

# **FREMTIDENS E-HEALTH I ALMEN PRAKSIS -UDFORDRINGER OG MULIGHEDER**



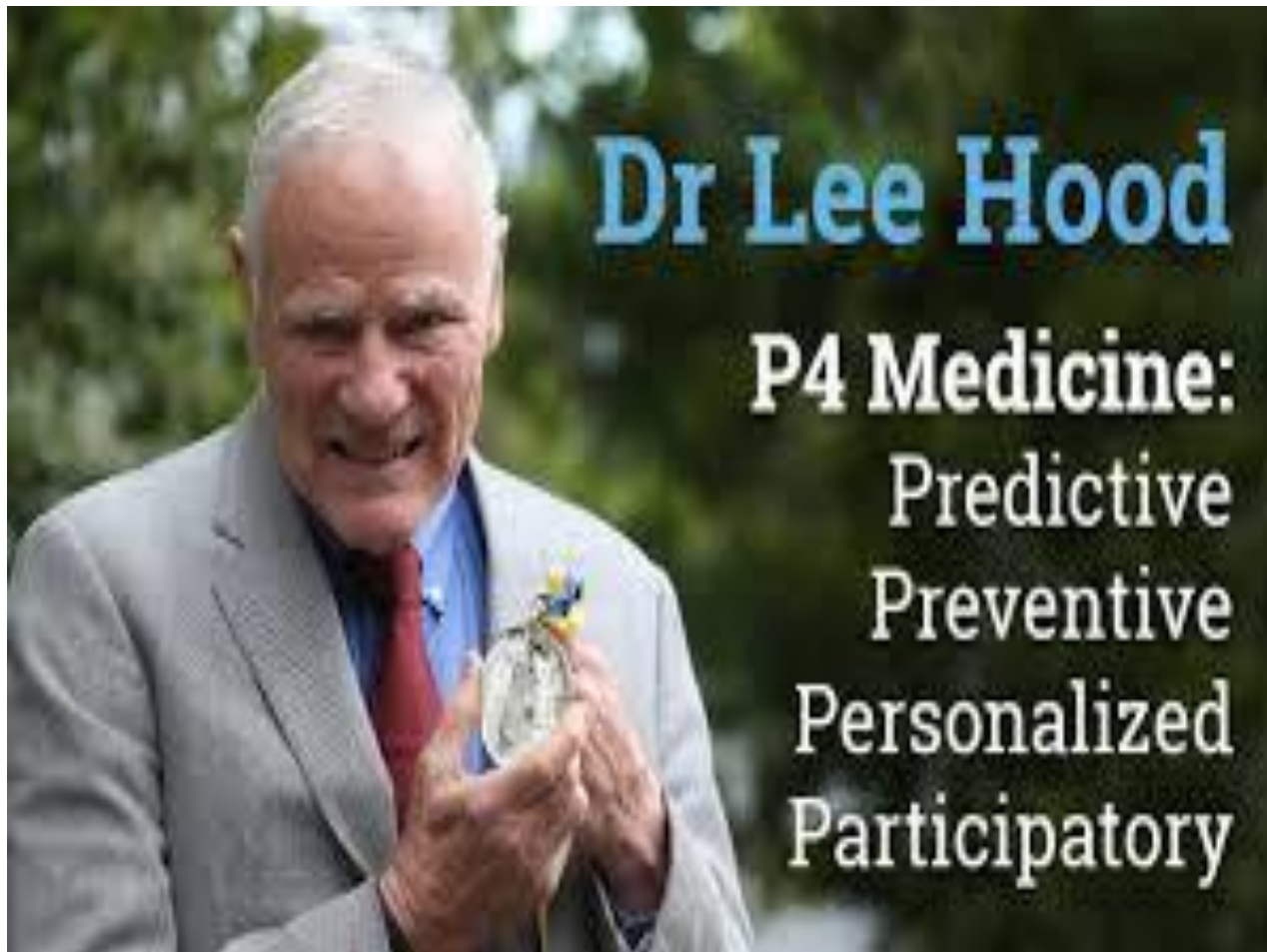
**E-SUNDHEDSOBSERVATORIET 2018  
NYBORG STRAND 2.OKTOBER**

# ER FREMTIDENS SUNDHED ET VÆSEN?

- ET VÆSEN: højerestående levende organisme, et menneske, et dyr eller en fantasiskabning

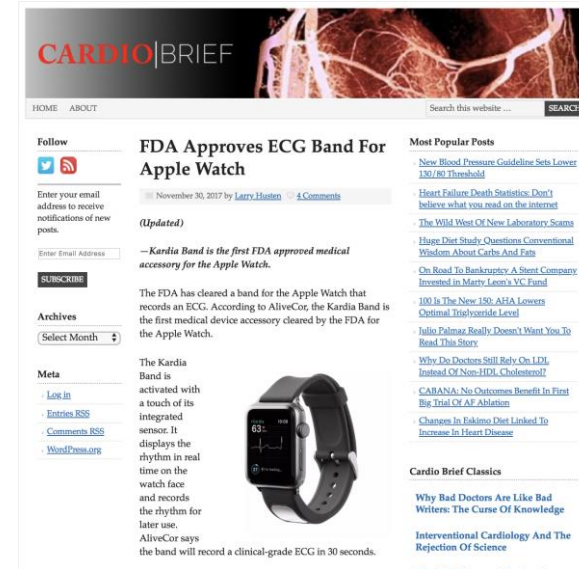


# SUNDHED 4.0



# THE WHY: ET AKTUELT EKSEMPEL

- ET RELEVANT PROBLEM
- FDA GODKENDT: 'Leverages sophisticated artificial intelligence to detect when a user's heart rate and physical activity are out of sync, and prompts users to take an EKG in case it's signaling possible abnormalities like Afib'
- HVORNÅR ER DET TILGÆNGELIGT I EU?
- KAN DET MERE?
- HVILKE MULIGHEDER HAR VI FOR EVIDENS VURDERING?



# HVAD ER DE CENTRALE UDFORDRINGER?

- HVEM OG HVORNÅR SKAL INFORMATION DELES?
  - POSITIV PRÆDIKTIV VÆRDI
  - SCREENINGS PERSPEKTIV
  - IMPLEMENTERING I SAMFUNDET
- KVALITET OG LIGHED I SUNDHED
  - TRUSTED THIRD PARTY?
  - ER DATA OLIE- HVEM FÅR DATA?
  - LIGE ADGANG TIL TEKNOLOGI
- KAN VI GØRE NOGET?



# ET VÆSENTLIGT ETISK SPØRGSMÅL - ULIGHED I BORGER SUNDHED



Dette er en Kronik. Kroniken er udtryk for skribentens holdning. Du kan indsende Kronik-forslag [her](#).

JENS WINTHIER JENSEN

KRONIKEN

## Big Data i sundhed rammer de svageste

Der er brug for en national strategi og investering, hvis vi vil sikre, at borgernes sundhedsdata forbliver fælleseje og kommer alle danskere til gavn.

FÅ DE  
En gang  
og med  
Dan

marie.sc

Ja tak  
kontakt  
e-bøger  
telefon  
Læs nr

sor ved  
JS



# CODE EKSEMPLER

REGION

Emergency  
Medical Services

FACULTY OF HEALTH AND MEDICAL SCIENCES  
UNIVERSITY OF COPENHAGEN



## Preliminary results on more than 100.000 calls

- 108.685 incidents with call to 1-1-2
- 1.453 OHCA from Danish Cardiac Arrest Registry
- 90 % of OHCA's were detected by machine learning
- Less than 2 % false positives

| Outcome (n=108365)       | Condition positive | Condition negative | Predictive value                 |
|--------------------------|--------------------|--------------------|----------------------------------|
| <b>Model recognition</b> |                    |                    | <b>Positive predictive value</b> |
| positive                 | 1308               | 1871               | 41,15%                           |
| <b>Model recognition</b> |                    |                    | <b>Negative predictive value</b> |
| negative                 | 145                | 105041             | 99,86%                           |
| <b>Model recognition</b> | <b>Sensitivity</b> | <b>Specificity</b> |                                  |
| Sensitivity&Specificity  | 90,02%             | 99,25%             |                                  |

Human operator ~70% sensitivitet  
Human specificitet ukendt – men  
formentlig meget høj  
+ tidsgevinst ved maskinlæring

www.regionh.dk/lakut

Projektleder: Nikolaj F. Blomberg  
Emergency Medical Services, University of Copenhagen

Corti

Machine learning in the wild.



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- 108.685 incidents with call to 1-1-2
- 1.453 OHCA from Danish Cardiac Arrest Registry
- 90 % of OHCA's were detected by machine learning
- Less than 2 % false positives

| Outcome (n=108685)      | Condition positive | Condition negative | Predictive value          |
|-------------------------|--------------------|--------------------|---------------------------|
| Model recognition       |                    |                    | Positive predictive value |
| positive                | 1308               | 1871               | 41,15%                    |
| Model recognition       |                    |                    | Negative predictive value |
| negative                | 145                | 10                 |                           |
| Model recognition       | Sensitivity        | Specificity        |                           |
| Sensitivity&Specificity | 90,02%             | 99                 |                           |

[www.regionh.dk/lakart](http://www.regionh.dk/lakart)

Human operator ~70% sensitivity  
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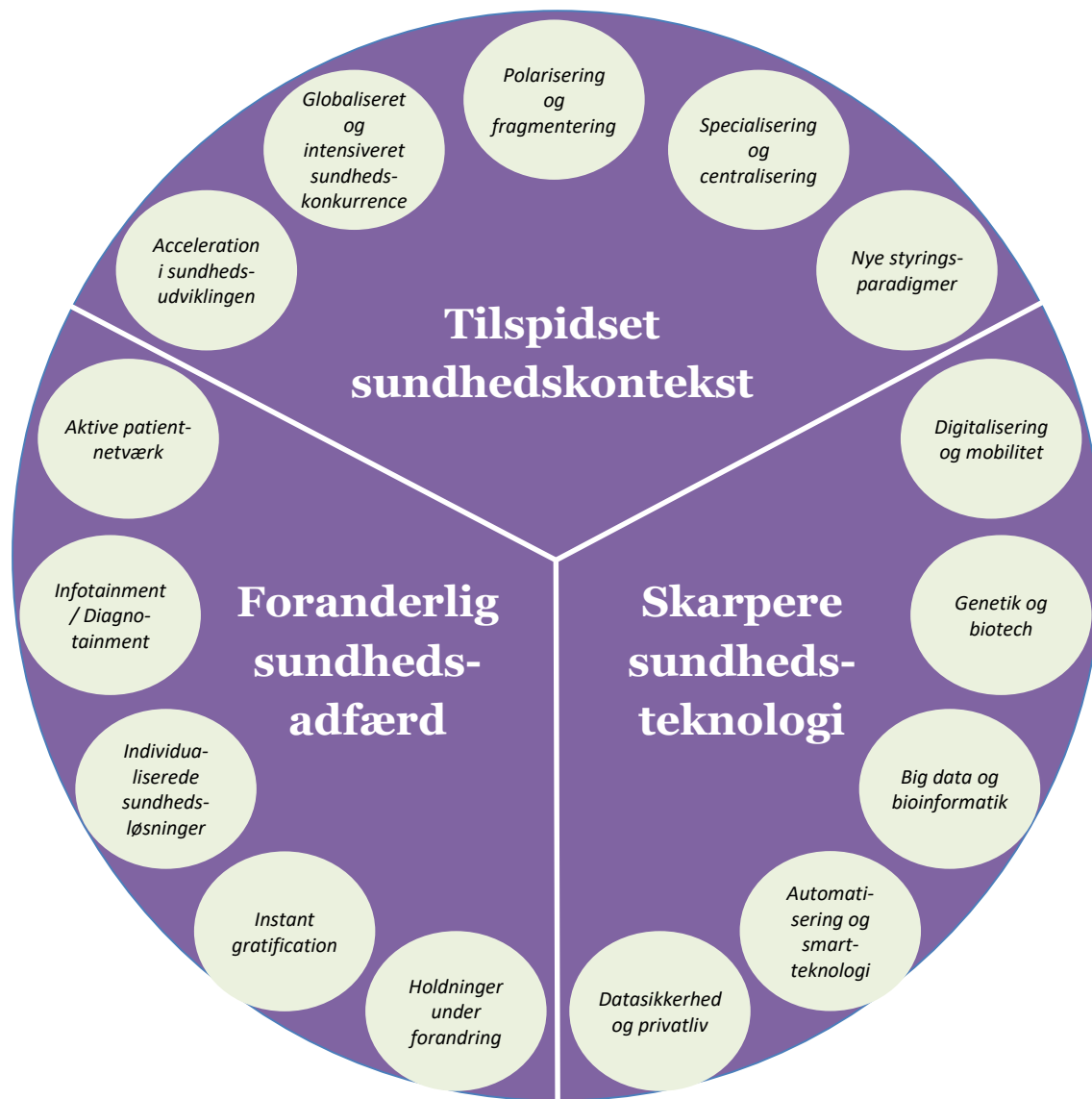


erg

en

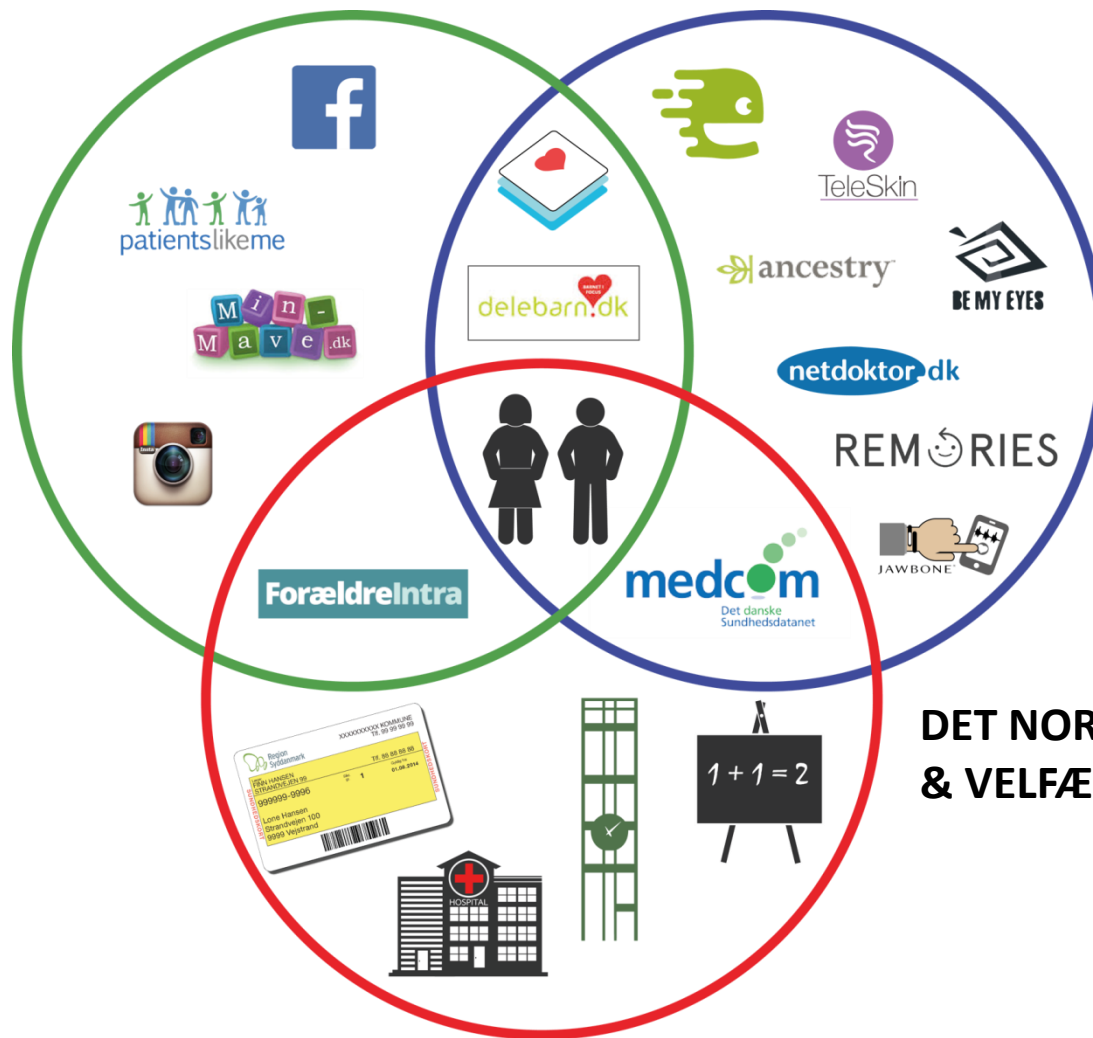


# DET VÆSENTLIGSTE TRENDS



# VIL DANMARK UDNYTTE POTENTIALIALET?

**SOCIAL  
PLATFORME**



**KOMMERCIELLE  
VELFÆRDS- &  
SUNDHEDS  
LØSNINGER**

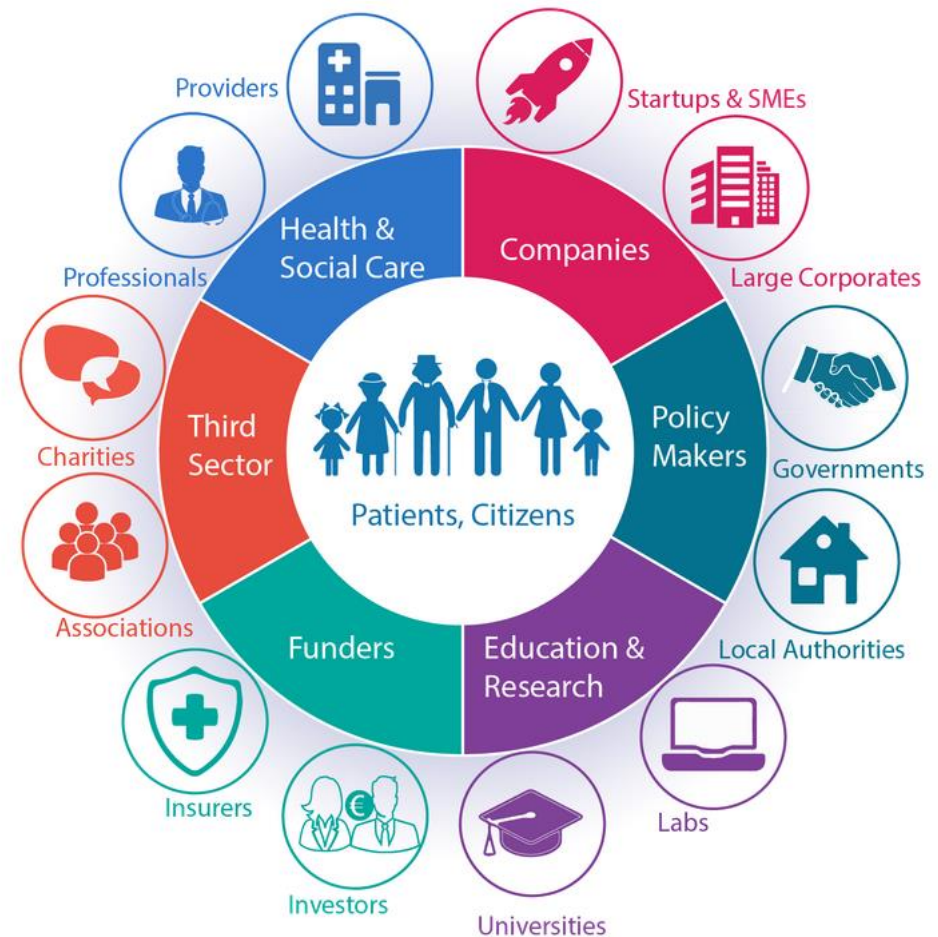
**DET NORDISKE SUNDHEDS-  
& VELFÆRDS SYSTEM**

# SITUATIONEN I DAG

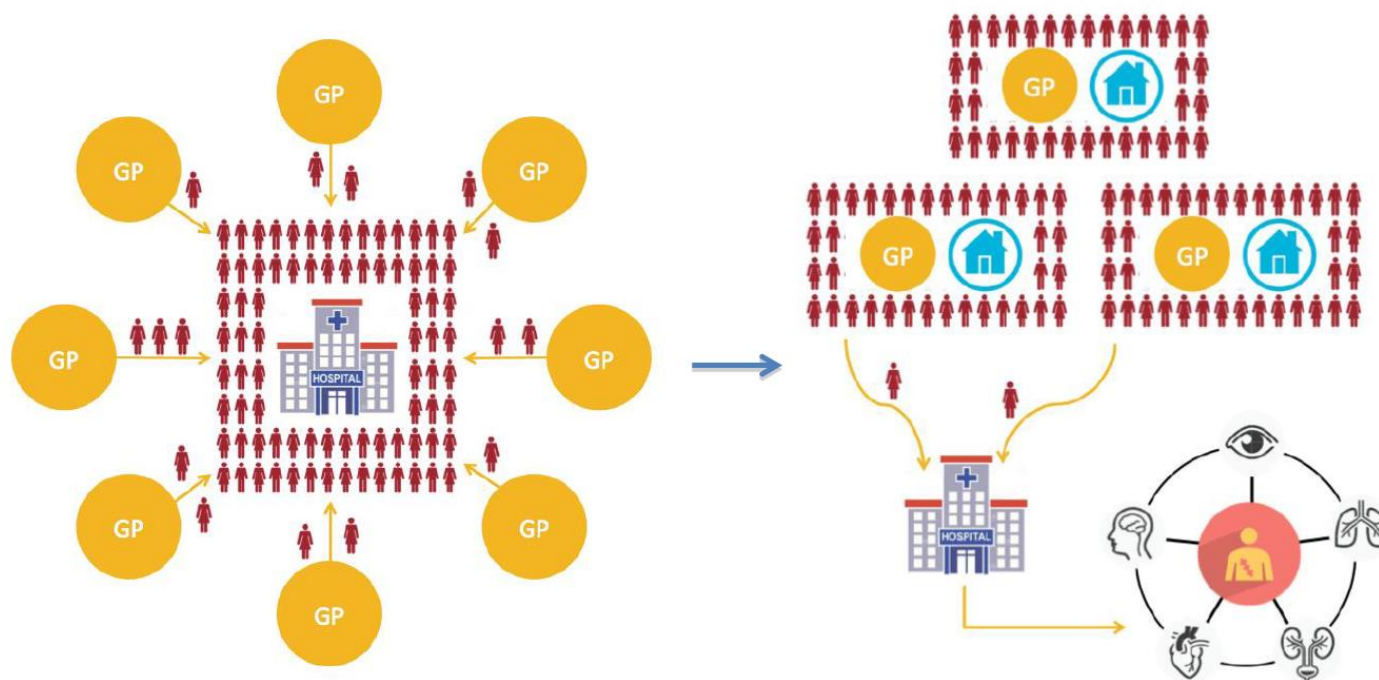
- SIKKERHED OG PRIVACY IKKE LØST
- BEGRÆNSET UDNYTTELSE AF DATA
- HVOR ER BRUGER, BORGER OG PATIENT SAMSKABELSEN?



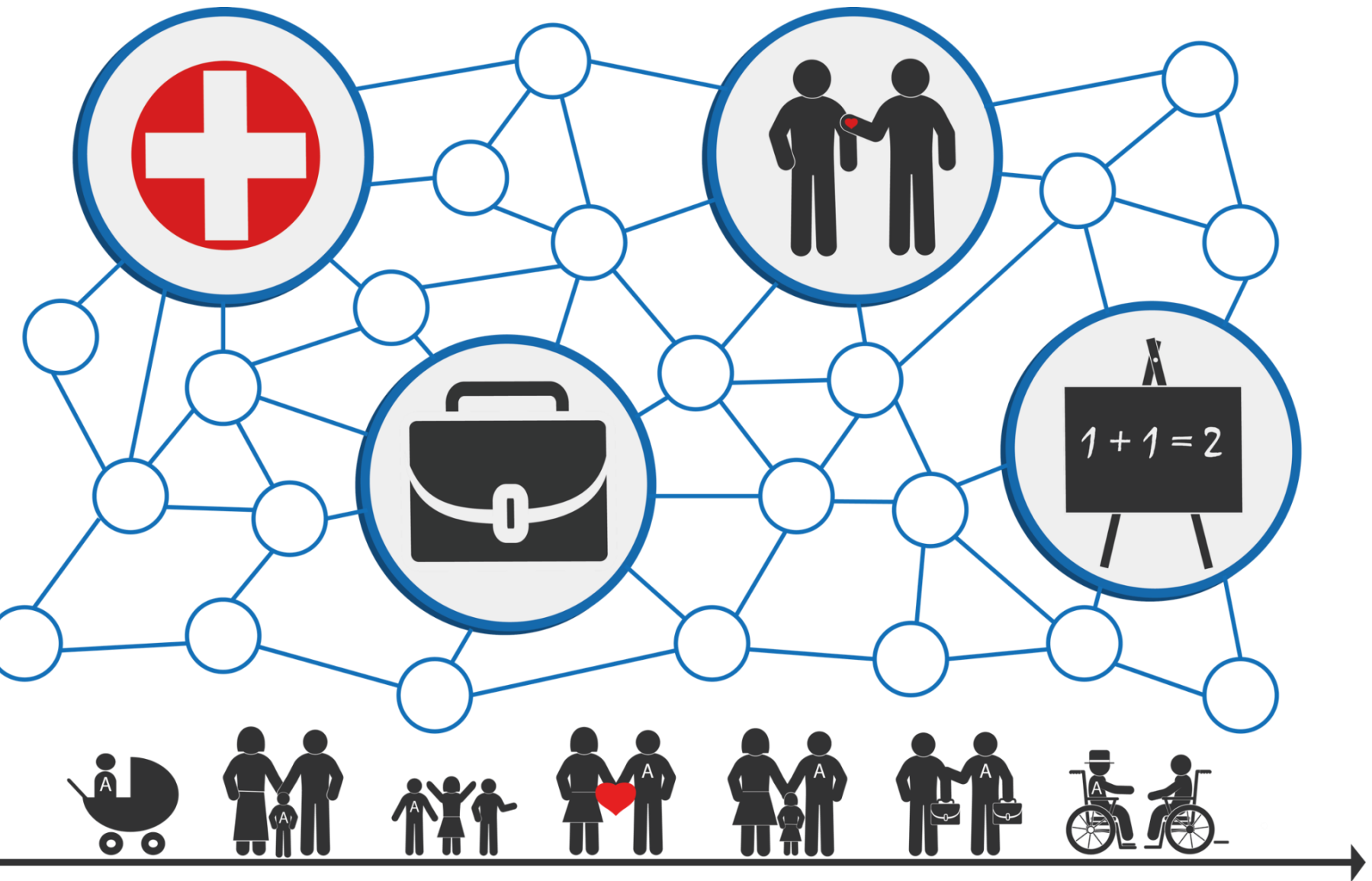
# INTERNATIONAL INSPIRATION



# ÆNDRING I ORGANISERING UDFORDRINGER OG MULIGHEDER



# FOLKETS SUNDHED 5.0 =VELFÆRD

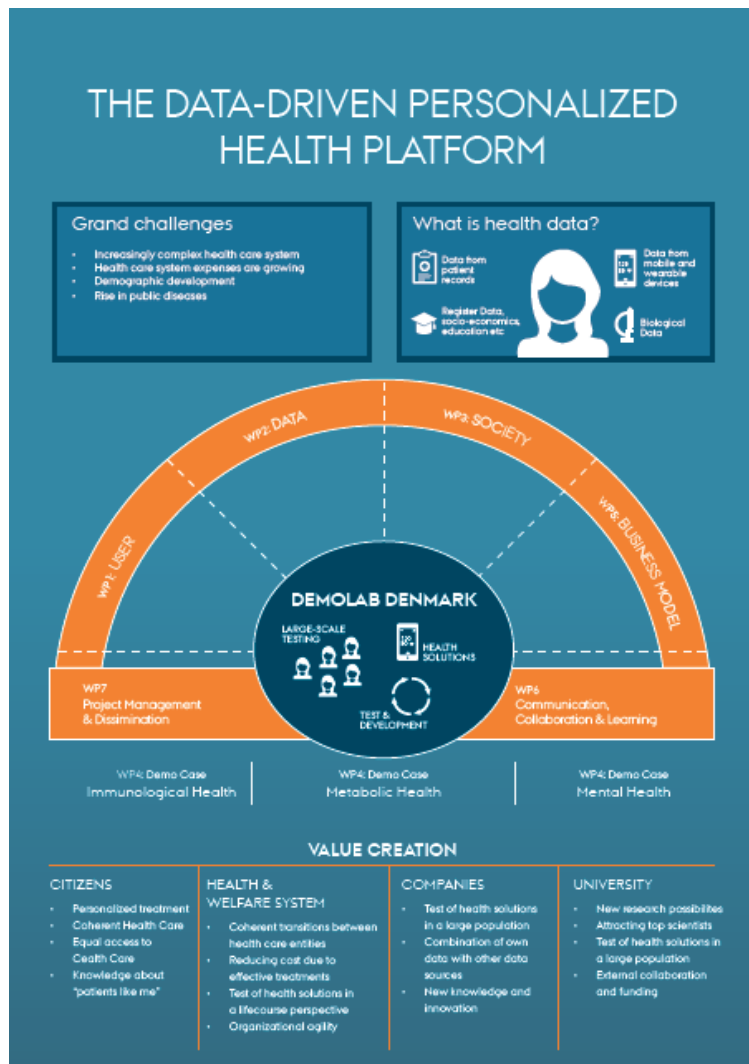






FOLKESUNDHED.DK (HEALTHD360)

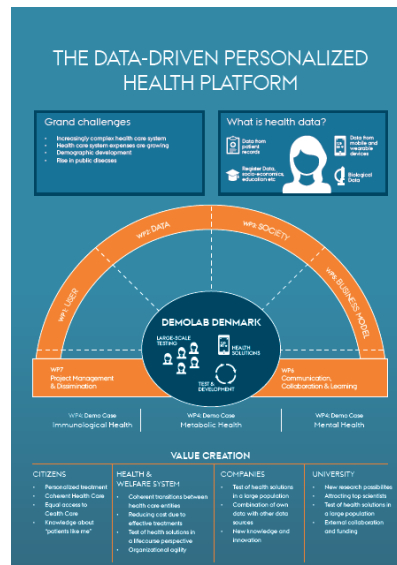
# 360DHEALTH- FOLKESUNDHED.DK ET NØDVENDIGT PROJEKT



- SECURITY BY DESIGN
  - KRYPTERING
  - PRIVACY IMPACT ASS-
- DATA KATEGORISERING
  - BORGER- SUNDHEDSPERSONALE
  - DATA LÆRING FASE 1-4
- BORGER DATA AUTONOMI
  - MOTIVERET SAMTYKKE
  - BIOETIK
  - ORGANISATORISK
  - BORGER CENTRERET DESIGN

# HVAD BYGGER VI PÅ

- PATIENTS LIKE ME
- PATIENT SITE
- MYDATA
- MIDATA
- DATAFORGOOD
- SUNDHED.DK
- DABAI
- SKOLESUNDHED.DK
- NORDICLIFECORE.COM
- VIBIS



# NORDIC LIFE COURSE RESEARCH INITIATIVE

NordicLifeCoRe

[Home](#) [About](#) [Data Resources](#) [Research](#) [Collaboration](#) [Contact](#)

## Nordic Life CoRe

The Nordic Life Course Research Initiative builds on a unique data infrastructure following more than 7 million Nordic citizens born from 1987 and on.

[Read more](#)



### The Potential

The potential of this register based platform of Nordic Life course can in itself provide an number of a unique insights. Because all data are linked by unique but encrypted identifiers data from surveys, patient files, quantified self data as well as biological data can potentially be linked.



### The Resource

Life course data from Finland, Sweden and Denmark has been brought together to form a core data resource. We have linked data from ad hoc cohorts. This allows the study of infrequent exposures and outcomes, advanced designs such as sibling and twin studies, and natural experiment designs. Trajectories of health, welfare, education and social development of more than 7 million persons can be followed up to 30 years.



### Value Creation

The core value creation focus of this initiative is to provide citizens the best knowledge to support that they obtain the highest level of physical and mental health throughout the course of their life. Our ambition is to contribute with epidemiology research at the highest international level but further to provide citizens and society with new meaningful knowledge and impact

## COLLABORATION

Collaboration across disciplines of epidemiology, sociology, health and welfare economics is central to understand the complexity of human life. We aim to build a collaborative intellectual structure across the platform of data resources

[Read more](#)



# SKOLESUNDHED.DK

- fra 2 til 25 år

[Om os](#) [Småbørn](#) [Grundskole](#) [Unge](#) [SkolesundhedPLUS](#) [Interventioner](#)



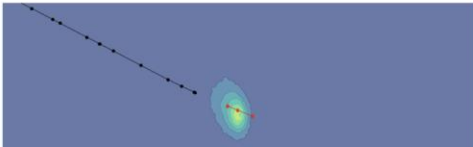
Besvar  
spørgeskema  
HER

Informationsmøde om Ungeprofilundersøgelsen 2017

# DABAI: AI LÆRING

[How to use DABAI](#)[Research and domains](#)[About DABAI](#)[News](#)[Events](#)[Cases](#)[Other big data activities](#)

## Cases



**Predicting the trajectories of fishing vessels**



**Improving teacher insight**



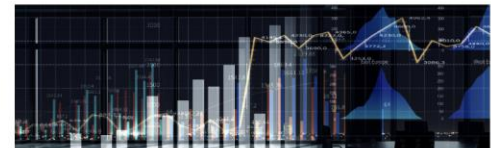
**Big data analytics for the City of Copenhagen**



**Detecting ghost-written high-school assignments**



**Patient flow in hospitals**



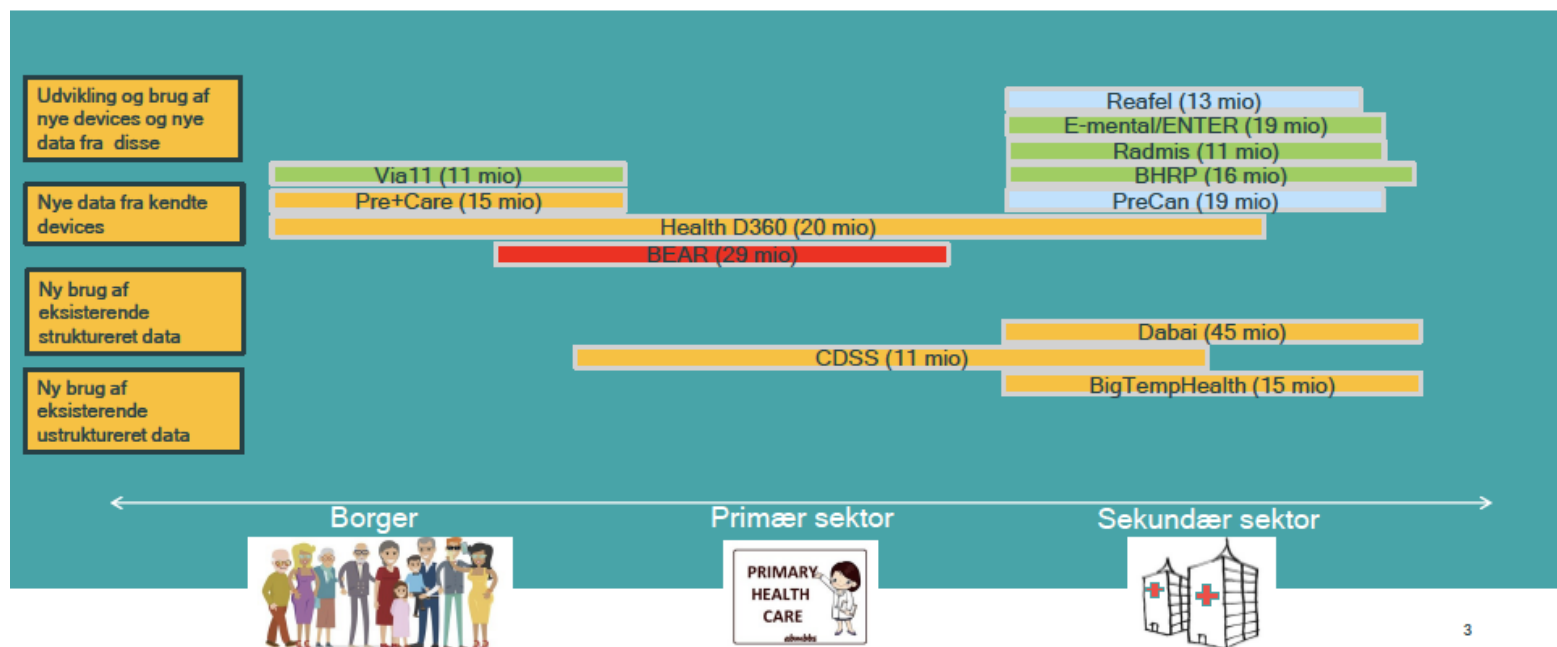
**Data-driven public administration - analysis of CVR and accounting data**



# INNOVATIONSFONDENS PROJEKTER

## Sundhedsdata Portefølje Investeringer 2015 -2018

|      |                           |
|------|---------------------------|
| Grøn | Psykiatri                 |
| Gul  | Data på tværs af sygdomme |
| Rød  | Hørerehabilitering        |
| Blå  | Somatisk                  |

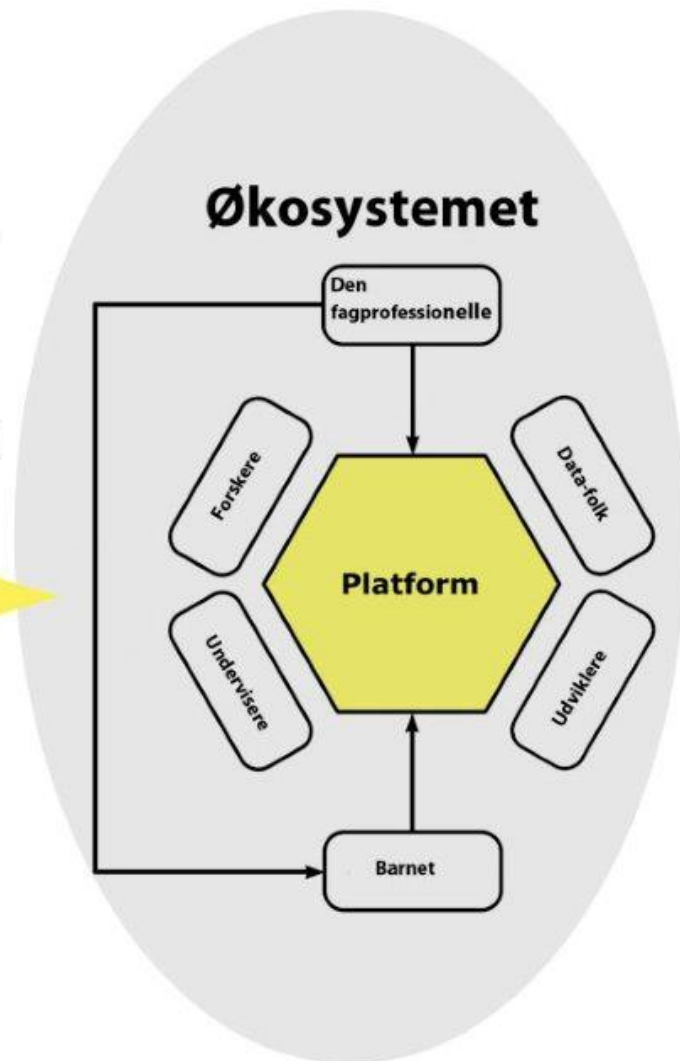
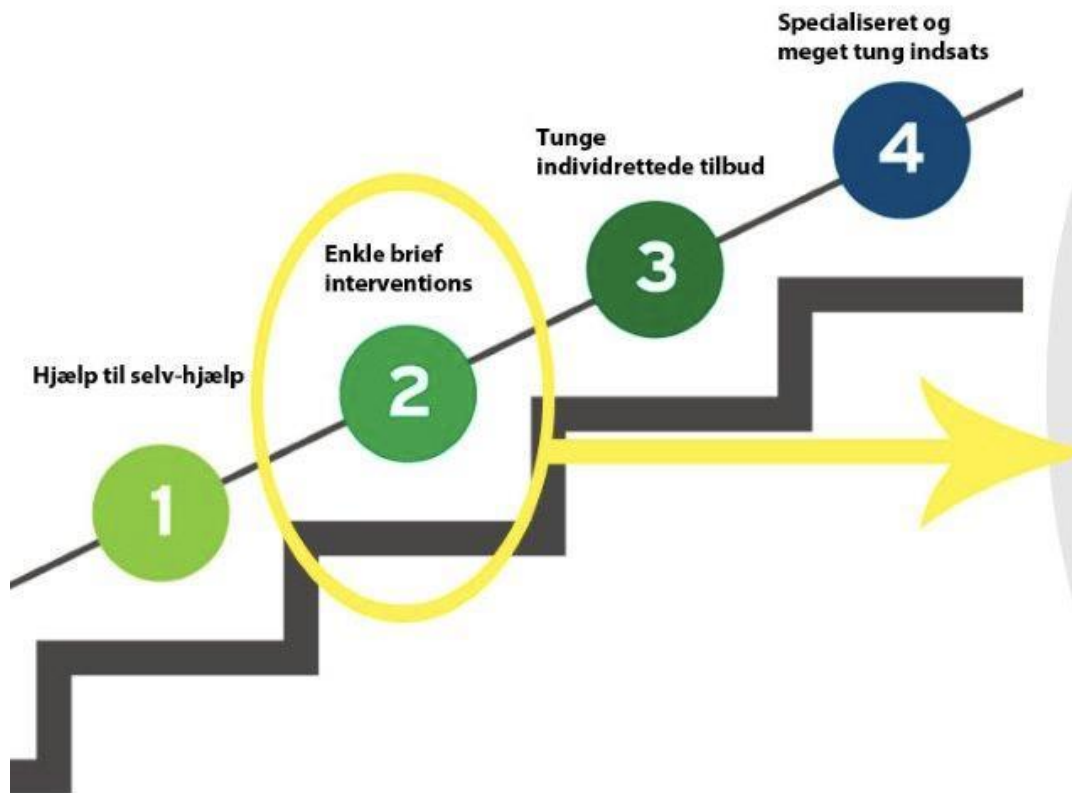


# BORGERENS VALG AF DELING?



# 360DHEALTH & ALMEN PRAKSIS

- FÆLLES BESLUTNINGER
- FORSTÅELSE AF PATIENTENS PERSPEKTIV
- ITERATIV MEDICIN
  - LEARNING BY DOING
- FLEKSIBILITET OG KOMPLEKSITET
  - OVERBLIK
  - KOORDINERING
- 'LÆGEKUNST'
- BESLUTNINGS STØTTE
- BORGER SAMSKABTE LØSNINGER
  - INDIVIDUALISEREDE
  - MOTIVERET KONSENT
- ITERATIV PROTOTYPING
  - NATURLIGE EKSPERIMENTER
  - N=1
- MODULOPBYGNING
  - MIKROSERVICES
  - MINIMAL VIABLES
- UNDERSTØTTE 'LÆGEKUNST'



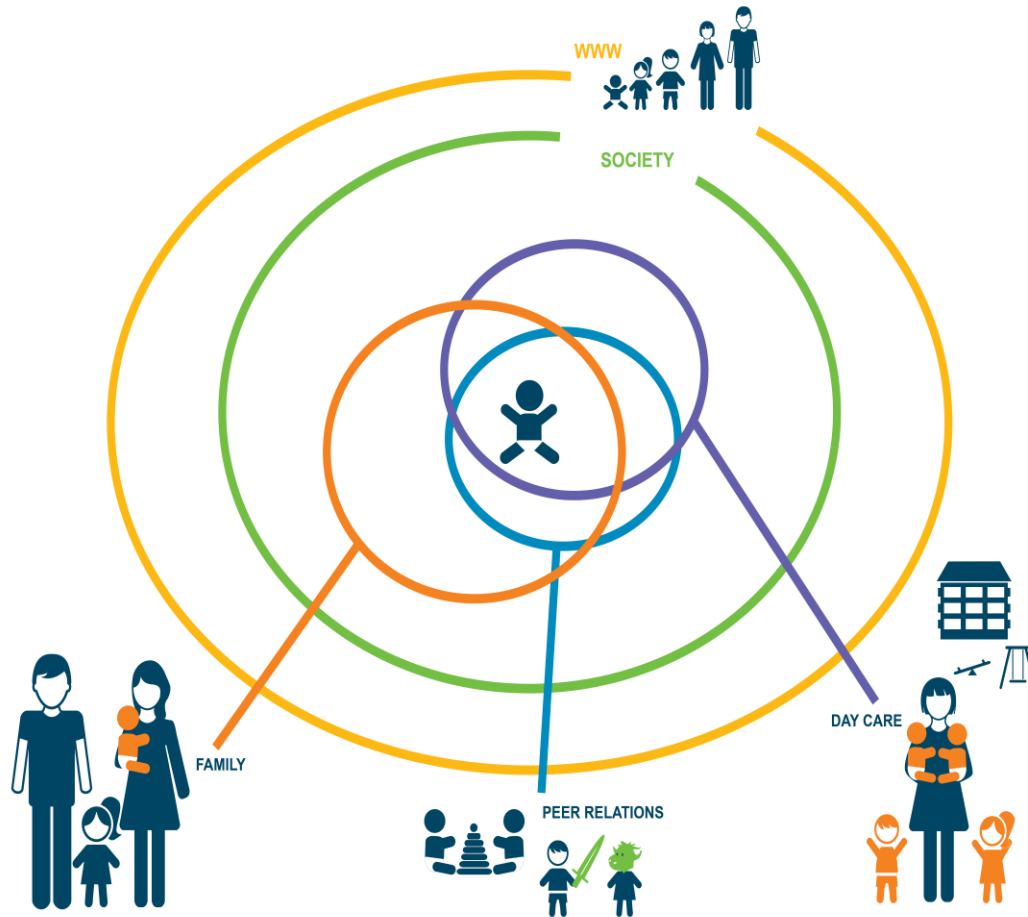
# TRAFIK ER CENTRAL



**How Google Maps Shows  
Accurate Real Time Traffic Data**



# 360 GRADERS TILGANG



# COLLABORATIVE HEALTH IMPORTANT

- 4 (5) KOMMUNER
- BISPEBJERG HOSP
- RANDERS REGIONSHOSP
- DANSKE PATIENTER
- SUNDHED.DK
- RKKP
- AU FOLKESUNDHED
- AU DATALOGI
- ALEXANDRA INST
- TEKNOLOGISK INST
- KITE INVENT
- NOVAX
- OPUS CONSULT
- CAMBIO

## NEW COLLABORATIVE MODELS

The Centre for Collaborative Health explains why European health challenges call for new collaborative models

Europe will face a number of complex health challenges over the coming decades. We will see the development in health perspectives move from a primary focus on

The Danish Centre for Collaborative Health at Aarhus University ([susa.au.dk](http://susa.au.dk))



BMJ 2017;358(3048):doi:10.1136/bmj.3048 (Published 2017 July 05)

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## ANALYSIS

### ESSAY

#### When “patient centred” is no longer enough: the challenge of collaborative health: an essay by Michael L Millenson

Patient centred care is being subsumed by collaborative health, enabled by sweeping technological, economic, and social changes. Doctors are losing some of their power and will have to alter their behaviour to retain public trust, writes **Michael L Millenson**

Michael L Millenson *president*<sup>1</sup>

<sup>1</sup>Health Quality Advisors, Highland Park, IL, USA; <sup>2</sup>Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

# BEHOV FOR EN NATIONAL STRATEGI

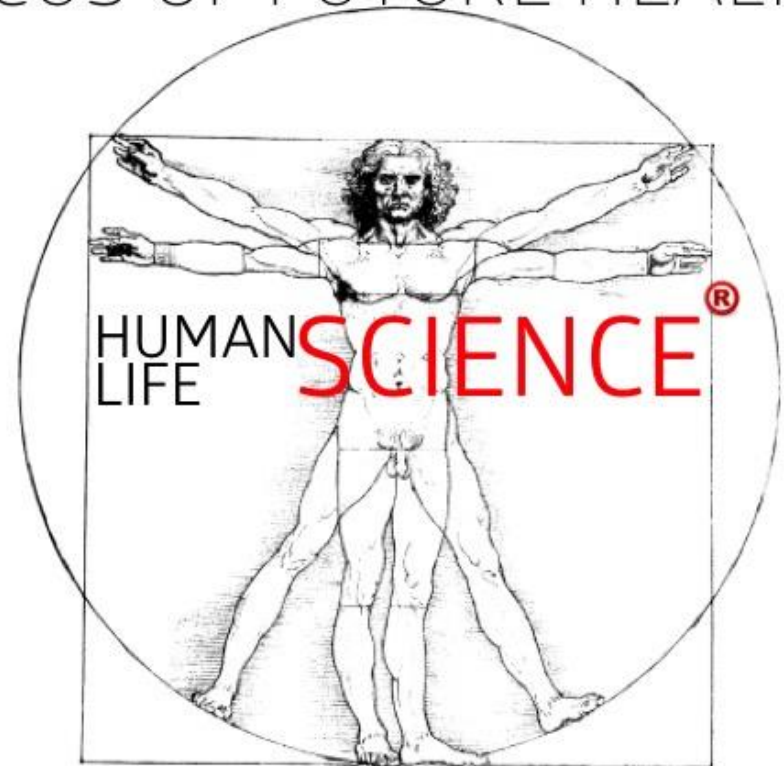


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  - BORGER CENTRERET DESIGN

# DEN INNOVATIVE UDFORDRING: DEMOKRATISK SUNDHED

- FÆLLESSKABSMODEL
- FRA QUANTIFIED TIL  
QUALIFIED SELF
- ECO-N-OMICS
- FOLKE(TS)SUNDHED..
- SRL+TRL?

FOCUS OF FUTURE HEALTH?



# VISION FOR FREMTIDENS ALMEN LÆGE (KUNST)

$$C_{\text{CONTEXT}} + C_{\text{CURIOSITY}} = C_{\text{CLEVERNESS}}^2$$





TAK FOR OPMÆRKSOMHEDEN

