CHIASMA

ACCESSIBLE INNOVATIVE METHODS FOR THE SAFETY & SUSTAINABILITY ASSESSMENT OF CHEMICALS & MATERIALS

4th March – BNN Networking, Vienna

CHIASMA in a nutshell

N°	Partner Name	Country
1	Luxembourg Institute of Science and Technology (LIST) - coordinator	Luxembourg
2	University of Tampere (TAU)	Finland
3	Seven Past Nine (7P9)	Slovenia
4	Rijksinstituut voor Volksgezondheid en Milieu (RIVM)	The Netherlands
5	Medical University Innsbruck (MUI)	Austria
6	AcumenIST SPRL (AIST)	Belgium
7	Norwegian University of Life Sciences (NMBU)	Norway
8	NovaMechanics (NovaM)	Cyprus
9	National Technical University of Athens (NTUA)	Greece
10	Austrian Institute of Technology (AIT)	Austria
11	Leibniz Institute für Umweltmedizinische Forschung GmbH (IUF)	Germany
12	BASF SE (BASF)	Germany
13	University of Rome Tor Vergata (UniTOV)	Italy
14	University of Amsterdam (UV)	The Netherlands
15	ECETOC	Belgium
16	Hanyang University (HYU)	South Korea
17	University of Birmingham (UoB)	United Kingdom
18	Swansea University (SU)	United Kingdom
19	Institute for Occupational Medicine (IOM)	United Kingdom
20	Eidgenössische Materialprüfungs- und Forschungsanstalt (EMPA)	Switzerland

Call: **HORIZON-CL4-2023-RESILIENCE-01**
Type of Action: **HORIZON-RIA**

Number of partners: **20**

Start Date: **1st January 2024**
Duration: **48 months**

Estimated EU contribution: **€6,845,417.25**
Total project cost (including Associated partners): **€10,369,061**

Personnel effort**: 1048 PM**
Deliverables: **36** Milestones: **11**

Project officer: **George KOTSIKOS**

CHIASMA's Overarching Objective

The CHIASMA's Overarching Objective is to devise and demonstrate a comprehensive set of New Approach Methodologies (NAMs) and integrate them in a user friendly, reliable and robust framework to perform human and environmental safety evaluation in a regulatory context.
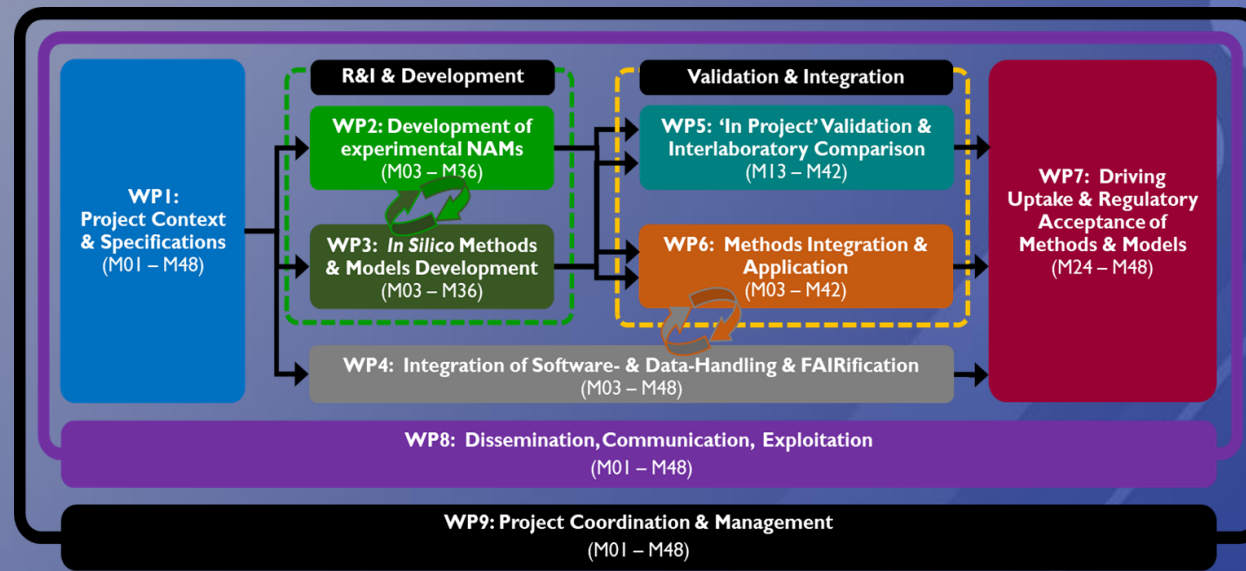
Illustrated PERT-Chart of the CHIASMA Project structure, individual WPs and the workflow and dependencies between them

CHIASMA's specific objectives and KPI

- Interface Communities and ensuring regulatory relevance of NAMs to assess safety of chemicals/materials

- Demonstrate the usefulness of NAMs for the implementation of REACH and CLP regulations

- Develop NAMs and validate them for the regulatory assessment of long-term safety

- Develop and user-stress-testing of software interface and insurance of proper handling by authorities, regulators and end users

- Demonstrate the transferability of the CHIASMA's NAMs

- Demonstrate the trans-domains applicability of the CHIASMA's safety and environmental framework

- Improve the Life Cycle Impact Assessment model for human toxicity and ecotoxicity

- *FAIR-ification* and *GLP-ification* of protocol and methods
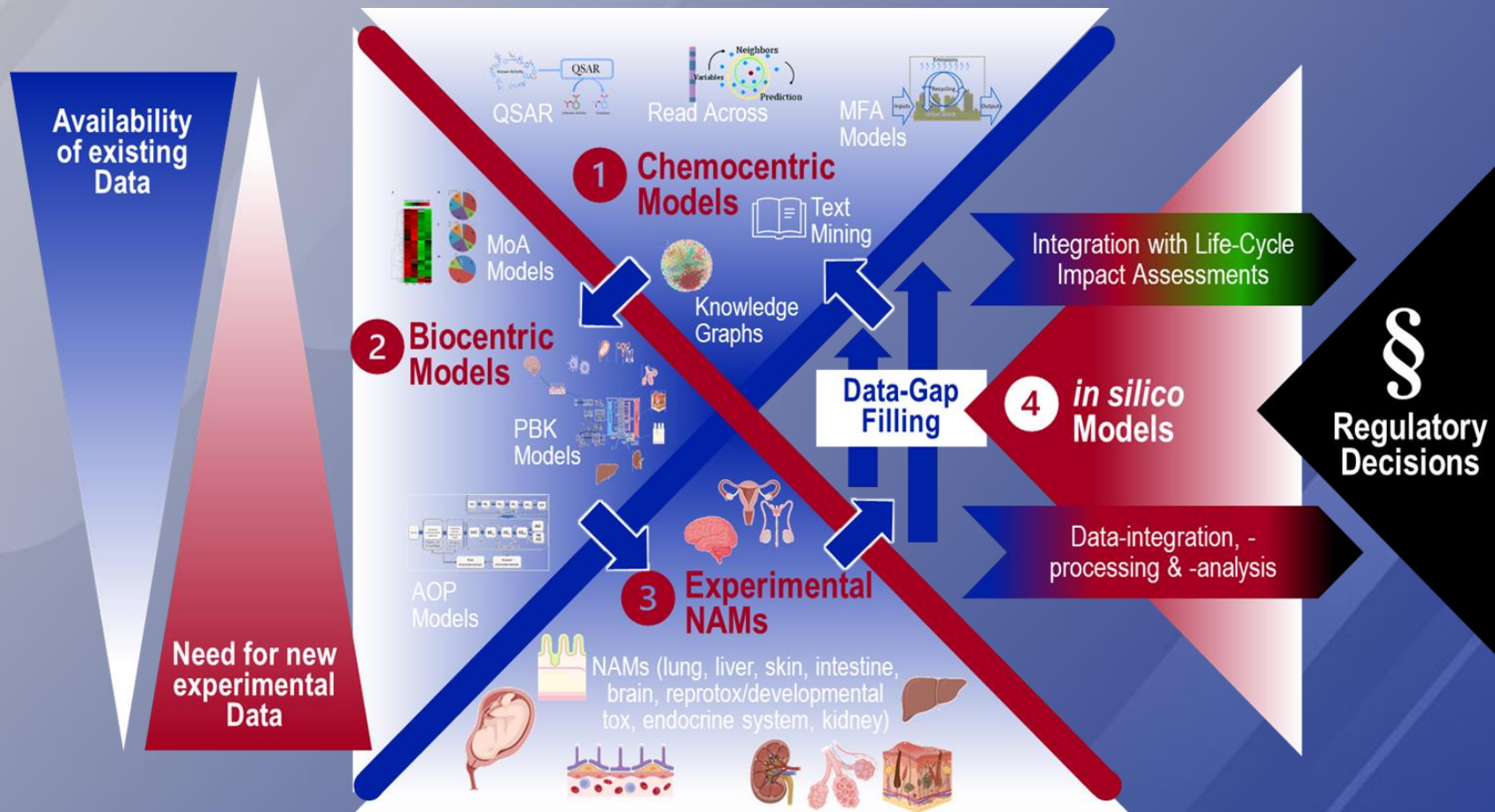
The CHIASMA R&I Approach

Illustration of the CHIASMA R&I approach to testing and assessment of materials using an iterative approach based on the integration of (1) chemocentric, (2) biocentric and (3) new experimental models into a conceptual framework for data-integration and -processing.

The CHIASMA's *in vitro* NAMs

BrainSpheres (3D multicellular organotypic cultures produced from hiPSC-derived neural progenitors.
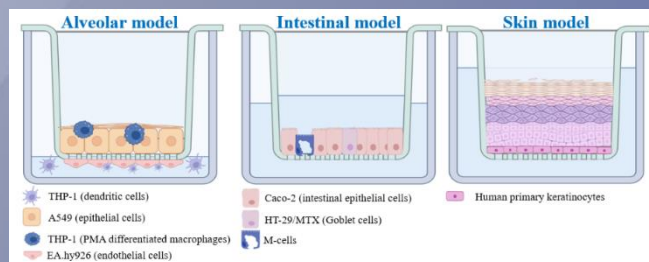External Biological Barriers (lung, skin and intestine).
Internal Biological Barriers (blood-brain-barrier and blood-foetus-barrier).
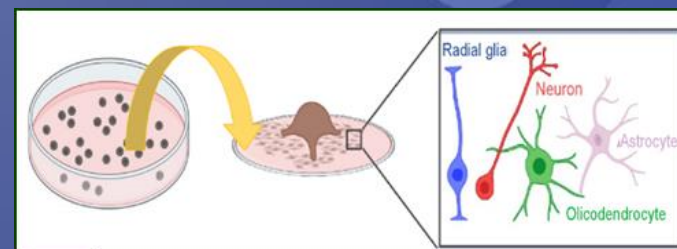Liver spheroids (based on HepG2)
iPSC-derived kidney model
Ex-vivo fish based Reproductive, Developmental toxicity and Endocrine system models.
hNPCs-based models for Developmental neurotoxicity (DNT)

External barrier models used in CHIASMA

Generation and differentiation of human Neurospheres.

NAMs development workflow in CHIASMA

Laboratory progression of the NAMs → Benchmarking & verification of the NAMs using known reference chemicals → Inter-laboratory and transferability *in-project* validation → Applicability domain study on the 3 chemical/materials groups → Integration into the CHIASMA-framework

The CHIASMA's computational NAMs

Chemocentric models enable the retrieval of information and its organisation/analysis to infer new information or highlight data gaps when the data are not of sufficient quality or quantity

- Text analysis tools.
- Knowledge graphs.
- Read across models.
- Predictive cheminformatics models.
- Material Flow Analysis models.

Biocentric models will be used to further reduced uncertainty and refine the chemocentric analysis. Aiming at developing a computational framework to estimate Points of Departure (PoDs) at the AOPs and MoA levels. CHIASMA's biocentric models will include:

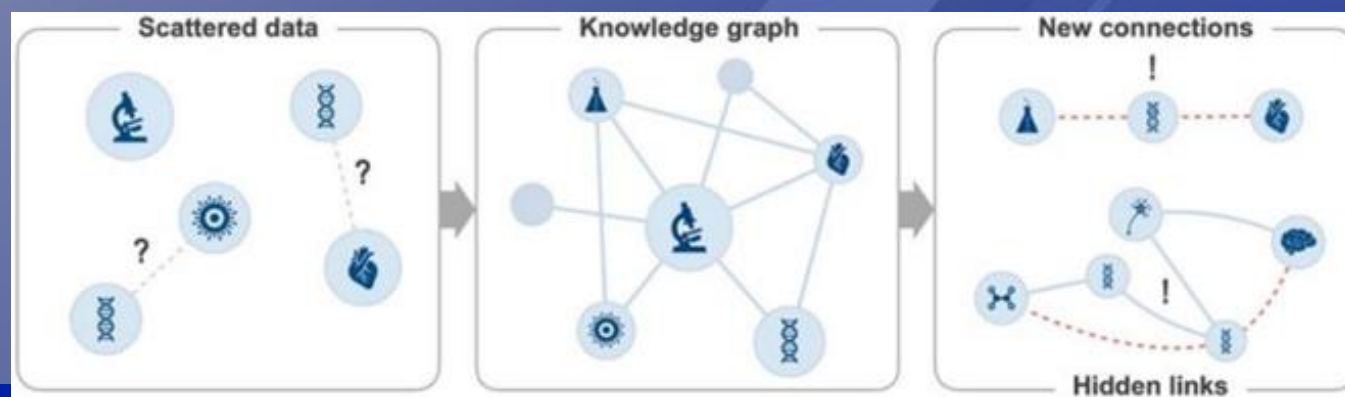- PBK models.
- AOPs and MoAs models.

Illustration of a knowledge graph, which can infer new relations from existing data (source: Pavel et al., 2022)
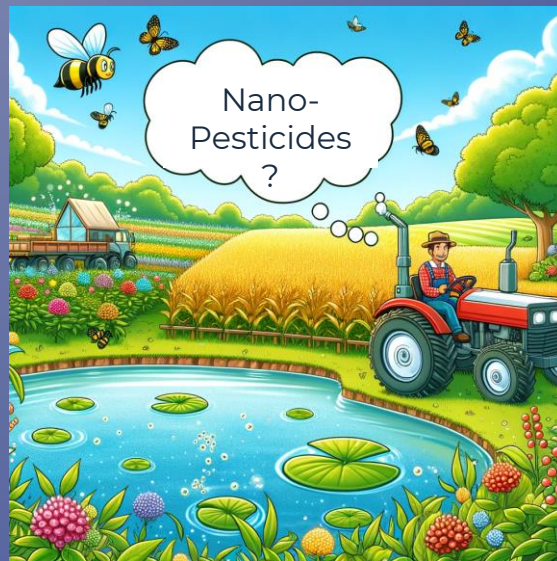
THE 3 CHIASMA Demo-cases:

Perfluoroalkyl and polyfluoroalkyl Substances (PFAS)

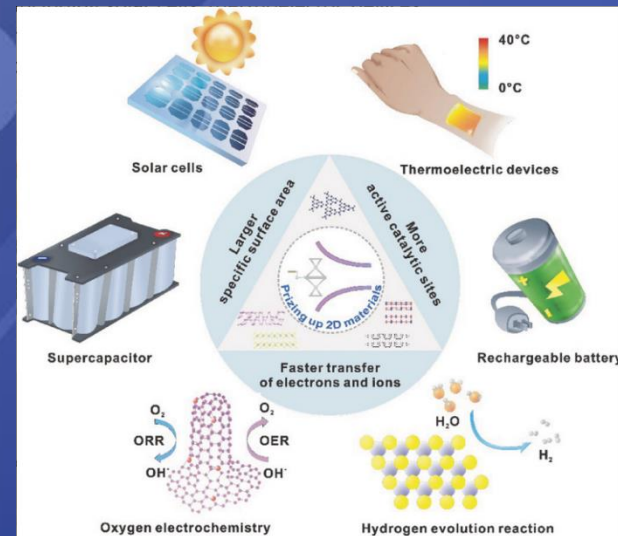## (Nano-)Pesticides

2D Material for Energy Applications e.g.

- Transition metal carbides, (MXenes)
- Composites based on transition metal dichalcogenides (TMDs)
- Graphene
- Carbon nanotubes (CNTs).

Example applications, source: US Dpt. Of defence.

Generated with Chat-GPT4

Example applications, source: Xue et al., 2017

Tommaso SERCHI, PhD, ERT

Luxembourg Institute of Science and Technology

tommaso.serchi@list.lu

Thank You

www.CHIASMA-Project.eu

4th March – BNN Networking, Vienna

INSIGHT in a nutshell

INSIGHT continents, countries and partners

EUROPE

Finland
TAU (coordinator)
Cyprus
NovaM
Greece
NTUA, AUTH
United Kingdom
UoB
Netherlands
ULEI
Luxemburg
LIST
Austria
MUI
Switzerland
EMPA (ass.)
Italy
WH, UPO
Belgium
AIST, SOLVAY

Spain
GRA
Slovenia
7P9
Germany
EVO

NORTH & SOUTH AMERICA

U.S.
UNC (ass.)
Brazil
CNPEM (ass.)

ASIA & AUSTRALIA

South Korea
HU (ass.)
Australia
LTU (ass.)

Call: **HORIZON-CL4-2023-RESILIENCE-01-22**
Type of Action: **HORIZON-RIA**

Number of partners: **18**

Start Date: **1st January 2024**
Duration: **48 months**

Estimated EU contribution: **€4,130,318**

Personnel effort**: 694 PM**
Deliverables: **35** Milestones: **8**

Project officer:

OBJECTIVES

- Develop an **integrated framework** for **mechanistic** impact assessment based on the novel concept of **IOP**;

- Provide curated and **user-friendly FAIR data and computational models** and workflows that support the development of the next generation SSbD chemicals and materials;

- Provide **open, accessible and interactive guidelines**, enabling end users and stakeholders to access and operate the framework.
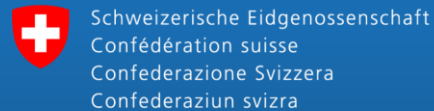
- **Showcase approach** for Advanced Materials + PFAS +

MULTI-LAYER GRAPH

DECISION MAPS

DECISION SUPPORT SYSTEM (WP4)

INSIGHT COMPUTATIONAL FRAMEWORK (WP2 - WP3 - WP4)

INSIGHT INTEGRATED IMPACT ASSESSMENT (SSbD) (WP5)

INSIGHT

THANK YOU

www.INSIGHT-Project.org

Dario Greco
+358 50 318 2106 (voice)
+358 44 023 5780 (Whatsapp)
dario.greco@tuni.fi
TAMPEEREN UNIVERSITY FINNLAND