Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

HealthTech Nordic Community 27.02.2018

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Regionen siger stop: Medicinalindustrien må ikke betale lægers kurser

AF: DANIEL JØRGENSEN , DLJ@JV.DK
Publiceret 22. juni 2017 kl. 14:49

45 % af danske CXO'er forventer, at dele af deres kerneforretning vil ændre sig grundlæggende eller helt forsvinde i løbet af de næste 3-5 år på grund af den digitale og teknologiske udvikling.

A CHANGE MAY BE JUST AROUND THE CORNER

Kilde: PwC & DE, 2016

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

SCENARIO Magazine
Prisvindende
magasin

Medlemsrapporter

Megatrends

- Social
- Technolog
- Economy
- Environm

Contextual
environment

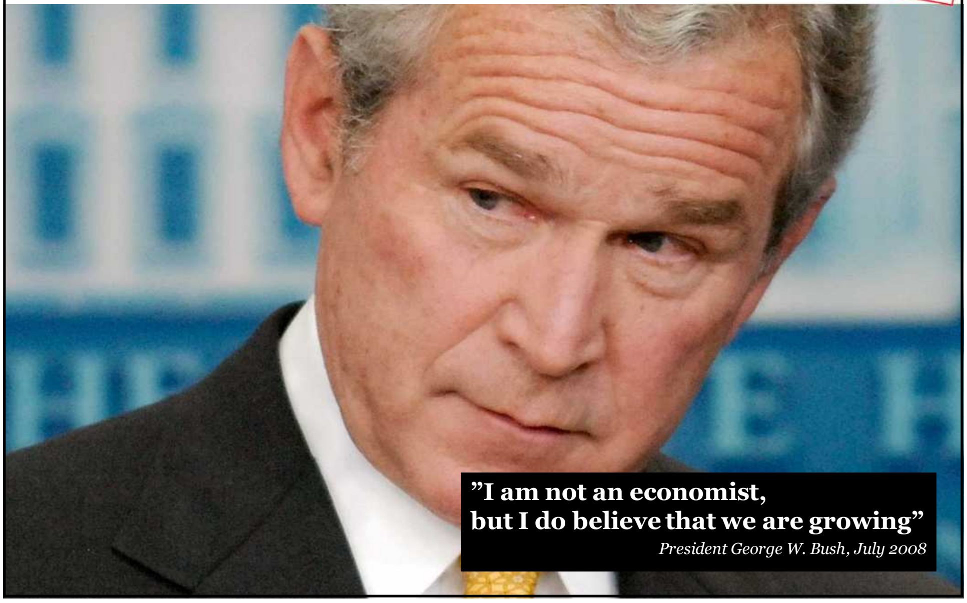
Global Scanning Review

SCENARIO
AUTOMATISERING
DIVIDUAL
SILIENCE
LIENS I DET
HUNDREDE
TRUST ME,
NOT A DOCTOR
NDS FOR
ORROW
ENTURY
STYLES
URE
OLOGY
GLOBAL
SCANNING
REVIEW

Wishful thinking is rarely enough

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

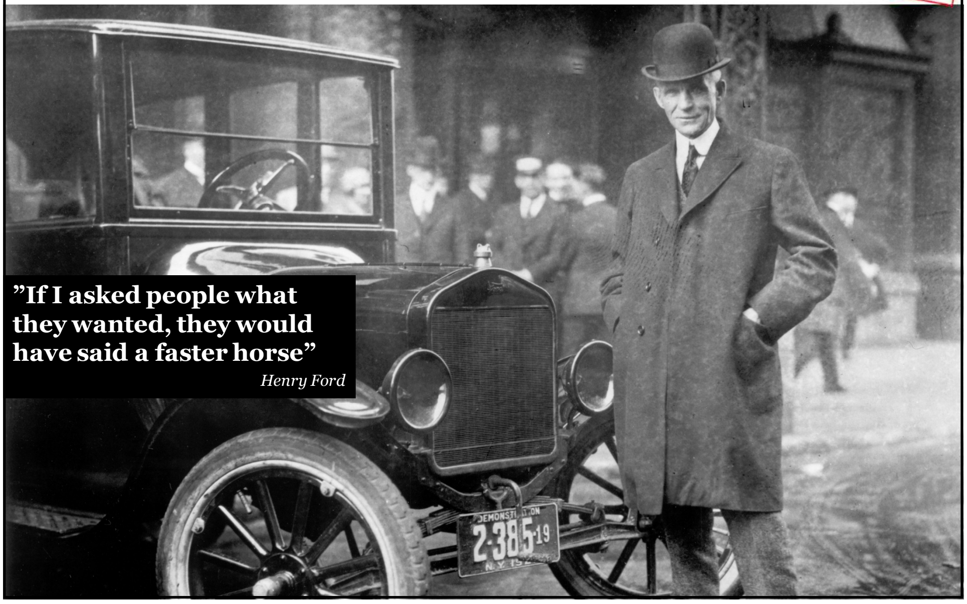
For RegLab internal use only



> ”I am not an economist,
> but I do believe that we are growing”
>
> *President George W. Bush, July 2008*

And we can't ask them…

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning


DEMONSTRATION
2-385 19
N.Y. 192

”If I asked people what they wanted, they would have said a faster horse”

Henry Ford

Tre perspektiver på forandring

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

“Vi ser verden som vi er, og ikke som verden er…”

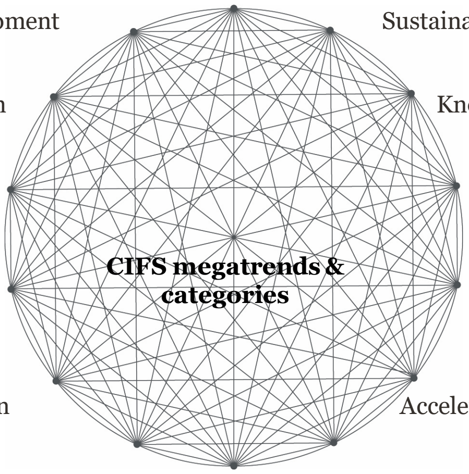
Fortiden	**Nutiden**	**Fremtiden**
De gode, gamle dage	*Vi tror det, når vi ser det*	*Vil bringe forandringer*

NEW YORK STOCK EXCHANGE
THE AMERICAN DREAM IS OVER

CIFS 14 megatrends

Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning

For RegLab internal use only



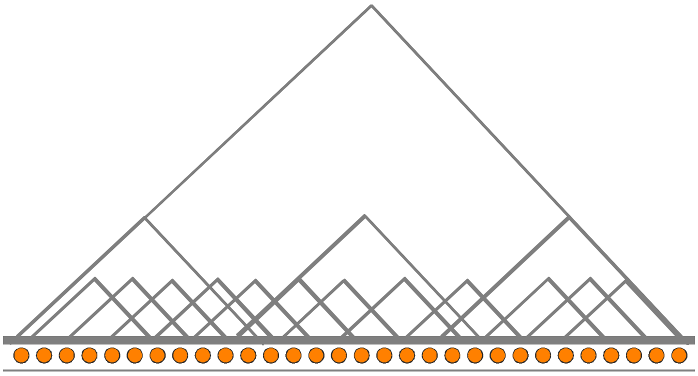
Network society
Demographic development
Sustainability
Focus on health
Knowledge society
Polarization
Immaterialization
CIFS megatrends & categories
Globalization
Democratization
Commercialization
Acceleration and complexity
Individualization
Technologic development
Economic growth

What is a megatrend?

Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning

For RegLab internal use only

Megatrends are a synthetic, complex aggregation of trends



Megatrend

Subtrends

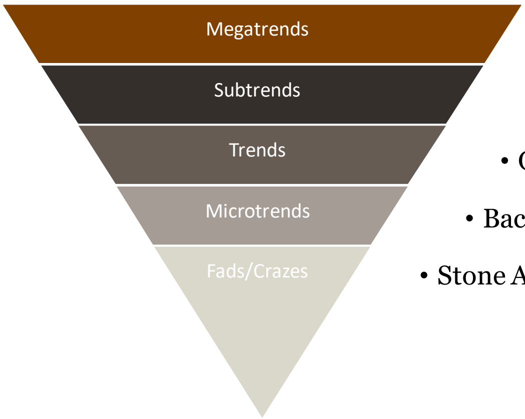
Trends

Individual
Observations

Source: CIFS, 2014.

Example of trend hierarchy

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning



Megatrends

Subtrends

Trends

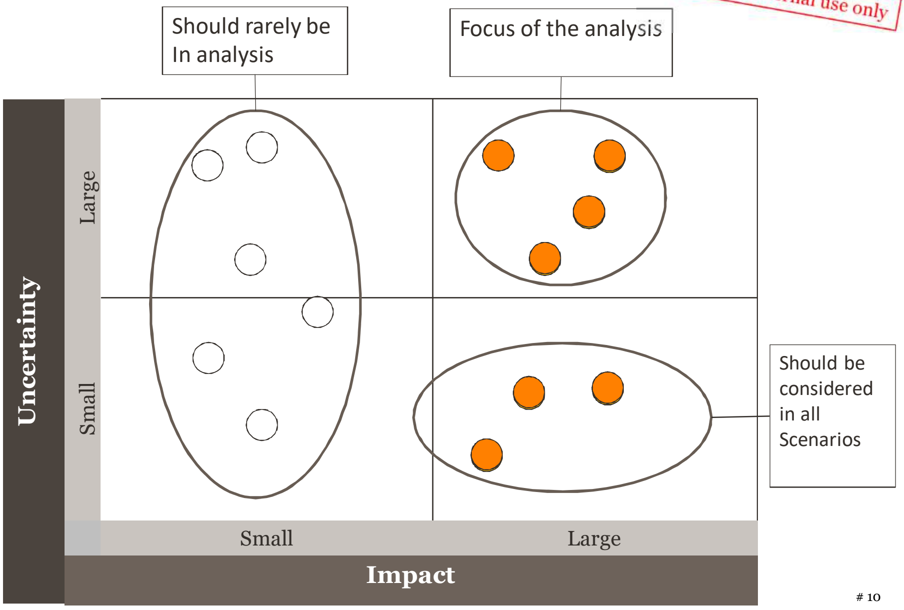
Microtrends

Fads/Crazes

- Focus on Health
- New Perceptions of Health & Wellness
- Organic Food
- Back to basics
- Stone Age Diet

Reducing uncertainty

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning



Should rarely be
In analysis

Focus of the analysis

Should be
considered
in all
Scenarios

Uncertainty

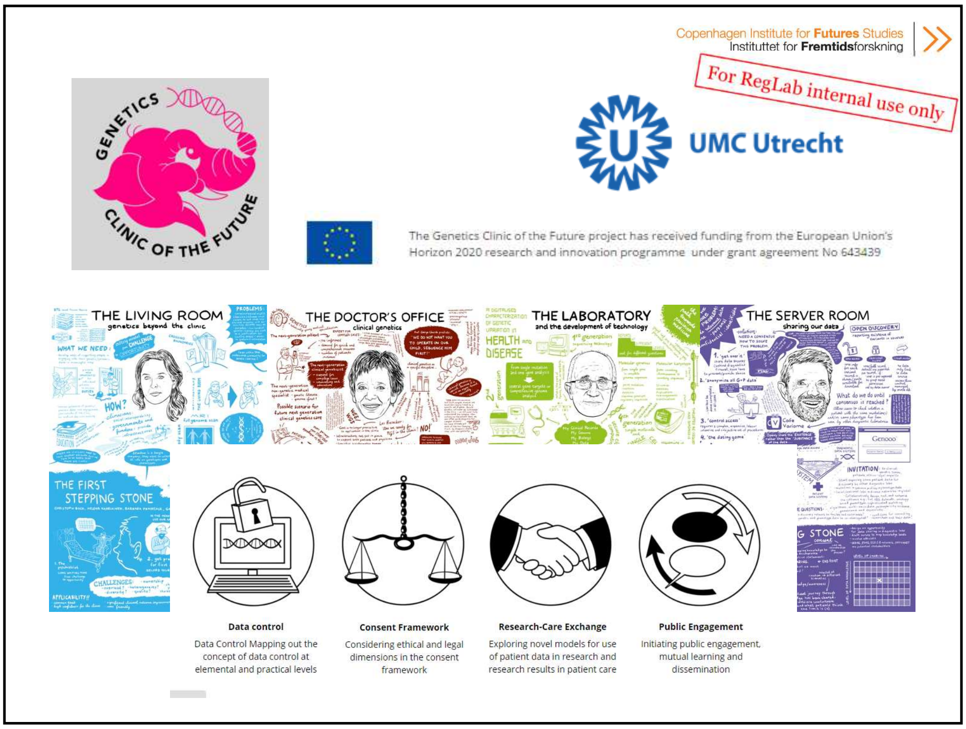
Large

Small

Impact

Small

Large



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

GENETICS CLINIC OF THE FUTURE

UMC Utrecht

The Genetics Clinic of the Future project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 643439

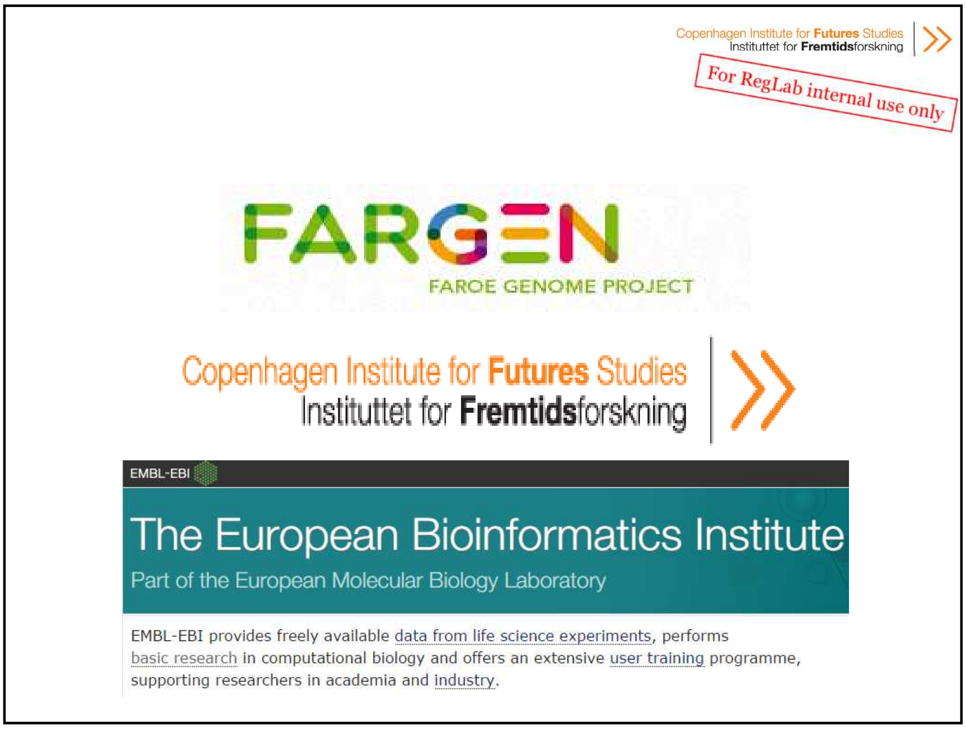
THE LIVING ROOM
genetics beyond the clinic
THE DOCTOR'S OFFICE
clinical genetics
THE LABORATORY
and the development of technology
THE SERVER ROOM
sharing our data
THE FIRST STEPPING STONE

Data control
Data Control Mapping out the concept of data control at elemental and practical levels

Consent Framework
Considering ethical and legal dimensions in the consent framework

Research-Care Exchange
Exploring novel models for use of patient data in research and research results in patient care

Public Engagement
Initiating public engagement, mutual learning and dissemination



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

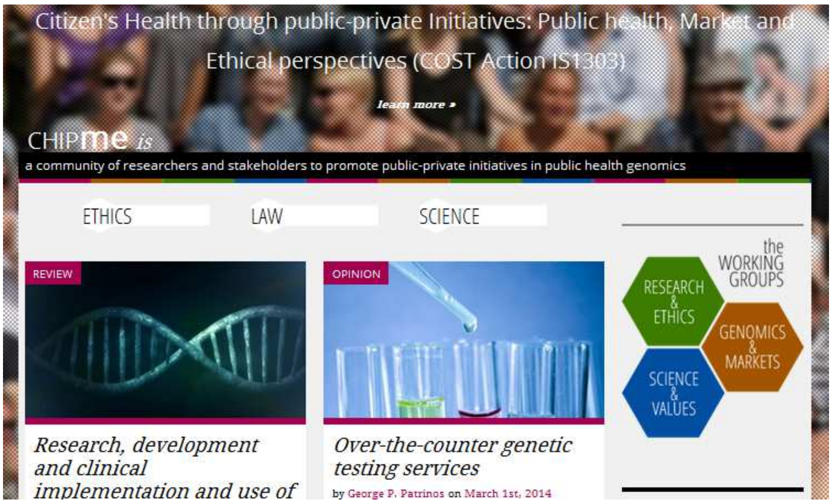
FARGEN
FAROE GENOME PROJECT

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

EMBL-EBI

The European Bioinformatics Institute
Part of the European Molecular Biology Laboratory

EMBL-EBI provides freely available data from life science experiments, performs basic research in computational biology and offers an extensive user training programme, supporting researchers in academia and industry.



Citizen's Health through public-private Initiatives: Public health, Market and Ethical perspectives (COST Action IS1303)

learn more »

CHIPme *is*

a community of researchers and stakeholders to promote public-private initiatives in public health genomics

Research, development and clinical implementation and use of

Over-the-counter genetic testing services

by George P. Patrinos on March 1st, 2014

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

United Nations
Educational, Scientific and
Cultural Organization

Our Mission

On July 2009, UNESCO signed an agreement to establish a *UNESCO Chair in Bioethics and Human Rights* with the Università Europea di Roma and Ateneo Pontificio *Regina Apostolorum*. The two universities, in cooperation with UNESCO, established this UNESCO Chair at the Bioethics and Human Rights Institute.

The UNESCO Chair offers a university framework of reflection and study, providing information and fostering the application of bioethical principles in science, medicine and new technologies based on the *UNESCO Declaration on Bioethics and Human Rights.*

Our UNESCO Chair encourages a wide exchange of ideas and allow for sharing of experiences through dialogue among international institutions of higher education especially with developing countries.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Members' Report 1/2013

TRUST ME,
I'M NOT A DOCTOR

Health is changing with
new technology

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning
Login
English Dansk
Membership
Consulting
Presentations
Publications
About Us
Search
Main Sponsors
Innovationsfonden
Lundbeck
Register here

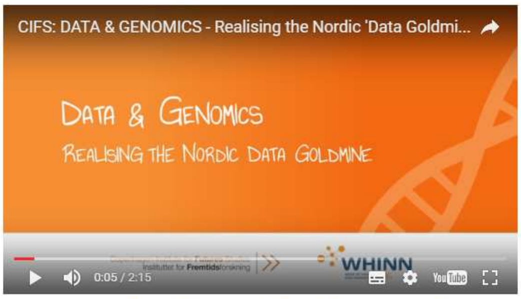
Genomics of the Future – The 360° Perspective

Upcoming **Conference**
Genomics of the Future -The 360° Perspective

Organizer
Copenhagen Institute for Futures Studies (Instituttet for Fremtidsforskning)

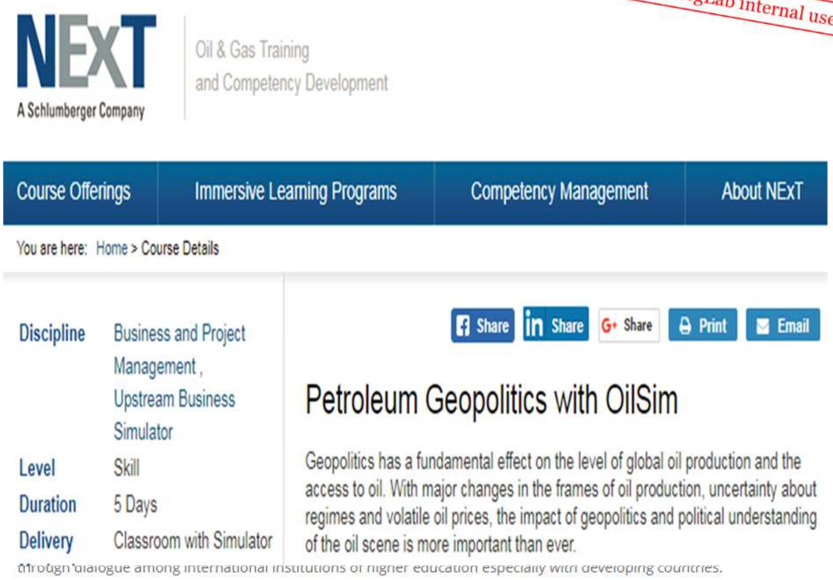
Are you a Researcher, a Policy-Maker, an Investor, or a Professional in the Field of Healthcare or Life Sciences?

Get a Unique and Broad Insight to the Genomic Revolution from Worl Experts in One Day



CIFS: DATA & GENOMICS - Realising the Nordic 'Data Goldmi...
DATA & GENOMICS
REALISING THE NORDIC DATA GOLDMINE
WHINN
0:05 / 2:15

Data & Genomics will have a significant impact on patients, research, local, regional and national administrations and politics, the business of life science, insurance, citizens, and digital health among other things – watch the video and learn more.



NExT
A Schlumberger Company
Oil & Gas Training
and Competency Development
Course Offerings
Immersive Learning Programs
Competency Management
About NExT
Share
Share
Share
Print
Email

You are here: Home > Course Details

Discipline	Business and Project Management , Upstream Business Simulator
Level	Skill
Duration	5 Days
Delivery	Classroom with Simulator

Petroleum Geopolitics with OilSim

Geopolitics has a fundamental effect on the level of global oil production and the access to oil. With major changes in the frames of oil production, uncertainty about regimes and volatile oil prices, the impact of geopolitics and political understanding of the oil scene is more important than ever.

through dialogue among international institutions of higher education especially with developing countries.

Burning platform

- Ageing and more years with disease
- 1% costs 30% - 10% costs 75-90%
- Comorbidity
- From “fee for service” to value based health
- Data Gold Mine – Between person and system
- Personalized health – from cradle to grave
- Broadening health concept and global health

[redacted]

[redacted]

Fremtiden for det danske sundhedssystem 2030

Scenarier og anbefalinger

14. august. 2017

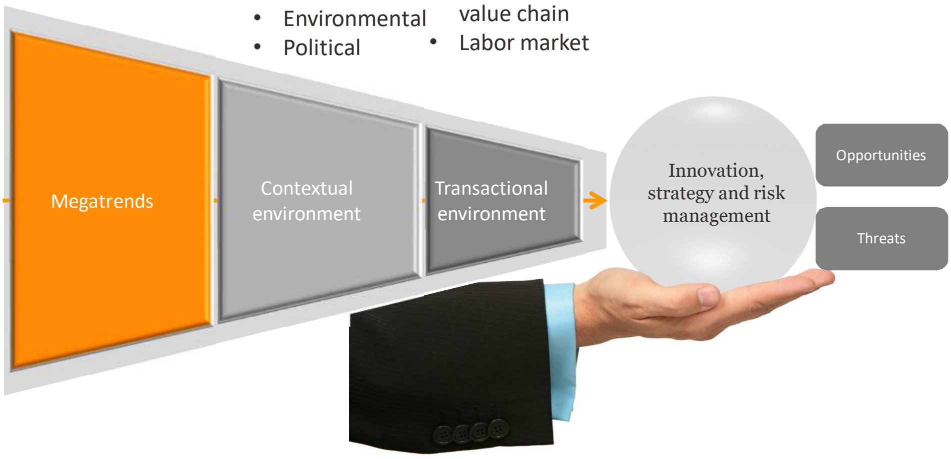
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Megatrends influencing the future

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

- Social
- Technology
- Economic
- Environmental
- Political

- Competitors (new and existing)
- Suppliers and value chain
- Labor market



Megatrends

Contextual environment

Transactional environment

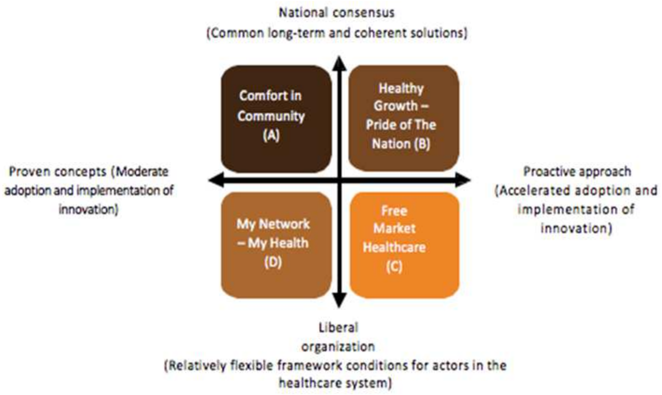
Innovation, strategy and risk management

Opportunities

Threats

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Scenario matrix



National consensus
(Common long-term and coherent solutions)

Comfort in Community (A)

Healthy Growth – Pride of The Nation (B)

Proven concepts (Moderate adoption and implementation of innovation)

Proactive approach (Accelerated adoption and implementation of innovation)

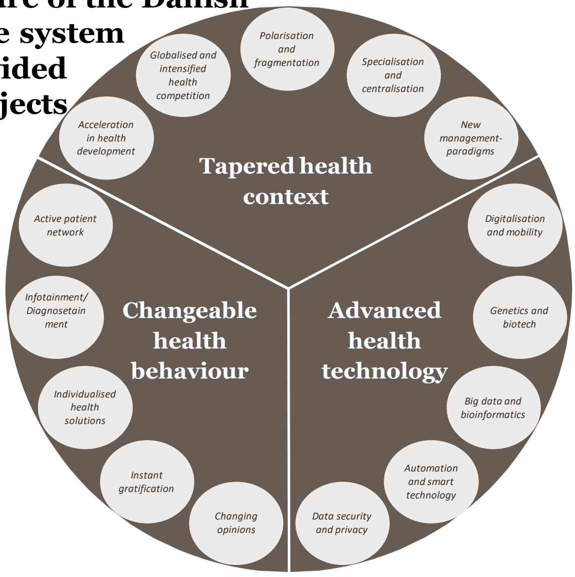
My Network – My Health (D)

Free Market Healthcare (C)

Liberal organization
(Relatively flexible framework conditions for actors in the healthcare system)

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

The specific trends and themes of the future of the Danish healthcare system can be divided into 3 subjects



Tapered health context

- Acceleration in health development
- Globalised and intensified health competition
- Polarisation and fragmentation
- Specialisation and centralisation
- New management-paradigms

Changeable health behaviour

- Active patient network
- Infotainment/ Diagnosetainment
- Individualised health solutions
- Instant gratification
- Changing opinions

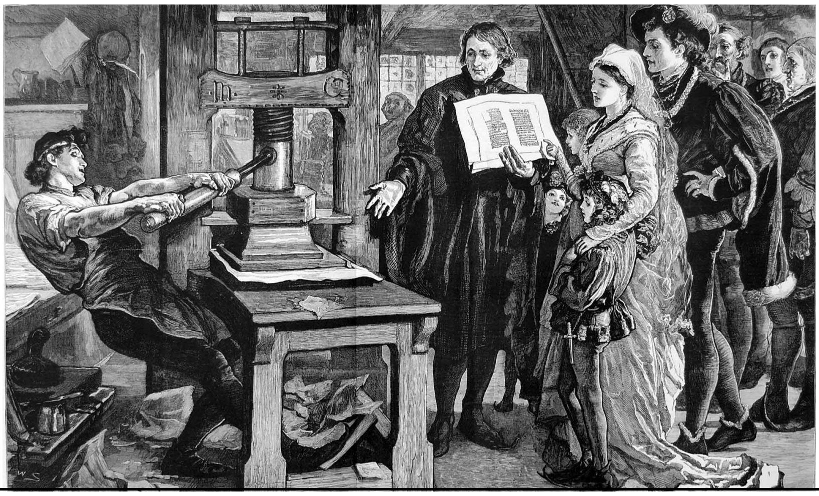
Advanced health technology

- Digitalisation and mobility
- Genetics and biotech
- Big data and bioinformatics
- Automation and smart technology
- Data security and privacy

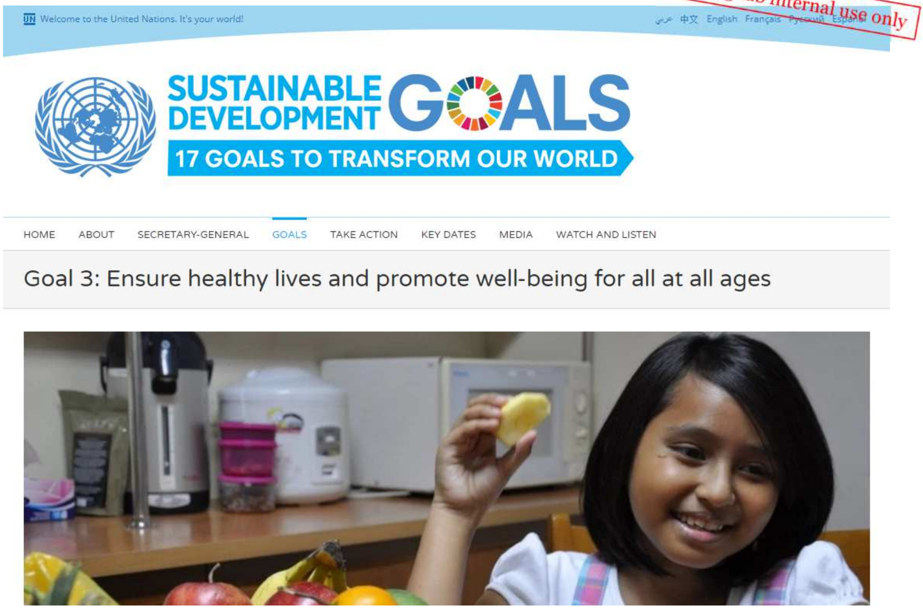
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

The Gutenbergproces of Health

- Technology & knowledge before limited for the few are now accessible for the masses.



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning


Welcome to the United Nations. It's your world!
عربي 中文 English Français Русский Español
SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD
HOME
ABOUT
SECRETARY-GENERAL
GOALS
TAKE ACTION
KEY DATES
MEDIA
WATCH AND LISTEN

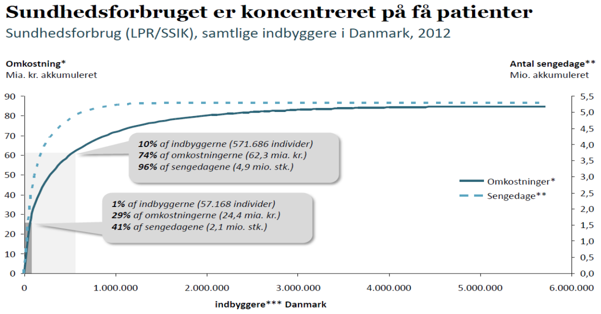
Goal 3: Ensure healthy lives and promote well-being for all at all ages

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Large challenges regarding costs and inequality in health care

A large part of health care services and health expenditures are consumed by a small number of patients



Sundhedsforbruget er koncentreret på få patienter

Sundhedsforbrug (LPR/SSIK), samtlige indbyggere i Danmark, 2012

10% *af indbyggerne (571.686 individer)*
74% *af omkostningerne (62,3 mia. kr.)*
96% *af sengedagene (4,9 mio. stk.)*

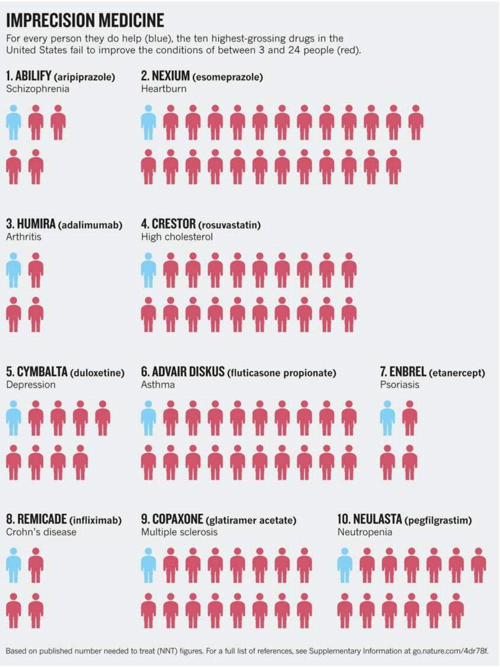
1% *af indbyggerne (57.168 individer)*
29% *af omkostningerne (24,4 mia. kr.)*
41% *af sengedagene (2,1 mio. stk.)*

Kilde: Health Navigator, Statens Seruminstitut, Sundhedsministeriet og Finansministeriet (upublicerede data)

Danish Regions

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



IMPRECISION MEDICINE

For every person they do help (blue), the ten highest-grossing drugs in the United States fail to improve the conditions of between 3 and 24 people (red).

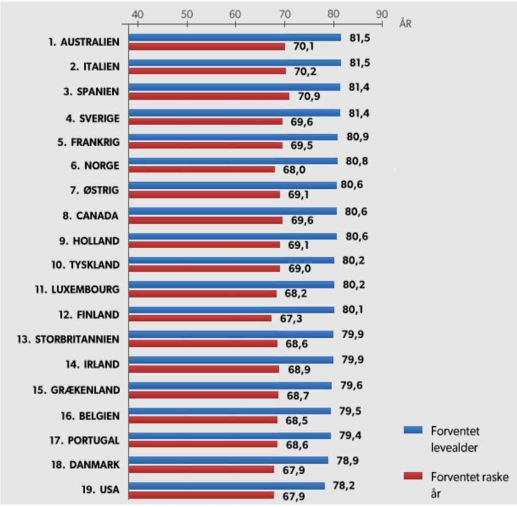
Based on published number needed to treat (NNT) figures. For a full list of references, see Supplementary Information at go.nature.com/4dr78f.

> "Precision medicine requires a different type of clinical trial that focuses on individual, not average, responses to therapy"
> - Nicholas J. Schork, Ph.D.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Life Expectancy and Healthy Life Years

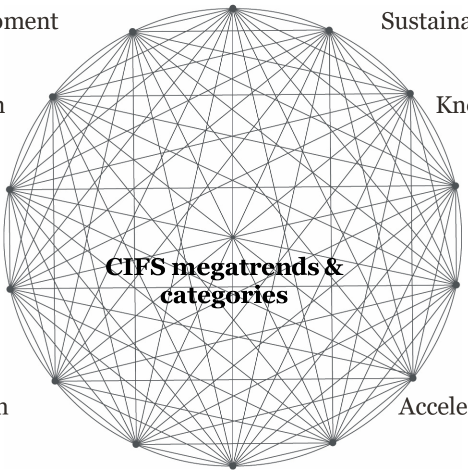


Kilde: The Lancet, 2013

CIFS 14 megatrends

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



Network society

Demographic development

Sustainability

Focus on health

Knowledge society

Polarization

Immaterialization

CIFS megatrends & categories

Globalization

Democratization

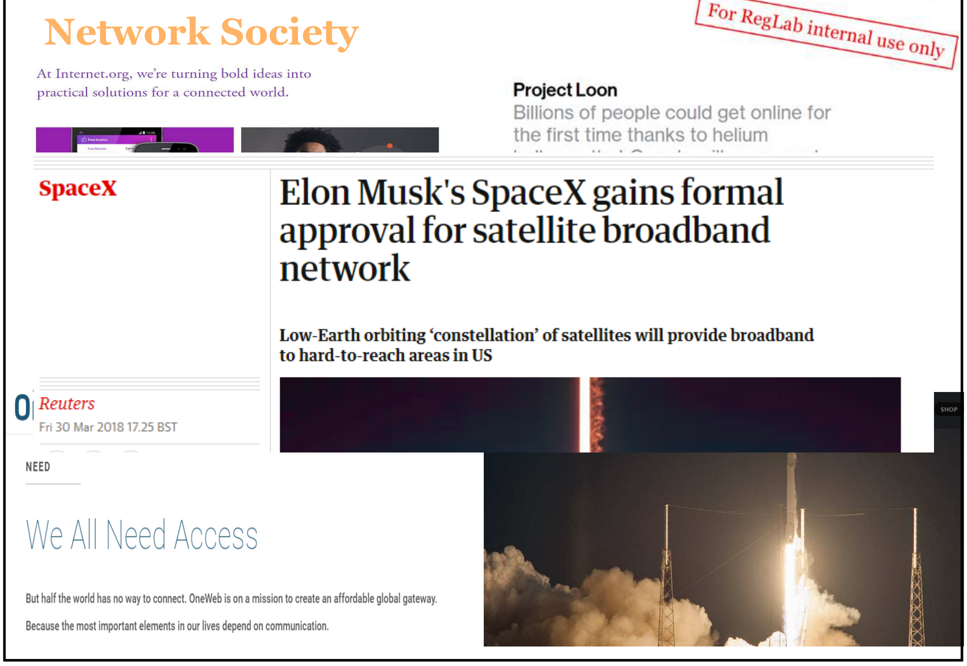
Commercialization

Acceleration and complexity

Individualization

Technologic development

Economic growth



Network Society

At Internet.org, we're turning bold ideas into practical solutions for a connected world.

Project Loon

Billions of people could get online for the first time thanks to helium

SpaceX

Elon Musk's SpaceX gains formal approval for satellite broadband network

Low-Earth orbiting 'constellation' of satellites will provide broadband to hard-to-reach areas in US

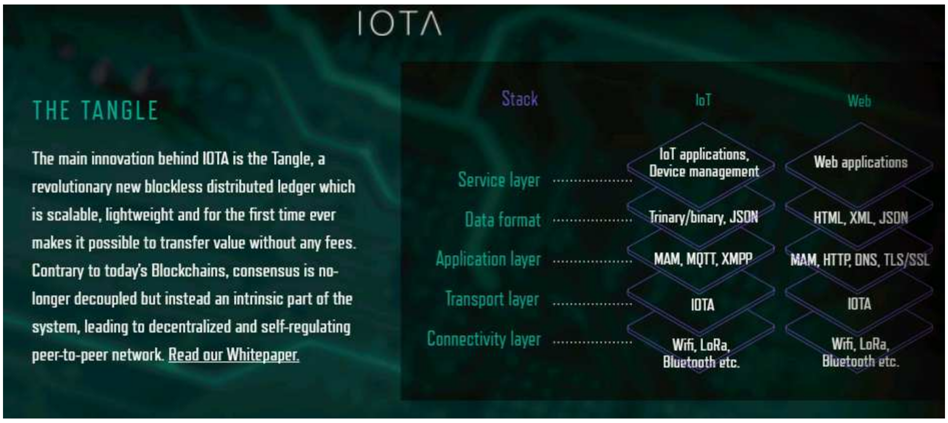
Reuters
Fri 30 Mar 2018 17.25 BST

NEED

We All Need Access

But half the world has no way to connect. OneWeb is on a mission to create an affordable global gateway.

Because the most important elements in our lives depend on communication.



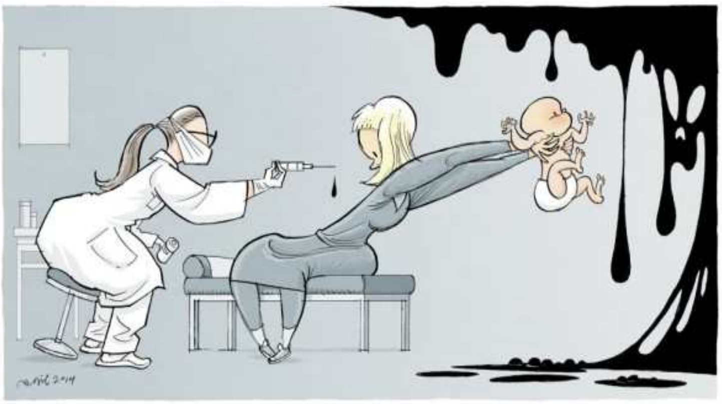
IOTA

THE TANGLE

The main innovation behind IOTA is the Tangle, a revolutionary new blockless distributed ledger which is scalable, lightweight and for the first time ever makes it possible to transfer value without any fees. Contrary to today's Blockchains, consensus is no-longer decoupled but instead an intrinsic part of the system, leading to decentralized and self-regulating peer-to-peer network. Read our Whitepaper.

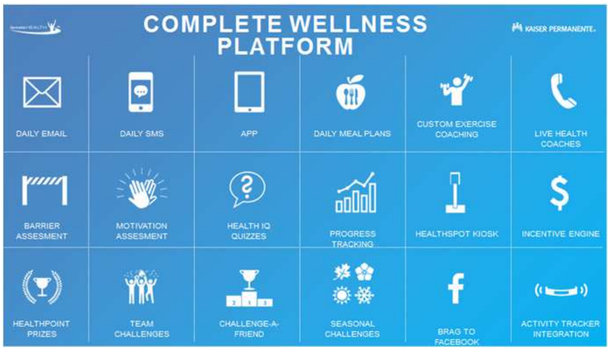
Stack	IoT	Web
Service layer	IoT applications, Device management	Web applications
Data format	Trinary/binary, JSON	HTML, XML, JSON
Application layer	MAM, MQTT, XMPP	MAM, HTTP, DNS, TLS/SSL
Transport layer	IOTA	IOTA
Connectivity layer	Wifi, LoRa, Bluetooth etc.	Wifi, LoRa, Bluetooth etc.

New networks and realities



Kaiser Permanente

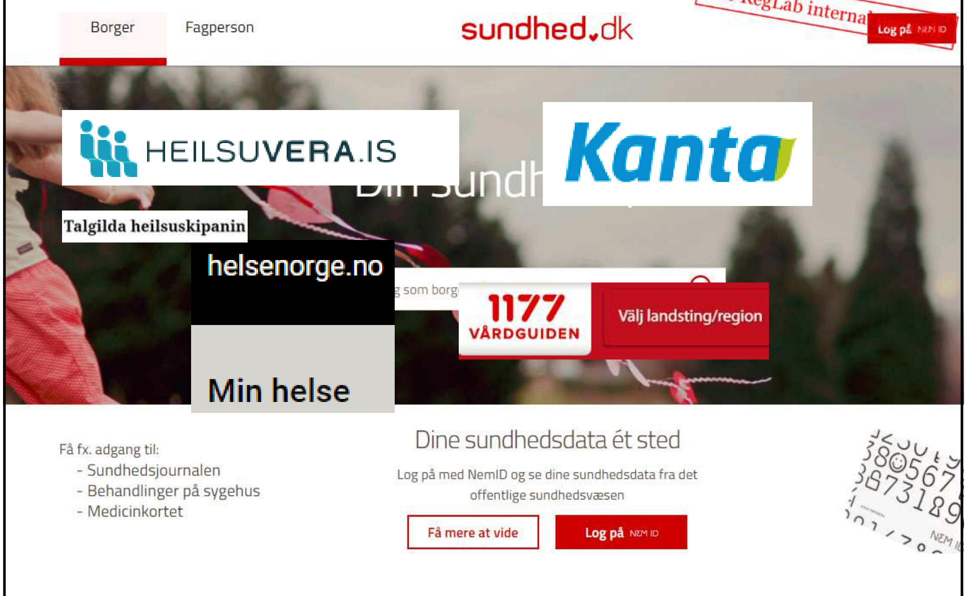
- An app for patients to communicate with doctors, make appointments, refill prescriptions, and view medical data
- Focuses on preventative and health analytics


COMPLETE WELLNESS PLATFORM
KAISER PERMANENTE
DAILY EMAIL
DAILY SMS
APP
DAILY MEAL PLANS
CUSTOM EXERCISE COACHING
LIVE HEALTH COACHES
BARRIER ASSESMENT
MOTIVATION ASSESMENT
HEALTH IQ QUIZZES
PROGRESS TRACKING
HEALTHSPOT KIOSK
INCENTIVE ENGINE
HEALTHPOINT PRIZES
TEAM CHALLENGES
CHALLENGE-A-FRIEND
SEASONAL CHALLENGES
BRAG TO FACEBOOK
ACTIVITY TRACKER INTEGRATION

Source: Kaiser Permanente

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab interna



Borger
Fagperson

sundhed.dk

Log på NEM ID

HEILSUVERA.IS

Kanta

Din sundh

Talgilda heilsuskipanin

helsenorge.no

g som borg

1177 VÅRDGUIDEN

Välj landsting/region

Min helse

Få fx. adgang til:
- Sundhedsjournalen
- Behandlinger på sygehus
- Medicinkortet

Dine sundhedsdata ét sted

Log på med NemID og se dine sundhedsdata fra det offentlige sundhedsvæsen

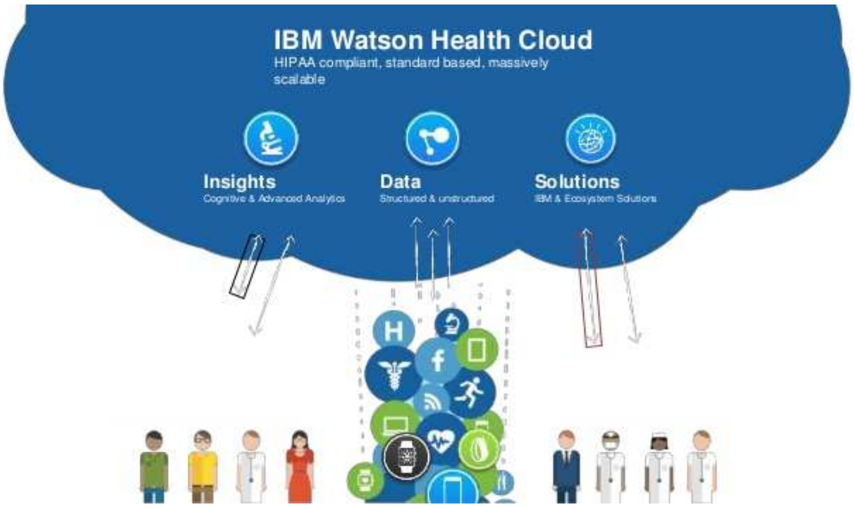
Få mere at vide

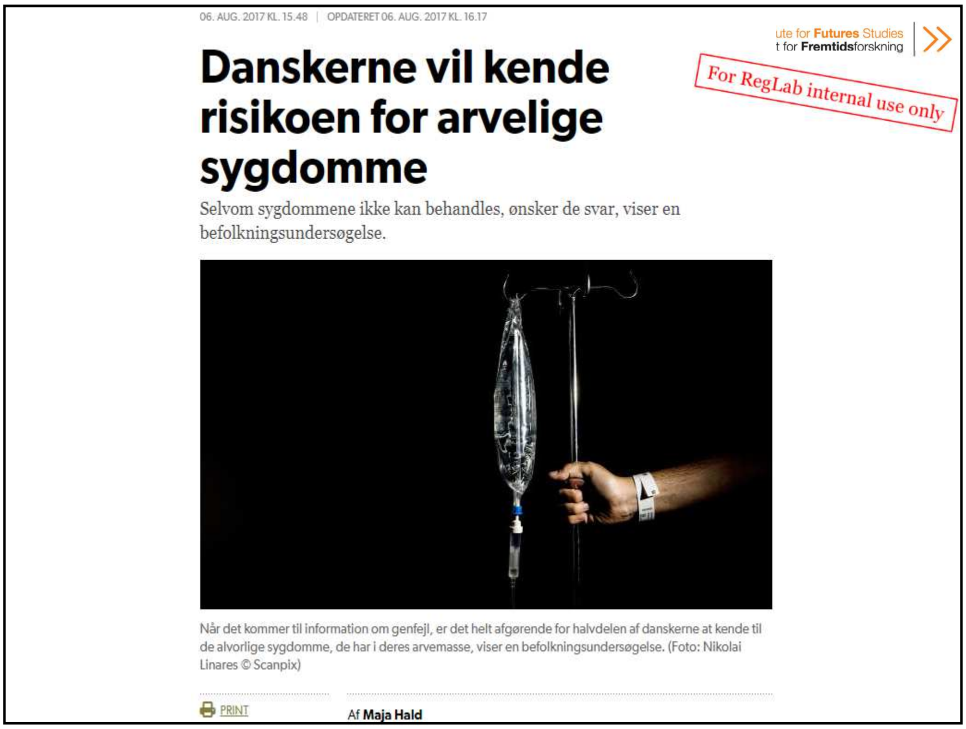
Log på NEM ID

Knowledge Society

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only


IBM Watson Health Cloud
HIPAA compliant, standard based, massively scalable
Insights
Cognitive & Advanced Analytics
Data
Structured & unstructured
Solutions
IBM & Ecosystem Solutions



ute for **Futures** Studies
t for **Fremtids**forskning

06. AUG. 2017 KL. 15.48 | OPDATERET 06. AUG. 2017 KL. 16.17

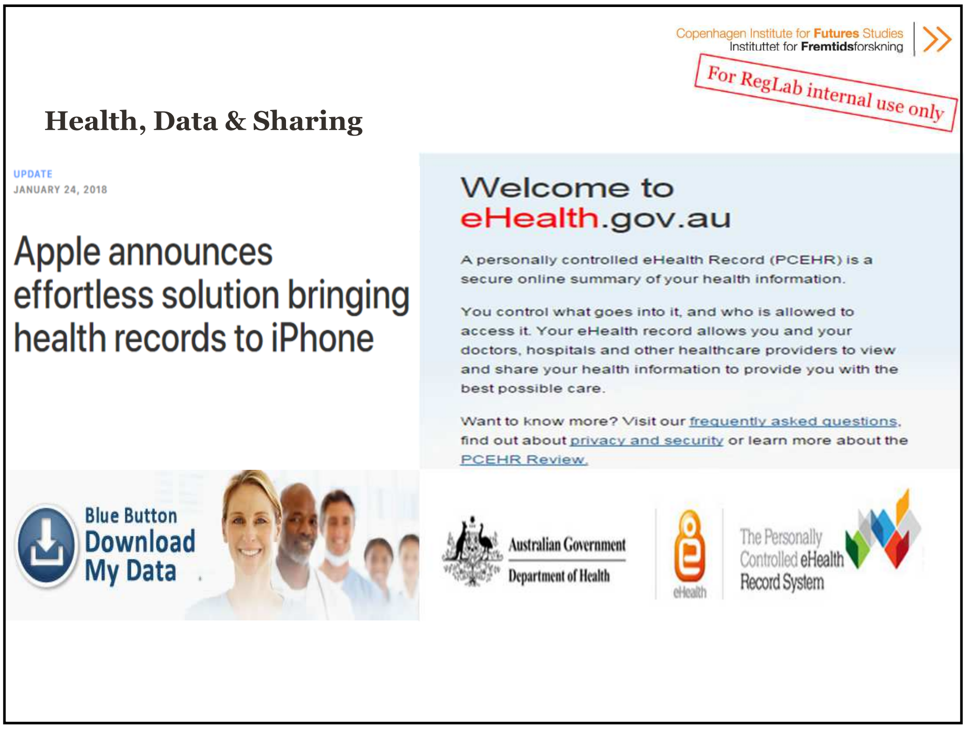
Danskerne vil kende risikoen for arvelige sygdomme

Selvom sygdommene ikke kan behandles, ønsker de svar, viser en befolkningsundersøgelse.

Når det kommer til information om genfejl, er det helt afgørende for halvdelen af danskerne at kende til de alvorlige sygdomme, de har i deres arvemasse, viser en befolkningsundersøgelse. (Foto: Nikolai Linares © Scanpix)

PRINT

Af **Maja Hald**



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Health, Data & Sharing

UPDATE
JANUARY 24, 2018

Apple announces effortless solution bringing health records to iPhone

Blue Button
Download
My Data

Welcome to eHealth.gov.au

A personally controlled eHealth Record (PCEHR) is a secure online summary of your health information.

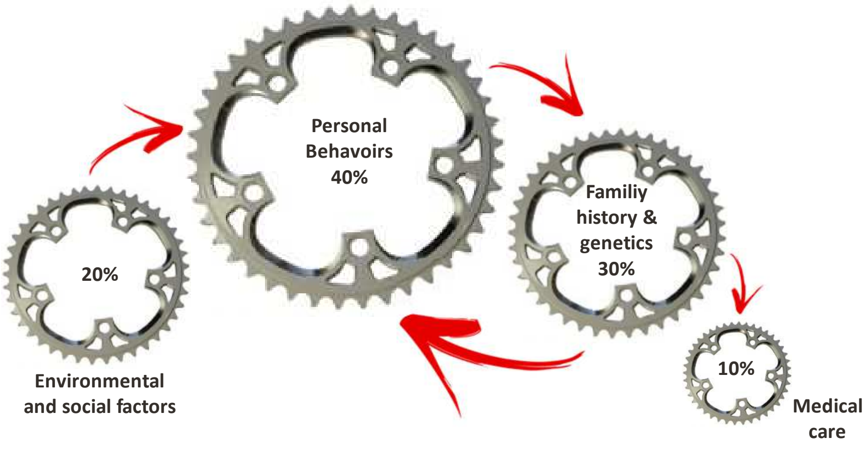
You control what goes into it, and who is allowed to access it. Your eHealth record allows you and your doctors, hospitals and other healthcare providers to view and share your health information to provide you with the best possible care.

Want to know more? Visit our frequently asked questions, find out about privacy and security or learn more about the PCEHR Review.

Australian Government
Department of Health
eHealth
The Personally Controlled eHealth Record System

How do we combine data?

”Social determinants of health” af Kaiser Permanente: 60 millioner kunder



Personal Behavoirs 40%

Familiy history & genetics 30%

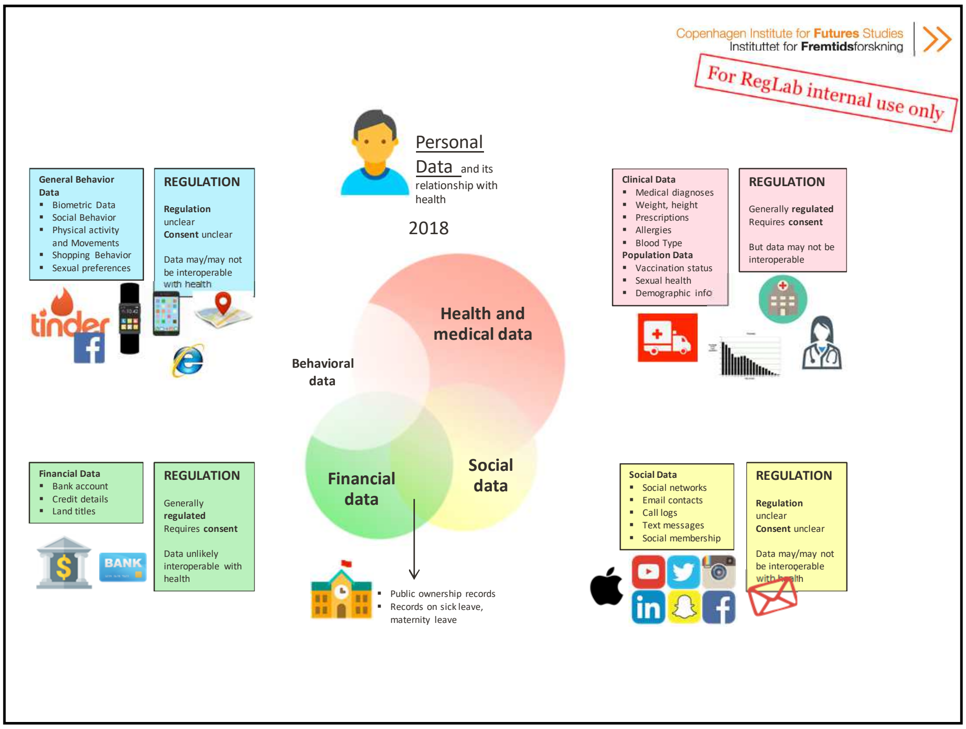
20%

Environmental and social factors

10%

Medical care

Kilde: Kaiser Permanente, 2017



Personal Data and its relationship with health

2018

General Behavior Data
- Biometric Data
- Social Behavior
- Physical activity and Movements
- Shopping Behavior
- Sexual preferences

REGULATION

Regulation unclear
Consent unclear

Data may/may not be interoperable with health

Clinical Data
- Medical diagnoses
- Weight, height
- Prescriptions
- Allergies
- Blood Type

Population Data
- Vaccination status
- Sexual health
- Demographic info

REGULATION

Generally **regulated**
Requires **consent**

But data may not be interoperable

Financial Data
- Bank account
- Credit details
- Land titles

REGULATION

Generally **regulated**
Requires **consent**

Data unlikely interoperable with health

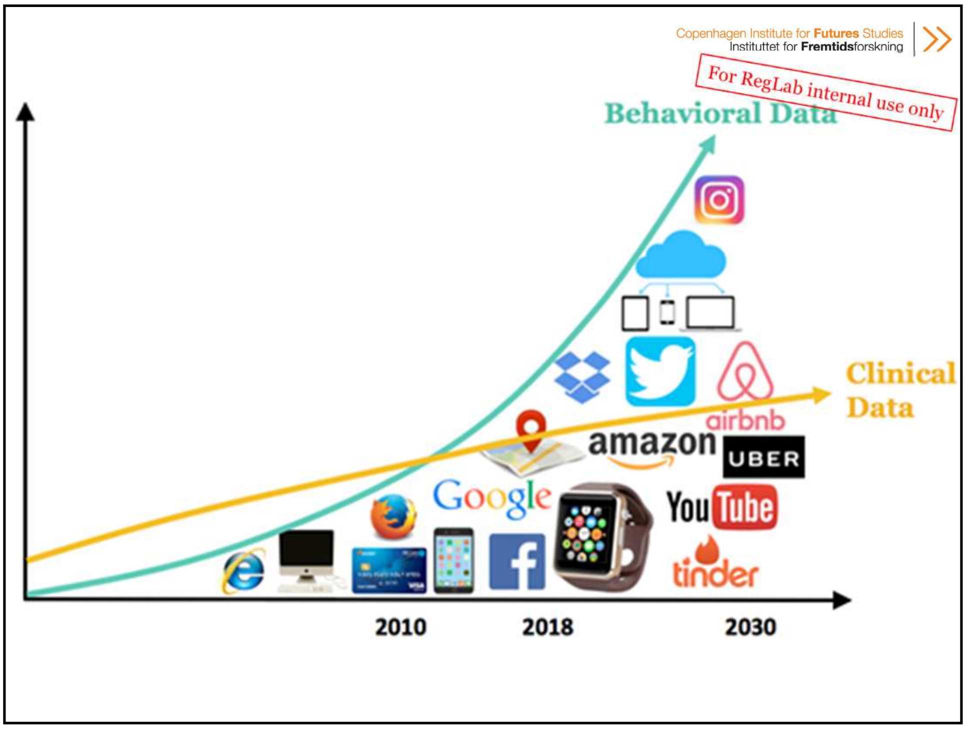
- Public ownership records
- Records on sick leave, maternity leave

Social Data
- Social networks
- Email contacts
- Call logs
- Text messages
- Social membership

REGULATION

Regulation unclear
Consent unclear

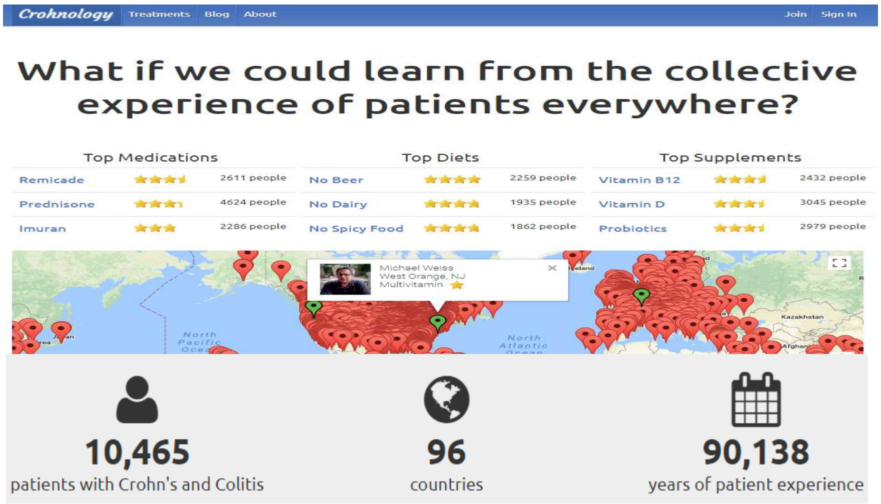
Data may/may not be interoperable with health



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Immaterialization


Crohnology
Treatments
Blog
About
Join
Sign In
Michael Weiss
West Orange, NJ
Multivitamin
North Pacific Ocean
North Atlantic Ocean
Kazakhstan

What if we could learn from the collective experience of patients everywhere?

Top Medications			Top Diets			Top Supplements		
Remicade	★★★½	2611 people	No Beer	★★★★	2259 people	Vitamin B12	★★★½	2432 people
Prednisone	★★★½	4624 people	No Dairy	★★★★	1935 people	Vitamin D	★★★½	3045 people
Imuran	★★★	2286 people	No Spicy Food	★★★★	1862 people	Probiotics	★★★½	2979 people

10,465
patients with Crohn's and Colitis

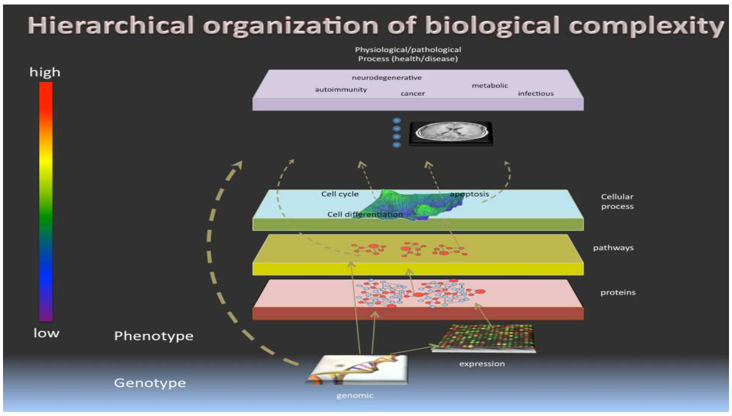
96
countries

90,138
years of patient experience

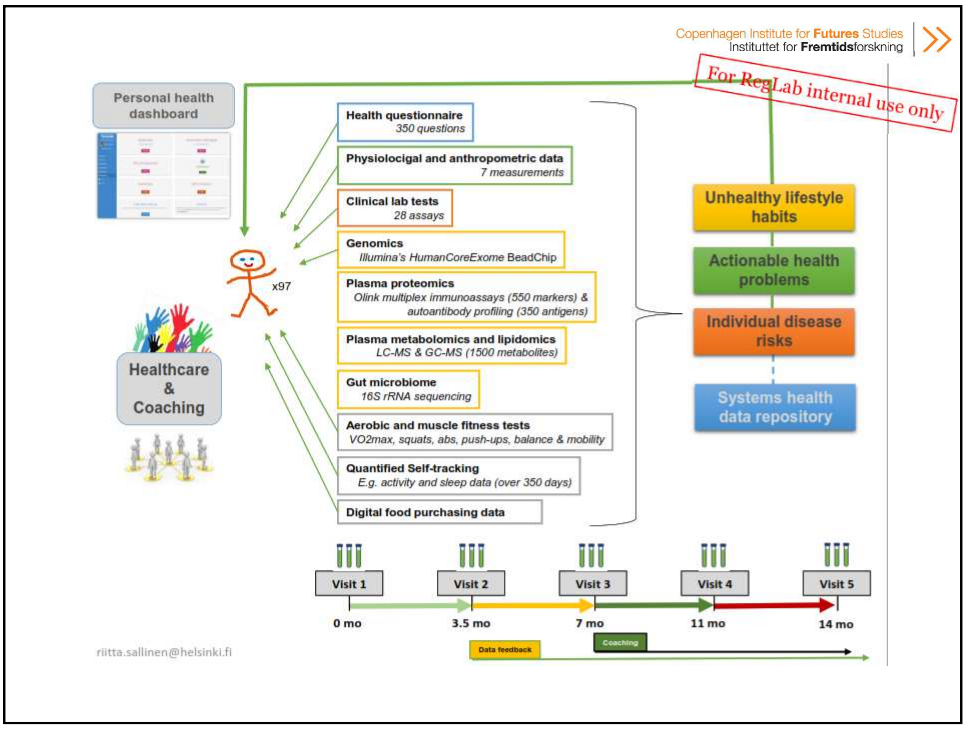
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Acceleration & complexity


Hierarchical organization of biological complexity

Physiological/pathological
Process (health/disease)
neurodegenerative
autoimmunity
cancer
metabolic
infectious
high
low
Cell cycle
apoptosis
Cell differentiation
Cellular process
pathways
proteins
Phenotype
Genotype
expression
genomic



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Personal health dashboard

Healthcare & Coaching

x97

Health questionnaire
350 questions

Physiolocigal and anthropometric data
7 measurements

Clinical lab tests
28 assays

Genomics
Illumina's HumanCoreExome BeadChip

Plasma proteomics
Olink multiplex immunoassays (550 markers) & autoantibody profiling (350 antigens)

Plasma metabolomics and lipidomics
LC-MS & GC-MS (1500 metabolites)

Gut microbiome
16S rRNA sequencing

Aerobic and muscle fitness tests
VO2max, squats, abs, push-ups, balance & mobility

Quantified Self-tracking
E.g. activity and sleep data (over 350 days)

Digital food purchasing data

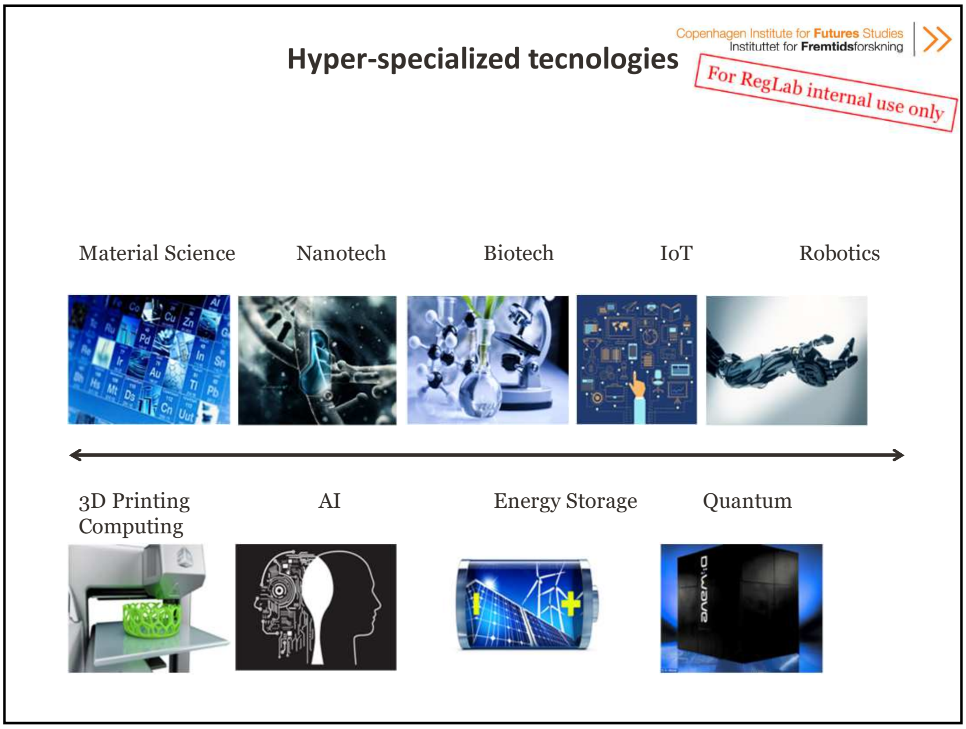
Unhealthy lifestyle habits

Actionable health problems

Individual disease risks

Systems health data repository

riitta.sallinen@helsinki.fi



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Hyper-specialized tecnologies

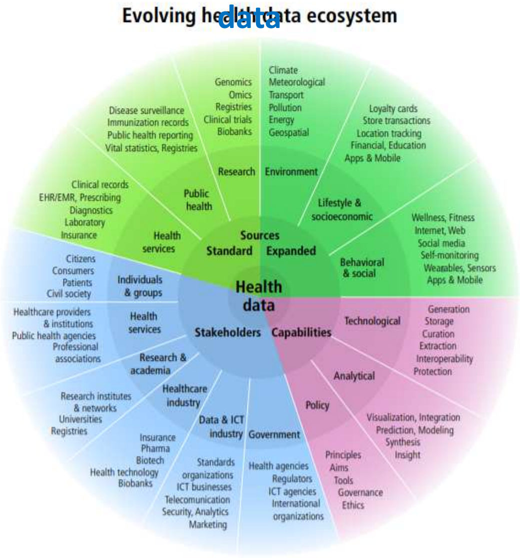
Material Science
Nanotech
Biotech
IoT
Robotics

3D Printing
Computing
AI
Energy Storage
Quantum

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Evolving health data ecosystem and big data


Evolving health data ecosystem
Health data
Sources
Standard
Expanded
Stakeholders
Capabilities
Research
Environment
Public health
Lifestyle & socioeconomic
Health services
Behavioral & social
Individuals & groups
Health services
Research & academia
Healthcare industry
Data & ICT industry
Government
Technological
Analytical
Policy
Genomics
Omics
Registries
Clinical trials
Biobanks
Climate
Meteorological
Transport
Pollution
Energy
Geospatial
Disease surveillance
Immunization records
Public health reporting
Vital statistics, Registries
Loyalty cards
Store transactions
Location tracking
Financial, Education
Apps & Mobile
Clinical records
EHR/EMR, Prescribing
Diagnostics
Laboratory
Insurance
Wellness, Fitness
Internet, Web
Social media
Self-monitoring
Wearables, Sensors
Apps & Mobile
Citizens
Consumers
Patients
Civil society
Healthcare providers
& institutions
Public health agencies
Professional
associations
Generation
Storage
Curation
Extraction
Interoperability
Protection
Research institutes
& networks
Universities
Registries
Visualization, Integration
Prediction, Modeling
Synthesis
Insight
Insurance
Pharma
Biotech
Health technology
Biobanks
Standards
organizations
ICT businesses
Telecomunication
Security, Analytics
Marketing
Health agencies
Regulators
ICT agencies
International
organizations
Principles
Aims
Tools
Governance
Ethics

E. Vayena, J. Dzenowagis, M. Langfeld, 2016

The health data ecosystem is described in this conceptual diagram, created by the WHO eHealth unit and the Health Ethics and Policy Lab, Epidemiology Biostatistics and Prevention Institute, University of Zurich.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

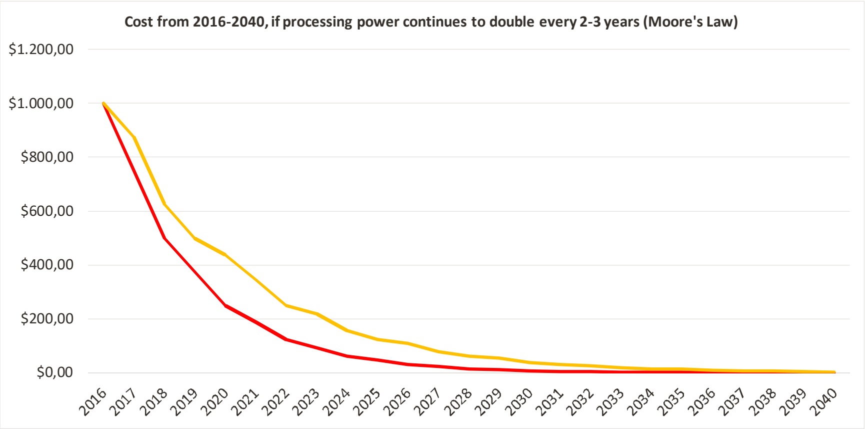
Automated decion support

Technological development

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Between 2001-2008, the price of genome sequencing fell from 100 million to 1.3 million USD. By 2040, the price could be less than 25 cents.

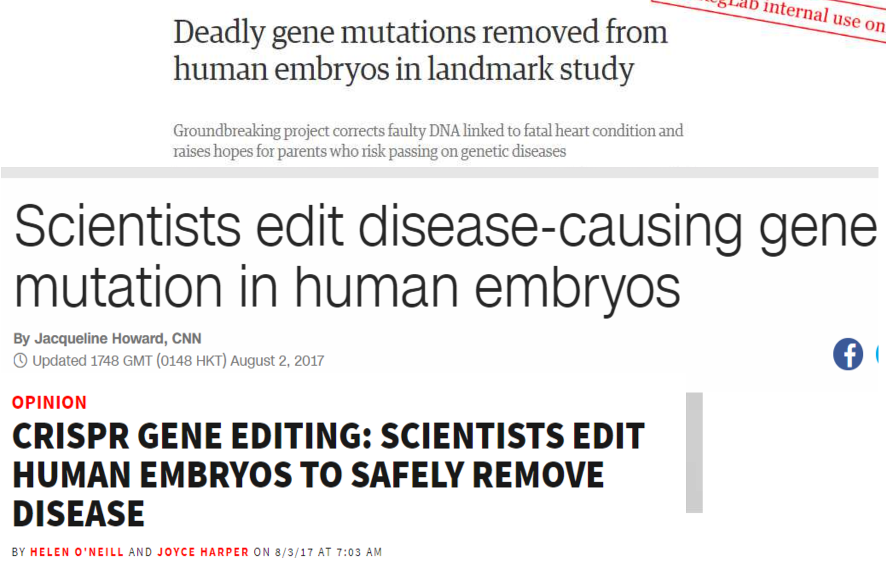


Kilde: IFF (2016) – ekstrapolering baseret på National Human Genome Institute

---

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



Deadly gene mutations removed from human embryos in landmark study

Groundbreaking project corrects faulty DNA linked to fatal heart condition and raises hopes for parents who risk passing on genetic diseases

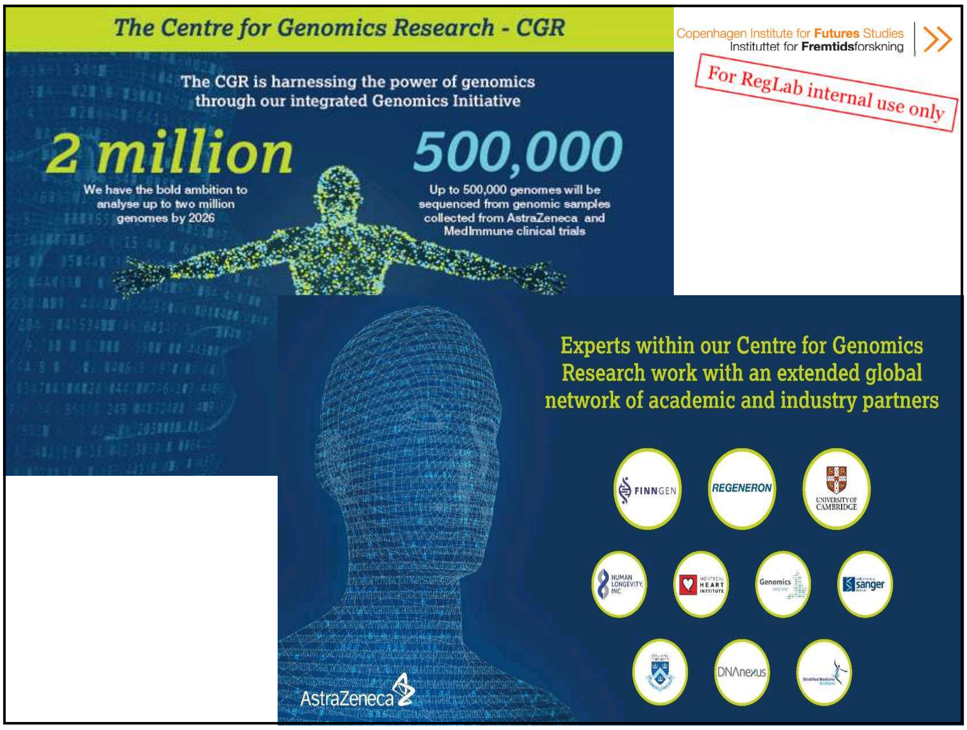
Scientists edit disease-causing gene mutation in human embryos

By Jacqueline Howard, CNN
Updated 1748 GMT (0148 HKT) August 2, 2017

OPINION

CRISPR GENE EDITING: SCIENTISTS EDIT HUMAN EMBRYOS TO SAFELY REMOVE DISEASE

BY HELEN O'NEILL AND JOYCE HARPER ON 8/3/17 AT 7:03 AM



Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning

For RegLab internal use only

The Centre for Genomics Research - CGR

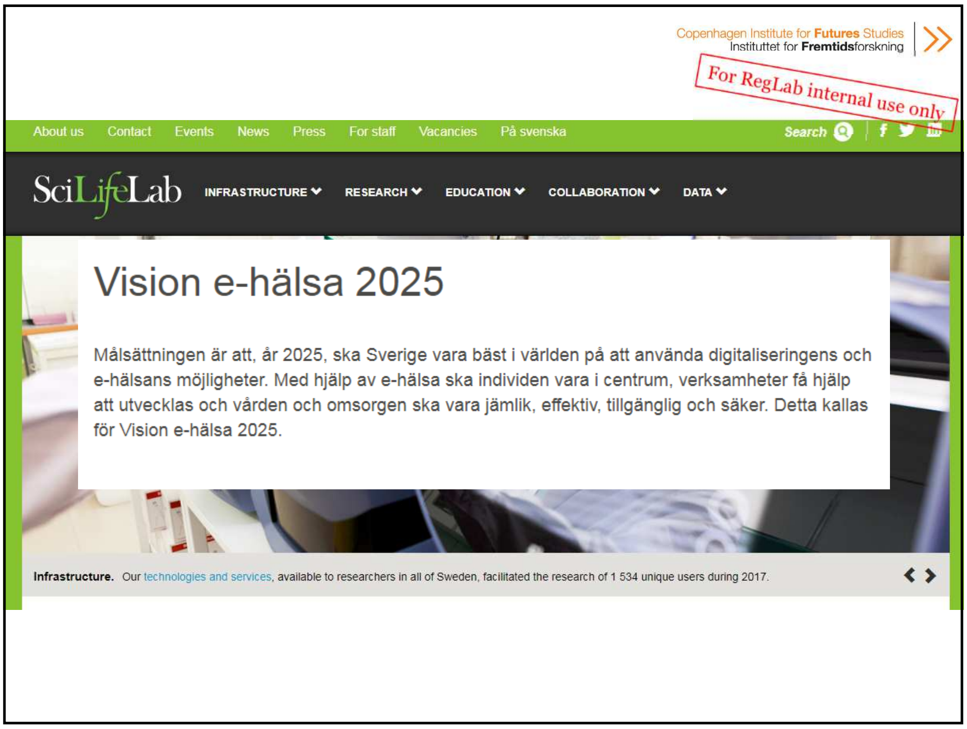
The CGR is harnessing the power of genomics through our integrated Genomics Initiative

2 million
We have the bold ambition to analyse up to two million genomes by 2026

500,000
Up to 500,000 genomes will be sequenced from genomic samples collected from AstraZeneca and MedImmune clinical trials

Experts within our Centre for Genomics Research work with an extended global network of academic and industry partners

FINNGEN
REGENERON
UNIVERSITY OF CAMBRIDGE
HUMAN LONGEVITY, INC.
MONTREAL HEART INSTITUTE
Genomics england
wellcome trust sanger institute
DNAnexus
Stratified Medicine Scotland
AstraZeneca



Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning

For RegLab internal use only

About us
Contact
Events
News
Press
For staff
Vacancies
På svenska
Search
SciLifeLab
INFRASTRUCTURE
RESEARCH
EDUCATION
COLLABORATION
DATA

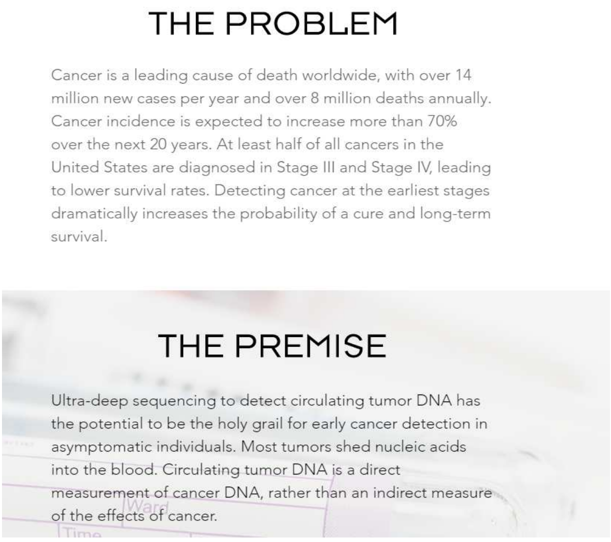
Vision e-hälsa 2025

Målsättningen är att, år 2025, ska Sverige vara bäst i världen på att använda digitaliseringens och e-hälsans möjligheter. Med hjälp av e-hälsa ska individen vara i centrum, verksamheter få hjälp att utvecklas och vården och omsorgen ska vara jämlik, effektiv, tillgänglig och säker. Detta kallas för Vision e-hälsa 2025.

Infrastructure. Our technologies and services, available to researchers in all of Sweden, facilitated the research of 1 534 unique users during 2017.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Early detection – the Grail Vision



THE PROBLEM

Cancer is a leading cause of death worldwide, with over 14 million new cases per year and over 8 million deaths annually. Cancer incidence is expected to increase more than 70% over the next 20 years. At least half of all cancers in the United States are diagnosed in Stage III and Stage IV, leading to lower survival rates. Detecting cancer at the earliest stages dramatically increases the probability of a cure and long-term survival.

THE PREMISE

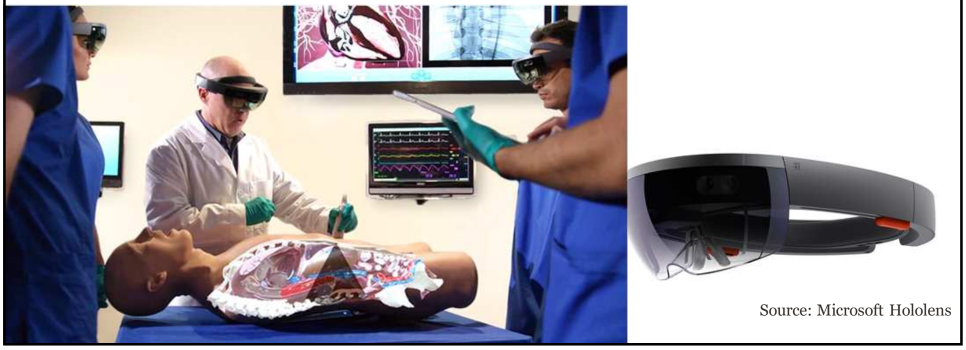
Ultra-deep sequencing to detect circulating tumor DNA has the potential to be the holy grail for early cancer detection in asymptomatic individuals. Most tumors shed nucleic acids into the blood. Circulating tumor DNA is a direct measurement of cancer DNA, rather than an indirect measure of the effects of cancer.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

AI, VR, AR

Microsoft Hololens

- A headset that enables users to see through a mixed reality
- Engage with digital content and holograms in the real world
- Partnered with CAEHealthcare to improve training



Source: Microsoft Hololens

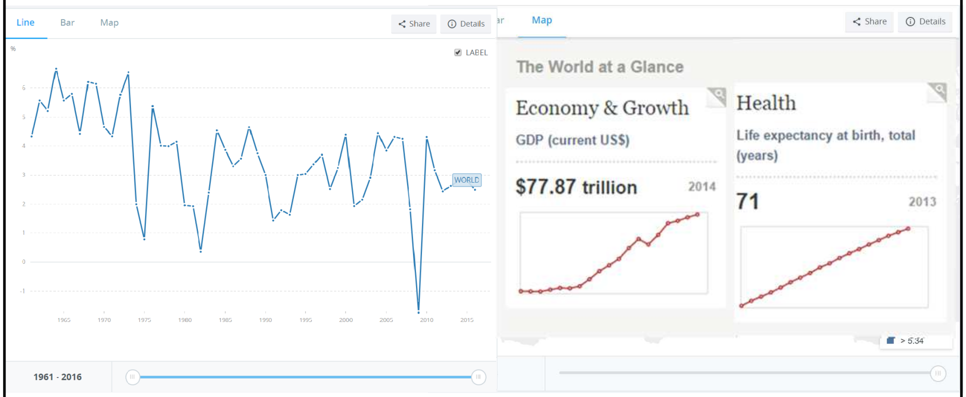
Humber River Hospital

- North America’s first fully digital hospital
- Integrates technology to improve efficiency and accuracy between patients and doctors/nurses

H+
HUMBER RIVER
HOSPITAL

Source: Humber River Hospital

Economic Growth


Line
Bar
Map
Share
Details
%
LABEL
6
5
4
3
2
1
0
-1
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
WORLD
1961 - 2016
Map
Share
Details
The World at a Glance
Economy & Growth
GDP (current US$)
$77.87 trillion
2014
Health
Life expectancy at birth, total (years)
71
2013
> 5.34

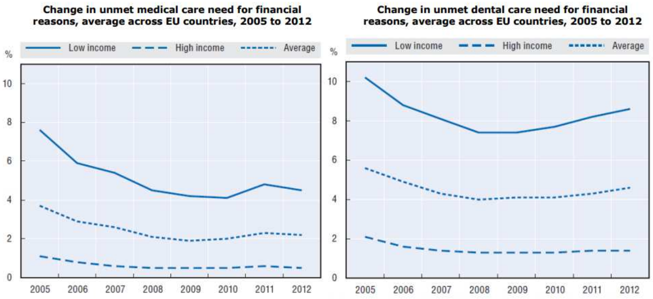
Graph 1 shows the economic growth in the world starting in 1961-2016

Source: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2016&start=1961&type=shaded&view=chart

---

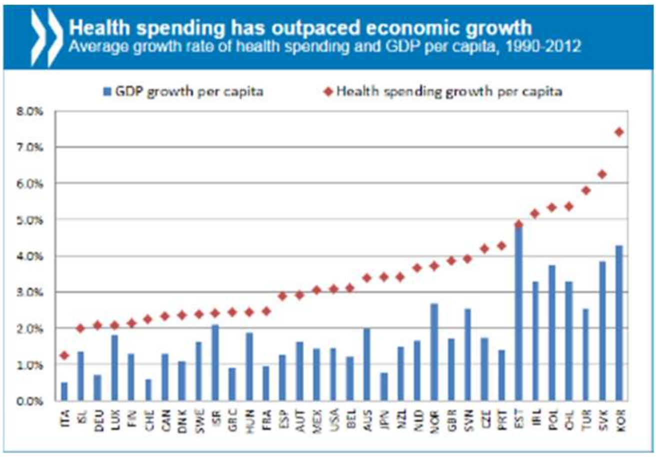
Sustainability

Low-income people are twice more likely to report unmet needs for medical and dental care than the general population


Change in unmet medical care need for financial reasons, average across EU countries, 2005 to 2012

Change in unmet dental care need for financial reasons, average across EU countries, 2005 to 2012

Source: ***Eurostat Statistics Database (based on EU-SILC)***



This graph shows the GDP growth per capita (blue) and the health spending growth per capita (red) from 1990-2012. All listed nations are spending an increasing amount on health.

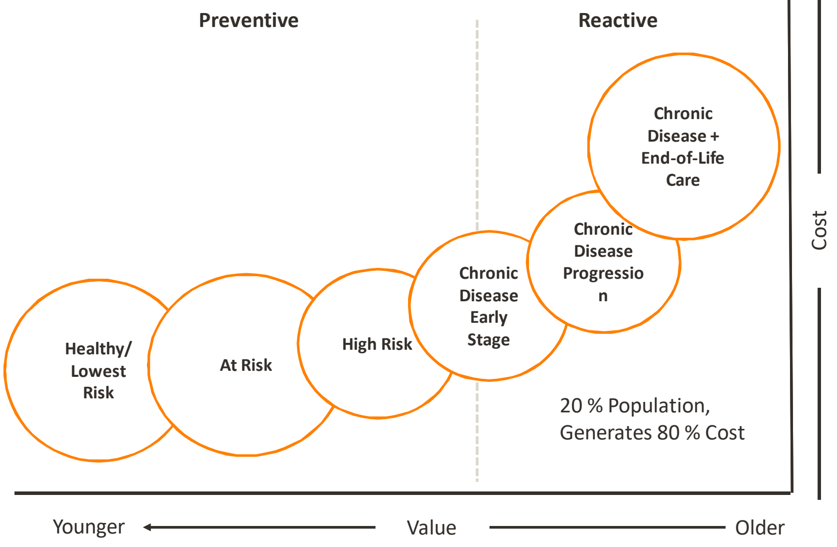
Going over budget on health spending remains endemic in most OECD countries. Maintaining today's healthcare, and funding future medical advances, will be difficult without major reforms that will require health and finance ministries to work together.

According to OECD projections, public expenditure on health and long-term care in OECD countries is set to increase from around 6% of GDP in 2030 to almost 9% of GDP in 2030 and as much as 14% by 2060, unless governments can contain costs.

Source: http://www.oecd.org/health/healthcarecostsunsustainableinadvancedeconomieswithoutreform.htm

---

Preventative Health:
From treatment to prevention



Preventive

Reactive

Chronic Disease + End-of-Life Care

Chronic Disease Progression

Chronic Disease Early Stage

High Risk

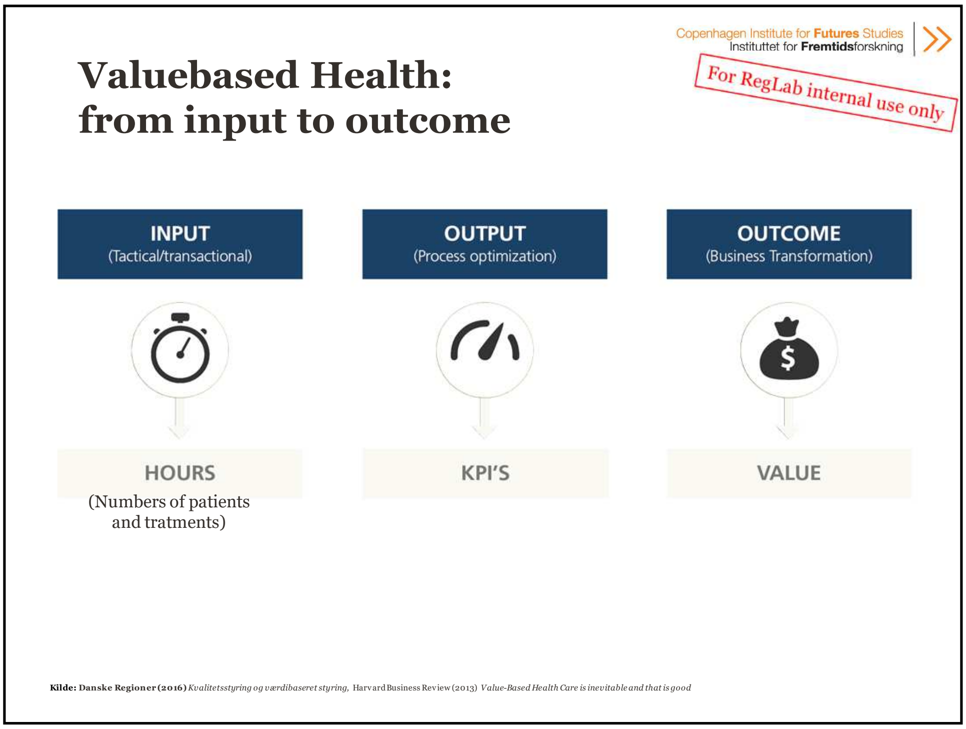
At Risk

Healthy/ Lowest Risk

Cost

20 % Population,
Generates 80 % Cost

Younger ← Value → Older



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Valuebased Health: from input to outcome

INPUT
(Tactical/transactional)

HOURS
(Numbers of patients
and tratments)

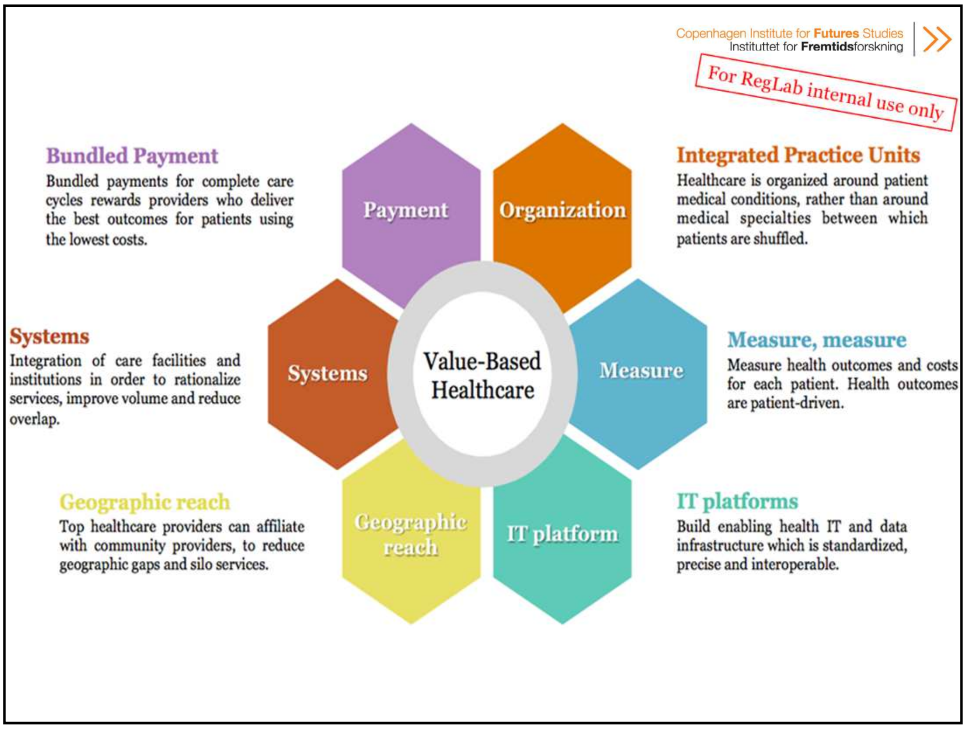
OUTPUT
(Process optimization)

KPI'S

OUTCOME
(Business Transformation)

VALUE

Kilde: Danske Regioner (2016) *Kvalitetsstyring og værdibaseret styring,* Harvard Business Review (2013) *Value-Based Health Care is inevitable and that is good*



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Bundled Payment
Bundled payments for complete care cycles rewards providers who deliver the best outcomes for patients using the lowest costs.

Integrated Practice Units
Healthcare is organized around patient medical conditions, rather than around medical specialties between which patients are shuffled.

Systems
Integration of care facilities and institutions in order to rationalize services, improve volume and reduce overlap.

Measure, measure
Measure health outcomes and costs for each patient. Health outcomes are patient-driven.

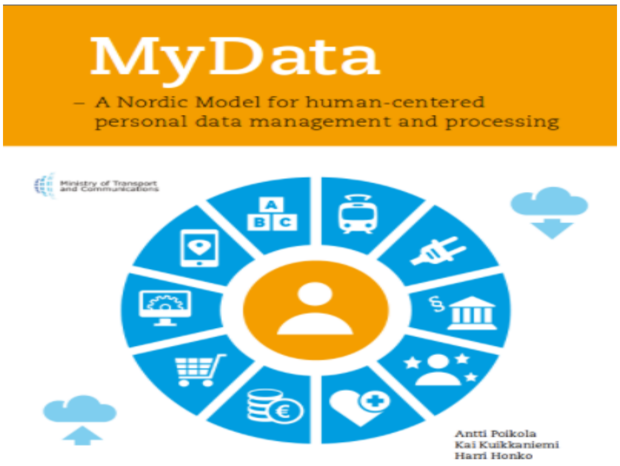
Geographic reach
Top healthcare providers can affiliate with community providers, to reduce geographic gaps and silo services.

IT platforms
Build enabling health IT and data infrastructure which is standardized, precise and interoperable.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Individualization



MyData

– A Nordic Model for human-centered personal data management and processing

Ministry of Transport and Communications

Antti Poikola
Kai Kuikkaniemi
Harri Honko

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Dynamic data.....

Consent in the Genetics Clinic of the Future

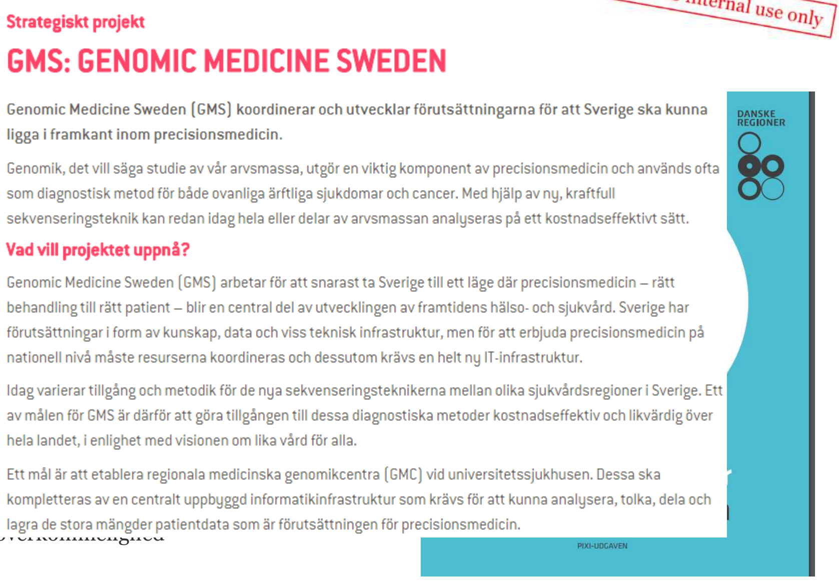
General Data Protection Regulation

Future c

- Broad consent
  - Single point in time
  - Agree to the 'rules of the game'
  - Often includes 'future research'
  - Difficult to recontact

- Dynamic consent
  - Electronic record of consents
  - Channel of communication
  - Opportunity to review and revise
  - Tailored information

Personlig sundhed



Strategiskt projekt

GMS: GENOMIC MEDICINE SWEDEN

Genomic Medicine Sweden (GMS) koordinerar och utvecklar förutsättningarna för att Sverige ska kunna ligga i framkant inom precisionsmedicin.

Genomik, det vill säga studie av vår arvsmassa, utgör en viktig komponent av precisionsmedicin och används ofta som diagnostisk metod för både ovanliga ärftliga sjukdomar och cancer. Med hjälp av ny, kraftfull sekvenseringsteknik kan redan idag hela eller delar av arvsmassan analyseras på ett kostnadseffektivt sätt.

Vad vill projektet uppnå?

Genomic Medicine Sweden (GMS) arbetar för att snarast ta Sverige till ett läge där precisionsmedicin – rätt behandling till rätt patient – blir en central del av utvecklingen av framtidens hälso- och sjukvård. Sverige har förutsättningar i form av kunskap, data och viss teknisk infrastruktur, men för att erbjuda precisionsmedicin på nationell nivå måste resurserna koordineras och dessutom krävs en helt ny IT-infrastruktur.

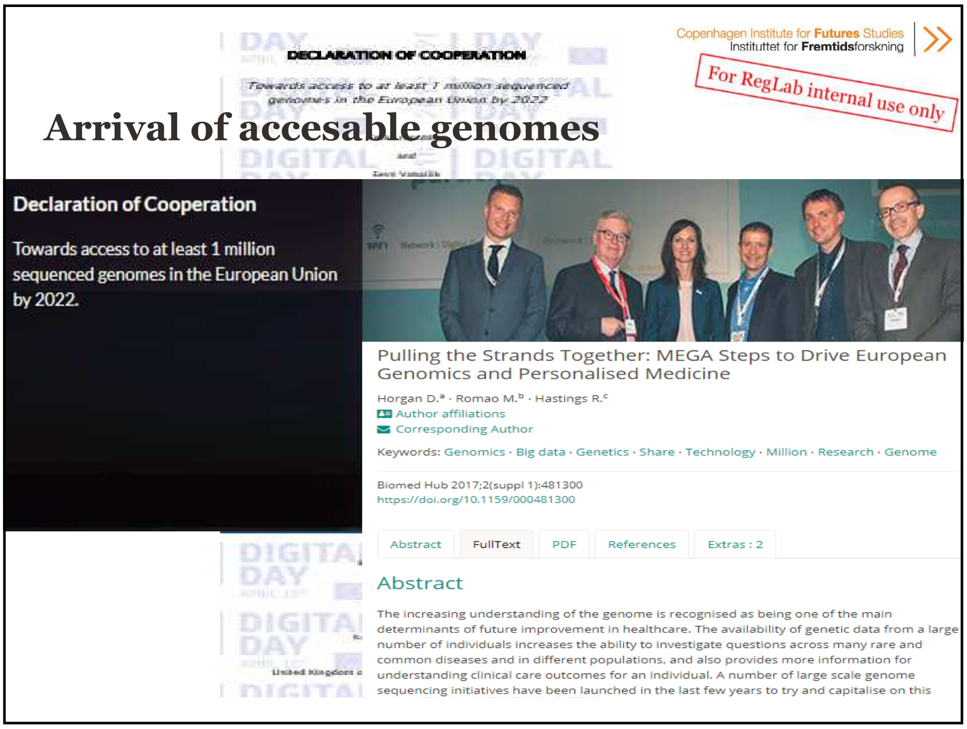
Idag varierar tillgång och metodik för de nya sekvenseringsteknikerna mellan olika sjukvårdsregioner i Sverige. Ett av målen för GMS är därför att göra tillgången till dessa diagnostiska metoder kostnadseffektiv och likvärdig över hela landet, i enlighet med visionen om lika vård för alla.

Ett mål är att etablera regionala medicinska genomikcentra (GMC) vid universitetssjukhusen. Dessa ska kompletteras av en centralt uppbyggd informatikinfrastruktur som krävs för att kunna analysera, tolka, dela och lagra de stora mängder patientdata som är förutsättningen för precisionsmedicin.

- Mer
- Opti **mec**
- **Øge**
- Opd øjeb
- Ænd
- **Øge** forb prisverkommenghed

Kilde: Danske Regioner

Arrival of accesable genomes



DECLARATION OF COOPERATION

Towards access to at least 1 million sequenced genomes in the European Union by 2022

Declaration of Cooperation

Towards access to at least 1 million sequenced genomes in the European Union by 2022.

Pulling the Strands Together: MEGA Steps to Drive European Genomics and Personalised Medicine

Horgan D.[a] · Romao M.[b] · Hastings R.[c]

Author affiliations

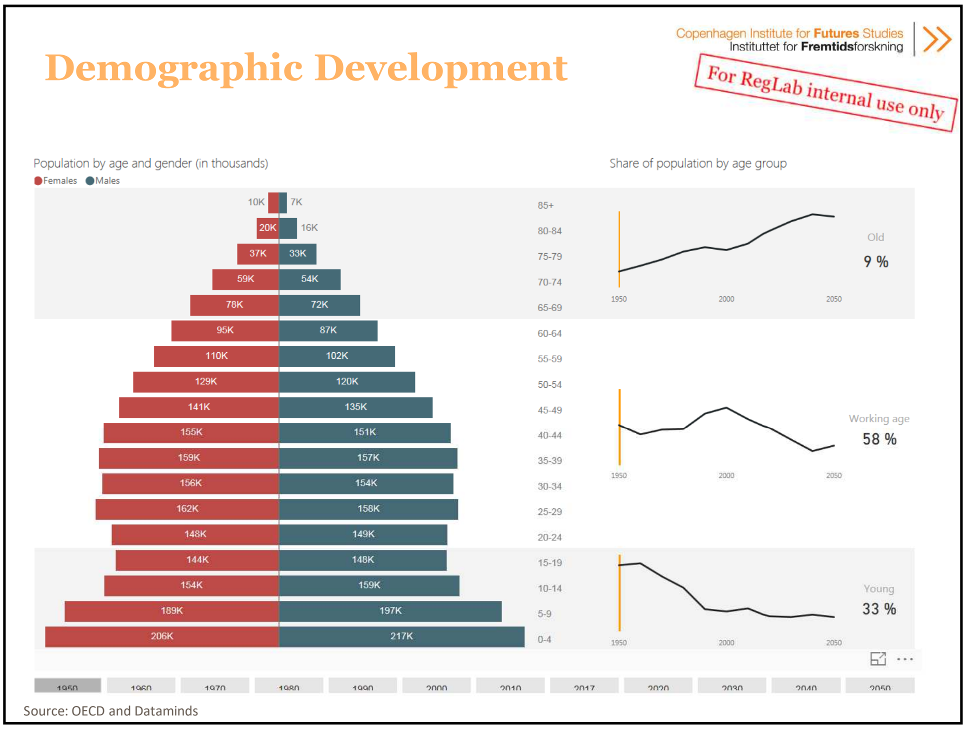
Corresponding Author

Keywords: Genomics · Big data · Genetics · Share · Technology · Million · Research · Genome

Biomed Hub 2017;2(suppl 1):481300
https://doi.org/10.1159/000481300

Abstract

The increasing understanding of the genome is recognised as being one of the main determinants of future improvement in healthcare. The availability of genetic data from a large number of individuals increases the ability to investigate questions across many rare and common diseases and in different populations, and also provides more information for understanding clinical care outcomes for an individual. A number of large scale genome sequencing initiatives have been launched in the last few years to try and capitalise on this



Demographic Development

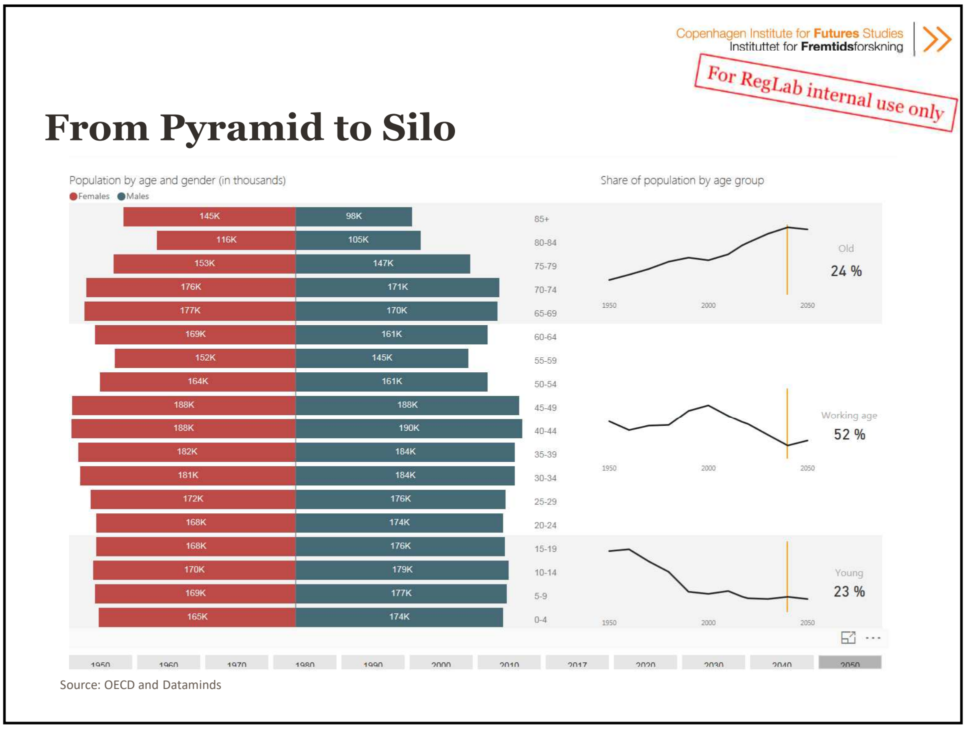
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Population by age and gender (in thousands)

Share of population by age group

Source: OECD and Dataminds



From Pyramid to Silo

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

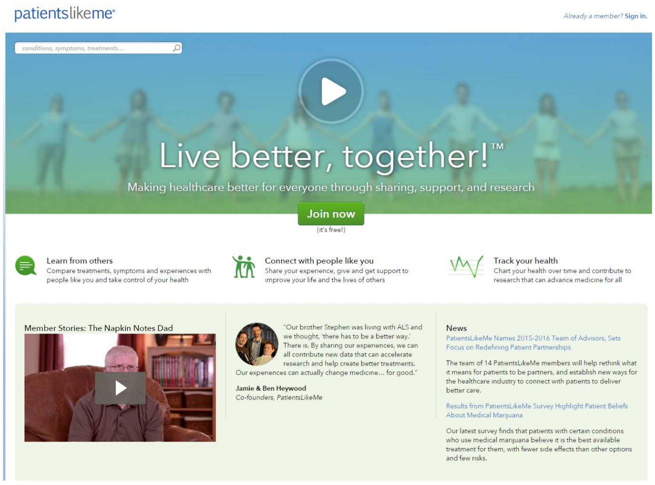
For RegLab internal use only

Population by age and gender (in thousands)

Share of population by age group

Source: OECD and Dataminds

Comercialization


patientslikeme
Already a member? Sign in.
conditions, symptoms, treatments...
Join now
(it's free!)

Live better, together!™

Making healthcare better for everyone through sharing, support, and research

Learn from others
Compare treatments, symptoms and experiences with people like you and take control of your health

Connect with people like you
Share your experience, give and get support to improve your life and the lives of others

Track your health
Chart your health over time and contribute to research that can advance medicine for all

Member Stories: The Napkin Notes Dad

"Our brother Stephen was living with ALS and we thought, 'there has to be a better way.' There is. By sharing our experiences, we can all contribute new data that can accelerate research and help create better treatments. Our experiences can actually change medicine… for good."

Jamie & Ben Heywood
Co-founders, PatientsLikeMe

News

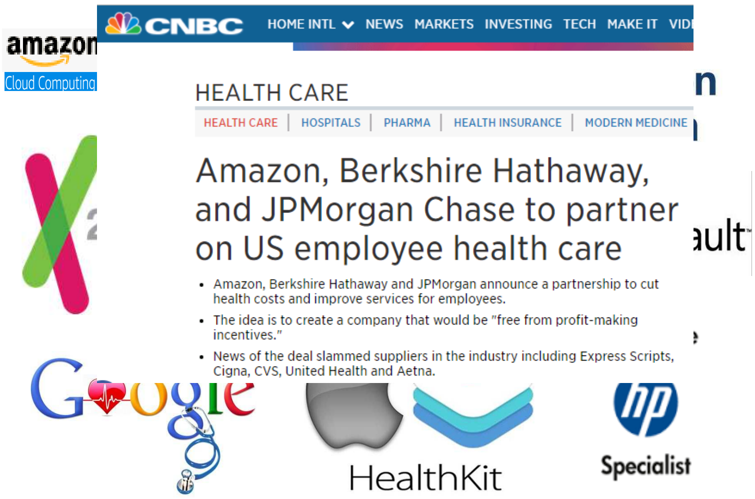
PatientsLikeMe Names 2015-2016 Team of Advisors, Sets Focus on Redefining Patient Partnerships

The team of 14 PatientsLikeMe members will help rethink what it means for patients to be partners, and establish new ways for the healthcare industry to connect with patients to deliver better care.

Results from PatientsLikeMe Survey Highlight Patient Beliefs About Medical Marijuana

Our latest survey finds that patients with certain conditions who use medical marijuana believe it is the best available treatment for them, with fewer side effects than other options and few risks.

Convergence & new business models



HEALTH CARE

HEALTH CARE | HOSPITALS | PHARMA | HEALTH INSURANCE | MODERN MEDICINE

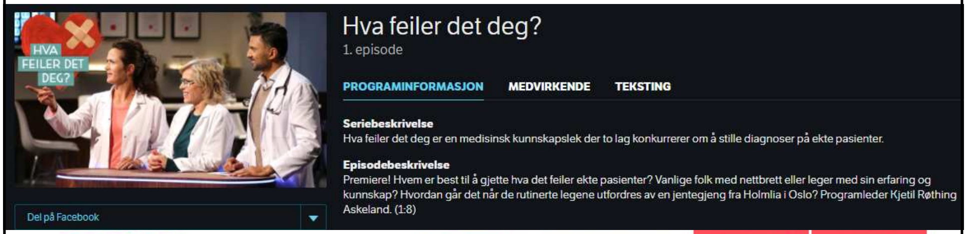
Amazon, Berkshire Hathaway, and JPMorgan Chase to partner on US employee health care

- Amazon, Berkshire Hathaway and JPMorgan announce a partnership to cut health costs and improve services for employees.
- The idea is to create a company that would be "free from profit-making incentives."
- News of the deal slammed suppliers in the industry including Express Scripts, Cigna, CVS, United Health and Aetna.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Democratization

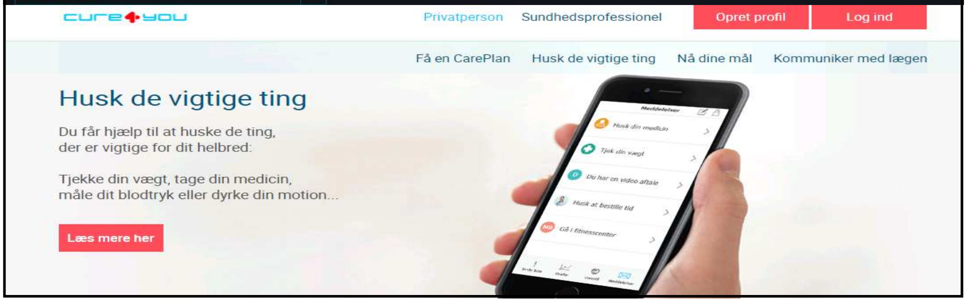
Gutenberg processes for the ”masses”


HVA
FEILER DET
DEG?
Del på Facebook
PROGRAMINFORMASJON
MEDVIRKENDE
TEKSTING

Hva feiler det deg?
1. episode

Seriebeskrivelse
Hva feiler det deg er en medisinsk kunnskapslek der to lag konkurrerer om å stille diagnoser på ekte pasienter.

Episodebeskrivelse
Premiere! Hvem er best til å gjette hva det feiler ekte pasienter? Vanlige folk med nettbrett eller leger med sin erfaring og kunnskap? Hvordan går det når de rutinerte legene utfordres av en jentegjeng fra Holmlia i Oslo? Programleder Kjetil Røthing Askeland. (1:8)

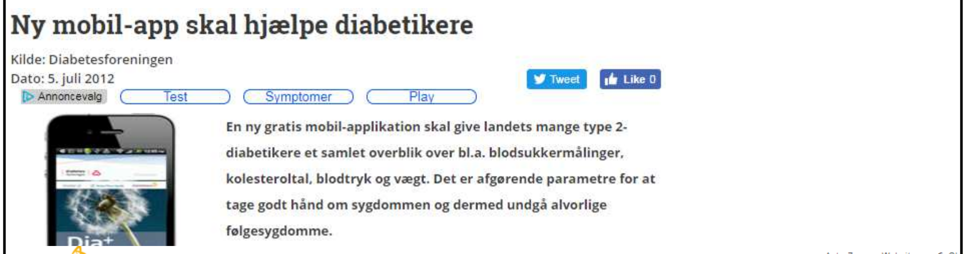

cure+you
Privatperson
Sundhedsprofessionel
Opret profil
Log ind
Få en CarePlan
Husk de vigtige ting
Nå dine mål
Kommuniker med lægen
Læs mere her
Meddelelser
Husk din medicin
Tjek din vægt
Du har en video aftale
Husk at bestille tid
Gå i fitnesscenter

Husk de vigtige ting

Du får hjælp til at huske de ting,
der er vigtige for dit helbred:

Tjekke din vægt, tage din medicin,
måle dit blodtryk eller dyrke din motion...

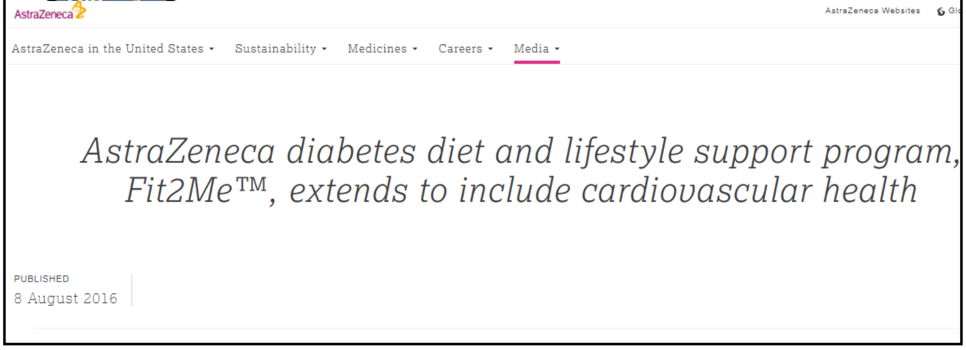
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning


Tweet
Like 0
Annoncevalg
Test
Symptomer
Play
Dia+

Ny mobil-app skal hjælpe diabetikere

Kilde: Diabetesforeningen
Dato: 5. juli 2012

En ny gratis mobil-applikation skal give landets mange type 2-diabetikere et samlet overblik over bl.a. blodsukkermålinger, kolesteroltal, blodtryk og vægt. Det er afgørende parametre for at tage godt hånd om sygdommen og dermed undgå alvorlige følgesygdomme.


AstraZeneca
AstraZeneca Websites
AstraZeneca in the United States
Sustainability
Medicines
Careers
Media

AstraZeneca diabetes diet and lifestyle support program, Fit2Me™, extends to include cardiovascular health

PUBLISHED
8 August 2016

Medical Industry Innovation

econsult

- (winner of HSJ Award 2017 for Primary Care Innovation) is a tool developed for and by GPs.
- Patients can access eConsult through an app with features such as self-help and symptoms checking, medical advise 24/7, questionnaires checking for red flag symptoms mailed directly to the clinic, information on alternative healthcare providers in case immediate medical attention is required outside opening hours.

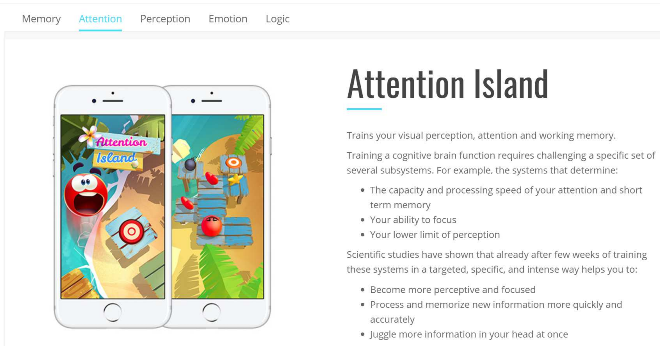
cuviva

- Cuviva is a scalable platform that connects the individual with health care professionals and relatives, providing personalised health services, real-time communication, and shared patient data.
- The Cuviva solution consists of four modules offering unique possibilities to cover all aspects of healthcare and safety at home: MyCuviva, Cuviva Cloud, Cuviva Home and Cuviva Communication.
- Cuviva collects all digital healthcare and home safety services into one personalised solution, providing one source of patient information accessible to all caregiver categories and one channel for real-time communication with healthcare and family.

Medical Industry Innovation

brain+
Care for your brain

- Gamification is used to train the brain within five areas: memory, attention, perception, emotion, and logic
- Neuro-game apps work with AI that adapts the difficulty in each game to your individual ability and based on the user's performance
- The main focus lays on either recover or enhance brain power
- Great brain training apps for people suffering memory loss or similar diseases
- Great for keeping the brain busy, especially in old age



Attention Island

Trains your visual perception, attention and working memory.

Training a cognitive brain function requires challenging a specific set of several subsystems. For example, the systems that determine:

- The capacity and processing speed of your attention and short term memory
- Your ability to focus
- Your lower limit of perception

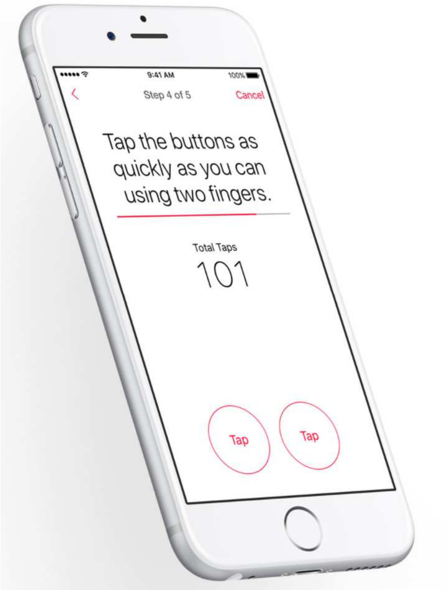
Scientific studies have shown that already after few weeks of training these systems in a targeted, specific, and intense way helps you to:

- Become more perceptive and focused
- Process and memorize new information more quickly and accurately
- Juggle more information in your head at once

Technological-Medical Partnerships

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



Creating a clearer picture of Parkinson's disease.

Since its launch in 2015, the mPower app has enrolled over 10,000 participants, making it the largest Parkinson's study in history — with 93 percent of participants never having taken part in any kind of research before. The app helps researchers better understand Parkinson's disease by using the gyroscope and other iPhone features to measure dexterity, balance, gait, and memory. Researchers have gained greater insight into the factors that make symptoms better or worse, such as sleep, exercise, and mood.

mPower
University of Rochester, Sage Bionetworks
Learn more in the App Store ↗

Behavioural Psychology

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

THE
BEHAVIOURAL
INSIGHTS TEAM.

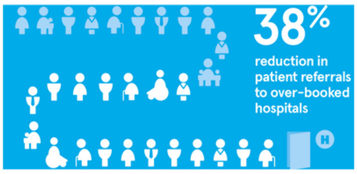
Behavioural Insights Team was the world's first government institution dedicated to the application of behavioural sciences.

They aim to:

- Make public services more cost-effective and easier for citizens to use
- Improve outcomes by using realistic models of human behaviour, and
- Enable people to make "better choices for themselves"

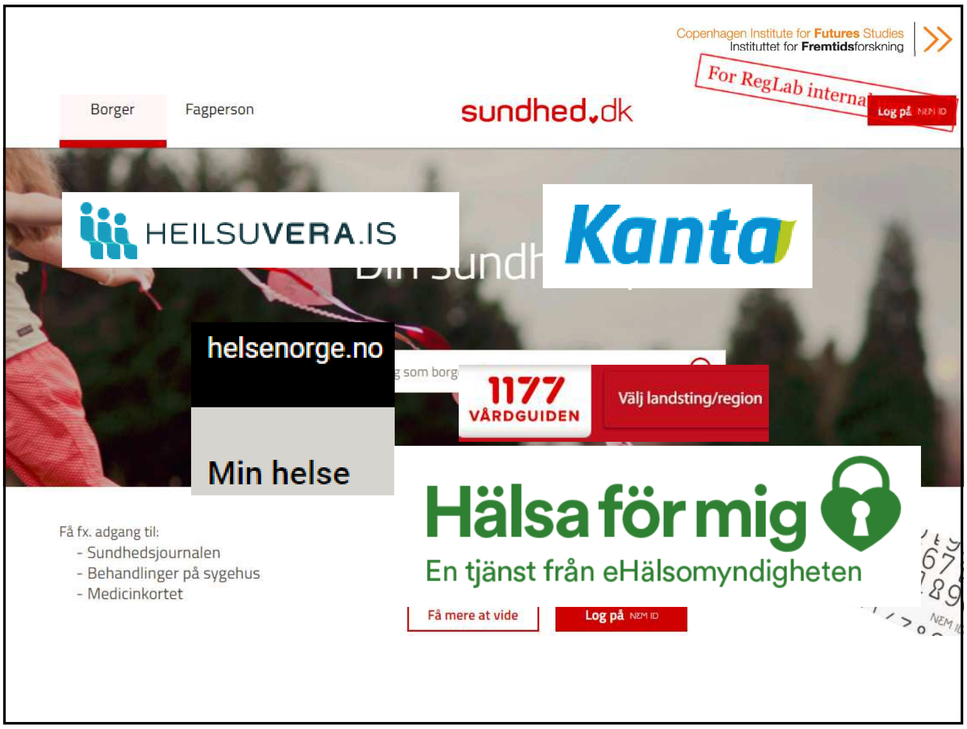
BIT projects:

Reducing referrals to hospitals with limited capacity (UK)
The BIT wanted to improve the ease by which primary care referrers could identify suitable referrals in order to reduce waiting times. They created "limited capacity" alerts to highlight long waiting times. A further pop-up informed GPs of the potential extended waiting time if they selected a limited capacity referral. The system did not prevent patients from making their own choices, but provided a prompt to make better informed choices.


38%
reduction in patient referrals to over-booked hospitals

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab interna

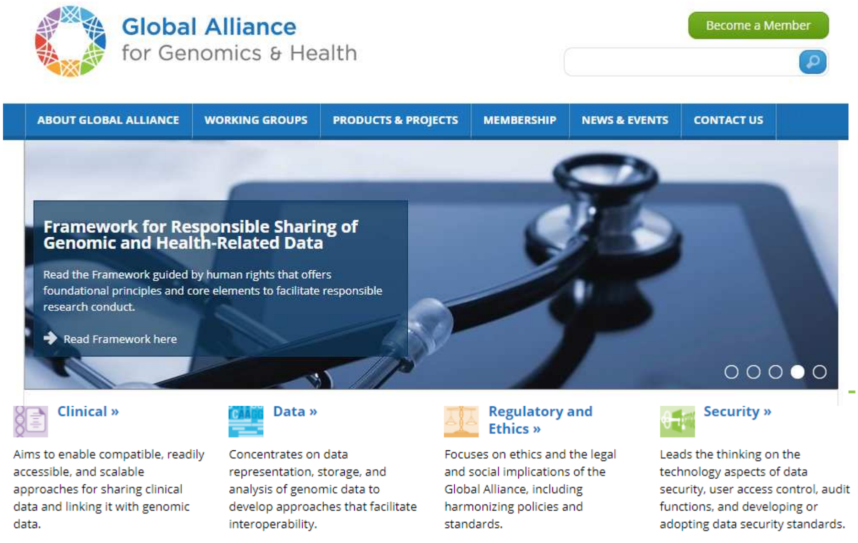

Borger
Fagperson
sundhed.dk
Log på NEM ID
HEILSUVERA.IS
Din sundh
Kanta
helsenorge.no
Min helse
g som borg
1177 VÅRDGUIDEN
Välj landsting/region
Hälsa för mig
En tjänst från eHälsomyndigheten
Få mere at vide
Log på NEM ID

Få fx. adgang til:
- Sundhedsjournalen
- Behandlinger på sygehus
- Medicinkortet

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Globalization


Global Alliance
for Genomics & Health
Become a Member
ABOUT GLOBAL ALLIANCE
WORKING GROUPS
PRODUCTS & PROJECTS
MEMBERSHIP
NEWS & EVENTS
CONTACT US
○ ○ ○ ● ○

Framework for Responsible Sharing of Genomic and Health-Related Data

Read the Framework guided by human rights that offers foundational principles and core elements to facilitate responsible research conduct.

Read Framework here

Clinical »
Aims to enable compatible, readily accessible, and scalable approaches for sharing clinical data and linking it with genomic data.

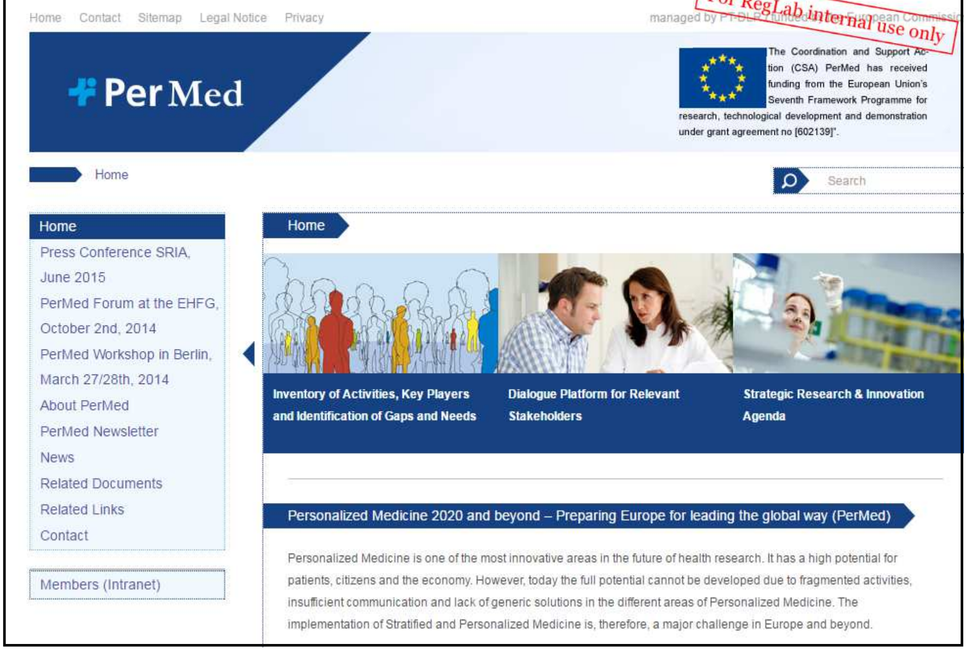
Data »
Concentrates on data representation, storage, and analysis of genomic data to develop approaches that facilitate interoperability.

Regulatory and Ethics »
Focuses on ethics and the legal and social implications of the Global Alliance, including harmonizing policies and standards.

Security »
Leads the thinking on the technology aspects of data security, user access control, audit functions, and developing or adopting data security standards.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



Home Contact Sitemap Legal Notice Privacy

managed by PT-DLR / funded by the European Commissio

Per Med

The Coordination and Support Action (CSA) PerMed has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no [602139]".

Home

Search

- Home
- Press Conference SRIA, June 2015
- PerMed Forum at the EHFG, October 2nd, 2014
- PerMed Workshop in Berlin, March 27/28th, 2014
- About PerMed
- PerMed Newsletter
- News
- Related Documents
- Related Links
- Contact

Members (Intranet)

Home

Inventory of Activities, Key Players and Identification of Gaps and Needs

Dialogue Platform for Relevant Stakeholders

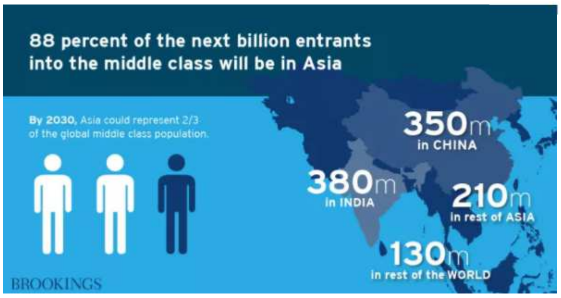
Strategic Research & Innovation Agenda

Personalized Medicine 2020 and beyond – Preparing Europe for leading the global way (PerMed)

Personalized Medicine is one of the most innovative areas in the future of health research. It has a high potential for patients, citizens and the economy. However, today the full potential cannot be developed due to fragmented activities, insufficient communication and lack of generic solutions in the different areas of Personalized Medicine. The implementation of Stratified and Personalized Medicine is, therefore, a major challenge in Europe and beyond.

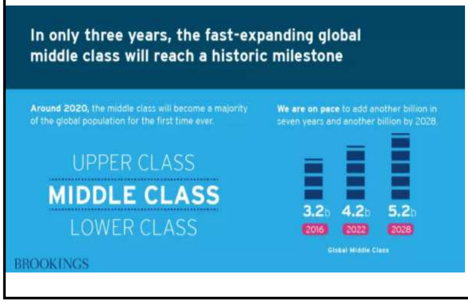
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



88 percent of the next billion entrants into the middle class will be in Asia

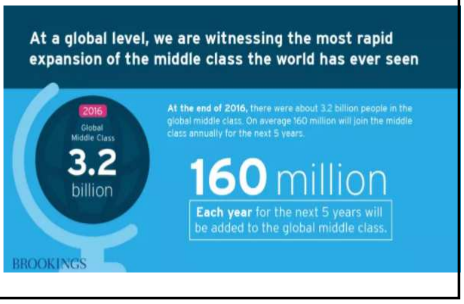
By 2030, Asia could represent 2/3 of the global middle class population.



In only three years, the fast-expanding global middle class will reach a historic milestone

Around 2020, the middle class will become a majority of the global population for the first time ever.

We are on pace to add another billion in seven years and another billion by 2028.



At a global level, we are witnessing the most rapid expansion of the middle class the world has ever seen

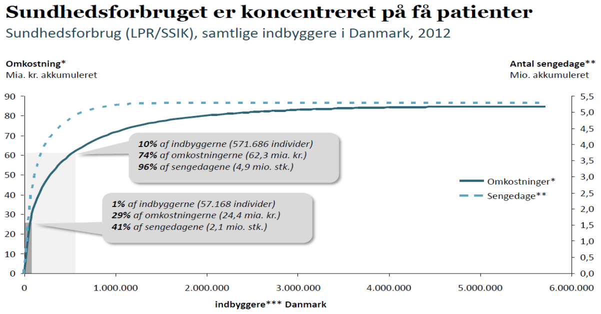
At the end of 2016, there were about 3.2 billion people in the global middle class. On average 160 million will join the middle class annually for the next 5 years.

160 million

Each year for the next 5 years will be added to the global middle class.

Polarization

A large part of health care services and health expenditures are consumed by a small number of patients



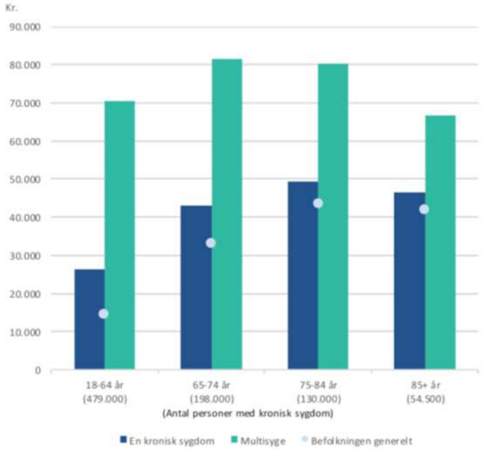
Sundhedsforbruget er koncentreret på få patienter

Sundhedsforbrug (LPR/SSIK), samtlige indbyggere i Danmark, 2012

Kilde: Health Navigator, Statens Seruminstitut,
Sundhedsministeriet og Finansministeriet (upublicerede data)

Danish Regions

Flere kronisk- og multisyge koster samfundet



- De gennemsnitlige udgifter til borgere med multisygdomme er på ca. 240.000 kr. årligt.
- De gennemsnitlige årlige regionale sundhedsudgifter til en voksen borger er ca. 20.000 kr.

Kilde: Store udgifter forbundet med multisygdom, SSI, Afdeling for Sundhedsanalyser 21. oktober 2015

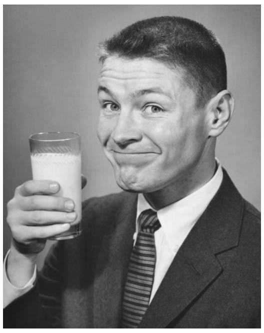
Focus on Health

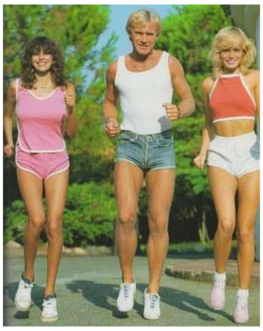
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

The concept of health is evolving

1950	1985	2015
Healthy is one who is ***not sick*** or handicapped	Healthy is one who is in ***good shape*** physically and mentally	Healthy is one who ***is better than average*** physical and mental endurance





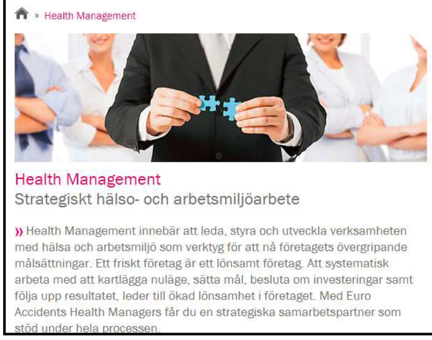
Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

UnitedHealthcare

Why should I have individual health insurance?

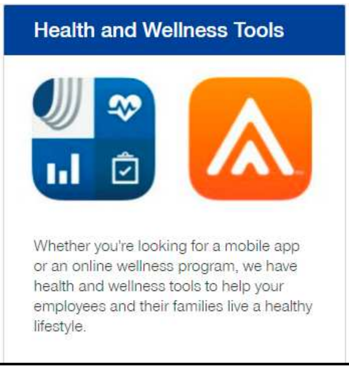
- **Prepare for the unexpected.** You never know when you'll need medical help.
- **Staying healthy.** Many preventive care services – like checkups - are covered at 100%.
- **It's the law.** Under the **Affordable Care Act**, you may pay a penalty if you don't have qualified health care coverage.



» Health Management

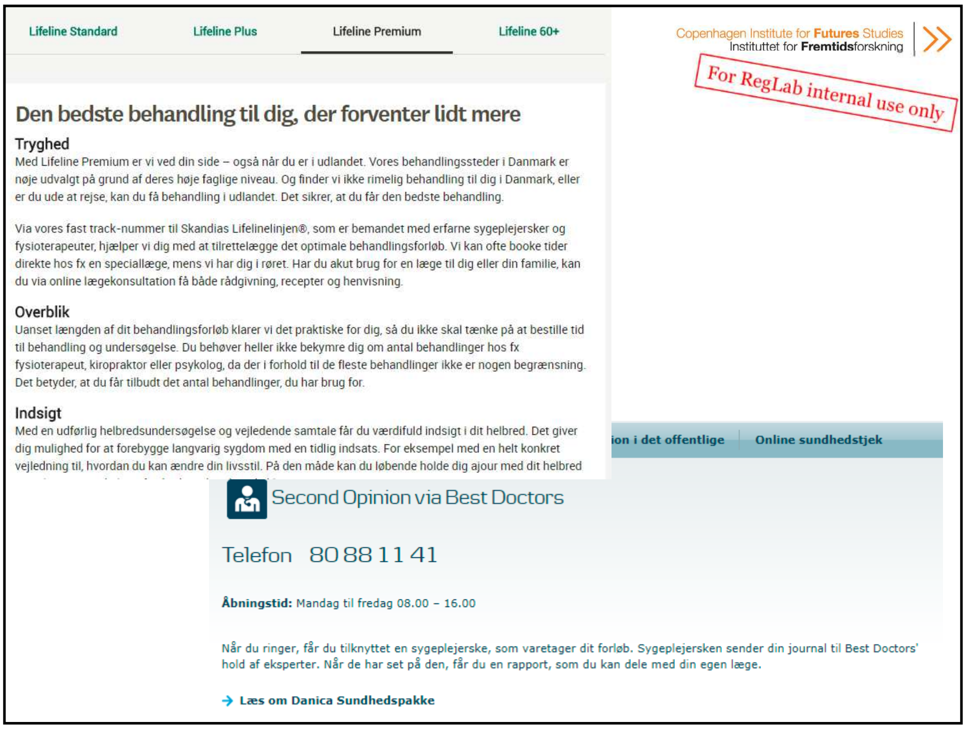
Health Management
Strategiskt hälso- och arbetsmiljöarbete

» Health Management innebär att leda, styra och utveckla verksamheten med hälsa och arbetsmiljö som verktyg för att nå företagets övergripande målsättningar. Ett friskt företag är ett lönsamt företag. Att systematisk arbeta med att kartlägga nuläge, sätta mål, besluta om investeringar samt följa upp resultatet, leder till ökad lönsamhet i företaget. Med Euro Accidents Health Managers får du en strategiska samarbetspartner som stöd under hela processen.



Health and Wellness Tools

Whether you're looking for a mobile app or an online wellness program, we have health and wellness tools to help your employees and their families live a healthy lifestyle.



Den bedste behandling til dig, der forventer lidt mere

Tryghed
Med Lifeline Premium er vi ved din side – også når du er i udlandet. Vores behandlingssteder i Danmark er nøje udvalgt på grund af deres høje faglige niveau. Og finder vi ikke rimelig behandling til dig i Danmark, eller er du ude at rejse, kan du få behandling i udlandet. Det sikrer, at du får den bedste behandling.

Via vores fast track-nummer til Skandias Lifelinelinjen®, som er bemandet med erfarne sygeplejersker og fysioterapeuter, hjælper vi dig med at tilrettelægge det optimale behandlingsforløb. Vi kan ofte booke tider direkte hos fx en speciallæge, mens vi har dig i røret. Har du akut brug for en læge til dig eller din familie, kan du via online lægekonsultation få både rådgivning, recepter og henvisning.

Overblik
Uanset længden af dit behandlingsforløb klarer vi det praktiske for dig, så du ikke skal tænke på at bestille tid til behandling og undersøgelse. Du behøver heller ikke bekymre dig om antal behandlinger hos fx fysioterapeut, kiropraktor eller psykolog, da der i forhold til de fleste behandlinger ikke er nogen begrænsning. Det betyder, at du får tilbudt det antal behandlinger, du har brug for.

Indsigt
Med en udførlig helbredsundersøgelse og vejledende samtale får du værdifuld indsigt i dit helbred. Det giver dig mulighed for at forebygge langvarig sygdom med en tidlig indsats. For eksempel med en helt konkret vejledning til, hvordan du kan ændre din livsstil. På den måde kan du løbende holde dig ajour med dit helbred

Second Opinion via Best Doctors

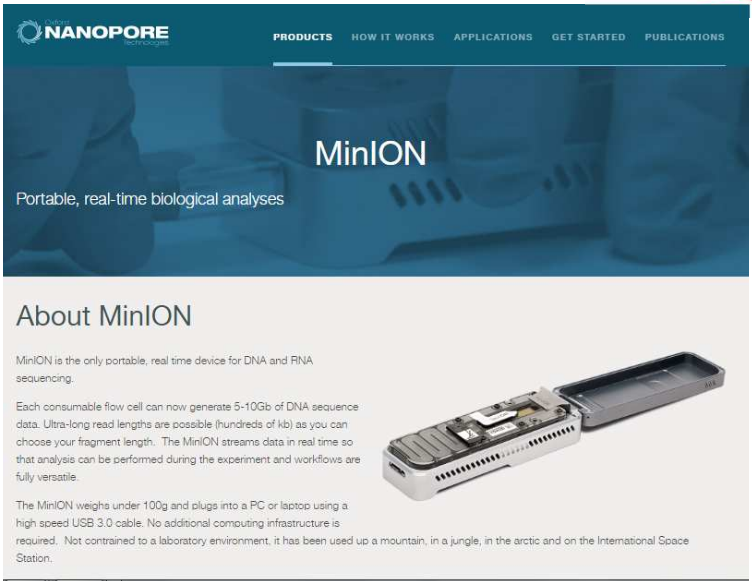
Telefon   80 88 11 41

Åbningstid: Mandag til fredag 08.00 – 16.00

Når du ringer, får du tilknyttet en sygeplejerske, som varetager dit forløb. Sygeplejersken sender din journal til Best Doctors' hold af eksperter. Når de har set på den, får du en rapport, som du kan dele med din egen læge.

→ **Læs om Danica Sundhedspakke**

USB stick size - genome sequencer



MinION

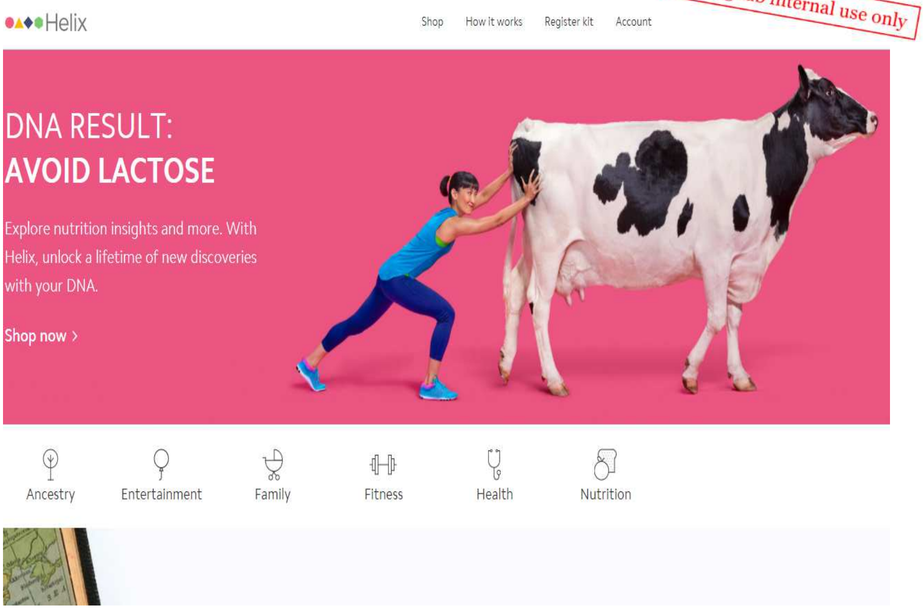
Portable, real-time biological analyses

About MinION

MinION is the only portable, real time device for DNA and RNA sequencing.

Each consumable flow cell can now generate 5-10Gb of DNA sequence data. Ultra-long read lengths are possible (hundreds of kb) as you can choose your fragment length. The MinION streams data in real time so that analysis can be performed during the experiment and workflows are fully versatile.

The MinION weighs under 100g and plugs into a PC or laptop using a high speed USB 3.0 cable. No additional computing infrastructure is required. Not contrained to a laboratory environment, it has been used up a mountain, in a jungle, in the arctic and on the International Space Station.



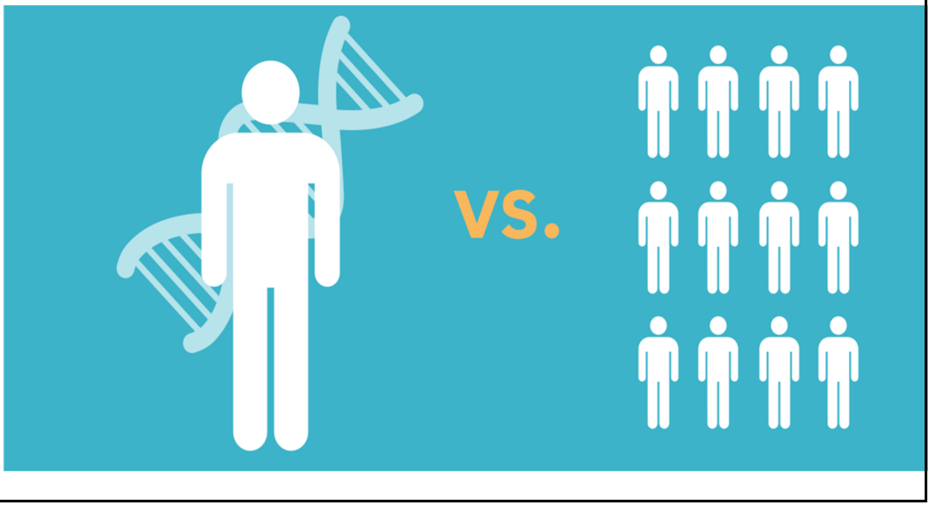
Helix
Shop
How it works
Register kit
Account
Ancestry
Entertainment
Family
Fitness
Health
Nutrition

DNA RESULT:
AVOID LACTOSE

Explore nutrition insights and more. With Helix, unlock a lifetime of new discoveries with your DNA.

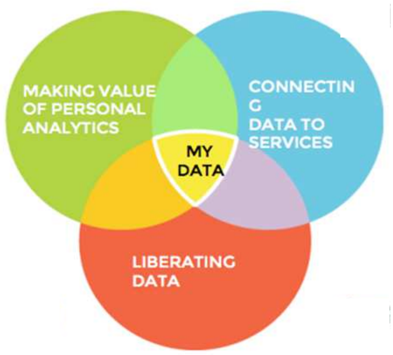
Shop now ›

Exploitation of the potential of genomics require knowledge about both individuals and groups



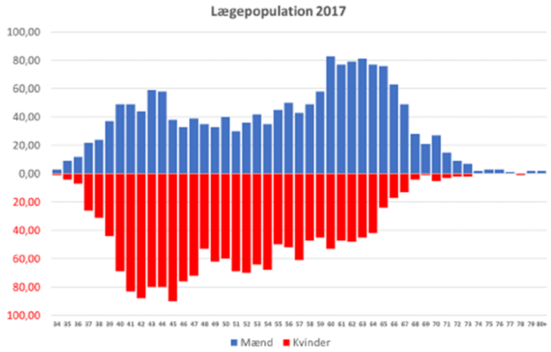
Digital Health Revolution

- Aims to create a MyData ecosystem to give individuals more control over their data


MAKING VALUE OF PERSONAL ANALYTICS
CONNECTIN G DATA TO SERVICES
MY DATA
LIBERATING DATA

Source: digitalhealthrevolution.fi

Trust - a Nordic Strength



Fordelingen af mænd og kvinder blandt de praktiserende læger viser, at antallet af kvindelige læger er størst blandt lægerne på 58 år eller derunder, mens billedet er omvendt for lægerne på over 58 år, hvor der antalsmæssigt er flest mænd.

JANUAR 2018

Ét sikkert og sammenhængende sundhedsnetværk for alle

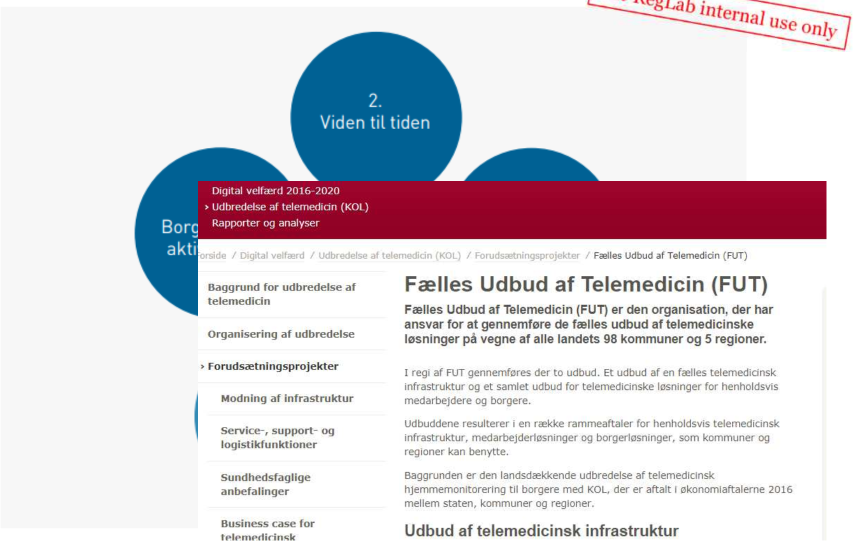
STRATEGI FOR DIGITAL SUNDHED 2018–2022

FÆLLES OVERLIGGER

Nationale mål:
Bedre sammenhæng,
kvalitet og geografisk
lighed i sundhedsvæsenet

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



2.
Viden til tiden

Borg
akti

Digital velfærd 2016-2020
› Udbredelse af telemedicin (KOL)
Rapporter og analyser

orside / Digital velfærd / Udbredelse af telemedicin (KOL) / Forudsætningsprojekter / Fælles Udbud af Telemedicin (FUT)

- Baggrund for udbredelse af telemedicin
- Organisering af udbredelse
- › Forudsætningsprojekter
  - Modning af infrastruktur
  - Service-, support- og logistikfunktioner
  - Sundhedsfaglige anbefalinger
  - Business case for telemedicinsk

Fælles Udbud af Telemedicin (FUT)

Fælles Udbud af Telemedicin (FUT) er den organisation, der har ansvar for at gennemføre de fælles udbud af telemedicinske løsninger på vegne af alle landets 98 kommuner og 5 regioner.

I regi af FUT gennemføres der to udbud. Et udbud af en fælles telemedicinsk infrastruktur og et samlet udbud for telemedicinske løsninger for henholdsvis medarbejdere og borgere.

Udbuddene resulterer i en række rammeaftaler for henholdsvis telemedicinsk infrastruktur, medarbejderløsninger og borgerløsninger, som kommuner og regioner kan benytte.

Baggrunden er den landsdækkende udbredelse af telemedicinsk hjemmemonitorering til borgere med KOL, der er aftalt i økonomiaftalerne 2016 mellem staten, kommuner og regioner.

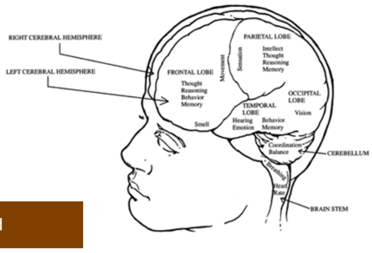
Udbud af telemedicinsk infrastruktur

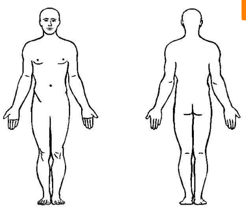
Individual resilience requires new mind- and skillset

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

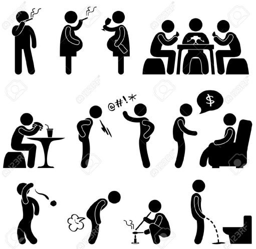
For RegLab internal use only

Body


RIGHT CEREBRAL HEMISPHERE
LEFT CEREBRAL HEMISPHERE
PARIETAL LOBE
Intellect
Thought
Reasoning
Memory
FRONTAL LOBE
Thought
Reasoning
Behavior
Memory
Movement
Sensation
OCCIPITAL LOBE
Vision
TEMPORAL LOBE
Hearing
Emotion
Behavior
Memory
Smell
Coordination
Balance
CEREBELLUM
Breathing
Heart Rate
BRAIN STEM



Mind



Competencies

Behaviour

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Levels of mHealth

Single use mHealth
- Single use for single user
- Consumer driven

Social mHealth
- Social networks
- Gamification apps

Integrate mHealth
- Links apps with formal healthcare system
- Tailored to multiple end users

Complex mHealth
- Integrated and predictive analytics
- Applied to complex data

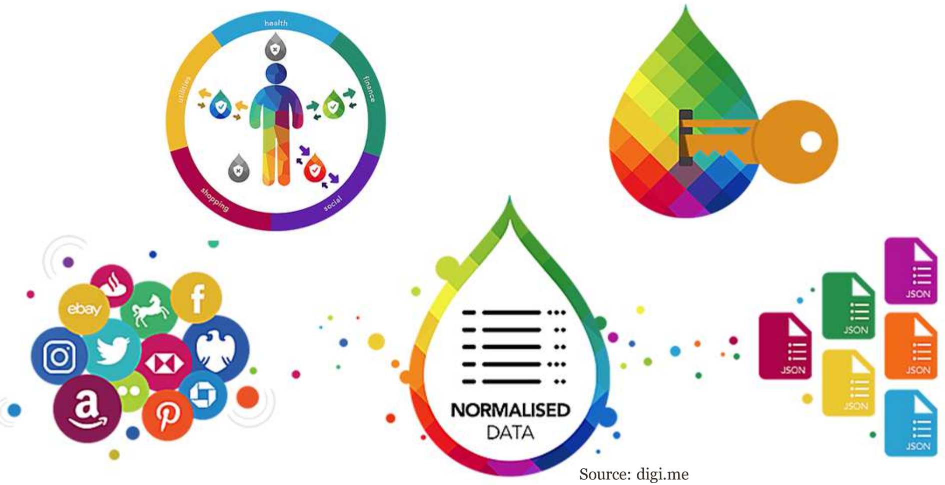
Source: Deloitte US Center for Health Solutions, 2014

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

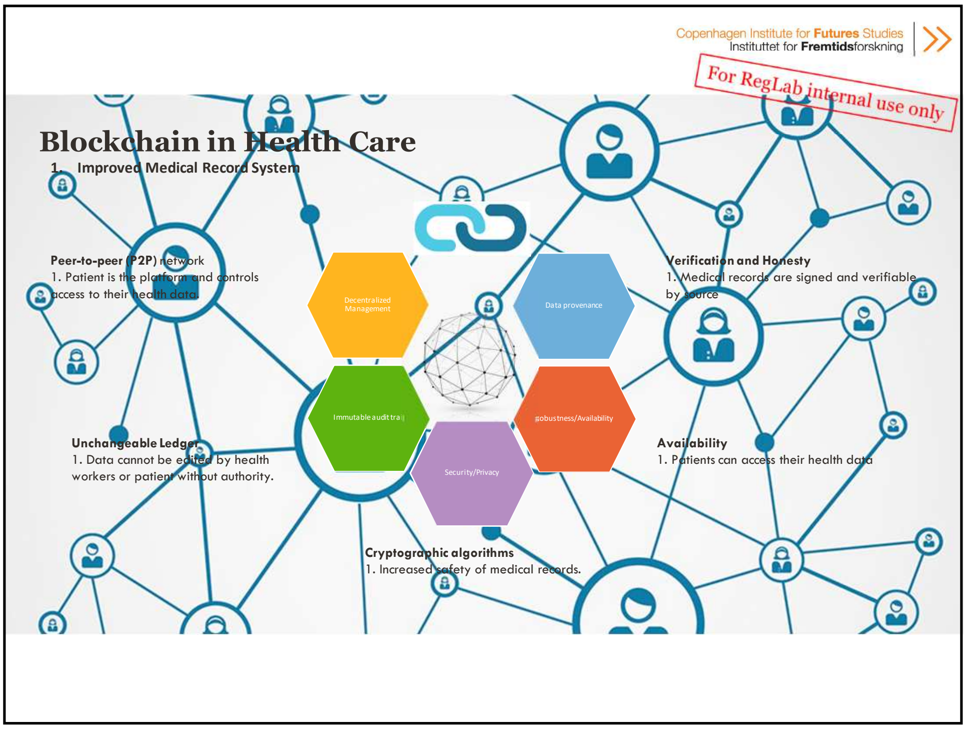
HEILSUVERA.IS

digi.me

- Putting the user in control of their data


health
finance
social
shopping
utilities
ebay
NORMALISED DATA
JSON

Source: digi.me


Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning
For RegLab internal use only
Decentralized Management
Data provenance
Immutable audit trai
Robustness/Availability
Security/Privacy

Blockchain in Health Care

1. **Improved Medical Record System**

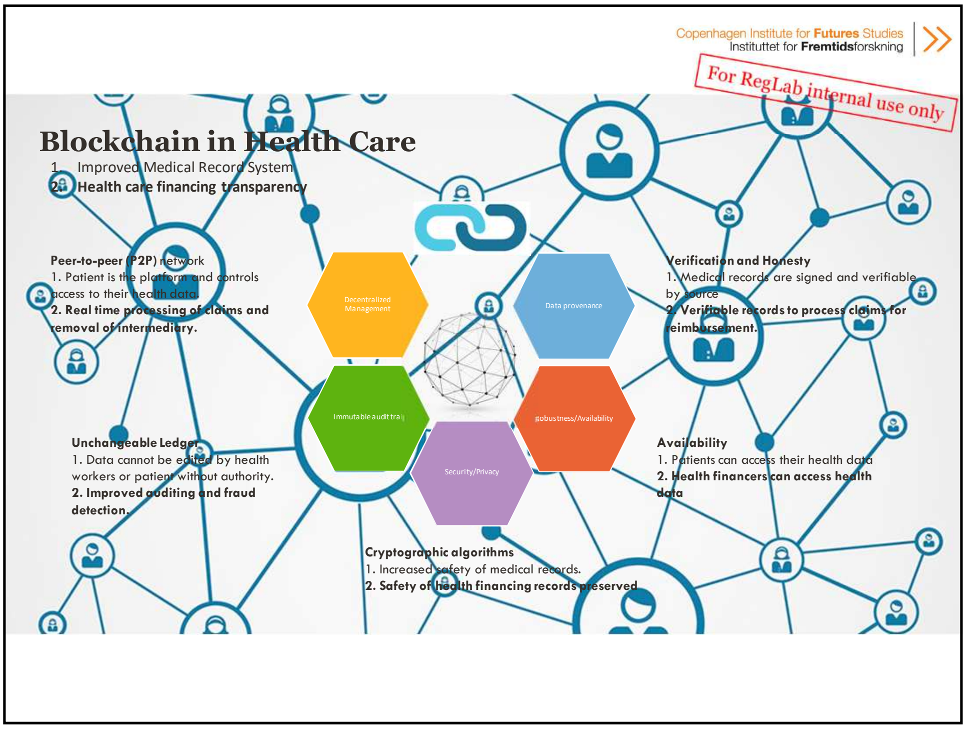
Peer-to-peer (P2P) network
1. Patient is the platform and controls access to their health data.

Unchangeable Ledger
1. Data cannot be edited by health workers or patient without authority.

Cryptographic algorithms
1. Increased safety of medical records.

Verification and Honesty
1. Medical records are signed and verifiable by source

Availability
1. Patients can access their health data


Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning
For RegLab internal use only
Decentralized Management
Data provenance
Immutable audit trai
Robustness/Availability
Security/Privacy

Blockchain in Health Care

1. Improved Medical Record System
2. **Health care financing transparency**

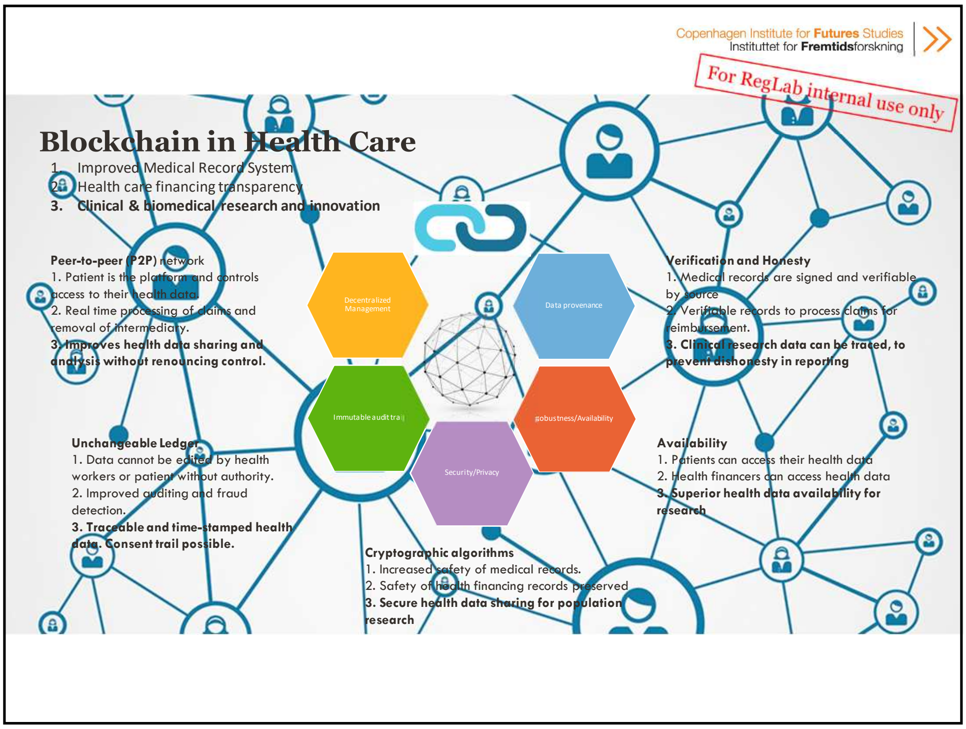
Peer-to-peer (P2P) network
1. Patient is the platform and controls access to their health data.
2. Real time processing of claims and removal of intermediary.

Unchangeable Ledger
1. Data cannot be edited by health workers or patient without authority.
2. Improved auditing and fraud detection.

Cryptographic algorithms
1. Increased safety of medical records.
2. Safety of health financing records preserved

Verification and Honesty
1. Medical records are signed and verifiable by source
2. Verifiable records to process claims for reimbursement.

Availability
1. Patients can access their health data
2. Health financers can access health data



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Blockchain in Health Care

1. Improved Medical Record System
2. Health care financing transparency
3. **Clinical & biomedical research and innovation**

Decentralized Management
Data provenance
Immutable audit trai
Robustness/Availability
Security/Privacy

Peer-to-peer (P2P) network
1. Patient is the platform and controls access to their health data.
2. Real time processing of claims and removal of intermediary.
3. Improves health data sharing and analysis without renouncing control.

Verification and Honesty
1. Medical records are signed and verifiable by source
2. Verifiable records to process claims for reimbursement.
3. Clinical research data can be traced, to prevent dishonesty in reporting

Unchangeable Ledger
1. Data cannot be edited by health workers or patient without authority.
2. Improved auditing and fraud detection.
3. Traceable and time-stamped health data. Consent trail possible.

Availability
1. Patients can access their health data
2. Health financers can access health data
3. Superior health data availability for research

Cryptographic algorithms
1. Increased safety of medical records.
2. Safety of health financing records preserved
3. Secure health data sharing for population research

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Actors

Citizen
Society
Research
Healthcare system
The public sector
Business

For RegLab internal use only

Relevant themes

Health
individual

Privacy

Sharing

Collective vs.

Big Data

BIG DATA
LARGE
INFORMATION
SCIENCE
INTERNET
BUSINESS

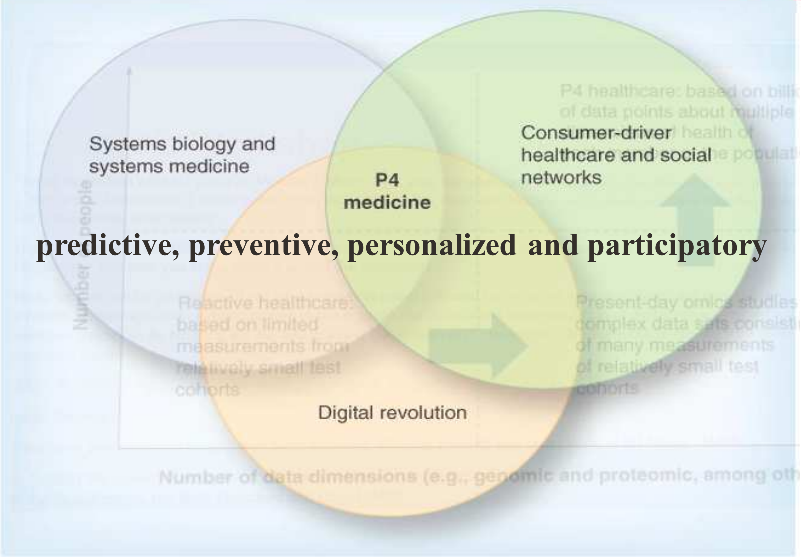
Legislation

Democratisation

democratization

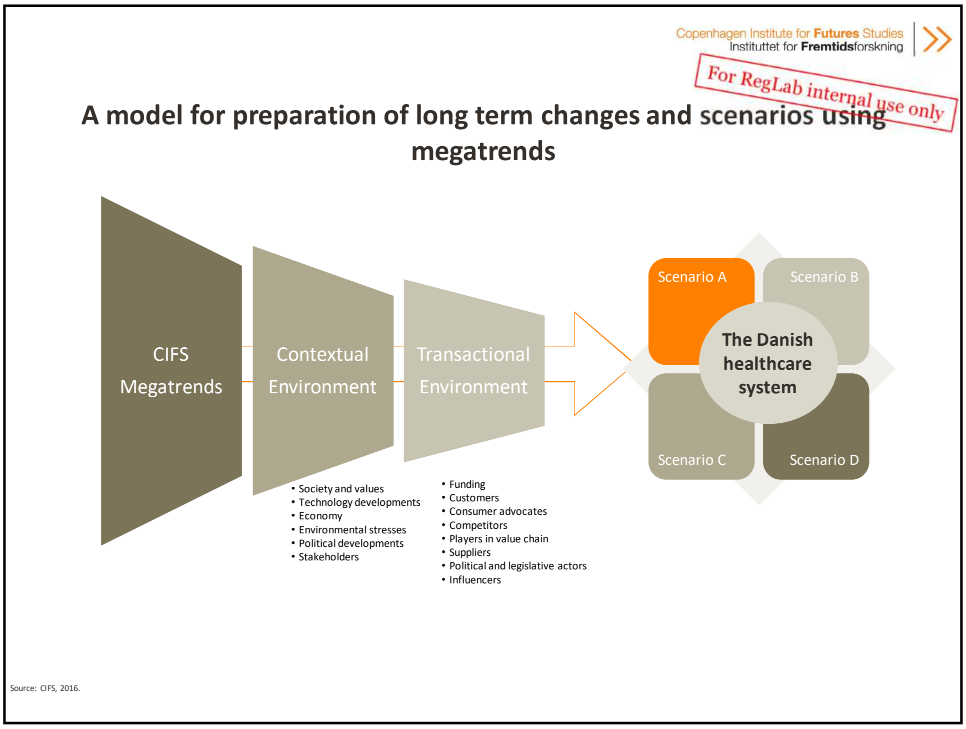
Access, control, ownership

For RegLab internal use only


Systems biology and
systems medicine
P4
medicine
Consumer-driver
healthcare and social
networks
Digital revolution
P4 healthcare: based on billi
of data points about multiple
health of
populat
Reactive healthcare:
based on limited
measurements from
relatively small test
cohorts
Present-day omics studies
complex data sets consisti
of many measurements
of relatively small test
cohorts
Number of people
Number of data dimensions (e.g., genomic and proteomic, among oth

predictive, preventive, personalized and participatory

Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning
For RegLab internal use only
ROSKILDE KOMMUNE
SYDDANSK SUNDHEDSINNOVATION
BIO PEOPLE
medicon valley alliance
Creating Opportunities
DANSKE PATIENTER
INNOVATING BETTER LIFE
Healthcare DENMARK
novo nordisk
AALBORG UNIVERSITY DENMARK
Cambio Healthcare Systems
DANSKE REGIONER
SDU
sundhed.dk
LEO
DNV·GL
Innovationsfonden
Lægeforeningen
FREDERICIA KOMMUNE
forsikring & pension
AARHUS UNIVERSITET
Esbjerg Kommune


Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning
For RegLab internal use only

A model for preparation of long term changes and scenarios using megatrends

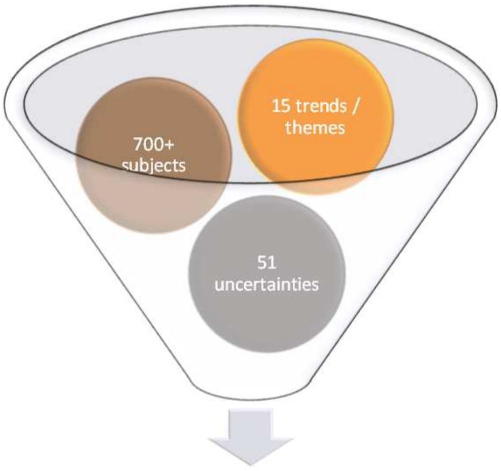
CIFS Megatrends
Contextual Environment
Transactional Environment
Scenario A
Scenario B
The Danish healthcare system
Scenario C
Scenario D

- Society and values
- Technology developments
- Economy
- Environmental stresses
- Political developments
- Stakeholders

- Funding
- Customers
- Consumer advocates
- Competitors
- Players in value chain
- Suppliers
- Political and legislative actors
- Influencers

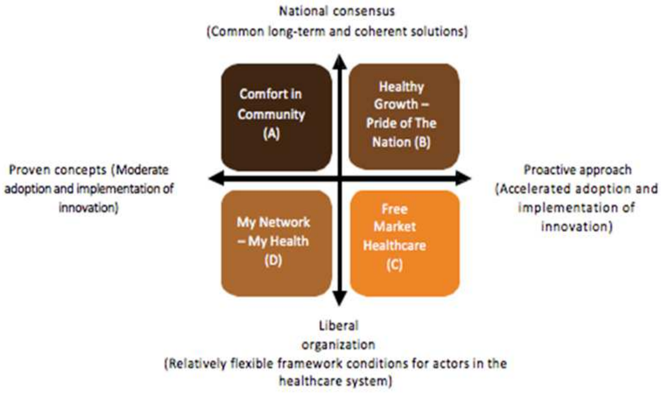
Source: CIFS, 2016.

Identification and focus



Uncertainty axis

Scenario matrix



National consensus
(Common long-term and coherent solutions)

Comfort in Community (A)

Healthy Growth – Pride of The Nation (B)

Proven concepts (Moderate adoption and implementation of innovation)

Proactive approach (Accelerated adoption and implementation of innovation)

My Network – My Health (D)

Free Market Healthcare (C)

Liberal organization
(Relatively flexible framework conditions for actors in the healthcare system)

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Task force recommendations

Increase political awareness and in-depth understanding of the challenges facing the future Danish health system

Work towards a mindset change: less local actor and departmental thinking and more integrated nation-wide strategic approaches

Improve opportunities for national execution of new initiatives, including knowledge sharing and development of competencies

Clarify access to personal medicine

Clarify the regulatory framework for data management and sharing

Clarify (and limit) inequality in the Danish healthcare system

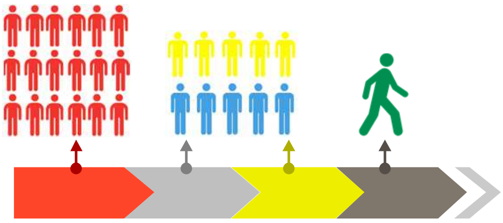
Establish a joint incentive management system across all healthcare actors

Establish a Ministry of Health and Growth

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

Transitioning from One-Size-Fits-All to Personalized Medicine

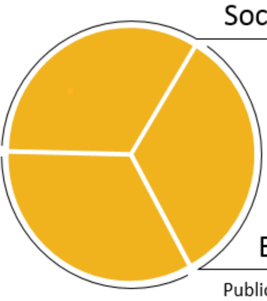


Single treatment for many people

Treatments are stratified, based on:
- Disease subtypes
- Biomarkers
- Stage of disease
- Demographics

Treatments are stratified, based on:
- Genomic status
- Molecular features
- Radiologic findings
- Environmental/lifestyle factors

Model Case – My Nordic Health Record Card



Society

- Public trust
- Horizontal data analysis
- Nordic scale impact
- Data driven health policies
- Treatment-to-prevention

Individuals

- Access
- Portability
- Interoperability
- Control
- Consent

Business

- Public-private collaboration
- New business opportunities
- Enables competition
- Data to show cost effectiveness
- Compliance with data regulation

Opportunities from a common My Nordic Health Record Card, built on a MyData infrastructure of person centric health data management

---

Types of Data Sets

BIG DATA

Big Data is quantitative data at a large scale that relies on machine learning. To be analysable, it must be normalized, standardized, defined, and clustered.

THICK DATA

Thick Data is based on qualitative, ethnographic research methods that shows valuable insights of the everyday lives of users. The sample size is small.

DEEP DATA

Deep Data is generated when industry experts are transforming massive amounts of big data into useful sections, thereby excluding irrelevant information.

LONG DATA

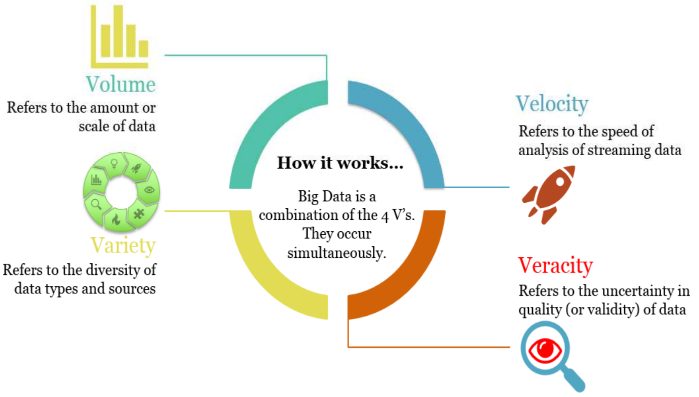
Long Data are datasets of long historical timescales. They help understanding how and in which pace human's behaviours and decisions are changing.

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only

4 V's of Big Data



Volume
Refers to the amount or scale of data

Variety
Refers to the diversity of data types and sources

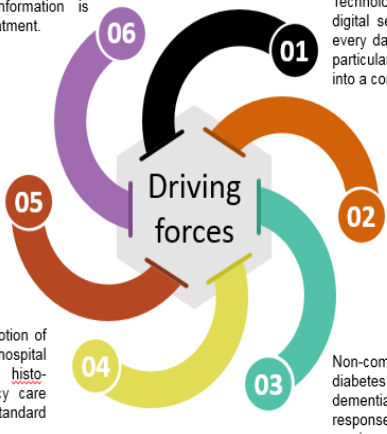
How it works…
Big Data is a combination of the 4 V's. They occur simultaneously.

Velocity
Refers to the speed of analysis of streaming data

Veracity
Refers to the uncertainty in quality (or validity) of data

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



Precision Medicine

Patients are informed about precision medicine. They demand that their multi-omic, environmental and lifestyle information is incorporated into customized treatment.
This becomes standard of care.

Ageing Population

Danes are living longer, and many choose to stay in their own homes. Pressure for hospital-in-the-home care grows. Financial strains escalate. Telemedicine and virtual medicine becomes widespread

Artificial Intelligence

The rise of AI challenges the very notion of Doctor in 2030. AI is used in various hospital settings, from radiologic diagnosis, histo-pathology evaluation and emergency care algorithms. AI replaces most standard functions performed by humans today.

Internet of Things

Technological acceleration has allowed digital sensors to be embedded into most every day objects. Real-time personal data, particularly behavioral data, is integrated into a common Nordic health portal.

Data Driven Health

Personal data management undergoes major transformation, so that health data is portable, interoperable and secure. Nordic quality registries are aligned to build evidence for health interventions.

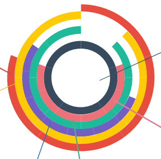
NCD explosion

Non-communicable diseases (NCDs) such as diabetes, coronary heart disease, cancer and dementia flood the health system. It is both a response to ageing and lifestyle shifts, as well as air pollution and environmental degradation

Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning

For RegLab internal use only

Ethical considerations



1. Selling vs. Sharing data

Selling is not the same as sharing. It can create incentives for fraud, as well as exploitation.

2. The Me in We

Should individuals benefit from public health interventions if they do not share their own data?

3. Winners and Losers

Those who struggle with technology will be unlikely to fulfil their data rights.

4. Anonymity vs. Precision

How can we remain anonymous in the era of personalization, precision and individuality?

5. Nudging or Coercion?

When does it slide from encouragement to persuasion to outright coercion?

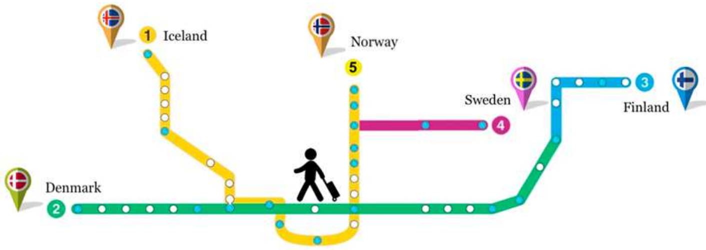
6. Precision Medicine or Health?

Transitioning from a health paradigm of treatment to prevention requires rigorous and transparent goal setting.

Copenhagen Institute for Futures Studies
Instituttet for Fremtidsforskning

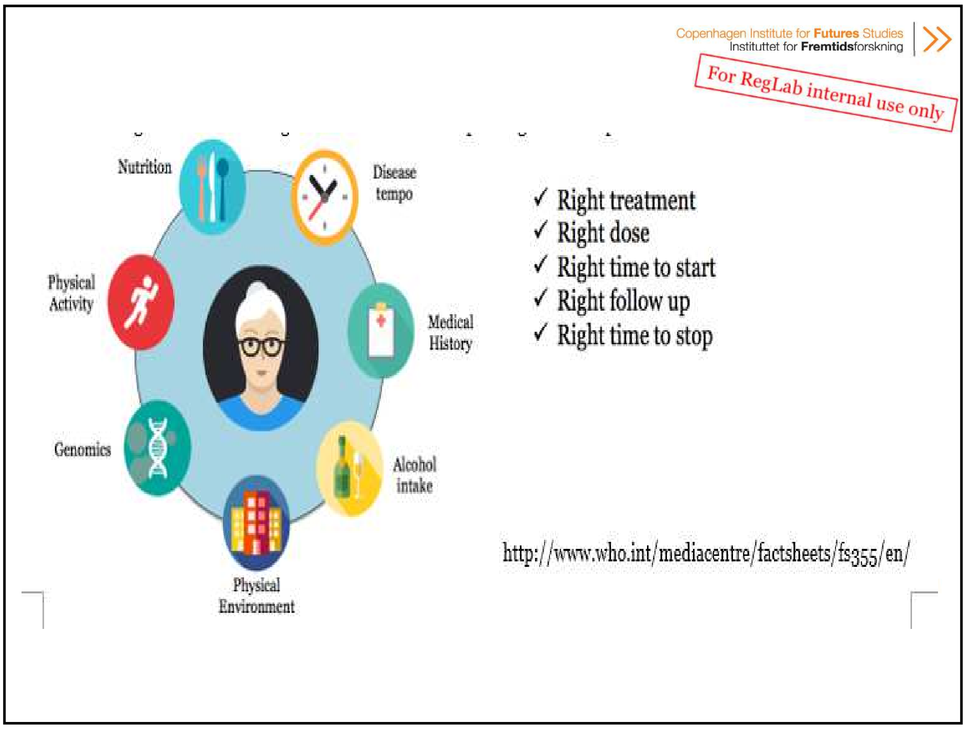
For RegLab internal use only

Navigating My Nordic Health Record Card



Individual

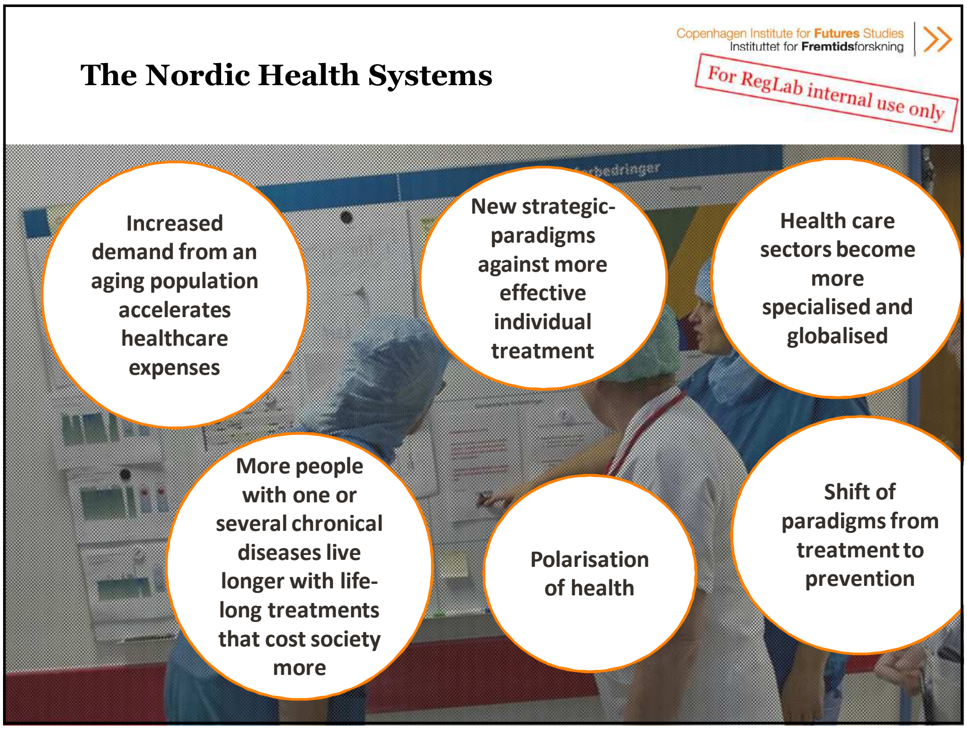
- ✓ Access
- ✓ Portability
- ✓ Interoperability
- ✓ Control
- ✓ Consent


Nutrition
Disease tempo
Physical Activity
Medical History
Genomics
Alcohol intake
Physical Environment

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

- ✓ Right treatment
- ✓ Right dose
- ✓ Right time to start
- ✓ Right follow up
- ✓ Right time to stop

http://www.who.int/mediacentre/factsheets/fs355/en/



Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

The Nordic Health Systems

Increased demand from an aging population accelerates healthcare expenses

New strategic-paradigms against more effective individual treatment

Health care sectors become more specialised and globalised

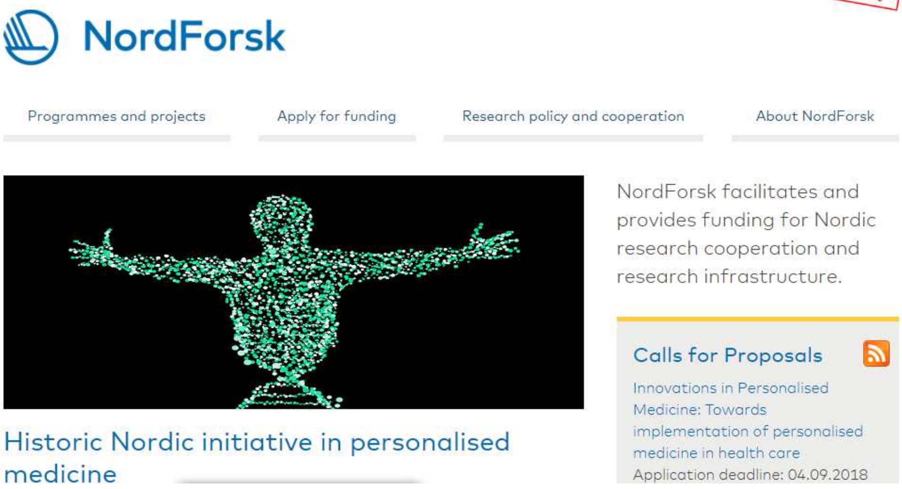
More people with one or several chronical diseases live longer with life-long treatments that cost society more

Polarisation of health

Shift of paradigms from treatment to prevention

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



NordForsk

Programmes and projects
Apply for funding
Research policy and cooperation
About NordForsk

Historic Nordic initiative in personalised medicine

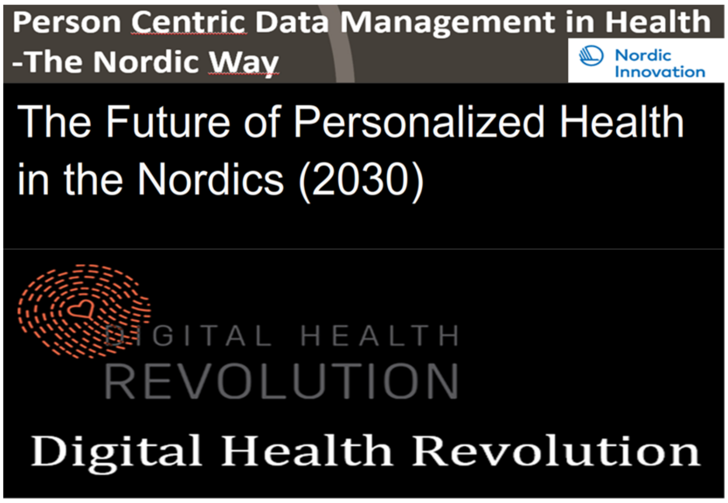
NordForsk facilitates and provides funding for Nordic research cooperation and research infrastructure.

Calls for Proposals

Innovations in Personalised Medicine: Towards implementation of personalised medicine in health care
Application deadline: 04.09.2018

Copenhagen Institute for **Futures** Studies
Instituttet for **Fremtids**forskning

For RegLab internal use only



Person Centric Data Management in Health -The Nordic Way

Nordic Innovation

The Future of Personalized Health in the Nordics (2030)

DIGITAL HEALTH REVOLUTION

Digital Health Revolution