

Interoperability of Environmental Data with a European Information Platform for Chemical Monitoring (IPChem)

Data management across the disciplines

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Abstract: Monitoring programs in Germany offer a large variety of data. On the one hand, these data are generated over many years in selected sampling areas; on the other hand, studies of monitoring take place in the context of research projects or other investigations. These data are often available in web-based information systems. Two databases will be presented with their potential for the interoperability with a (technical) platform for data of the chemical monitoring. The European project "Information Platform for Chemical Monitoring (IPChem)" promotes networking of various existing databases and information systems with the goal of advancing the environmental data exchange between different disciplines.

Keywords: monitoring; human biomonitoring; German Environmental Specimen Bank; POP-Dioxin Database; IPChem, integration, PCB, Bisphenol A, Dioxin

I. INTRODUCTION

Monitoring programs in Germany offer a large variety of data. On the one hand, these data are generated over many years in selected sampling areas; on the other hand, studies of monitoring take place in the context of research projects or other investigations. These data are often available in web-based information systems, and can be publicly searched for various issues. Two of these are the German Environmental Specimen Bank (ESB) and the POP-Dioxin Database of the Federation and Laender (Federal States) (POP-DB) which allow interoperability between several platforms. The EU-project "Information Platform for Chemical Monitoring (IPChem)" financed by the Commission of Environment (DG Env) promotes interoperability of various existing databases and information systems with the aim of advancing the environmental data access between different disciplines. From a scientific point of view, this European research project contributes to the implementation of the European eGovernance Strategy. The Joint Research Centre in Ispra (JRC) is responsible inter alia for the technical solution and coordination of this project.

II. DATA AND METHODS

A. POP-Dioxin Database

The POP-Dioxin Database of the Federation and Laender (Federal States) represents a central portal that provides access to results of national and international measurement programs and research projects for the substance group of Persistent Organic Pollutants (POPs). For more than 15 years, data from approximately 100 monitoring programs of Federal and Laender Agencies and Research Institutes have been stored in the database, accessible via a web-based service interface (<http://www.dioxindb.de/index-e.html>).

The metadata - data about data - are an essential issue for an integrated approach to evaluation and assessment. Information on sampling, spatial and time references, and methodologies from the environmental compartments soil water, air, biota (plant and animal life in nature), products, food and animal feed, breast milk as well as other areas are the basis for the derivation of temporal and spatial trends [1].

The POP- Dioxin Database uses various IT tools whose development and networking concepts are explained in detail here (http://www.dioxindb.de/f_datan_db_e.html).

Using the eXtensible Markup Language, information can be exchanged between databases of different model concepts. The approach of the free, platform- and implementation-independent exchange of data of the POP-Dioxin Database is one of the important issues which fit the requirements of an open interface for environmental data, and the interoperability between several platforms.

B. The German Environmental Specimen Bank

The German Environmental Specimen Bank (ESB) is a specialised environmental monitoring program, which collects and archives environmental and human specimens. It is a major component of the German environmental observation system. In the 1980s the German ESB started to systematically collect samples from the environment and human populations.

A general concept [2] and more specific standard operating procedures (SOP) define where, when and which specimen and matrices should be taken, and which measurements have to be carried out regularly. The measurements cover chemical analyses, biometric and anamnestic data, but also metadata logging the sampling circumstances. After sampling, the samples are deep frozen and stored long-term for retrospective analyses.

Both the results of the annual investigation program and the results of retrospective trend analyses are published on the ESB public website along with the data and additional information (www.umweltprobenbank.de). Retrospective analyses cover substances like perfluorinated compounds, biocides, phthalates, and bisphenol A.

Networking in the ESB community has a long tradition and focuses on two aspects: harmonization of scientific methods and data interchange and integration. In 2008, the *International Environmental Specimen Bank Group* (IESB) was launched and set up a joint website to promote and share ideas among ESBs and interested parties (<http://www.inter-esb.org>) [3].

III. INTEROPERABILITY OF IPCHEM

The EU project "Information Platform for Chemical Monitoring (IPChem)" establishes a direct and tailor-made link to data collections. Providers maintain databases' structure, while combining their knowledge and rendering it accessible for search and retrieval through a unique interface. This creates larger visibility and promotes a wider use of valuable chemical monitoring data, thus amplifying the knowledge base for a sound risk management and communication. Combining information from different sources on a variety of environmental media, consumer products, food, and ultimately from human beings themselves, provides the basis for understanding combined exposure and the effects of chemical mixtures [4] [5].

IPChem is structured into four modules based on the group type of chemical monitoring data. For the module 'environmental monitoring data' the Federal Environment Agency (UBA) provided metadata and analytical data of the

substance group Polychlorinated Biphenyls (PCB) enabling the project team of JRC to test the methodology for the IT solution. First results were presented on a workshop in December 2014 [6].

For the ESB the data are already publicly accessible via a single access point [7] – so, why would we like to contribute these data to the platform of IPChem? From our point of view, IPChem, with its single access point to locate and retrieve chemical monitoring data from different data providers, gives us the chance to make the data known beyond the specimen bank and human biomonitoring communities. This means added value for our investigations and both the public and the scientific community would have the chance to profit from our data. Because a platform for data interchange is still missing in 2015, IPChem could be a chance to fill this gap - at least for the European ESBs.

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