



# An atypical career path: from engineering and bioinformatics to social security physician in a health insurance fund

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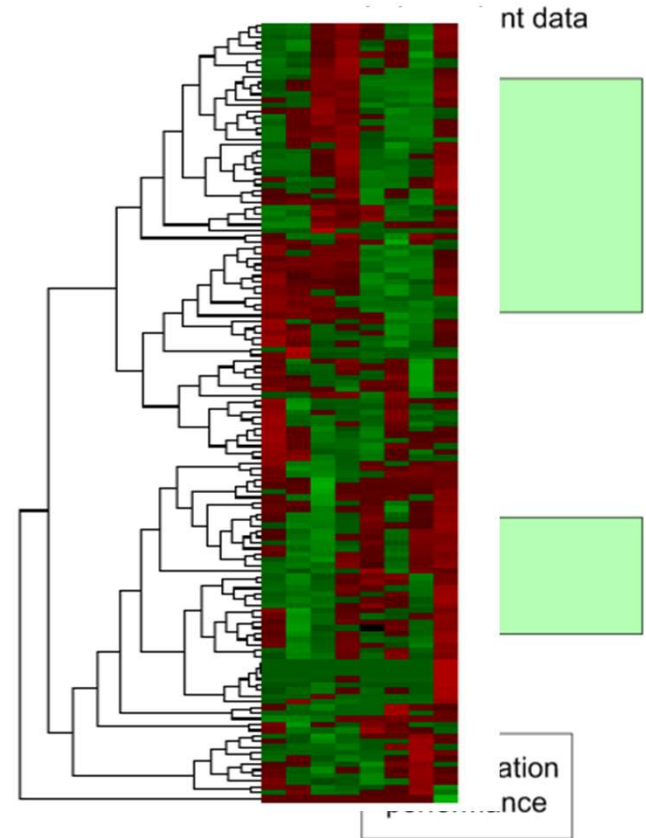
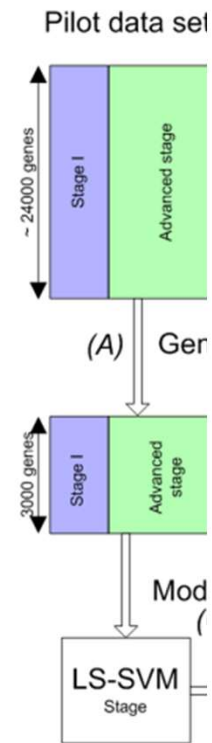
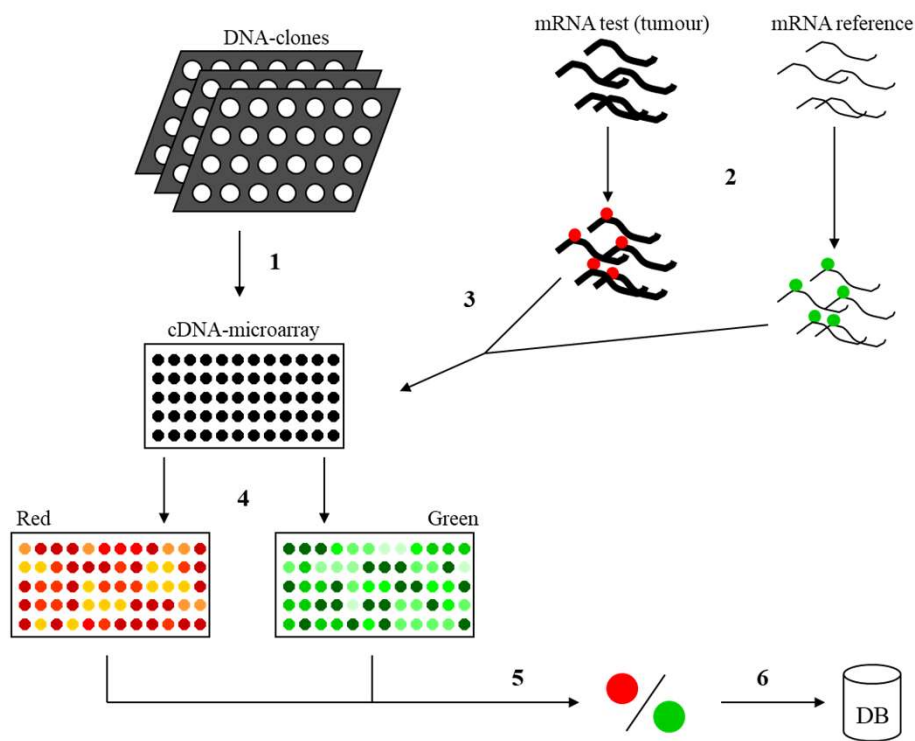
Frank De Smet, 08/07/2022

# Before PhD

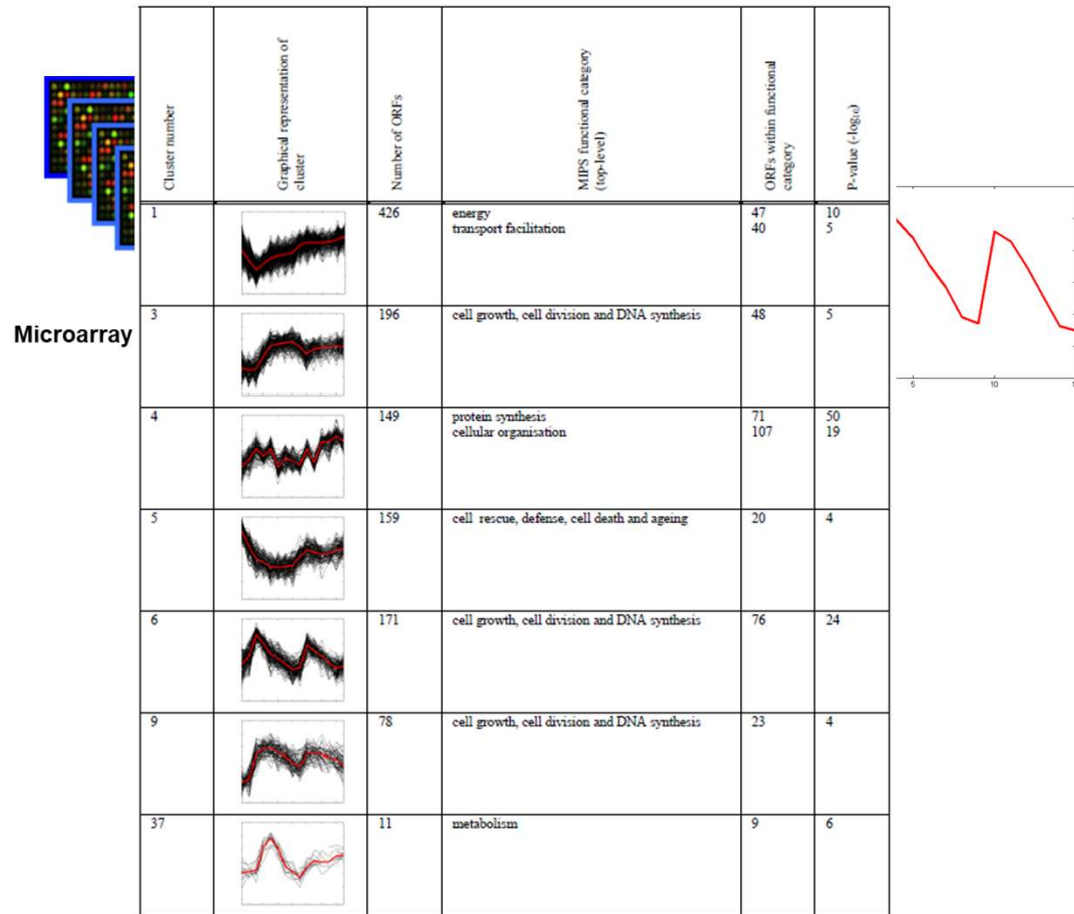
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- Master in Electrical Engineering, microelectronics (1992)
- Medical Doctor (1998)

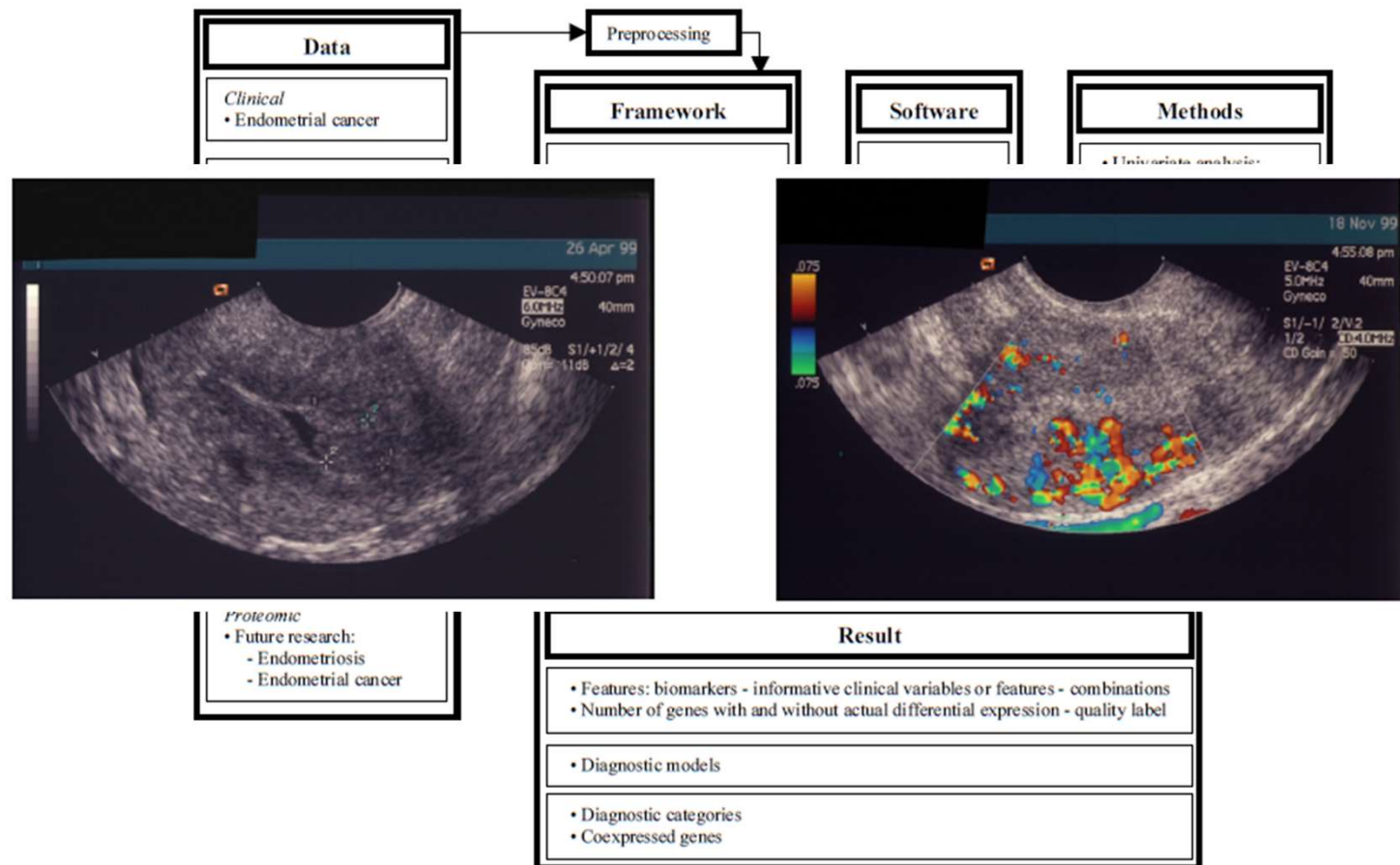
# Microarrays: algorithms for knowledge discovery in oncology and molecular biology



# Microarrays: algorithms for knowledge discovery in oncology and molecular biology



# Microarrays: algorithms for knowledge discovery in oncology and molecular biology



# Post-doc

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Human Reproduction  
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Availability of manuscript

**Human Reproduction, Vol.25, No.3 pp. 654–664, 2010**

Advanced Access publication on December 9, 2009 doi:10.1093/humrep/dep425

human  
reproduction

ORIGINAL ARTICLE *Gynaecology*

## Non-invasive diagnosis of endometriosis based on a combined analysis of six plasma biomarkers

**A. Mihalyi<sup>1,2</sup>, O. Gevaert<sup>3</sup>, C. M. Kyama<sup>1,2,4</sup>, P. Simsa<sup>1,2,5</sup>,  
N. Pochet<sup>3,6,7</sup>, F. De Smet<sup>3,8</sup>, B. De Moor<sup>3</sup>, C. Meuleman<sup>1</sup>,  
J. Billen<sup>9</sup>, N. Blanckaert<sup>9</sup>, A. Vodolazkaia<sup>1,2</sup>, V. Fulop<sup>5</sup>,  
and T. M. D'Hooghe<sup>1,4,10</sup>**

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# After PhD: CM – Health Insurance Fund Social Security Physician

- Health insurance fund: Main tasks:
  - Health insurance implementation
    - Insurance: obligatory vs supplementary vs free
    - Reimbursements of health care vs benefits during incapacity for work
  - Co-manager
    - Member in different agencies, commissions, ... (NIDHI(RIZIV), KCE, ...)
    - Actively involved in negotiations concerning reimbursement rates
    - Spokesperson for and representation of patients
  - Sickness Funds law 1990
    - Goal: to promote the physical, psychological and social well-being – without profit seeking
      - Development of projects to promote a healthy lifestyle
      - To give information and advise to our members concerning their health

# Big data – Resource use data Datawarehouse (Oracle®) @ CM

3 types of data:

1. Resource use data
  - Reimbursement drugs, hospitalisations, medical acts, visits, physical therapy, ...
  - Very detailed, based on “nomenclature” codes (one number for each type of medical act) + information about: patient, date, health care professional, prescriber, place (hospital), price, ...
  - Direct clinical information is not available – only indirect (proxies)
2. Member data
  - Age, sex, address, social status (employee, independent, out of work, disabled, ...), date of death, ...
3. Auxiliary tables
  - Additional enrichment of data (e.g., for drugs: active ingredient, manufacturer, dose, price, number of units/box, ...)

For CM in 2021:



- 4.6 million members (40% market share in Belgium)
- 725 million records resource use data
- 14,5 billion euro health care reimbursements



# Big data – Resource use data Research with clinical or societal impact

Vaccine 33 (2015) 5188–5195  
Environmental Pollution 266 (2020) 115130

Contents lists available at ScienceDirect

 Environmental Pollution 

journal homepage: [www.elsevier.com/locate/envpol](http://www.elsevier.com/locate/envpol)

Antithrombotic medication and endovascular interventions associated with short-term exposure to particulate air pollution: A nationwide case-crossover study<sup>☆</sup>

Hans Scheers<sup>a, b</sup>, Tim S. Nawrot<sup>a, c</sup>, Benoit Nemery<sup>a</sup>, Katrien De Troeyer<sup>a</sup>, Michael Callens<sup>d</sup>, Frank De Smet<sup>a, d</sup>, An Van Nieuwenhuyse<sup>a, e</sup>, Lidia Casas<sup>a, f, \*</sup>

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<sup>d</sup> IMA-AIM, Tervurenlaan 188A - box 9, 1150 Brussel, Belgium  
<sup>e</sup> Department of Health Protection, Laboratoire National de Santé (LNS), Dudelange, Luxembourg  
<sup>f</sup> Epidemiology and Health Policy, Department of Epidemiology and Social Medicine, University of Antwerp, Universiteitsplein 1, 2610 Antwerp, Belgium

Check for updates

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<sup>\*</sup> Agency for Care and Health, Infectious Disease Control and Vaccinations, K. Albert II laan 35 Box 33, 1030 Brussels, Belgium



# Big data – Resource use data

## Detection of fraud



- Specific signals

- Ad hoc exploration

-> Predictive

- Anomaly detection

- Straightforward

- e.g., social networks

- More advanced

...

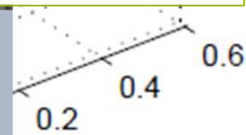
- Results NOT generalizable

representatie van de werkelijkheid door middel van data'. Wie belastingfraude wil voorspellen, zou data moeten verzamelen die het mogelijk maken om een onderscheid te maken tussen toekomstige fraudeurs en brave betalers. Alleen: het is niet bekend welke data zo'n onderscheid mogelijk maken, en dat verleidt sommigen wellicht om zomaar te beginnen met de data waar de belastingdienst de hand op kan leggen (*low hanging fruit*). Bijkomend punt is dat het ook niet bekend is welke belastingfraude tot nu toe onder de radar is gebleven. Zo wordt het een hachelijke zaak om steeds meer datapunten te verzamelen en daarin patronen te zoeken; de inbreuk op de privacy wordt steeds groter en succes is niet verzekerd. Mogelijk speelt hier ook nog een *selffulfilling prophecy* een rol. Wanneer wordt ingezoomd op degenen waarvan op enig moment bekend is dat zij frauderen, veronderstelt men ten onrechte dat de relevante patronen ook daar worden gevonden [Harcourt 2007].

2d



Yolande Berbers  
Mireille Hildebrandt  
Joos Vandewalle e.a.  
Koninklijke Vlaamse Academie van België  
voor Wetenschappen en Kunsten, 2017  
Standpunten 49



1ste Principale Component

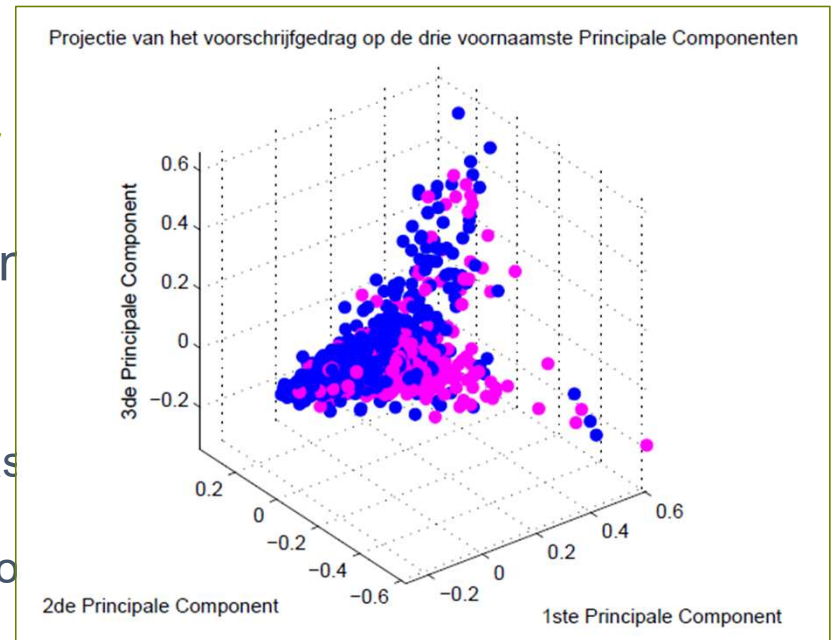
ster analysis



# Detection of fraud and waste

## Master thesis + PhD (Promotor

- Master thesis (Joachim Jacobs - 2007): Data on prescriptions by family physicians
- > Conclusions :
  - No real clusters only individual outliers, in most cases specific subpopulation of a specific physician
  - Clear relation between gender and prescription profile
- PhD Hannes De Meulemeester: Detection of Fraud and Overconsumption in Healthcare
  - Validation of algorithms expected after the summer



# Big data – Resource use data

## Observational studies - retrospective cohort studies

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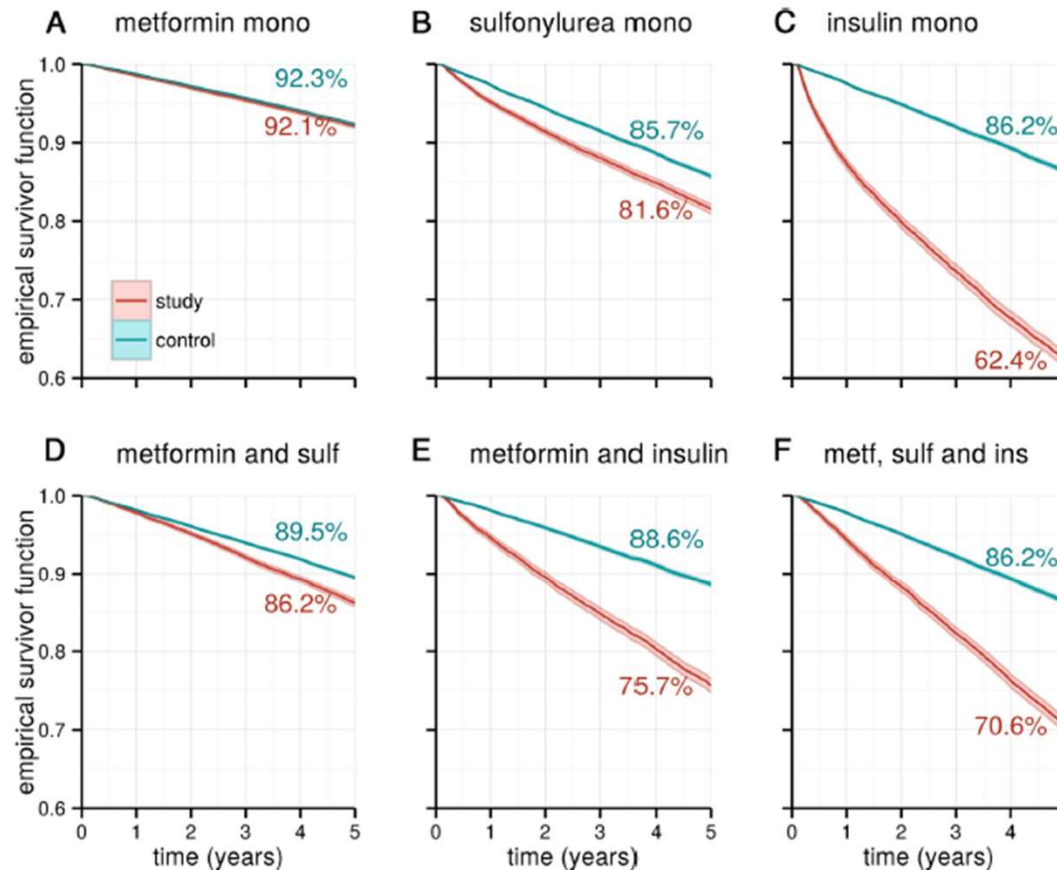
- Observational studies: e.g., Retrospective cohort studies
  - Comparison of cohort with and without specific medication
  - Large sample sizes
  - Long follow-up possible
  - Matched controls: age, sex, social status, region, comorbidity (if proxy available)
  - Outcome: survival available

# Observational study vs. randomized controlled trial

## PhD (Promotor b)

ORIGINAL ARTICLE

- PhD thesis (M) data: Data-driven
- Chapter 2: M cohort study

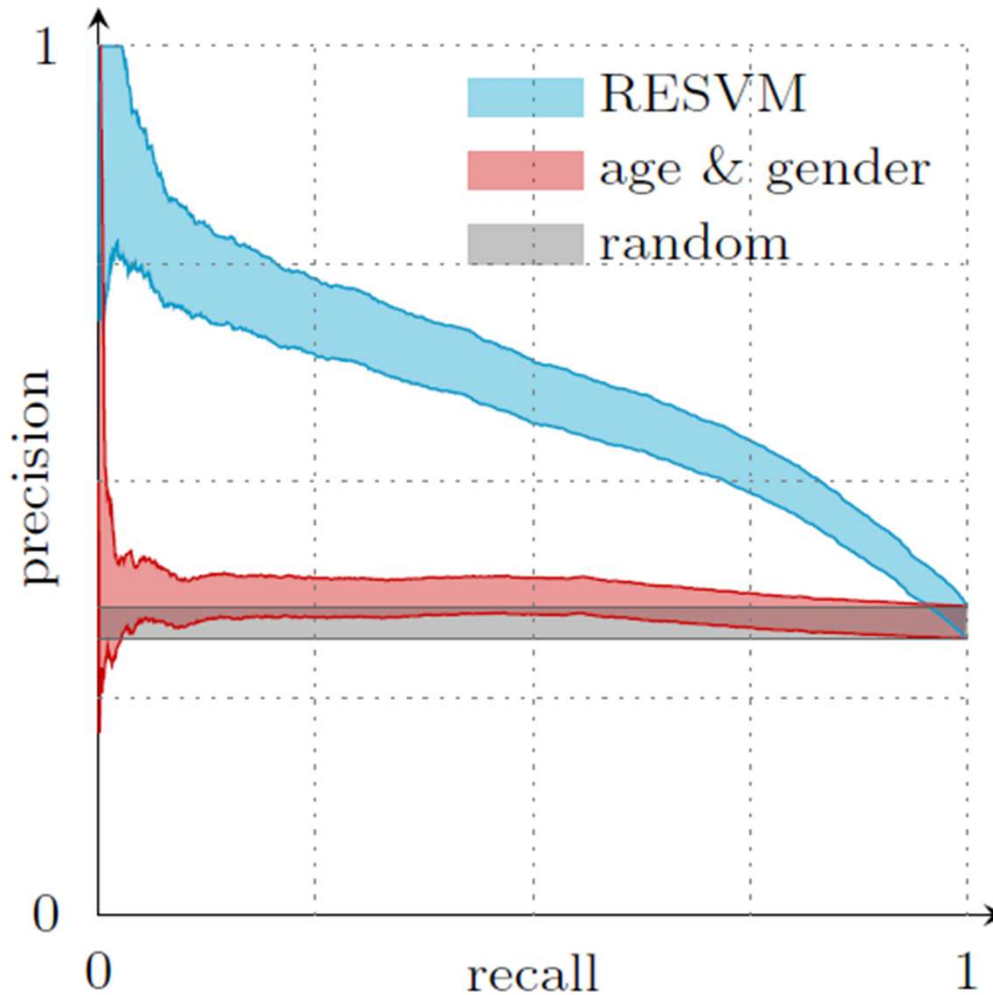


expenditure

large, controlled

# PhD Marc C Clinical app

- Predict who will (develop) diabetes) using
  - Scientific POC
  - Semi-supervised
  - Results (74.9% on test data)
    - Germany: 74.9%
  - No operational
    - No prospective
    - Model performance
      - False positive
      - False negative
    - Only use administrative data
    - CM is a social



## Challenges

• Limited data (Type 2)

• Limited data

• Limited data

• Limited data (with clinical)

• Limited data, e.g.,

# Research Department

& GEZONDHEID  
SAMENLEVING

alliative care



Incapacity for work



VLAANDEREN

VLAAMS  
INSTITUUT  
KWALITEIT  
VAN ZORG

Contact A - A - A  
Vragen?

## DE KWALITEIT VAN DE ZORG IN VLAANDEREN IN KAART GEBRACHT

Deze website biedt zorgvoorzieningen in Vlaanderen een centraal platform om hun resultaten op het vlak van kwaliteit van zorg op uniforme wijze publiek te rapporteren en te vergelijken. Deze metingen gebeuren aan de hand van een set van indicatoren ontwikkeld met de sector volgens een evidence-based methodologie. Deelnemende voorzieningen nemen zo een voortrekkersrol op in Vlaanderen op het vlak van zorgkwaliteit en transparantie.

Health inequalities

and cost of care





# Samen met jullie strijden wij elke dag tegen kanker

HELP MEE

WAT DOEN WIJ?

Kom op tegen Kanker

## € Wat doen we met je ingezamelde geld?

32,32 miljoen euro: dat ongelooflijke bedrag kunnen we inzetten in de strijd tegen kanker.

[Hoe besteden wij ons geld](#)

## i Onze website allesoverkanker.be

Wat is kanker? Hoe leef je ermee en wat erna? Lees er alles over op onze website vol kankerinformatie!

[Naar allesoverkanker.be](#)

## ♥ Help mee: steun de strijd tegen kanker!

Draag je steentje bij in de strijd tegen kanker: steun, doe mee aan of organiseer een actie.

[Doe mee](#)



### Verkoop mee plantjes

Het is nu en als vrijwilliger meeplantjes te



### De Col op

We lanceren een gloednieuwe fietsuitdaging!

Report 'Towards effective mentoring practices for migrant newcomers. Guidelines for social mentoring programs

Welkom op onze conferentie "Samen op weg naar Industrie 5.0", 22 juni, Leuven. Boeiende keynotes, fijne workshops, interessante panels, en boekvoorstelling

HULP NODIG





# Miscellaneous: Insurance Medicine - EBM

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- Physician specialist in insurance medicine and medical expertise
- Visiting professor Department of Public Health and Primary Care (Insurance Medicine)
  - Training in Evidence-based Health Care and research methodology

**KU LEUVEN**