Changes and opportunities in the future of health

Fabrizio Conicella
Conicella@bioindustrypark.it

Fabrizio Conicella
Conicella@bioindustrypark.it

Bioindustry Park Silvano Fumero

Science Park and cluster managing company (**bioPmed**) focused on **life sciences and health**, created with the support of Regione Piemonte in the EU programs framework (beginning 90's) - Operational since 1998.
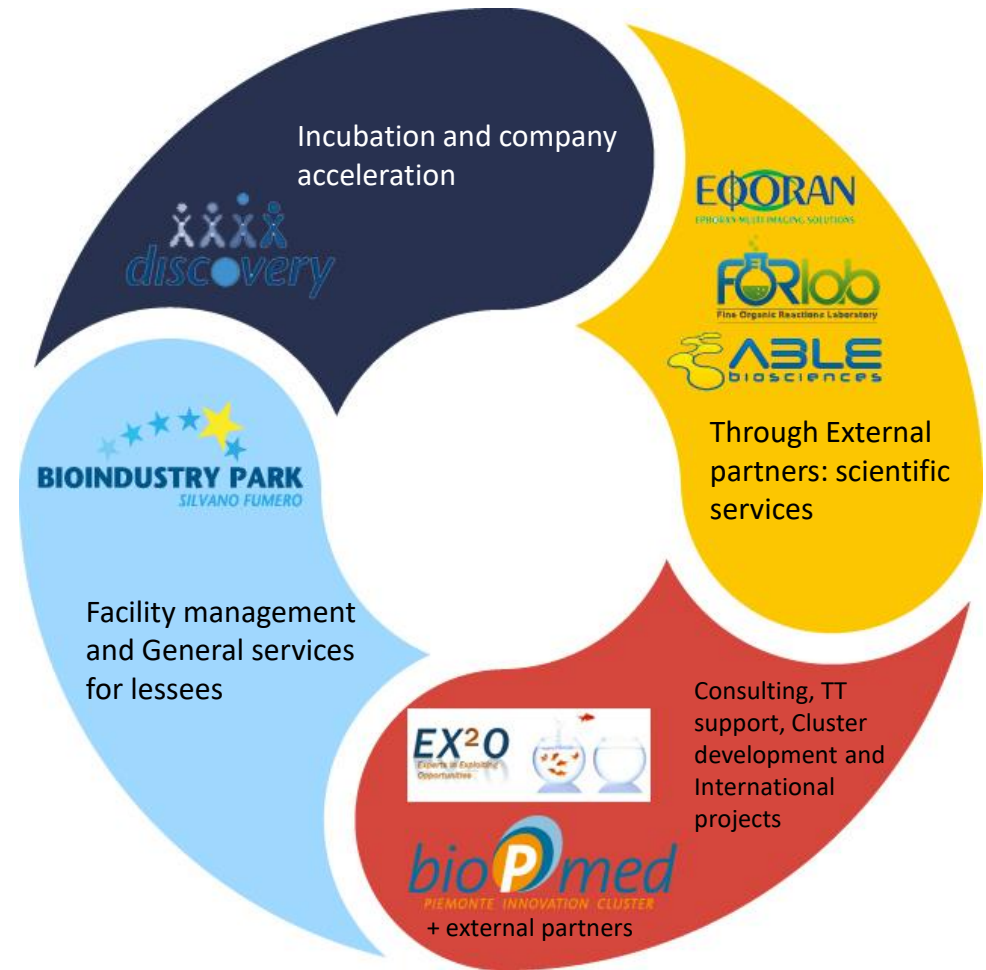

www.bioindustrypark.eu

Key elements

- 25.000 sqm labs, office spaces
- R&D shared facilities and services
- Support and acceleration of start-up/spin off
- Consultancy in biomanagement
- Networking and clustering(bioPmed)
- Conference centre

The Bioindustry Park value creation process

From the identification of promising scientific results to the growth of a successful company:

- **Incubation**
- **Acceleration**
- **Settlements**
- **Managerial consulting**
- **Clustering**
- **International projects**
- **Scientific support (outsourced)**

Incubation and company acceleration

Through External partners: scientific services

Facility management and General services for lessees

Consulting, TT support, Cluster development and International projects

+ external partners

The Italian health care system

Bloomberg 2017 Healthiest Country Index

Rank	Country	Health grade	Health score	Health risk penalties	Rank	Country	Health grade	Health score	Health risk penalties
1	Italy	93.11	97.44	−4.33	26	Belgium	80.96	86.03	−5.07
2	Iceland	91.21	96.20	−4.99	27	Slovenia	80.81	86.65	−5.83
3	Switzerland	90.75	94.96	−4.21	28	Denmark	80.36	85.02	−4.66
4	Singapore	90.23	94.11	−3.88	29	Chile	77.18	82.53	−5.35
5	Australia	89.24	93.88	−4.64	30	Czech Rep.	75.76	81.82	−6.06
6	Spain	89.19	94.14	−4.95	31	Cuba	74.23	79.13	−4.90
7	Japan	89.15	93.69	−4.54	32	Lebanon	74.03	79.55	−5.51
8	Sweden	88.92	93.78	−4.85	33	Costa Rica	73.14	77.16	−4.01
9	Israel	88.14	92.47	−4.33	34	U.S.	73.05	78.25	−5.21
10	Luxembourg	87.87	92.90	−5.03	35	Croatia	72.88	78.16	−5.28
11	Norway	86.81	91.61	−4.81	36	Qatar	71.78	77.33	−5.55
12	Austria	86.34	90.78	−4.44	37	Brunei	70.21	75.14	−4.92
13	Netherlands	85.83	89.94	−4.11	38	Estonia	69.24	75.67	−6.43
14	France	85.59	90.93	−5.34	39	Poland	68.92	75.34	−6.42
15	Finland	84.80	89.58	−4.78	40	Bahrain	68.73	74.20	−5.46
16	Germany	84.78	89.40	−4.62	41	Maldives	67.90	71.82	−3.92
17	Canada	84.57	89.53	−4.96	42	Bosnia & H.	67.83	72.91	−5.08
18	Cyprus	84.52	89.17	−4.65	43	U.A.E.	67.30	73.56	−6.26
19	New Zealand	84.48	89.95	−5.47	44	Macedonia	65.64	69.96	−4.32
20	Greece	84.28	88.17	−3.89	45	Uruguay	65.40	70.86	−5.45
21	Portugal	82.97	88.24	−5.27	46	Slovakia	65.10	70.54	−5.44
22	Ireland	82.52	88.53	−6.01	47	Barbados	64.14	68.55	−4.41
23	U.K.	82.28	87.21	−4.94	48	Oman	62.89	67.79	−4.90
24	S. Korea	82.06	87.67	−5.61	49	Panama	62.39	67.13	−4.73
25	Malta	81.27	86.42	−5.15	50	Albania	62.01	66.72	−4.71

Sources: World Health Organization, United Nations Population Division, World Bank

Note: Health grade (X) = Health score (A) - Health risk penalties (B)
A: Health score metrics: 1. mortality by communicable, non-communicable diseases and injuries; 2. life expectancy at the defining age of birth, childhood, youth and retirement; 3. probability to survive neonatal, into young adulthood and retirement stages; B: Health risk penalties: 1. behavioral/endogenous factors such as high incidences of population with elevated level of blood pressure, blood glucose and cholesterol, prevalence of overweight, tobacco use, alcohol consumption, physical inactivity and childhood malnutrition, as well as mental health and basic vaccination coverage; 2. environmental/exogenous factors such as greenhouse gas emissions per capita and percentage of population with access to improved drinking water.

Most recent data used. Of the more than 200 countries and regions evaluated, 163 had enough data to be included in the final outcome; The top 50 are displayed.

Bloomberg

Bloomberg 2019 Healthiest Country Index

2019 Rank	2017 Rank	Change	Economy	Health Grade	Health Score	Health Risk Penalties
1	6	+5	Spain	92.75	96.56	−3.81
2	1	−1	Italy	91.59	95.83	−4.24
3	2	−1	Iceland	91.44	96.11	−4.67
4	7	+3	Japan	91.38	95.59	−4.21
5	3	−2	Switzerland	90.93	94.71	−3.78
6	8	+2	Sweden	90.24	94.13	−3.89
7	5	−2	Australia	89.75	93.96	−4.21
8	4	−4	Singapore	89.29	93.19	−3.90
9	11	+2	Norway	89.09	93.25	−4.16
10	9	−1	Israel	88.15	92.01	−3.86
11	10	−1	Luxembourg	87.39	92.03	−4.64
12	14	+2	France	86.94	91.70	−4.76
13	12	−1	Austria	86.30	90.81	−4.51
14	15	+1	Finland	85.89	90.18	−4.29
15	13	−2	Netherlands	85.86	90.07	−4.21
16	17	+1	Canada	85.70	90.31	−4.61
17	24	+7	S. Korea	85.41	89.48	−4.07
18	19	+1	New Zealand	85.06	89.68	−4.62
19	23	+4	U.K.	84.28	88.74	−4.46
20	22	+2	Ireland	84.06	89.57	−5.51

BIOINDUSTRY PARK
SILVANO FUMERO

Health related sector: a growing competitive pressure

MARKET Global challenges General price pressure Growth of emerging countries Growth of market complexity and new competitors Role of empowered users/clients	**MACRO TREND** De-materialization of R&D process Personalised and Precise medicine paradigm Growth of «health services sector» Health systems and subsidiarity Market trends & Servifications of products Sustainability
PRODUCT DEVELOPMENT Longer time to market access Inceased R&D costs per product unit Bigger products/solution complexity Higher technological complexity Multitecnological products and processes	**HEALTH CARE SYSTEM & REGULATIONS** Shrinking of health expenses in mature market and strong negotiation on prices New control system on therapeutic efficacy New medical device regulation GDPR

Complex global health issues
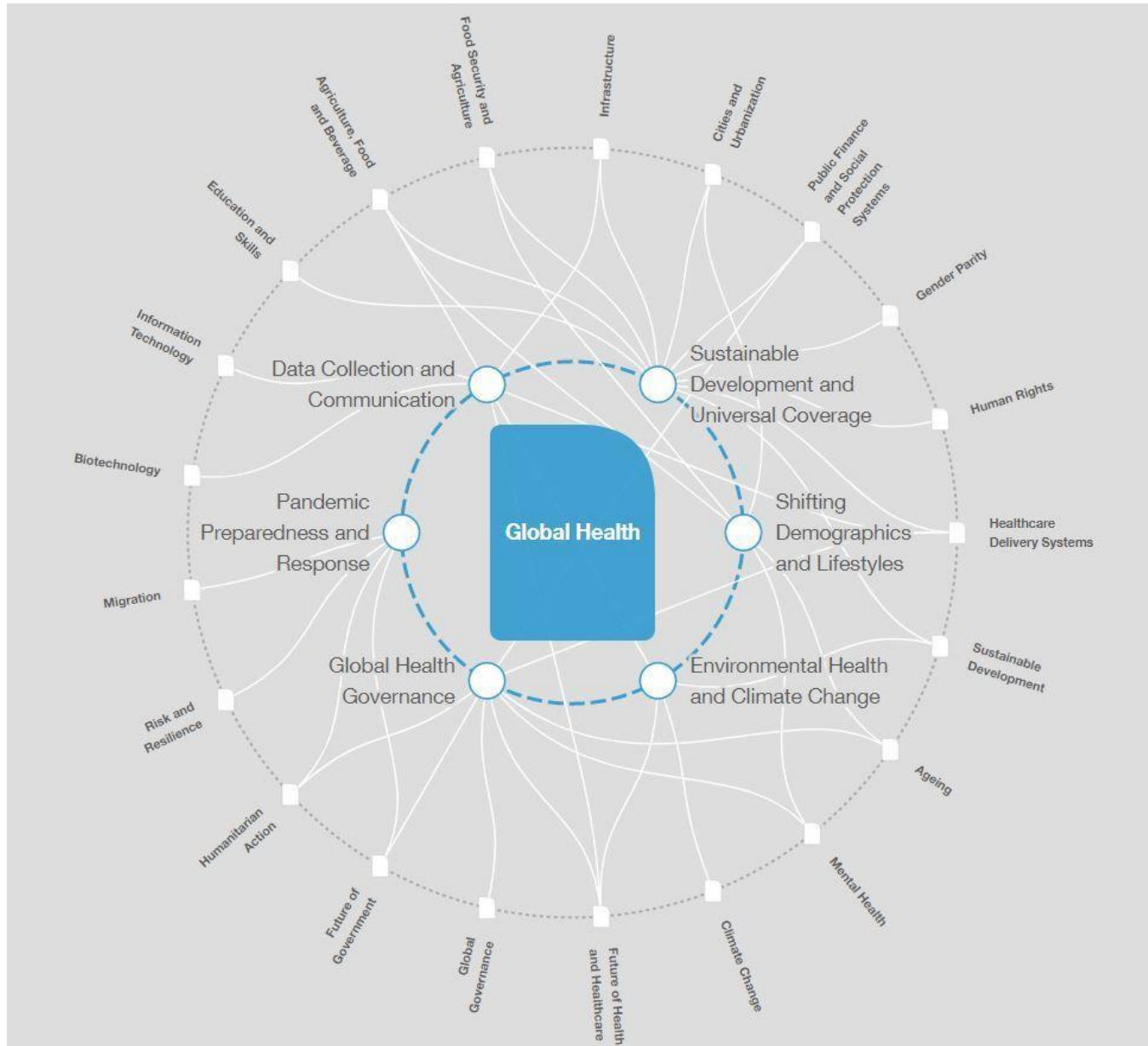
A complex technological landscape……

- CRISPR/CAS9 approaches
- Stem cells/cell therapies
- Liquid Biopsy
- Exome sequencing and IVD
- Metabolic profiling
- Combined products
- Active implants
- New bioabsorbable materials
- Miniaturization
- ………..

Healthcare Horizons: Trends To Watch

Digital Health

Intelligent drug design	Skin-as-a-platform	Blockchain-enabled hospitals
Automating drug design and compound selection	Dermal/Transdermal drug delivery and monitoring devices	Distributed networks advancing security and data sharing

Biotechnology

CAR-T Therapies	RNA Therapies	Anti-Aging Therapies
Re-engineering T cells to better attack cancer	Filling in therapeutic gaps with RNA-based medicines	Preventing, halting, or reversing the aging process

Medical Devices

Bio-Printing	Neurotechnology	Hand-held diagnostics
Early-stage startups building organ printing machines	Enhancing human capabilities by integrating with the nervous system	Condensing lab-grade diagnostics into hand-held devices

CBINSIGHTS

BIOINDUSTRY PARK
SILVANO FUMERO

New competitors…..

#	Project	Type	Partner	Disease
1	Miniaturized CGM	Sensors	DEXCOM	Diabetes
2	Smart Lens Program	Sensors	Alcon	Diabetes
3	Study Watch	Sensors	Google	General Heath
4	Debug	Interventions	Other	Other
5	Galvani Bioelectronics	Interventions	GlaxoSmithKline	Other
6	Liftware	Interventions	Google	Parkinsons
7	Retinal Imaging	Interventions	Nikon	Diabetes
8	Verb Surgical	Interventions	Johnson & Johnson	Surgery
9	Healthcare performance measurement	Health Platforms & Population Health Tools	3M (HIS)	General Heath
10	NHS Early Intervention Program	Health Platforms & Population Health Tools	MSD	General Heath
11	Onduo	Health Platforms & Population Health Tools	Sanofi	Diabetes
12	MS Observational Study	Precision medicine	Biogen	MS
13	One Brave Idea	Precision medicine	AstraZeneca	Coronary Heart Disease (CHD)
14	Personalized Parkinson's Project	Precision medicine	Other	Parkinsons
15	Precision Medicine Initiative	Precision medicine	Other	General Heath
16	Project Baseline	Precision medicine	Other	General Heath

What company is this??

BIOINDUSTRY PARK
SILVANO FUMERO

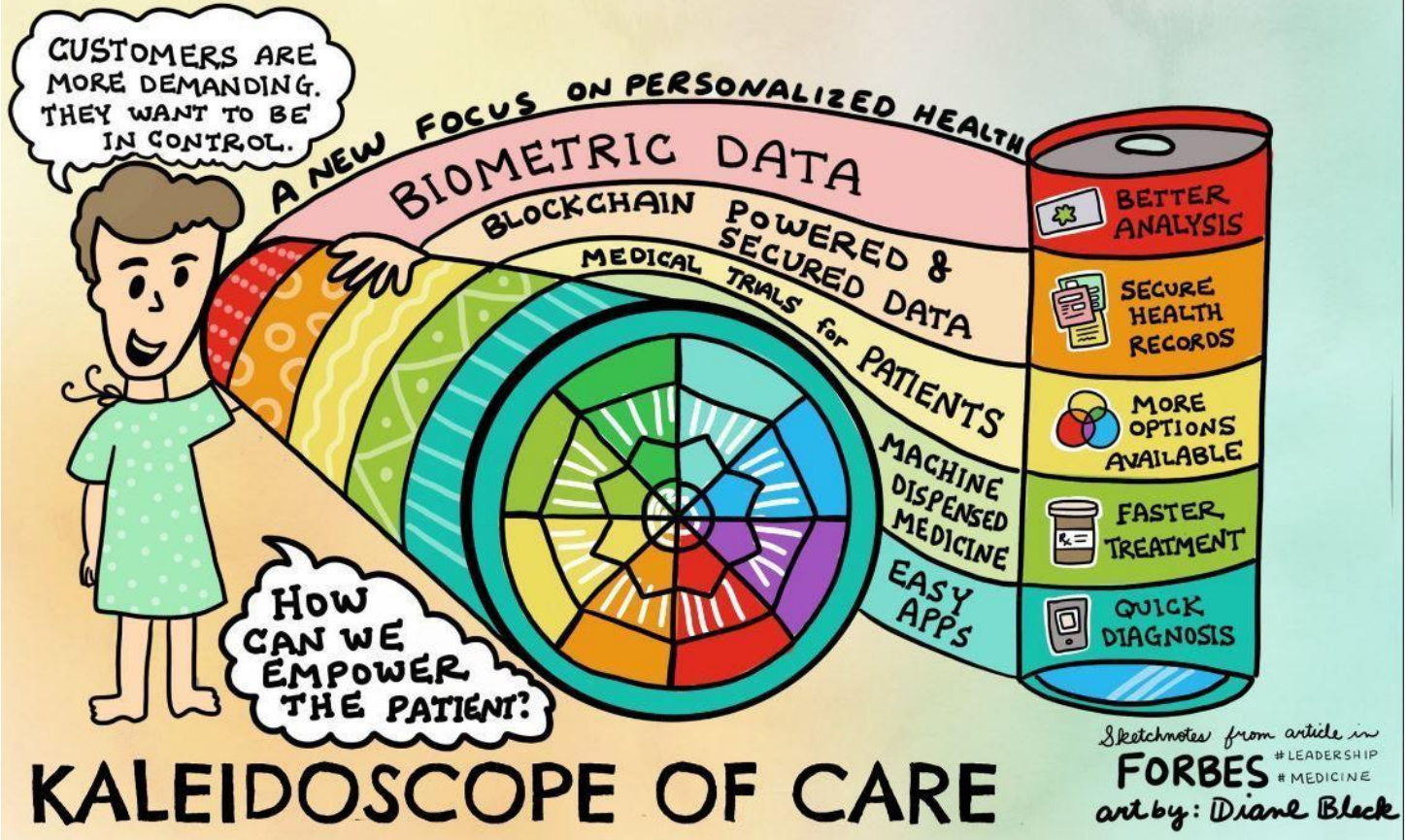# A complex health care ecosystem
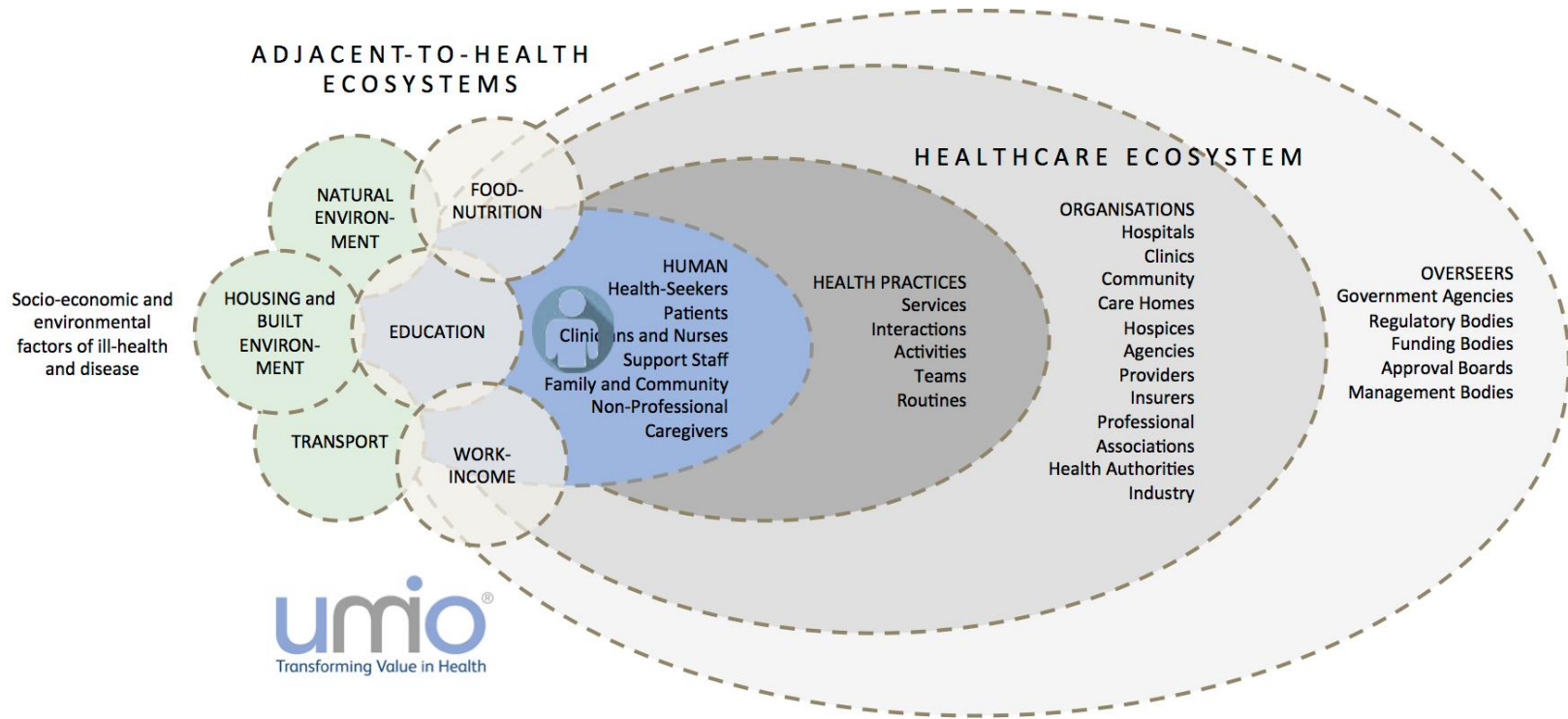
Categories in healthcare ecosystem adapted from Frow, P., et al.,
Co-creation practices: Their role in shaping a health care
ecosystem, Industrial Marketing Management (2016)

..and some market trends to consider…

Ageing and chronics conditions

Personalisation end precision in therapeutics solutions

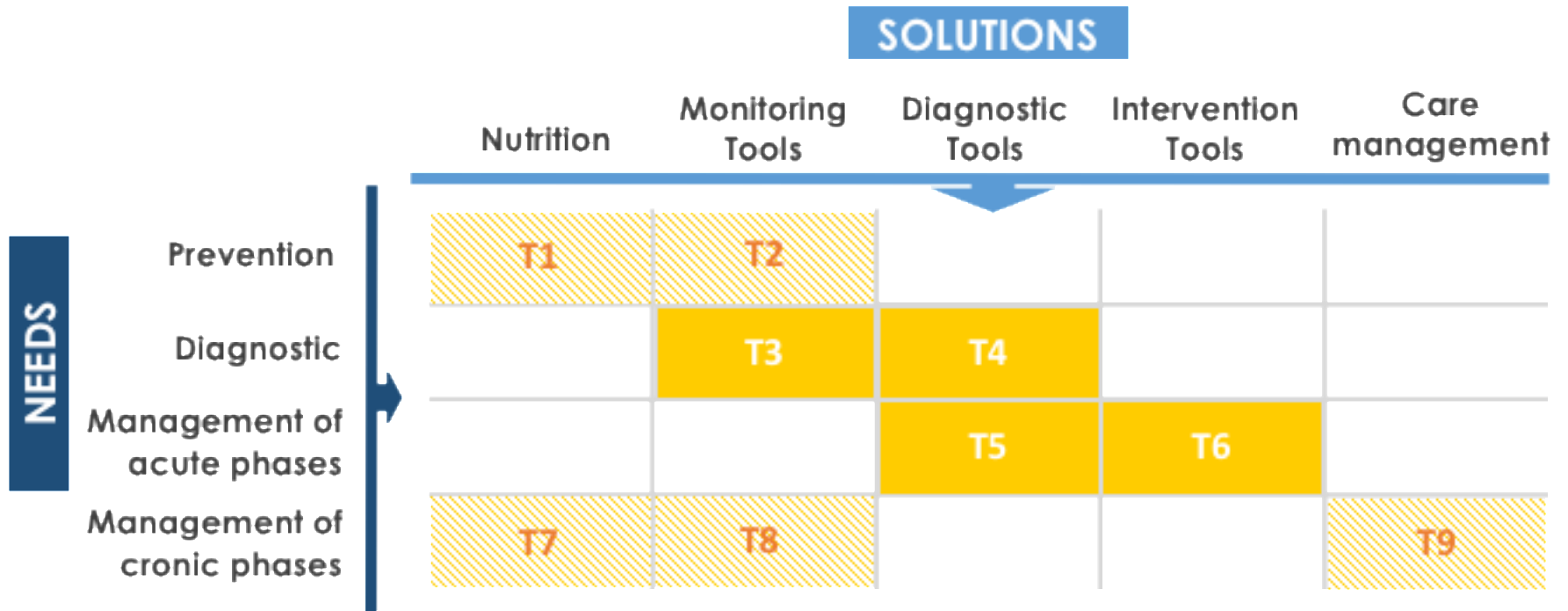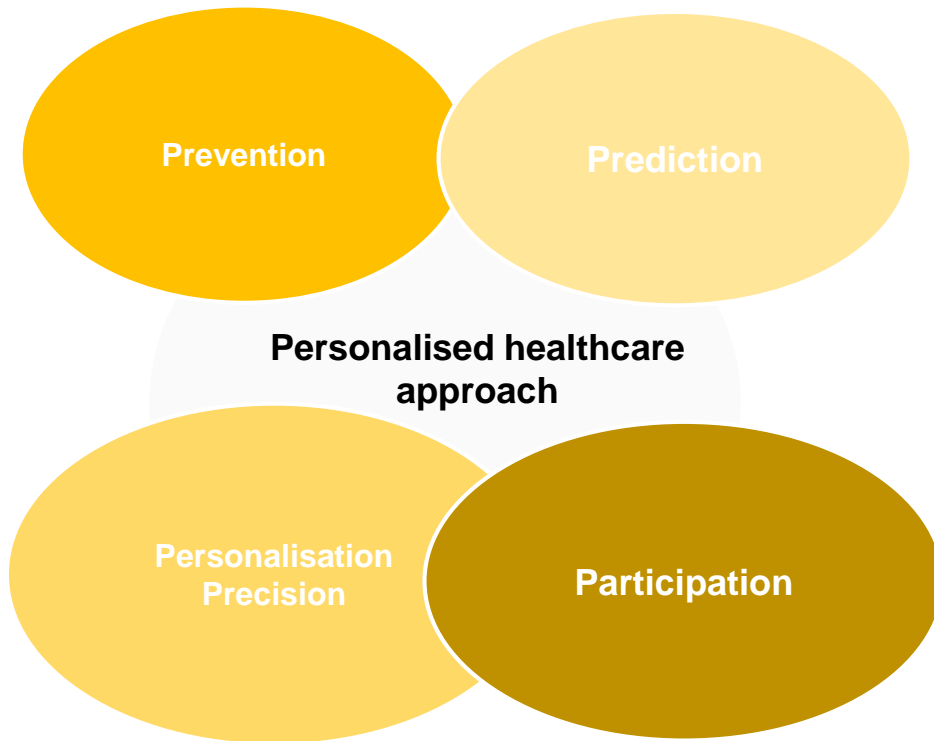**Cost pressure and value based approach**

**Patient empowerment and patient centrics approach**

with possible «new» market segmentations

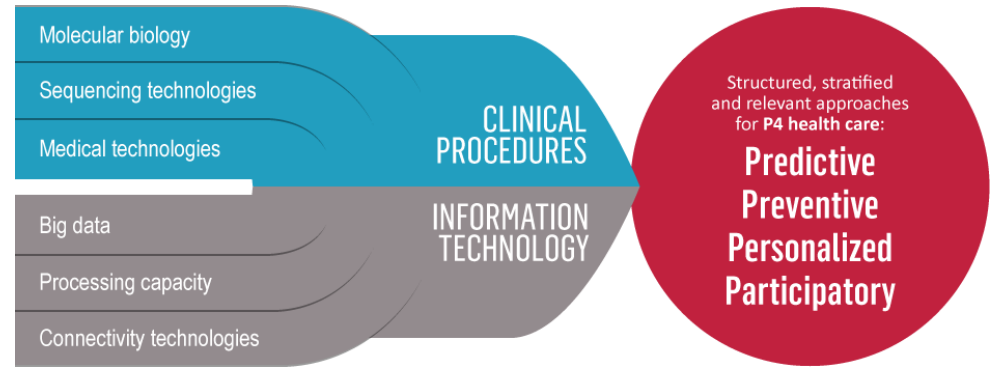# A different vision for the future of health management?

Prevention

Prediction

Personalised healthcare approach

Personalisation Precision

Participation

The impact of personalised health approach

- Key role of diagnosis and theranostics

- Genetically-determined drug response variability

- Increased safety and efficacy

- Pharmacogenetics represents an 'evolution' not a 'revolution' in medicine

- Increased presence of **personalised health**, not just at a genetic level but as general reference also for medical technologies

- Role of big data, AI, deep learning , machine learning, blockchain….

DNA TEST

| SAFE, EFFECTIVE | SAFE, NOT EFFECTIVE | UNSAFE, NOT EFFECTIVE | UNSAFE, EFFECTIVE |
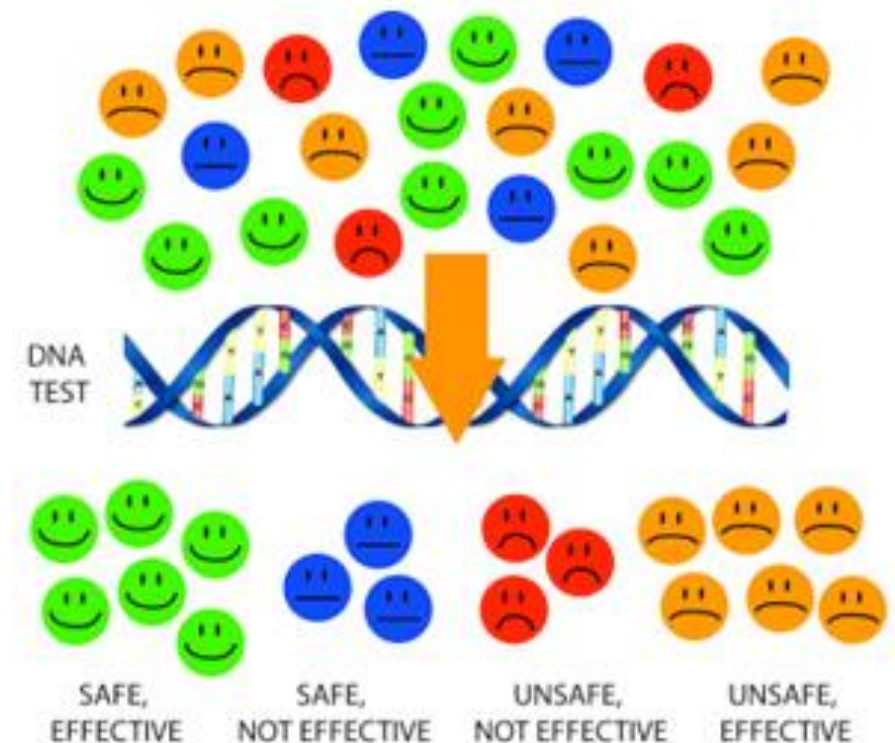
From the stratification to the «one patient» approach -> Precision medicine

The "Disruptive" role of IT

Application	Applicaton type	Potential benefits
Automate prior authorization process • Automatically read and analyze treatment requests, patient clinical information, and clinical and policy guidelines • Generate preauthorization recommendations	Product Process	Faster, more consistent results Reduced staff time Lower costs
Improve care management • Identify high-risk patients • Identify effective interventions • Personalize engagement • Develop holistic view of patients	Insight Product	Higher treatment adherence Better health outcomes Lower costs
Improve population health management • Identify high-risk populations • Identify effective interventions	Insight Product	Better health outcomes Lower costs
Detect fraud, waste, and abuse	Process	Lower costs
Automate de-identification of patient records	Process	Greater privacy Faster results Lower costs
Automate member service • Enable members to interact with virtual agents using natural language • Automatically provide relevant, personalized answers to member questions	Product	Improved customer satisfaction Lower costs
Support market and product strategy • Identify customer segments • Design products tailored to segments	Insight	Better strategies Greater product relevance to consumers
Enhance provider networks/create value-based networks	Insight	Improved access to affordable, quality care Improve patient satisfaction
Manage pricing and risk • Augment actuarial capabilities	Insight	Improved pricing for value-based care Smarter management of risk pricing
Marketing and sales • Analyze customer sentiment • Automate marketing processes • Automate sales process using guided selling	Product Process	Greater customer insight Greater marketing effectiveness Personalized offerings

Source: PwC 2015

BIOINDUSTRY PARK
SILVANO FUMERO

Source: http://qnphc.org/personalized-health-care/

Source: Keltontech.com

• Innovation and change elements:
  - •Management/analysis/data visualization ;
  - •"Ubiquitous" health management;
  - • IoT;
  - •AI/machine lerning/deep learning
  - •BPR of health care providers processes/health care management solutions

15

The emerging reality of »digital therapeutics«

Examples of digital therapeutics on the market or under development include:

Combined software and hardware program to improve asthma and COPD control and optimize healthcare utilization

Digital therapeutic utilizing adaptive sensory stimulus software for the treatment of ADHD delivered through an engaging video game experience

Digital therapeutic used as an adjunct to standard, outpatient treatment for Substance Use Disorder (SUD)

Digital sleep improvement program featuring Cognitive Behavioral Therapy (CBT) techniques

Digital therapeutic engaging individuals with Type 2 diabetes, hypertension, and obesity, and their providers, to improve self-management and outcomes

AI-based digital diagnostics and personalized therapeutics for pediatric behavioral healthcare

Neurologic Music Therapy to address motor, speech, and cognitive dysfunction caused by neurologic disease or injury

Digital delivery of physical exercises, behavioral therapy, and education for chronic back pain patients

Personalized digital program to help people prevent the onset of diabetes and other chronic diseases

Basal insulin dose calculator for adults with Type 2 diabetes

Intervention tool to train cognition in concussion patients

Source: Digital Therapeutics Alliance – Report

Digital health application map

Business Model: Healthcare Service Provider	PROGRAMS & SERVICES	CUSTOMER RELATIONSHIP	CARE DELIVERY	OPERATIONS	REVENUE MANAGEMENT	BUSINESS ADMINISTRATION	RESEARCH
STRATEGIC	Corporate Strategy & Planning	Patient Planning	Models of Care Planning	Supply Chain Planning	Revenue Cycle Planning	Facility Planning	Research Portfolio Planning
	Service Line Planning	Physician Planning	Patient Safety	Pharmacy	Pricing / Contracting Planning	Information Technology Planning	Research Facility Planning
	Ambulatory Services Planning	Payer Planning	Leading Practices & Evidence-based Medicine	Laboratory, Radiology	Patient Access Management Planning	Human Resource Planning	
	Brand Strategy			Support Therapies Strategy			
TACTICAL	Service P&L Management	Customer Satisfaction Assessment	Case Management	Information Management	Contract Negotiations Oversight	Business Performance Management	Policy & Regulation
	Supply & Demand Matching	Disease Management	Specialty Care	Procurement & Logistics Oversight	Referrals, Authorizations & Claims Management	Organization Process & Design	Compliance Oversight
	Market Tracking	Service Issue Tracking	Capacity & Utilization Management	Patient Scheduling	Finance Tactical / Audit	Legal & Regulatory Compliance	Funding Tracking
			Staffing & Scheduling			Quality Management	Information Management
						Recruitment & Retention	Research Tracking
OPERATIONAL	Service Administration	Patient Relations	Wellness & Prevention	Documentation & Coding	Registration / Admission	Risk Management	Protocol Administration
	Customer Services & Communications	Physician Services	Outcomes Measurement	Results Management	Patient Accounting	Facility / Equipment Management	Grant Administration
	Joint Ventures	Customer Servicing	Physician Clinical Practice	Inventory Management, Procurement, Standardization & Utilization	Denial Management	HR Administration	Consent Management
			Post Acute Services		Accounts Receivable	IT Systems & Operations	IP Maintenance
			Clinical Documentation		General Ledger	Education & Training	

REVENUE MODEL LEGEND
- = Revenue Opportunity
- = Revenue Flow
- = Channel
- = Core Differentiating Competency
- = Core Competitive Competency

VALUE MODEL LEGEND
- = Value Opportunity
- = ROI Opportunity
- = Value Identification
- = Value Creation
- = Value Governance

SERVICE MODEL LEGEND
- = Service Flow
- = Main/Supporting Service
- = Simple Service
- = Complex Service
- = Unique Service

COST MODEL LEGEND
- = Cost Opportunity
- = Cost Flow
- = TCO Opportunity
- = Cockpits, Dashboards & Scorecards
- = Evaluation & Audits

PERFORMANCE MODEL LEGEND
- = Performance Opportunity
- = Control & Monitoring
- = BPM (Effectiveness & Efficiency)
- = Measurements
- = Reporting Flow

OPERATING MODEL LEGEND
- = Integration Opportunity
- = Standardization Opportunity
- = Governance, Policies & Guidelines
- = People Distribution
- = Maturity Level

...ference Framework

Source: www.LEADingPractice.co

BIOINDUSTRY PARK
SILVANO FUMERO

These are some of the most important **DIGITAL HEALTH CATEGORIES**.....
- Digital Imaging – (MRI / CTI / X-Ray / Ultrasound)
- Robotic Surgery – (Microsurgery / Remote Surgery)
- Patient Monitoring – (Clinical Trials / Health / Wellbeing)
- Biomedical Data – (Data Streaming / Biomedical Analytics)
- Emergency Incident Management – (Response Team Alerts)
- Epidemiology – (Disease Transmission / Contact Management)

Here are some of the most important **DIGITAL MONITORING SMART APPS**.....
- Activity Monitor – (Pedometer / GPS)
- Position Monitor – (Falling / Fainting / Fitting)
- Sleep Monitor – (Light Sleep / Deep Sleep / REM)
- Cardiac Monitor – (Heart Rhythm / Blood Pressure)
- Blood Monitor – (Glucose / Oxygen / Liver Function)
- Breathing Monitor – (Breathing Rate / Blood Oxygen Level)

BIOINDUSTRY PARK
SILVANO FUMERO

Blockchain as potential innovation driver…

Blockchain technology has the potential to transform health care, placing the patient at the center of the health care ecosystem and increasing the security, privacy, and interoperability of health data. This technology could provide a new model for health information exchanges (HIE)
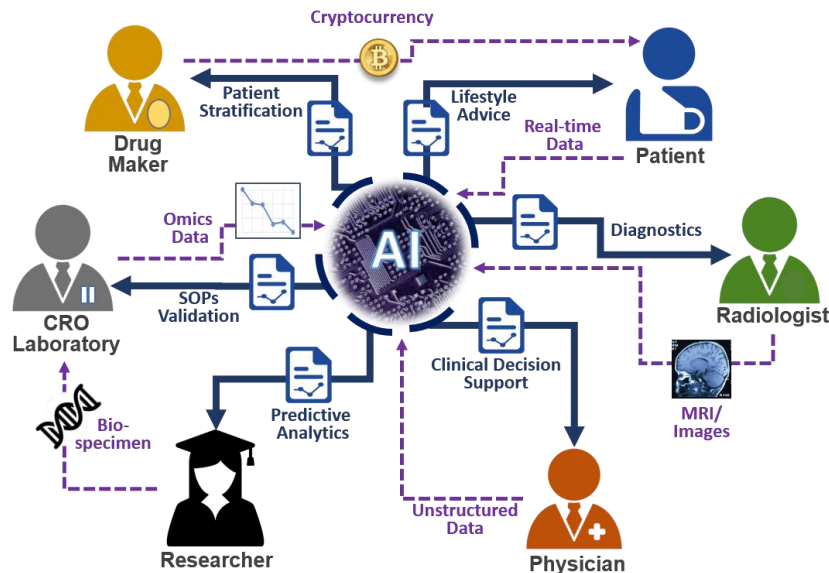
Blockchain Health Applications

Immediate	Near-Future	Longer-term Future
Universal EMR	Smart Contracts and Health Insurance	Blockchain Happiness: Personal Development Chains
Health Databanks	Smart Property: Drug and Inventory Management	Virtual Patient Modeling
Quantified Self Data Commons	Health Token: HSN, Research	*Blockchain AI Applications:*
Big Data File Storage, Access, and Analysis	Smarthome, Personal Robotics, QS IOT	Friendly AI
Health Document Notarization and Tracking	Environmental Monitoring	Blockchain Deep-Learners
Identity Verification	Demurrage Redistributions	Blockchain Health Advocates
Health Vendor RFPs	Health Policy Voting	Digital Mindfile Services

May 5, 2015
Blockchain Health
HSN: Health Social Network, IOT: Internet of Things
http://www.amazon.com/Bitcoin-Blueprint-New-World-Currency/dp/1491920491
6

Source: Melanie Swann, 2015

- Clinical data sharing.
- Public health.
- Research and clinical trials. Administrative and financial information. .
- Patient and provider identity..
- Patient-generated data.

so…converging technologies will also change the scenario

Do we have today available ehealth solutions?

Consequences at patient level
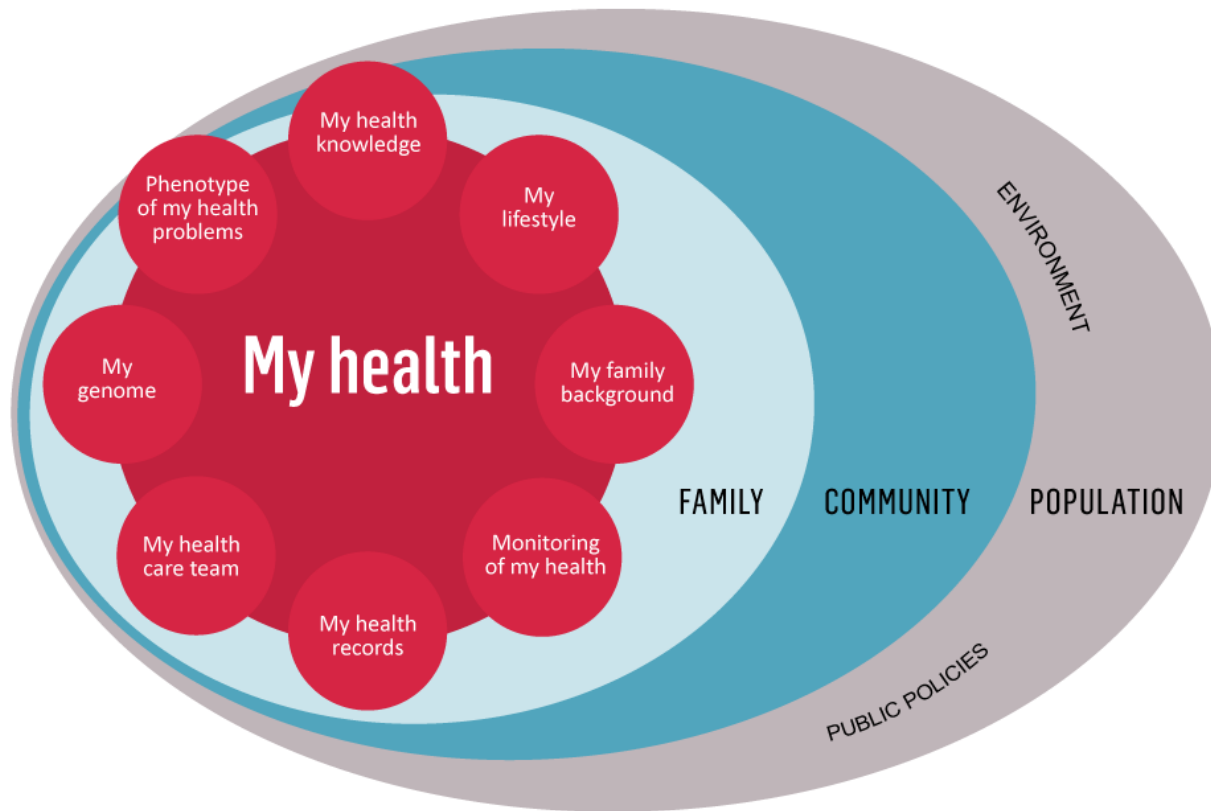
Source: http://qnphc.org/personalized-health-care/

Elements:
- Patient Empowerment
- Life long health management
- Prevention/prediction as priority
- ....

Issues:

- Data (clean, anonymized, safe)
- Standardisation/interoperability
- Privacy
- Data ownership
- Decision power
- Trust
- Cost/sustainability
- Mutualisation of data
- ....

Consequences on the health system

Acute phase health care models

- Citizens are taken in consideration if they have a disease
- Patients are not empowered
- Hospitalization is the "usual" way to manage care
- Private providers are a "premium" or a "low cost"choice and they are solution suppliers
- Health care is based on cost management

Prevention and care management health care models

- The citizen are taken in consideration with a life long approach
- "4ps" approach: hospitalization for acute phases and personalized treatment
- Advanced prevention, diagnostic, monitoring systems
- New role for families, society and private providers
- Health care is based on value management
- Mutalisation of data is a pre-requisite

BIOINDUSTRY PARK
SILVANO FUMERO

What will probably happens…..
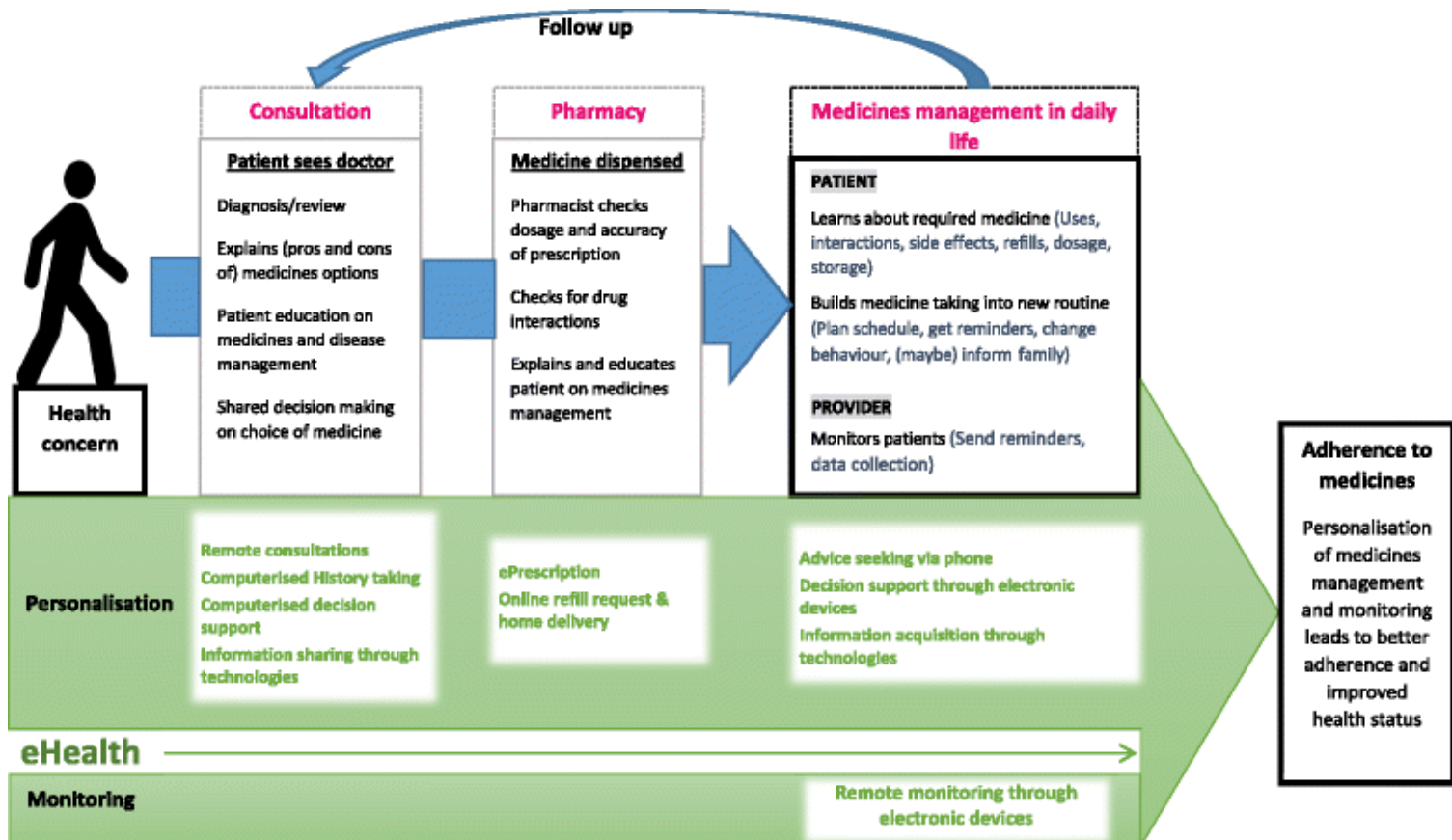
Potential opportunities for companies

Solutions

	Food/nutriceutics	Monitoring	Diagnostic	Interventional tools	Post intervention/care management.

Needs

- Prevention
- Prediction & diagnostic
- Acute phase management
- Chronic phase management

**New market and innovation spaces and segments e.g.**
- Biotech and combined products (therapeutics and diagnostics)
- Telemonitoring/remote monitoring
- Private on line prevention/prediction/diagnostic services
- On line consulting
- Temporary health communities
- Wereables and implantables devices/smart devices
- Social innovation solutions for management of chronic diseases and new models to "manage" elderly
- AI for health data analysis
- Big data population health management
- Health robotics
- Mobile workflow and care coordinating IT solutions
- «Frugal innovation» solutions
- Simuation tools
- Serious gaming solutions
- Standardisation/electronic private-public CUP
- Helath care management solutions
- ……………

BIOINDUSTRY PARK
SILVANO FUMERO

Scale up problems

"First mover advantage doesn't go to the first company that launches, it goes to the first company that scales."

Reid Hoffman, co-founder of Linkedin

From Startups to Scaleups

STARTUP

EARLY-STAGE BARRIERS

CROSSING THE CHASM

SCALEUP

SCALER

SUSTAINABLE CORPORATE

SEP
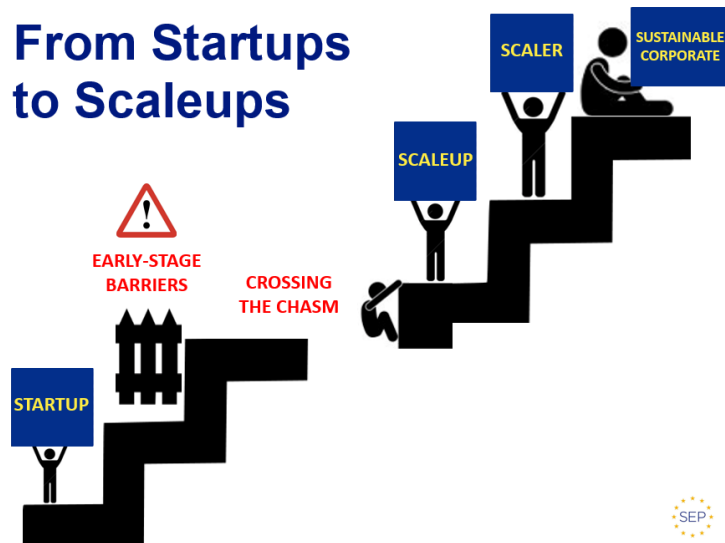
- Technological issues
- Validation issues
- Competencies issues
- Regulatory issues
- Market issues
- Reimbursement issues

BIOINDUSTRY PARK
SILVANO FUMERO

Key actions to scale up a business

- Commit to growth with realism (assess Your growth stage) broadening the vision
- Build broad management skillset
- Identify core competencies
- Focus on product and clients
- Capability to deliver the promise (also in production terms..)
- Develop technology to deliver 10X more of what the market is now expecting
- Build collaborations and outsource what is not a strategic asset
- Standardize processes
- Articulate competitive strength(s)
- Identify business limitations and act fixing things iteritavely
- Define the geographical focus
- Be paranoid about validation and execution and define KPI to monitor

Contents

It is the team that wins,
not the single player

Bioindustry Park Silvano Fumero SpA

Via Ribes, 5
10010 Colleretto Giacosa (TO), Italy
Tel. +39-0125-561311
Fax +39-0125-538350

www.bioindustrypark.eu
Info@bioindustrypark.it

www.biopmed.eu
info@biopmed.eu