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AI-PROGNOSIS / Artificial intelligence-based Parkinson’s disease risk assessment and prognosis

Funded by the European Union

The EU call (HLTH-2022-STAYHLTH-01-04-two-stage)

Trustworthy artificial intelligence (AI) tools to predict the risk of chronic non-communicable diseases and/or their progression

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Artificial intelligence-based Parkinson's disease risk assessment and prognosis

Our why

Most common neurodegenerative movement disorder

~10M persons worldwide; heterogeneous (non-) motor symptoms; no cure

Parkinson's disease (PD) is often missed or misdiagnosed

Subtle early symptoms; common with other diseases

'Trial & error' medication regimen selection

Leading to unnecessary suffering and additional costs

Our vision

Advance Parkinson’s disease diagnosis and care through AI-enabled tools

Implementation at a glance

Consortium	**18 partners**
Budget	**~6M €**
Duration	**Jul 2023 – Jun 2027**
EU Funding Agency	**EU Health and Digital Executive Agency (HaDEA)**

6	Work packages
27	Tasks
39	Deliverables
>700	Person-months

Consortium

Data Science

ARISTOTLE UNIVERSITY OF THESSALONIKI

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

KU LEUVEN

AINIGMA

Clinical

CHU TOULOUSE

TECHNISCHE UNIVERSITÄT DRESDEN

Fundación INCE

NTD Centers of excellence NeuroTransData

abbvie

Participatory design

UPPSALA UNIVERSITET

Software development

Netcompany

SQUAREDEV

Genetics

THE CYPRUS INSTITUTE OF NEUROLOGY & GENETICS

Human kinetics

U LISBOA

FMH FACULDADE DE MOTRICIDADE HUMANA

Ethics / Legal

diadikasia BRIGHT GROUP MEMBER

UNIVERSITY OF OXFORD

Dissemination & Communication

SMARTSOL

External Expert Advisory Board

Dr. Alvaro Sanchez-Ferro

Director of Clinical Outcomes Programme at Movement Disorders Society

Neurologist at Hospital 12 de Octubre / Chief Medical Officer at Leuko Labs

Dr. Angela Kehagia

Clinical Medical Manager at Novo Nordisk

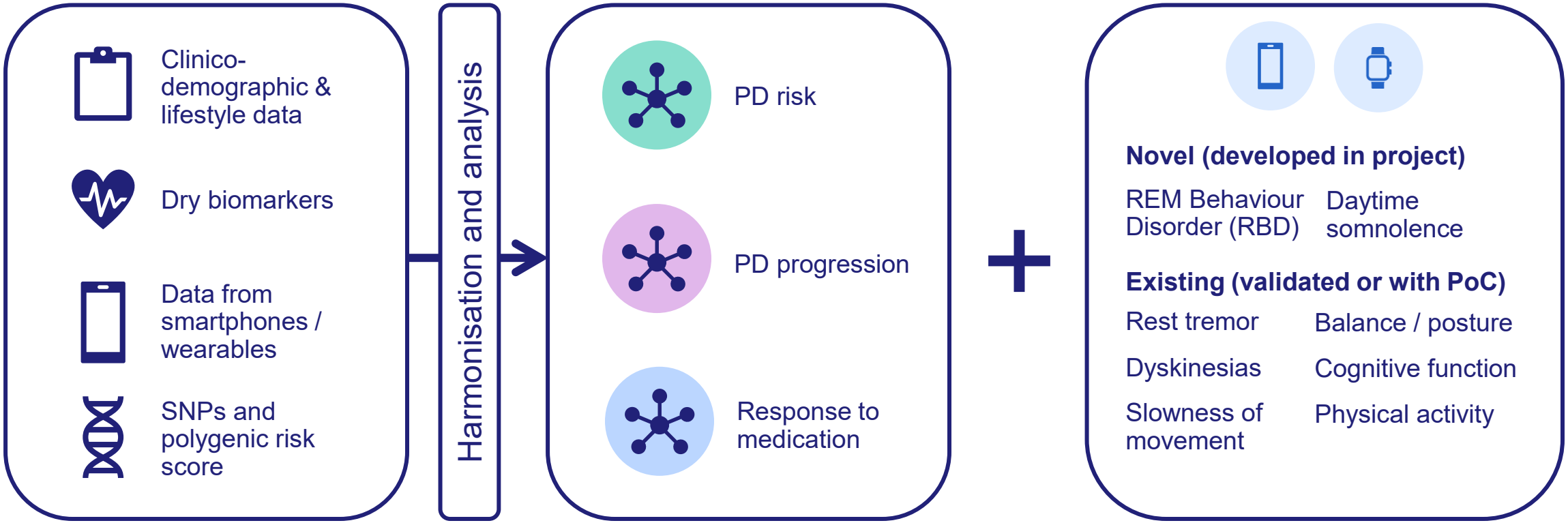
ex-Deputy Director and Health Technology Analyst at KiTEC

Prof. Lynn Rochester

Professor of Human Movement Science at Newcastle University,

Coordinator of MOBILISE-D IMI

Our research



Existing in-depth health and genetic data

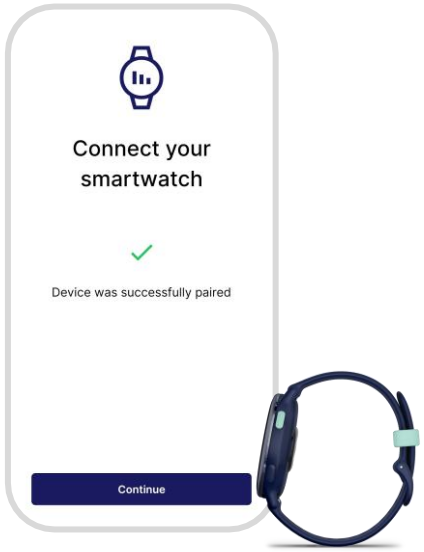
Predictive models

Digital biomarkers of symptoms & progression determinants

Digital biomarkers

Passively measured

Smartwatch

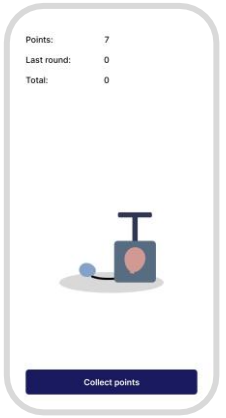


- Rest tremor
- Slowness of movement
- Sleep-related symptoms
- Dyskinesias
- Physical activity

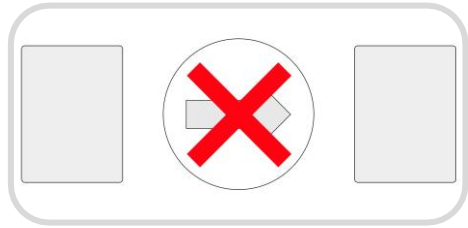
Virtual keyboard

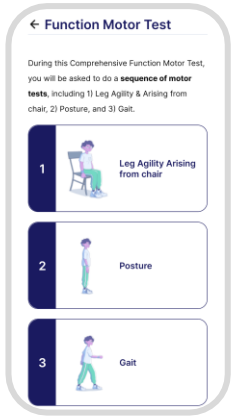
- Slowness of fine finger movement via typing dynamics

Active tests

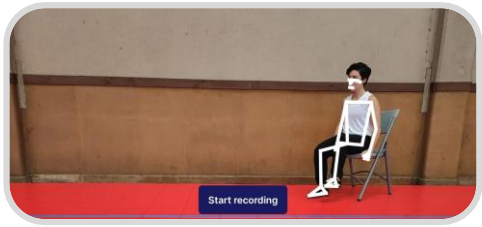


Standardized tests (BART, N-back, Signal) to assess cognitive function





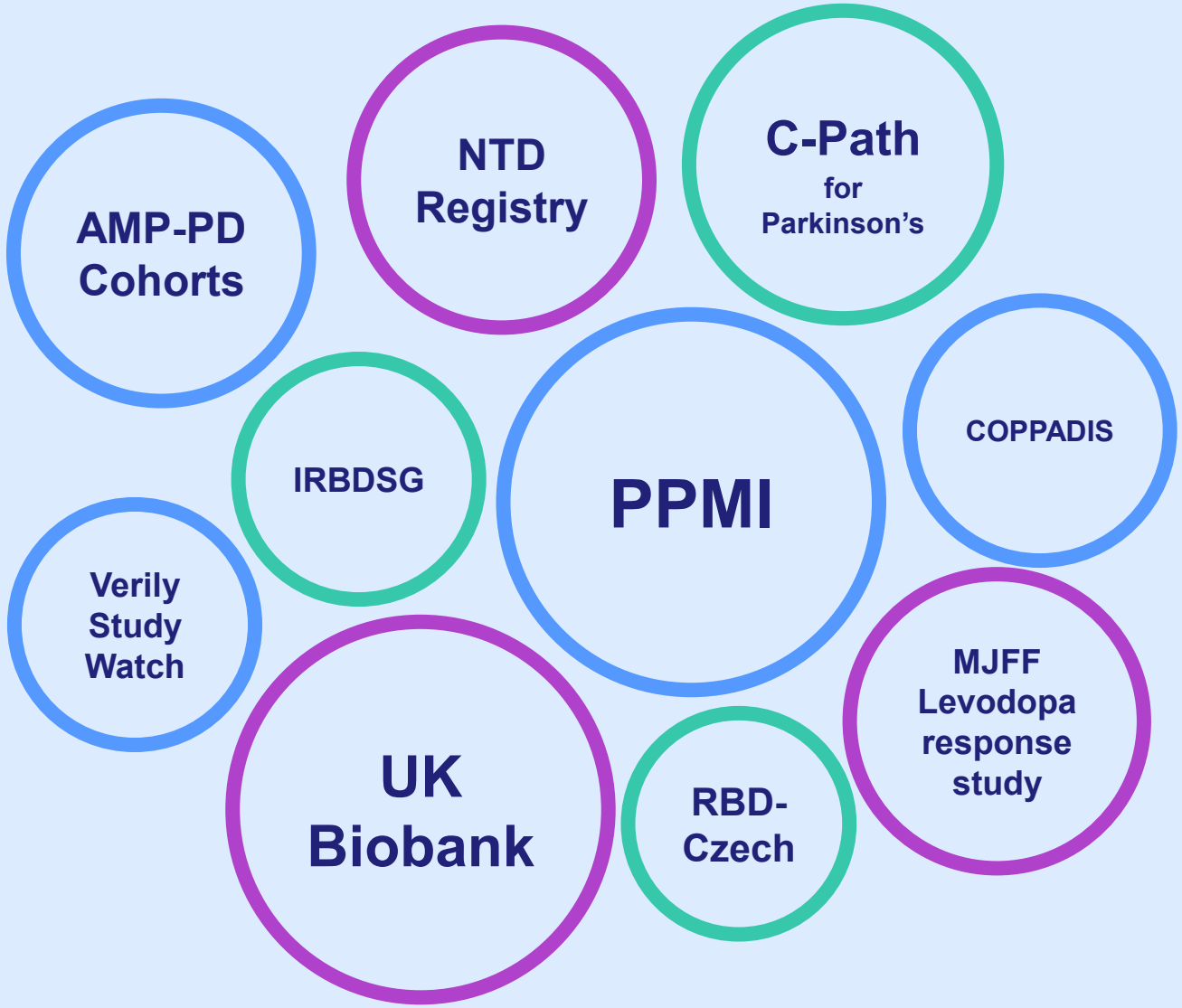
Body-tracking motor test to assess posture, balance and gait



Data in the spotlight

Accessed and harmonising multi-source sets of relevant in-depth health and genetic data including:

- Incident PD diagnoses and at risk cohorts
- PD progression long-term follow-up
- PD-specific medication history and response (incl. side effects)
- Digital phenotyping data (from wearables and smartphones)



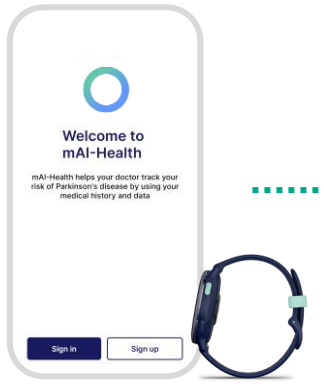
Our envisioned tools

PD screening

Person at risk

Communication of findings

Primary or secondary healthcare provider



mAI-Health app

Wrist wearable data + self-reports on risk markers

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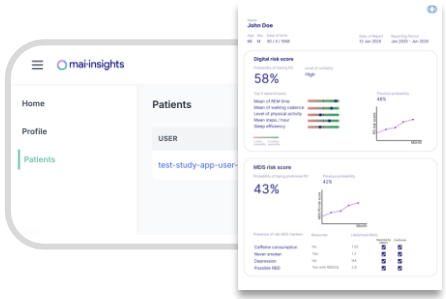
Intelligence

PD risk model + associated digital biomarkers



mAI-Insights app

Recurrent reports on PD risk + relevant insights

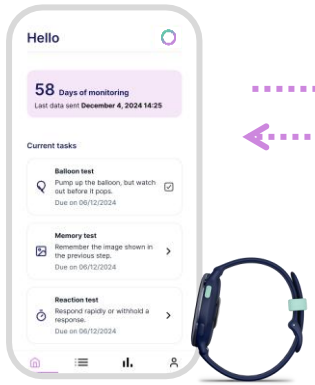
Our envisioned tools

PD care

Person with PD

Informed and efficient disease management

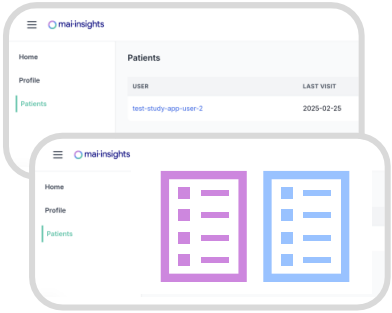
Secondary healthcare provider



Actionable insights

Monitoring + prognosis

Medication decision support



mAI-Care app

Wrist wearable data + active tests + self-reports on health status + insights

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Intelligence

- PD progression model + associated digital biomarkers
- Medication response model

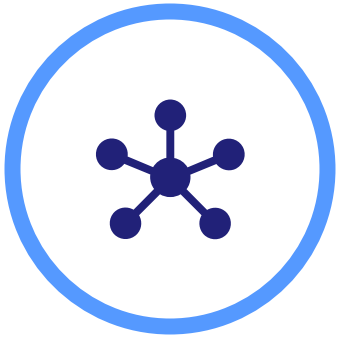
mAI-Insights app

Recurrent reports on PD progression + AI-assisted MEdication Decision support (AIMED)

Our methodological pillars

Co-creation

User research and engagement of key stakeholders over the course of R&D



Trustworthy AI

Compliance in practice with Trustworthy and Responsible AI regulations (i.a. ALTAI, EU AI act & MDR)

Clinical validation

Well-designed, sufficiently-powered studies for proof-of-concept (PoC) prospective validation

Clinical studies

1

Ongoing

dBM-DEV study

Development, validation and verification of digital biomarkers

Germany, France, Spain
90 participants / 17 months

2

To start in 2025

AI-PRA study

PoC* validation of PD risk model and associated software

UK, France, Spain
60 participants / 21 months

3

To start in 2025

AI-PMP study

PoC validation and utility of PD progression model and associated software; PoC validation of medication response model

France, UK, Germany, Spain
100 participants / 21 months

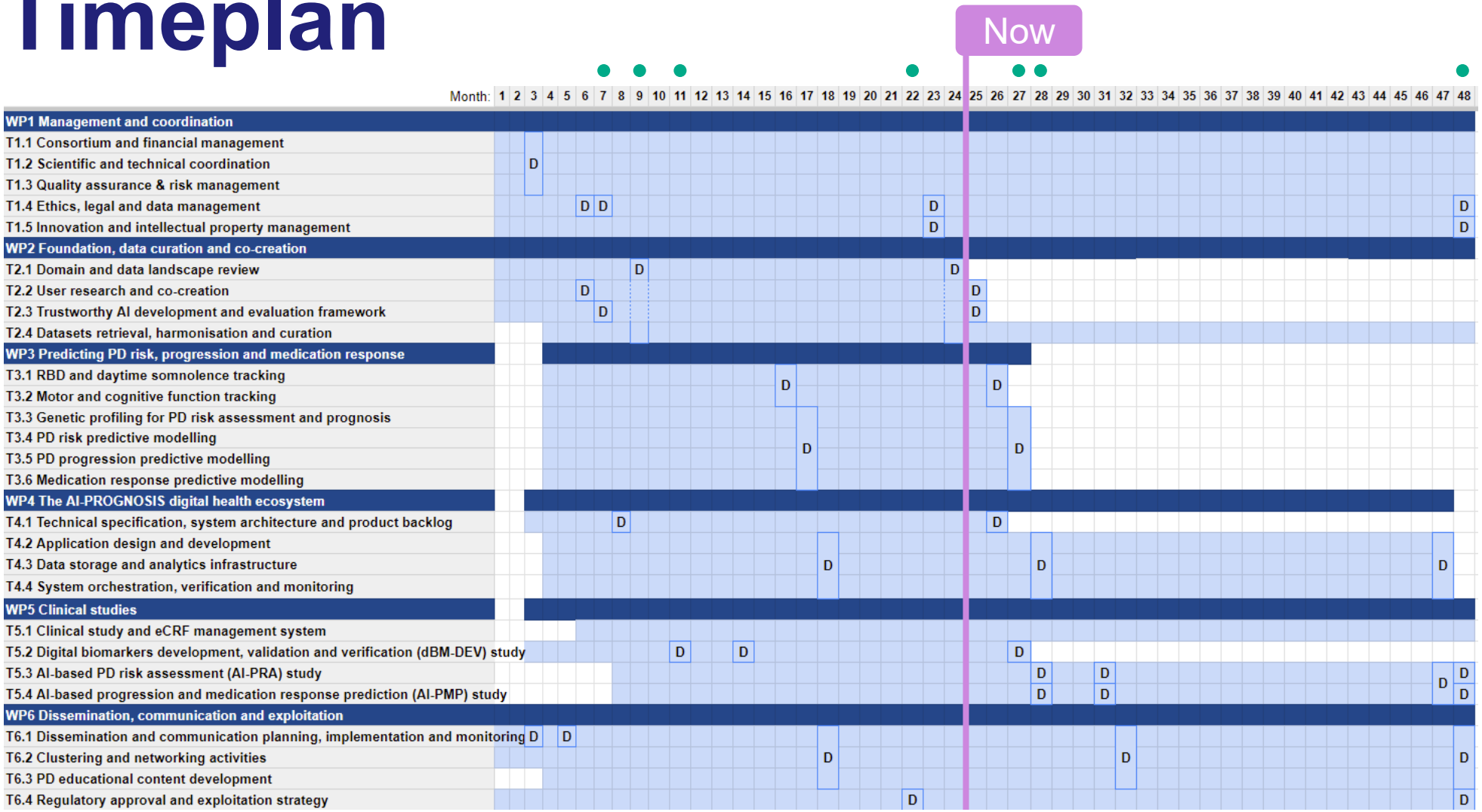
*Proof of concept

Work breakdown

R&D

Work Package	Title	Duration
WP1	Management and coordination	M1-M48
WP2	Foundation, data curation and co-creation	M1-M48
WP3	Predicting PD risk, progression and medication response	M4-M27
WP4	The AI-PROGNOSIS digital health ecosystem	M3-M47
WP5	Clinical studies	M3-M48
WP6	Dissemination, communication and exploitation	M1-M48

Timeplan


Now
Month: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
WP1 Management and coordination
T1.1 Consortium and financial management
T1.2 Scientific and technical coordination
T1.3 Quality assurance & risk management
T1.4 Ethics, legal and data management
T1.5 Innovation and intellectual property management
WP2 Foundation, data curation and co-creation
T2.1 Domain and data landscape review
T2.2 User research and co-creation
T2.3 Trustworthy AI development and evaluation framework
T2.4 Datasets retrieval, harmonisation and curation
WP3 Predicting PD risk, progression and medication response
T3.1 RBD and daytime somnolence tracking
T3.2 Motor and cognitive function tracking
T3.3 Genetic profiling for PD risk assessment and prognosis
T3.4 PD risk predictive modelling
T3.5 PD progression predictive modelling
T3.6 Medication response predictive modelling
WP4 The AI-PROGNOSIS digital health ecosystem
T4.1 Technical specification, system architecture and product backlog
T4.2 Application design and development
T4.3 Data storage and analytics infrastructure
T4.4 System orchestration, verification and monitoring
WP5 Clinical studies
T5.1 Clinical study and eCRF management system
T5.2 Digital biomarkers development, validation and verification (dBM-DEV) study
T5.3 AI-based PD risk assessment (AI-PRA) study
T5.4 AI-based progression and medication response prediction (AI-PMP) study
WP6 Dissemination, communication and exploitation
T6.1 Dissemination and communication planning, implementation and monitoring
T6.2 Clustering and networking activities
T6.3 PD educational content development
T6.4 Regulatory approval and exploitation strategy
Milestone
D
Deliverable

Key R&D achievements so far

Data analysis & AI

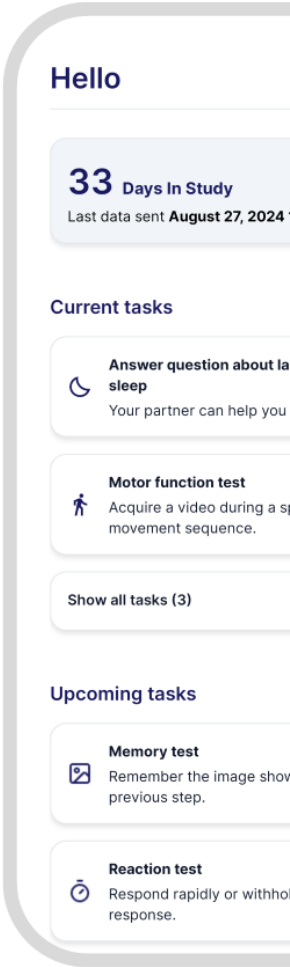
- ✓ **Digital biomarkers of slowness of movement** with good cross-dataset correlation with the clinical gold standard
- ✓ **PD risk assessment model relying on digital measurements of mobility and sleep** in daily life with promising performance in at-risk cohort
- ✓ **Predictive model of progression sub-groups** based on patients' phenotypic data and daily life digital measurements of physical activity
- ✓ **Models predicting dyskinesia appearance** based on multi-cohort clinico-demographic and medication history data

Digital health ecosystem

- ✓ **>350 stakeholders** engaged in co-creation activities leading to user requirements identification and translation to product features
- ✓ **Study app on Google Play Store** implementing the core smartwatch and active test data collection
- ✓ **Alpha versions of mAI-Health, mAI-Care, and mAI-Insights** Minimum Viable Products

Clinical studies

- ✓ **>50 participants in the ongoing dBM-DEV study** on digital biomarkers
- ✓ **AI-PMP study protocol** submitted for ethics approval



What’s next

- Successful completion of the ongoing dBM-DEV study
- Cross-dataset validation of digital biomarkers and predictive models
- Ethics approval and initiation of prospective clinical validation studies (AI-PRA and AI-PMP)
- Successful completion of the AI-PRA and AI-PMP studies
- Proof-of-concept validation of predictive models and early clinical utility evidence
- User acceptance evidence of AI-PROGNOSIS tools
- Delivery of AI-PROGNOSIS digital health ecosystem minimum viable products
- Mature exploitation and regulatory approval plan

2025 to 2027

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Let's connect

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