



science and policy  
for a healthy future

HORIZON2020 Programme  
Contract No. 733032 HBM4EU

# Database of exposure-related and ancillary data for priority substances

## Deliverable Report

### AD 12.1

### WP 12 - From HBM to exposure

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## 2 Introduction

### 2.1 Aims, approach, scope and audience of the HBM4EU exposure database

This document aims at:

- (a) outlining the technical development of the European Human Biomonitoring Initiative (HBM4EU) web-based exposure database (within Work Package 12) to support the modelling of exposure towards better Human Biomonitoring (HBM) data interpretation, accessible at <https://hbm4eu.enve-lab.eu/>,
- (b) providing an overview of its software implementation,
- (c) providing information of the type and the amount of data included in the database at the current level of development.

The database has been created by the University School for Advanced Studies Pavia (IUSS) and the Aristotle University of Thessaloniki (AUTH) and several data have been already imported. The data come from Work Package (WP) 12 partners, as well as from available reports and scientific literature. Overall almost 250,000 entries have been imported up to now. Details on the imported fields have been described in the report in Chapter 5 – Description of data.

Overall, previous experience from building similar databases (such as the ones of INTERA and INTEGRA) and review of other similar databases such as ExpoFacts, EFSA, US EPA and Canadian exposure handbooks and RefXP, have been very useful in the design of the database and the data collection datasheets. In terms of design, the HBM4EU exposure database uses a similar structure to these databases (mainly RefXP) for organising the exposure related data, but it is implemented using a web-based user interface, thus ensuring a more user-friendly environment.

The intended users are the people involved in HBM4EU and especially WP12, but not only. The database provides a wealth of exposure related data, that are necessary for estimating exposure and further associate them with HBM data. Given the above, the design of the database and the type of info included, is the result of consultation among experts in exposure science involved in WP12.

The database is fed with data from various studies, even though not all of them provide the same amount of detail. However, the database itself requires consistent fields for data input, so when a user is exporting data from the database, they are in a consistent format. The database is updated automatically whenever a user is uploading new data. However, regular updates on new data available from the consortium are scheduled to be done on a monthly basis. In addition, new data uploaded by the HBM4EU consortium will be checked by the database administrators (data quality control) for avoiding mistakes, duplicates etc. on a monthly basis. Update with new data arising from the literature will be done on an annual basis.

Updates of the web based database will be done only when deemed necessary and only when stable versions will be provided by the developers of the used javascript libraries (jquery, dataTable, jszip).

The database will be available for all the normal duration of the project and beyond. AUTH and IUSS will support its maintenance till the end of the project, without any additional budget than the one already foreseen for the activities of WP12. The database is ownership of the HBM4EU consortium and accessible to all partners forever.

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Access has been granted to all WP12 partners. The database will be enriched with data from the partners, especially the ones from WP12, but also with newer data arising from the European literature.

One other key aspect of the database is the link with IPCheM. The close contact of principal investigators involved in the HBM4EU database development with the JRC team responsible for the IPCheM platform the last years, through their participation in various relevant workshops, was proven very useful for understanding the requirements of establishing this link. Up to now, all relevant requirements for ensuring compatibility with IPCheM, have been followed.

In case you need to contact the database administrators, users can send an email to [hbm4eu.database@gmail.com](mailto:hbm4eu.database@gmail.com).

## 2.2 Document Organisation

This document is organised into the following sections:

- The 1<sup>st</sup> chapter provides general information of the report and the way this is organised.
- The 2<sup>nd</sup> chapter provides an overview of the design of the web-based database.
- The 3<sup>rd</sup> chapter illustrates the architecture of the database.
- The 4<sup>th</sup> chapter presents the use case analysis.
- The 5<sup>th</sup> chapter provides the design of the database.
- The 6<sup>th</sup> chapter includes the literature references.
- The appendix illustrates the related screenshots from the web database (Annex 1) and the requested type of data (Annex 2).

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## 3 Design Overview

### 3.1 Approach

The following steps were followed for the database design:

- Requirements Phase: during the requirements phase a candidate architecture was proposed to be validated in the System Design Phase.
- System Design Phase: in this phase, the evolutionary prototype was created and finalised by establishing a sound architectural foundation for the construction phase.
- Construction Phase: in this phase, the design was updated to reflect changes in any interface definitions.
- Transition / Training Phase: in this phase, no further additions or modifications were made. If a new functionality is expected to be implemented, this will go through all the above phases and this document will be updated accordingly.

### 3.2 Architectural Goals and Constraints

A key architectural goal is to leverage engineering and scientific best practices for designing and developing an intuitive and user-friendly web database.

### 3.3 Maintain and Operate Database

Regular maintenance of the database will be carried out at least once a year. However, the database content will be updated in the case of emerging user needs and whenever new data are available. The methods that will be used for staying abreast with new ancillary data include:

- Periodical research of new data
- Periodical review of scientific and regulatory body databases
- Periodical communication directly with partners

During the database lifetime, project partners will modify, add, and delete content on a regular basis. Setting up a password-protected administrative component will ensure only project partners are able to make changes, protecting the database content. The update of the interface is responsibility of the project partners involved in the database development. AUTH will be in charge for the monthly and the annual updates of the database.

### 3.4 Additional Considerations

#### 3.4.1 Language

HMB4EU WP12 database is available in English only.

#### 3.4.2 Requests for Technical Assistance and Information

The webmail provides technical assistance and information to the user of web-based database through the menu “contact us”. In addition, the web site provides instruction and technical assistance for filling the forms. It is worth mentioning that additional instructions and material are provided by the developers through the website.



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### 3.5 Database conceptual design

The conceptual design of the database is graphically illustrated in Figure 1. This Figure depicts visually the tables, columns and relationships that make up a relational database. The available data-tables of the web database, upload data from specified “lookup” database table. Database lookup tables allow to work with duplicate records (multiple records with the same key value). In addition, these tables include groups with related topics and they are used as a selection list during the queries. Last but not least, they are also able to create a wide range of complicated queries, as well as they will improve data migration, consistency and referential integrity avoiding free text input.

List of “lookup” tables

- Chemical
- References
- Study
- Units
- Matrix\_category
- Geographical\_location\_city
- Geographical\_location\_coutry
- Gender
- Age\_group
- Activity\_data

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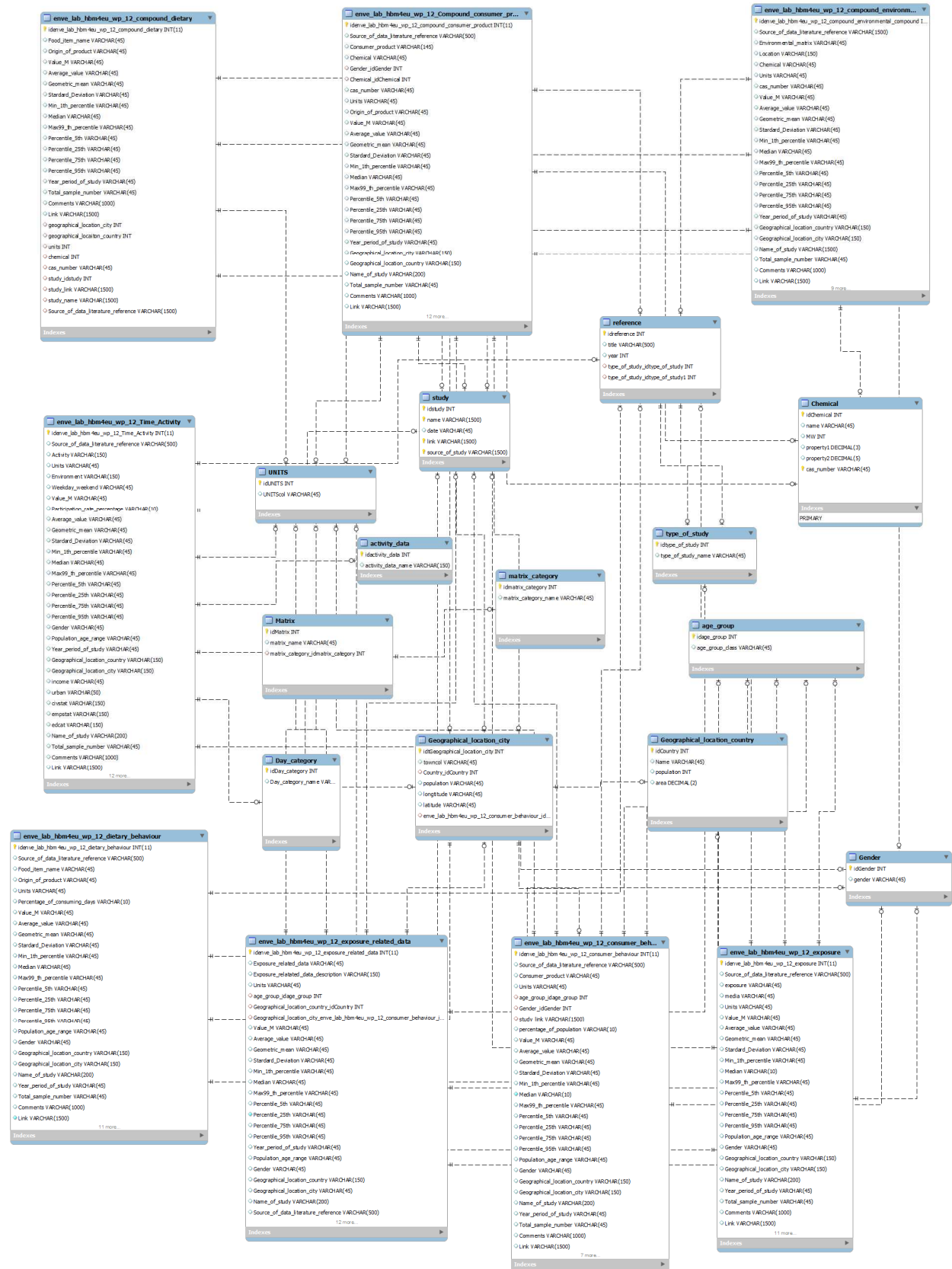
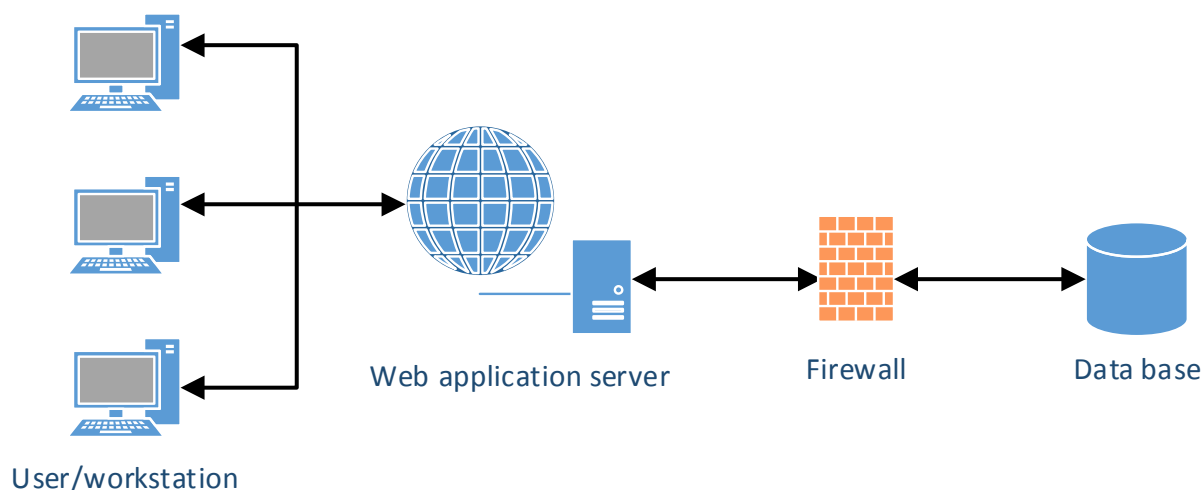


Figure 1: Database conceptual design

## 4 Application Architecture

### 4.1 Technical Design Diagram

The diagram in Figure 2 shows all existing technical resources required for the successful completion of the Db developments.



**Figure 2: Interaction of software components**

- **Web/Application Server:** Tomcat is used as web and as application server. It is responsible for serving web pages, mostly HTML pages, via the HTTPS protocol to clients. The server sends out web pages in response to requests from browsers. A page request is generated when a client clicks a link on a web page in the browser.  
The server hosts the business logic and the business model classes of application as well. It serves requests for dynamic HTTP web pages from client.
- **MySQL Database** which stores the available dataset collected by HMB4EU WP12 partner's user profile, credentials and account data.
- **HTTP:** Hyper Text Transport Protocol is the communication protocol used to connect to servers on the World Wide Web. The primary function of HTTP is to establish a connection with a Web server and transmit HTML pages to the user's browser.
- **PHP:** Database Connectivity is providing using php language

### 4.2 Server infrastructure

- **Server:** 4 CPU's, 8 GB RAM, 200 GB Hard Disk Space
- **Web data Server:** 4 CPU's, 8 GB RAM, 50 GB Hard Disk Space
- **Windows Server 2008 64-bit.**

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### 4.3 Development tools/languages

- Apache: PHP version 5.3
- HTML
- Joomla 3.7.3
- SQL language
- Javascript 1.8.5
- Phpmyadmin
- Tomcat 8.5.13

### 4.4 Process view

HMB4EU WP12 web database has been developed to store and retrieve human environmental contamination data, exposure-related and ancillary data collected from scientific literature, research project reports and databases. All HMB4EU WP12 web database users may have author rights. This is to allow the users to upload additional or new data, whenever they want. However, only the database administrator has the right to delete data.

### 4.5 Logical view

The HMB4EU WP12 web database provides access to a SQL database. The logical view presents the core design of the system. It presents the primary classes that collaborate to implement the system functionality. It contains the following subsections:

- Presentation Layer which is responsible for authentication, presentation and managing user state.
- Business Layer which insulates the user interface layer from database design. It is also responsible for complex business rule logic.
- Data Layer which is responsible for data integrity, transactions and data intensive business rules
- Resource layer which includes the underlying resources used by the application to deliver its functionality. This is MySQL database to persist information.

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## 4.6 Web Controls Modules

### 4.6.1 Controller Administrator Module

#### Description:

This is the module which controls the actions of administrators within the system.

#### Responsibilities:

- To communicate with the database to perform user authentication during login.
- To perform account management tasks including creation, deletion and editing.
- To delete and /or deactivate account unless the user explicitly specifies they want to delete their account. In this case their information and data are permanently removed from the database.
- To provides an interface to communicate with the desktop application in order to change user settings and manage the security devices.
- To upload datasets.

#### Communicates With:

- Controller authentication

### 4.6.2 Controller Operations Module

#### Description:

This module controls the interaction between the website and the database.

#### Responsibilities:

- To handle user and admin authentication
- To enable the user explore website
- To enable the user download data
- To handle system function logs
- To handle changes of the system settings

#### Communicates With:

- The database (SECURE)

### 4.6.3 Controller Authentication Module

#### Description:

This module authenticates users when they login and oversees all operations of the web application.

#### Responsibilities:

- To create a connection with the database
- To authenticate login for all users including administrators

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### **Communicates With:**

- The database
- The underlying modules

#### **4.6.4 User interface**

HMB4EU WP12 web database provides a content management system (CMS) based on Joomla which allows to publish web content. It is built on a model–view–controller web application framework that can be used independently of the CMS.

The rich client interface can be used by authors, manufacturing authors, administrators, and other users to:

- Search HMB4EU WP12 available dataset.
- Download dataset
- Inform about HMB4EU WP12
- Administrate a user account
- Create a user account
- Administrate and organise web site
- Upload data using forms

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## 5 Description of data

### 5.1 Type of data

Humans are exposed to a wide range of chemicals that can be found in multiple environmental and micro-environmental media such as dust, soil, food, air, personal care products, through multiple exposure routes such as dermal, inhalation and oral. These chemicals can originate from human or natural sources and their environmental fate is a result of a variety of natural processes and human facilities.

HBM4EU WP12 database stores the currently available exposure and ancillary data. The collected data was classified according the following two main categories:

1. Data related to specific chemical substances; this includes data on the prioritised chemical substances, namely PAHs (polycyclic aromatic hydrocarbons), bisphenols, DINCH (diisononyl cyclohexane-1,2-dicarboxylate), phthalates, PFASs (per- and polyfluoroalkyl substances), BFRs (brominated flame retardants) and heavy metals. The chemical-specific data include information related to the contamination levels in several environmental matrices such as ambient air, indoor air, water, soil, dust, as well food residues in various food items, and concentration in consumer products. The data were collected and stored disaggregated by geographical location within Europe.
2. Data that are not chemical specific; this includes data related to consumer behaviour such as food and drinking water consumption, inhalation rates, time activity patterns, dust ingestion rates, soil ingestion rates, frequency of use of consumer products, hand to mouth and object to mouth behaviour data. Data of this type were also disaggregated by gender and age class, as well as geographical location.
3. Exposure modifier data were included along with their respective geographical location such as country and city and stratified by population, age and gender.

The user can add the data by filling eight (8) different forms, each one addressing a specific type of data. The forms available on website of the database are the following:

- Compound – Environmental matrix
- Compound – Dietary
- Compound – Consumer products
- Exposure related data
- Time activity diary
- Dietary behaviour
- Consumer behaviour
- Exposure data

The type of information to be imported is presented in Annex 9.2.

#### 5.1.1 Compound – Environmental matrix

Environmental matrices are generally described as environmental media in which human contact with a pollutant or a chemical takes place, treated as a well-characterised, relatively homogenous location with respect to pollutant concentrations for a specified time period. Environment matrices include outdoor air, indoor air (including various micro-environments such as home, school,

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workplace, inside an automobile or bus), as well as water (e.g. ground water, surface water), dust, soil, etc. Inclusion of this type of data, ensures the successful calculation of both near- and far-field exposure, resulting in more accurate integrated exposure profiles.

### **5.1.2 Compound - Dietary**

This form includes data collected about levels of chemical contamination in different food items (food residues). Chemical contaminants can be present in foods mainly as a result of the use of agrochemicals, such as pesticides and veterinary drugs, contamination from environmental sources (water, air or soil pollution through multimedia interactions) and the respective bioaccumulation and biomagnification across the food web, cross-contamination or formation during food processing, migration from food packaging materials, presence or contamination by natural toxins or use of unapproved food additives and adulterants.

### **5.1.3 Compound – Consumer products**

This form includes data collected about levels of chemical contamination in consumer products. The number and variety of consumer products and cosmetics has extremely increased and products with more complex chemistries as well as new materials are entering in the marketplace. While these products provide benefits, effective oversight is important to address or prevent dangers to consumers. Exposure to chemical substances during use of consumer products is mainly determined by the way the product is used (exposure scenario), the concentration of the substance in the product and the release of the substance from the product during use.

### **5.1.4 Exposure related data**

In this dataset form, exposure related data are defined as additional information that is related with the frequency and rate of exposure – in layman's terms all information that could help us model/characterise exposure, short of exposure information itself. A characteristic example of additional exposure information is "inhalation rate", dietary habits or the rate an object is mouthed. These data vary significantly among various age and gender groups, as well as a function of the country of origin; they are also associated to the time activity data (e.g. intensity of activity inhalation rate) that are included in the next form.

### **5.1.5 Time Activity**

Most human exposure models require human activity data as an input. An activity pattern is a series of discrete events of varying time intervals describing an individual's lifestyle and routine when moving through different microenvironments.

### **5.1.6 Dietary behaviour**

The dietary behaviour dataset provides data related to the frequency of consumption of various food items per age, gender and country of origin.



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### 5.1.7 Consumer behaviour

The consumer behaviour dataset provides data on the frequency of use of various consumer products.

### 5.1.8 Exposure data

The exposure dataset provides data on measured personal exposure levels of the compounds of interest.

## 5.2 Data included in the database

The population of the database is a dynamic process, which will continue upon collection of additional data. Up to now (30/6/2017), **224,548** entries are included in the database. These include a combination of chemical-specific and non-specific data, for various countries and from multiple sources. Details on the database entries are given below.

### 5.2.1 Compound – Environmental matrix

Up to now, **1,278** entries are included in the compound – environmental matrix dataset. This pertains to a combination of 117 compounds (including e.g. the various congeners of PAHs, phthalates and BFRs), 29 different EU countries and 6 different environmental matrices. Data were obtained from 63 different studies that include either large scale studies, eventually under a national or international monitoring program or individual per-reviewed studies.

**Table 1: Data identified related to chemical families per country regarding contamination of various environmental media**

	BFRs	Bisphenols	Heavy metals	PAHs	PCBs	PFCs	phthalates	Flame retardants	Total
Austria	1	1							2
Belgium		12	4	527		1	2		546
Croatia				6					6
Czech Republic				4					4
Denmark							22		22
Europe				11		114	66		191
Finland				14					14
France						1			1
Germany	2	9	12	69	1	1	12		106
Greece	5	4	5	100					114
Hungary				28					28

	BFRs	Bisphenols	Heavy metals	PAHs	PCBs	PFCs	phthalates	Flame retardants	Total
Italy		3		25		1			29
Lithuania				12					12
Netherlands		1		4		1	5		11
Norway				4		1		4	9
Not specified							8		8
Poland			5						5
Portugal		1		27					28
Romania			4						4
Scotland	2								2
Slovenia				15		1			16
Spain	2	1	12	8					23
Sweden		6		1			21	7	35
Swiss				6					6
UK	6	1		47				2	56
Total	18	39	42	908	1	121	136	13	1278

### 5.2.2 Compound - Dietary

With regard to food residues data, **1,572** entries have been included in the compound – dietary dataset. This pertains to a combination of 81 compounds, 13 different EU countries and 262 food items. 319 entries have been obtained from EFSA, while another 1222 entries were obtained from 45 individual per-reviewed studies.

**Table 2: Data identified related to chemical families per country regarding food residues**

	BFRs	Bisphenols	Heavy metals	PAHs	PCBs	PFCs	Phthalates	Total
Austria		3						3
Europe				288		614	110	1012
Greece			1					1
Italy			56		1			57
Norway	350							350
not specified	50			9			37	96

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	BFRs	Bisphenols	Heavy metals	PAHs	PCBs	PFCs	Phthalates	Total
Poland			6					6
Portugal			26	4				30
Slovakia			3					3
Slovenia			1		1			2
Spain		5	7					12
Switzerland								0
Grand Total	400	8	100	301	2	614	147	1572

### 5.2.3 Compound – Consumer products

For consumer products data, **828** entries have been included in the compound – consumer products data set. This includes a combination of 60 compounds, 8 different EU countries and 114 different consumer products. Data were obtained from 25 different per-reviewed studies.

**Table 3: Data identified related to chemical families per country regarding concentrations in consumer products**

	BFRs	Bisphenols	Heavy metals	PAHs	PFCs	Phthalates	Total
Belgium		19					19
Denmark				164			164
Europe		1		16		112	129
Germany			2	8			10
Netherlands		54					54
Norway		42					42
not specified	66	33	10	15	179	106	409
Poland			1				1
Total	66	149	13	203	179	218	828

### 5.2.4 Exposure related data

With regard to non-chemical specific data, **136** entries have been included in the exposure related data set. This includes a combination of 126 different inhalation rates per age-group and gender groups, and 10 entries related to non-dietary soil and dust ingestion.

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### 5.2.5 Time Activity data

With regard to time activity overall **219,580** entries have been included. This includes a combination of age and gender stratified data, for 17 different EU countries, 119 different activities encountered and related locations micro-environments. 878 entries were obtained from the EXPOLIS study, 90 Hellenic Statistical Authority, 35 entries from the Flemish Time Use Survey and 218577 were obtained from the Multinational Time Use Study. Time activity patterns are also differentiated between weekdays and weekends.

### 5.2.6 Dietary behaviour

With regard to dietary behaviour, overall **601** entries have been included. This includes a combination of data age and gender stratified, for 14 different EU countries, and 21 different categories of food items. Food consumption data were obtained from EFSA (577 entries), while 24 entries (regarding bottled water consumption) were obtained from the European Federation of Bottled Waters and the Beverage Marketing Corporation.

### 5.2.7 Consumer behaviour

With regard to consumer behaviour, overall **707** entries have been included. For specific personal care products, data on age and gender is provided. In addition, data of the use of specific consumer products for 11 different EU countries, for 17 different consumer products.

### 5.2.8 Exposure data

A very limited number (**10** entries) of exposure data related to the 1<sup>st</sup> priority compounds were identified at the current time; data on personal exposure measurements are mostly available for compounds that are not included in the 1<sup>st</sup> set of priority compounds (e.g. data on inhalation exposure of VOCs and PM).

## 5.3 Link to IPCheM

We have been in close contact with the people responsible for the IPCheM platform (Dr. Stelios Kephelopoulou, Dr. Silvia dalla Costa) during the last years, participating in various relevant workshops.

To be compatible with IPCheM the HBM4EU database needs to follow key requirements which are included in the “Data Content” sheet provided us by the JRC, so as to ensure a certain level of data quality and comparability across the data.

To this aim the data structure of the HBM4EU database comprises all the mandatory elements as identified by the IPCheM team including:

- The Record ID
- Sampling source ID
- Chemical/Biomarker name
- CAS number
- Media/setting

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- Concentration value (several type of statistical values)
- Unit of measure
- Spatial coverage
- Sampling start date
- Sampling end date (when applicable)
- Sampling Location name (when applicable)
- Sample Longitude (when applicable)
- Sample Latitude (when applicable)
- LOD
- LOQ

The only exceptions are: “Sample Longitude” and “Sample Latitude”, that however (a) are not mandatory fields and (b) they can be obtained by the description of location. It has however highlighted that the process of transformation, normalisation and mapping of the original data in the structure proposed by IPCheM is fully handled by the IPCheM team who may did the needed modifications/additions to the data provided to facilitate the full mapping.

On these basis the datasheets used for collection of data used in the HBM4EU database fulfill the requirements of IPCheM. Thus, data collected for the HBM4EU database could be sent to be included in the IPCheM platform.

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## 6 Use cases analysis

A use case analysis (Jacobson, 1993) was carried out to demonstrate the sequence of actions, performed by one or more actors (people or non-human entities outside of the system) and by the system itself. The use case analysis was used as a driving force for development and disclosure of the web database needs. The actions of the user are illustrated in Figure 3.

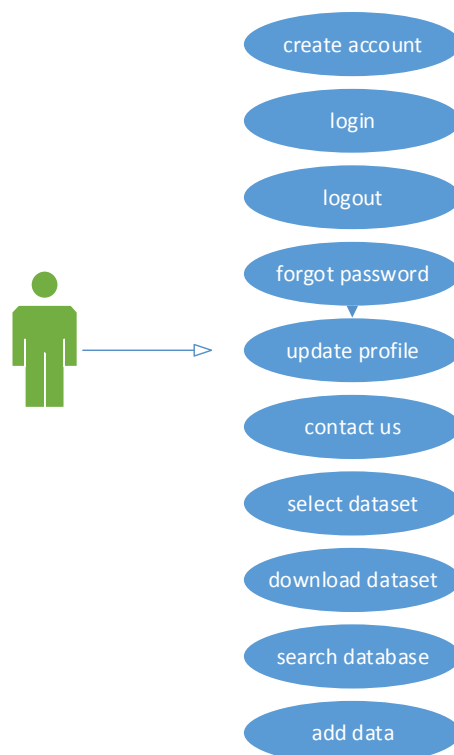


Figure 3: Use case diagram

### 6.1 Use cases

#### 6.1.1 Create an Account

**Use case name:** Create an account.

**Scope:** System.

**Primary actor:** All users.

**Scientific community, stakeholders and interested parties:** All users.

**Preconditions:** This primary actor has to visit the website and select the menu “*create an account*”.

**Post conditions:** The user’s personal information will be saved in the HMB4EU WP12 web database. The system will send an email containing a default password and a username to the customer.

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### Main Success Scenarios:

1. Click “*create an account*”
2. Fill in the form
3. Click “*Register*” button to end request

### Extensions:

- 2a. If the mandatory fields which are marked with a star are incomplete; the actor will remain in the form page with incomplete important fields highlighted in red.
  - Repeat 2,3

## 6.1.2 Login

**Use case name:** Login.

**Scope:** System.

**Primary actor:** User, security personnel.

**Primary actor:** All users.

**Scientific community, stakeholders and interested parties:** All users.

**Preconditions:** User must be registered i.e. he should exist in the database.

**Post conditions:** Successful execution results in the successful login. Unsuccessful login returns the user to the login screen.

### Main Success Scenarios:

1. User enters his login
2. User enters his password
3. User presses the login button
4. A correct combination of user name and password results in the user being redirected to the web page displaying in the main menu the tab “*Dataset*”.
5. An incorrect combination of username and password result in the user being redirected to the login page with an error message “*Username and password do not match or you do not have an account yet*”. If the user enters a wrong password more than three times in the row, he is locked out of the system and an error message asks him to contact the administrator.

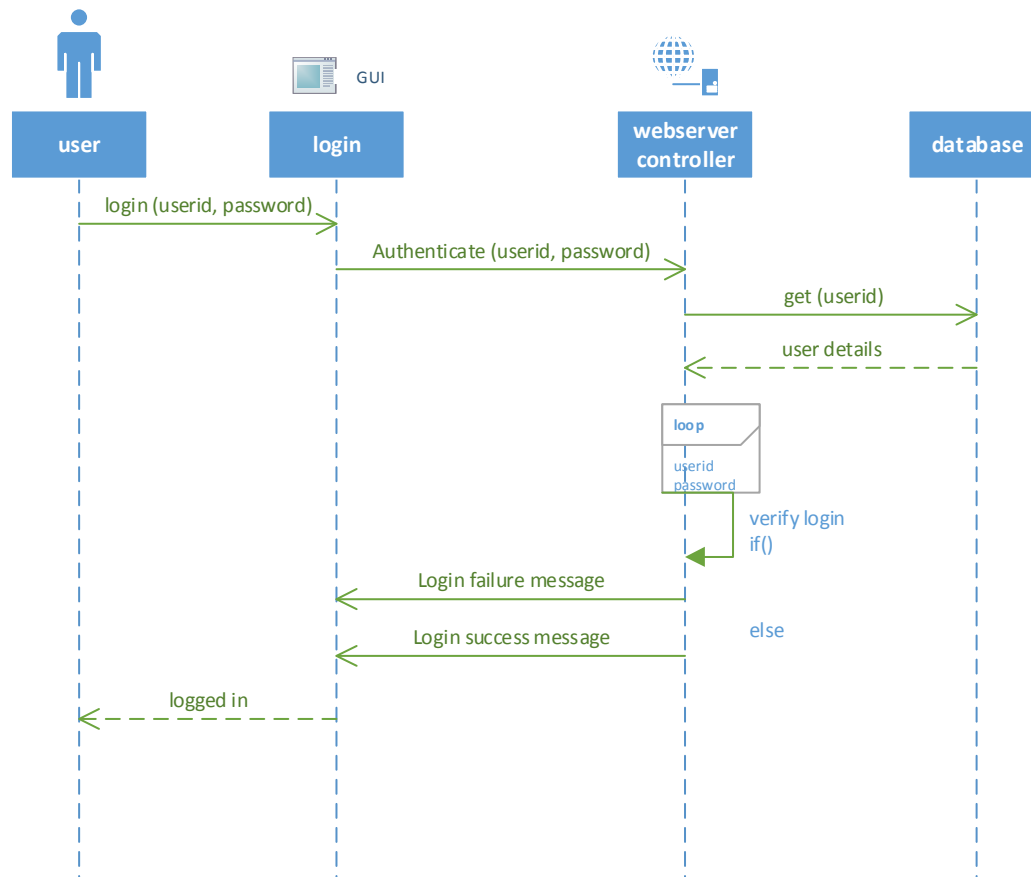


Figure 4: Login use case sequence diagram

### 6.1.3 Logout

**Use case name:** Logout.

**Scope:** System.

**Primary actor:** User, security personnel.

**Primary actor:** All users.

**Scientific community, stakeholders and interested parties:** All users.

**Preconditions:** User must be logged in the database

**Post conditions:** Successful execution results in the successful logout and returns to home button.

**Main Success Scenarios:**

1. Click "Logout" button



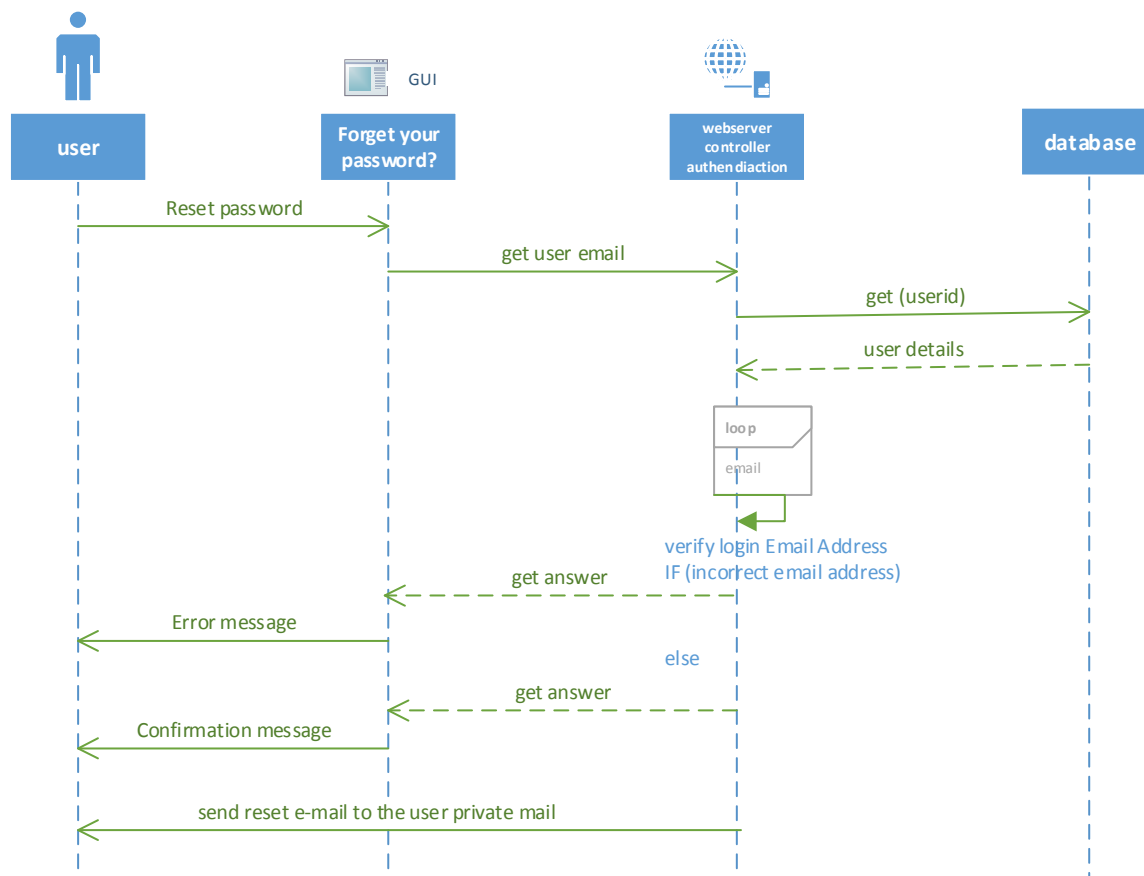


Figure 5: Reset password use case sequence diagram

### 6.1.4 Reset Password

**Use case name:** Reset Password.

**Scope:** System.

**Primary actor:** User, security personnel.

**Scientific community, stakeholders and interested parties:** any registered user wanting to reset the password.

**Preconditions:** User must be registered i.e. should exist in the database.

**Post conditions:** Successful filling of field results in a reset password confirmation mail.

**Main Success Scenarios:**

1. User clicks on link "Forgot your password?"
2. Fill in the "Email Address" field
3. Click "Submit" button

**Extensions:**

- 2a. If the mandatory fields which are marked with a star are incomplete or the email address is wrong; the actor will remain in the form page with incomplete important fields highlighted in red; a warning message is appeared to the user.

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### 6.1.5 Retrieve Username

**Use case name:** Remember user name.

**Scope:** System.

**Primary actor:** User, security personnel.

**Scientific community, stakeholders and interested parties:** any registered user wanting to remember his username.

**Preconditions:** User must be registered i.e. should exist in the database.

**Post conditions:** Successful filling of field results in a mail that includes username.

**Main Success Scenarios:**

1. User clicks on link "Forgot your username?"
2. Fill in the "*Email Address*" field
3. Click "*Submit*" button

**Extensions:**

- 2a. If the mandatory fields which are marked with a star are incomplete or the email address is wrong; the actor will remain in the form page with incomplete important fields highlighted in red; a warning message appears to the user.

### 6.1.6 Edit Account

**Use case name:** Edit an account

**Scope:** System

**Primary Actor:** All users.

**Scientific community, stakeholders and interested parties:** All users.

**Preconditions:** This actor has to be logged to the HMB4EU WP12 web database site and he/she wants to change his or her personal information.

**Post conditions:** The changes on the user's account will be saved to the HMB4EU WP12 web database.

**Main Success Scenarios:**

1. Click "*your profile*"
2. Click "*edit Profile*"
3. Make changes on the fields
4. Click Submit button to save

**Extensions:**

- 3a. If the mandatory fields which are marked with a star are incomplete the actor will remain in the form page with incomplete important fields highlighted in red; a warning message is appeared to the user; repeat 3.
- 4a. Confirming the save action by clicking "cancel" the user return to "*your profile*".

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### 6.1.7 Download data

**Use case name:** Download a dataset

**Scope:** System

**Primary Actor:** All users

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged on at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website and he/she wants to download a dataset.

**Post conditions:** The user will save the dataset into his personal drive.

**Main Success Scenarios:**

1. Click "*Database*"
2. Click button "CSV" or "Excel" or " PDF"
3. Click "OK" button of the pop up window to save dataset

**Extensions:**

- a. Confirming the save action by clicking "cancel" the user "Database" web page

It is noted that in the exported data file, the name of the project will be imprinted at the first line before the data table.

### 6.1.8 Print data

**Use case name:** Print a dataset

**Scope:** System

**Primary Actor:** All users

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged on at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website and he/she wants to print a dataset.

**Post conditions:** The user will print the dataset to his printer.

**Main Success Scenarios:**

1. Click "*Database*"
2. Click button "*Print*"
3. Click "OK" button of the pop up window to save dataset

**Extensions:**

- 2a. Confirming the print action by clicking "ok"
- 2b Canceling the save action by clicking "cancel" the user return to previous web page

It is noted that in the printed document, the project logo will be imprinted at the left corner of the print area before the data table.

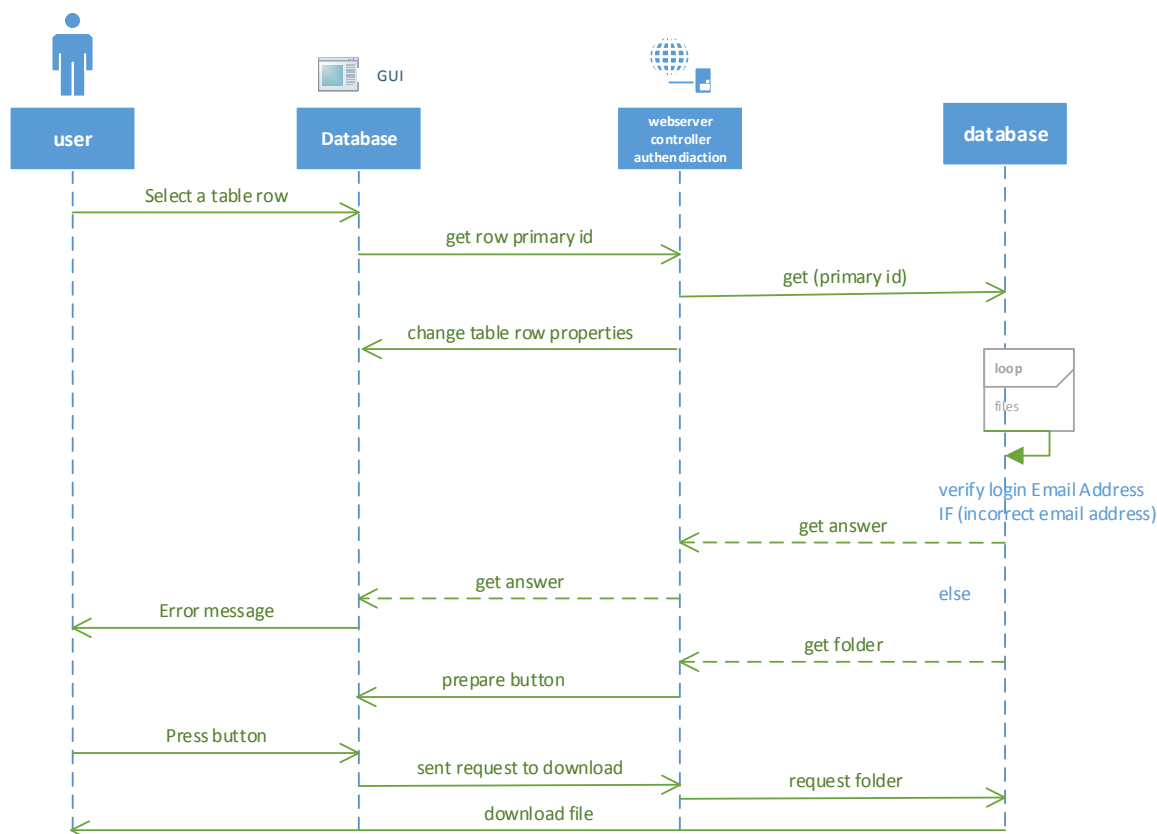


Figure 6: Download use case sequence diagram

### 6.1.9 Copy data

**Use case name:** Copy a dataset to clipboard

**Scope:** System

**Primary Actor:** All users

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged on at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website and he/she wants to copy a dataset.

**Post conditions:** The user will copy the dataset to the temporary memory.

**Main Success Scenarios:**

1. Click "Database"
2. Click button "Copy"

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### 6.1.10 Search dataset

**Use case name:** Search a dataset

**Scope:** System

**Primary Actor:** All users.

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged on at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website and he/she wants to search a dataset using one key word.

**Post conditions:** The user will get a table based on the request.

**Main Success Scenarios:**

1. Click “Database”
2. Type a keyword into the search field above the illustrated table.

### 6.1.11 Filtering by multiple search

**Use case name:** Filtering a dataset

**Scope:** System

**Primary Actor:** All users.

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged in at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website and he/she wants to filter a dataset using multiple key words.

**Post conditions:** The user will retrieve a table based on the request.

**Main Success Scenarios:**

3. Click “Database”
4. Type keywords into several search fields at the bottom of the table columns

### 6.1.12 Column visibility

**Use case name:** Column visibility

**Scope:** System

**Primary Actor:** All users.

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged in at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website and he/she wants to change the column visibility of the dataset table.

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**Post conditions:** The column visibility provides a set of buttons that can be used to easily give the end user the ability to set the visibility of columns.

**Main Success Scenarios:**

1. Click "*Database*"
2. Click "*Column visibility*"
3. Click column name button
4. Click out of column margins

**Extensions:**

- 3a. Once the pressed button is pressed again by the user, the column appears.

### 6.1.13 Contact us

**Use case name:** Contact with Administrator

**Scope:** System

**Primary Actor:** All users

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to visit HMB4EU WP12 web database site.

**Post conditions:** The user will get a confirmation mail

**Main Success Scenarios:**

1. Click "*Contact us*"
2. Click "*Contact form*"
3. Fill in the form
4. Click "*Send Email*" button

**Extensions:**

- 3a. If the mandatory fields which are marked with a star are incomplete; the actor will remain in the "*Contact form*" with incomplete mandatory fields highlighted in red; repeat 3.

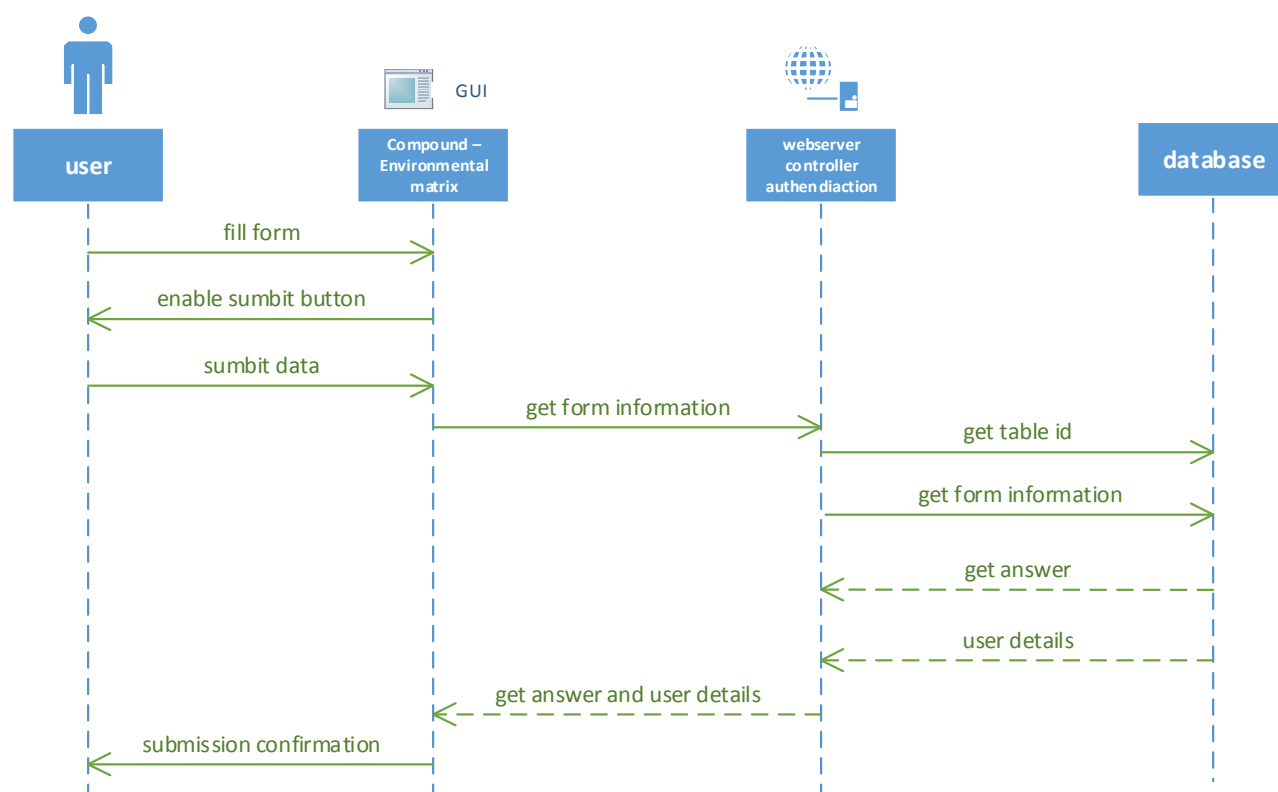


Figure 7: Fill data and submit form use case sequence diagram

#### 6.1.14 Import data

**Use case name:** Import data

**Scope:** System

**Primary Actor:** All users

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged on at the HMB4EU WP12 web database site through the HMB4EU WP12 web database website, select the “Import data” menu from top menu and then fill in the desired form.

**Post conditions:** The user will get a confirmation message above the filling form.

**Main Success Scenarios:**

1. Click “Import data”
2. Click desired form (e.g. “Compound – Environmental matrix”)
3. Fill in the form
4. Click “*Submit Form*” button

The use case to fill in Excel sheets and send it for import to the administrator is missing (see figure 16).

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### Extensions:

- 3a case 1. If the mandatory fields marked with a blue star are incomplete the actor will remain in the “*Contact form*” and the button “Submit form” will remain unavailable.

3a case 2. If at least one of the mandatory fields which are mark with a red star is incomplete; the actor will remain in the “*Contact form*” and the button “Submit form” will remain unavailable. It is remarked that the data validation for duplicates will be carried out by the administrators on a monthly base

### 6.1.15 Import data via excel file

**Use case name:** Import data using excel file

**Scope:** System

**Primary Actor:** All users

**Scientific community, stakeholders and interests:** All users.

**Preconditions:** This actor has to be logged to the HMB4EU WP12 web database site through the HMB4EU WP12 web database website, select the “Instructions” menu from top menu and then download the excel file form.

**Post conditions:** The user will get an excel file.

### Main Success Scenarios:

1. Click “Instructions”
2. Click button “Download excel file”

It is noted that the user will fill the excel form from his personal computer and the file must be sent to the administrator through an e-mail. The administrator is responsible to upload the data on the database. However, if the forms have not filled according the instructions, the administrator will contact with the user for further information.



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## 7 Requirements

### 7.1 Computer and smart mobile devices specifications

There is no hardware limitations for accessing database through personal computers and mobile devices. Delays on the communication with the web based database may be related to the user's internet connection.

### 7.2 Browser specification

The web based database is accessible from the following internet browsers:

- Chrome
- Firefox
- Safari
- Opera

## 8 References

JACOBSON, I. 1993. *Object-oriented software engineering: a use case driven approach*, Pearson Education India.

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## 9 Appendix

### 9.1 Annex 1 – web database screenshots

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### HBM4EU WP12 DATABASE

This web database stores the data which are being collected during the work package 12 (WP12) of the HBM4EU. The data is submitted to a SQL database via the provided online forms.

The HBM4EU exposure data database aims at providing to the users the exposure related data for the exposure models that will be used for associating exposure with HBM data. The database has been created by IUSS and AUTH overall almost 250,000 entries have been imported up to now.

Overall, previous experience from building similar databases (such as the ones of INTERA and INTEGRA) and review of other similar databases such as ExpoFacts, EFSA, US EPA and Canadian exposure handbooks and RefXP, have been very useful in the design of the database and the data collection datasheets. In terms of design, the HBM4EU exposure database uses a similar structure to these databases (mainly RefXP) for organizing the exposure related data, but it is implemented using a web-based user interface, thus ensuring a more user-friendly environment.

The intended users are the people involved in HBM4EU and especially WP12, but not only. The database provides a wealth of exposure related data, that are necessary for estimating exposure and further associate them with HBM data. Given the above, the design of the database and the type of info included, is the result of consultation among experts in exposure science involved in WP12.

The database is fed with data from various studies, even though not all of them provide the same amount of detail. However, the database itself requires consistent fields for data input, so when a user is exporting data from the database, they are in a consistent format. The database is updated automatically whenever a user is uploading new data. However, regular updates on new data available from the consortium are scheduled to be done on a monthly basis. Update with new data arising from the literature will be done on an annual basis.

The database will be available for all the normal duration of the project and beyond. AUTH and IUSS will support its maintenance till the end of the project, without any additional budget than the one already foreseen for the activities of WP12. The database is ownership of the HBM4EU consortium and accessible to all partners forever.

You are here: Home

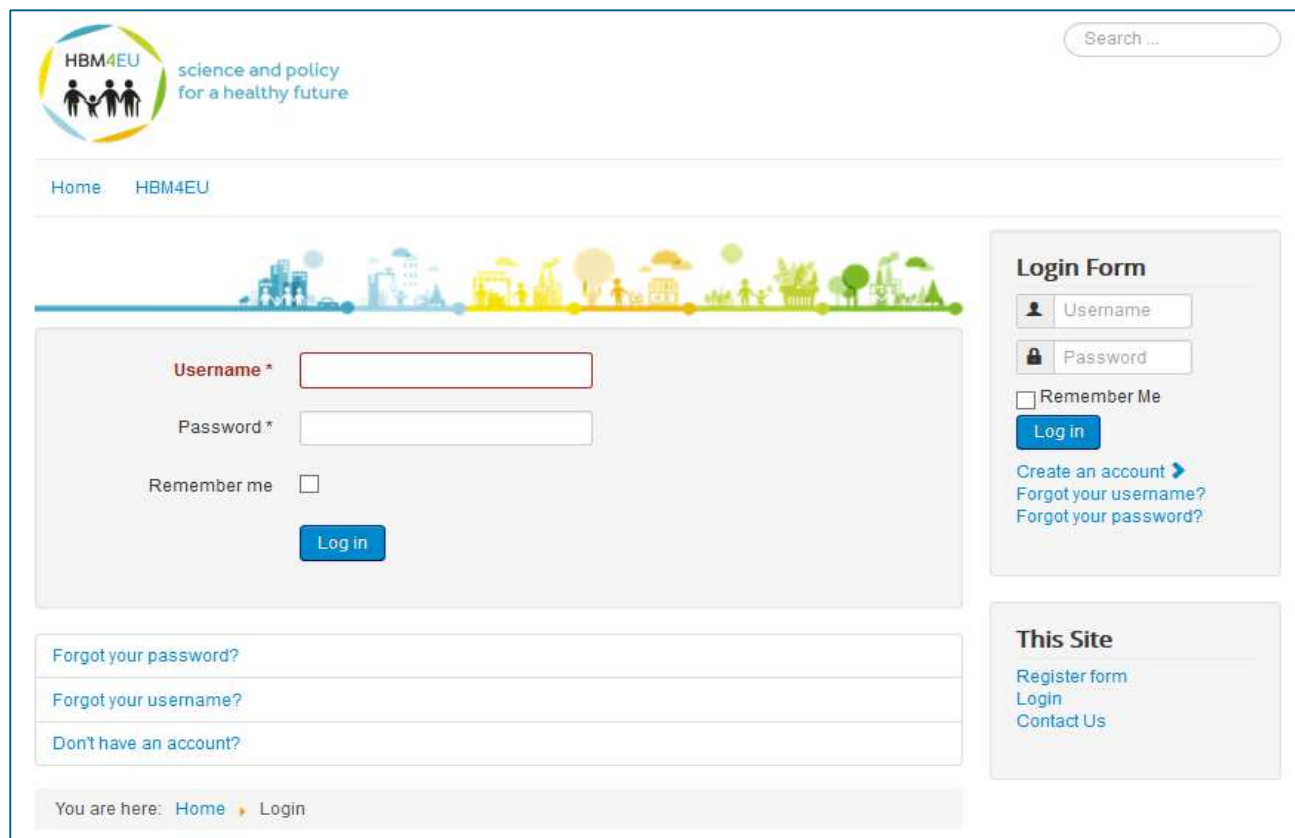
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**Login Form**  
Hi demo,  
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**This Site**  
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Figure 8: HMB4EU WP12 web database - home page

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Username \*

Password \*

Remember me ☐

Log in

Forgot your password?

Forgot your username?

Don't have an account?

You are here: [Home](#) > [Login](#)

**Login Form**

Username

Password

☐ Remember Me

Log in

[Create an account](#)

[Forgot your username?](#)

[Forgot your password?](#)

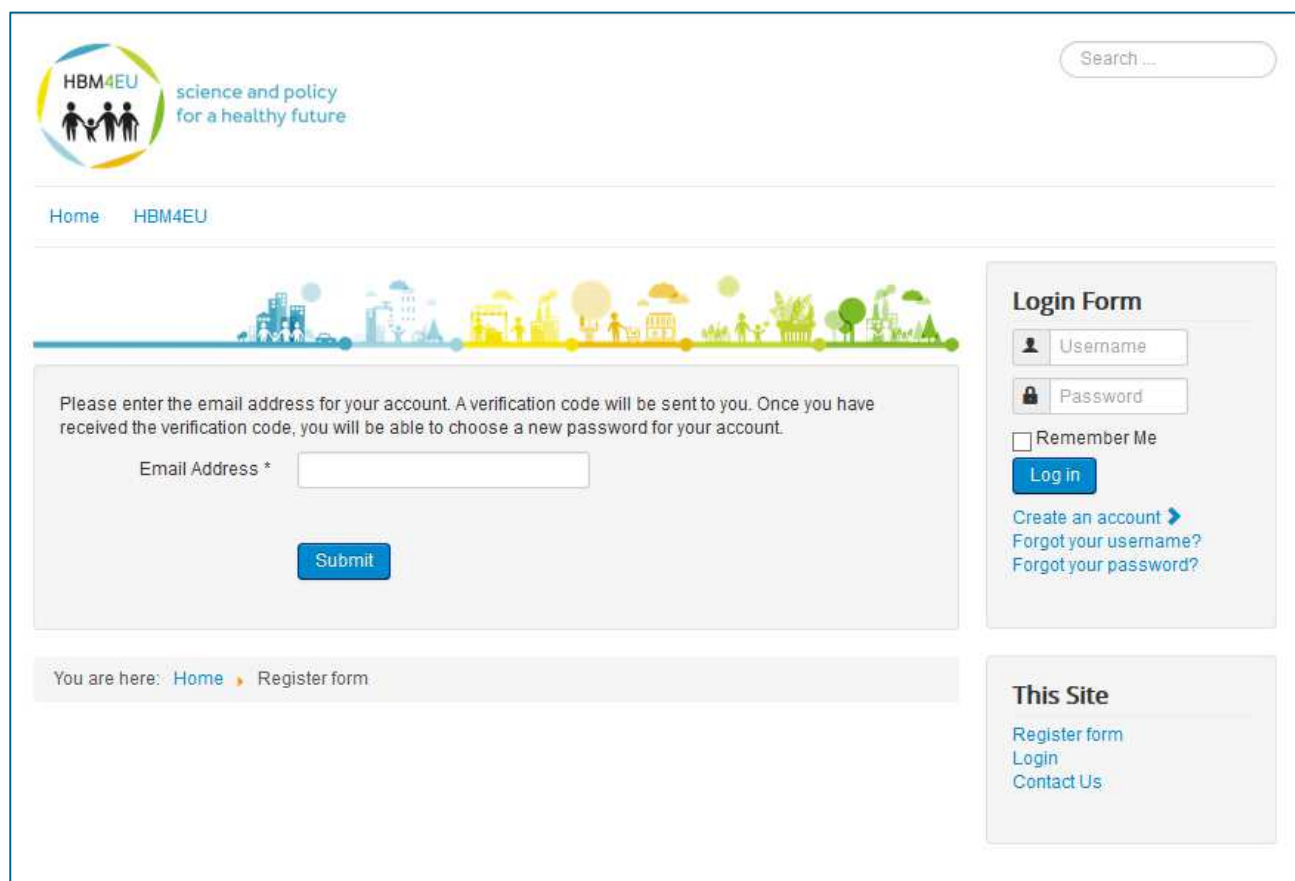
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Figure 9: HMB4EU WP12 web database- “Login” webpage



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Search ...

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Please enter the email address for your account. A verification code will be sent to you. Once you have received the verification code, you will be able to choose a new password for your account.

Email Address \*

Submit

**Login Form**

Username

Password

☐ Remember Me

Log in

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Figure 10: HMB4EU WP12 web database - “Forgot your password?” webpage

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Please enter the email address associated with your User account. Your username will be emailed to the email address on file.

Email Address \*

You are here: [Home](#) » [Register form](#)

### Login Form

☐ Remember Me


[Create an account](#) »  
[Forgot your username?](#)  
[Forgot your password?](#)

### This Site


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Figure 11: HMB4EU WP12 web database - “*Forgot your username?*” webpage

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### Contact

✉ [hbm4eu.database@gmail.com](mailto:hbm4eu.database@gmail.com)

### Contact Form

#### Send an Email

\* Required field

Name \*

Email \*

Subject \*

Message \*

Send copy to yourself (optional) ☐

[Send Email](#)

### Login Form

☐ Remember Me

[Log in](#)

[Create an account](#) ▶  
[Forgot your username?](#)  
[Forgot your password?](#)

### This Site

[Register form](#)  
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Figure 12: HMB4EU WP12 web database - “*contact us*” webpage

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**Edit Your Profile**

Name \* demo

Username (optional) demo

Password (optional)

Confirm Password (optional)

Email Address \*

Confirm email Address \*

**Basic Settings**

Editor (optional) - Use Default -

Time Zone (optional) - Use Default -

Frontend Language (optional) - Use Default -

Submit Cancel

**Login Form**

Hi demo,

Log out

**This Site**

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[Register form](#)


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You are here: [Home](#) > Your Profile

Figure 13: HBM4EU WP12 web database - “Your profile (edit profile)” webpage

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### User Registration

\* Required field

First name \*

Last name \*

Institution/organization \*

Username \*

Password \*

Confirm Password \*

Email Address \*

Confirm email Address \*

Please, write the reasons of your registration. \*

### Login Form

☐ Remember Me

[Create an account](#)

[Forgot your username?](#)

[Forgot your password?](#)

### This Site

[Register form](#)

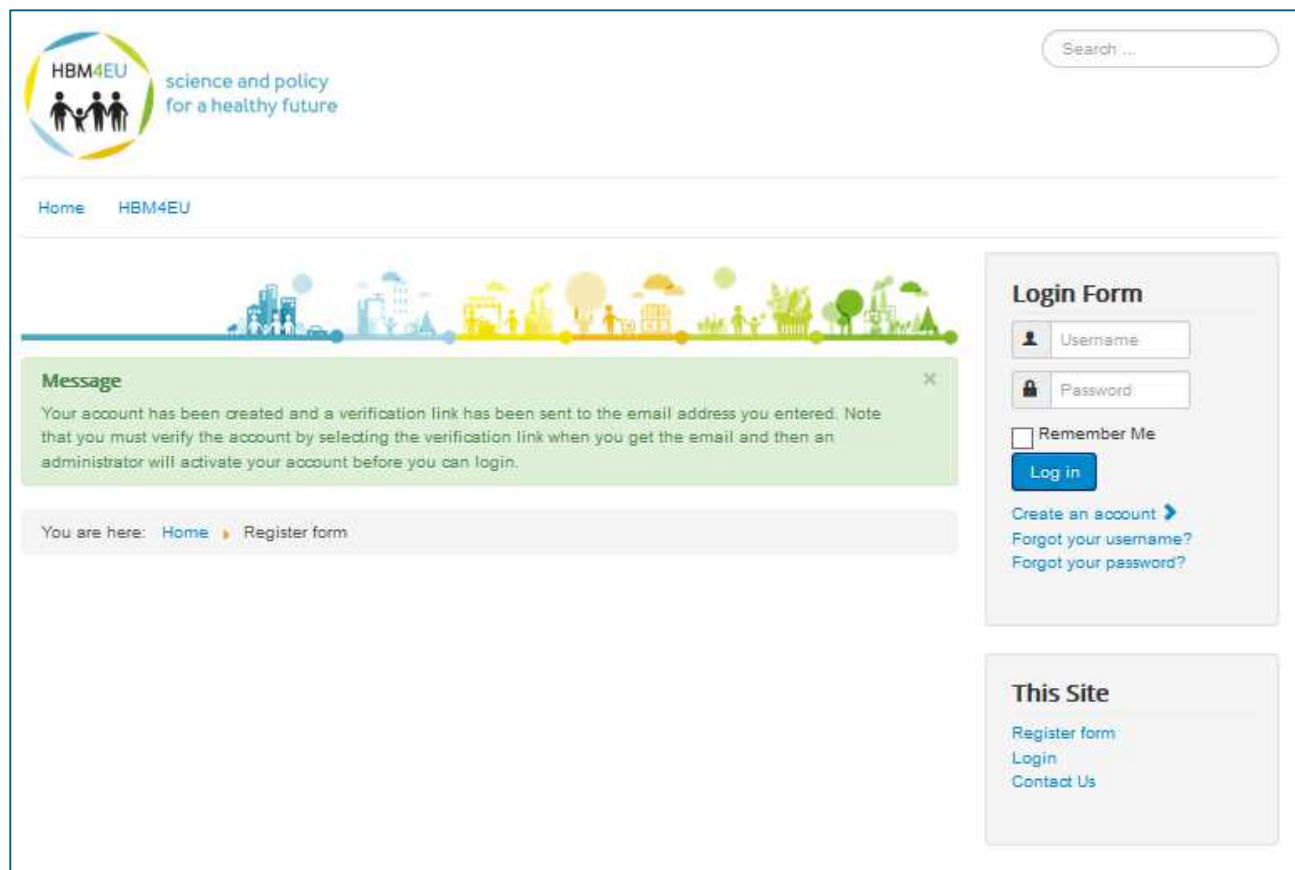
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Figure 14: HMB4EU WP12 web database - “Create an account” webpage


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The screenshot displays the HBM4EU website interface. At the top left is the HBM4EU logo with the tagline "science and policy for a healthy future". A search bar is located at the top right. Below the header, there is a navigation bar with "Home" and "HBM4EU" links. A decorative banner with colorful icons representing various environmental and health themes spans the width of the page. On the left side, a green message box contains the following text: "Message: Your account has been created and a verification link has been sent to the email address you entered. Note that you must verify the account by selecting the verification link when you get the email and then an administrator will activate your account before you can login." Below the message box, a breadcrumb trail shows "You are here: Home > Register form". On the right side, there is a "Login Form" section with input fields for "Username" and "Password", a "Remember Me" checkbox, and a "Log in" button. Below the login form are links for "Create an account", "Forgot your username?", and "Forgot your password?". At the bottom right, a "This Site" section lists links for "Register form", "Login", and "Contact Us".


Figure 15: HMB4EU WP12 web database - message after the creation of a new account





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### General information

The database under construction can be used in a great variety of ways and can help HBM4EU partners to build the foundations of a solid and complete exposure science database.

This page provides instructions and best practices on how the user can fill the database forms related to the demands of HBM4EU WP12.

The user can add the collected information by filling the forms in the tab menu "Add data" and then, the added data is deposited into an SQL server. In "Add data" tab the user can find 8 different forms, as follows.

- Compound – Environmental matrix
- Compound – Dietary
- Compound – Consumer products
- Exposure related data
- Time activity
- Dietary behavior
- Consumer behavior
- Exposure

### Instruction of filling forms

As a general rule for these forms is:

- fields with a blue star (\*) are mandatory;
- at least one of the fields with a red star (\*) is mandatory;

Particularly, the user has to fill all the Mandatory fields that are marked with a blue star (\*) and list one of the fields that are marked with a red star (\*). Of course the more fields the user can fill, the better it is! It must be noted that the above combination is **mandatory** to enable the 'Submit form' button of form.

In case of the button 'Submit form' is enable, by pressing on it, an acceptance message is appeared to the screen. In case of agreement the data is added into the database and a confirmation message is appeared above the filled form else the user can continue filling the form.

### Good practice

Every field should only contain one type of data (only one number or one string without special characters such as: ";", /, %).

Let's examine the case of a literature study where two (or more) "average value" are found in the same source of data (e.g. Title of study: "Indoor Air Quality Investigations at Five Classrooms"). In these cases, the best practice is to include the values in different forms, rather than grouping cases by using special symbols.

In particular, in text corpus of the above mention study, a figure presents different concentrations values of PM10 measurements for the same "Environment/location/place". On the left in following figure, it can be observed that the user has added multiple informations in the fields "Average value", "Min (1st percentile)" and "Max(99th percentile)" that is a **bad practice**. In the right of following figure, it can be observed that the user has splitted the informations in 2 forms that is a **good practice**.

### Login Form

Hi demo,

Log out

---

### This Site

[Your Profile](#)

[Register form](#)

[Login](#)

[Contact Us](#)

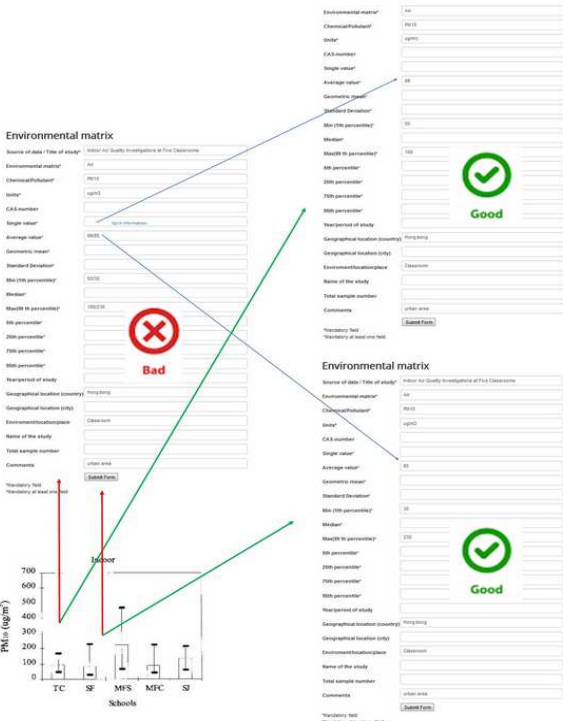


Figure 1: Bad and good practice to add data using website forms.

### EXCEL forms

User can also use the provided excel file as supporting tool in order to organized as well as to keep track of the literature review process.


Download instructions for excel file

Download excel file


You are here: [Home](#) > [Instructions](#)

Figure 16: HBM4EU WP12 web database - "Instructions" webpage

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### Login Form

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## Compound - Dietary


Source of data / Title of study\*   
Food item\*   
Origin of product   
Chemical/Pollutant\*   
CAS-number\*   
Chemical category   
Units\*   
Single value\*   
Average value\*   
Geometric mean\*   
Standard Deviation\*   
Min (1th percentile)\*   
Median\*   
Max(99 th percentile)\*   
5th percentile\*   
25th percentile\*   
75th percentile\*   
95th percentile\*   
Year/period of study   
Geographical location (country)   
Geographical location (city)   
Name of the study   
Total sample number   
Comments   
Link\*

\*Mandatory field  
\*Mandatory at least one field


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Figure 17: HBM4EU WP12 web database - “Compound – Dietary” webpage (Top menu, submenu “Import data”)

AD 12.1 Database of exposure-related and ancillary data for priority substances	Security: Public
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## Compound - Consumer products

Source of data / Title of study\*

Consumer product\*

Origin of product

Chemical/Pollutant\*

CAS-number\*

Chemical category

Units\*

Single value\*

Average value\*

Geometric mean\*

Standard Deviation\*

Min (1th percentile)\*

Median\*

Max(99 th percentile)\*

5th percentile\*

25th percentile\*

75th percentile\*

95th percentile\*

Year/period of study

Geographical location (country)

Geographical location (city)

Name of the study

Total sample number

Comments

Link\*

\*Mandatory field  
 \*Mandatory at least one field

You are here: [Home](#) > [Import data](#) > Compound - Consumer products

Figure 18: HBM4EU WP12 web database - “Compound – Consumer products” webpage (Top menu, submenu “Import data”)



AD 12.1 Database of exposure-related and ancillary data for priority substances	Security: Public
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### Time activity

Source of data / Title of study\*

Activity\*

Environment

Weekday / Weekend

Units\*

Single value\*

Average value\*

Geometric mean\*

Standard Deviation\*

Min (1st percentile)\*

Median\*

Max(99 th percentile)\*

5th percentile\*

25th percentile\*

75th percentile\*

95th percentile\*

Participation rate(%)\*

Population age/range

Gender\*

Year/period of study

Geographical location (country)

Geographical location (city)

Name of the study

Total sample number

Comments

Link\*

Income

Urban or rural

Marital status

Employment status

Educational level

\*Mandatory field  
\*Mandatory at least one field

You are here: [Home](#) > [Import data](#) > [Time activity](#)

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Figure 20: HMB4EU WP12 web database - “Time activity” webpage (Top menu, submenu “Import data”)

AD 12.1 Database of exposure-related and ancillary data for priority substances	Security: Public
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### Dietary behaviour

source of data / Title of study\*

Food item name\*

Origin of product

Units\*

Single value\*

Average value\*

Geometric mean\*

Standard Deviation\*

Min (1th percentile)\*

Median\*

Max(99 th percentile)\*

5th percentile\*

25th percentile\*

75th percentile\*

95th percentile\*

Population age range\*

Gender\*

Year/period of study

Geographical location (country)

Geographical location (city)

Name of the study

Total sample number

Comments

Link\*

\*Mandatory field  
\*Mandatory at least one field

You are here: [Home](#) > [Import data](#) > Dietary behavior

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Figure 21: HBM4EU WP12 web database - “*Dietary behaviour*” webpage (Top menu, submenu “Import data”)

AD 12.1 Database of exposure-related and ancillary data for priority substances	Security: Public
WP 12 - From HBM to exposure	Version: 9.0
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### Consumer behaviour

Source of data / Title of data\*

Consumer product\*

Origin of product

Units\*

Single value (Frequency of use)\*

Average value\*

Geometric mean\*

Standard Deviation\*

Min (1th percentile)\*

Median\*

Max(99 th percentile)\*

5th percentile\*

25th percentile\*

75th percentile\*

95th percentile\*

Population age range\*

Gender\*

Year/period of study

Geographical location (country)

Geographical location (city)

Name of the study

Total sample number

Comments

\*Mandatory field  
\*Mandatory at least one field

You are here: [Home](#) > [Add data](#) > Consumer behavior

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Figure 22: HMB4EU WP12 web database - “Consumer behaviour” webpage (top menu, submenu “Import data”)





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### AirBase - The European air quality database

AirBase is the European air quality database maintained by the EEA through its European topic centre on Air pollution and Climate Change mitigation. It contains air quality monitoring data and information submitted by participating countries throughout Europe. The air quality database consists of a multi-annual time series of air quality measurement data and statistics for a number of air pollutants.

AirBase - The European air quality database

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Show  entries
 Search:

num	Source of data / Title of study	Environmental matrix
1	Dilisononyl 1,2-cyclohexanedicarboxylic acid (DINCH) and Di(2-ethylhexyl) terephthalate (DEHT) in indoor dust samples: Concentration and analytical problems	Dust
2	Dilisononyl 1,2-cyclohexanedicarboxylic acid (DINCH) and Di(2-ethylhexyl) terephthalate (DEHT) in indoor dust samples: Concentration and analytical problems	Dust
3	Dilisononyl 1,2-cyclohexanedicarboxylic acid (DINCH) and Di(2-ethylhexyl) terephthalate (DEHT) in indoor dust samples: Concentration and analytical problems	Dust
4	Dilisononyl 1,2-cyclohexanedicarboxylic acid (DINCH) and Di(2-ethylhexyl) terephthalate (DEHT) in indoor dust samples: Concentration and analytical problems	Dust
5	A comparative assessment of human exposure to tetrabromobisphenol A and	Dust

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Figure 23: HMB4EU WP12 web database - “View data” webpage (Top menu, submenu “Compound – Environmental matrix”)



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Show  entries

num	Source of data / Title of study	Consumer item/produ
1	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle
2	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle
3	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle
4	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle
5	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle
6	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle
7	EPHECT project - Survey on Indoor Use and Use Patterns of Consumer Products in EU MS	All purpose cle


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Figure 24 HMB4EU WP12 web database - “View data” webpage (Top menu, submenu “Consumer behaviour”)

AD 12.1 Database of exposure-related and ancillary data for priority substances	Security: Public
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Database Output  
 CSV Excel PDF Print Copy **Column visibility**

Show  entries

num	Source of data / Title of study	Consumer product
1	PAHs in toys and childcare products	Toothbrush
2	PAHs in toys and childcare products	Bathing shoes
3	PAHs in toys and childcare products	bicycle tyre
4	PAHs in toys and childcare products	Bicycle grip
5	PAHs in toys and childcare products	Eraser
6	PAHs in toys and childcare products	Plastic doll
7	PAHs in toys and childcare products	Toy car wheels
8	PAHs in toys and childcare products	Pen
9	PAHs in toys and childcare products	Toothbrush
10	PAHs in toys and childcare products	Plastic clogs

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Figure 25: HBM4EU WP12 web database - “View data” webpage (Top menu, submenu “Compound – Consumer products”)

AD 12.1 Database of exposure-related and ancillary data for priority substances	Security: Public
WP 12 - From HBM to exposure	Version: 9.0
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## 9.2 Annex 2 – Data type required in the database

Table 4: Short description of excel worksheets columns

Column name	Short description
<b>Number/id</b>	Id or number that user provide during the importing of the entities. Id/number starts from number 1 and increases by one for every new inscription
<b>Source of data (literature reference)</b>	Title of reference, report name etc.
<b>Environmental matrix</b>	This fields describes the environmental matrix that has been measured a specific pollutant (air, water, dust etc.)
<b>Location</b>	Description of the location where the environmental matrix has been measured (e.g. indoor, home, outdoor, etc. )
<b>Chemical</b>	Chemical name. It is recommended to use abbreviations (e.g. BPA, BDE128)
<b>Units</b>	Units of a quantity that related to the columns (e.g Average value, Geometric mean, Standard deviation, etc.)
<b>cas number</b>	cas-number of the observed chemical
<b>Link/DOI</b>	Website - doi - link
<b>User_name</b>	User name based on HBM4EU WP12 database
<b>Import_date</b>	Date where the entry was imported to the database. The time must be written in DD-MM-YYYY.
<b>Import_time</b>	Time where the entry was imported to the database. The time must be written in 24-hour notation (HH:MM)
<b>Chemical_category</b>	Chemical category the observed chemical
<b>Food item name</b>	Food item name or description
<b>Exposure related data</b>	Exposure related data is referred to information related to exposure such inhalation rates, object to mouth events, dust ingestion rate etc.
<b>Population age / range (years)</b>	Population age (e.g. 35), population range( 45-60), population age class (e.g. newborns, general population)
<b>Gender</b>	Male, female, both
<b>Activity</b>	Activity is the description of a daily human activity
<b>Duration units</b>	Duration units
<b>Exposure</b>	Calculated or measured exposure
<b>Media/device/sampler</b>	Media/Device/Sampler where used to measure exposure
<b>Single value</b>	A value of one sample
<b>Average value</b>	Average value
<b>Geometric mean</b>	Geometric mean value
<b>Standard Deviation</b>	Standard deviation value
<b>Min(1<sup>th</sup> percentile)</b>	Minimum value
<b>Median</b>	Median value

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<b>Max(99<sup>th</sup> percentile)</b>	Maximum value
<b>5<sup>th</sup> percentile</b>	5th percentile value
<b>25<sup>th</sup> percentile</b>	25th percentile value
<b>75<sup>th</sup> percentile</b>	75th percentile value
<b>95<sup>th</sup> percentile</b>	95th percentile value
<b>Participation Rate (%)</b>	Participation rate (%) of the observed population to an activity/behaviour
<b>Starting time of activity</b>	Starting time of an activity
<b>Percentage of population (%)</b>	Percentage of Population (%)
<b>Frequency of use (single value)</b>	The frequency that a population use a product or does an activity
<b>Frequency of use (average value)</b>	The frequency that a population use a product or does an activity
<b>Percentage of consuming days</b>	Percentage of consuming days
<b>Year/period of study</b>	Year or range of years that the measurement took place
<b>Geographical location (country)</b>	Country where the measurements were carried out
<b>Geographical location (city)</b>	City where the measurements were carried out
<b>Name of the study</b>	The study that the measured value carried out (e.g. DEMOCOPHES)
<b>Total sample number</b>	Number of samples
<b>Comments</b>	Additional comments for the study
<b>Origin of product</b>	Origin of a product (e.g. CHINA)
<b>Exposure related data description</b>	Additional description for the exposure related data
<b>Environment</b>	Environment describes additional information related to the location that an activity takes place (e.g. home, outdoor, indoor, kitchen, etc.)
<b>Weekday/weekend</b>	Weekday/Weekend
<b>Income</b>	Income level based on national average (e.g. middle 50%)
<b>Urban</b>	Residential area of the observed population (e.g. urban, rural, etc)
<b>Civstat</b>	Marital/civil status
<b>Empstat</b>	Employment status (e.g. school, maternity, retirement)
<b>Edcat</b>	Educational level (e.g. ISCED 5 or above-4 )
<b>Origin of food item</b>	Origin of food Item
<b>LOQ</b>	Limit of quantitation of the used instrument
<b>LOD</b>	Lower limit of detection of the used instrument