VALUE

Value based healthcare supported by process mining tools

## Creating VALUE through clinical pathways optimization

USE CASE: Elderly frail patients

It is focused on the emergency department (ED) at the Huddinge site at the **Karolinska University Hospital**. The ED is having issues with crowding and extended length of stay for elderly frail patients. The ED is not a good location of care for elderly frail patients that have a higher need for basic care and assistance that is difficult to provide in an ED that is under pressure. This leads to an increased risk of complications and poor patient outcomes for this group.

We will use process mining to better understand how the real process looks like for this group of patients and how it differs from other patient groups. We will use the findings to identify improvement initiatives. Initiatives will be aimed at reducing ED length of stay and will be followed up and analyzed using **IPM** to drive improvement initiatives and to evaluate results.

USE CASE: Acute brain infarction
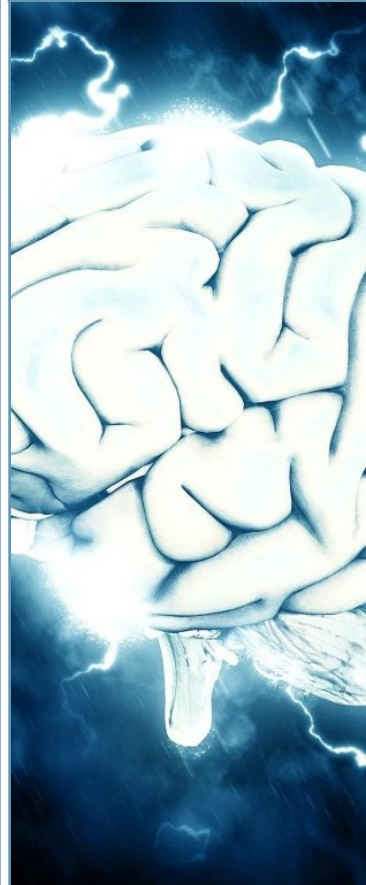
The use case at **Erasmus University Medical Center** focuses on the acute ischemic brain infarction care pathway. Case prognosis significantly depends to prompt diagnosis and time to treatment, what is known as time-to-needle. The current care pathway contains numerous and critical dependencies that influence the actual time for the patient to get the right treatment. We hypothesize that by reducing the length of stay on the Stroke Unit, bed occupancy and staff workload will be also reduced producing a process improvement which will impact time-to-needle and eventually patient outcome.

IPM will be applied to produce an in-depth analysis of the current Stroke Care Path, aiming at identifying dependencies and consequences that are relevant for patient outcome and patients in general and specifically those which are relevant for the length of stay of the patient.

USE CASE: Myocardial infarction emergency care pathway
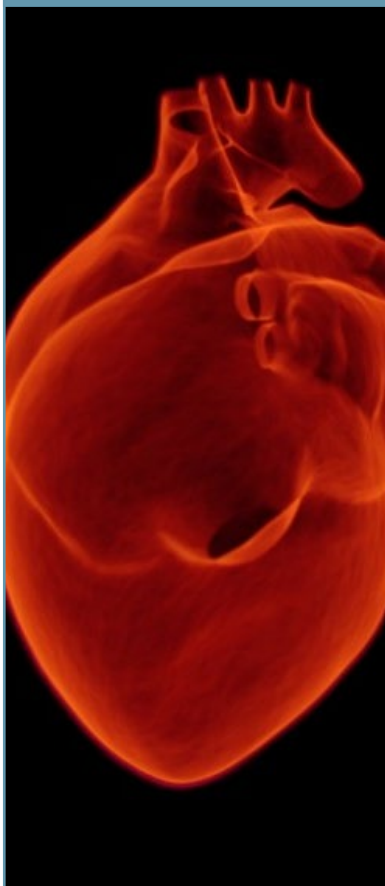
From the **Centro Hospitalar e Universitário de Coimbra**, the use case will focus on the myocardial infarction emergency care pathway. Currently, the central region of Portugal is suffering the highest mortality from ST-elevation myocardial infarction. Timely access to reperfusion therapy is a key variable for favourable prognosis but angioplasty requires a specialized trained care team available 24/7 and resources are limited.

The goal is to identify which regions are experiencing the highest-time-to-reperfusion and the highest mortality. Analyzing the registries with **IPM** will allow assessing the impact of setting a new PCI facility in the region. It would be possible to assess the improvement in reducing time-to-reperfusion in those regions that need it most.

USE CASE: Emergency room care flow and Stroke patients
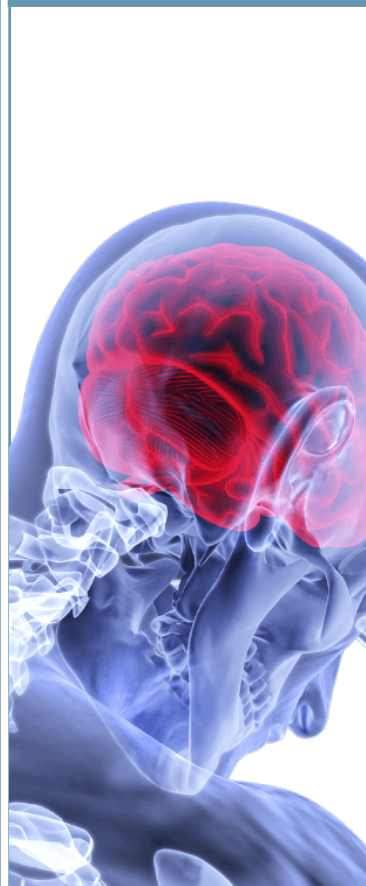
Vall d'Hebron Hospital will run two different use cases, one targeting the improvement of emergency room (ER) care flow and other focusing on the stroke patient flow. The first use case will focus on optimizing the door-diagnosis and the door-treatment time in the triage level 3 ER patients and acute stroke patients. The second use case will optimize the follow up of stroke acute phase process.

In both, time is an important issue. To detect the steps in these care processes that will allow us to reduce the time and improve patient flow is key, with the final aim to maximize safety, quality and efficiency in the diagnosis and treatment phase. By using the implementation of RTLS and through the implementation of an emergency unit care model, and **IPM**, we will be able to closely follow patients and implement the tracking system in the Emergency Department and the Stroke Unit.

USE CASE: Musculoskeletal disease

The **Hospital Clínico San Carlos** of the **Servicio Madrileño de Salud** is working on musculoskeletal disease care-flow. A care flow affected by issues like high prevalence, high burden of disease due to disability and chronicity, in which patients follow a clinical pathway fragmented between primary and specialized care and between specialities.

The use case aims at gathering clinical and operational insights through **IPM** to improve on the following aspects, tasks and processes:
- referral to the right care at the right time,
- reduction of unnecessary care loops for the patient,
- eliminate redundancies between the actions of health professionals,
- staff resources' planning and allocation and
- measure the quality of care and impact on disability.

USE CASE: Cardiology

This use case focuses on cardiac patients at the **Hospital Universitario de Salamanca** that suffer long waiting lists, long time to diagnosis and a long time to treatment. In addition, the clinical pathway suffers from segmentation between primary and specialized care, with a denoted low level of coordination between general practitioners and the cardiology service. Such suboptimal setup impact on both satisfaction of the patient and the care team. The cardiology use case analyzes with **IPM**, the entire external consultation process, with a special focus on the management of the patient with heart failure. Currently, the use case pursues to:

- reduce time to diagnosis – from first patient appointment to diagnosis notification–,
- improve the discharge rate of patients to be followed by GP,
- increase patient satisfaction.

What is VALUE solution based on?

Interactive Process Mining

✓ IPM breaks the *Black Box* concept allowing the involvement of the domain expert in the learning process, incorporating the medical expertise into the model

✓ IPM produces longitudinal understandable views providing not only answers but roads to new questions

✓ IPM models general but accounting for individual, identifying singular processes

Interactive Process Mining-Induced Change Management Methodology for healthcare

✓ It has the objective of creating a team-based problem-solving culture, encouraging digital transformation in healthcare organizations based on IPM

✓ This methodology guides the steps of IPM and health experts in the definition of Interactive Process Indicators (IPIs)

✓ At the time that teaches health experts in the use of this disruptive technology as IPM is

What are the other technologies behind VALUE solution?

Real-Time Location System
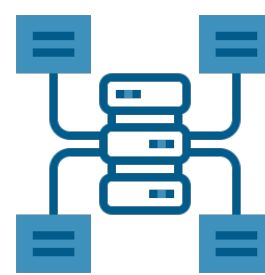
An IoT platform with actionable information for Healthcare services optimized by IPM
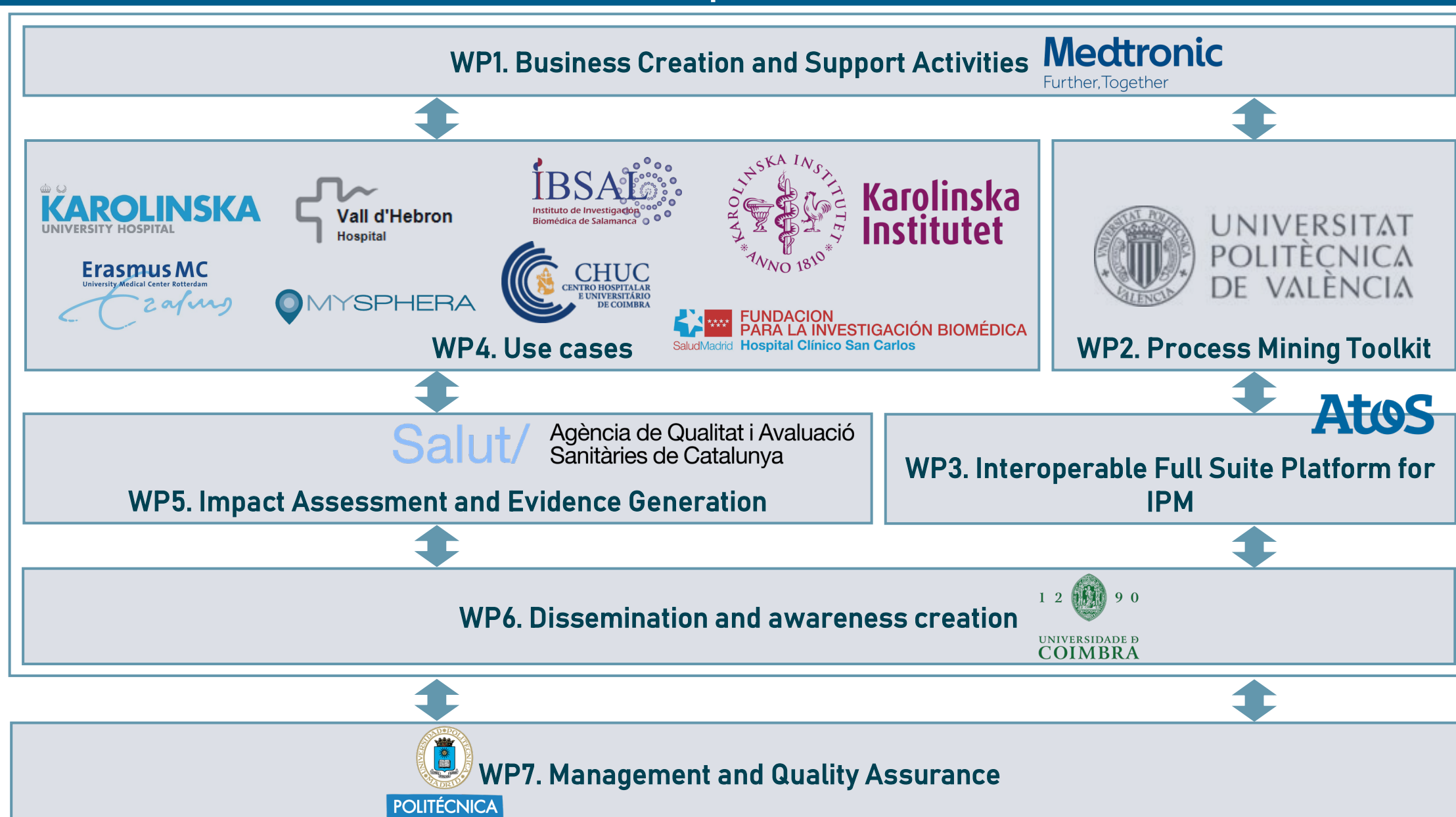
Clinical Data Repository

It helps to homogenize any data source coming from the hospital to facilitate their consumption in IPM

Lean Six Sigma

LSS is boosted by IPM to agile process discovery and metadata analysis

VALUE implementation

WP1. Business Creation and Support Activities

Medtronic
Further, Together

KAROLINSKA UNIVERSITY HOSPITAL

Vall d'Hebron Hospital

IBSAL Instituto de Investigación Biomédica de Salamanca

KAROLINSKA INSTITUTET ANNO 1810

Karolinska Institutet

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Erasmus MC University Medical Center Rotterdam

MYSPHERA

CHUC CENTRO HOSPITALAR E UNIVERSITÁRIO DE COIMBRA

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WP4. Use cases

WP2. Process Mining Toolkit

Salut/ Agència de Qualitat i Avaluació Sanitàries de Catalunya

WP5. Impact Assessment and Evidence Generation

AtoS

WP3. Interoperable Full Suite Platform for IPM

WP6. Dissemination and awareness creation

1290 UNIVERSIDADE D COIMBRA

WP7. Management and Quality Assurance

POLITÉCNICA

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eit Health

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VALUE is supported by EIT Health

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