



PROJECT PRESENTATION

*Comprehensive solutions of healthcare improvement based on
the global Registry of Stroke Care Quality*



Funded by
the European Union

WHAT WILL BE COVERED

- Fundamentals about stroke.
- Who we are.
- Project goals and objectives.
- Virtual Assistants.
- Natural Language Processing.
- Predictive models.
- Semantic Harmonization Layer.
- Legal frame.
- Project impact.

FUNDAMENTALS ABOUT STROKE

Medical facts

- 5 millions deaths of stroke per year worldwide.
- Every 4 seconds someone gets stroke.
- Every 40 seconds someone dies of stroke.
- Treatment has to be started within 6 hours.
- Mostly curable if recognized and treated in time.

Economical facts

- One of the leading cause of disability of adults.
- Great economical burden that could be eased or avoided.



FUNDAMENTALS ABOUT STROKE II.

Current issues

- The effective stroke treatment exists, but the implementation is missing.
- The data on stroke care quality are missing, hard to collect due to lack of workforce and different data availability across Europe.
- After discharge we lose track of patients.

Our solution

- We will automate data mining from different sources.
- We will develop a law-compliant solution that will improve data availability, quality, interoperability and reuse.
- We will track the whole patient pathway via virtual assistants helping both care providers and patients.



PROJECT OVERVIEW



RES-Q+ PARTNERS CONSORTIUM

Technical Partners

- Institute of Health Information and Statistics (Coordinator)
- Aalborg University (Co-coordinator)
- Health Management Institute
- Technological University Dublin
- University of Murcia
- Charles University
- Ontotext (SIRMA AI)
- Alana AI

Law Partners

- Timelex
- Chino
- Masaryk University

Clinical Partners

- University of Glasgow
- University Hospital Bucharest
- Vall d'Hebron Research Institute
- Institute of Psychiatry and Neurology
- International Clinical Research Center
- National & Kapodistrian University of Athens
- University Multi-Profile Hospital for Active Treatment "St. Naum"

Dissemination Partners

- Boehringer Ingelheim (Angels Initiative)
- World Stroke Organization
- Stroke Alliance for Europe



21 Partners

13 European countries

PROJECT OVERVIEW

Duration: November 2022 – October 2026

Program: Horizon Europe, Health

Budget: 7,7 million €

Call: HORIZON-HLTH-2021-TOLL-06

Grant provider: EU

Project number: 101057603



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OVERALL GOALS



IMPROVE THE QUALITY OF EUROPEAN HEALTHCARE SYSTEMS

SAVE PATIENTS' LIVES

DECREASE HEALTHCARE COSTS

“

Watch the Horizon, better stroke care is coming!

Name of the author

PROJECT OBJECTIVES I.



Create an **European space for ethically and legally-compliant health data collaboration** in stroke care



Create **Virtual Assistants** for patients monitoring their life after stroke, and for clinicians that will help them understand quality care data better



Develop innovative **Natural Language Processing tool** to mine and analyze unstructured and heterogeneous data from multiple languages and sources

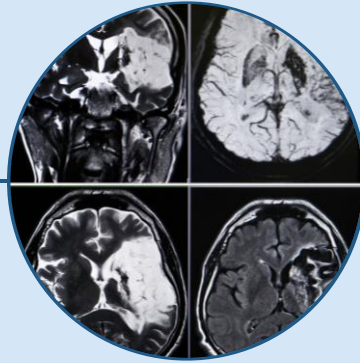


Harmonize data semantically and provide **standardized exchange interface** for data reuse

PROJECT OBJECTIVES II.



Develop, implement and validate a set of **data analytics and predictive modelling solutions** to analyze the data in the European Stroke Hospital Discharge Reports



Establish **European Open Stroke Data Platform** – open research platform for data aggregation, semantic harmonization and interoperability across European countries to promote the use and re-use of health data



Design, assess, clinically validate and refine usable, trusted services and draft an **EU Hospital Discharge Report Standard for stroke**



Translate RES-Q+ into **health policies and clinical practice** for more accessible high-quality care and standardization



OUR SOLUTIONS



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VIRTUAL ASSISTANTS (VAs)

Both VAs can be voice controlled.

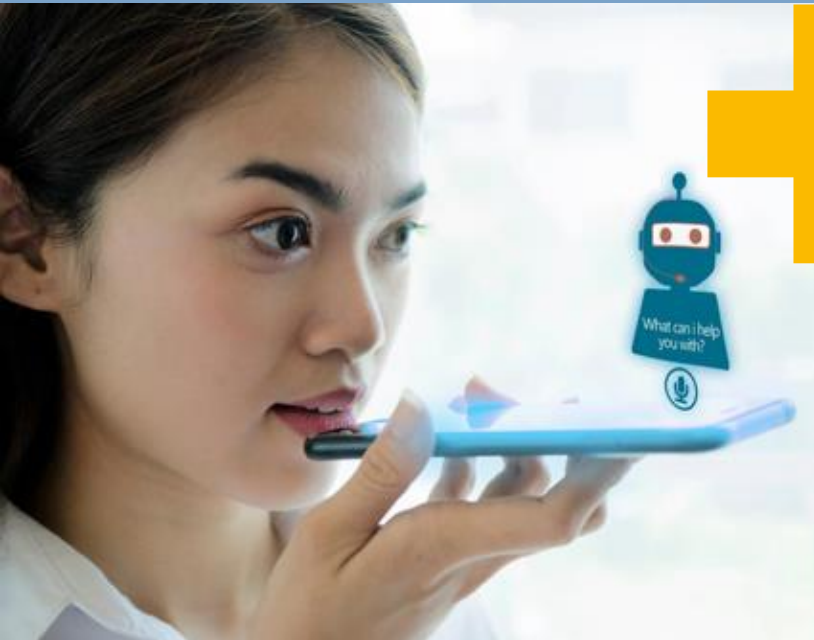


For Patients

- To track their medical condition after stroke.
- To help them understand and improve their outcome after stroke.

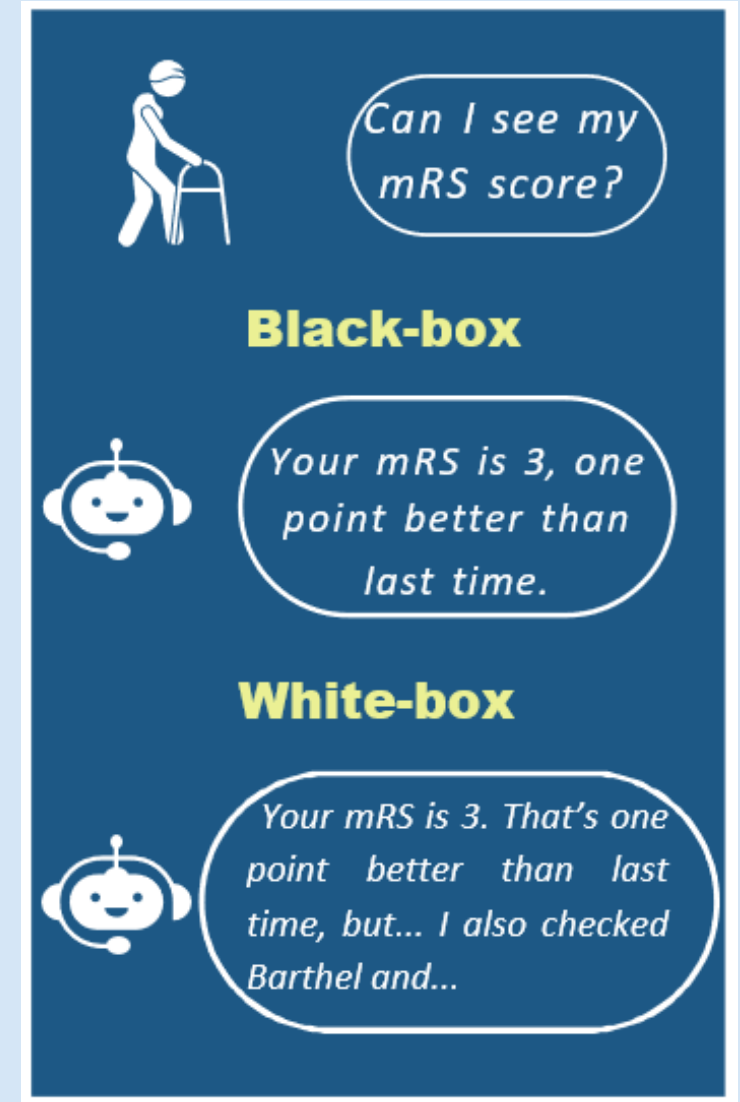
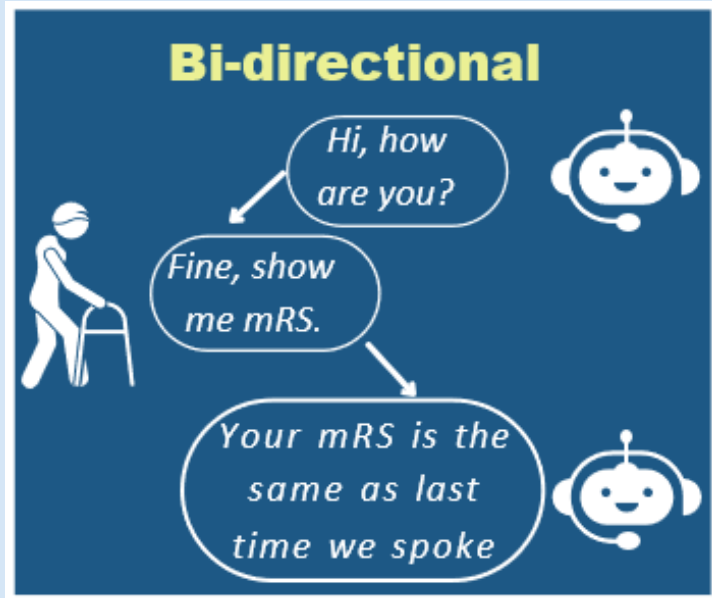
For Healthcare Professionals

- To improve stroke care quality based on data analyses.
- To learn about patients' outcome after discharge.



VAs options + examples

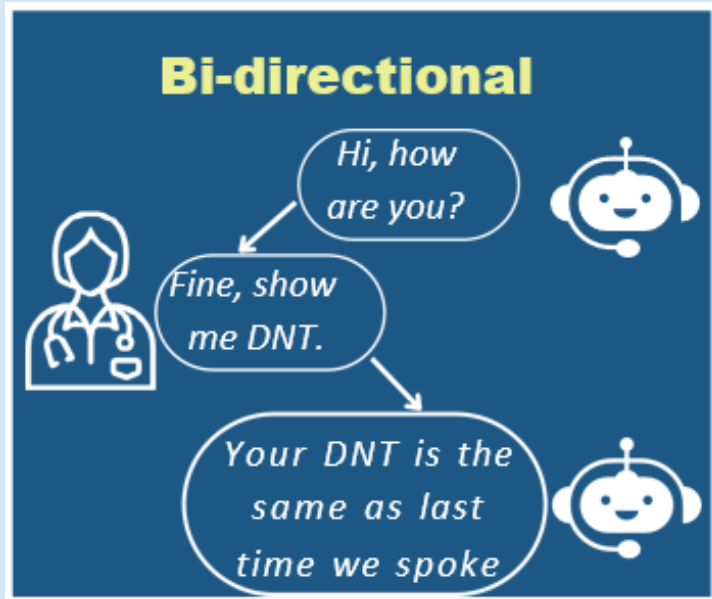
For Patients



VAs options + examples

For Healthcare Professionals


Bi-directional



Hi, how are you?


Fine, show me DNT.

Your DNT is the same as last time we spoke




Can I see the DNT?

Passive




*Your DNT is 45 minutes.
What's next?*

Active




Your DNT is 45 minutes. Compare to local or show CT time?




Can I see the DNT?

Black-box



Your DNT is very long. Try shortening CT times

White-box



Your DNT is 5 minutes higher than last time, but... I also checked CT times and...

NATURAL LANGUAGE PROCESSING (NLP)

NLP in RES-Q+

- Artificial Intelligence assisted data mining from stroke patients' discharge reports - Discharge Importer Tool.
- Semi-automatic extraction of medical information, manual validation and insertion into RES-Q.

DISCHARGE REPORT		
Patient:	John Doe	Patient ID: 666
Address:	California Street. 116, Brno, Czech Republic	

Hospitalized from 01.12.2022 10:34 to 03.12.2022 10:08 at Neurology ICU
 Hospitalized from 03.12.2022 10:08 to 09.12.2022 at Neurology standard dpt.

Anamnesis:
OA: Hypertension on medication, chron. VAS Lp- disp. neurology, polyradiculoneuritis in 2006, scleroderma of the skin, polyarthralgia - examined for rheumatology - just symptomat. ter., without steroids, IH in 1973, Surgery: splenectomy after hockey injury in 1980, TEP hip l. sin. in 2008, st.p. TEP l. dx. 3/2022 HID 6/2015
RA: father died in the age of 41 (MI), mother breast Ca, TBC, Alzheimer
AA: pollen
FA: Lorista 25mg tbl. p.o. 1-0-0, ANP 100mg tbl. p.o. 0-1-0
SA+PA: unemployed
EA: COVID 19 vaccinated
 Non-smoker, alcohol rarely

RES-Q
Data for Life
3.0 Standard Data Collection Form

ALL STROKES: HOSPITALIZATION DATA Denotes mandatory fields*

Patient ID*

ALL STROKES: ADMISSION DATA

Age*
Gender*
 Male
 Female
 Other

Stroke while already hospitalized (select one)
 Yes
 No
 Unknown

Wake up stroke*
 Yes
 No

If yes, time when patient went to bed*

Date of admission*

Arrival time to hospital (if unknown then kindly put the best estimate time)*

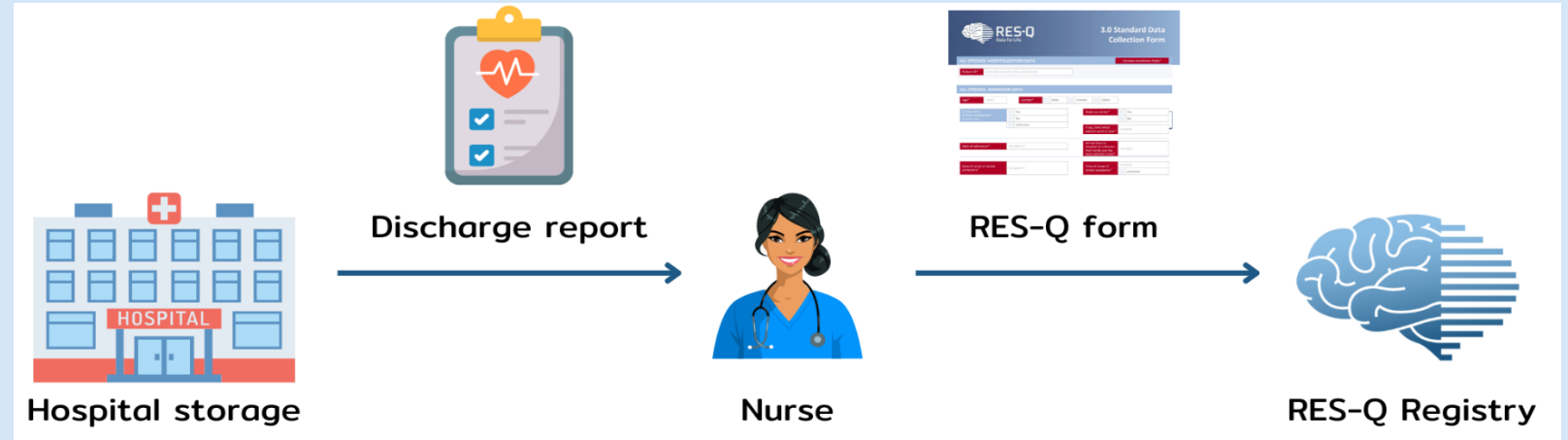
Date of onset of stroke symptoms*

Time of onset of stroke symptoms*

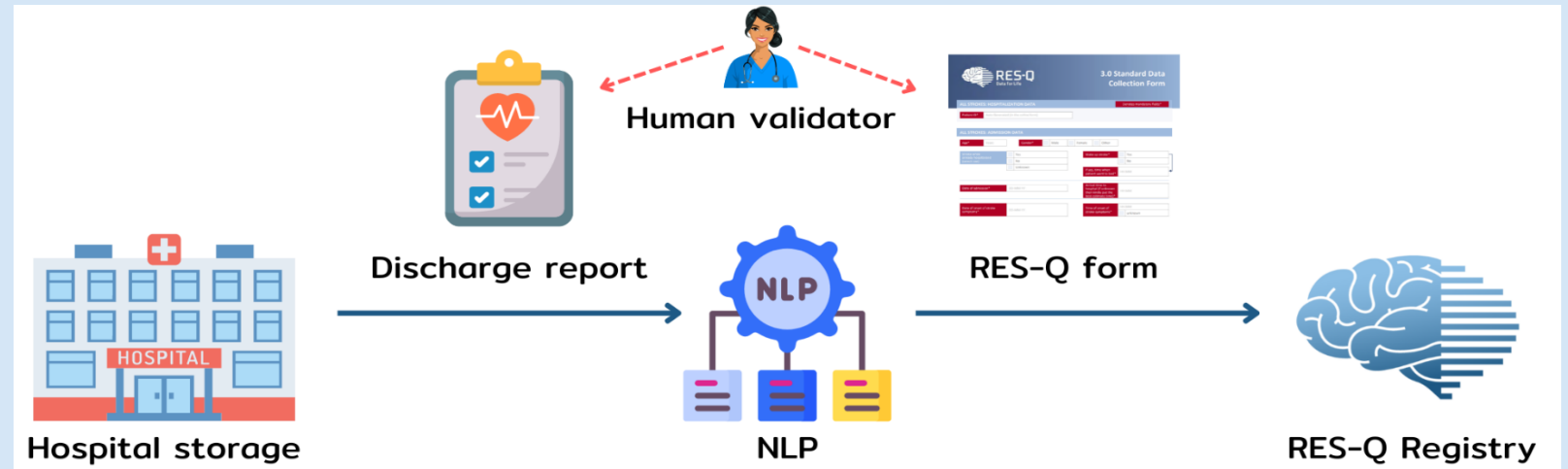
 unknown

NATURAL LANGUAGE PROCESSING (NLP)

RES-Q current status



RES-Q after NLP deployment



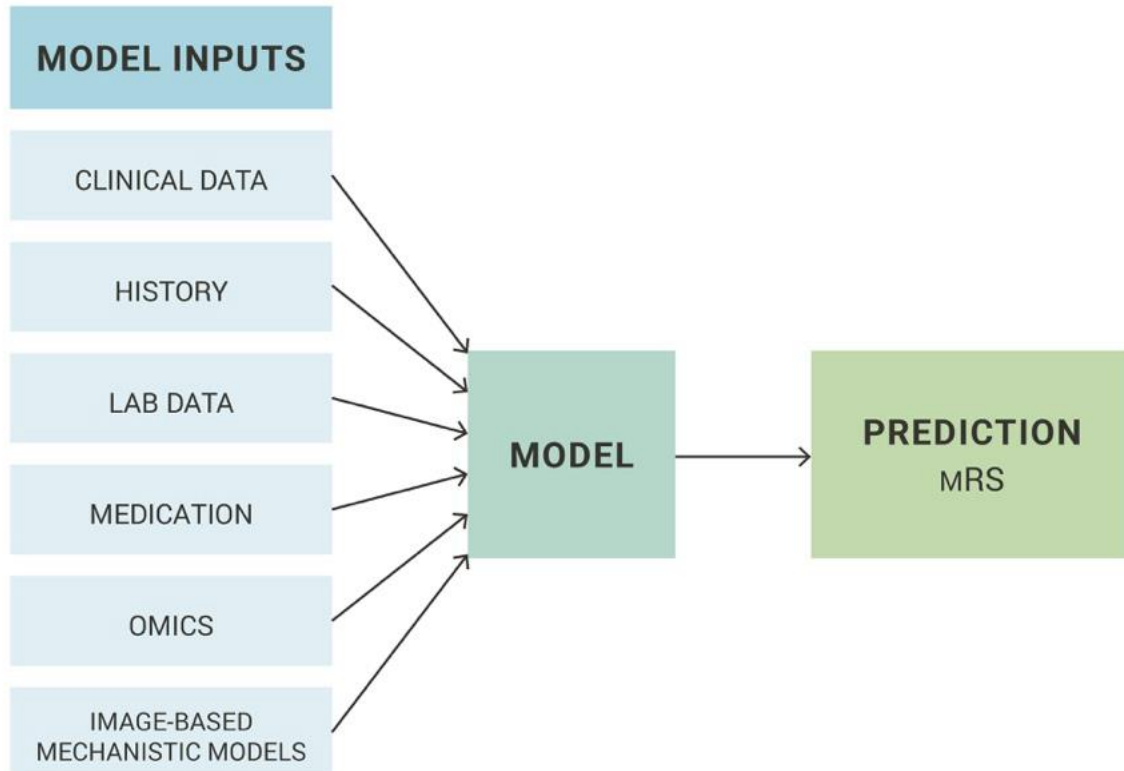
PREDICTIVE MODELS

Predictive models in RES-Q+

- Set of predictive models for patients' outcomes will be developed and validated.
- At least two patient conditions (e. g. depression, cognitive decline, spasticity, fatigue, etc.) will be predicted this way.



PREDICTIVE MODELS



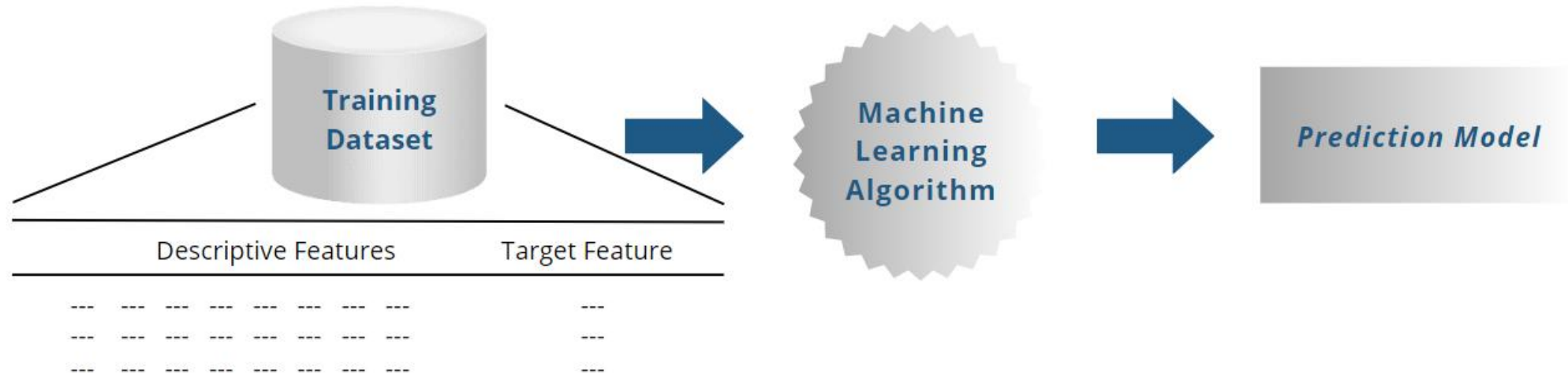
Predictive models generally

- Computer programmes that implement a mapping from a set of inputs that are known to a predictive or forecast of an unknown value .
- A set of features that are known about a patient who has suffered a stroke can be used to a forecast of what the modified Rankin Scale (mRS) assessment for that patient is likely to be in 90 days time.

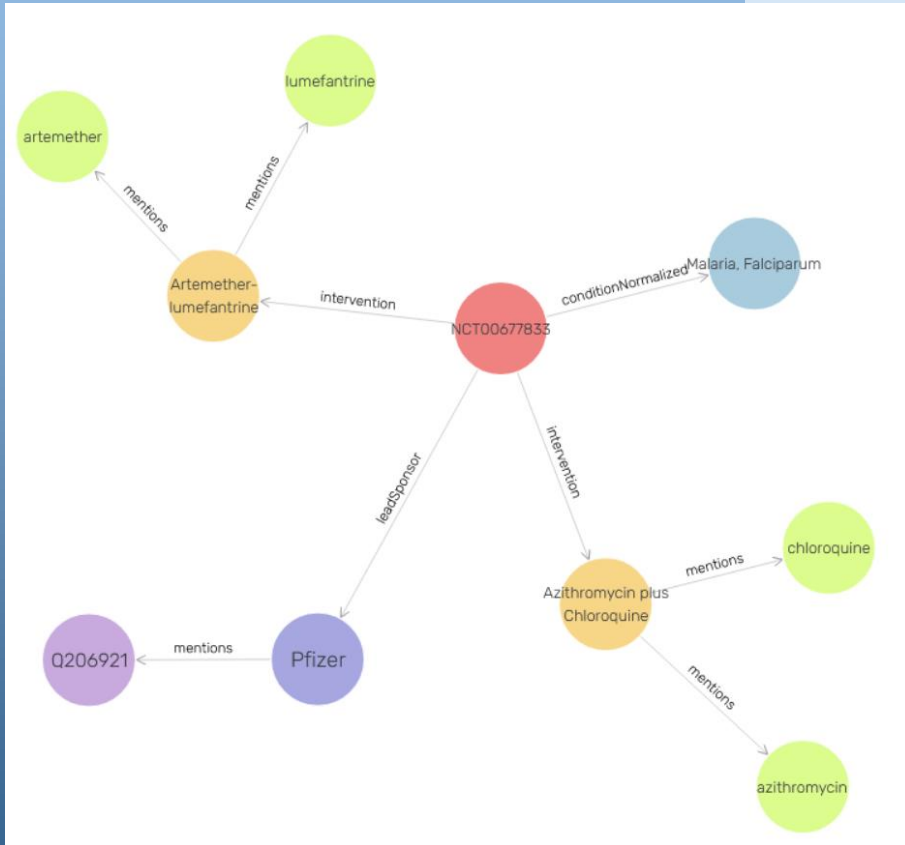
PREDICTIVE MODELS

Model training

- Applying a machine learning algorithm to a dataset of previous examples.
- The algorithm analyses the data to identify recurring patterns.
- Based on the analyses the machine learning algorithm creates a model (prediction).



SEMANTIC HARMONIZATION LAYER



Semantic Harmonization in RES-Q+

- Ensures no redundancy or ambiguity on the data level.
- Allows easy extension of data models.
- Has natural integration with the NLP pipelines for Knowledge extraction.
- As the data is highly normalized allows more precise data analysis.
- Supports semantic interoperability.

SEMANTIC HARMONIZATION LAYER

Semantic Harmonization

Semantic harmonization is a process in which different data sources, systems, or entities with varying terminologies, structures, and representations are aligned and made compatible in terms of their meanings. The goal of semantic harmonization is to ensure that information from disparate sources can be effectively shared, understood, and processed across different contexts and applications.

Semantic Layer

Semantic Layer includes metadata which provide context and wider understanding of the data, such as data quality and definitions. Semantic Layer can be represented by knowledge graphs.



LEGAL FRAME

For European Open Stroke Platform



- To enable legally and ethically compliant health-data sharing and collaboration
- To ensure legal and ethical obedience of project implementation, data collection and development of data entry tool and virtual assistants.
- To provide guidance to overcome legal and ethical obstacles to access the health data necessary to conduct the research and innovation action.
- To ensure legal and ethical compliance for post-project operation by creating a legal toolbox for the full operation.

PROJECT IMPACT I.

HEALTH

- 10% improvement of at least 50% quality metrics.
- 10% reduction in case fatality/disability annually.
- 40,000 less deaths in Europe.

SCIENTIFIC

- Description of epidemiology of conditions after stroke and models to predict their risk. Identification of how the quality of care influences different outcomes after stroke.



PROJECT IMPACT II.

TECHNOLOGICAL

- Proof-of-concept of Virtual Assistants expandable to other settings
e.g. clinical trials, obtaining patient history, drug development.

SOCIETAL

- Changing the paradigm of quality improvement and automation
in medicine.

ECONOMICAL


- Expected annual saving over 0.5 billion € in Europe.





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