EnvironMENTAL Introduction: Aims, objectives and research strategy

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environMENTAL

Reducing the impact of major environmental challenges on mental health

Topic: HORIZON-HLTH-2021-STAYHLTH-01-02 Towards a molecular and neurobiological understanding of mental health and mental illness for the benefit of citizens and patients

Maximum grant amount (proposed amount, after evaluation): 9 972 288.00 EUR

Project duration: 60 months

Total score: 14.5/15 (Threshold: 10)

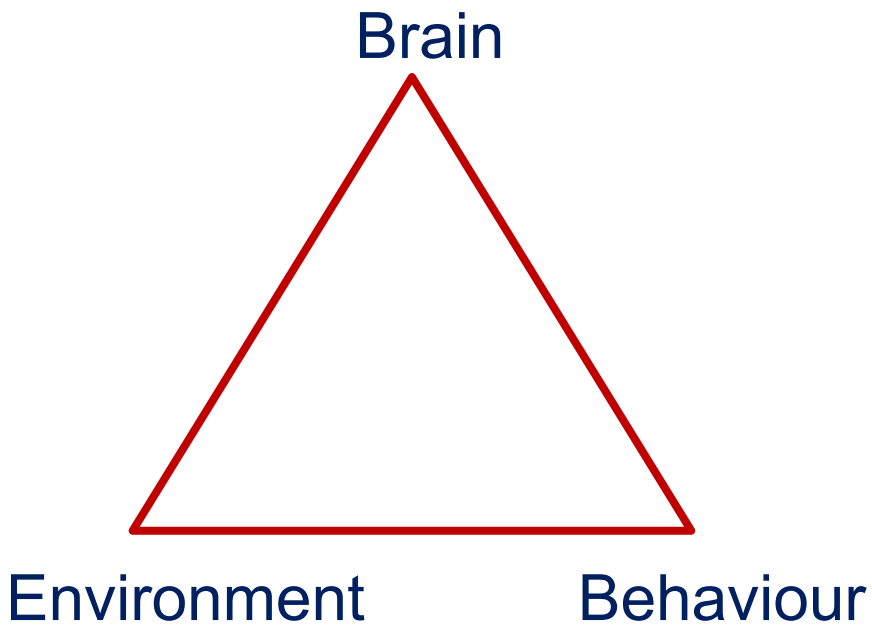
Start date: June 2022

Participant No.	Participant organisation name	Short name	Country
1	Charité (Gunter Schumann)	Charité	DE
2	Freie Universität Berlin	FUB	DE
3	Zentralinstitut für Seelische Gesundheit	CIMH	DE
4	Universitätsklinikum Schleswig Holstein, Kiel	UKSH	DE
5/6	University of Oslo	UiO	NO
	Oslo Universitetssykehus Hf – *Affiliated Entity*	OUS	NO
7	University of Jena	UJ	DE
8	Universität Potsdam	UP	DE
9	RadboudUMC	RUMC	NL
10	Institute for Science and Technology Austria	ISTA	AU
11	University of Barcelona	UB	ES
12	Universitätsklinikum Bonn	UBO	DE
13	Life and Brain	LB	DE
14	Ksilink (SME)	KL	FR
15	Aix-Marseille Universite	AMU	FR
16	Virtual Bodyworks	VB	ES
17	ARTTIC Innovation GmbH	AI	DE
Associated Partners			
18	Fudan University Shanghai, ISTBI	FUDAN	CN
19	Georgia State University; TReNDs Center	GSU	USA
20	University of Southern California	USC	USA
21	Google Inc.	Google	USA
22	King's College London	KCL	UK
23	De Montfort University	DMU	UK

Mental illness accounts for almost 30% of disease burden among non-communicable diseases.

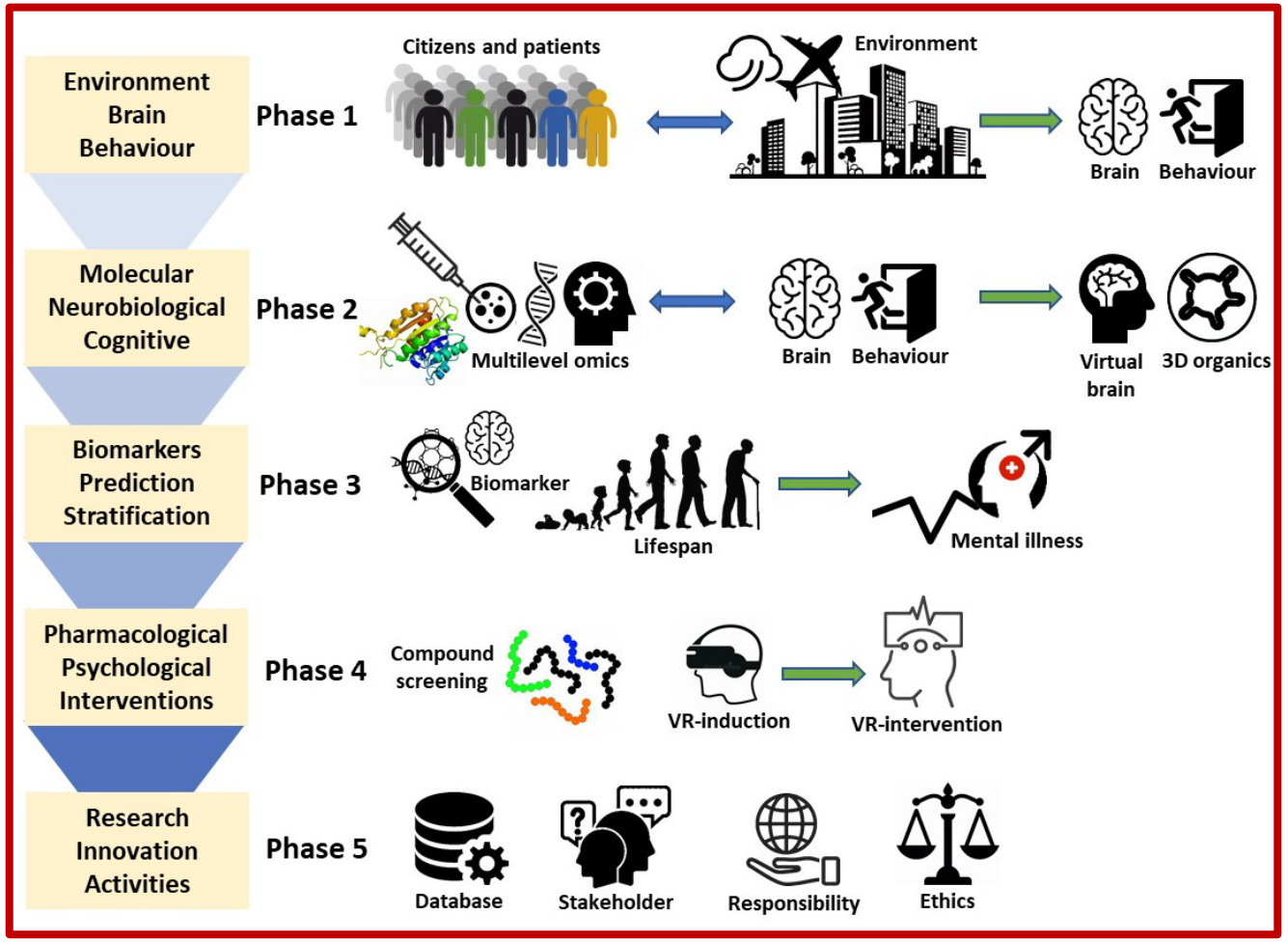
Environmental factors can account for more than 50% of the attributable risk for mental disorders.

New environmental challenges affecting Europe and the world are emerging.



Our aim:

Enabling adaptive coping to environmental challenges.



environMENTAL- Objectives

Objective 1 – Identification of adverse environmental signatures, their interaction with genetics and their relationship with brain and behaviour in citizens and patients (WP1, 2, 3, 4, 6, 12)

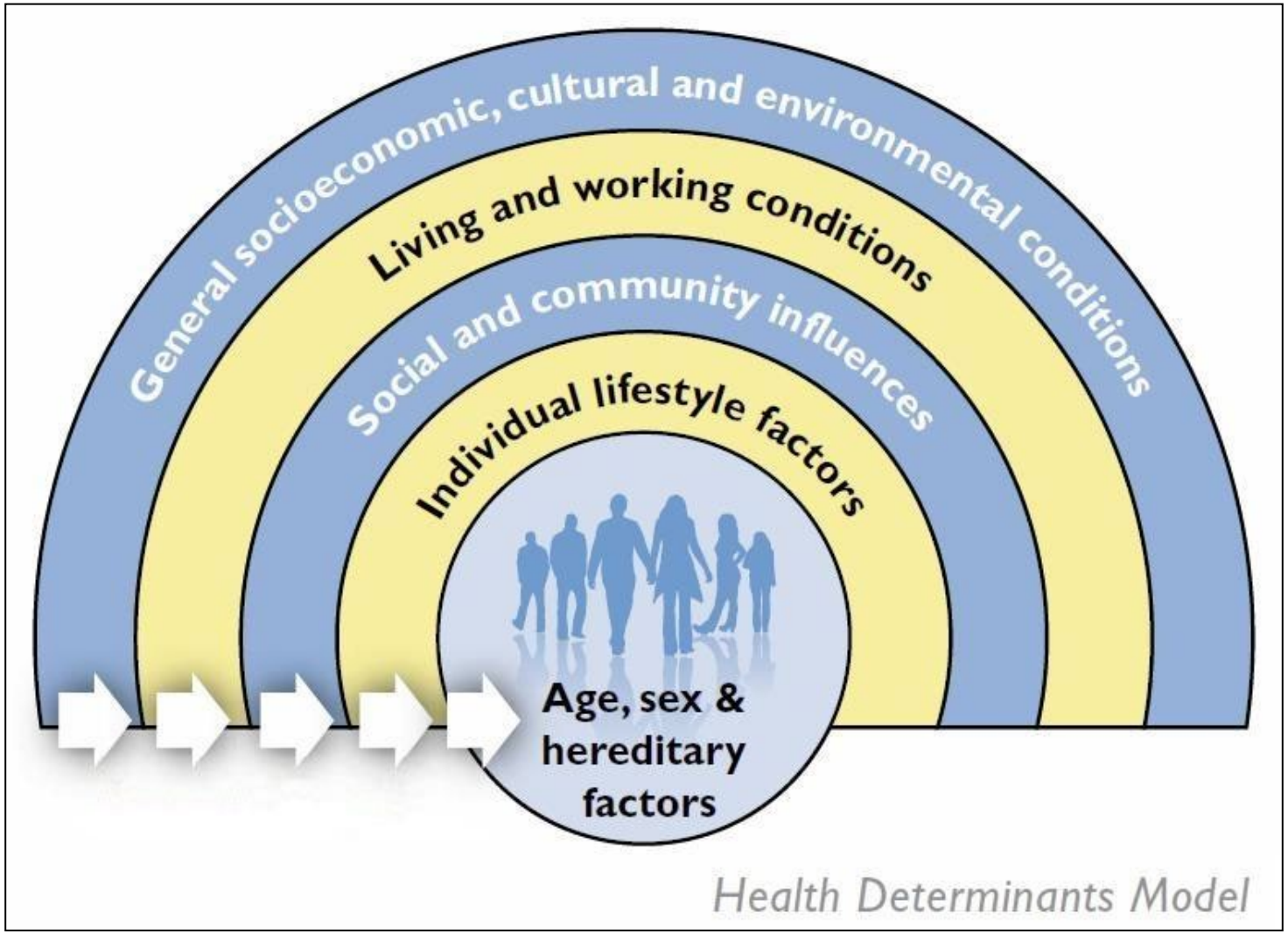
Objective 2 – Characterization of molecular, neurobiological and cognitive mechanisms underlying the brain and behavioural changes related to environmental adversity (WP4, 5)

Objective 3 – Establishment of quantitative neurobiological biomarkers for prediction and stratification of environmentally-related mental illness (WP1, 2, 3, 4, 5, 6)

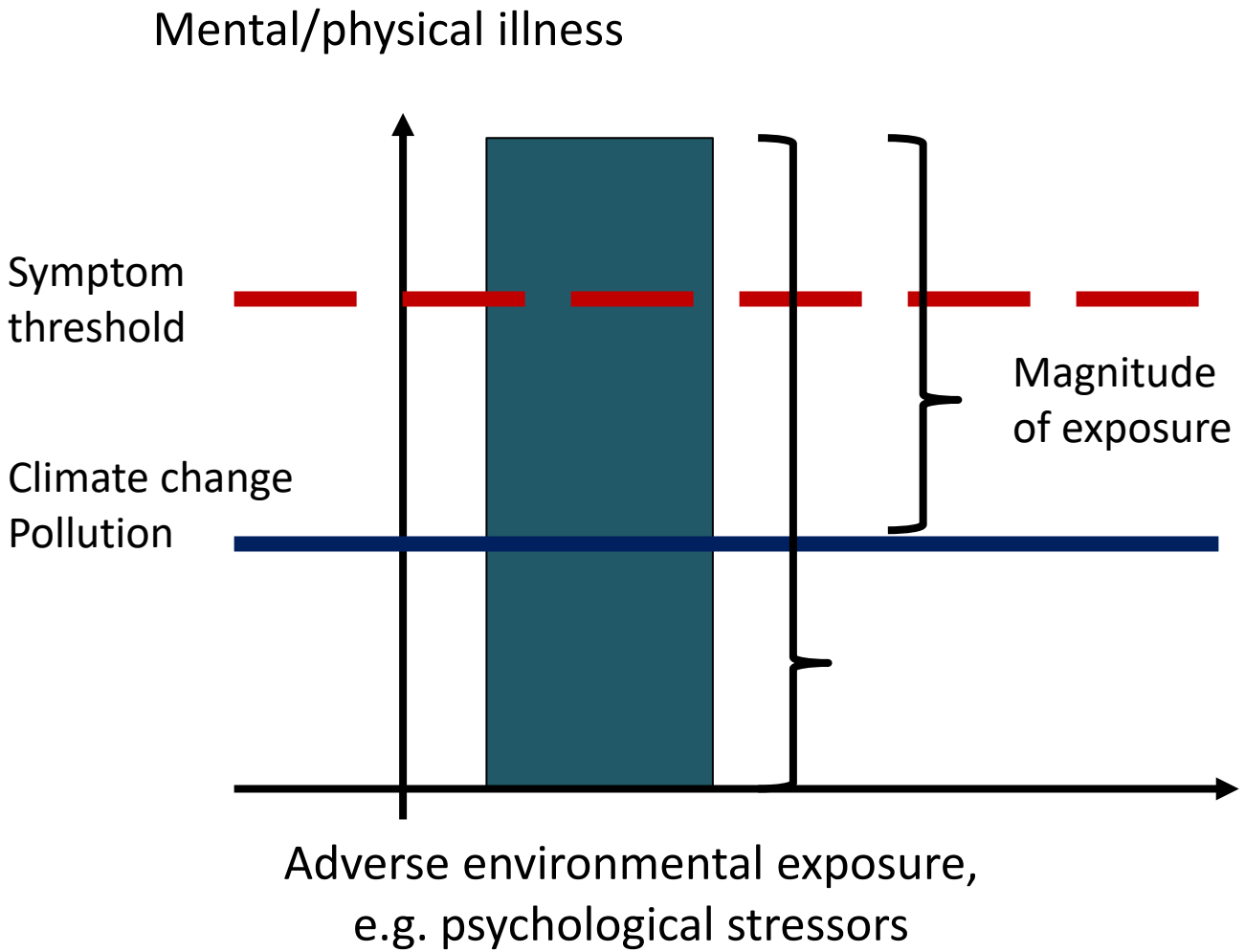
Objective 4 – Development of pharmacological, cognitive and educational interventions targeting molecular and neurobiological mechanisms of environmentally-sensitive symptoms of mental illness. (WP 7, 8)

Objective 5 – Establishing a programme of responsible research and innovation (WP1,3,6,7,8,9)

Environmental determinants of mental health



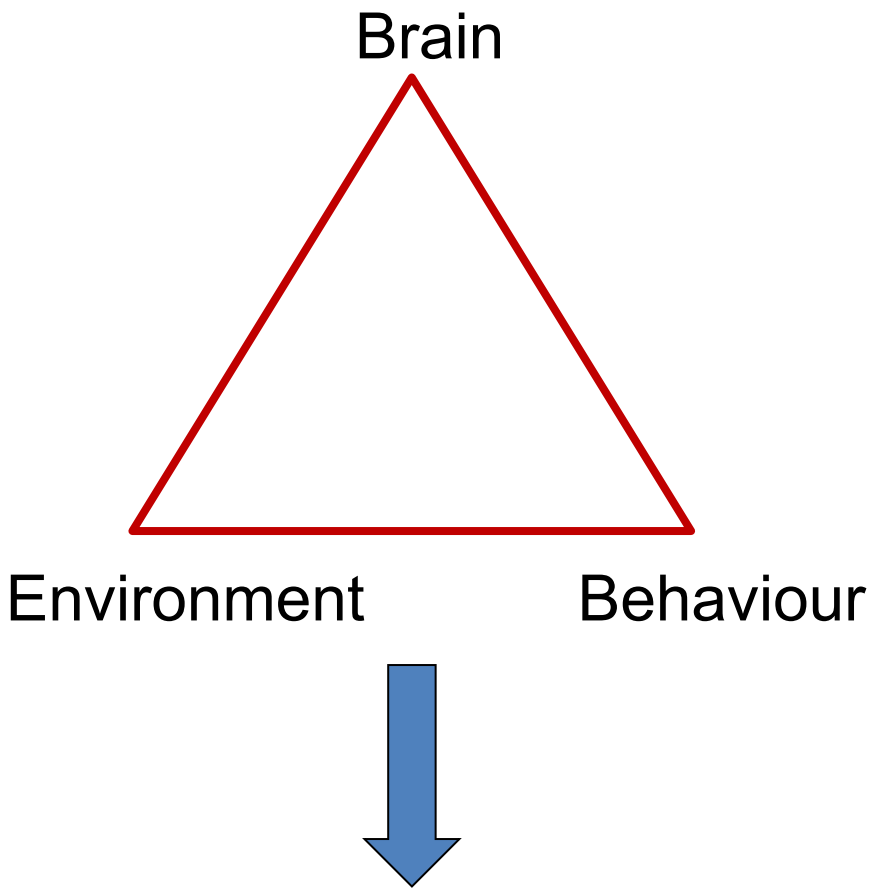
Why multimodal environmental analyses?



Population-based research strategy

ENVIRONMENT

- Climate/Pollution
- Covid 19
- Urbanicity
- Socioeconomic factors
- Psychosocial stressors



Individual biomarkers
for risk of maladaptive coping

COHORTS

approx. 1M participants,
80.000 neuroimaging scans

EUROPE

- UK Biobank
- German National Cohort
- Norwegian Registry Data
- IMAGEN/STRATIFY

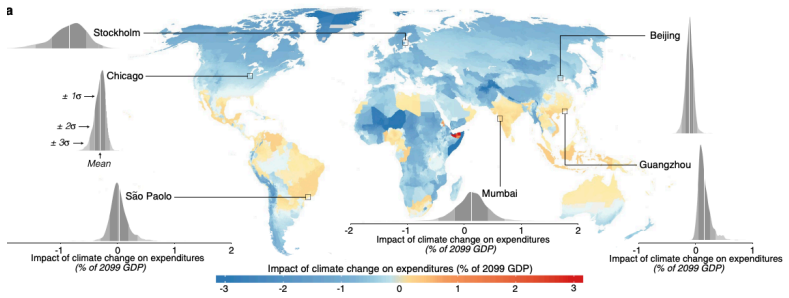
CHINA

- Zhangjiang International Biobank
- Shanghai Suburban Adult Cohort
- Subclin. Outcomes Polluted Air

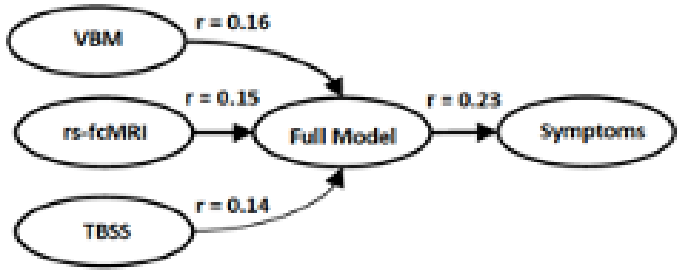
Some technical components:

Method development:

- Climate models for mental health
- Multi-level data integration



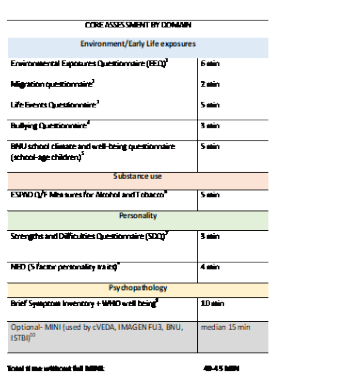
Rode et al. 2021

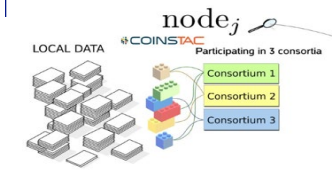


multiple sparse Canonical Correlation Analysis

Cohort enrichment:

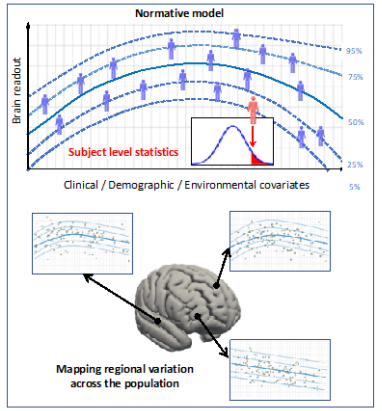
- Behavioural characterization
- Digital health apps
- Neuroimaging
- Federated data analysis



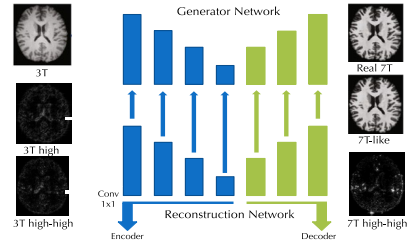


Statistical analyses:

- Normative modelling
- Prediction



Normative modelling provides statistical inferences at the level of the individual person on the basis of centiles of variation in the population



Modelling of future incidence of environment-dependent mental illness:

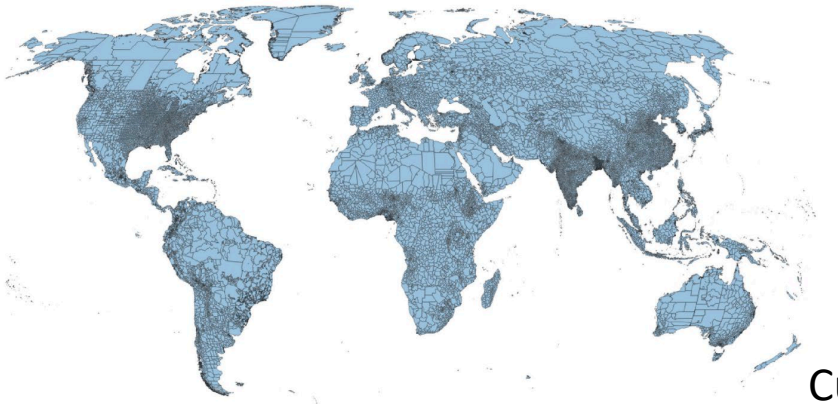
Climate + environment

Longitudinal regional climate models

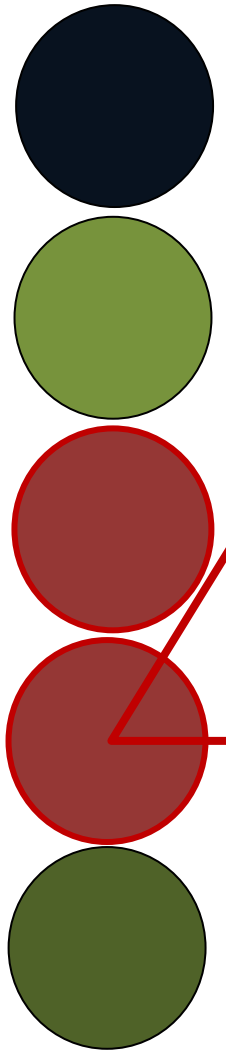
Cross-sectional

transformation

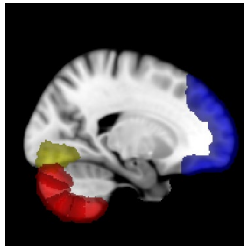
Interaction with multimodal environmental data



Cohorts



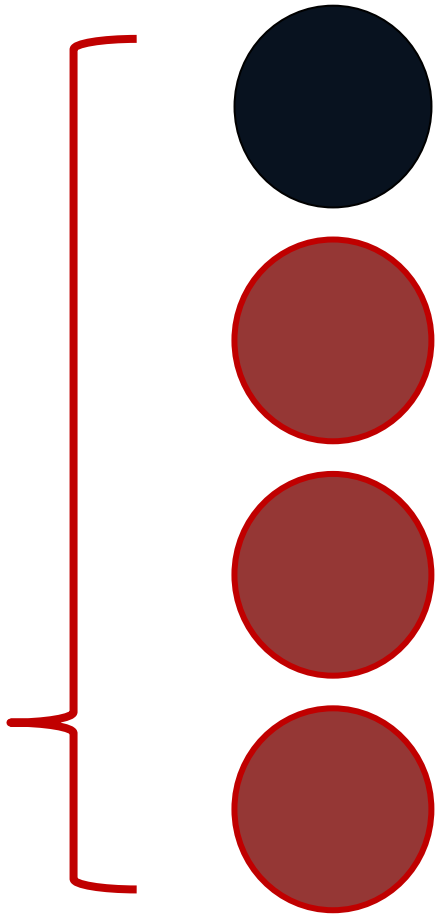
Brain



Behaviour

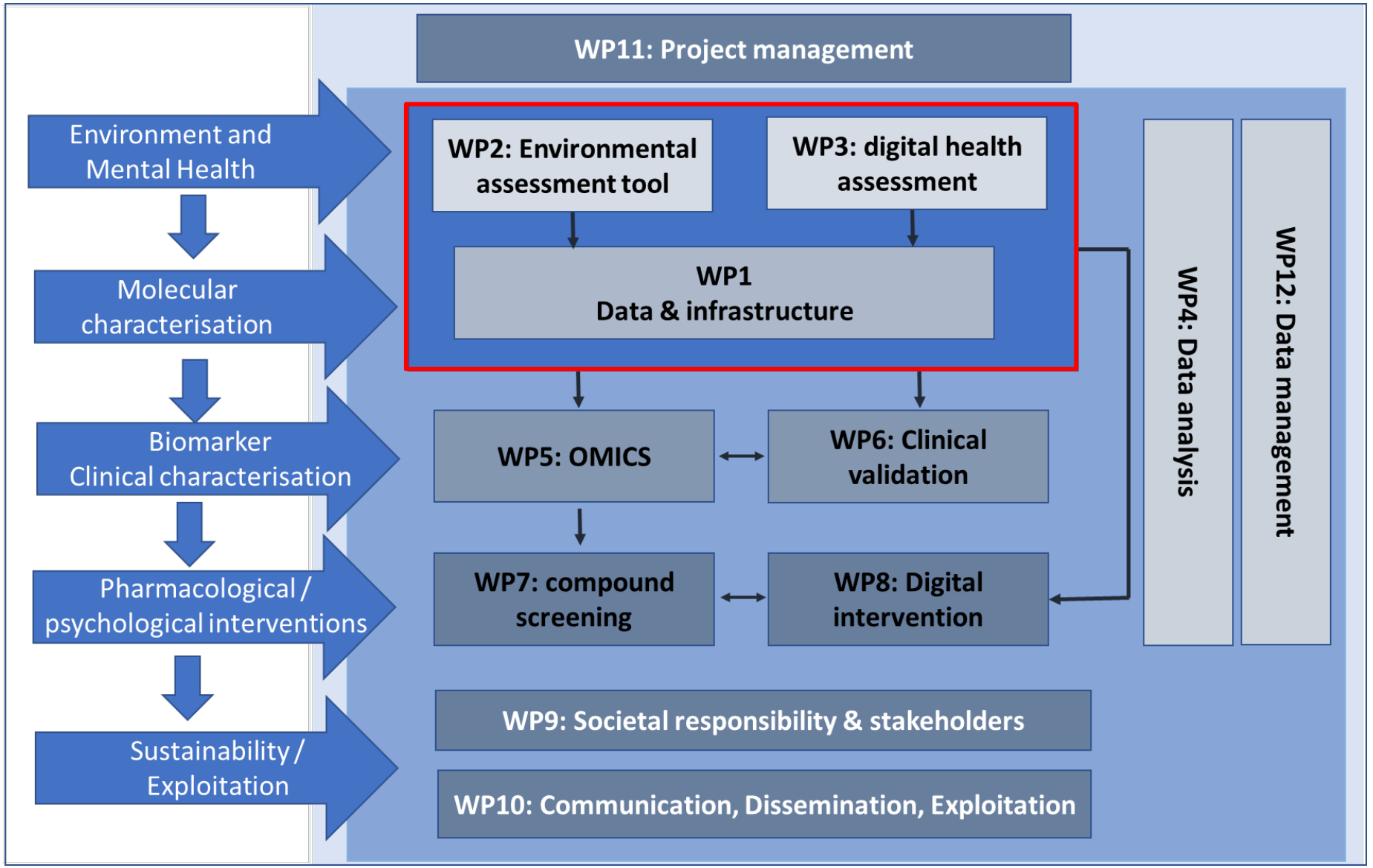
Current regional climate pattern distribution

Prediction



Simulation of future regional distribution

environMENTAL- project plan



Overview of project phases and timeline