



OLLSCOIL NA GAILLIMHÉ
UNIVERSITY OF GALWAY

AI Natural Language Processing at HRB-CRFG

Dr Conor Judge

Consultant Nephrologist
Senior Lecturer in Applied Clinical Data Analytics

University of Galway

BMBS BEng PhD MRCPI



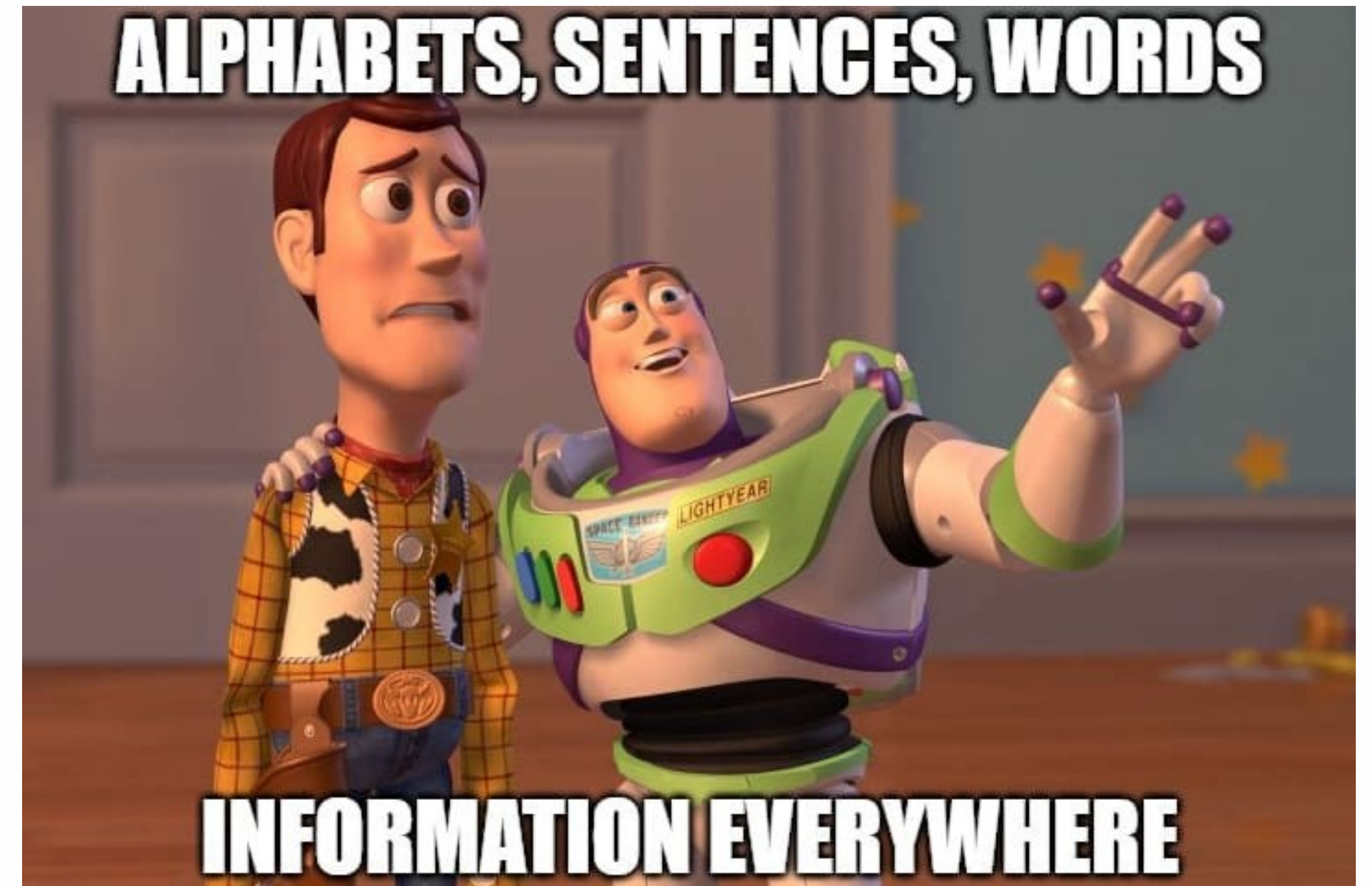
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Natural Language Processing (NLP)

Refers to the branch of artificial intelligence concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.

The IBM logo, consisting of the letters 'IBM' in a stylized, striped font.



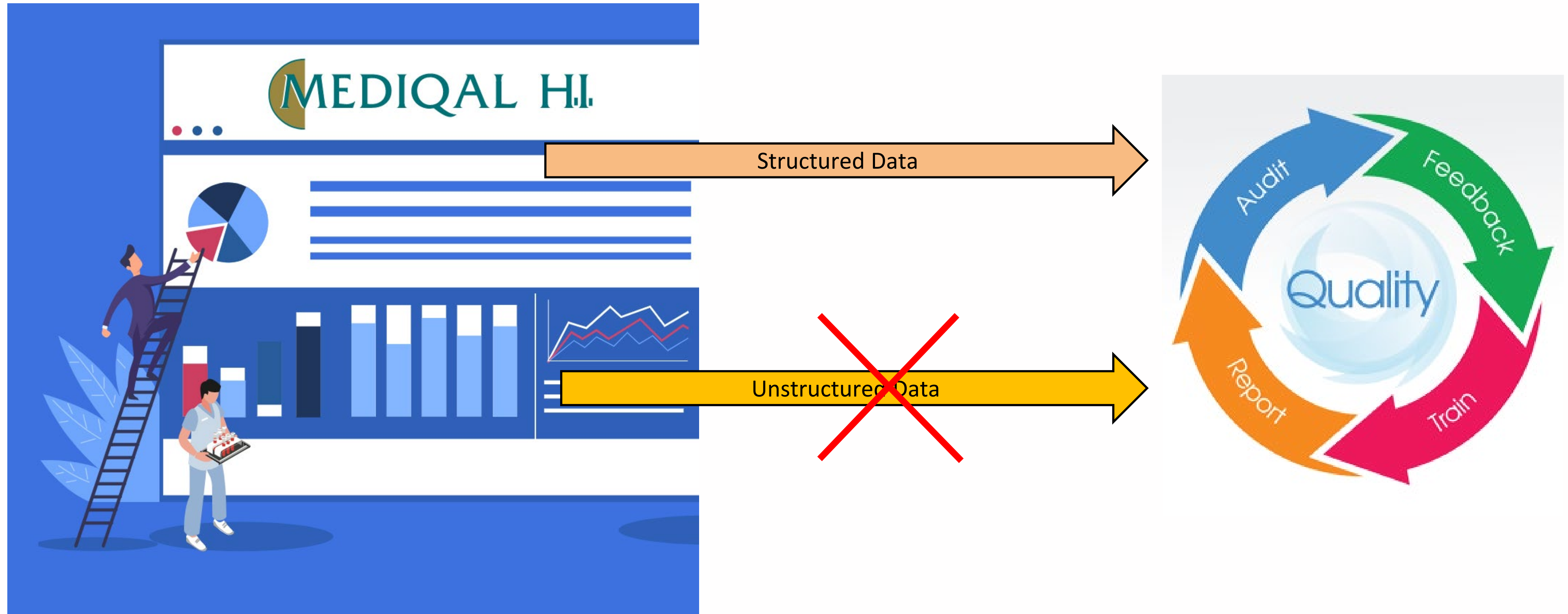


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Automated extraction of kidney failure concepts from clinical notes using AI



The Problem

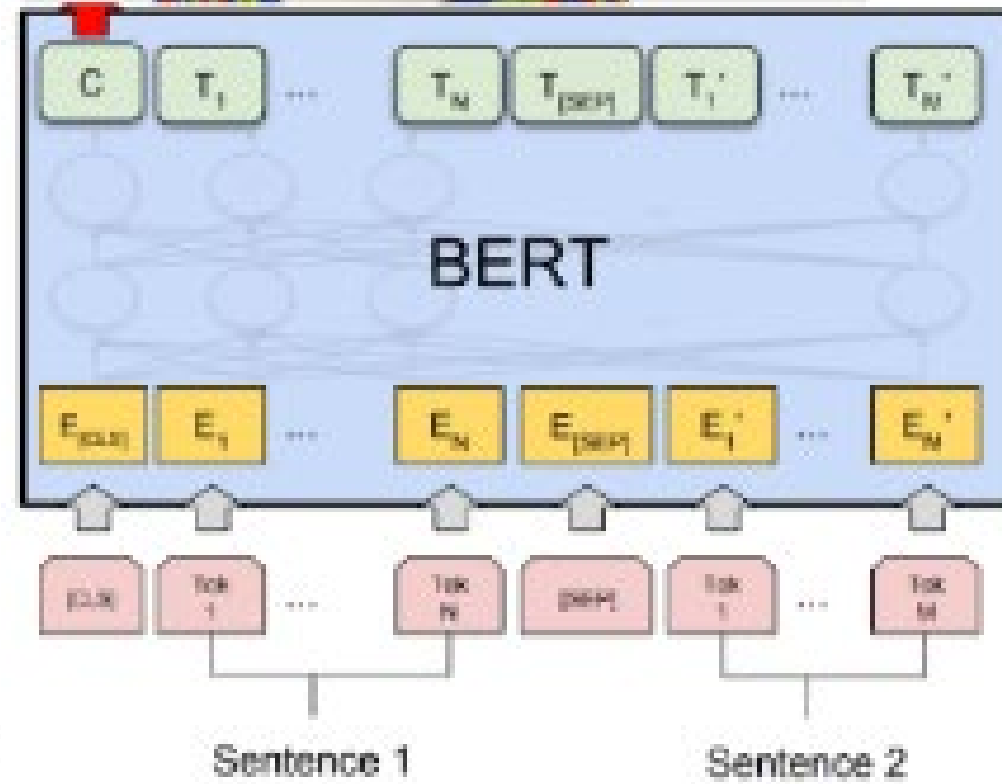




Type 2 Diabetes - Yes

IgA Nephropathy - No

Hypertension- Yes



Defect	Frequency (%)
Ventricular septal defect	22.7
Coarctation of the aorta	1.6
Atrial septal defect	4.0
Interatrial septal defect	2.7
Stenosis of P valve	1.3
Single ventricle	4.6
Tetralogy of Fallot	4.6
Apical left heart	4.6
Complete transposition of the great arteries	4.6
Double outlet right ventricle	1.4
Apical right heart	1.7
Single aorta	1.0
Pulmonic stenosis	2.7
Aortic stenosis	2.8
Transposition	11.6

Woolfson P, Hooper JG. Incidence of congenital heart disease. B. *Paediatric Cardiol* 1980; 1:100-102.



Dr Conor Judge
 Consultant Nephrologist and
 Senior Lecturer of Applied
 Clinical Data Analytics in UoG



Prof George Mellotte
 Consultant Nephrologist and HSE
 Clinical Lead Renal Services



Prof Richard Greene
 HSE Chief Clinical Information Officer



Prof Ed Curry
 Director of the Insight SFI Research
 Centre for Data Analytics at the UoG



Dr Howard Johnson
 HSE Clinical Lead Health Intelligence

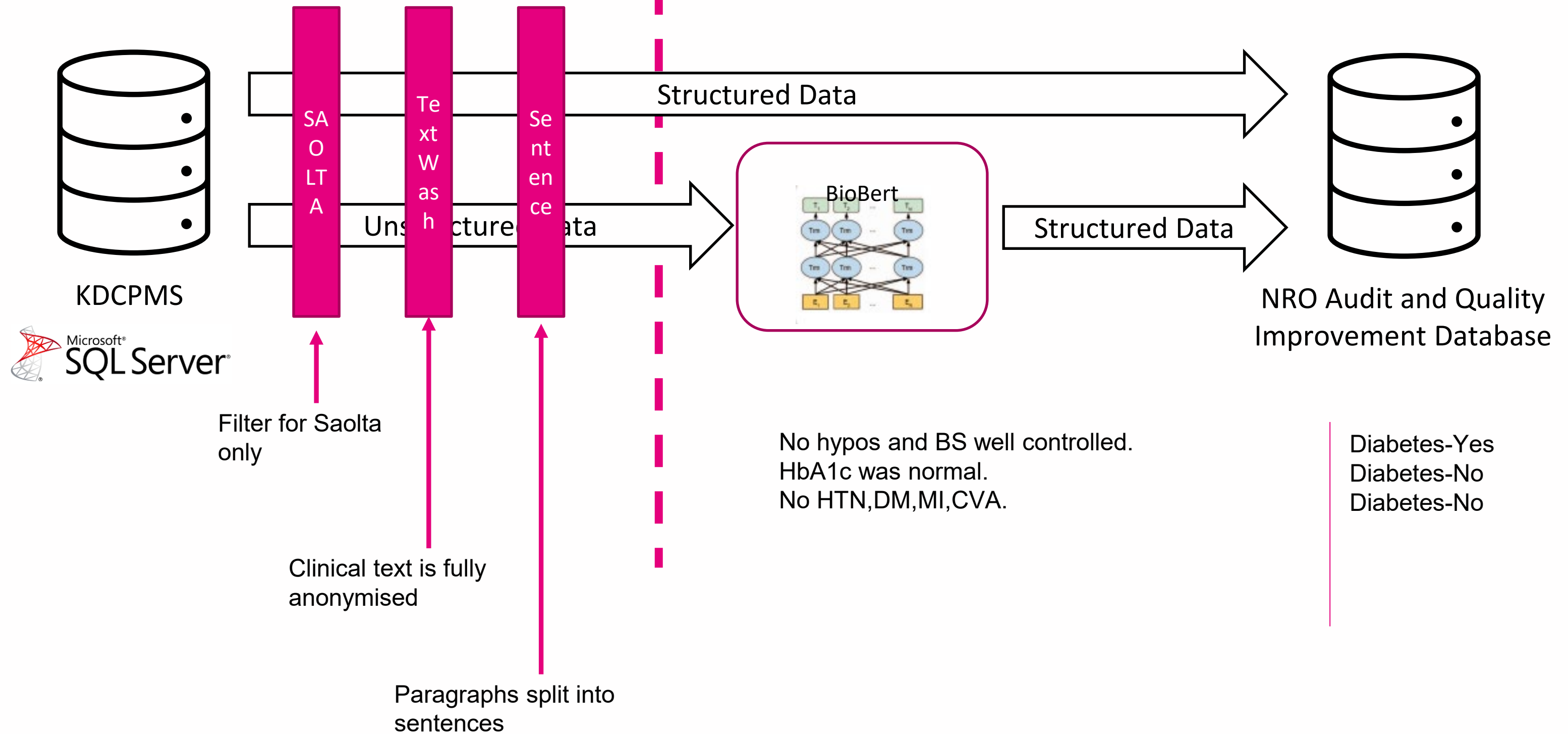


Dr Steve Griffin
 Innovation from
 Healthcare Lead,
 HIHI

Data Protection Impact Assessment (DPIA)

**HSE Application Specific Data Centre
(HSE National Renal Office)**

**HSE Data Lake
(HSE Integrated Information Service)**



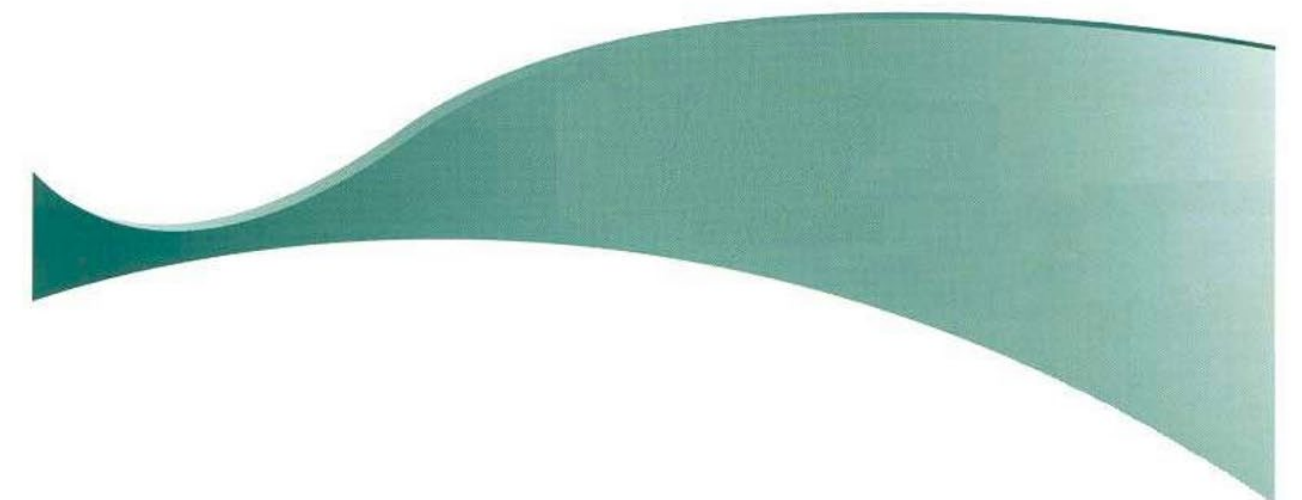
Data Protection Impact Assessment

- Section 1 – Initial Details (Threshold Assessment)
- Section 2 – Activity Details
 - How can data subjects exercise their right to access and to data portability under Article 15 and Article 20 of the GDPR?
 - How can data subjects exercise their right to rectification and erasure under Articles 16 & 17 of the GDPR?
 - Describe the organisational security measures associated with this activity:
 - Describe the technical security measures associated with this activity
- Section 4 – Risks and Risk Mitigation
- Section 5 – Data Subject Consultation
- Section 6 – DPO/DDPO Consultation



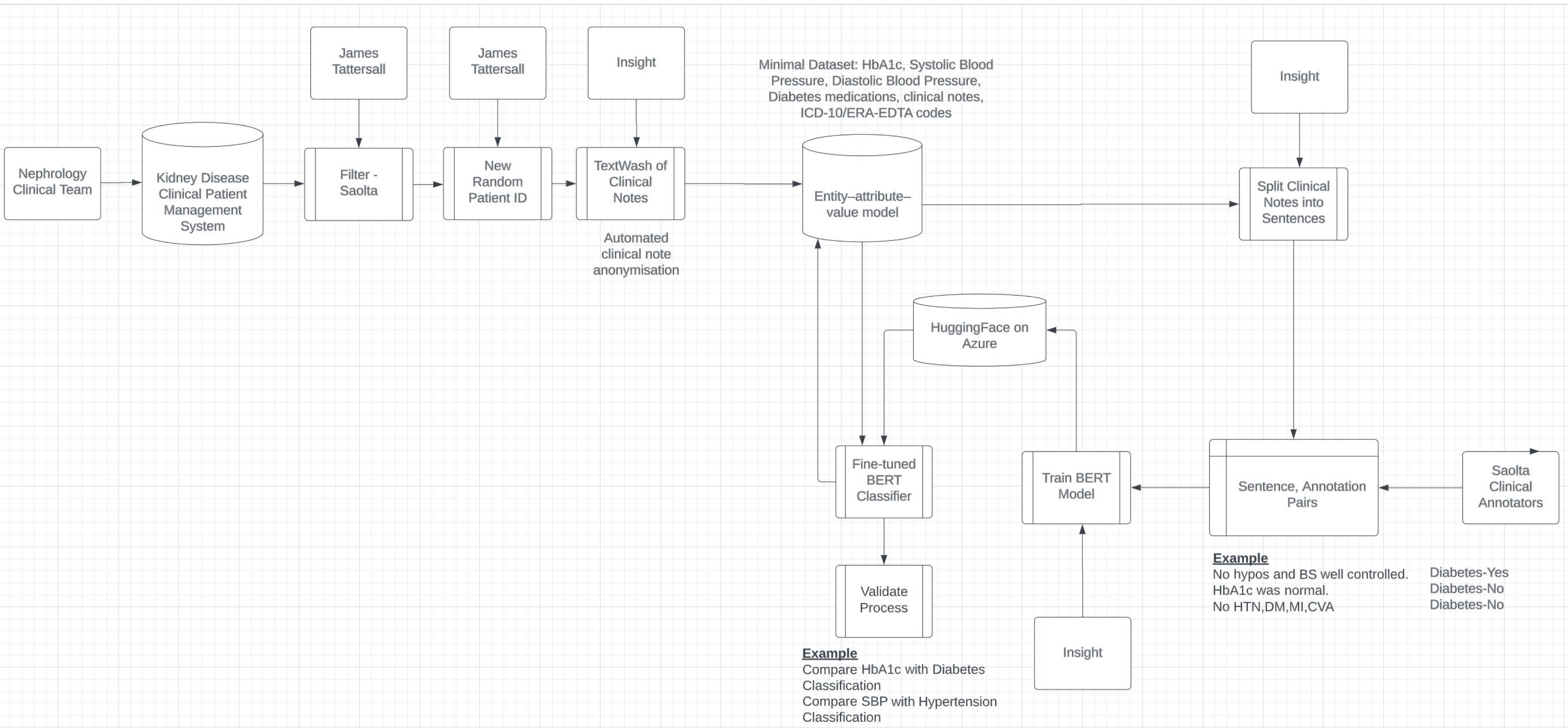
Privacy Impact Assessment (PIA) Form

Private & Confidential



This form should be completed with reference to the HSE Privacy Impact Assessment Process Guidance Document

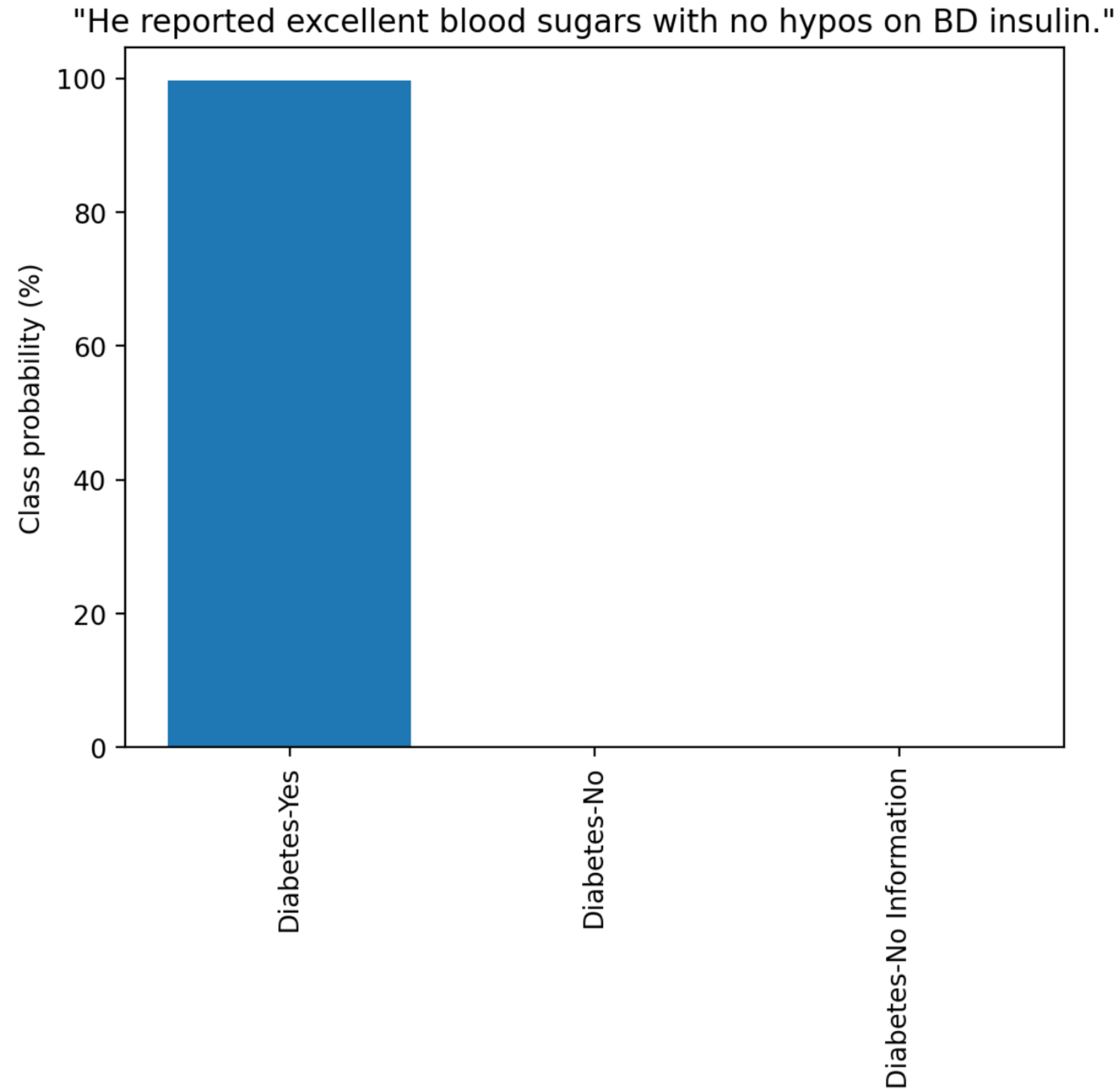
*Version 2.0
June 2019*



Diabetes sentence classifier

The blood sugars were normal in clinic today

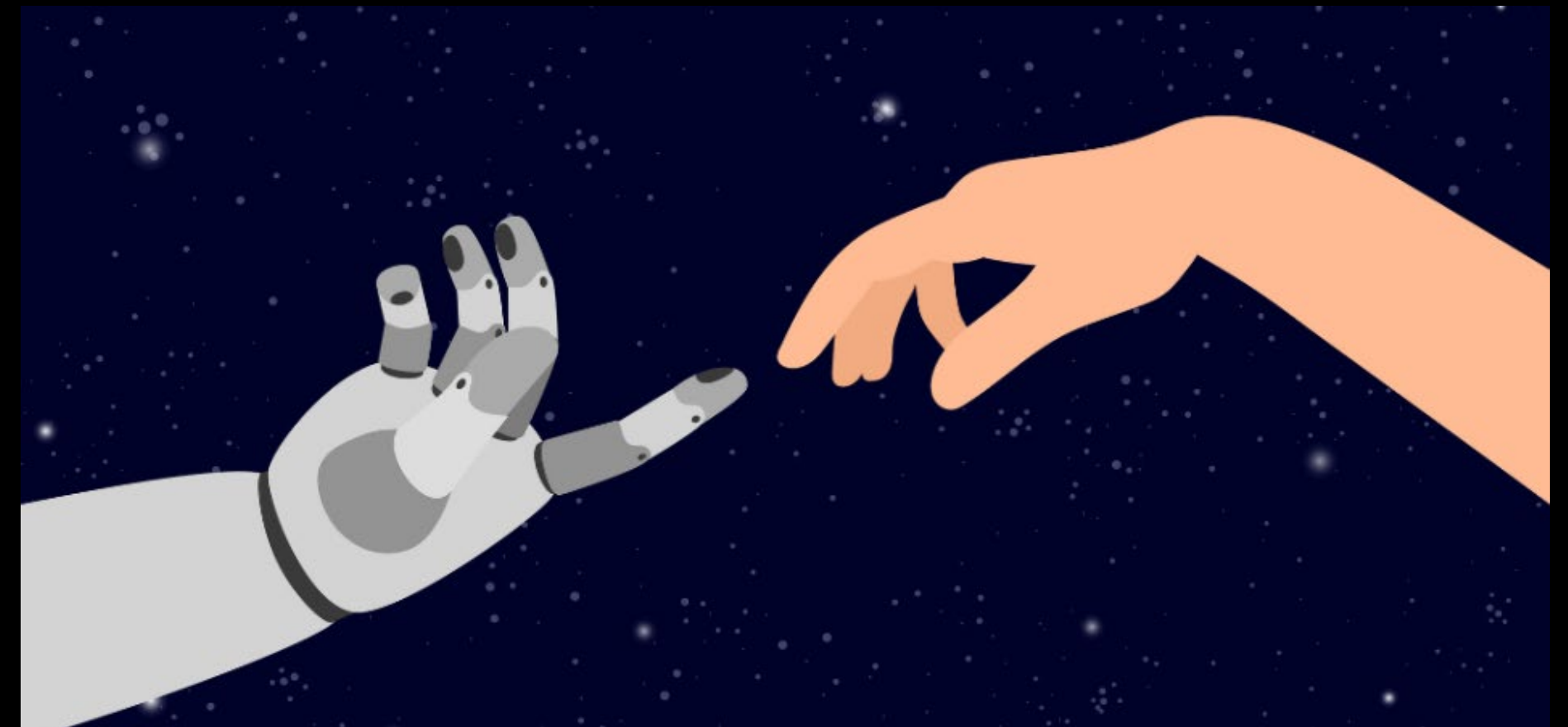
He reported excellent blood sugars with no hypos on BD insulin.



https://huggingface.co/spaces/conorjudge/diabetes_sentences

Automatic extraction of echocardiography concepts from free text echo reports using pre-trained language models

Sarah Flanagan, Pavel Roshanov, Paul Nolan, Martin O'Donnell, Conor Judge



Problem?

DEPARTMENT OF CARDIOLOGY,
GALWAY UNIVERSITY HOSPITALS

ECHO REPORT

*This echo has not been reviewed by a Cardiologist unless stated below.
Please correlate clinically.
Echo reports may be changed following Cardiologist review.*

Date 12/10/2022

Ref. Doc. Dr Conor Judge
Location AMUE

Referral Reason

HTN,

Echo Findings

SR

Non dilated LV cavity with mild to moderate LVH, basal sigmoid septum, over all good systolic function, estimated EF 55%

Stage 2 diastolic dysfunction

mitral E/A ratio = 1.07

E/e' = 18.16

LA dilated

RV not dilated, good function

Moderately dilated LA

RA not dilated

Aortic valve - opens well,

Mitral valve - opens well, mild MR seen

Tricuspid valve - opens well, trivial TR seen with estimated RVSP 26mmHg

IVC normal size and normal respiratory change hence RA pressure estimated as 3mmHg

Pulmonary valve - opens well, trivial PR seen

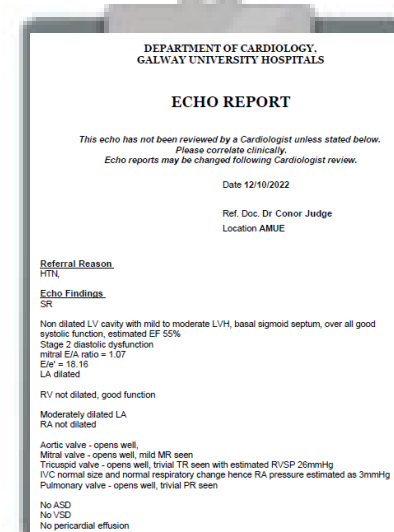
No ASD

No VSD

No pericardial effusion

- Free text format.
- Limitations
 - Unable to analyse the reports
 - Time restraints
 - Excessive costs
- Outputs of interest
 - Ejection fraction
 - Regional wall motion
 - Valve information
 - LVH
 - Atrial size

Our application



BioBERT



Ejection fraction = 50%

Atrial size = 4.0cm

LVH = 5mm

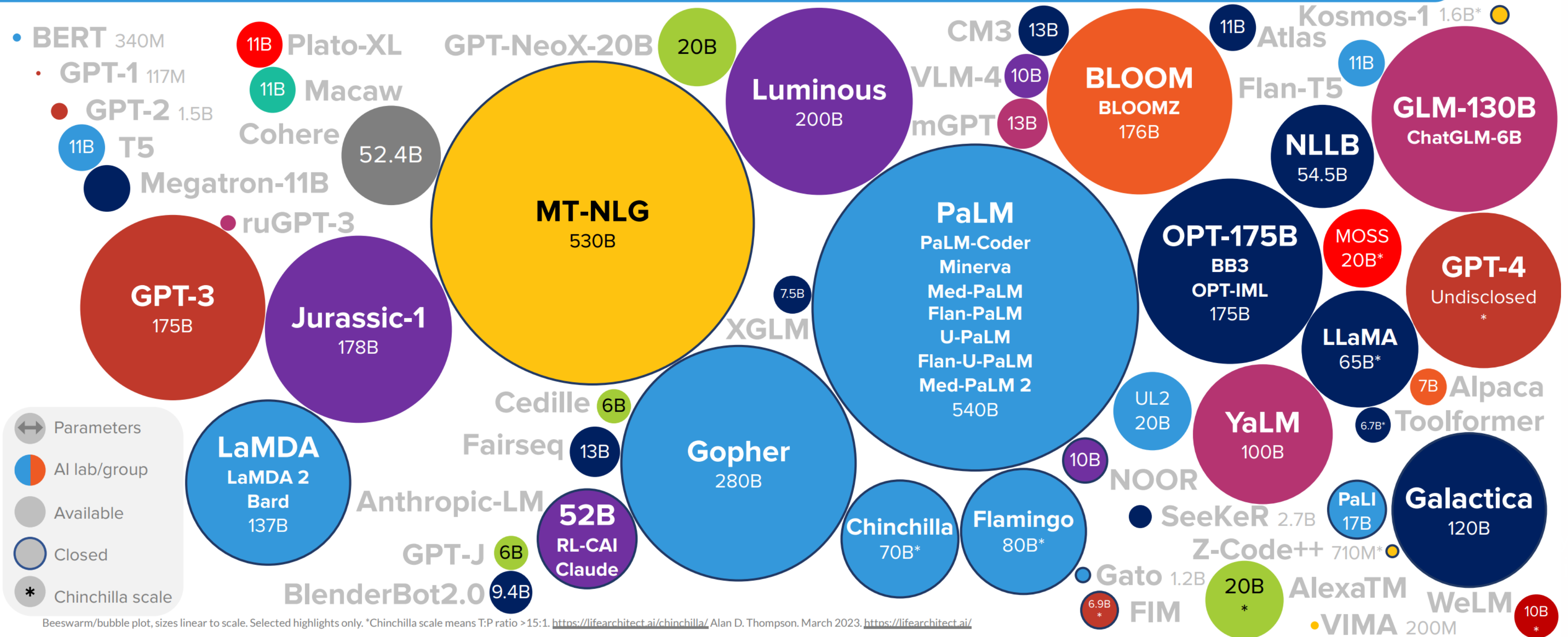
Feature	Prevalence (%)
Septicemia	20.7
Diabetes mellitus	19.9
Heart failure	19.0
Myocardial infarction	17.7
Stroke	17.0
Chronic kidney disease	16.8
Coronary artery disease	16.8
Chronic obstructive pulmonary disease	14.4
Chronic liver disease	13.7
Chronic lung disease	13.0
Chronic pain	12.7
Chronic depression	12.5
Chronic anxiety	11.9

Modified from Pathak, et al. Incidence of composite heart failure: A meta-analysis of cohort studies. *Journal of the American College of Cardiology* 2018; 71:1050-1058.



Large Language Models

LANGUAGE MODEL SIZES TO MAR/2023



Beeswarm/bubble plot, sizes linear to scale. Selected highlights only. *Chinchilla scale means T:P ratio >15:1. <https://lifaearchitect.ai/chinchilla/>; Alan D. Thompson, March 2023. <https://lifaearchitect.ai/>



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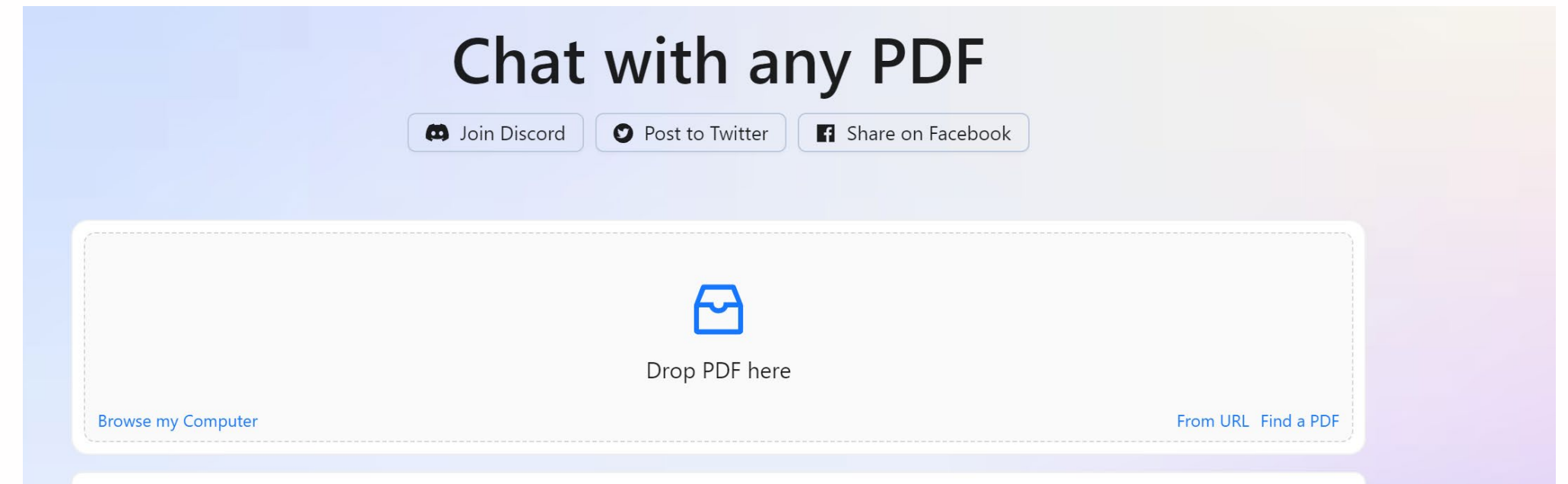
Other AI Tools



Secondary Data Analysis Projects
(SDAP) 2023

Guidance Notes

December 2022



www.chatpdf.com



LangChain



ChatGPT API



OI
UN

the Secondary Data Analysis Projects (SDAP) 2023 Guidance Notes! This PDF file provides important information and instructions for submitting your application through the HRB online Grant E-Management System.

Example questions:

- What is the deadline for submitting applications through the HRB online Grant E-Management System?
- Why is it important to have your application reviewed and approved by the authorized approver at the Host Institution before submitting it to the HRB?
- When does the application open for the SDAP 2023?

Yes, the HRB will contribute to the indirect costs of the research through an overhead payment of 30% of Total Direct Modified Costs (TDMC excludes student fees, equipment, and capital building costs) for laboratory or clinically based research and 25% of Total Direct Modified Costs for desk-based research. You can find more information on this in the HRB Policy on Overhead Usage on page 36 of the PDF.



Secondary Data Analysis Projects (SDAP) 2023

Guidance Notes

December 2022

Does the HRB pay overheads?



Secondary Data Analysis Projects (SDAP) 2023

Guidance Notes

December 2022

Can a co-applicant be salary supported?

A Co-Applicant may receive funding for items such as running costs and personnel but will not receive support towards his/her own salary if they are in salaried positions. However, Co-Applicants can request their own salary, depending on their role and percentage of time dedicated to the research for the duration of the award if they are contract/independent investigators. You can find more information on this on page 11 of the PDF.



Secondary Data Analysis Projects (SDAP) 2023

Guidance Notes

December 2022

What is the role of the data controller?

The role of a data controller is to decide how and why a data subject's personal data are processed. This can refer to a person, company, or other body. If two or more persons or entities decide how and why personal data are processed, they may be 'joint controllers', and they would both share responsibility for the data processing obligations. In the context of an HRB SDAP grant application, Data Controllers from the provider organization should be named as Co-applicants where justified by their level of involvement. Otherwise, they should be named as Collaborators unless the exceptions in Section 4.1 apply (the dataset is publicly accessible, the CSO has given a letter of comfort, or the access process will not commence prior to securing research funding). You can find more information on this on page 49 of the PDF.



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MSc in Applied Clinical Data Analytics

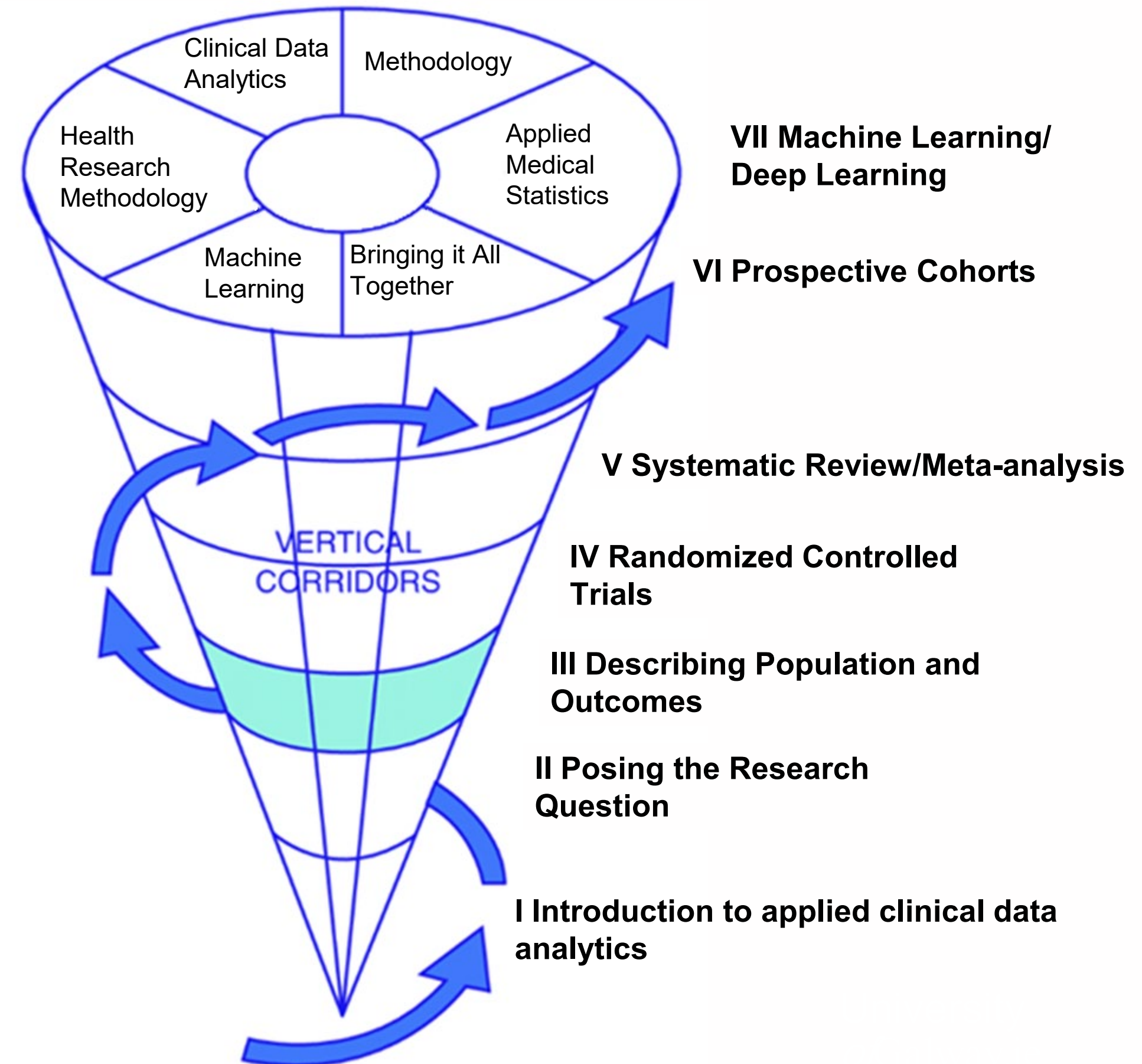
September 2023



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of Galway.ie

MODULAR STRUCTURE OF PROGRAMME

- Spiral Curriculum
 - Competency based
 - Simple to complicated concepts
- Specific - development for Healthcare professionals
 - Problem -based clinical research scenarios
 - Application to biomedical laboratory
- 3 Semesters
- 6 Modules (60 ECTs) and Final Year Project (30 ECTs)
 - No Supervisors
- In Person (Year 1)
 - Blended Delivery (Year 2)
 - Online only option available (Year 3)





OLLSCOIL NA GAILLIMHĒ
UNIVERSITY OF GALWAY

The Team



Dr Sonja Khan



Prof Andrew Smyth



Dr John Ferguson



Dr Catriona Reddin



Dr Conor Judge



Prof Martin O'Donnell



Dr Alberto Alvarez-Iglesias



An Institiúid do Thrialacha Cliniciúla
Institute for Clinical Trials

FutureTrials
30 & 31 May



Sharing a vision of excellence for clinical trials.

On 30th and 31st May 2023, the *University of Galway Institute for Clinical Trials* will be formally launched. During this milestone event, an inspiring vision for the Institute and the future of clinical trials in Ireland will be shared.

We would be honoured if you could join us to learn how the Institute will create a new standard of excellence for clinical trials in Ireland.

Ambition, innovation and partnership lie at the heart of this vision. Reinforcing this, the stature of speakers and attendees at the launch reflect the Institute's clear goal of becoming a global force in clinical trials.

Unlocking new possibilities for patients and medical professionals

The power of research and clinical trials to transform outcomes for patients has been proven repeatedly over many years. By integrating clinical, educational and commercial expertise, the *University of Galway Institute for Clinical Trials* will create a culture of enquiry, partnership and excellence.

For patients and medical professionals alike, the possibilities are ambitious. A clear sense of the Institute's future scale and impact will be shared on 30th & 31st May.

We hope you can join us then.

Where: Bailey Allen Hall

When: 30th & 31st May 2023

[Register here](#)

Leading a new era of excellence in clinical research.

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UniversityofGalway.ie

Email crfg@universityofgalway.ie to receive the registration link.