Proposals for NORMAN Joint Programme of Activities 2026

Title	**Chemical Bioactivity Database: Enhancing and Enriching Existing Resources**
Type of activity	Research and database development
Leader	INERIS: Abd El Rahman El Mais, Selim Aït-Aïssa, Valeria Dulio BFG: Sebastian Buchinger, Andreas Schüttler KWR: Miina Yanagihara EI: Jaroslav Slobodnik, Lubos Circa UBA: Peter von der Ohe
Topic / activities	***Background / Justification for the proposed activity:*** A comprehensive chemical bioactivity database is essential for supporting researchers in effect-based monitoring and hazard assessment. While the current NORMAN Bioactivity database covers a wide range of compounds across multiple bioassays and modes of action, some key components remain incomplete or missing. One key gap is the absence of a tool to calculate Relative Potency (REP) values and estimate the contribution of detected compounds to observed bioassay activity—expressed as Chemical Bio-analytical Equivalents (Chem-BEQ). As part of PARC Task 4.2 (EDC Pilot study), a comprehensive assessment was conducted to evaluate the (Chem-BEQ) contribution of nearly 170 chemicals detected by targeted chemical analysis in various matrices (surface waters, air, and soil). To enable this assessment, a tiered strategy was established to collect/derive Relative Potencies for each substance and each bioassay/mode of action. The strategy covered the following steps and data sources: 1. In-house data: When available, EC_{10}/EC_{50} values generated by participating bioassay laboratories, using the same assay protocols applied to the environmental samples, were compiled. 2. Literature search: For chemicals lacking in-house data, EC_{10}/EC_{50} or REP values were retrieved from published studies. 3. ToxCast data re-analysis: Although ToxCast contains extensive data, its modeled potency values sometimes lack precision for Chem-BEQ calculation. To address this, PARC partners extracted raw data from ToxCast, performed quality control, fit concentration–response curves, and produced improved EC_{50} estimates. This refinement has already been completed for nearly 170 chemicals across 10 bioassays targeting nine human nuclear receptors, i.e., the Androgen Receptor (AR), Estrogen Receptor (ER), Glucocorticoid Receptor (GR), Mineralocorticoid Receptor (MR), Progesterone Receptor (PR), Aryl Hydrocarbon Receptor (AhR), Pregnane X Receptor (PXR), Peroxisome Proliferator-Activated Receptor Gamma (PPARγ), and Retinoic Acid Receptor Alpha (RARα), as well as the competition with thyroid hormone to bind its transport protein, Transthyretin (TTR). Using these combined data sources, chem-BEQ were calculated, giving the highest priority to in-house and literature values, followed by the re-modeled ToxCast results. During the study, experts concluded that an automated solution would significantly enhance efficiency and consistency. Specifically, they identified the need for a tool capable of retrieving existing raw data and automatically calculating REP values. This core functionality could then be complemented by an additional module that integrates Chem-BEQ values to assess the contribution of detected chemicals to observed biological effects. Based on these reflections, it was agreed to propose the development of such a tool within the NORMAN Database System. ***Description of the proposed activity and expected outcomes for 2026 and beyond:*** The proposed activity will focus on consolidating, structuring, and expanding chemical bioactivity data to support consistent REP calculations and chem-BEQ applications. Specifically, the goal is to: 1. Improve and harmonize the existing Bioactivity database: • Define and implement mandatory metadata fields (e.g., reference compound, assay conditions, endpoint definitions). • Harmonize data formats and quality criteria across existing and new datasets. 2. Enrich the database with the 170 compounds across 10 assays collected within PARC: • Integrate EC_x values retrieved from in-house sources or from peer-reviewed literature. • Incorporate the newly re-modeled ToxCast EC_{50} dataset for ~170 compounds across 10 assays. • Perform quality control and flag uncertainties where necessary. 3. Develop a user-friendly REP calculation module: • Create a tool that allows users to compute REPs by selecting assay type, endpoint (EC_{10}/EC_{50}), and reference compound. • Enable export of REP and chem-BEQ outputs for downstream risk assessment workflows. • Provide documentation and guidance for standardized use across laboratories. ***Added value / Link with other NORMAN activities and / or other projects*** • A complete and more harmonized bioactivity database integrated within the NORMAN platform. • Availability of curated and quality-checked ECx data for ~170 chemicals. • A functional REP calculation tool accessible to PARC and NORMAN members. • Improved consistency and transparency in chem-BEQ assessments. • Stronger collaboration between bioassay laboratories and data management teams.
Participants	INERIS, BFG, KWR, EI, UBA, WG2 members, and all interested NORMAN members.

Proposed in-kind contribution	Working hours for implementing the project (and maybe a scientific paper on bioactivity data, which Ineris and co-leaders will lead).
Contribution needed from NORMAN Association[1]	A total budget of €12,500 is requested, distributed as follows: - IT support for the implementation of the recommended improvements: €10,000 - Allocation to KWR: €2,500

[1] Please, provide here a transparent justification of the requested resources and of the in-kind contribution, thereby distinguishing between the costs associated with "person-months" for the organisation, the "travelling costs" for invited speakers and the costs for the logistics (e.g. meals, room rental etc.)