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# **PROLEPSIS**

HorizonEurope-funded project developing a novel personalised digital care ecosystem for people with PsA

## **iPROLEPSIS project newsletter | Issue No. 1**

July 2023

Welcome! This is the first edition of Newsletter series of the **iPROLEPSIS** project! **The 1st newsletter** brings you the information that you need to know about the iPROLEPSIS project, its vision, pillars and objectives, and partners involved.

The **iPROLEPSIS** Newsletter will be published until the end of the project. Through our project's website, social media accounts, and this Newsletter, we will keep you informed about project's progress.

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**Funded by  
the European Union**

**iPROLEPSIS** received funding from the European Union under Grant Agreement No. 101095697.

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# Learn more about iPROLEPSIS



**iPROLEPSIS** - funded by the EU Horizon 2022 Research & Innovation Programme - kicked off in January 2023 and brings together **15 partners** from **9 European countries**.



**iPROLEPSIS** aims to understand the transition to Psoriatic Arthritis (PsA) using a comprehensive AI-based model that analyzes diverse data sources like health, environment, genetics, and behavior. The goal is to provide a comprehensive and reliable understanding of the factors involved in the development of PsA.

## iPROLEPSIS concept

### A novel personalised digital care ecosystem for people with PsA

#### IoT sensing technologies and a mobile app for RWD collection

At the core of the iPROLEPSIS lies the **integration of IoT sensing technologies and a mobile application**. These cutting-edge tools will enable **collection of RWD** throughout the PsA treatment process. The aim is gather both retrospective and prospective multi-source data from clinical partners' databases, as well as from open access sources.

#### AI models and analytical tools for personalized treatments

Through the analysis and visualization of these data using **AI predictive models** and an intuitive visual analytics tool, the iPROLEPSIS will be able to propose **personalized treatments** (i.e., diet, physical activity, stress/fatigue/pain management), empowering doctors, caregivers, and hospitals towards the optimal management of PsA.

#### xAI techniques for better clinical practices

Through **xAI techniques**, iPROLEPSIS aims to **facilitate hospitals and policy makers in gaining new insights towards better clinical practices**, thus shaping future PsA treatment policies.

Ensuring long-term impact through **building active iPROLEPSIS community**, making **project outputs widely accessible**, **increasing engagement of individuals** with or at risk of PsA, **collaborating** with similar research and innovation projects, **establishing a forum** for HCPs, **identifying exploitation mechanisms**.



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# Consortium

## iPROLEPSIS project coordinator

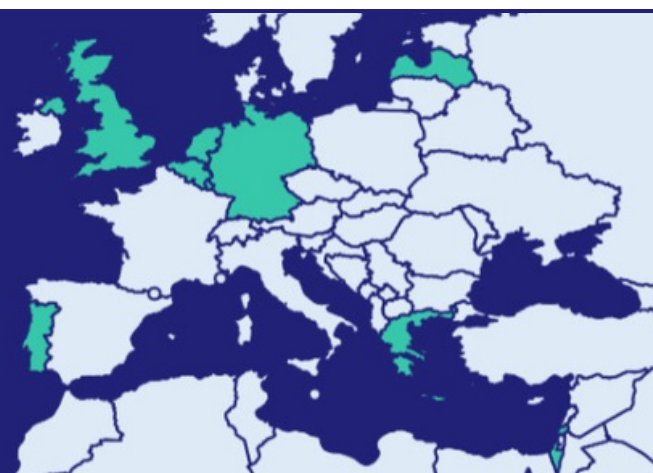
Aristotle University of  
Thessaloniki



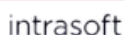
Consortium consists of  
**15 partners** from **9 countries**

Project duration **48 month**

Total budget **€ 6,4M**



## iPROLEPSIS consortium partners





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## Word from Project Coordinator

The project coordinator of iPROLEPSIS, Prof. Leontios Hadjileontiadis from Aristotle University of Thessaloniki, shares his insights and vision for this initiative.



### What excited you when you first imagined this project?

**Prof. Leontios Hadjileontiadis:** The related call from the EU was focused in identifying the path from health-to-disease in inflammatory diseases; hence, I thought that this exploration via the iPROLEPSIS project is a **very challenging but also very exciting endeavor**, as with its successful realization, it could **provide insights in unknown etiologies of inflammation in Psoriatic Arthritis (PsA) and propose solutions** that could **increase the quality of life** of people with PsA.



### How do you hope the iPROLEPSIS will contribute to a more healthier Europe?

**Prof. Leontios Hadjileontiadis:** iPROLEPSIS is both a **research and innovation action**, that explores unknown interconnections between factors that span from genetic/cellular/microbiome data to environmental and occupational stressors, lifestyle dynamic/unobtrusive sensing. **Approaching the PsA from a holistic perspective, incorporating new models with AI**, covering populations of people with PsA across four European countries, iPROLEPSIS captures the diversity and **provides models and solutions** with high generalization ability. In this way, the knowledge that will be derived from iPROLEPSIS, will provide the **bases for new regulations and policies across Europe, contributing to wide awareness and healthier living.**



### What would you say is the iPROLEPSIS's main added value?

**Prof. Leontios Hadjileontiadis:** iPROLEPSIS **opens pathways towards the exploration of the way inflammation leads from health to PsA.** The new data that will be produced from many modalities (e.g., optoacoustic imaging, genetic, cellular, microbiome data, sensors' data from wearables) along with explanatory **AI-based predictive models**, will **provide insights** on causal relationships between different factors at different scales, **introducing digital biomarkers** that could interconnect biomarkers with digital phenotyping. All these will add **significant value in our efforts to identify** to whom, why, and when the transition from health to PsA will be activated, **offering innovative, personalized solutions** to people with PsA.



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# iPROLEPSIS objectives



**iPROLEPSIS** consortium works on **7 ambitious key objectives** in the field of Psoriatic Arthritis.



## PsA inflammation drivers

Discover PsA inflammation drivers through AI-driven health, environmental and omics data mining.



## Digital biomarkers

Develop and validate objective digital biomarkers for tracking inflammatory symptoms and disease activity.



## Role of mast cells

Investigate the role of mast cells and features from non-invasive skin microvascular/joint imaging in inflammatory symptoms tracking.



## Trustworthy AI models

Build trustworthy AI models for personalised PsA risk prediction, early diagnosis and high disease activity prognosis.



## Personalised interventions

Develop ICT-based personalised interventions to sustain or even improve quality-of-life.



## Digital health ecosystem

Develop and clinically validate the iPROLEPSIS digital health ecosystem to empower persons with/at risk of PsA and healthcare professionals.



## Co-creative ecosystem

Co-create the iPROLEPSIS ecosystem with key stakeholders, following ethical, inclusive and trustworthy AI principles.



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# iPROLEPSIS Work packages



The **6 Work Packages** of the project will bring together various and complementary expertise from consortium partners.

## WP1 Management and coordination

WP1 is dedicated to project management and coordination **aiming to enable a smooth project workflow**; ensure optimal contractual, administrative, financial, scientific, technical, IP and innovation management; assure project quality and safeguard ethics, regulatory compliance and proper data management.

## WP2 Knowledge mining, foundation & participatory design

WP2 **aims to create foundational knowledge on PsA, associated conditions, and inflammation**. This includes identifying and curating relevant datasets, engaging stakeholders to address research questions and co-create digital care tools, and ensuring adherence to trustworthy AI principles.

## WP3 Research on PsA inflammation drivers & monitoring

WP3 focuses on **identifying drivers of PsA** and associated inflammation using diverse health data sources. The **aim is to develop dBMs** through **smartphone/wearable devices** to assess PsA symptoms. Additionally, WP3 investigates changes in joints and skin microvasculature related to PsA, including the role of mast cells in inflammation. By combining data, **WP3 aims is to develop a comprehensive PsA model** predicting the transition from high-risk individuals and PsO patients to PsA, as well as the progression of PsA to an advanced inflammatory state.

## WP4 Digital health ecosystem for personalised preventive care

WP4 will **specify the technical aspects of the ecosystem and establish a strong data management infrastructure** and DevOps/MLOps platforms. Through an agile approach, the project will **develop the MVPs for personalised PsA care**, including patient **app for PsA monitoring**, knowledge, targeted interventions, and tailored AI-driven lifestyle recommendations; **a serious gaming suite** for health and wellness; and **an app for HCPs** to remotely monitor patients and access predictions on their course.

## WP5 Clinical studies

WP5 aims to develop **study protocols**, coordinate recruitment, and manage clinical data. **Four clinical studies will be conducted**, including: **2 multicenter prospective cohort studies** for discovering and validating PsA inflammation drivers and digital biomarkers; **an observational study on PsA** and changes in joints and skin microvasculature; **a multicenter proof-of-concept randomized controlled trial** to evaluate the effectiveness of the digital care tools.

## WP6 Dissemination, communication & exploitation

WP6 aims to **maximize project visibility, facilitate knowledge exchange, and engage stakeholders**. This includes **developing educational content** related to PsA, **establishing a roadmap for regulatory approval** of the iPROLEPSIS digital tools, and **conducting a comprehensive socio-economic/market analysis**. Additionally, concrete **joint and individual exploitation plans will be developed** to ensure the project's outcomes are effectively utilized.





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## Ambitions

### Multiscale/multifactorial PsA model explaining health-to-PsA transition

The **advanced xAI-based data mining techniques** will be applied on heterogeneous and multiscale data sources to identify key factors from the PsA disease emergence.

### xAI-based PsA inflammation assessment and prognostic models

**iPROLEPSIS** proposes an **xAI-based integration** of the PsA manifestation sources by combining deep feature embeddings from different data types, in order to form PsA inflammation assessment and prognostic models.

### New digital biomarkers from smart sensors for dynamic monitoring of PsA risk/progression in daily living, preserving data privacy and security

**iPROLEPSIS** proposes the unobtrusive sensing of data from **smart sensors** (wearables) and the **development of new digital biomarkers** for dynamically tracking motor, physical, emotional, nutrition, gastrointestinal activity, sleep quality and functional level status in daily living.

### New personalised interventions for PsA inflammation prevention, treatment optimization and QoL enhancement

**iPROLEPSIS** foresees the PsA treatment optimization in a set of **personalised interventions** via the **AI-PGS, the miPROLEPSIS app, and the biAURA app**, set within dynamic evaluation of the PsA symptoms.

### Integrated xAI-based PsA management

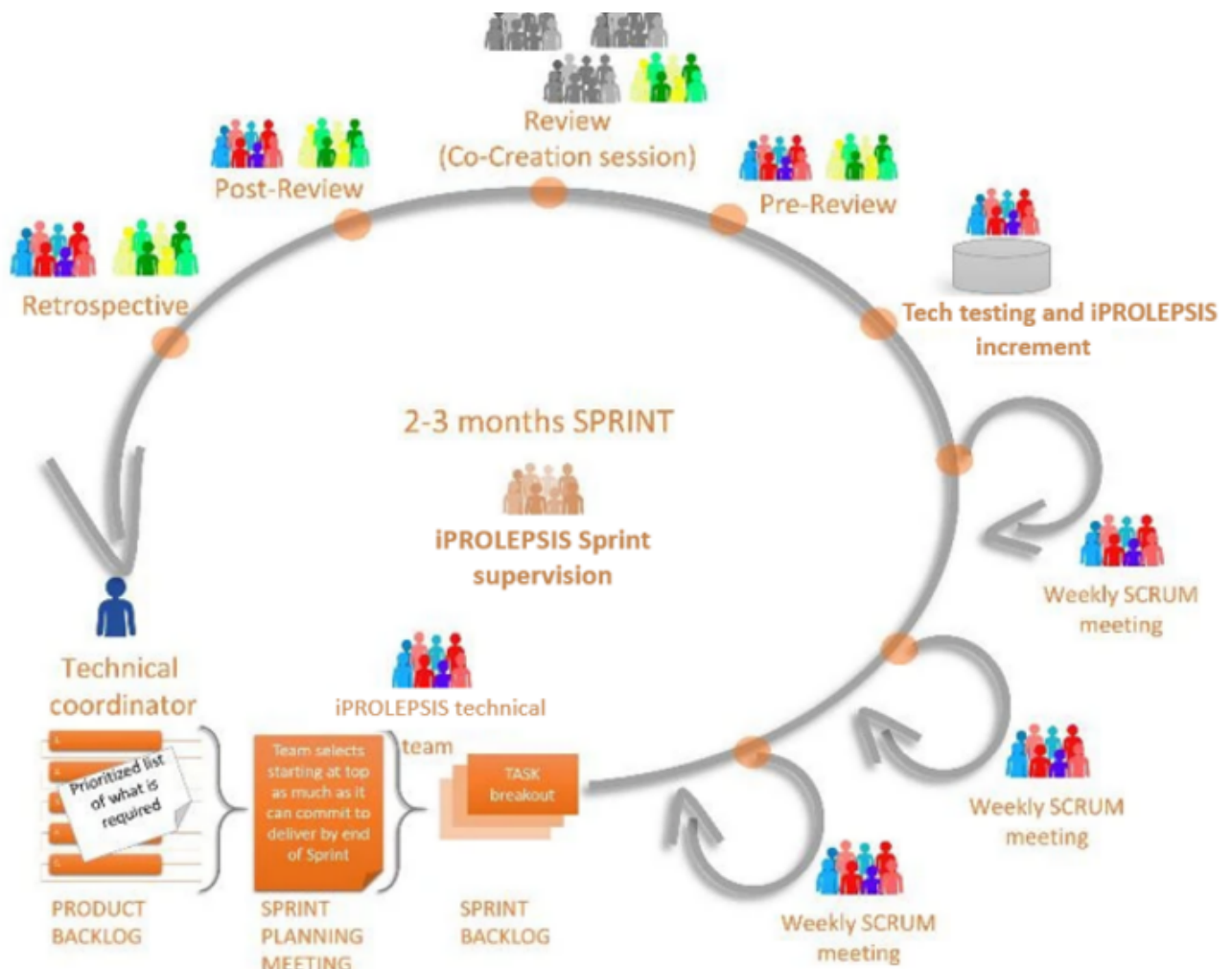
**iPROLEPSIS** aims to provide an **integrated end-to-end digital care ecosystem**, shedding light upon the understanding of the actionable factors that affect the health-to-PsA transition and converting the developed **xAI-based models supporting PsA screening, progression monitoring, inflammation prevention and treatment optimization**.



# Methodology



**iPROLEPSIS** will follow a **user-centred co-creation** and **agile methodology**, based on continuous involvement of patients and other stakeholders throughout the design, development, and testing stages. **The co-creation principles** and development methodologies are **combined within an Agile framework**, adapted to fit the needs of the distributed consortia of iPROLEPSIS.



Technical coordinator



Technical Partners



Focus group - Living Lab team



Stakeholders Community



Project coordinator team





# The core activity domains



iPROLEPSIS will be built upon **three complementary activity domains**, covering all needs for its successful realization.

Exploitation and regulatory strategy development (O9)

Dissemination/communication and networking activities (O10)



## Establishment

The foundation for the project's research activities is laid by means of an **extensive exploration of the available literature and data** and the **design of the clinical data collection and validation studies**. Participatory design supporting the **development of a user-oriented ecosystem** of solutions will be employed to establish a framework for trustworthy **AI-based R&D**.

## Research and Development

Research on multimodal data aims to **reveal key PsA inflammation drivers**, provide **digital biomarkers** of PsA inflammatory symptoms, and explore the effect of PsA on the joints and skin microvasculature, as well as the role of mast cells in PsA transition. The outcomes will be synthesized into a **multiscale/multifactorial model of the health-to-PsA transition**. Ultimately, the aim is to deliver the **integrated iPROLEPSIS digital health ecosystem** that includes **personalized preventive care tools for PsA** to empower both patients and healthcare professional in effectively managing the condition.

## Data collection and Validation

This includes the **design and implementation of four clinical studies** that will collect research data, validate the inflammatory symptoms digital biomarkers in individuals at risk of PsA and PSO patients, and evaluate the efficacy of the digital care tools with respect to prevention of inflammation exacerbation.

## Cross-domains initiatives

Cross-domains initiatives - exploitation and regulatory strategy development and dissemination/communication and networking activities - are dedicate to **ensure the successful implementation of the pathways towards impact in long-term**.



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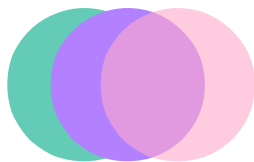
# Knowledge material



In our **knowledge base**, you can find the communication materials produced within the **iPROLEPSIS** project. Any material can be downloaded on **iPROLEPSIS website**.

## Logo

# iPROLEPSIS



# Public deliverables

## D6.1

Project branding and communication channel



## D6.2

Dissemination, exploitation and communication plan



## Poster



## Flyer



## Roll-up

