CHIASMA - Accessible Innovative Methods for the Safety & Sustainability Assessment of Chemicals & Materials

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Objectives

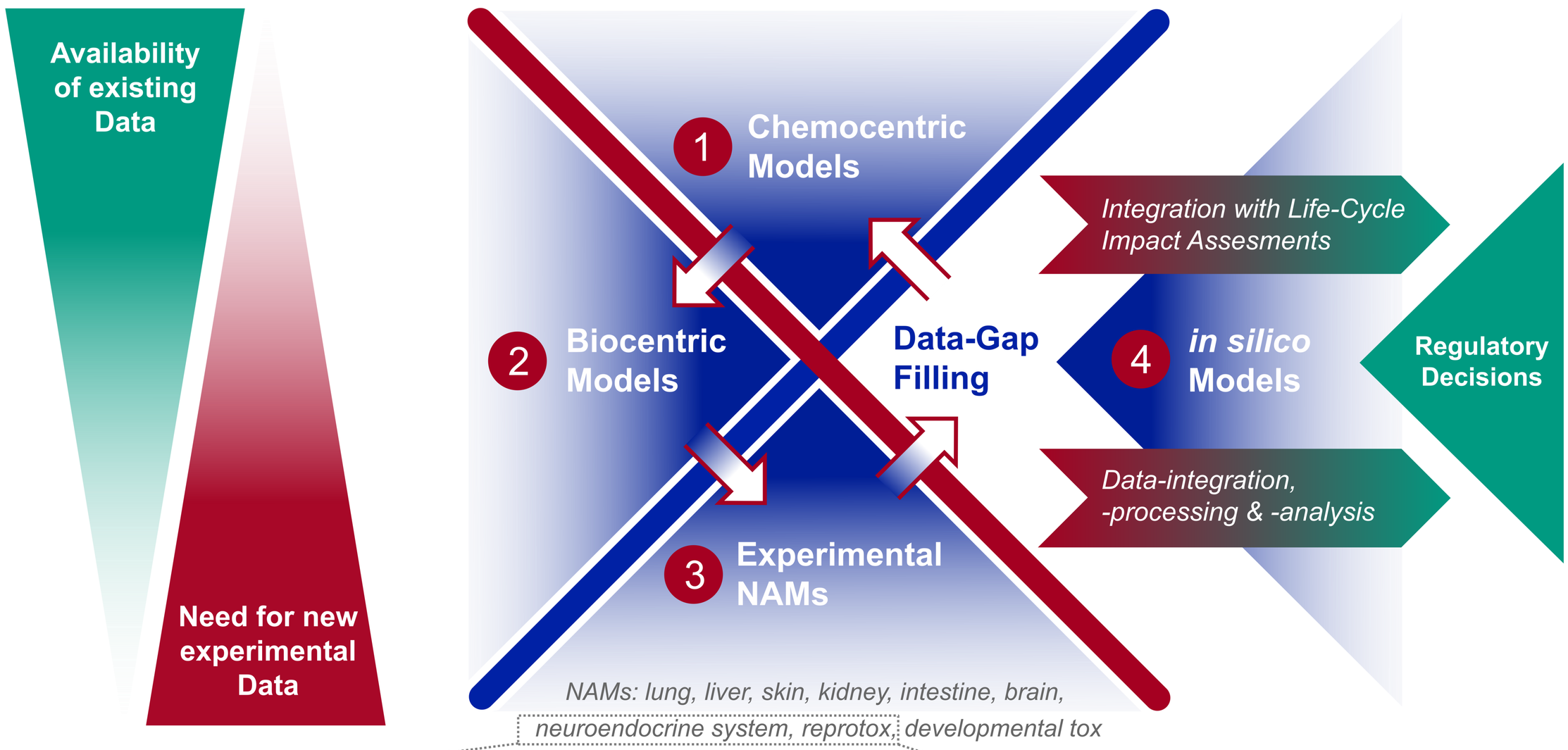
The shift to **ethical and sustainable toxicology** is one of the goals set by EU Commission for the next generation hazard and risk assessment of chemicals and materials. However, the shift is hindered by the reliance on animal testing, lack of validated alternatives, standardized methods, stakeholder coordination, and accessible data. To address this, a large collaborative project namely **CHIASMA** - Accessible Innovative Methods for the Safety & Sustainability Assessment of Chemicals & Materials[1] – has been funded by the European Union's Horizon Europe Research and Innovation program and will run during 2024-2027. The project includes more than 20 partners from around the globe and aims at developing and implementing **a comprehensive set of New Approach Methodologies (NAMs)** for a user-friendly, reliable, and robust evaluation of human and environmental safety within regulatory context.

Methods

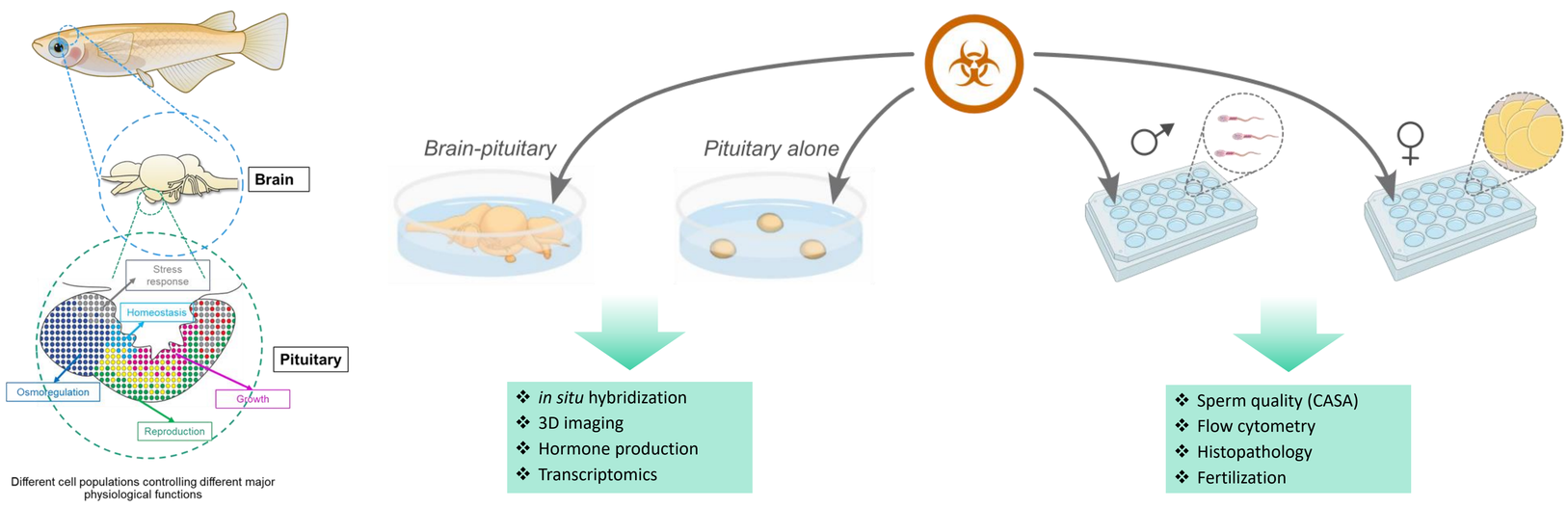
NAMs will be based on both *in silico* and experimental methods, including *in vitro* methods, human *ex vivo* methods and non-mammal *in vivo*/*ex-vivo* methods. The *in silico* and experimental NAMs will be 'in-project' validated against three groups of chemicals and materials: (i) **Polyfluoroalkyl Substances (PFAS)**, (ii) **(nano)-pesticides**, and (iii) **2D materials** for energy applications, which were chosen based on their high health impact, environmental persistence, and large industrial use. At the Norwegian University of Life Sciences (NMBU), we will use an ***ex vivo* Brain-Pituitary-Gonadal axis system** based on model fish (Zebrafish and Medaka) to develop NAMs within CHIASMA framework (ref. abstract and presentation by Sina Velzi et al.).

[1] *CHIASMA - Accessible Innovative Methods for the Safety & Sustainability Assessment of Chemicals & Materials (Grant Agreement (GA) No.: 101137613); Call Topic: HORIZON-CL4-2023-RESILIENCE-01-21.*

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.



Neuroendocrine and reprotox NAMs under development in our group (EksBio, NMBU)



Anticipated Results

By combining chemometric and biometric models, optimized experimental NAMs and data integration, the CHIASMA project will create **Safe and Sustainable by Design (SSbD) Assessment** (for safety- and environmental-assessment), which will enable risk assessors, commercial enterprises and regulators to address relevant endpoints using human-centric and 3R-compliant approaches.

At NMBU, we will develop and employ experimental NAMs for neuroendocrine and reproductive toxicity testing (see presentation by Sina Velzi et al. for more information). Obtained experimental results will be implemented in model testing and optimization in CHIASMA.