



# PROMETEUS

preterm brain-oxygenation  
and metabolic eu-sensing

## D8.2 - Website and project logo

Partner:	Università degli Studi di Padova (UNIPD)
Lead Author:	Università degli Studi di Padova (UNIPD)
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Prepared by	Sabrina Brigadoi
Reviewed by	Marta Pozza
Verified by	Sabrina Brigadoi

### History of Changes

Revision	Date (dd/mm/yyyy)	Author	Changes	Status (Draft/Inreview/ Submitted)
v 1	08/04/2023	Sabrina Brigadoi		Draft
v 2	28/04/2021	Sabrina Brigadoi	Finalized the section regarding translations and social networks	Submitted



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## 1. Prometeus Logo

Prometeus logo and website have been created with the aid of a professional website and graphic designer.

Prometeus logo has been created focusing on the main social aim of the project, i.e., helping preterm neonates, their families, and the healthcare professionals (HCP) working in intensive care unit and taking care of preterm babies. The logo depicts a newborn who is held and rocked by an adult hand, which could symbolize either the parents' hand, the HCP's hand, or the hand that each of the Prometeus partner can provide as contribution to the project. The stylized representation of the newborn highlights the presence of the brain, the health of which is the main focus of our project and of the nutritional clinical advisor. The colour of the logo, light blue, has been chosen because of its peaceful and calming meaning.



**PROMETEUS**  
preterm brain-oxygenation  
and metabolic eu-sensing

## 2. Prometeus website

URL: <https://www.prometeus-eic.eu/>

The website has been online since early April and fully operational since April 28<sup>th</sup> 2023.

The website has been created using Wordpress, to make it easier to keep the website updated and easily handled by non-expert users.

The website currently consists of the following menus, which will be detailed below:

- Home
- About Prometeus
- Partnership
- Research
- Gallery
- Events & News

Furthermore, a “Reserved Area” has been created, with access only to partners. In the restricted area, non-public deliverables, meetings' minutes and other important and reserved documents will be uploaded so as to share them easily with all partners.

In the “contact us” area of the website, in the footer, the email to be used to contact us ([prometeus.dpss@unipd.it](mailto:prometeus.dpss@unipd.it)) is visible. This email has been created ad-hoc for this project and is daily controlled by the coordinator and the coordinator's support staff. In the contact area, the link to the social networks of the project are shared (Twitter, Instagram and LinkedIn, see section 3).

Importantly, the website is available in all the languages of the countries the partners are located:



English, Italian, Spanish, French and Israeli.

## 2.1 Homepage

The homepage is divided into 6 sections. The first section contains a catchy video of a newborn squeezing the finger of an adult hand, to highlight immediately the focus of the project. The title of the project, with its acronym, is also visible at the center of the short video (Fig. 1). This video might be replaced as the project is implemented when we will collect videos of our own patients.

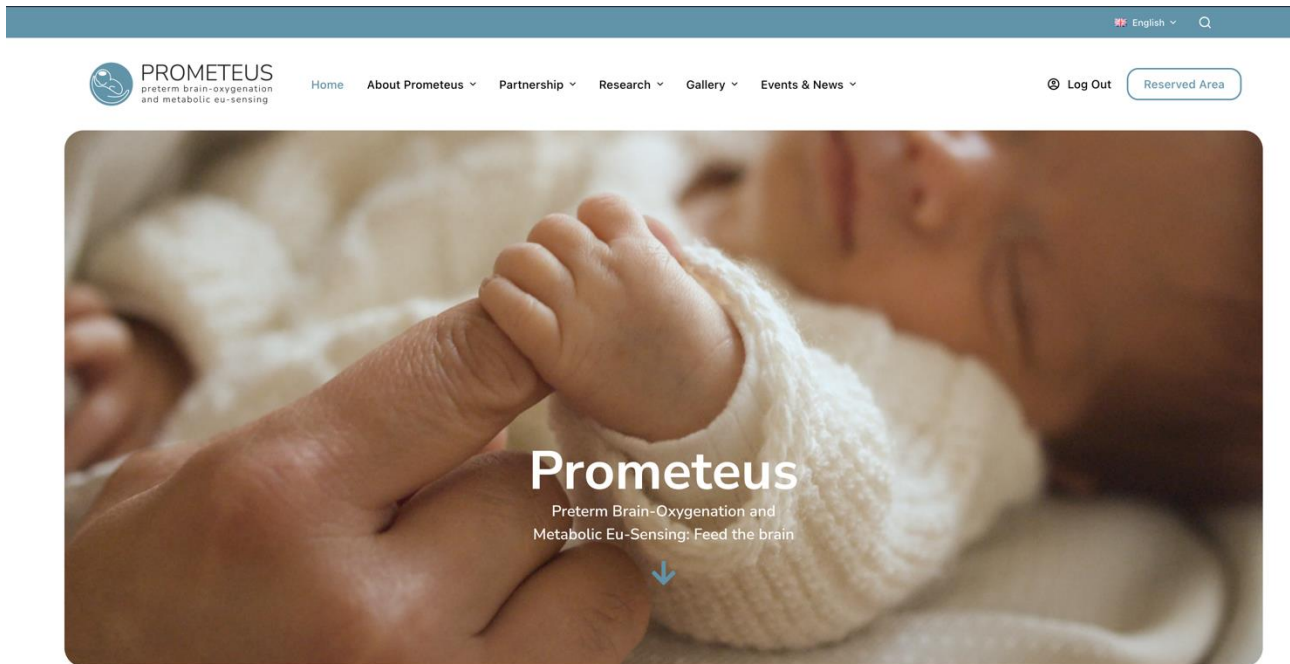


Fig. 1 First section of the homepage

In the second and third section (Fig. 2) some hints to the technological development of the project are highlighted.



TECHNOLOGY

# Preterm Brain-Oxygenation and Metabolic Eu-Sensing: Feed the brain

It will change the paradigm of preterm neonatal care and nutrition, through a Nutritional Clinical Advisor, who will guide the parenteral (intravenous) nutritional intake of preterm infants to meet the needs necessary to guarantee optimal levels of cerebral oxygenation.

INTERFACE

## Newborn's digital twin

PROMETEUS also consists of a digital device with a double user interface: one for healthcare personnel and the other for parents.

This device, which represents to all intents and purposes the digital twin of the preterm infant, is a unique tool that will accompany parents during the hospitalization of their babies in the neonatal intensive care unit, reducing the "distance" that typically characterizes hospitalization in the neonatal intensive care unit between families (at home) and their children.



Fig. 2 Second and third section of the homepage

In the fourth section, the social impact of the project is highlighted, reporting a sentence released by the coordinator in an interview released after the funding of the project (Fig. 3). In the fifth section, the latest events are reported (currently no events have been added, but this section will be updated constantly as the project continues).

"The Prometeus project will lead to a significant reduction in the number of premature babies developing cognitive, motor, or sensory deficits over the years. The Prometeus project will open the door to a new digital era of neonatal intensive care management."

S. BRIGADOI, 4 Million Euros Awarded to the International UniPDProject for Premature Babies,  
Università di Padova, 2022

NEWS

## Latest Events

There are currently no events.

Fig. 3 Fourth and fifth section of the homepage

In the sixth section, the logos of all partners are reported (Fig. 4).



Fig. 4 Sixth section of the homepage

All pages of the website have the following footer (Fig. 5), which shows the Prometeus logo, the EU and EIC logo and acknowledgment of funding with number of grant agreement. The link to the cookie and privacy policies are also present in the footer.

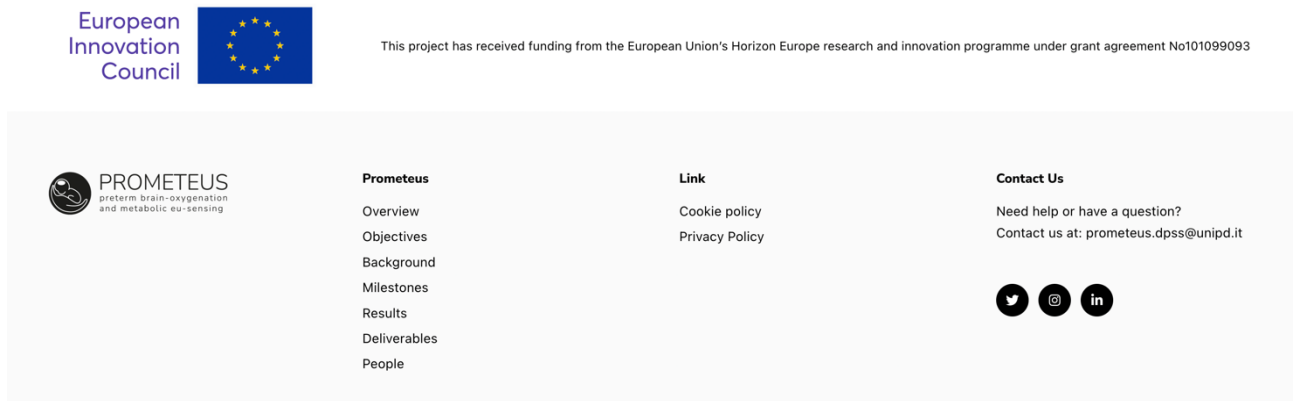


Fig. 5 Footer

## 2.2 About Prometeus

About Prometeus menu contains the following pages:

- Overview (Fig. 6): a brief overview of our project



HOME > OVERVIEW

## Overview

**Prometheus** (Preterm Brain-Oxygenation and Metabolic EU-Sensing: Feed the Brain) is a project aimed at introducing a **new-paradigm for personalized nutrition of prematurely born neonates** in neonatal intensive care unit (NICU). It will develop a groundbreaking technology for real-time adjustment of glucose and nutrients intakes to target neonatal **brain needs**. The brain of a baby born prematurely is highly susceptible to early neonatal injuries that, in turn, increase the risk for neurodevelopmental disability. Provision of adequate nutrients and oxygen is essential for proper brain development and growth. However, current nutritional strategies are unfit to target real-time brain necessities, and are driven by pre- specified (non personalised) nutritional charts, in the absence of contemporary cot-side monitoring of both brain "health" and metabolic supplies. As a consequence, sudden changes of brain fuel-requirements cannot be promptly addressed by real-time adjustment of glucose and nutrients provision.

**Prometheus** will develop a metabolic model of the interaction between the three key brain fuels and their effect on cerebral blood flow, oxygenation and metabolism. The model will serve to individualize brain nutrition targeting "**brain health**" according to the inputs derived from two novel minimally invasive metabolic sensing systems: a **wearable cap** measuring cerebral blood flow, oxygenation and metabolism, and a **subcutaneous miniaturized metabolic sensor** for the three key brain fuels. The system will create a metabolic "womb" to feed the brain of preterm neonates. Prometheus will be paralleled by a parent- dedicated interface, exploiting a purposely developed family adjusted visual language, that will inform parents of preterm babies during their NICU admission and stay. Prometheus will dramatically **reduce the risk for prematurity-associated disability** in Europe and worldwide, with a consequent incalculable ethical, social and economic impact.

Funded by the **European Innovation Council** (EIC) under the **Pathfinder Open** call, Prometheus is a multidisciplinary and challenging project, involving **11 partners in 6 different countries** (France, Great Britain, Ireland, Israel, Italy, Spain, United Kingdom).

Fig. 6 Overview of the project

- Objectives (Fig. 7): a list of the objectives of the project with a brief description

HOME > OBJECTIVES

## Objectives

The main objective of Prometheus is to provide a framework for personalized brain-oriented nutrition for preterm babies ("feed" the brain, based on real-time monitoring of cerebral blood flow, oxygenation and brain metabolic supplies). With Prometheus, we will reduce the number of former preterm children needing some sort of school support from ~125,000 to ~25,000 per year, thus reducing of a similar proportion prematurity related costs over a 5-year period, from 25,000,000€ per year in Europe to 5,000,000€.

To achieve this final aim, Prometheus will first reach different objectives:

- ✓ To develop a new non-invasive brain-imaging technology (neo-opticap) that will provide markers of the neurophysiological impact of metabolic state from multiple brain location, measuring cerebral blood flow, oxygenation and metabolism
- ✓ To develop a miniaturized on-body patch sensor for the minimally invasive continuous monitoring of the three key brain metabolites
- ✓ To define a metabolic model of the effect of nutrition on cerebral blood flow, oxygenation and metabolism
- ✓ To develop a Nutritional Clinical Advisor (NCA), that will guide parenteral (intravenous) nutritional intakes of preterm neonates to achieve optimal brain oxygenation
- ✓ To design a cloud-based app for healthcare personnel and families that incorporates the digital twin neonate
- ✓ To test the efficacy of Prometheus at improving cerebral blood flow, oxygenation and metabolism of preterm neonates admitted to NICU
- ✓ To create the first Visual and Oral Archive of Prematurity to inform developers of medical devices but also to support families and healthcare personnel experiencing premature birth

Fig. 7 Objectives of the project

- Background (Fig. 8): the background on which the Project has been developed





HOME > BACKGROUND

## Background

As increasing numbers of neonates born **preterm** receive neonatal intensive care and survival rates continue to improve, **the number of former preterm babies presenting an impairment in motor, sensory and cognitive functions dramatically increases**. Out of the 500,000 babies annually born before term in Europe, by the time they reach school-age, 125,000 (25%) are expected to require a variable range of school support, paid-leave for families and caregivers and may not be able to achieve superior instructions due to a wide range of learning and motor disabilities that cannot be identified and effectively prevented during the early post-natal period. The prematurity associated disability cost for the first two years of life in Europe is estimated to be more than 50,000 € per year per baby. **Addressing the global burden of preterm birth has been considered a pivotal task to achieve the third WHO Sustainable Development Goal – ensure healthy lives and promote wellbeing for all at all ages – and to reduce preterm-related neonatal and child social burden.**

In this context, Prometheus, with the **developmental of innovative technologies, novel metabolic models and the first oral and visual archive of prematurity**, will contribute to reduce the risk for prematurity-associated disability in Europe and worldwide.

Fig. 8 Background of the project

- Milestones (Fig. 9): milestones will be added chronologically as they are reached during the project. Currently, only the kick-off meeting milestone is present

HOME > MILESTONES

## Milestones

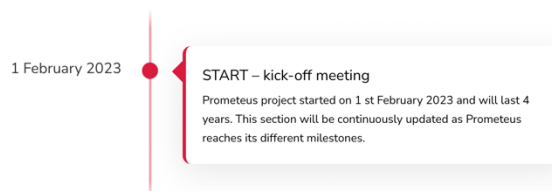


Fig. 9 Milestones of the project

- Results: results achieved during the project. This page is currently empty and will be updated as results are achieved during the project
- Deliverables (Fig. 10): public deliverables will be uploaded in this page and could be downloaded by everyone. Currently only one public deliverable is available. This page will be constantly updated during the project.

HOME > DELIVERABLES

## Deliverables

In this section you can download the project **deliverables** that are public.

31/03/2023

**Deliverable 8.1**

[Download file](#)

Fig. 10 Deliverables of the project



- People (Fig. 11): in this page, a brief CV of the coordinator and of all work package leaders are available. The link to their personal webpage is also listed.

HOME > PEOPLE

## People

### Coordinator

#### Sabrina Brigadoi

Università degli Studi di Padova, Italy

Dr. Sabrina Brigadoi is Assistant Professor at the Department of Developmental and Social Psychology at the University of Padova. She received her master degree in Bioengineering in 2010 and then her PhD in Psychological Science in 2014 both from the University of Padova. During her PhD, she visited both the Martinos Center for Biomedical Imaging in Boston and University College London (UCL), working on signal processing techniques and neonatal atlases for functional near-infrared spectroscopy (fNIRS) applications. She worked for one year as Research Associate at UCL, before coming back as post-doctoral fellow at the University of Padova, working on advances in fNIRS and performing cognitive studies in infants and adults. In 2018 she won a starting grant from the University of Padova, to study the relation between glycemic changes and brain oxygenation changes in very preterm neonates, which was further funded by the Italian Ministry of Health. Dr. Brigadoi's research activity covers a broad range of topics, both methodological and neuroscientific, most of them related to the development and application of optical techniques to study human brain development, brain functions and its pathological alterations.

[More info...](#)

### WP leaders

#### Davide Contini

Politecnico di Milano, Italy

Davide Contini (PhD, Ass. Prof.), Head of the fNIRS lab. He has been an Associate Professor of Physics at Politecnico di Milano since 2014. His research activity is focused on time-resolved spectroscopy of highly diffusive media for applications in biology and medicine. He designed, developed and characterized different systems for the non-invasive measurement of the functional activity in the cerebral and muscular tissues. He participated in several EU funded projects. He co-authored more than 250 publications on international peer-reviewed journals and congress proceedings with an h-index of 33. He is co-founder of PioNIRS srl, Spin-off Company of Politecnico di Milano.

[More info...](#)

#### Idan Tamir

QuLab, Israel

Dr. Tamir obtained his PhD in immunology from the Weizmann Institute (Rehovot Israel), followed by a fellowship at National Jewish Hospital (Denver CO) supported by grants from the NIH and awards from the American Leukemia Society. Since 2001, Dr. Tamir has been involved in multiple life science start-up companies, some as a founder and others as CTO and CEO. He was the President and CEO of RAD Biomed, one of Israel's leading medical device accelerators, founding over 20 new startups with several notable exits (Steadymed acquisition by United Therapeutics, and Eon Surgical acquisition by Teleflex) and over \$100M in follow-on investments. Dr. Idan Tamir is the co-founder and CEO of QuLab Medical, an Israeli start-up company developing the next generation of minimally-invasive, multi-analyte continuous metabolic monitoring patches. QuLab Medical has one granted patent for its innovative sensor technology and three additional pending patent applications and is the recipient of multiple grants from the Israeli Innovation Authority (IIA) and the Juvenile Diabetes Research Foundation (JDRF). Dr. Tamir is the co-author of 15 peer-reviewed publications and recipient of several granted patents.

[More info...](#)

#### Chiara Dalla Man

Università degli Studi di Padova, Italy

Chiara Dalla Man was born in Venice, Italy, on March 2, 1977. She graduated cum laude in Electronics Engineering at the University of Padova in 2000 and received the Ph.D degree in Biomedical Engineering from the University of Padova and City University London, in 2005. She is currently Associate Professor in Bioengineering at University of Padova. Her research activity, carried out in collaboration with Italian and foreign investigators, regards mainly mathematical modeling of physiological systems, in particular metabolic and endocrine systems. She is author of more than 170 publications (to date Scopus reports 177 papers in the period 2002-2023, quoted 10960 times, with an h-index of 52) on international journals and 4 International Patents. She is on the editorial board of Journal of Diabetes Science and Technology and serves as reviewer for several international journal.

[More info...](#)

#### Eugene Dempsey

University College Cork, Ireland

Professor Eugene Dempsey is a UCC graduate, he completed postgraduate training in Paediatrics in Ireland and later a Neonatal Fellowship at McGill University Health Centre, Montreal. He is the inaugural Horgan Chair in Neonatology at University College Cork, a consultant Neonatologist at Cork University Maternity Hospital and is clinical lead at the INFANT Research Centre. He is a member of a number of international collaborations conducting randomised trials on different aspects of neonatal care (Premod 2, Safeboosc3 and COSGOD trials). He leads a number of local clinical studies, supervising PhD students and junior doctors on many aspects of newborn medicine including cardiovascular support and the newborn microbiome. He is a member of a number of international organisations including the European Society of Paediatric Research, European Neonatal Echo Working group, European NIRS Working group and Pharmacology section of the European Society for Paediatric Research. He has been awarded a number of Higher Degrees, including a doctorate for work on Hypotension in the preterm infant, an MSc in Health Care Ethics and Law and an MA in Teaching and Learning, focused on Simulation based procedural care. He has > 200 publications in newborn care.

[More info...](#)



### Jose Vehi

Universitat de Girona, Spain

Dr. Josep Vehi is full Professor at the University of Girona and research associate at the Girona Biomedical Research Institute. Since 2018 Prof. Vehi belongs to the Spanish centre of excellence CIBERDEM: "Networked Research Centre on Diabetes and associated Metabolic Diseases". His research interests include control systems with application to bioengineering, applications of artificial intelligence and machine learning to biomedicine, modelling and simulation of biomedical and biological processes and human-in-the-loop control systems design. He is a co-author of more than 150 peer-reviewed international journal papers and 12 books and chapters of books. Throughout his career, Prof. Josep Vehi has supervised 18 doctoral theses and numerous master's theses and bachelor's theses. In 2000 Prof. Vehi founded the "Laboratory of Modelling, Identification, and Control Engineering" (MICELab), recognized and funded as "consolidated group" by the government of Catalonia. The MICELab Group consists of a team of well-trained people having a solid theoretical basis in: Mathematics, Computer Engineering, Control Engineering, Artificial Intelligence, and Biomedical Engineering, and with the capacity and experience of having led and participated in a large number of competitive research projects, both at European and national level, and by its ability to achieve transferable products.

[More info...](#)

### Alberto Scarpa

DAVE Embedded Systems, Italy

Alberto Scarpa is project manager in DAVE Embedded Systems and CEO of D-EYE. After the telecommunication Engineering degree, Alberto joined M31 (accelerator and engineering company) as project manager for medical and automation projects. Later Alberto was a co-founder of D-EYE (a medtech startup) first as CTO and then as CEO. Alberto managed the development of the D-EYE solution from concept to certified product in the market with more than 3000 units sold worldwide. With this experience, Alberto and the company won many awards in the innovation and medical industry (like Premio Marzotto and Bioupper by Novartis) and was a partner of the European project SeeFar. Alberto also received a MBA (master in business administration) from CUOA (Italy) and University of Michigan – Dearborn (USA). Alberto is a post-degree mentor for University of Padova and a startup mentor for Newchip Accelerator (USA). Alberto joined DAVE Embedded Systems (embedded technologies) as project manager for medical projects. His interests and researches include digital innovation in the healthcare sector, startup and new business model development, product development, machine learning and IoT applied to medical data, privacy and data management, medical certifications for products and softwares (ISO 13485, FDA GMP, ISO 62304, SaMD).

[More info...](#)

### Paola Rigo

Università degli Studi di Padova, Italy

Dr. Paola Rigo is an Assistant Professor at the University of Padua and a member of the Padua Neuroscience Center. She received her Ph.D. in Psychological Sciences and Education at the University of Trento (2013). She was a post-doctoral fellow at the National Institute of Child Health and Human Development, National Institute of Health (US; 2014-2015) and Nanyang Technological University (Singapore; 2016-2017). She is an author of 27 peer-reviewed articles in international scientific journals (most of them in high-quality journals including Scientific Report Nature, Proceeding of National Academy of Sciences, Developmental Review, NeuroImage and Social neuroscience), one book and five book chapters. Her research interest focuses on the psychobiological basis of parenting and intersubjectivity. Through an ecological and interdisciplinary perspective, she investigates how caregivers' response is modulated by the interplay between individual and clinical factors of parents (e.g., temperament, mood) and biological changes occurring during the early postpartum period. In connection with these studies, her research also investigates the effect of situational context in which parents respond to infant needs. She uses an integrated approach from psychological measures to observational, behavioral, and neuroimaging studies (e.g., fMRI, EEG and NIRS).

[More info...](#)

### Sabrina Brigadoi

Università degli Studi di Padova, Italy

Dr. Sabrina Brigadoi is Assistant Professor at the Department of Developmental and Social Psychology at the University of Padua. She received her master degree in Bioengineering in 2010 and then her PhD in Psychological Science in 2014 both from the University of Padua. During her PhD, she visited both the Martinos Center for Biomedical Imaging in Boston and University College London (UCL), working on signal processing techniques and neonatal atlases for functional near-infrared spectroscopy (fNIRS) applications. She worked for one year as Research Associate at UCL, before coming back as post-doctoral fellow at the University of Padua, working on advances in fNIRS and performing cognitive studies in infants and adults. In 2018 she won a starting grant from the University of Padua, to study the relation between glycemic changes and brain oxygenation changes in very preterm neonates, which was further funded by the Italian Ministry of Health. Dr. Brigadoi's research activity covers a broad range of topics, both methodological and neuroscientific, most of them related to the development and application of optical techniques to study human brain development, brain functions and its pathological alterations.

[More info...](#)

Fig. 11 People webpage: CV of coordinator and work package leaders

## 2.3 Partnership

Partnership menu contains a brief description of all partners involved in the project, displaying their logo and the link to their main webpage:

- Università degli Studi di Padova (Fig. 12)



HOME > UNIPD

## Università degli Studi di Padova



**UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA**

The University of Padova will coordinate and manage the whole project. The coordinator is based at the Department of Developmental and Social Psychology. Furthermore, the University of Padova will be involved in several working packages. The expertise of the Bioengineering group at the Department of Information Engineering, who developed the first metabolic simulator for diabetes, will guide the implementation of the new neonatal metabolic model. The expertise in neonatal clinical trials of the neonatologists at the Department of Women and Children's Health will be essential when Prometheus device will be tested in preterms. The expertise on social science and health divulgation to society (university third mission) at the Department of Developmental and Social Psychology will be the guiding force for the development of the Visual and Oral Archive of Prematurity.

[Read more](#)

Fig. 12 Partner Università degli Studi di Padova

- QuLab Medical (Fig. 13)

HOME > QULAB

## QuLab Medical



QuLab is a leading company in realizing personalized metabolic profiling, revolutionizing diabetes prevention, early diagnosis and management, by delivering a complete solution which will be deeply rooted in users' individual needs. QuLab will guide the development of the miniaturized on-body patch sensor for the minimally invasive continuous monitoring of the three key brain metabolites, relying on their unique technology for microsensing that enables multimetabolic sensing on a small interface.

[Read More](#)

Fig. 13 Partner QuLab

- ICFO (Fig. 14)

HOME > ICFO

## ICFO



ICFO is a world-leading research center in Photonics, with great expertise in diffuse correlation spectroscopy and speckle contrast optical spectroscopy techniques. ICFO will be responsible of the development of the speckle contrast optical spectroscopy module of neo-opticap.

[Read more](#)

Fig. 14 Partner ICFO

- Universitat de Girona (Fig. 15)



HOME > UDG

## Universitat de Girona



Universitat de Girona, through its Institute of Informatics and Applications, has high expertise in the implementation of control algorithm for diabetic application (e.g., the artificial pancreas). Universitat de Girona will guide the implementation of the Nutritional Clinical Advisor, a control algorithm that will output the correct parenteral (intravenous) nutritional intakes for each preterm neonate to achieve optimal brain oxygenation.

[Read more](#)

Fig. 15 Partner Universitat de Girona

- Politecnico di Milano (Fig. 16)

HOME > POLIMI

## Politecnico di Milano



**POLITECNICO**  
MILANO 1863

Politecnico di Milano, through the Department of Physics, is the world-leader in the development of time-domain near-infrared spectroscopy devices. Politecnico di Milano will be responsible of the development of the time-domain near-infrared spectroscopy module of neo-opticap, as well as will supervise the implementation of the entire neo-opticap in all its components.

[Read more](#)

Fig. 16 Partner Politecnico di Milano

- University College London (Fig. 17)

HOME > UCL

## University College London



University College London, through the Department of Medical Physics and Biomedical Engineering, is a world-leader expert in optical imaging technologies applied to newborns. University College London will be responsible of the development of the ergonomic cap that will host the optical imaging technologies developed by ICFO, Politecnico di Milano and pioNIRS.

[Read more](#)

Fig. 17 Partner University College London

- pioNIRS (Fig. 18)



[HOME](#) > [PIONIRS](#)

## pioNIRS



pioNIRS is a recently founded company arising from an interdisciplinary team of alumni and professors of Politecnico di Milano. pioNIRS has expertise in the field of diffuse-optics, single-photon detectors, electronics, basic and applied research and will be involved in the development of neo-opticap and in its future commercialization potentials.

[Read more](#)

Fig. 18 Partner pioNIRS

- University College Cork (Fig. 19)

[HOME](#) > [UCC](#)

## University College Cork



University College Cork, through its INFANT Research Centre, has great expertise in neonatal clinical trials involving medical devices and brain oxygenation. University College Cork will lead the first testing of Prometeus in the neonatal intensive care unit on premature newborns.

[Read more](#)

Fig. 19 Partner University College Cork

- INSERM (Fig. 20), the affiliated entity of Université Grenoble Alpes

[HOME](#) > [INSERM](#)

## INSERM



INSERM (INSTITUT NATIONAL DE LA SANTE ET DE LA RECHERCHE MEDICALE) is an affiliated entity of Université Grenoble Alpes.

[Read more](#)

Fig. 20 Affiliated entity INSERM

- Université Grenoble Alpes (Fig. 21)



## Université Grenoble Alpes



Université Grenoble Alpes, through the Grenoble Institute Neurosciences, is a world-leader expert in animal experiments involving magnetic resonance imaging scanning to detect brain blood flow, oxygenation and metabolism. Université Grenoble Alpes will be responsible of the animal experiments that will provide preliminary data for the implementation of the neonatal metabolic model.

[Read more](#)

Fig. 21 Partner Université Grenoble Alpes

- Dave Embedded Systems (Fig. 22)

## DAVE Embedded Systems



DAVE Embedded Systems is a company specialized in the design and production of embedded systems. Dave Embedded Systems will lead the implementation of the cloud-based app for healthcare personnel and families that incorporates the digital twin neonate.

[Read more](#)

Fig. 22 Partner Dave Embedded Systems

### 2.4 Research

Research menu contains the following pages, which describe the main technologies and objectives of the project, covering the different fields involved in the project, and the partner specifically involved in each research topic:

- Photonic technologies (Fig. 23)

## Photonic technologies

Prometheus will develop an innovative brain imaging device (neo-opticap) able to monitor in real-time brain oxygenation, blood flow and metabolism from multiple regions of the head at the cot-side. Neo-optical will be developed by combining two photonics technologies, time-domain near-infrared spectroscopy (TD-nirs) and speckle contrast optical spectroscopy (SCOS), which will be coupled to the newborn's head via an optimized and ergonomic wearable cap.

The TD-nirs module will be developed at Politecnico di Milano (Italy) and pioNIRS (Italy), whereas the SCOS module will be developed at ICFO (Spain). The ergonomic wearable cap will be developed at University College London (U.K.).

Fig. 23 Photonic technologies involved in WP1

- Metabolic monitoring (Fig. 24)



HOME > METABOLIC MONITORING

## Metabolic monitoring

Prometeus will develop an innovative miniaturized on-body patch sensor for the minimally invasive continuous monitoring of the three key brain metabolites: glucose, lactate and beta-hydroxybutyrate (BHB). There are currently no neonatal metabolic sensors able to measure all three brain metabolites. All these information should provide a more detailed picture of the metabolic state of the newborn.

The metabolic sensor will be developed by QULab (Israel).

Fig. 24 Metabolic monitoring technology involved in WP2

- Neonatal in silico avatar (Fig. 25)

HOME > NEONATAL IN SILICO AVATAR

## Neonatal in silico avatar

Prometeus will implement the first neonatal metabolic model describing the effects of nutrition on brain oxygenation, blood flow and metabolism. The model will be initially implemented based on data from an animal study in Sprague Dawley rats, due to their brain anatomical and functional proximity to the preterm newborn. Rats will be fed with different diets (high/low fat and protein) and put into hypo (low blood sugar) or hyperglycemia (high blood sugar).

This neonatal metabolic model will be our neonatal in silico avatar. The neonatal in silico avatar will be developed at Università degli Studi di Padova (Italy) whereas the animal study will be carried out at Université Grenoble Alpes and their affiliated entity INSERM.

Fig. 25 Neonatal in silico avatar developed in WP3

- Nutritional Clinical Advisor (Fig. 26)

HOME > NUTRITIONAL CLINICAL ADVISOR

## Nutritional Clinical Advisor

Prometeus will develop a Nutritional Clinical Advisor (NCA), a personalized and adaptive algorithm able to yield, for each newborn, the best nutritional diet. The suggested diet will be chosen based on the real time measurements coming from neo-opticap and the metabolic sensor and using the neonatal in silico avatar to target optimal brain oxygenation.

The NCA will be developed at Universitat de Girona (Spain).

Fig. 26 Nutritional clinical advisor developed in WP4

- Digital twin (Fig. 27)

HOME > DIGITAL TWIN

## Digital twin

Prometeus will develop a cloud-based app with a double interface, one for health care personnel (HCP) and one for the families with their newborn babies in the neonatal intensive care unit (NICU). The app will incorporate the "digital twin" neonate. The digital twin is the functional interface that will guide HCP in neonatal care by providing nutritional guidance and alerts from the Prometheus on-body monitoring tools. The family-interface, in contrast, will inform families on baby wellbeing and progresses with respect to the goals of the care, and allow them to have a protected, remote, and real-time interaction with the caregivers in NICU.

The Prometheus app will be developed by Dave Embedded Systems (Italy).

Fig. 27 Digital twin developed in WP5

- Visual & Oral archive of prematurity (Fig. 28)





HOME > VISUAL & ORAL ARCHIVE OF PREMATURITY

## Visual & Oral archive of prematurity

One of the main and immediate impact that Prometheus can have on society is the creation of the first European Archive of Prematurity. Parents of preterm babies and health care professionals (HCP) working in neonatal intensive care units (NICU) will be interviewed longitudinally for over a year to evaluate the impact of prematurity on their lives, the impact of on-body monitoring devices in babies and the need-for- information for parents during the separation due to NICU admission. At the end of the series of interviews, parents and HCP will be interviewed one last time to document the individual dramatic experience of NICU admission of a preterm baby; the baseline perception of prematurity, of on-body monitoring and the longitudinal memory of such an experience.

These interviews will be carried out in two different countries, in Italy (Università degli Studi di Padova) and in Ireland (University College Cork). The final Archive will be released online with subtitles in Italian, English, French, Spain, and Israel.

Fig. 28 Visual & Oral archive of prematurity developed in WP7

- Feasibility and testing (Fig. 29)

HOME > FEASIBILITY AND TESTING

## Feasibility and testing

All Prometheus components will be first tested at the laboratory level. After this first test, Prometheus prototype will be piloted in two neonatal intensive care units (NICUs): at the NICU of the Padova University Hospital (Università degli Studi di Padova, Italy) and at the NICU of the University College Cork (Ireland).

Fig. 29 Feasibility and testing, performed in WP6

### 2.5 Gallery

The Gallery menu contains two pages, the Video Gallery and the Photo Gallery. In the former, videos related to the Prometheus project will be uploaded, whereas in the latter, photos related to the Prometheus project will be uploaded.

### 2.6 Events & News

The Events & News menu contains two pages, the Events page (currently empty, it will be constantly updated with new events as the project proceeds) and the Press Release page, containing all press releases related to the project from all partners (Fig. 30).

HOME > PRESS RELEASE

## Press Release

04.11.2022

**4 Million Euros  
Awarded to the  
International UniPD  
Project for Premature  
Babies**

[More info...](#)

Fig. 30 Press Release webpage

### 3. Prometeus social networks

Twitter and Instagram account and a LinkedIn page for Prometeus have been recently opened.

#### 3.1 Twitter

A Twitter account has been created and our first tweet has been published on 03/05/2023 promoting and launching the Prometeus project (Fig. 31).



Fig. 31 Twitter profile and first published tweet



### 3.2 Instagram

An Instagram account has been created and our first post has been published on 28/04/2023 promoting and launching the Prometheus project (Fig. 32).



Fig. 32 Instagram profile and first published posts

### 3.3 LinkedIn

A LinkedIn page has been created for the project and our first post has been published on 03/05/2023 promoting and launching the Prometheus project (Fig. 33).

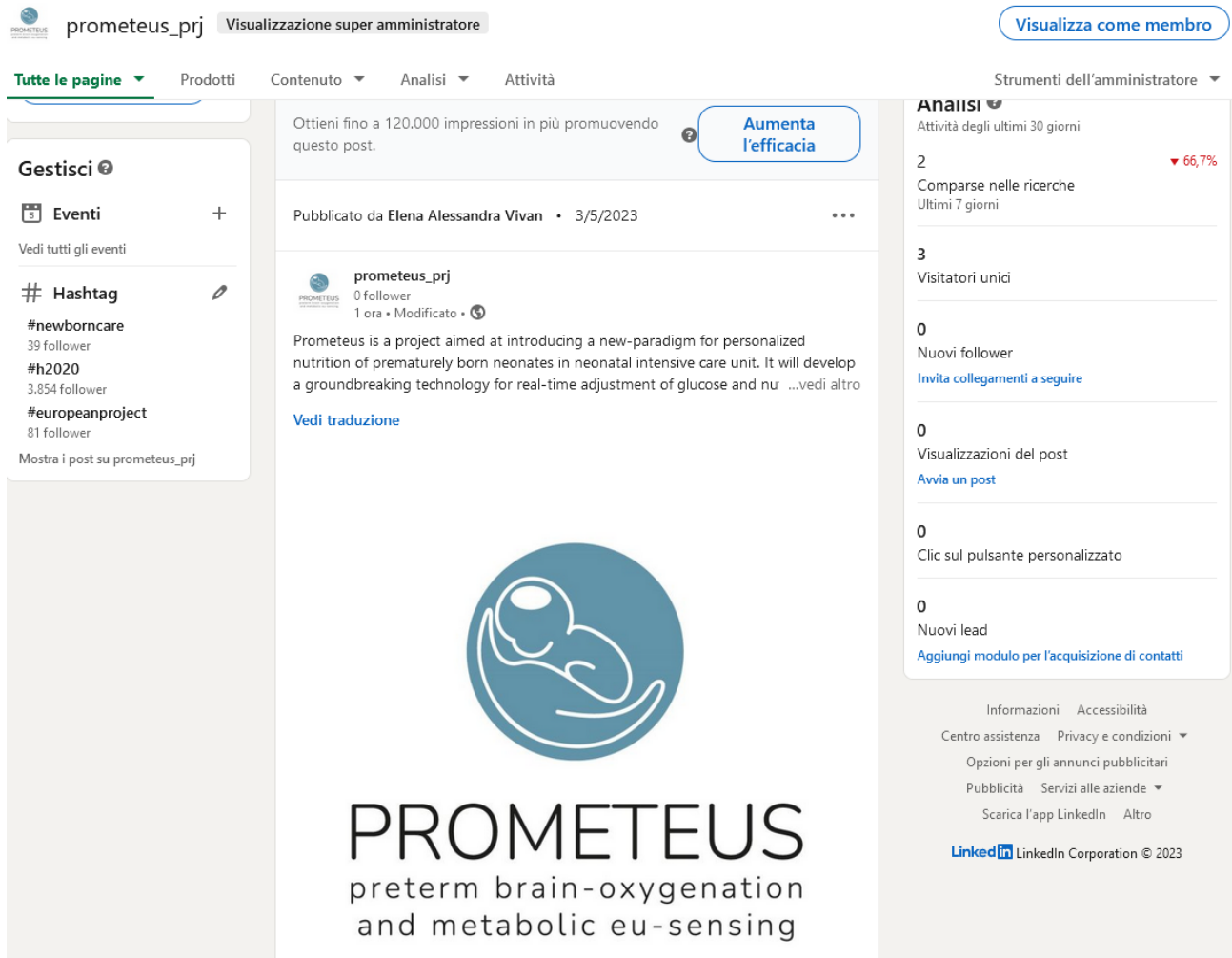


Fig. 33 LinkedIn page and first published post