

Jornadas
FCCN 2023



Predictive Algorithms for Detection of Intimate Partner Violence in the Healthcare System



28 junho 2023



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Image generated with AI | DALL·E - 2

Make a background image that represents the use of Data, Informatics and Technology in Medicine, make it edgy and professional-looking, trending on art station

Mariana × DALL·E 2

Human & AI



CESPU

TEACHING HEALTH SINCE 1982

CESPU

HIGHER EDUCATION UNIVERSITY



4 Degrees

Biomedical Sciences
Forensic Science
Nutrition
Psychology

3 Integrated Masters

Pharmaceutical Sciences
Odontology
Veterinary Medicine

2 Specialization Courses

Orthodontics
Oral Rehabilitation and Prosthodontics

6 Masters

Clinical Analysis
Forensic Laboratory Science and Techniques
Molecular Therapies
Orthodontics
Psychology of Health and Neuropsychology
Oral Rehabilitation

2 PhD

Biological Sciences Applied to Health
Toxicology

Total of Students – 1635

Foreign Students – 52,3 %

CESPU

HIGHER EDUCATION POLYTCHENIC



CESPU
INSTITUTO POLITÉCNICO
DE SAÚDE DO NORTE

8 CTESP

Support to Dental and General Doctor
Bioanalysis and Control
Esthetic Cosmetic and Wellness
Gerontology
Thermal and Wellness
Clinical Secretary
Health and Exercise
Family and Community Service

10 Degrees

Nursing (ESSVA and ESEnfTS)
Pharmacy
Clinical Physiology
Physiotherapy (ESSVA and ESTeSTS)
Osteopathy
Podiatry
Dental Prosthesis
Medical Image and Radiotherapy

2 Specialization Courses

Nursing Rehabilitation (ESSVA and ESEnfTS)

4 Master

Physiotherapy
Sports Podiatry
Children's Podiatry
Mental Health and Psychiatry Nursing

Total of Students - 1713

Foreign Students – 27,5 %

CESPU



Predictive Algorithms for Detection of Intimate Partner Violence in the Healthcare System

Mariana Canelas Pais
Teresa Magalhães (Principal Investigator)
Ricardo Dinis-Oliveira
Tiago Taveira-Gomes

An abstract representation of a research study on domestic violence as digital art.

Mariana × Midjourney
Human & AI



VIOLÊNCIA DOMÉSTICA

World Health Organization

- Reconhecida pela Organização Mundial de Saúde (OMS) como um problema significativo de saúde pública
- Elevada prevalência global
- Consequências graves

International Statistical Classification of Diseases and Related Health Problems

ICD 10 > T74, Y07, Z61

INTERVENÇÃO

Intervenção Legal e Social

Intervenção de Saúde

TREAT	REABILITATE
PROTECT	PREVENT

VIOLÊNCIA DOMÉSTICA

Prevalência (Europa Ocidental)

Maus-tratos infantis ~19%

Violência entre parceiros íntimos ~20%

Maus-tratos a idosos ~19%

~64% em contexto institucional

Outros



An abstract representation of a research study on domestic violence as digital art.

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VIOLÊNCIA DOMÉSTICA

Fenómeno escondido

Someone hiding in a dark room because of fear and shame. Face not visible, hands hiding the face. Emotional. Digital art.

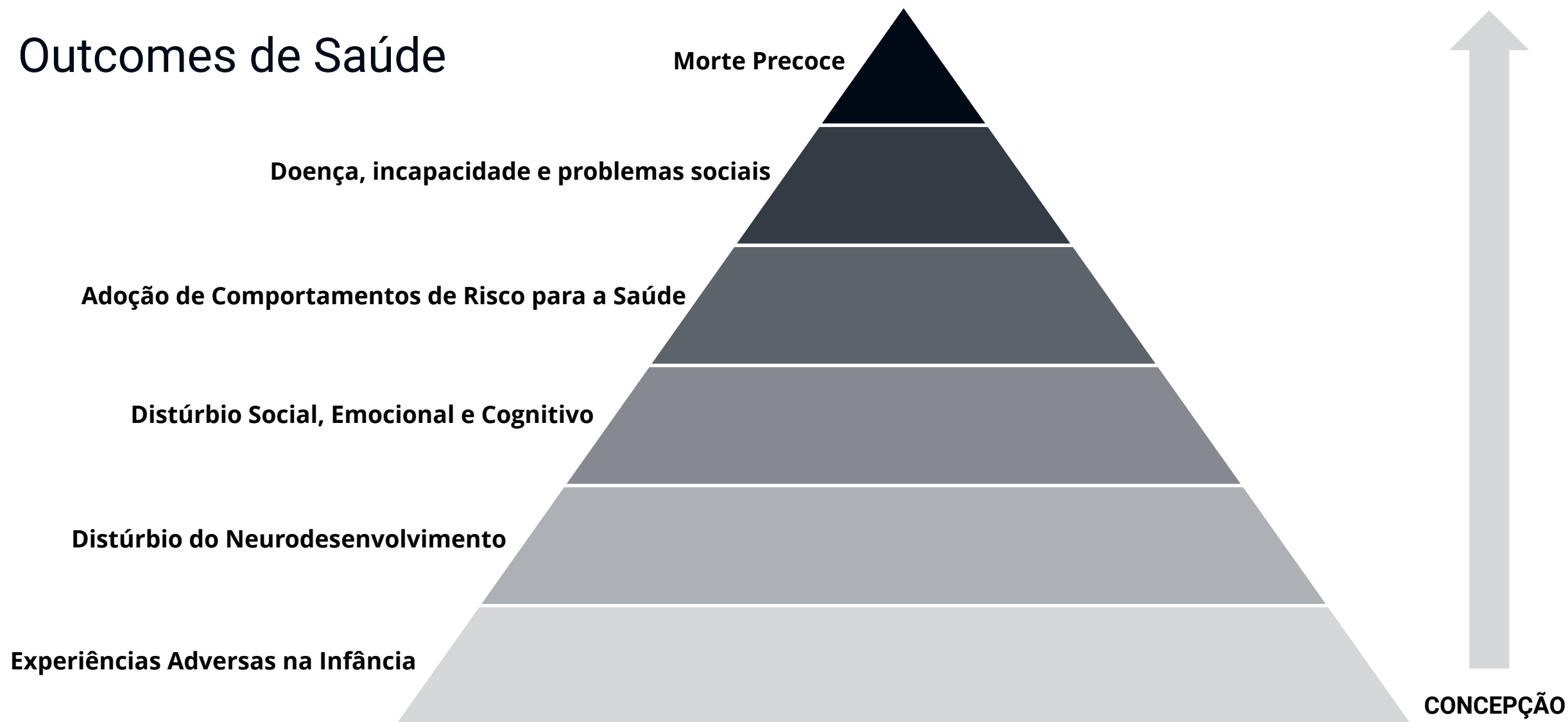
Mariana × Midjourney

Human & AI



VIOLÊNCIA DOMÉSTICA

Outcomes de Saúde



Adapted from Felitti, Vincent J., et al. "Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study." *American journal of preventive medicine* 14.4 (1998): 245-258.

VIOLÊNCIA DOMÉSTICA

Intervenção de Saúde

Article

Health Outcomes in Women Victims of Intimate Partner Violence: A 20-Year Real-World Study

Maria Clemente-Teixeira ¹, Teresa Magalhães ^{1,2,3,4}, Joana Barrocas ^{5,6}, Ricardo Jorge Dinis-Oliveira ^{1,3,4,7}  and Tiago Taveira-Gomes ^{2,3,8,9,*} 

Table 1. Female population observed at LHUM, 2001–2021.

General Female Population of LHUM (n)	Suspected Female Victims of IPV—n (%)		
	G1 (Codes and Clinical Notes)	G2 (Codes)	G3 (Clinical Notes)
72,376	1676 (2.3)	766 (1.1)	931 (1.3)

Table 2. Victims’ history of substance consumption (health risk behaviours).

Substance Consumption	General Female Population		Suspected Female Victims of IPV					
			G1		G2		G3	
	n	%	n	%	n	%	n	%
Tobacco	12,356	17.1	395	23.6	200	26.1	199	21.4
Alcohol	274	0.4	22	1.3	19	2.5	4	0.4
Drugs	54	0.1	8	0.5	7	0.9	1	0.1

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Table 3. Victims’ history of traumatic injuries and intoxications (medicolegal aetiology unknown).

Traumatic Injuries and Intoxications	General Female Population		Suspected Female Victims of IPV					
			G1		G2		G3	
	n	%	n	%	n	%	n	%
Bone fracture	23,998	33.2	796	47.5	409	53.4	394	42.3
Bone dislocation	1828	2.5	64	3.8	31	4.1	35	3.8
Open wound	17,835	24.6	621	37.1	307	40.1	322	34.6
Superficial injury	1850	2.6	76	4.5	43	5.6	35	3.8
Crushing injury	401	0.6	17	1	6	0.8	11	1.2
Burns	2161	3	76	4.5	40	5.2	35	3.8
Intoxications	9737	13.5	408	24.3	206	26.9	200	21.5

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and Tiago Taveira-Gomes ^{2,3,8,9,*} 

Table 4. Victims’ mental health conditions.

Mental Health Conditions	General Female Population		Suspected Female Victims of IPV					
			G1		G2		G3	
	n	%	n	%	n	%	n	%
Headaches	1793	2.5	79	4.7	52	6.8	28	3.0
Sleep disorders	5016	6.9	285	17.0	191	24.9	98	10.5
Eating disorders	133	0.2	9	0.5	6	0.8	4	0.4
Poor health perception	1348	1.9	58	3.5	36	4.7	24	2.6
Unspecified chronic pain	6947	9.6	286	17.1	179	23.4	114	12.2
Memory disorders	252	0.4	18	1.1	12	1.6	6	0.6
Anxiety disorders	15,552	21.5	699	41.7	440	57.4	271	29.1
Major psychiatric disorder	25,352	35.0	1091	65.1	579	75.6	527	56.6
Posttraumatic stress disorder	74	0.1	13	0.8	10	1.3	3	0.3
Suicidal ideation	212	0.3	36	2.2	19	2.5	19	2.0
Social deprivation	957	1.3	109	6.5	80	10.4	29	3.1
Anxiolytics consumption	37,263	51.5	1276	76.1	670	87.5	627	67.4
Sedatives consumption	18,583	25.7	727	43.4	392	51.2	341	36.6
Antidepressants consumption	28,080	38.8	1156	69.0	624	81.5	551	59.2
Antipsychotics consumption	6209	8.6	418	24.9	208	27.2	217	23.3

Article

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and Tiago Taveira-Gomes ^{2,3,8,9,*} 

Table 5. Victims’ somatic conditions.

Somatic Conditions	General Female Population		Suspected Female Victims of IPV					
			G1		G2		G3	
	n	%	n	%	n	%	n	%
Obesity	12,570	17.3	389	23.2	234	30.5	162	17.4
Hypercholesterolemia	27,750	38.3	772	46.0	382	49.8	398	42.7
Metabolic syndrome	44,298	61.2	1 232	73.5	623	81.3	619	66.4
Type 2 diabetes	3354	4.6	157	9.3	92	12.0	69	7.4
Non-alcoholic fatty liver disease	436	0.6	35	2.0	17	2.2	19	2.0
Chronic obstructive pulmonary disease	416	0.6	17	1.0	8	1.0	9	1.0
Hypertension	13,262	18.3	421	25.1	267	34.9	163	17.5
Early heart disease	254	0.4	12	0.7	5	0.7	7	0.8
Myocardial infarction	212	0.3	11	0.7	5	0.7	6	0.6
Ischaemic stroke	893	1.2	55	3.3	30	3.9	26	2.8
Haemorrhagic stroke	63	0.1	4	0.2	3	0.4	1	0.1
Chronic kidney disease	544	0.8	24	1.4	10	1.3	15	1.6
Inflammatory pelvic disease	210	0.3	10	0.6	4	0.5	6	0.6
Urinary tract infection	3709	5.1	122	7.3	64	8.4	60	6.4
Sexually transmitted infections	1106	1.5	57	3.4	37	4.8	20	2.2
Preeclampsia	592	0.8	20	1.2	15	2.0	5	0.5
Desired pregnancy	1688	2.3	31	1.9	15	2.0	16	1.7
Undesired pregnancy	190	0.3	8	0.5	7	0.9	1	0.1
Spontaneous abortion	1767	2.4	82	4.9	45	5.9	38	4.1
Voluntary abortion	609	0.8	25	1.5	16	2.1	9	1.0
Chronic immune infective disorder	1085	1.5	32	1.9	15	2.0	17	1.8
Asthma	4583	6.3	141	8.4	72	9.4	70	7.5
Cancer	7550	10.4	253	15.1	124	16.2	131	14.1
Cervical cancer	248	0.3	10	0.6	6	0.8	4	0.4

VIOLÊNCIA DOMÉSTICA

Algoritmo Preditivo



A predictive algorithm at the service of the security authorities to predict violence; use references from the minority report film; sci fi ambience; digital art

Mariana × Midjourney
Human & AI

ALGORITMO PREDITIVO

- 1 Detecção
- 2 Reporte
- 3 Disgnóstico
- 4 Avaliação Forense

OBJETIVO GERAL



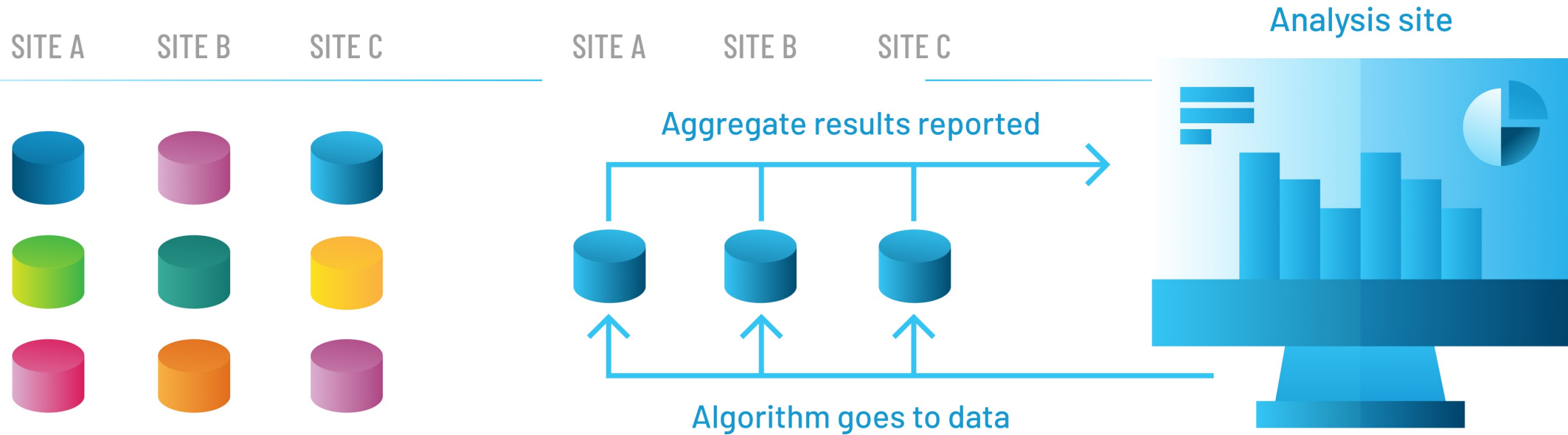
A predictive algorithm at the service of the security authorities to predict violence; use references from the minority report film; sci fi ambience; digital art

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OBJETVO

Desenvolver um **modelo preditivo para suspeita de violência doméstica entre parceiros íntimos** baseado em fatores de risco latentes que podem ser identificados nos registros de saúde eletrônicos regularmente produzidos por profissionais de saúde no contexto da prática clínica.

PROCESSO DE IMPLEMENTAÇÃO

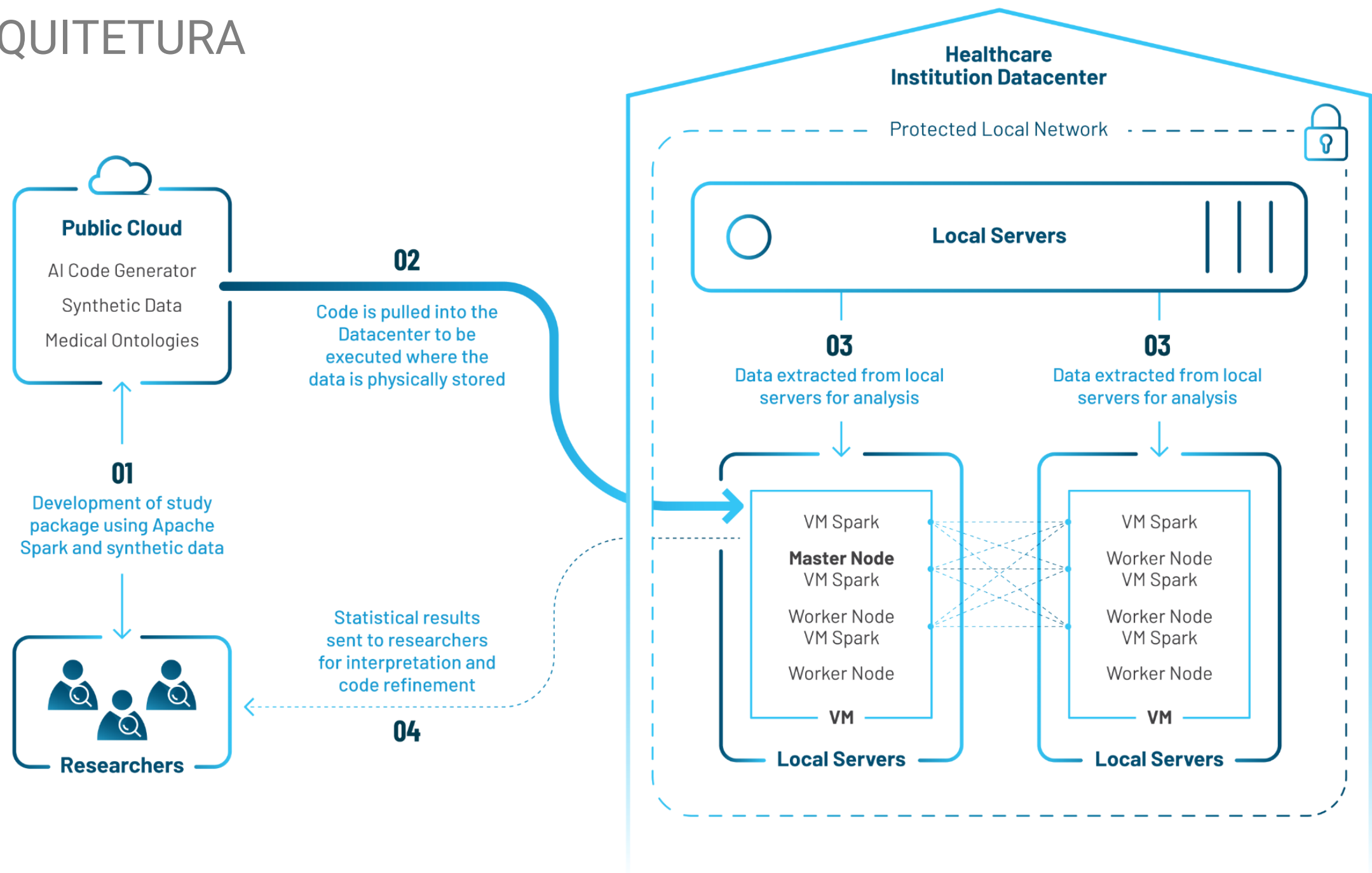


**EHRs
REGISTRIES**

**REAL-WORLD
DATA**

**REAL-WORLD
EVIDENCE**

ARQUITETURA



LIMITAÇÕES



*A very large futuristic datacenter, sci fi
ambience, digital art.*

Mariana × Midjourney

Human & AI

LIMITAÇÕES

*An abstract representation of data
privacy leaks in the context of health
data, as digital art.*

Mariana × Midjourney
Human & AI

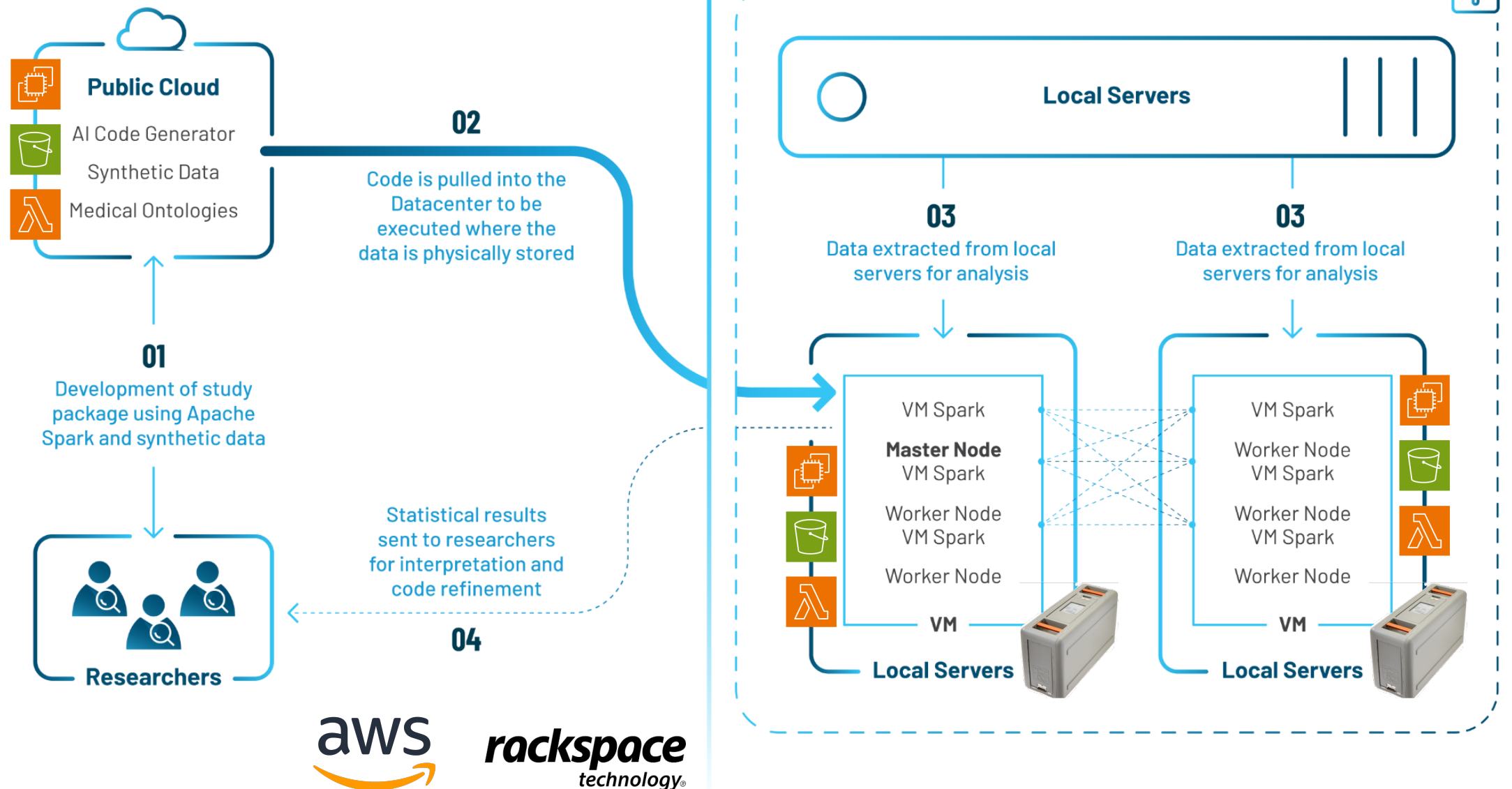


AWS SNOWBALL DEVICES

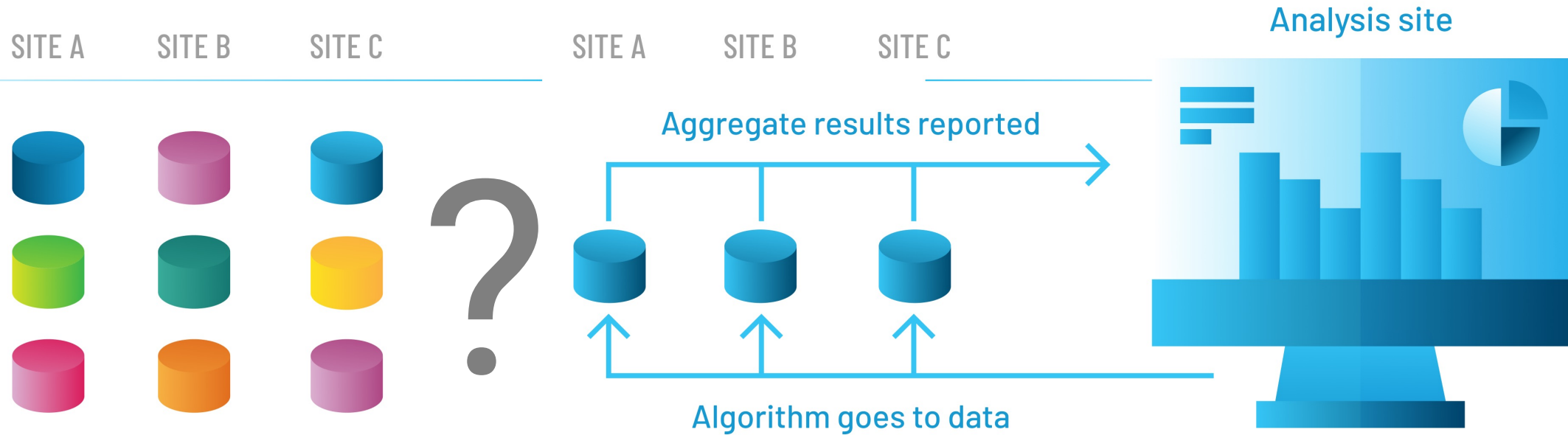


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ARQUITETURA



PROCESSO DE IMPLEMENTAÇÃO



**EHRs
REGISTRIES**

**REAL-WORLD
DATA**

**REAL-WORLD
EVIDENCE**

HARMOMIZAÇÃO DE DADOS

DATA STANDARDS

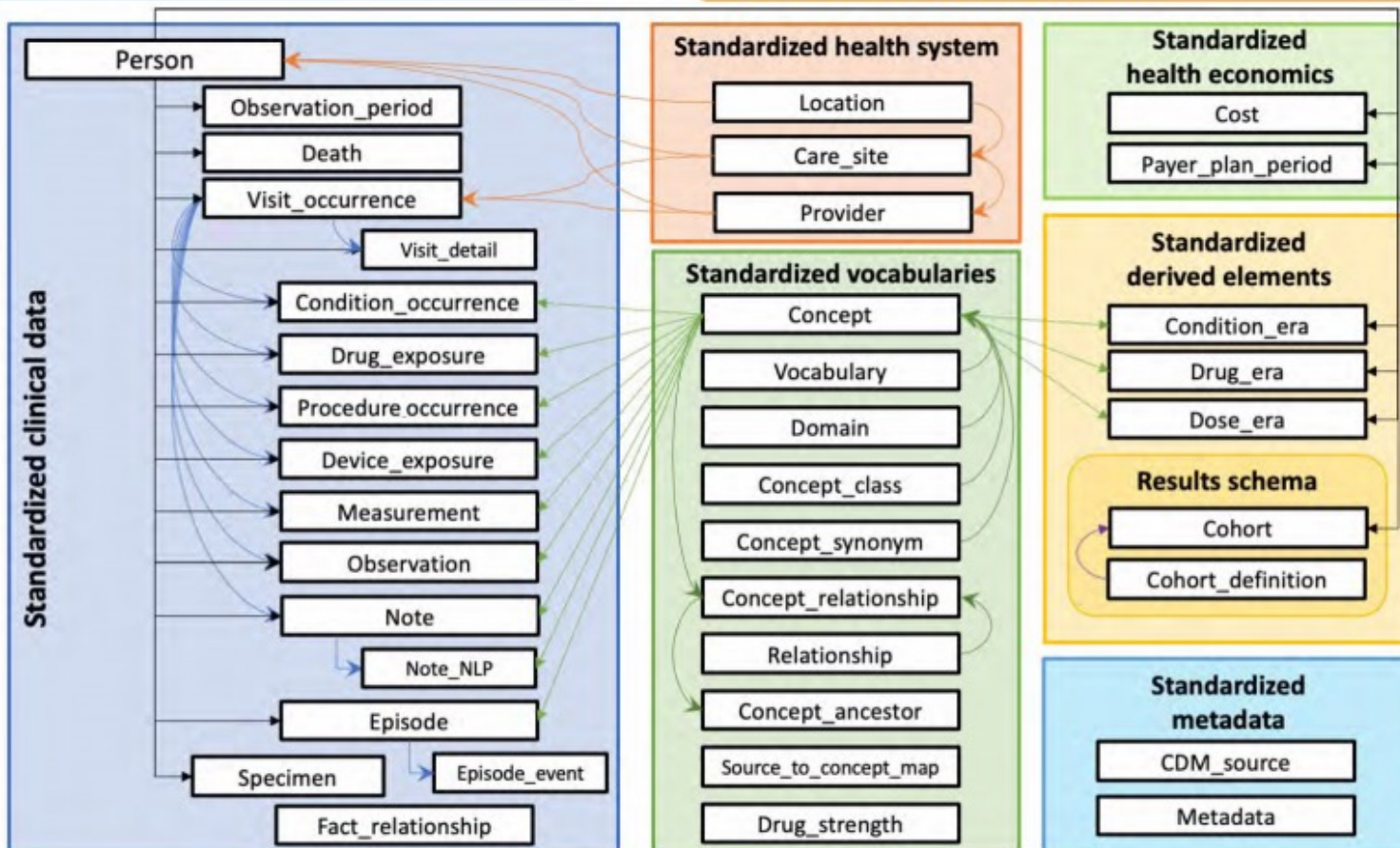
OMOP Common Data Model

The Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) is an open community data standard, designed to standardize the structure and content of observational data and to enable efficient analyses that can produce reliable evidence.



"The OMOP Common Data Model serves as the foundation of all our work in the OHDSI community, and I'm proud that our open community data standard has been so widely adopted and so extensively used to generate reliable evidence."

- **Clair Blacketer**
2020 Titan Award for
Data Standards
recipient



OMOP CDM By The Numbers

37 tables

- 17 to standardize clinical data
- 10 to standardize vocabularies

394 fields

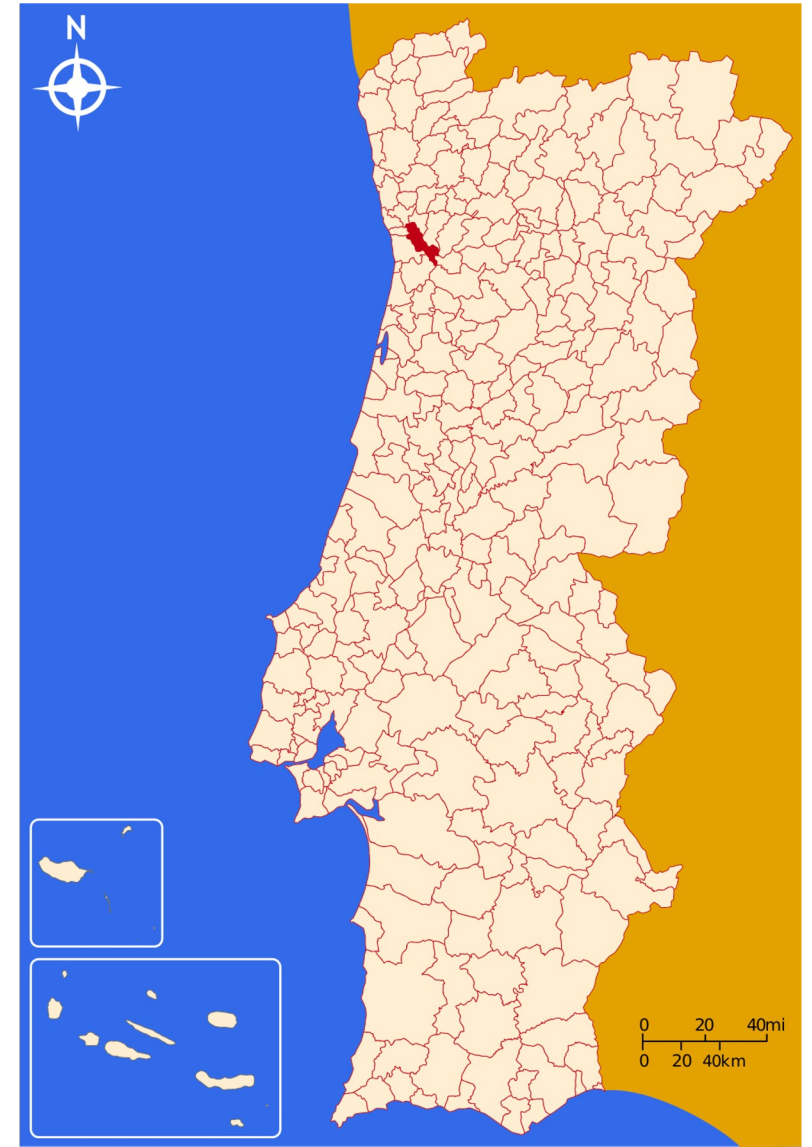
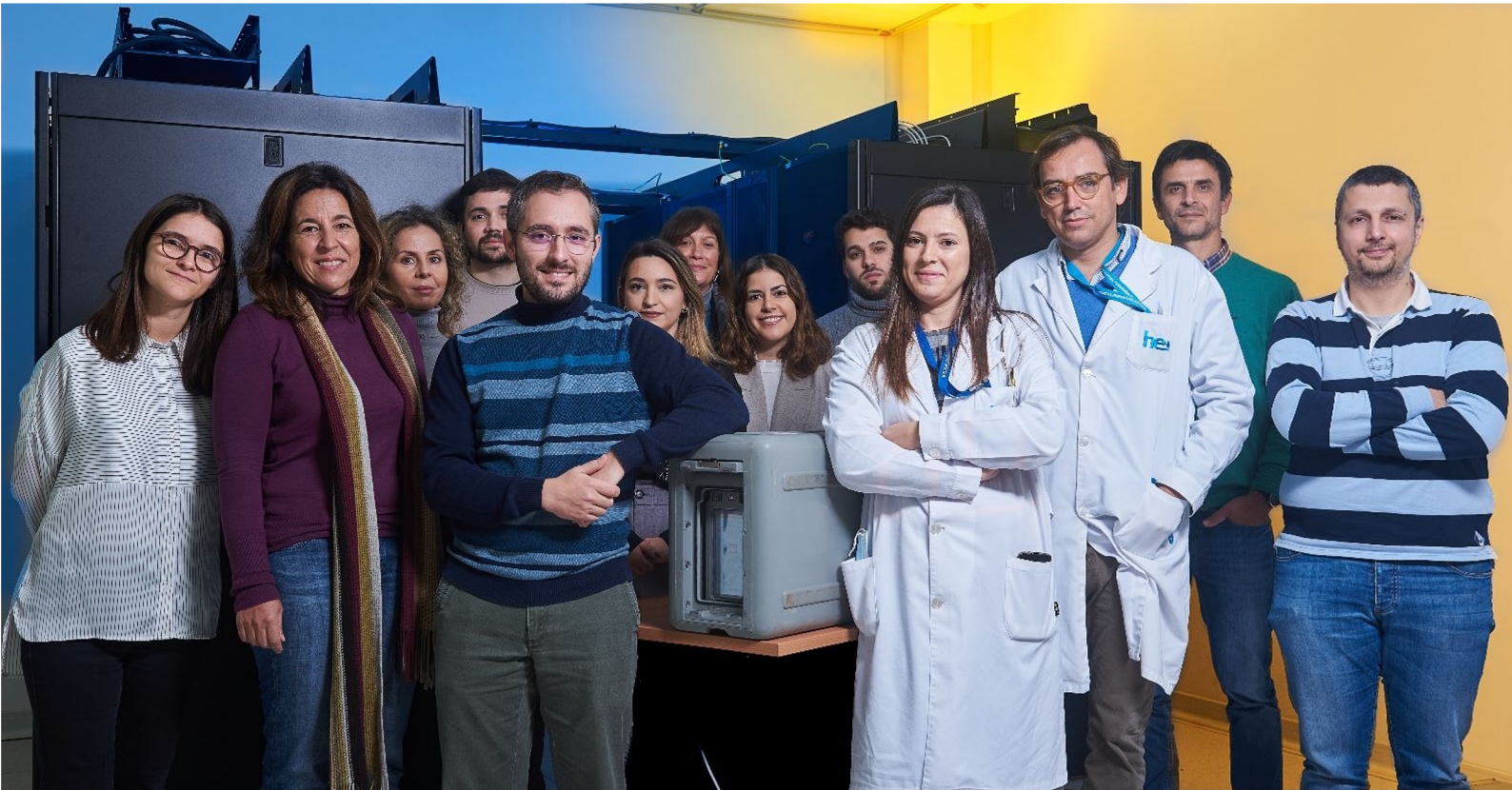
- 193 with `_id` to standardize identification
- 101 with `_concept_id` to standardize content
- 43 with `_source_value` to preserve original data

1 Open Community Data Standard

DESENHO MULTICÊNTRICO

Hospital Escola Fernando Pessoa - Gondomar

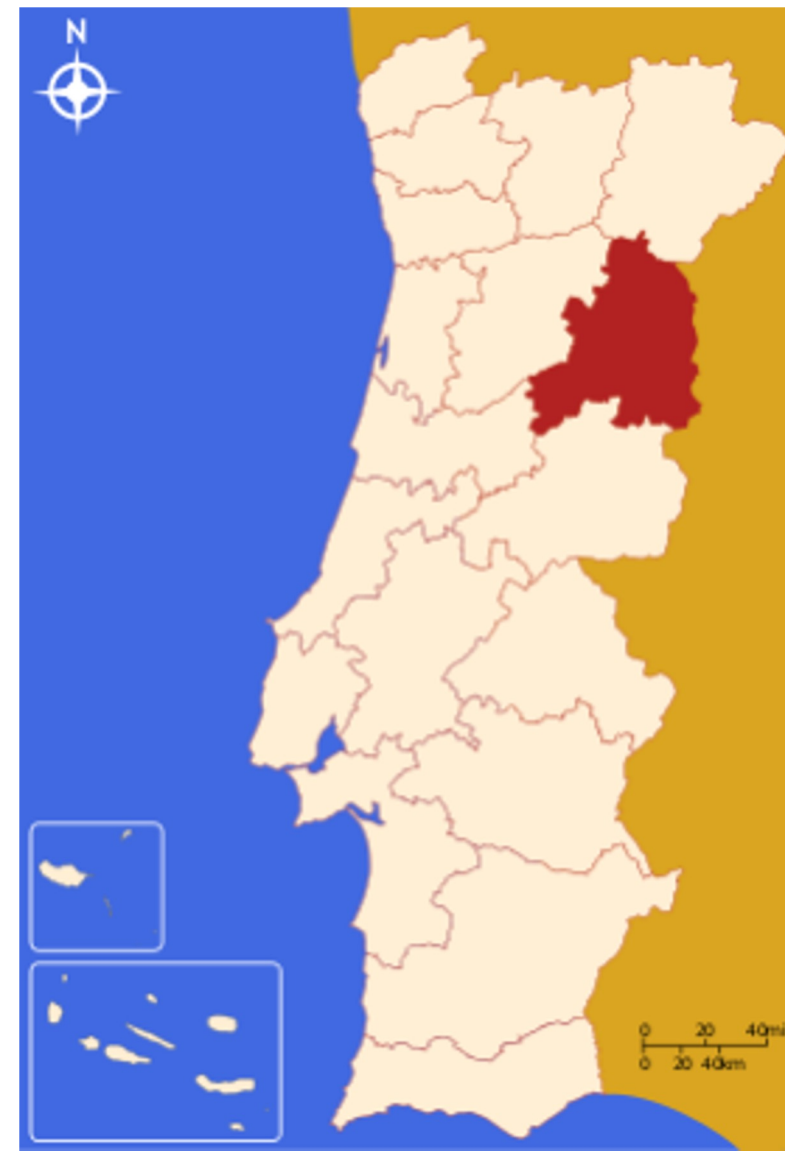
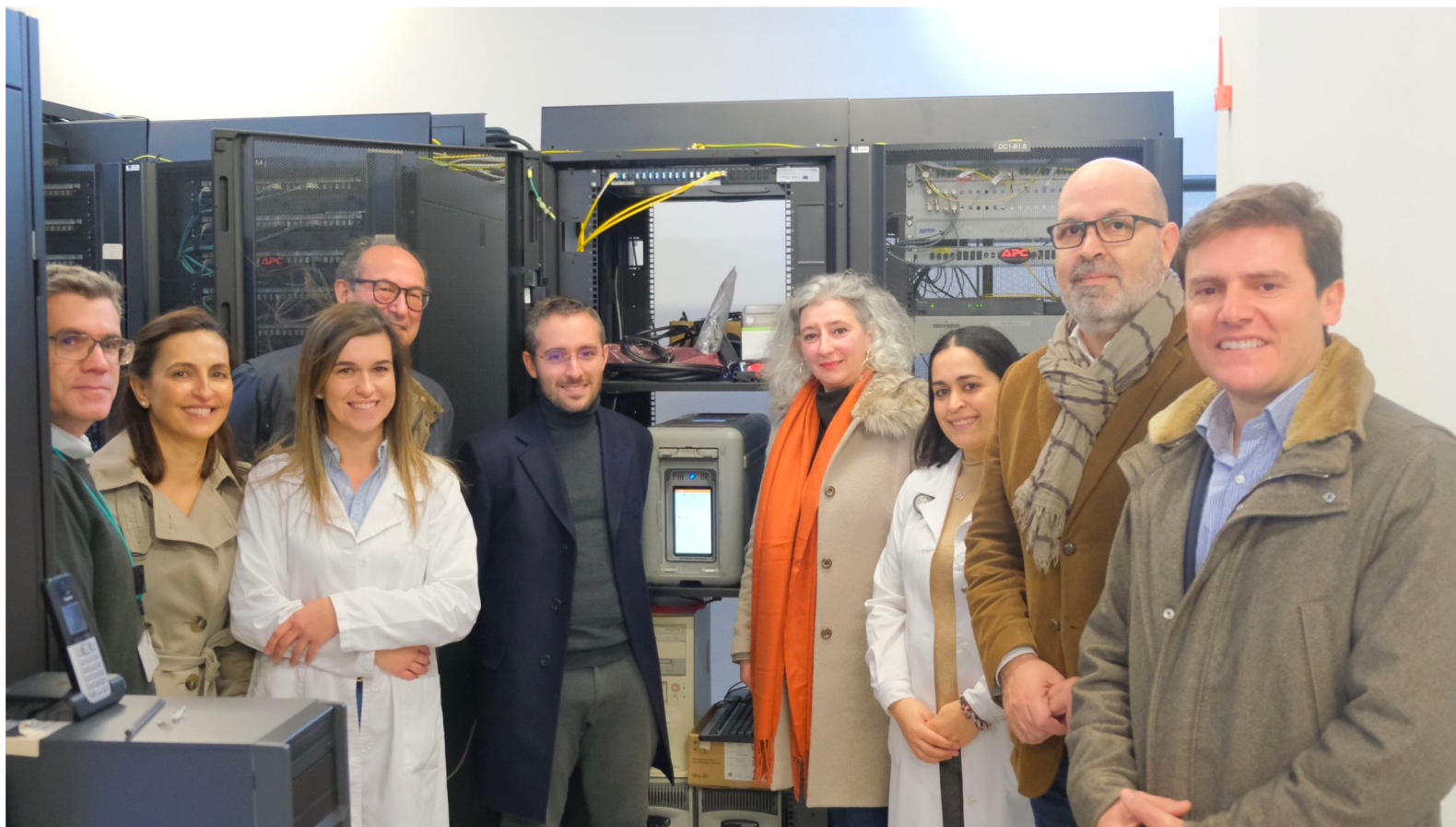
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DESENHO MULTICÊNTRICO

Unidade Local de Saúde da Guarda

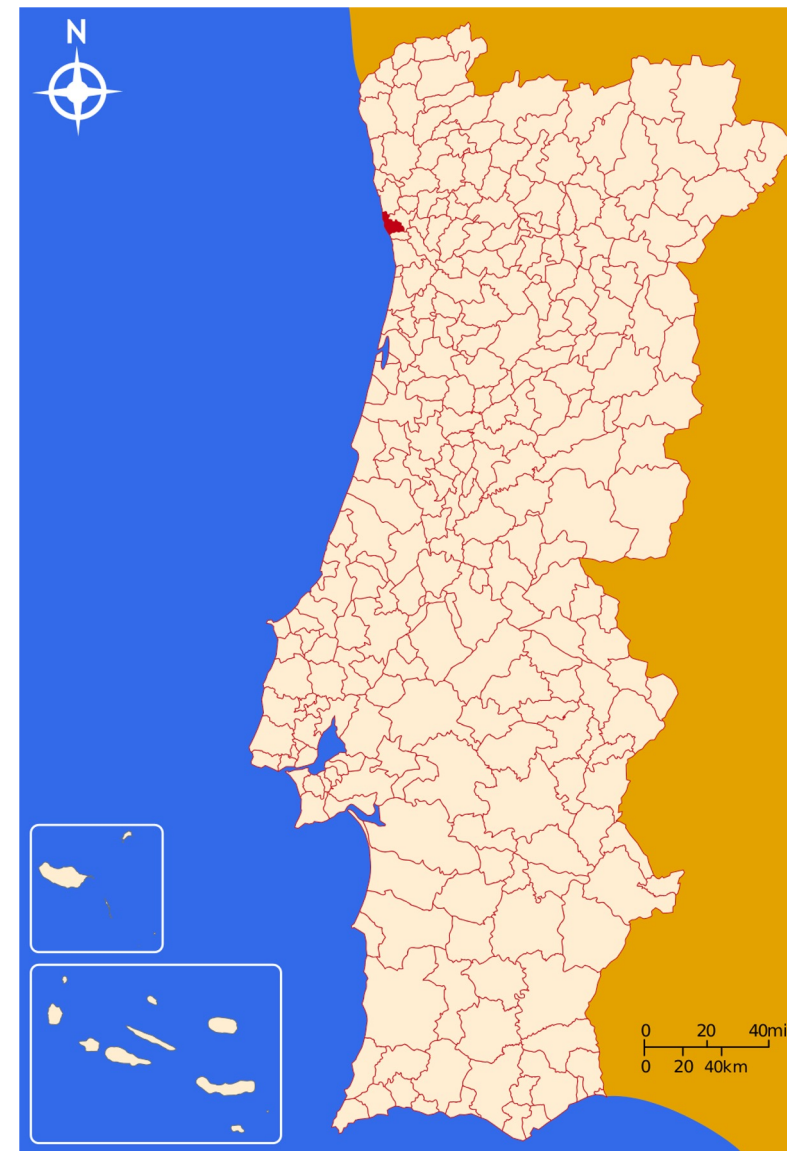
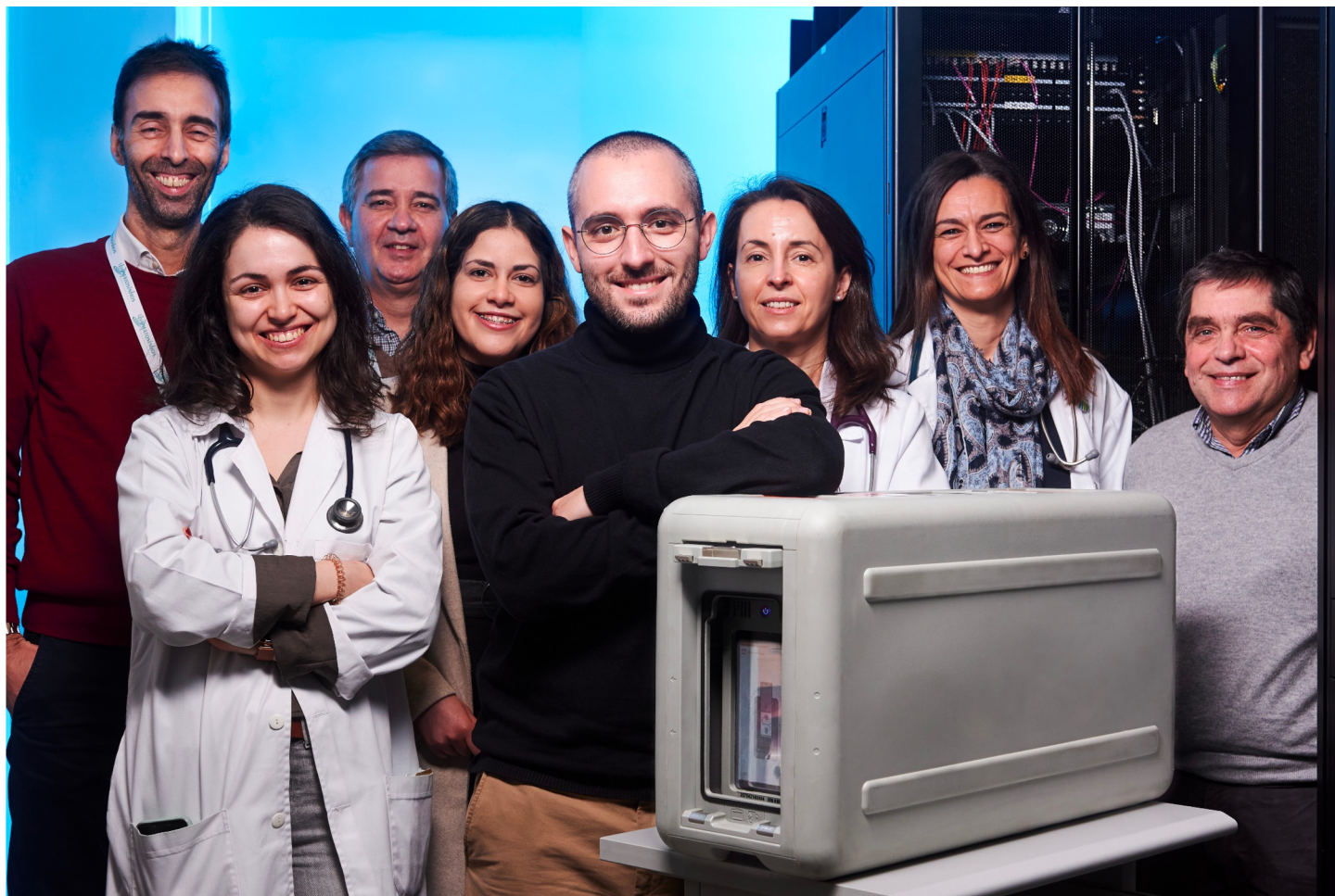
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DESENHO MULTICÊNTRICO

Unidade Local de Saúde de Matosinhos

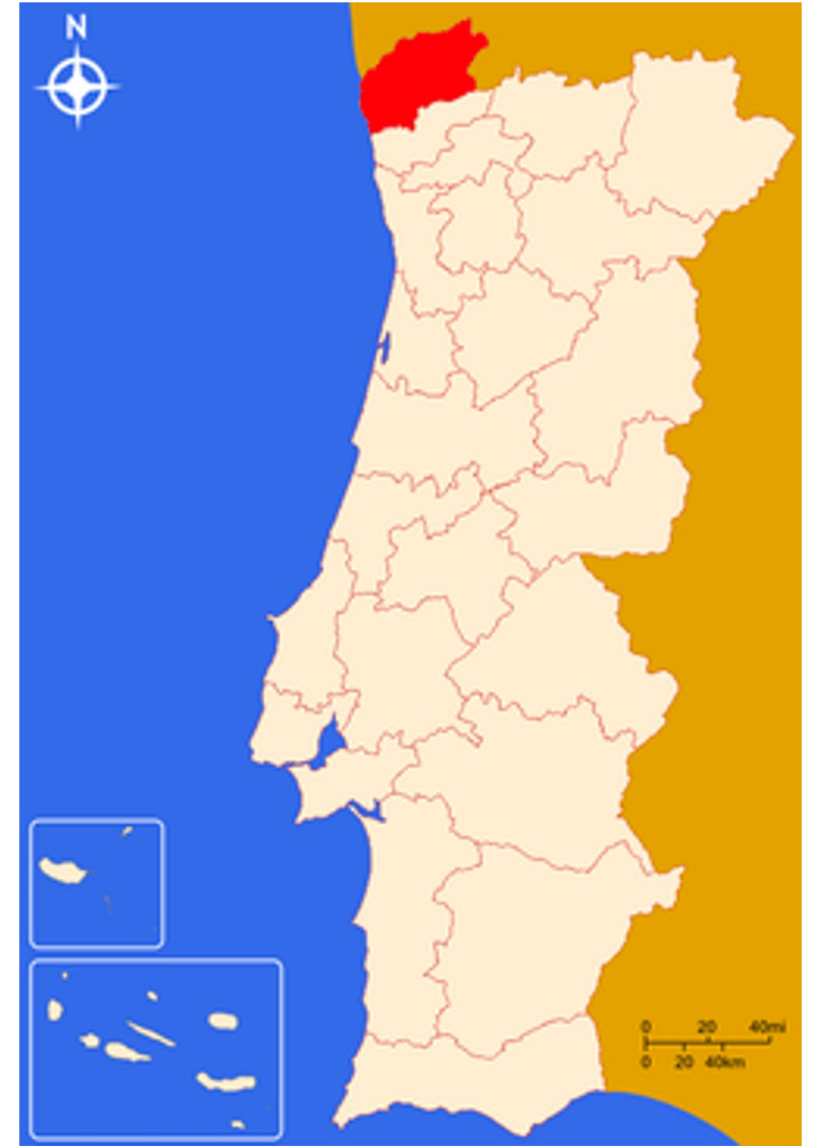
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DESENHO MULTICÊNTRICO

Unidade Local de Saúde do Alto Minho

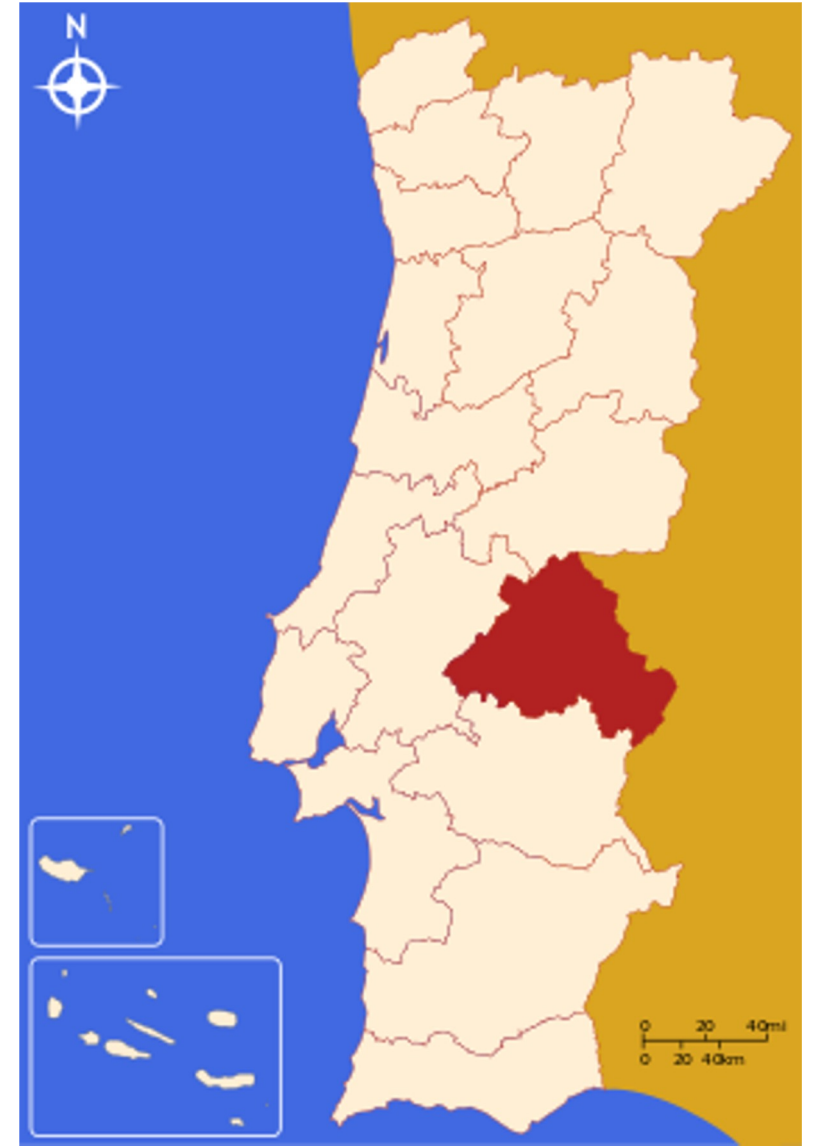
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DESENHO MULTICÊNTRICO

Unidade Local de Saúde do Norte Alentejano

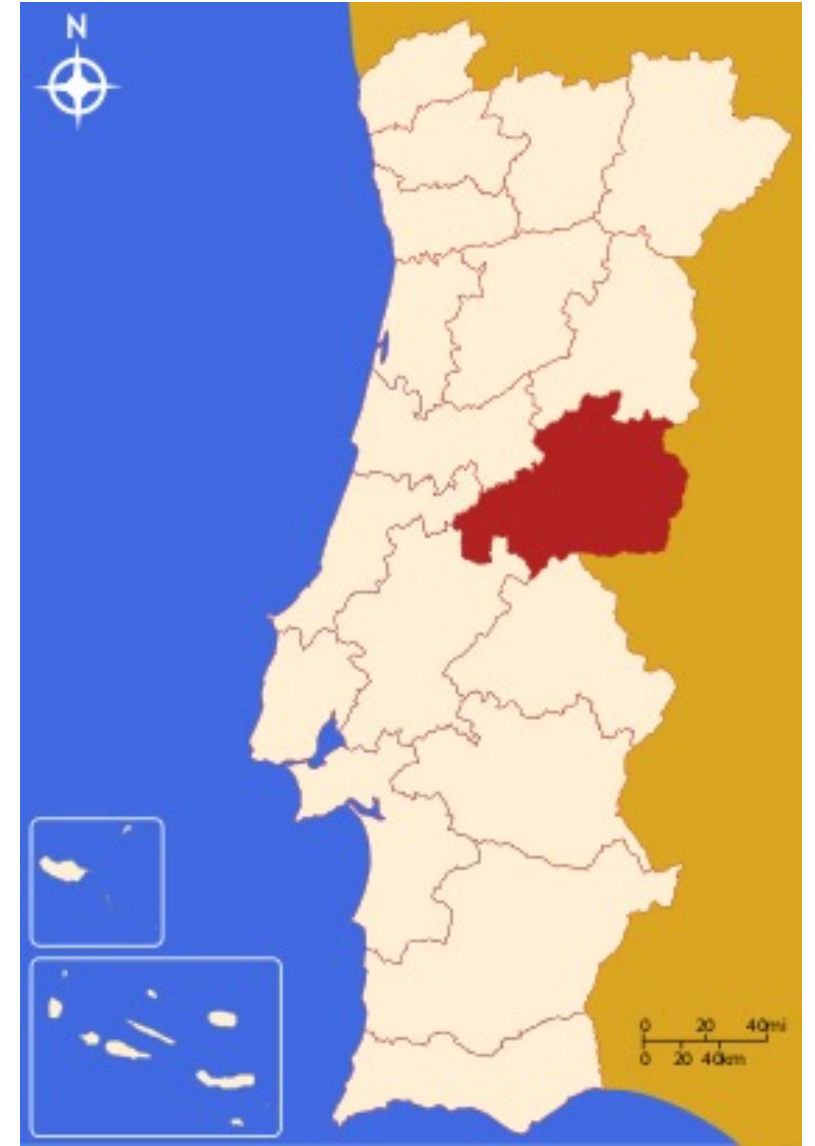
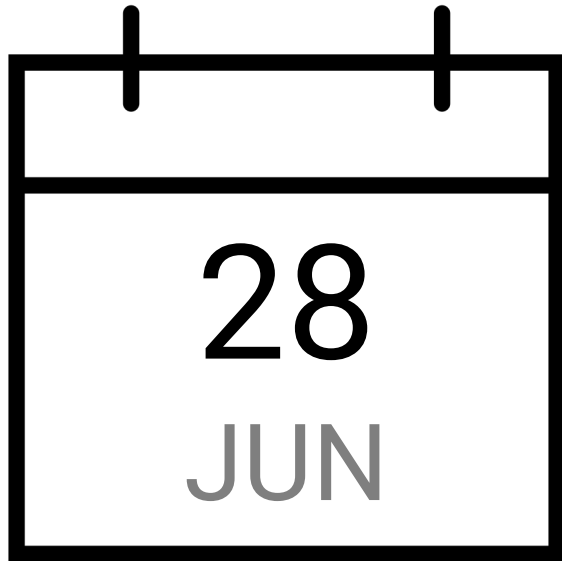
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DESENHO MULTICÊNTRICO

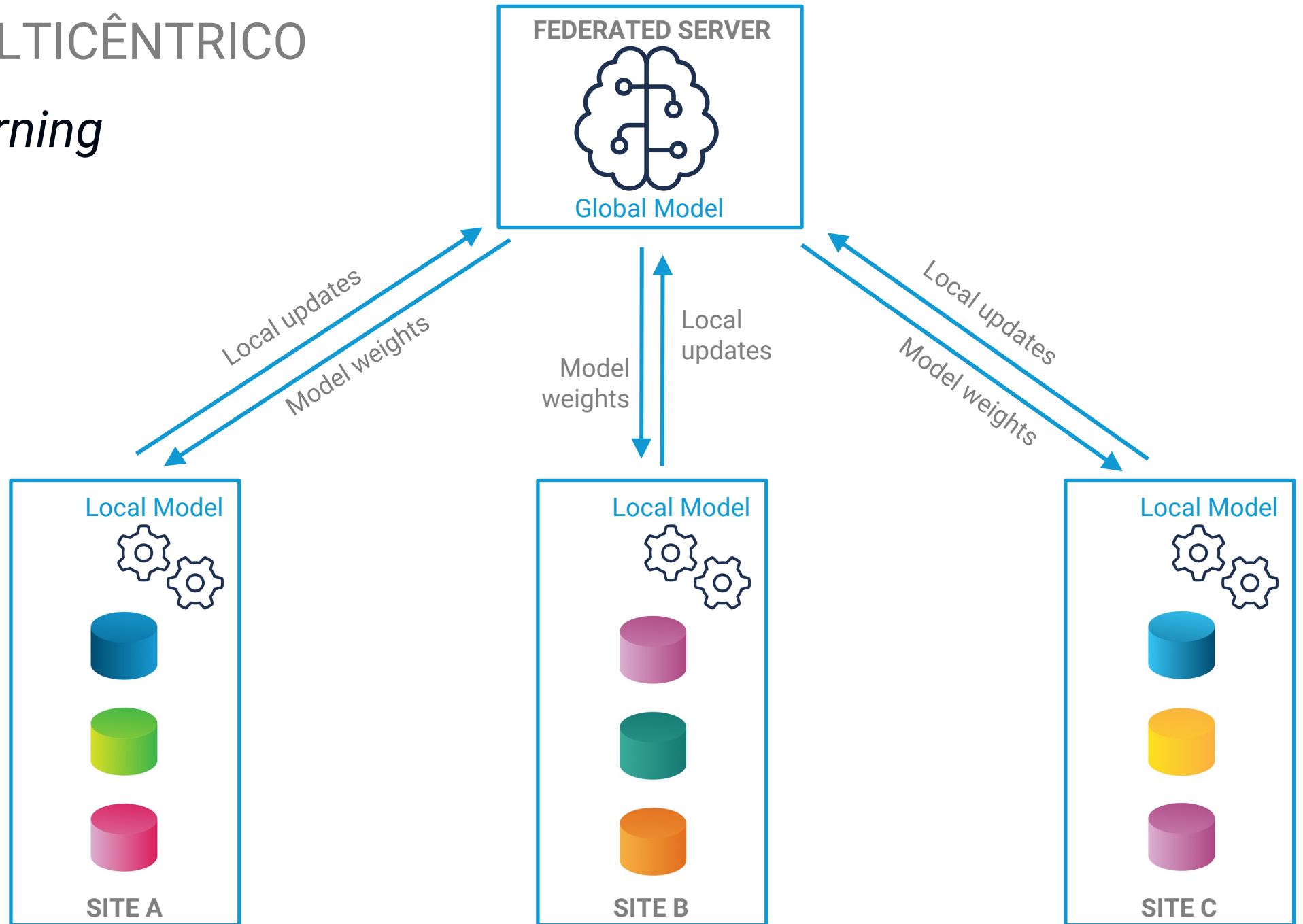
Unidade Local de Saúde de Castelo Branco

N = 107 504



DESENHO MULTICÊNTRICO

Federated Learning



CONCLUSÃO

- Promove **Cooperação Multidisciplinar**
- **Ajuda a Ultrapassar Restrições Regulamentares e de Hardware**
- Reforça a **Confiança e Aceitação**
- Promove **Custo-Benefício**
- Facilita a **Tomada de Decisões Baseada em Evidências**

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