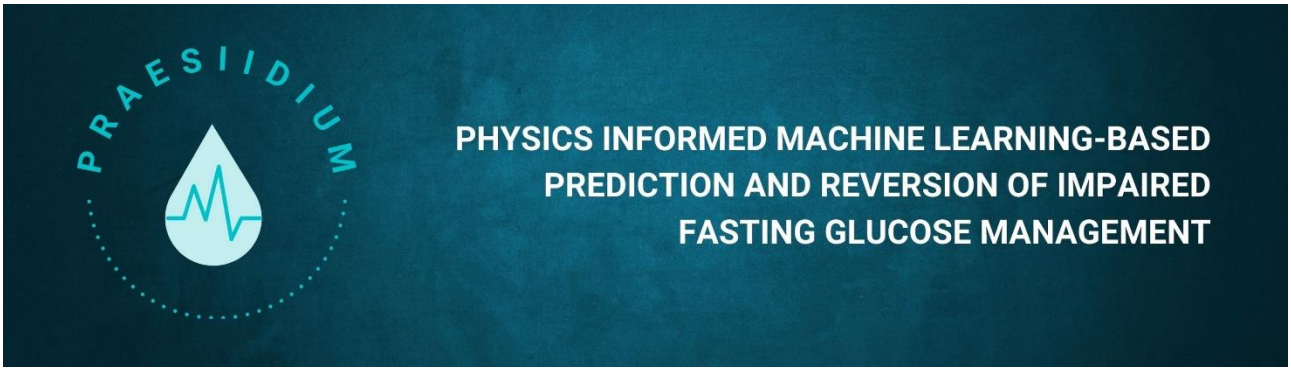

D7.6 – Project Website

Due date of deliverable: 30/06/2023

Responsible partner: SPXL

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement **No 101095672**

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DOCUMENT DETAILS

Title	Title
Deliverable No.	D7.6
Work Package	WP7 – Communication, dissemination and exploitation
Task	T7.3
Deliverable Type	R - report
Lead Partner	SPXL
Contributing Partner(s)	all
Due date of deliverable	30/06/2023
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Abstract	This document presents contents and functionalities included by the project website
Keywords	Communication, website

Dissemination level:		
PU	Public	X
RE	Restricted to a group specified by the consortium (including Commission Services)	
CO	Confidential, only for members of the consortium (including Commission Services)	

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CHANGE HISTORY

Version	Date	Changed by	Changes made
V1.1	16/05/2023	Giulia Masetti (SPXL)	First Draft
V1.2	30/06/2023	Leonardo Napoletani (SPXL)	Final approved draft

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Explanation of acronyms and abbreviations

Acronym	Full name
AI	Artificial intelligence
CA	Consortium agreement
C&D	Communication and Dissemination
EU	European Union
FP7	Seventh-framework programme
GA	Grant agreement
IDF	International diabetes federation
IFG	Impaired fasting glucose
IGT	Impaired glucose tolerance
M	million
MetS	Metabolic syndrome
T2D	Type-2 diabetes
PIML	Physics-informed machine learning
WHO	World Health Organisation
WP	Work package
XAI	Explainable Artificial Intelligence

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1. OVERVIEW OF THE DELIVERABLE

1.1. Scope

The Deliverable D7.6 aims at presenting the structure of the PRAESIIDIUM's project website.

1.2. Audience

This document is public. To maximise the impact of the project, we have pre-identified some targeted audience groups:

- **Technology providers** such as researchers in academia, SMEs or other institutions working on artificial intelligence (AI)-based algorithms for preventative and personalised medicine.
- **Clinicians and healthcare professionals** e.g., in the fields of endocrinology, hepatology, metabolism, etc.
- **Patients, caregivers, and healthy people** will be the end-users of the solution.
- **Industry** including (but not limited to) pharma companies, wearable devices manufacturers, patients remote control manufacturers, etc.

1.3. Summary

The aim of this document is to present the structure of the project website which will be used in terms of Communication & Dissemination (C&D) activities of the PRAESIIDIUM project's results, achievement, and advances to a general and as wider audience as possible.

1.4. Structure

The content of this document is structured in the following sections:

- Introduction of project rationale and management
- Branding of the website
- Presentation of the project website structure

2. INTRODUCTION

2.1. PRAESIIDIUM's project overview

- In 2021, 1 in 11 European adults were living with diabetes (61M people); by 2024 its incidence is expected to increase to 69M people,
- 36% European adults live with **undiagnosed diabetes**, which if not properly cure can cause life-threatening outcomes,
- Impaired glucose tolerance (IGT) and Impaired fasting glucose (IFG) are precursors of the overt diabetes called "**prediabetes**" and – if early diagnosed – can be reversed by lifestyle modifications (e.g., healthy diet and physical activity),
- Therefore, there is an urgent need of personalised, early diagnosis tools,

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- The PRAESIIDIUM project will develop a tool for the **real-time prediction** of the **prediabetic risk** of an individual based on "physics-informed machine learning" (PIML) model accessible through a user-friendly web-based application,
- The PIML will make use of multi-scale, integrated mathematical models (MISSION T2D) coupled with explainable AI trained on large-scale, real-life, and already existing clinical databases, plus data from two newly dedicated clinical studies with continuous ingestions by wearable sensors.

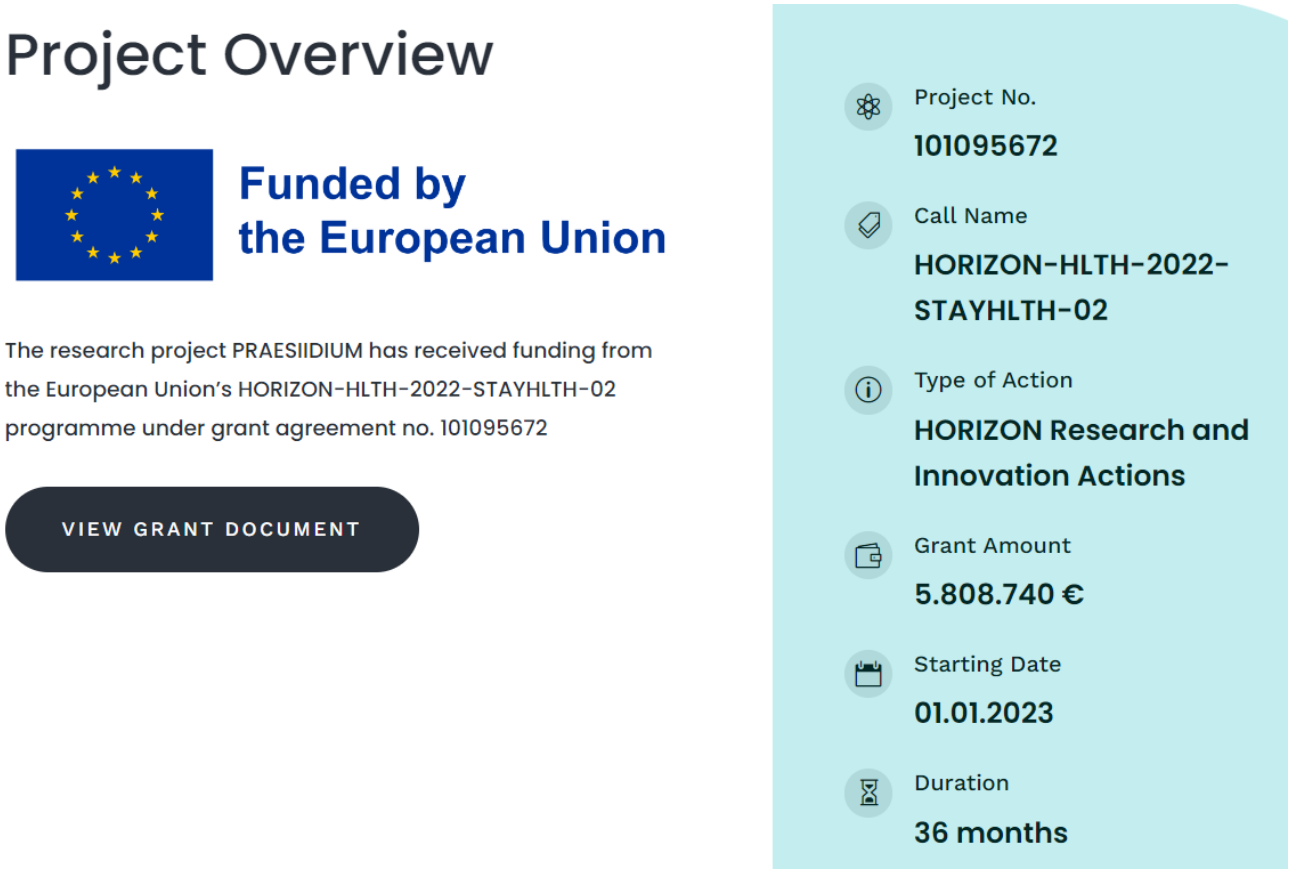

Figure 1- PRAESIIDIUM's project details (from the website content)

Diabetes is a chronic disease occurs when the pancreas no longer produces insulin (or the body is not able to correctly use the secreted insulin[1]), leading to an increased glucose blood level (i.e., *glycaemia*). European prevalence of diabetes in 2021 was of 1 in 11 adults (61M)[2], and its incidence is predicted to increase to 69M by 2045. Diabetes is also the third leading cause of death, responsible of a total 6.7M deaths (1.1M only in Europe).

Amongst others, **type-2 diabetes** (T2D) accounts for 90% total diabetes cases with an adulthood onset. It is characterised by insulin resistance (i.e., the insulin hormone cannot effectively regulate the blood glucose levels) and/or a failure in compensatory mechanisms for insulin secretion (i.e., the body does not correctly use the insulin produced) [1]. Besides genetic predisposition and family

[1] Diabetes (who.int)
[2] IDF Diabetes Atlas | Tenth Edition

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history, metabolic syndrome and obesity increase the risk of T2D development, along with physical inactivity, age, and ethnicity. Despite a management of diabetes is still possible considered all the challenges, taking **effective prevention measures** are mandatory.

According to the IDF Diabetes Atlas (10th edition)[2], 36% European adults are living with undiagnosed diabetes, and such incidence is much higher in low/middle income countries, where 1 in 2 people live with undiagnosed diabetes. Also, 541M adults (20–79-year-old) worldwide have *Impaired Glucose Tolerance* (IGT), an important risk factor for further T2D development. Both IGT and/or the *Impaired Fasting Glucose* (IFG) are intermediate condition within the "healthy-to-T2D transition" and are manifestations of the so-called prediabetes condition. For the sake of completeness, the definitions of IGT and IFG are:

- **Impaired Glucose Tolerance** (IGT) occurs when "glycaemia is higher than normal, but not high enough to be classified as diabetes" [2]: blood glucose level of 140 to 200 mg/dL 2 hours after a 75g oral intake of glucose (during oral glucose tolerance test),
- **Impaired Fasting Glucose** (IFG) happens when "glycaemia level is consistently higher than normal ranges in the fasting state, but not high enough to be classified as diabetes" [2]: fasting blood glucose level of 100 to 125 mg/dL5. In 2021, around 25,600 European adults had IFG, and this number is set to increase close to 27,000 by 2045.

As for T2D, family history and ethnicity are important risk factors for prediabetes. Moreover, prediabetes can occur because of the metabolic syndrome (MetS), i.e., presence of high body fat (central obesity), non-alcoholic fatty liver disease (e.g., steatosis) and insulin resistance.

Unlike overt T2D, **prediabetes** is still an early-stage, intermediate condition that **can be reversed**; in fact, "*the rate of T2D progression within 3 years can be decreased by approx. 58% with a lifestyle modification*" [2]. **Physical activity** should be performed for minimum 30-54 minutes at least 2-5 days/week, and a **healthy diet** is also strongly recommended (2014 WHO and IDF recommendations7)[3,4].

2.1.1. Aim of the project

The "physics-informed machine learning-based prediction and reversion of impaired fasting glucose management" (PRAESIIDIUM) project will exploit and optimize some of the outcomes of a multi-scale, hybrid computational model of the human metabolic and inflammatory status (developed by CNR during the EU-FP7 project **MISSION-T2D**[5]), along with the integration of a new research area called "*physics-informed machine learning*" (**PIML)** [3] to develop an easy-to-use, reliable, and efficient tool for the prediction of the prediabetes risk. Thus, the aim of the PRAESIIDIUM project (i.e., in Latin "*praesidium*" means "protection") is:

[3] Prevention (idf.org)
[4] Framework-for-Action-on-Sugar-010615.pdf (idf.org)
[5] www.mission-t2d.eu/MISSION-T2D/index.html

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To develop a tool aimed at providing a **real-time prediction of the prediabetic risk of an individual**. The prediction algorithm will be based on a "*physics-informed machine learning*" approach: a rich dataset of real-life data, obtained from already existing previous and a new clinical trial with continuous data ingestion through wearable sensors, will be combined with mathematical models and explainable artificial intelligence (XAI) techniques, to overcome the limits of "*black-box*" machine learning approaches while improving the prediction performances and reducing the computational time of the risk calculation based on the simulations of the mathematical model. The final algorithm will be implemented in a web-based platform, where medical doctors and patients can inject data from several sources (acquisition form connected sensors and manual insertion) and obtain a real time analysis of the risk to develop the prediabetic condition over time.

2.2. Purpose of the deliverable

This document encloses the project's website structure, in line with the Work package (WP) 7 scope – "Exploitation, dissemination and communication". Such a website will serve as a tool to secure a well-planned, timely and properly implemented project's communication and dissemination activities.

3. Branding the Project Website

3.1. Purpose of the website

The project website acts as a main dissemination portal of the project advances, results, and acknowledgments. The website is available online starting from M4 available at the following address: PRAESIIDIUM | Preventing diabetes with Artificial Intelligence (spindoxlabs.com), while here we present its structure. The website displays two main functions:

- institutional function
- communication function: to attract attention from clinicians, industry, and possible stakeholders. It also provides materials and news to be communicated to a wider audience.

3.2. Website colours

The following colours should be used to outline the visual identity of any project communication materials including the website:



Figure 2- PRAESIIDIUM's official colour palette

3.3. Website font

The following fonts will be used for written contents in PRAESIIDIUM's communication, reporting, presentations and website contents:

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Table 1-PRAESIIDIUM's official website fonts

Font	Usage
Roboto – ***Roboto*** – Roboto **ROBOTO** – ***ROBOTO*** – ROBOTO	For written materials (documents, deliverables, reports), ppt and website

3.4. Project logo

This logo has been chosen by the project's partners through a survey. The logo should appear in any formal/informal communication and dissemination material concerning the project's advances, results, and acknowledgment. Other modified versions of the logo could be created within the project timeframe.

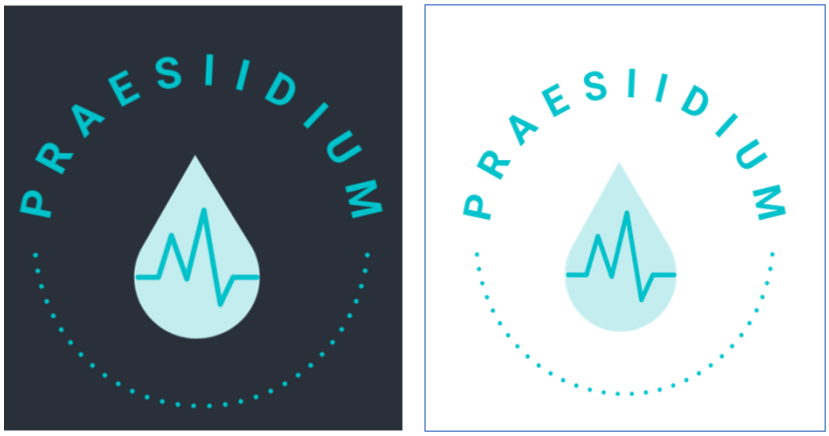

Figure 3- PRAESIIDIUM's project logo

4. Structure of the Project Website

4.1. Home/Frontpage

The PRAESIIDIUM's website is structured in a front-page including the Project Logo, direct information link to the Horizon Europe framework and main menu:

- Home
- Partners
- Contact Us

As shown in Figure 4 below.

The home section displays a brief introduction as described in chapter 2 of the following document, including:

- Prediabetes Risk
- Preventing Diabetes with AI

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The Home section also welcomes an update from Twitter' latest news from both the project's account and the Horizon Europe (CINEA) account.

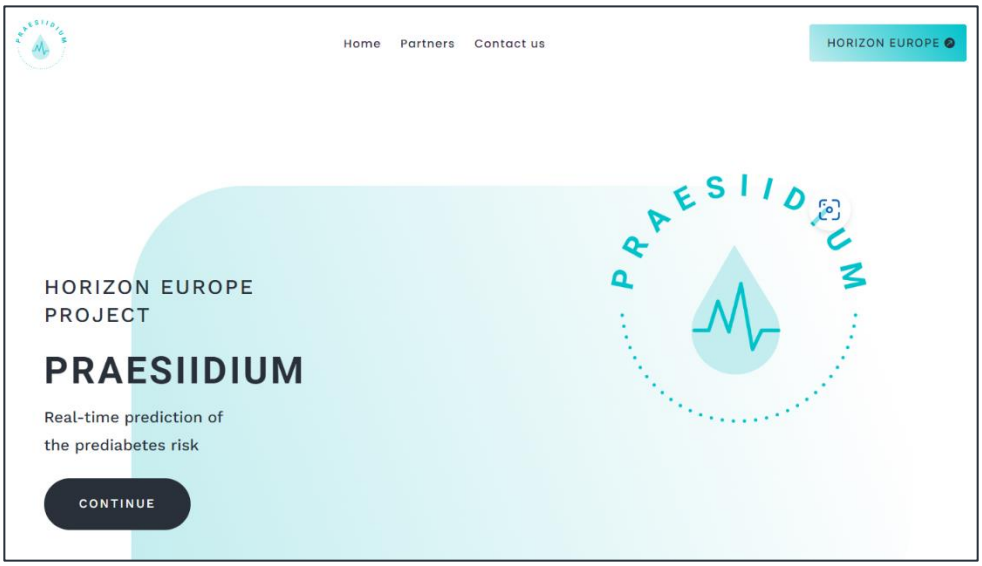

Figure 4- PRAESIIDIUM's project website front page.

4.2. Partners

The section presents the consortium capacity in the project. Each partners is represented by a description, their logo, their project website and an assigned hashtag explaining its role within the project.

The consortium consists of 11 members, three of which are companies, and the rest are universities or research institutes. The members come from five EU countries and one Swiss Associated Partner. Within the consortium, partners blend theoretical and practical knowledge in formal methods, mathematical modelling, explainability of machine learning models, collection of medical data via clinical trials and their analysis, to address the project's enabling objectives.

Spindox Labs srl is the research and development center of Spindox SpA. Mission of Spindox Spa is to support the process of digital transformation of their customers, by developing new technology and providing consultancy in five strategic domains: cloud computing, hybrid and native mobile applications, artificial intelligence, big data & analytics and internet of things. Spindox Labs collaborates with Italian and international universities and research centers carrying out innovation projects related to Artificial Intelligence and Artificial Vision, Internet of Things and 3D modelling.

Role in the project: #coordinator #systemIntegrator #microbiomeModel

The **National Research Council** of Italy (CNR) is a public organization; its duty is to carry out, promote, spread, transfer and improve research activities in the main sectors of knowledge growth and of its applications for the scientific, technological, economic and social development of the country. Two departments are involved within PRAESIIDIUM, both with strong expertise and research in diabetes prediction and prevention:

- The **Istitute IAC "M. Picone"** (Istituto per le Applicazioni del Calcolo (www.iac.cnr.it) is specialized in developing highly advanced mathematical, statistical and computational methods to solve problems with strong relevance to society and industry.
- The **Institute of Electronics, Information Engineering and Telecommunications** IEIIT (www.ieiit.cnr.it) performs research activity in the fields related to information technology, systems engineering, electronics, and biomedical engineering.

Role in project: #MissionT2D #predictiveComputationalModels #machineLearning #diabetesResearch #bigDataAnalysis

Euronet Consulting EEIG (Exploitation Manager) is a pan-European group of cutting-edge consultancy companies and a global network consisting of partners in Official Development Assistance (ODA) countries. The group was established in 1990 as a coordination hub for managing joint operations in a broad number of thematic sectors. Over time it evolved to become a means by which services of member companies have been made readily available to major international donors, primarily the Commission of the European Union.

Role in project: #exploitationManager #businessPlan #costBenefitAnalysis #marketabilityRoadmap

SUPSI-IDSIA is a Swiss research institute - one of the most prominent European research institutes in AI - with pioneering expertise in mathematical modelling and optimization, machine learning, advanced statistics, distributed systems, control of swarm intelligence and Bayesian methods. optimization, and machine learning.

Role in project: #physicsInformedMachineLearning #federatedLearning #bigDataAnalysis

The Medical University of Graz (MUG) is the second largest Medical University of Austria with over 2,500 academic and general staff members and around 4,500 students. The Division of Endocrinology and Diabetology offers extensive outpatient services and a 21-bed inpatient ward. Research areas of the Division are: analysis of real-world data, assessment of risk prediction tools, biomarker research, design, evaluation and use of diabetes technology incl. software, hypoglycaemic clamp experiments, new pharmaceutical approaches for the treatment of diabetes mellitus.

Role in project: #type2Diabetes #endocrinology #largeClinicalDatabase #clinicalStudy

HKL Lab HKL Lab (HKL) develops research assets for the new season of AI, where the availability of predictive models is vital for any organization, from corporates to public agencies and individuals. HKL has expertise based on more than 20 years of international research in machine learning, including highly cited papers in deep learning, predictive biomarkers, model distillation, and model reproducibility. H3K Lab provides solutions & consulting services in machine learning, data science and their applications, with a focus on Life Sciences.

Role in project: #dataDriftAnalysis #trustworthyAI #modelDistillation #machineLearning

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EDI is a public state research institute conducting fundamental and applied research in the broad area of Smart Embedded Cooperative Systems. Currently, EDI is the highest rated scientific institution in Latvia specializing in engineering research. The key driving force of EDI scientific activities is its economic and social impact; therefore we apply our expertise in mobility, industry, health, digital life and space domains. Meanwhile, we are focusing on following research directions: extremely precise event timing; remote sensing and space data processing; robotics and machine perception; signal processing and embedded intelligence; smart sensors and IoT.

Role in project: #bioimpedenceSensors #wearableSensors #IoT

CheckHealth is an innovative medtech company developing and marketing solutions to help care organisations implement customised remote patient monitoring programmes. CheckHealth offers LinkWatch, a cloud-based platform for patient data collection and self-monitoring, RheumaCloud a service for self-management of rheumatic patients with cardiovascular complications using our medical device gateway and federated cloud and VoiveRPM, an Intelligent Digital Voice Assistant for Remote Patient Monitoring.

Role in project: #remotePatientSelfManagement #LinkWatch #digitalVoiceAssistance

Scuola di Robotica is a non-profit association founded in 2000 by a group of robotics and human science scholars. The main objective of Scuola di Robotica is the promotion of culture through education, training, education and dissemination of the arts and sciences involved in the process of development of robotics and new technologies. Over the years Scuola di Robotica has become a national and international reference point for many research activities and application of robotics in the most varied sectors of society such as didactics, ecology and disabilities.

Role in project: #ethicsBoard #ethicsForHumanData #ethics-by-designWebApp #ethicsAssessment

The Italian Liver Foundation (Fondazione Italian Fegato (FIF)–ONLUS) is a no-profit research center in Trieste, Italy, specialized in translational research and educational training of researchers and clinical personnel in liver-related diseases. Its additional strength lies in the vast network of collaborators with research centers, universities, hospitals (more than 30) located worldwide (Italy, US, EU, Indonesia, Philippines, Argentina, Vietnam). The Foundation's staff ranges from senior scientists and researchers, PostDocs and PhD students, including the visiting researchers and a significant number of ungraduated students performing their daily research activity. One research line developed ten years ago is dedicated to studying metabolic associated liver disorders and chronic liver diseases, and currently, the team counts on expertise/skills/tools and models for the investigation of the liver diseases.

Role in project: #metabolicSyndromePatients #obesity #NAFLD #predictiveBiomarkers #clinicalStudy

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University of Latvia (UNIL) is one of the largest comprehensive and leading research universities in the Baltics. University of Latvia is continuously developing — expanding horizons of the academic work and scientific research by collaborating internationally, increasing the number of international study programmes, strengthening its cooperation with industrial partners. The **laboratory for Personalized Medicine**, Faculty of Medicine has experience in running national and international scientific projects in the area of diabetes and endocrinology. In addition, close collaboration of UNIL with Latvian Genome database (national biobank) allows for high-quality sample collection and preservation protocols.

Role in project: #type2Diabetes #endocrinology #personalizedMedicine #clinicalStudy

4.3. Contact Us

The "Contact Us" section wants to be a point of contact between the audience and the consortium. We created the following mail address to make the Consortium reachable by the general audience, with specific regards to possibly interested patients, domain experts, researcher, general public, etc.

praesiidium.project@spindox.it

5. Conclusions

The present document shows the branding and the structure of the project website, reachable at the following address: PRAESIIDIUM | Preventing diabetes with Artificial Intelligence (spindoxlabs.com).

The website will act as a frontpage to communicate to a wider audience the advances and results of the project itself. To this end, the initial overall strategy adopted by the PRAESIIDIUM consortium to prepare and manage the C&D activities thought to performed in the upcoming stages of the project lifecycles is presented in Deliverable D7.1.

We reckon that - in the next future - other pages and sections will be needed to properly present each project achievements, newsletters, results, consortium photos etc.

6. References

[1] Bloomgarden Z.T. (2011) American Diabetes Association Postgraduate Meetings - 2011. *Diabetes Care*; 34(11): e164-e169. https://doi.org/10.2337/dc11-1557

[2] Mayans L. (2015) Metabolic Syndrome; insulin resistance and prediabetes. *FP Essent*. Aug; 435:11-6.

[3] Karniadakis G.E., Kevrekidis I.G., Lu L., Perdikaris P., Wang S., Yang L. (2021) Physics-informed machine learning. Nature Reviews Physics 3, 422-440. https://doi.org/10.1038/s42254-021-00314-5

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