



Report on WP2Epi,

**Task T2.4: “Status report on
OH Knowledge Base – Epi”**

JIP1 - ORION - AI1 - 1st Call

Responsible Partner: FLI, BfR



GENERAL INFORMATION

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Task T-2Epi.2: Improving OH Knowledge Base – Epi

After discussions initiated in the prioritization workshop (M13), it was decided to work in small groups, to fine-tune the three inventory tables, within each health sector. Each sector needs to define the concepts lists (which will be drop-down lists of options in the inventory forms) for the respective fields and complete those according to existing EFSA and ECDC lists and guidelines. We also created a handbook file for each table with descriptions on what information is needed in the individual fields.

We collaborated with representatives of EFSA and ECDC on the details and sustainability questions of the inventories. A specific discussion meeting was carried out at EFSA on M19. We revised the knowledge base and the handbook for the tables.

The technical specifications and options to publish the inventories with the given platforms have been evaluated. Publishing in the EJP website proved more challenging than anticipated, and therefore an alternative solution are under development. We decided to create shiny web apps. First versions of the web apps are ready; the technical specifications are developed and have to be tested now before it can be published.

The basic idea of the knowledge base is to create inventories for





- Surveillance systems,
- Tools and methods, and
- Literature overview for these inventories

1) Inventory of surveillance systems

As reported previously, we decided to create separate lists for the three sectors (public health, animal health, and feed&food). We improved the inventories and developed dropdown lists in order to have consistent entries in the inventories. Furthermore, we developed a guidance document to help people to fill in the inventories. In July, we discussed the inventories as well as the guidance document with EFSA and ECDC.

Based on this discussion, we revised the dropdown list for the animal health and the feed & food inventory using the data catalogues from EFSA (ZOO_FACT_DISEASESTATUS_MAN, ZOO_FACT_FBO_MAN, ZOO_FACT_PREVALENCE_MAN, ZOO_FACT_AMR_ISOLATE_AST_MAN, ZOO_FACT_AMRESBL_MAN, ZOO_FACT_ANIMAL_POPULATION_MAN). Whenever possible, we used these catalogues and changed the category name. In some cases, when no EFSA catalogue was suitable we kept our categories.

The inventories are published at

Sector	Inventory	Guidance document
Animal health		
Public health		Under revision
Food & Feed		Under revision



Additionally, we developed the first version of a Shiny web app in order to make the data of the inventories available for public and to make it possible that new surveillance systems can be entered. Before these new entries are added to the database, we developed a flow chart, how to include these entries (figure 1).

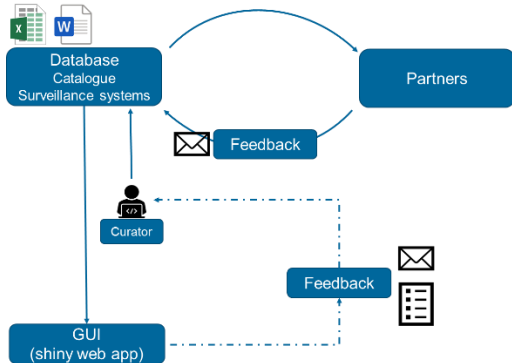


Figure 1: Flow chart for the inventories

For the shiny web application, a server at FLI will be set up and the link to the application will be published. A preliminary version can be tested at <https://joergethmann.shinyapps.io/OrionAHS/> (see figures 2-3)

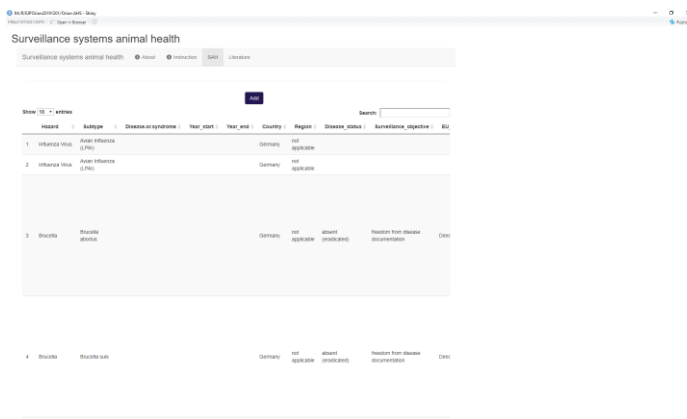


Figure 2: List surveillance systems



The screenshot shows a web application titled "Surveillance systems animal health" with a navigation menu including "About", "Instruction", "SAH", and "Literature". The "Literature" tab is active. Below the navigation is a search bar and a table of literature entries. The table has columns for ID, CATEGORY, AUTHOR, TITLE, JOURNAL, and HOWPUBLISHED. There are 5 entries listed.

ID	CATEGORY	AUTHOR	TITLE	JOURNAL	HOWPUBLISHED
1	TECHREPORT	Literwijk, M., Keur, I., Friesema, I., Roodhooft, H., Hobbelaar, M., van den Esker, H., Kortbeek, T., Maassen, K.	Staat van Zoonosen 2017 (State of Zoonotic Diseases 2017)		NA
2	MISC		Durchgeföhrt BSE-Tests bei Rindern seit 2001	Bundesministerium Für Ernährung und Landwirtschaft	https://www.bmel.de/DE/Tier/Tiergesundheit/Tierseuchen/_texte/BSE-TestsRinder.html
3	TECHREPORT	Homeier-Bachmann, T., Schell, S.	Tiergesundheitsjahresbericht 2017		NA
4	ARTICLE	Pringle, M.	Consumption of Antibiotics and Occurrence of Antimicrobial Resistance in (Sweden)		NA
5	ARTICLE		Surveillance and Monitoring of (Toxoplasma) in Humans, Food and Animals - (Scientific Opinion) of the (Panel) on (Biological Hazards)	Efsa Journal	NA

Figure 3: List literature

2) Inventory Methods & Tools

Regarding the tools and methods, we received seven answers with information on tools. The answers are very detailed; some responders reported the use of the following software: SAS, STATA, Excel and R. For the methods, responders referred to general methods, e.g. descriptive statistics, with several responders stressing that the used method is purpose driven. Hence, the challenge will be to create a list with all purposes in the field of surveillance systems (e.g. sample size calculation, early detection, descriptive statistics, prevalence estimation) and collect the tools according to the purpose.

We developed a data base of statistical tools and methods with particular importance in surveillance projects. These methods and tools are collected in a comma separated file (.csv) which could be read and edited with spreadsheet software tools like Excel or OpenOffice calc. To increase the usability we additionally developed a graphical user interface. For the development of this GUI we used the R package 'shiny'. By the use of 'shiny' the comma separated file is translated into a HTML file that can be used interactively in a common web browser . We have published the data base GUI in an open web repository it can be assessed under the following link:

<https://statmethods.shinyapps.io/toolsdatabase/>

Below a screenshot of the front page of the data base is given. On the left side there are links to introductory texts which provide an overview of the data base, explain the background and the structure of the database and provide use cases for a deeper understanding of the data base. With the GUI the data base is searchable, sortable and filterable. There are functionalities to search the complete data base and additionally there are functions to search, sort and filter according to single data base columns. The columns of the data base are: ID, Name, Short description, type, Main purpose, Software, Literature and Examples in R. The column Software, contains links to web sites providing the application or software sources for the respective method. The columns Literature and Examples in R are linking to further literature and to worked out examples for many data base entries that we developed in R. The R script could be downloaded and applied by the user.



Data base

This database collects statistical methods and software tools used in surveillance.

[Overview](#)

[How to use](#)

Show entries Search:

ID	Name	Short description	type	Main purpose	Software	Literature	Examples in R
1	RISKSUR	RISKSUR tools for surveillance design and evaluation	Website	Framework development validation evaluation decision support	RSISKSUR (Web App)	Calba (2015)	
2	survtools	Method collection accompanying RISKSUR	Website	Methods for development validation evaluation decision support	survtools (Web App)	Alban (2018)	
3	surveillance	Temporal and Spatio-Temporal Modeling and Monitoring of Epidemic Phenomena	R package	modeling and monitoring of time series of counts, proportions and categorical data. The monitoring methods focus on aberration detection.	surveillance (R-Paket)	Meyer (2017)	Bsp
4	epitools	Tools for training and practicing epidemiologists including methods for two-way and multi-way contingency tables.	R package		epitools (R-Paket)		
5	BayesPEM (individuell)	Bayesian Prevalence Estimation under Misclassification: Prävalenzschätzung mit Korrektur für Über- und Unterschätzung bedingt durch diagnostische Sensitivität und Spezifität	Software tool	Estimation of true prevalence based on apparent prevalence.	BayesPEM (Web App) , riskBayes2 (R-Paket)	Cowling (1999) , Rogan (1978)	see Web App

ID	Name	Short description	type	Main purpose	Software	Literature	Examples in R
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Previous	1	2	3	4	5	...	8	Next
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GUI of the data base of statistical tools and methods for surveillance projects (screenshot)

3) Inventory of Data sources

The preliminary screening showed that there are many reports available but it is hard to list it in a unique way because there are different publication types, e.g. scientific publications, reports, data on websites, databases. Hence, we decided to use a common system, which can list all different data sources and be used to collect relevant information for the repository. It was finally decided to use the Zotero reference management tool (*Zotero*, <https://www.zotero.org>) to collect available information. We created groups in Zotero for Data sources Surveillance systems and Data sources for Methods & tools and gave access to all partners.

To make the data sources available to all partners, we transferred the data of the zotero groups into Shiny web apps (see figure 3).



zotero

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Library

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Tags

animal Campylobacter Dengue virus detection me... Dega Domestic ani...
food food-borne a... human Listeria monitoring Mosquitoes parasites
Pets and com... Reverse tran... Rubber Salmonella surveillance Toxoplasma
toxoplasmos... Urban areas Zoonoses zoonoses

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Title	Creator	Publisher	Language	Date Modified
BVL - Zoonosen-Monitoring				7/11/2018 1:26 PM
CNR Toxoplasmosis - Toxoplasmosis Monitoring			en-US	10/23/2018 6:17 PM
Consumption of antibiotics and occurrence of antimicrobial r...	Phingle			2/19/2019 9:26 AM
Data dictionaries—guidelines for reporting 2017 data on zoon...			en	7/11/2018 1:26 PM
Diagnostic biologique de la toxoplasmosse acquise du sujet im...	Giraud		fr	10/23/2018 6:21 PM
Diagnostic biologique de la toxoplasmosse chez les patients i...	Giraud		fr	10/23/2018 6:20 PM
Disease surveillance in England and Wales, March 2018	Limited		en	10/23/2018 6:08 PM
Durchgeführte BSE-Tests bei Rindern seit 2001			de	4/16/2019 10:27 AM
Ereger von Zoonosen in Deutschland im Jahr 2011	for Risikobewertung et al.			7/11/2018 1:26 PM
Ereger von Zoonosen in Deutschland im Jahr 2015	Hartung et al.		de	12/1/2019 5:34 PM
Ereger von Zoonosen in Deutschland im Jahr 2016	Hartung et al.		de	12/1/2019 5:35 PM
First evidence of dengue infection in domestic dogs living i...	Thongyuan and Kittayapong		en	7/11/2018 1:26 PM
Guidelines for reporting 2017 prevalence sample-based data i...	Bocca et al.		en	7/11/2018 1:26 PM
Infektionsepidemiologisches Jahrbuch meldepflichtiger Krankh...	Koch-Institut		de	12/1/2019 5:21 PM
Infektionsepidemiologisches Jahrbuch meldepflichtiger Krankh...	Koch-Institut		de	12/1/2019 5:20 PM
Manual for reporting on zoonoses and zoonotic agents, within...	Bowlaert et al.		en	7/11/2018 1:26 PM
Monitoring and analysis of food-borne diseases			en	7/11/2018 2:39 PM
Prevalence, incidence estimations and risk factors of Toxopl...	Wilking et al.		en	12/1/2019 5:25 PM
Staat van Zoonosen 2016	M et al.		nl	10/23/2018 6:11 PM
Staat van Zoonosen 2017 (State of Zoonotic Diseases 2017)	Ulferswijk et al.		NL	12/1/2019 5:21 PM
Surveillance and monitoring of Toxoplasma in humans, food an...			en	10/23/2018 6:23 PM
Surveillance of infectious diseases in animals and humans in...	Lindberg et al.		en	10/23/2018 5:55 PM
Surveillance of infectious diseases in animals and humans in...	Lindberg et al.		en	10/23/2018 5:56 PM
SurvStat@PKI 2.0				12/1/2019 5:20 PM

Figure 4: List of data sources in zotero



Task T-2Epi.3: Epi - OH pilot studies

WP2-T3-ST1: One Health Pilot 1: Toxoplasma gondii (carried out by FLI and BfR, Germany) (M7-M30)

In this pilot study, the first step will be an analysis of currently available data on *T. gondii* surveillance from reports of the different sectors. This will be followed by a literature review on seroprevalence data and risk factors for the infection with *T. gondii* in the relevant livestock species. The study on the risk factors was published in January 2019 (Stelzer et al. 2019).

Additionally, an analysis of the data on *T. gondii*-seroprevalence in participants of the study on the "Status of Health in Pomerania" (SHiP) and comparison with the national cohort (Wilking et al, 2014) will be conducted, as well as a literature analysis on seroprevalence and source attribution of *T. gondii* in humans.

At BfR, a study on surveillance systems on *T. gondii* in feed and food will be carried out.

With this pilot study, we will be able to test the inventory and show its practical applications. Additionally, we will be able to make a gap analysis and show opportunities and challenges for stakeholders.

We will also be able to test the ORION Glossary of WP1, as well as to provide data from different sectors to involve in the analysis of data interoperability in WP3.

More details on pilot study can be found at <https://data.d4science.net/G2vy>

JIP1-WP2-T3-ST2: One Health Pilot 2: Salmonella (M7-M30)

The plan for the pilot study has been developed and agreed. A document detailing experiences regarding whole genome sequence data sharing processes and lessons learnt from experiences during 2019 is in development which will be used to develop recommendations for the final project outputs. A data sharing protocol and draft Memorandum of Understanding is in development

More details on pilot study can be found at

JIP1-WP2-T3-ST3 One Health Pilot 3: Hepatitis E (carried out by WBVR and RIVM, the Netherlands) (M7-M30)

Currently, the pilot study is in the phase of planning with objectives and expected outcomes being defined. Data about hepatitis E gathered in PH and AH are hardly combined at the moment. One of the goals is to set up a collaboration between several parties/institutions. Aims to be considered are the needs for a good (hepatitis E) surveillance and collaboration, and perform epidemiological and NGS data analyses in a concerted action.

More details on pilot study can be found at <https://data.d4science.net/GKmn>

JIP1-WP2-T3-ST4 One Health Pilot 3: AMR (carried out by Sciensano, Belgium) (M7-M30)

The plan for the pilot study was developed. The plan includes the objectives, the expected outcome as well as information on collaboration and reporting of the results.

More details on pilot study can be found at <https://data.d4science.net/Eqdk>

JIP1-WP2-T3-ST5 One Health Pilot 5: Application of Rasch model on data collected in questionnaires (see above JIP1-WP2-T2-ST1 - Data collection and integration)

Based on the questionnaires describing the properties of surveillance projects a set of



quality scores are planned to be calculated by the use of a Rasch model . By this application of a method developed and validated in **JIP1-WP2-T2-ST2** – (Data analysis and validation) on data collected in **JIP1-WP2-T2-ST1** – (Data collection and integration) we optimize the information gain and further examine the practical applicability of the method collection. The Rasch model is a special case of the item resonance theory, or more generally speaking the Rasch model is a special case of the generalized linear model. It is commonly used in psychology to assess unobservable personality traits, such as intelligence or mathematical skills. Based on questionnaires or tests carried out by test persons, the Rasch model can then be used to draw conclusions about the unobservable personality traits. In the case of the application of the Rasch model on surveillance projects there are some assumptions: 1. The overall quality of a surveillance project is not observable. 2. There are observable traits of surveillance projects and information on these can be collected in a questionnaire In the application to surveillance projects this means that we send questionnaires to project partners and people engage in surveillance projects. These questions address the focus of the institute where the surveillance projects are conducted, e.g. is the focus on food and feed or on public health or animal health or on the environment. Other questions are aiming at the type of the institute e.g is the institute an academic institute or a governmental organisation or is it of another type. Other questions are following the Idea of data harmonization. For example there are questions about the reporting of results, are the reports available, are the reports freely available? Some questions are about the standardisation of the planning of the projects and the interpretation of results: are there standard operation procedures on how the surveillance projects were planned and how the results were interpreted? Is there a regular evaluation of the methods used? All these questions have to be answered with yes or no. With the Rasch model we calculate scores to evaluate the surveillance projects in terms of different categories. For example the questions on the data harmonization are assembled to obtain a 'data harmonization score' for each surveillance project. With the results we provide a base for a ranking of surveillance systems and for the discussion of the properties of recent surveillance projects under the framework of one-health. We have coded the model as a Bayesian Version of the Rasch model. We have use R and for the bayesian estimation the programming language JAGS for the implementation of the model. The core of the Model is the Likelihood function that is described with these two equations: $Y \sim \text{dbern}(P(\text{yes}))$ and $P(\text{yes}) = \text{ilogit}(\text{QuestionDiscr} * (\text{SPQuality} - \text{QuestionDifficulty}))$ We are using weakly informative normal priors on the relevant variables which are the quality score of the surveillance project, the question discrimination and the question difficulty. The results are posterior distributions that contain more information because they are now informed by the questionnaire data. The results are distributions of the scores from which the mode (that is the most probable value) and the HighestDensityInterval as a measure of uncertainty are be calculated.

Project status: Model is coded and validated using in silico data und examples form literature. Results will be calculated immediately after feedback of questionnaires.