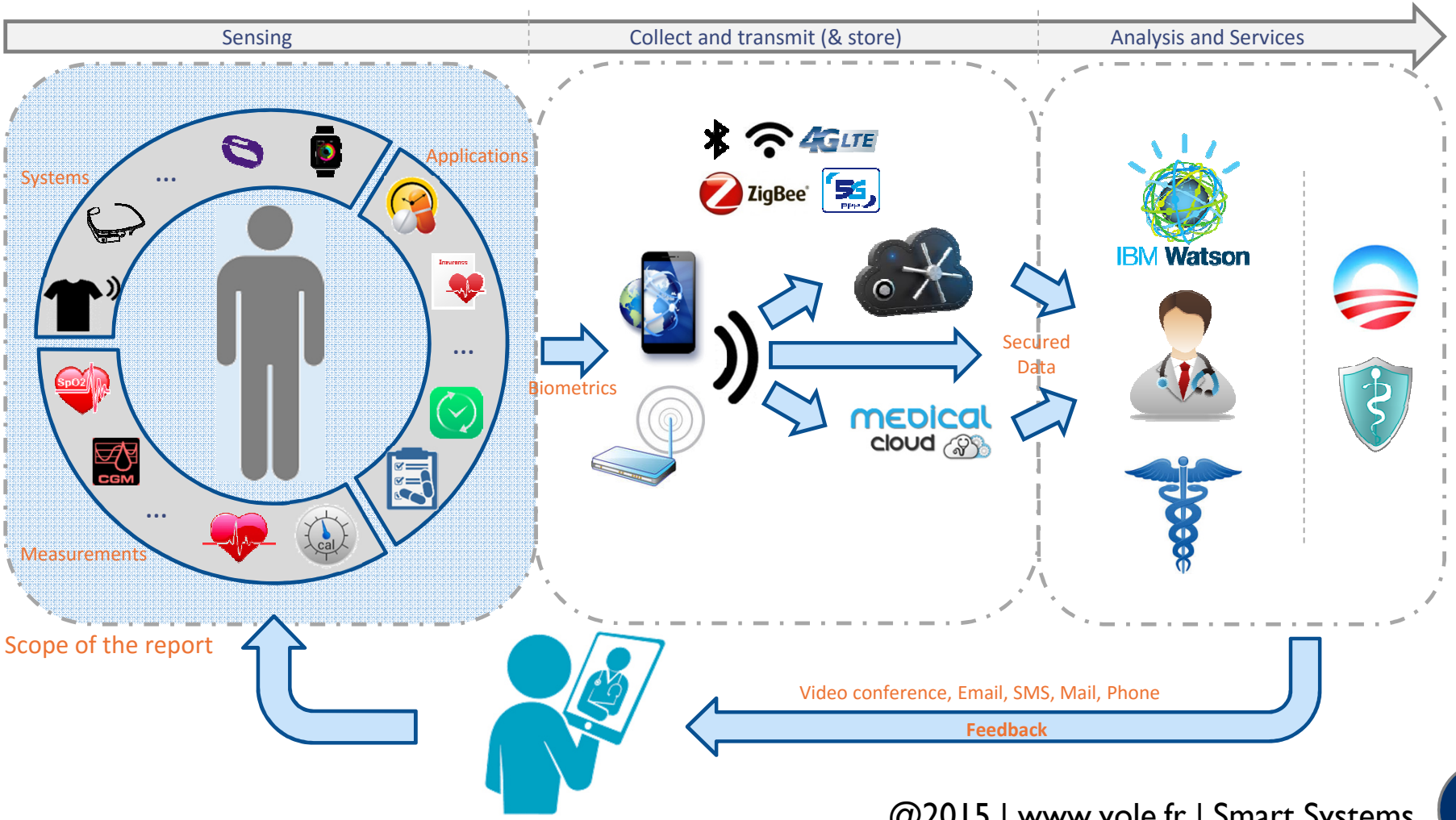
Volume is interesting but adoption of camera remains uncertain



WEARABLE: AN EARLY 'INTERNET OF THINGS' APPLICATION

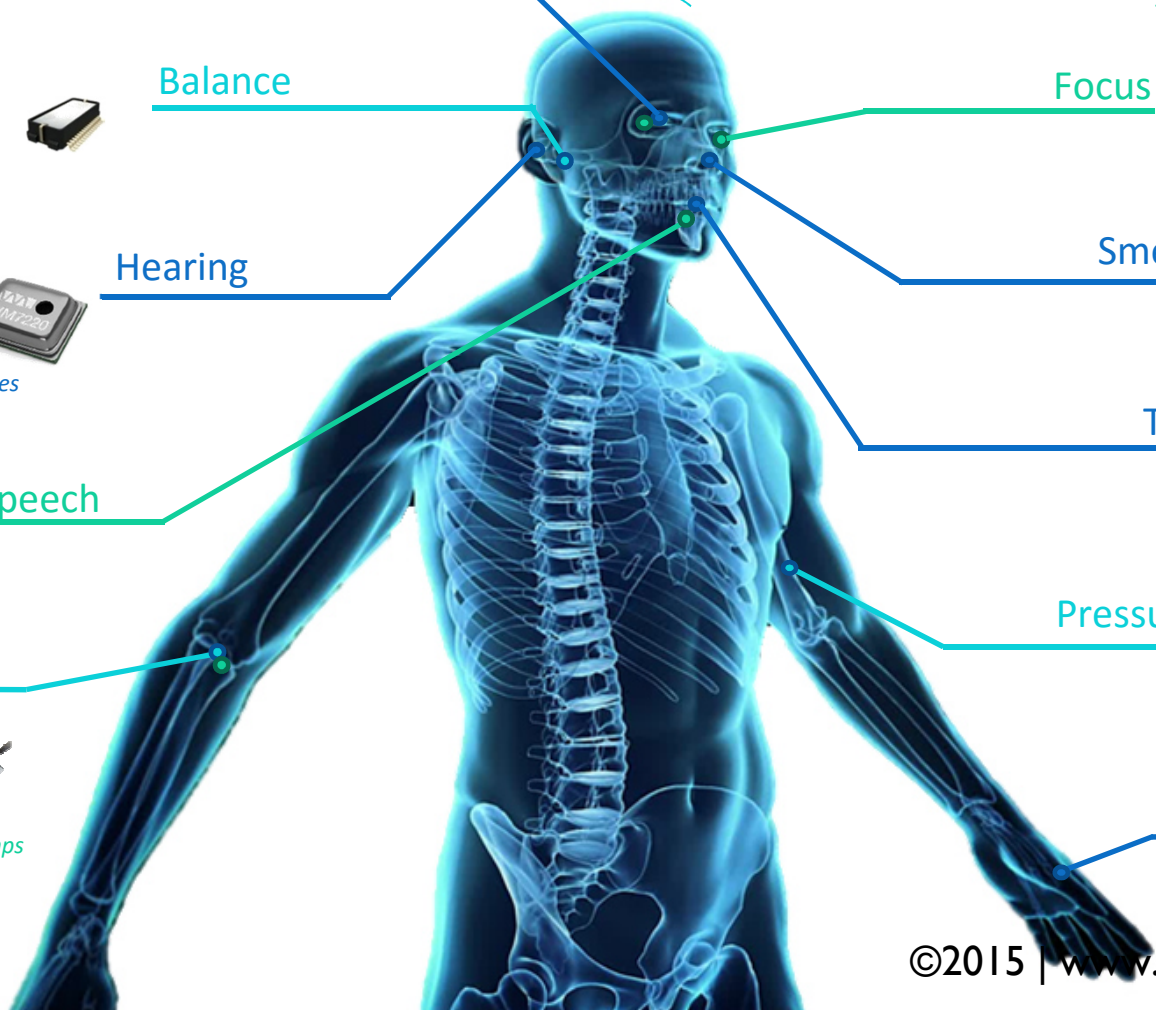
The human is a connected object

Wearable technologies are expected to provide strong value at all industry levels



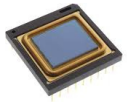
MEMS & SENSORS & ACTUATORS
THE 5 SENSES AND MANY MORE…

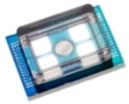
…and are expending towards stronger environment interaction…



Sight


microdisplays

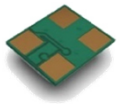

microbolometers


micromirrors

Balance

Inertial devices

Hearing

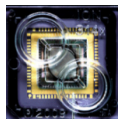


microphones

Speech

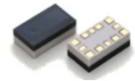

Microspeakers

Fluids


Biochips

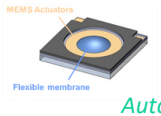

Micropumps

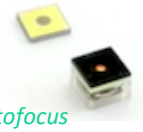
RF communication




Oscillators, tuners & filters & switches

Focus




Autofocus

Smell


Gas sensors

Taste


Humidity sensors

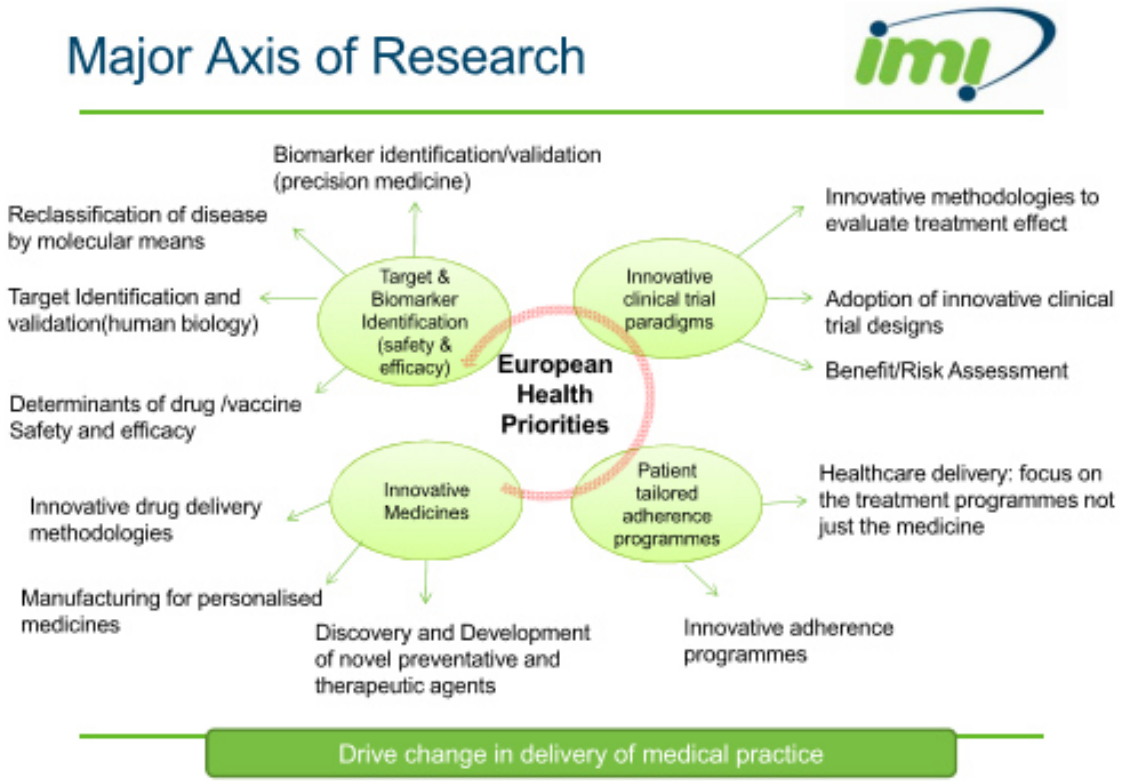
Pressure


Pressure sensors

Touch


Force & touch sensors

Innovation financing support



And many more also at Swiss level

BLUMORPHO Open Innovation Framework

Unique in size and coverage

50k stakeholders

Research centers, start-up, SMEs, large corporate

All along the value chain in broad range of vertical business

More than 300 investors worldwide

Supporting smart innovations and recognizing our added-value

We facilitate innovation while reducing technical, market and financial risks

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