One Health Surveillance Codex Document

Release 1.0

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Dec 12, 2022

Contents

The OHS Codex/Knowledge Integration Platform (OHS Codex/KIP) aims at establishing a high-level framework that supports mutual understanding and information exchange between One Health Surveillance (OHS) sectors, which are requisite for integrated OHS data analyses. To bring this framework into "action", the OHS Codex/KIP postulates a set of five high-level principles as well as a number of resources (e.g. tools, technical solutions, guidance documents) and example implementations supporting the adoption of each OHS Codex/KIP principles. For each resource a short description is provided together with a link where more detailed information on the resource. Furthermore, under each principle OHS Codex/KIP users can find examples and "lessons learned" from pilot studies with practical experiences from different One Health efforts. The OHS Codex/KIP is designed as an open framework that is continuously updated to adapt to the needs of the One Health community.

The design of the OHS Codex/KIP follows the ambitions of the "Tripartite Guide to Addressing Zoonotic Diseases in Countries" (specifically chapters 3, 4 and 5), which highlight the importance of multi-sectorial One Health surveillance information sharing. With the OHS Codex/KIP document the One Health EJP H2020 ORION and MATRIX projects provide specific resources / solutions that support the practical implementation of actions proposed by the "Tripartite Zoonoses Guide" for a multi-sectoral One Health approach.

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CHAPTER 1

Introduction / Background

Zoonoses and antimicrobial resistance (AMR) continue to be significant impediments to human and animal health and to socioeconomic development worldwide[1],[2],[3]. National and international surveillance systems and monitoring programmes for zoonoses, zoonotic agents and AMR are means to combat these impediments. It is generally recognized that human and animal health are interconnected and that the transmission of zoonoses and AMR can essentially take place through various links of the human-animal interface e.g. the environment or food[4],[5]. This implies that surveillance cannot be addressed by the human or animal sector alone, but instead have to be a multisectoral and multidisciplinary collaboration[6]. This approach to collaboration is referred to as One Health. The benefits and importance of One Health Surveillance (OHS) are widely accepted, however, there are still gaps in surveillance or surveillance data that hinder a truly integrated OHS approach.

Within the EU, EFSA and ECDC have made substantial efforts to harmonize data collection and reporting within their sectors. These achievements are important assets for future OHS harmonization efforts, for example the Data Collection Framework (DCF[7]) and the SIGMA project (SIGMA[8]) from EFSA, as well as the European Surveillance System (TESSy[9]) from ECDC. Other ongoing joint efforts of these stakeholders support OHS data harmonization as well, for example the joint molecular typing database[10]. Another collaborative effort is the compilation of the yearly European Summary Reports (EUSRs) on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks and on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food (URL: https://www.efsa.europa.eu/en/publications). However, the current practice of provisioning OHS data in reports could be improved, specifically when it comes to national or research data not covered by European legislation. Moreover, no generic strategy for surveillance data reporting is currently available that could be adopted by all OHS related scientific disciplines including e.g. environmental science.

[1] "Zoonotic Diseases: Progress Has Stalled." European Food Safety Authority, 12 Dec. 2018, www.efsa.europa.eu/en/press/news/181212.

[2] "Zoonoses." World Health Organization, World Health Organization, 19 July 2017, www.who.int/topics/zoonoses/en/.

[3] "Antimicrobial Resistance." World Health Organization, World Health Organization, www.who.int/en/news-room/fact-sheets/detail/antimicrobial-resistance.

[4] A European One Health Action Plan against Antimicrobial Resistance

[5] Taking a Multisectoral, One Health Approach:A Tripartite Guide to Addressing Zoonotic Diseases in Countries

[6] Taking a Multisectoral, One Health Approach:A Tripartite Guide to Addressing Zoonotic Diseases in Countries

[7] https://www.efsa.europa.eu/en/supporting/pub/en-444

[8] https://www.efsa.europa.eu/en/supporting/pub/en-1428

[9] https://ecdc.europa.eu/en/publications-data/european-surveillance-system-tessy

[10] EFSA (European Food Safety Authority), 2014. Technical specifications for the pilot on the collection of data on molecular testing of food-borne pathogens from food, feed and animal samples. EFSA supporting publications 2014;11(12):EN-712, 58 pp. doi: 10.2903/sp.efsa.2014.EN-712

1.1 The One Health European Joint Programme (OHEJP)

In 2018, the One Health European Joint Programme (OHEJP) was established with the ambition to support the practical implementation of the One Health framework in Europe. The main focus of the new OHEJP is to reinforce collaboration between institutes by enhancing transdisciplinary cooperation and integration of activities by means of dedicated Joint Research Projects, Joint Integrative Project and through education and training in the fields of Foodborne Zoonoses (FBZ), Antimicrobial Resistance (AMR) and Emerging Threats (ET).

The One Health EJP Joint Integrative Project (JIP) "One health suRveillance Initiative on harmOnization of data collection and interpretatioN" (ORION) aims at establishing and strengthening inter-institutional collaboration and transdisciplinary knowledge transfer in the area of One Health Surveillance (OHS) data integration and interpretation. Detailed requirement analyses were performed within ORION to identify current best practices, resources and needs within the OHS community[11]. Results from the requirement analyses confirmed that cross-sectoral and multidisciplinary communication, collaboration and knowledge exchange are still significant challenges for the European OHS community. In addition, the results reinforced the need for better harmonization of reports on OHS data, which could ultimately lead to improved mutual understanding and use of sector-specific data in future One Health analysis.

Another One Health EJP H2020 JIP currently in progress is called "MATRIX: Connecting dimensions in One-Health surveillance", which aims to strengthen OHS practices and synergies across the entire surveillance pipeline between the public health (PH), animal health (AH) and food safety (FS) sectors within each country (expected end in December 2022). MATRIX builds upon the foundation laid out by ORION and other One Health EJP H2020 projects, while focusing on cross-sectoral hazards (i.e. Salmonella, Campylobacter, Listeria, and emerging threats, including antimicrobial resistance).

This OHS Codex/KIP therefore aims at establishing a high-level framework that supports collaboration, mutual understanding, knowledge exchange, data interoperability and coordination between OH sectors that will support integrated OHS data analyses, data interpretation and OH decission making. A manuscript describing the practical application scenarios of the OHS Codex/KIP has been also published[12].

1.2 Purpose

The purpose of this OHS Codex/KIP is to provide users with guidance and resources, e.g. tools, technical solutions, guidance documents, that support the design and planning of OH surveillance and monitoring activities as well as OH-driven data analysis and interpretation by the different OHS sectors. With that, the OHS Codex/KIP supports the ambitions outlined in chapter 3, 4, and 5 of the FAO, OIE and WHO document 'Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries"[13] (Tripartite Zoonoses Guide) by proposing specific resources that support putting a true One Health approach (as described in the Tripartite Zoonoses Guide) into practice in Europe.

1.3 Target community, main stakeholders and organizations

The primary target group for the OHS Codex/KIP are the official organisations and authorities involved in One Health. Other stakeholders, delivering data or in other ways are involved in One Health topics will have interest in knowing the system, the tools available and the lessons learned. According to the understanding of the authors elements of the OHS Codex/KIP will be useful for organizations or researchers that are involved in

[11] ORION. (2020, April 16). Deliverable-JIP1-D2.3 Report on requirement analysis for an "OH Knowledge Base – Integration" (ORION). Zenodo. http://doi.org/10.5281/zenodo.3754596

[12] Filter M., Buschhardt T., Dórea F., Lopez de Abechuco E., Günther T., Sundermann E. M., Gethmann J., Dups-Bergmann J., Lagesen K & Ellis-Iversen J. One Health Surveillance Codex: promoting the adoption of One Health solutions within and across European countries, One Health, Volume 12, 2021. https://doi.org/10.1016/j.onehlt.2021.100233. http://doi.org/10.5281/zenodo.3754596

[13] Taking a Multisectoral, One Health Approach:A Tripartite Guide to Addressing Zoonotic Diseases in Countries

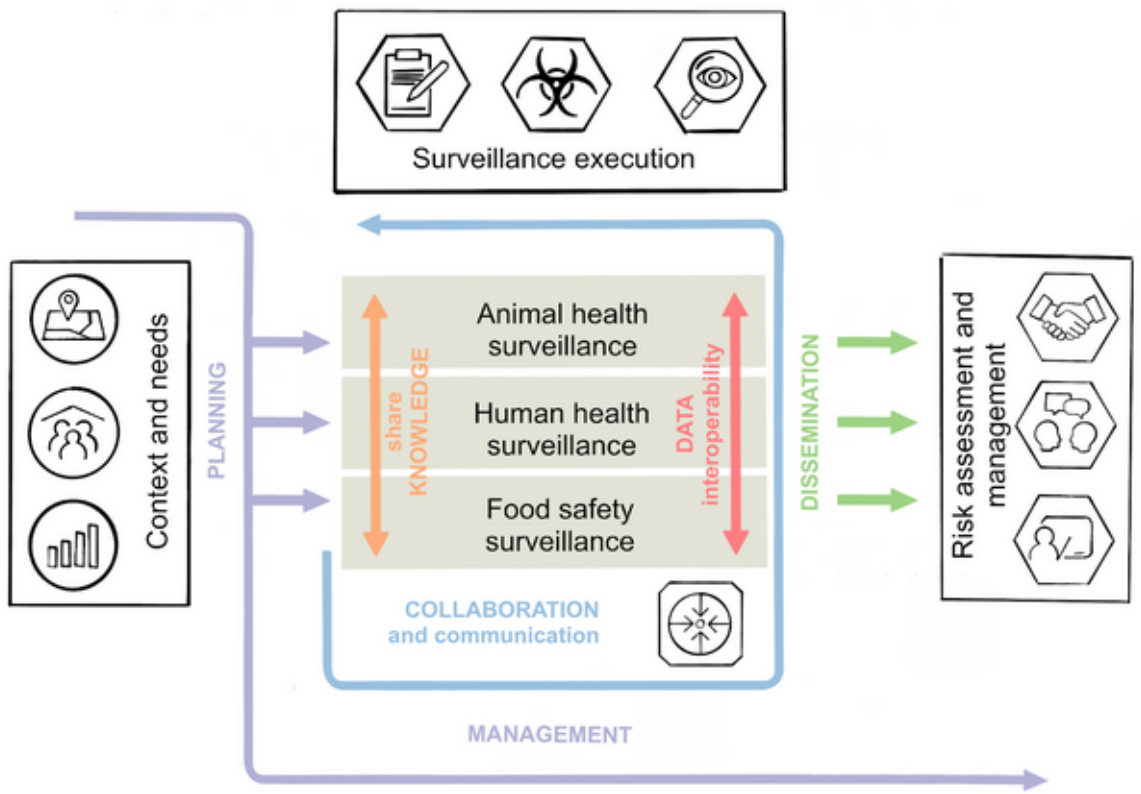


Fig. 1: Fig. 1: Connection between the Tripartite Zoonoses Guide (FAO, OIE and WHO) and the five principles of the OHS Codex/KIP. The OHS Codex/KIP principles and their dimensions are indicated by coloured arrows. The icons correspond to the guiding icons from the Tripartite Zoonoses Guide.

- One Health surveillance implementation
- One Health surveillance data reporting
- One Health data harmonization and standardization
- Cross-sector risk management

Specifically, this includes

- the One HEalth EJP H2020 project consortium and their follow up organization
- national authorities in Europe involved in OHS
- European authorities and institutes, as e.g. EFSA, ECDC, EEA
- other stakeholders in OHS, as e.g. research organizations

1.4 Scope

The scope of the OHS Codex/KIP is to provide a framework to embrace different tools and methods that can enhance OHS data generation, analyses and interpretation. Currently, it is structured according to five core principles that were jointly defined by the OHS Codex/KIP curation board as critical for achieving this objective. The OHS Codex/KIP framework has the potential to be expanded by more principles in the future in case the scope / objective is broadened. In this case the OHS Codex/KIP could become a comprehensive hub of tools for OHS improvement.

1.5 Principles

The OHS Codex/KIP framework is structured by five main principles. The OHS Codex/KIP describes each principle and within each of them it provides available solutions & methods to enhance OHS within each principle. These methods and tools were developed and tested within one of the EJP projects. However, the OHS Codex/KIP is designed as an updatable online resource that can be continuously expanded when new useful methods & solutions become available.

1.6 Download

The OHS Codex/KIP document is also available to download as:

PDF: https://oh-surveillance-codex.readthedocs.io/_/downloads/en/latest/pdf/

HTML: https://oh-surveillance-codex.readthedocs.io/_/downloads/en/latest/htmlzip/

EPUB: https://oh-surveillance-codex.readthedocs.io/_/downloads/en/latest/epub/

References

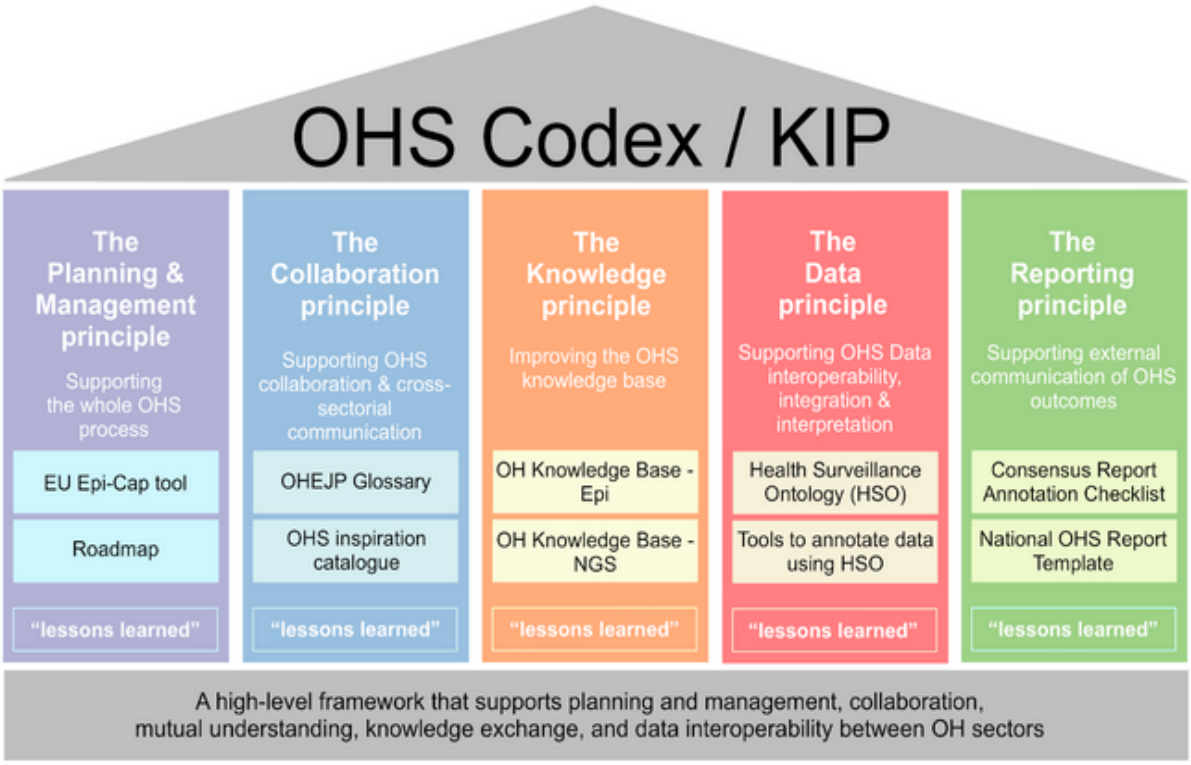


Fig. 2: Fig. 2: The overview of the OHS Codex/KIP framework structured into five principles. The white boxes under each principle show examples of some of the solutions, tools and resources included into the OHS Codex/KIP. The "lessons learned" boxes describe practical One Health activities carried out, e.g.during the OH European Joint Programme (OHEJP) projects.

CHAPTER 2

1. The Planning and Management principle: Supporting the whole One Health Surveillance process

2.1 Purpose

The Planning and Management principle defines that an One Health oriented surveillance organization and management can lead to a more effective One Health coordination, emergency preparedness, data generation and decision making. The resources provided under this principle are meant to support and strengthen the planning and management tasks along the whole surveillance process. This includes the design, development, establishment, implementation, monitoring, evaluation and optimization of surveillance systems with a cross-sector One Health approach.

2.2 Scope

The methods proposed under this principle were designed to support the activities related to the planning, design, coordination and management of surveillance activities. These methods aim to be applicable to all One Health sectors and adaptable to the OH capacities and capabilities under each country considering their resource settings.

2.3 Methods

2.3.1 FoodChain-Lab tracing software (FCL)

The free and open source software FoodChain-Lab (FCL) allows for fast and reliable tracing of suspicious food items along complex global supply chains during foodborne incidents. It unifies supply chain tracing data collection, cleaning, visualisation, analysis and reporting in one modular framework. FCL is available as desktop version (FCL Desktop) and as web application (FCL Web).

In both tools, tracing data remains completely on the user side without any storage on servers to ensure data protection. FCL is already in use by several EU Member States, EFSA and U.S. FDA. In 2020, it became part of the SISOT tool box of OIE, WHO and FAO.

FCL Desktop and FCL Web are joint outputs of several projects (e.g. SiLeBAT, EFSA-BfR Framework Partnership Agreements, One Health EJP COHESIVE) and will contribute to future projects on traceability together with EFSA e.g. by integrating FCL Web into a European framework of tracing tools and by developing a universal tracing data exchange format.

For more information on FCL, please check https://foodrisklabs.bfr.bund.de/foodchain-lab/. FCL Desktop can be installed via https://foodrisklabs.bfr.bund.de/installation/. FCL Web is available at https://fcl-portal.bfr.berlin. The software code is published at https://github.com/SiLeBAT/BfROpenLab (FCL Desktop), https://github.com/SiLeBAT/fcl-client and https://github.com/SiLeBAT/fcl-server (both FCL Web).

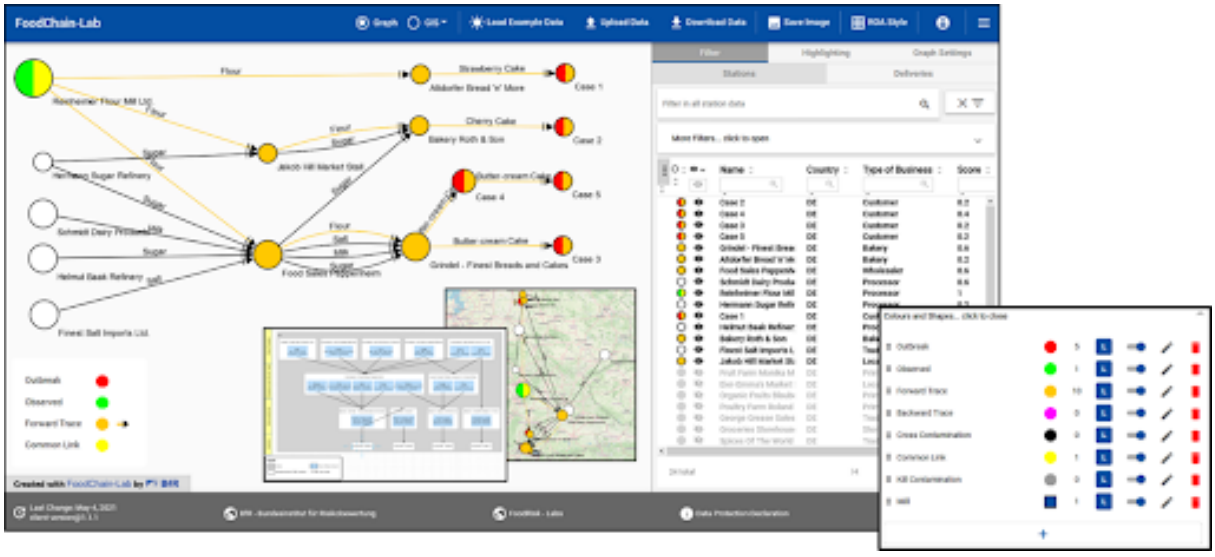


Fig. 1: Fig. 3: FCL Web visualising the supply chain network of a fictitious foodborne disease outbreak in the **network view**, the **map view**, the **reporting view** and in the **data table**.

2.3.2 Surveillance Evaluation Framework (SurF)

Surveillance Evaluation Framework (SurF) is a free available online guideline. It was initially developed by P. Muellner, K.D.C. Stärk, and J. Watts[13] to provide a fit-for-purpose and efficient surveillance evaluation framework for the Ministry for Primary Industries (MPI) in New Zealand to assess surveillance activities, programmes, systems or portfolios in a structured and adaptable way.

SurF builds upon and adapts previous work conducted nationally and internationally in the context of the evaluation of human and animal health surveillance. This includes in particular the SERVAL Framework[14], the recently published guidelines by the European Centre for Disease Control (ECDC, 2014), as well as the available information describing the preliminary version of the EVA tool (RiskSur Consortium 2013 & 2015), which at the time of writing is still under development. An effort was made to align this framework with the national standards proposed by the Aotearoa New Zealand Evaluation Association (ANZEA, 2015) where possible.

SurF provides a common umbrella for surveillance evaluation in the animal, plant, environment and marine sectors. It consists of four components, each supporting a distinct phase in the evaluation. Each component describes the activities and decisions related to a phase within an evaluation project: (i) Motivation for the evaluation, (ii) Scope of the evaluation, (iii) Evaluation design and implementation, and (iv)

[13] Muellner, P, Watts, J, Bingham, P, et al. SurF: an innovative framework in biosecurity and animal health surveillance evaluation. Transbound Emerg Dis. 2018; 65: 1545– 1552. https://doi.org/10.1111/tbed.12898

[14] Drewe, J.A., Hoinville, L.J., Cook, A.J.C., Floyd, T., Gunn, G. and Stärk, K.D.C. (2015), SERVAL: A New Framework for the Evaluation of Animal Health Surveillance. Transbound Emerg Dis, 62: 33-45. https://doi.org/10.1111/tbed.12063

Reporting and communication of evaluation outputs. The tool provides users with an Evaluation Template to guide capturing input. Further, SurF provides a visual output that allows for comparison of core performance between systems and within individual systems over time.

Link: https://www.mpi.govt.nz/dmsdocument/18091-Surveillance-Evaluation-Framework-SurF-Main-Document

References

2.3.3 OH-EpiCap tool

This is an interactive, stand-alone tool to evaluate the capacities and capabilities for the One Health Surveillance of a specific sector and/or pathogen of choice. Additionally, the tool allows the benchmarking of surveillance capacities and capabilities for comparison i) with other countries for the same hazard; ii) between specific hazards within one country. The tool addresses the need for evaluating strengths and weaknesses of multi-sectoral surveillance systems and identifying opportunities for further integration. The tool evaluates 3 dimensions: Organization of One Health (formalization, coverage / transdisciplinary, resources, evaluation and resilience) One Health in operational activities (data collection / methods sharing; data sharing; data analysis and interpretation; communication) Impact of One Health (technical outputs, collaborative added values, immediate and intermediate outcomes, ultimate outcomes)

More information about the OH-EpiCap tool is available here.

OH-EpiCap online application for evaluating the OH capacities of surveillance systems: https://freddietafreeth.shinyapps.io/OH-EpiCap/

The Report on the implementation of the OH-EpiCap evaluation tool on several study cases is available here: https://zenodo.org/record/7375651#.Y5Bw1HbMKUk

2.3.4 Roadmap to develop national One Health Surveillance

This is a guideline that countries can use to develop One Health Surveillance according to their needs and resources. Countries can use it both to build a new One Health Surveillance system or to advance an existing one. The roadmap expands the work of the OHEJP COHESIVE project.

More information about the OHEJP COHESIVE project and roadmap is available here. The roadmap provides step by step instructions on how to work through its different parts. The roadmap also addresses barriers and facilitators between One Health Surveillance sectors, based on the findings of a requirement analysis that is available here.

The website with the roadmap (guidelines) for countries to improve One Health Surveillance is available here: https://www.ohras.eu

The requirement analysis for the Roadmap including a systematic literature review of both peer-reviewed and grey literature is available here: https://zenodo.org/record/6504418#.YmuyAdpByUk

2.3.5 Best practices to operationalize cross-sectorial collaborations

This solution provides practices to operationalize cross-sectorial collaborations with a focus on data collection, data sharing, data analysis, and the dissemination of surveillance results. It is a guideline to the practical implementation of collaboration between the animal health, public health and food safety sectors according to different surveillance purposes: surveillance purposes: i) measuring the levels and temporal trends of exposure and burden of disease; ii) supporting early detection and response to outbreaks; iii)

identifying risk factors to implement control measures. This work builds upon a report about the mapping of surveillance chains and cross-sectorial linkages for different hazards.

The report is available here

The best-practice guidelines are available here: https://zenodo.org/record/7053387#.Y5N6A-zMLOR

2.3.6 A guide to design, implement, and evaluate official controls within the food sector using outputbased standards

This is a non-prescriptive guideline for countries, a loose framework to work around the aspects of output-based standards for surveillance in the food sector. The guideline maps out the process, considerations, evaluation strategies etc. depending on what the aims of surveillance are. It can be used i) to assess the current sensitivity of surveillance; ii) to reduce sampling numbers; iii) to implement risk based surveillance; iv) to identify a method to analyse a current surveillance system to ensure it is fit for purpose.

Link to the guideline: https://zenodo.org/record/7390006#.Y5bkJXbMKUk

2.3.7 Mapping of food chain surveillance across countries

This exploratory study was to identify barriers and opportunities for an integrated One Health surveillance of food-borne diseases in selected EU countries. The results from these studies can be used to support revision of existing systems, or development of new systems for food-borne disease surveillance from a One Health (OH) perspective. This study was part of One Health EJP NOVA. The study is available on Zenodo: https://zenodo.org/record/5497346#.Y5NcwuzMLOR

CHAPTER 3

2. The Collaboration principle: Supporting One Health Surveillance collaboration & cross-sectoral communication

3.1 Purpose

The collaboration principle defines that collaboration and mutual understanding are the foundations for all cross-sector One Health activities. The tools and practices collected under this principle enable inter-sector communication and help to overcome barriers to collaboration e.g. resistance to changes to intra-sector traditions. For example, a cross-sector OHS glossary supports communication by supporting efforts to find a shared language and unambiguous terminology across sectors to avoid misunderstandings. The OHS idea catalogue describing successful cross-sector surveillance initiatives in different countries will support the belief in self-efficacy by demonstrating that when there is a will, there is way. The experience-sharing will encourage discussions and may lead to new solutions for collaborative approaches supporting OHS.

3.2 Scope

The resources provided within this principle are meant to be generically applicable for surveillance purposes in all One Health sectors, including those sectors that were not directly involved in the development process e.g. the environmental sector. In addition they are meant to be applicable to all European countries, geographic areas and administrative levels.

3.3 Methods

3.3.1 OHEJP Glossary

The OHEJP Glossary is a freely available online resource that comprises an extensive list of One Health surveillance related terms and definitions. The interface of the glossary allows users to search and filter for entries in the glossary. It further provides a reference to the source of each definition and an Unique Resource Identifier (URI) for specific referencing of each glossary entry. The purpose of the OHEJP

Glossary is primarily to highlight differences and similarities in the interpretation of terms used by different One Health sectors, disciplines and stakeholders. It does not aim to create harmonized definitions of OHS-related terms. The OHEJP Glossary is developed and maintained as a collaborative effort of three One Health EJP H2020 projects, namely ORION, NOVA and COHESIVE, with support from One Health experts of One Health EJP H2020 stakeholders. Link: https://foodrisklabs.bfr.bund.de/ohejp-glossary/

Additionally, OHS-related terms and definitions from the OHEJP Glossary can be easily retrieved in an automatic way thanks to the **Glossaryfication** web service. This online infrastructure can be particularly useful during the creation of One Health reports for which OH glossaries are needed. The Glossaryfication web service, based on text processing technologies, allows automatic search within any user-provided text documents for terms that are contained in the OHEJP Glossary. The main output is a downloadable list of matching glossary terms as well as their corresponding definitions, sectoral assignments, frequencies and references, which can be added to the user's document as an One Health glossary.

3.3.2 One Health Surveillance Initiatives - ideas and inspiration (OHS Inspiration catalogue)

Changes and new initiatives are often hampered by the lack of vision to imagine that new ways can work or the inability to conceptualise a new approach. The OHS Initiative Catalogue is a resource that provides ideas and inspiration by describing OHS success stories. It shows different ways of overcoming barriers such as data-sharing, communication and strategic changes in OHS in many steps of the surveillance pathway. The Inspiration catalogue provides 15 examples of successfully implemented and functioning One Health Surveillance initiatives from all over the Europe Union and aims to inspire new approaches in OHS in other European Member States (MS).

Link: https://www.food.dtu.dk/english/-/media/Institutter/Foedevareinstituttet/Publikationer/Pub-2019/Rapport-One-Health-Integration-in-Surveillance.ashx?la=da

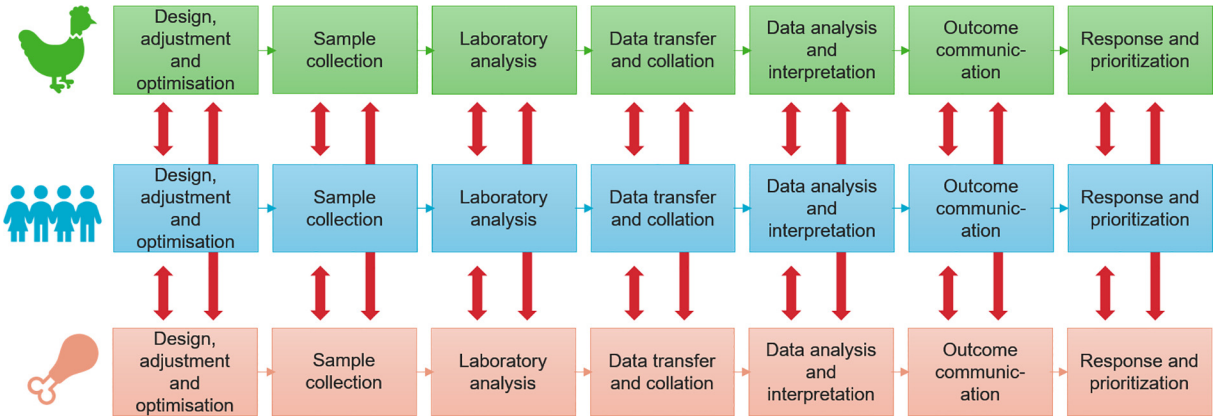
3.3.3 One Health Surveillance Pathway Visualization

Surveillance is a complex process with various activities and fluent "borders". Gaining a high level view on surveillance activities is sometimes challenging, as many actors focus on their own small part in the surveillance pathway and subsequently anchor discussions on these specific parts. This is even more complicated if it comes to inter-sectoral or One Health surveillance. To facilitate efficient communication and discussions on surveillance and to ensure mutual understanding of the extent of systems and programmes, supportive tools or illustrations are needed. To be able to compare e.g. surveillance systems in different sectors, they need to be described in a similar way. The Surveillance Pathway Visualization is a new resource, illustrating the pathway and the flow of data, findings and actors along many One Health surveillance programs. The One Health Surveillance Pathway Visualization is not comprehensive and all steps do not apply to all types of surveillance in all sectors. However, it has been aligned with other ways of describing surveillance activities and does provide a proper tool to facilitate cross-sector communication.

Figure 4. The "One Health Surveillance Pathway Visualization" illustrates the different process steps carried out in animal health, public health and food safety surveillance. The red arrows indicate where surveillance activities could be connected between two or all three sectors to support the One Health concept.

3.3.4 Interactive guide to developing multi-sectoral surveillance systems

This interactive tool is a guide to facilitate the development of multi-sectoral (One Health) surveillance frameworks from existing animal health, public health and food safety surveillance systems. The guide provides a step-wise approach to developing such multi-sectoral surveillance frameworks, drawing upon



both theoretical learnings and practical expertise/experiences. The guide outlines 7 steps towards integrating sectoral surveillance systems: i) establish a working group; ii) identify and engage stakeholders; iii) define the objectives / purpose of the integrated system; iv) map the available data; v) determine the point in the process where data could be shared; vi) design and implement the system; vii) evaluate the system. This work builds upon a report describing the commonalities and differences between operational frameworks in animal health, public health and food safety.

The report is available here.

Link to the ressource: https:ejp-matrix.eu/

3.3.5 Outbreak guide Norway (Utbruddsveilederen)

The outbreak guide is created to serve municipal doctors and the Norwegian Food Safety Authority when it comes to clarifying disease outbreaks caused by infection from food, water or animals. The guide presents the methods and how the responsibility is distributed as well as templates for questionnaires, reports and database to register patients, guidelines for cooperation in the municipalities and additional litterature.

Link: https://www.fhi.no/nettpub/utbruddsveilederen/

3.3.6 Norwegian Infection Control Guide (Smittevernveilederen)

The Infection Control Guide is a reference work on the prevention and control of infectious diseases. The main target group is employees in the municipal health service. The Guide is divided into two main groups; a section on various infection control topics and a section on individual diseases.

Link:

https://www.fhi.no/nettpub/smittevernveilederen/

3.4 Examples & Lessons learned

Several One Health EJP H2020 ORION project partners carry out national pilot studies to test the Collaboration principle within a cross sectional approach. Findings and lessons learned on collaboration will be reported here.

Positive lessons and tools that facilitated collaboration and characterised positive outcomes were: frequent meetings/workshop between partners, mutual and clear definitions and goals from the beginning of the project agreed between all partners, templates/check lists/schematic drawings, data-sharing agreements in place and that the project

addressed a mutual need/interest. Other things that motivated good collaborations were piggy-backing on existing partnerships and previously established trust, when political interest or pressure existed, and if equal priority/interest/buy-in/enthusiasm from the participating organisations was present. Clear areas of responsibilities and a continuous focus on the outcomes and goals rather than on detailed process and resources, were also experienced as positive in building collaborations.

Some pilot projects saw collaboration grow after having 'planted the seed' a while ago. However, this approach is not well-suited for a project with a specific end time. In general, it was recognised that One Health Surveillance Initiatives (OHSI) take time to develop and establish, which does not always fit well with academic project deadlines. Some pilot projects experienced that success in starting up an OHSI could be very person-dependent and convincing individuals to integrate their expert topics with others could be a barrier.

Lack of sufficient leadership support both internally in the organisations and externally was highlighted as problem. This is a known barrier for additional OH integration between policy areas and portfolios[15]. For some of the OHSI-developing pilot projects, it could be difficult to get buy-in from or within organisations without proof-of-principle. Interesting, in contrast our tool-developing pilot projects found that, despite offering and demonstrating an actual tool, it was difficult to obtain adoption in existing OHSI.

References

[15] Dos S Ribeiro, C., van de Burgwal, L., & Regeer, B. J. (2019). Overcoming challenges for designing and implementing the One Health approach: A systematic review of the literature. One health (Amsterdam, Netherlands), 7, 100085. https://doi.org/10.1016/j.onehlt.2019.100085

CHAPTER 4

3. The Knowledge principle: Improving the One Health Surveillance knowledge base

4.1 Purpose

The Knowledge principle defines that better surveillance planning, data integration and interpretation needs efficient and continuous knowledge exchange and joined knowledge evolution between all One Health parties.

Therefore, the purpose of this principle is to provide surveillance professionals and stakeholders with guidance on available knowledge resources that may be used to foster an One Health approach within their area of work, or to increase the value of their sector-specific surveillance reports for future One Health analysis.

4.2 Scope

The Knowledge principle focus on providing a resource to exchange knowledge on

- existing surveillance data collections
- established methods for surveillance data analysis and interpretation
- current methods for surveillance planning
- experiences with implementation of new technologies supporting surveillance

Although many surveillance systems and data are already shared with EFSA and ECDC, there are several additional national surveillance systems that are not. The results from these surveillance systems can be difficult to access as reports are often only published in the national language and not listed in scientific databases (e.g. PubMed).

Overall, the solutions & tools provided under the Knowledge principle aim to collate and improve access to surveillance data, improve knowledge of methods to interpret and analyse surveillance data and elucidate new technologies supporting surveillance. Furthermore, each is designed to be maintainable in a collaborative manner. Together, these solutions and tools are expected to support cross-sector, as well as within sector surveillance activities in the future.

4.3 Methods

4.3.1 OH Knowledge Base – Surveillance systems

The OH Knowledge Base – Surveillance systems consist of:

(1) an inventory of existing surveillance systems carried out in different countries including links to the literature or websites. The objective was to generate a comprehensive list of surveillance systems in the One Health approach. It was accomplished by collaboration between One Health EJP H2020 ORION project and EFSA/ECDC using similar terminology in describing the surveillance systems. The interface of the inventories provides users with easy and intuitive search functions. The first version is published at https://shiny.fli.de/ife-apps/EJPOrion_WP2Epi/.

2) a database that provides an overview of the common statistical methods used for surveillance data within the EU. Furthermore, it also contains a selection of links to literature, sample calculations in R and software solutions on the internet recommended for surveillance data. This enables a comparison between the existing methods and the methods actually used in surveillance projects and inspires institutes to consider new data analytical methodologies. The first version is published at https://shiny.fli.de/ife-apps/toolsdatabase/.

(3) a literature database gathering reports, scientific literature, and web resources. The collection of the literature is carried out using a literature database (Zotero, https://www.zotero.org/groups/2204615/ejp_orion_wp2epi_data_sources_surveillance_systems/library). As Zotero requires registration, contributors need to be invited. Nevertheless, to be able to access the resources without registration, the database will be accessible via the web applications too.

4.3.2 OH Knowledge Base - The Sequencing for Surveillance Handbook

The Sequencing for Surveillance (SfS) Handbook is a web-based resource containing best practice advice and hands on experience for how to set up and use sequencing for surveillance in a OH-supporting manner . The handbook currently consists of the following sections:

- public guidance documents from institutions such as EFSA and ECDC
- descriptions of infrastructural solutions for sequencing and analysis
- review of bioinformatics tools and pipelines used for analyzing and typing foodborne pathogens
- databases and other resources needed to perform analyses for species specific analyses
- guidance on how to use typing data for surveillance and outbreak detection, including clustering guidelines

As part of the infrastructure and pipeline sections, the handbook will include guidelines on how institutions can best process their data and how data can be shared between institutions. In addition, we are creating a prototype analysis system for Listeria, which will serve as a test case for guidelines on how to analyze NGS data in a reproducible and reliable way.

Link: https://oh-sfs-handbook.readthedocs.io/en/latest/

4.3.3 RAKIP Model Repository

The 'Risk Assessment Modelling and Knowledge Integration Platform' (RAKIP) partners BfR, ANSES and DTU Food developed the RAKIP Model Repository with the aim of supporting modellers, scientists, risk assessors and risk managers in their efforts to share and re-use mathematical models as well as

data analysis procedures across One Health sectors. The RAKIP Model Repository is a curated web-based database currently populated with executable mathematical models relevant for food safety. These models are provided in the Food Safety Knowledge eXchange (FSKX) format, an open exchange format that can include data, model scripts, visualization scripts, simulation settings and harmonized metadata on the model / data. The RAKIP model repository provides a user-friendly interface to access, filter and download the FSKX model file. Registered users can also execute, edit or join models online.

Link to the resource: https://knime.bfr.berlin/landingpage/RAKIP-Model-Repository

Link to the description of the resource: https://foodrisklabs.bfr.bund.de/rakip-web-portal/

4.3.4 Manual for One Health Surveillance Dashboards

This is an online dashboard inventory and practical manual to facilitate the design and implementation of One Health Surveillance dashboards using open source tools. More information is available at the Dashboard Information Centre here. The Dashboard Information Centre is a "living document" that contains an inventory of planned, ongoing and finished dashboard projects, a practical manual and a best practice guide to the development of One Health Surveillance dashboards. It covers the following topics: i) information context and end-user considerations; ii) technical and legal barriers associated with cross sector data sharing; iii) the pitfalls and biases of coanalysing One Health data; iv) the selection of the most suitable technical implementation. It is meant to be used as a "companion" when planning or developing a dashboard.

The Dashboard Information Centre is available here. User manual for construction and implementation of One Health dashboards using open source tools (source codes):, https://zenodo.org/record/7398545#.Y43KOMuZOUk

> A practical manual to the use of dashboards in One Health Surveillance practice, including recommendations for sustainability:, https://zenodo.org/record/7398589#.Y49j7HbMJlZ

4.3.5 Webinar: Vaccine and Infection Control days 2021 Norway (Vaksine- og smitteverndager 2021)

The vaccine and infection control days in 2021 shed light on various current topics within vaccination and infection control and are mainly intended for health personnel who work with infection control and / or vaccines in both municipal and specialist health services.

Link: https://www.fhi.no/om/kurs-og-konferanser/webinar-vaksine–og-smitteverndager-2021/

4.4 Examples & Lessons learned

Several One Health EJP H2020 ORION project partners carry out national pilot studies to test methods from the Knowledge principle regarding usability within a cross sectional approach. Findings from these pilot studies can be found under the project Deliverable 2.7 (Zenodo: https://doi.org/10.5281/zenodo.5062653).

CHAPTER 5

4. The Data principle: Supporting One Health Surveillance Data interoperability, integration & interpretation

5.1 Purpose

The Data principle defines that better surveillance data integration and interpretation needs tools and guidelines to annotate surveillance (meta)data so that the surveillance data context is transparent to both humans (cross-sectoral interpretation) and machines (interoperability among data systems). Data and metadata annotation with formal knowledge representations add value to surveillance data by improving its usability inside the institutions who own and/or use the data, as well as improving the potential for reuse in cross-sectoral communication and decision-making, research, and discovery, all of which are important components of One Health Surveillance.

5.2 Scope

The Data principle aims to support cross-sectoral data interoperability *respecting data provenance* established at the data source. *If* data will be shared, *how* data will be shared and *who* has access to that data is the responsibility of data providers and therefore beyond the scope of the Data principle, as are legal and technical aspects.

Data interoperability can be achieved under two scenarios of cross-sectoral cooperation:

(1) A single sector produces and analyses data, and annotates the data with the relevant context using e.g. machine readable knowledge models, that assure other sectors can reuse the data.

(2) Health sectors work in collaboration to produce information from data and support decision-making, analysing data jointly.

5.3 Methods

Data - in particular in a scenario of ever growing data volume, velocity and variety - is only useful to support surveillance if it can be used to produce information to support decision-making. The FAIR data

principles (findable, accessible, interoperable and reusable)[16] aim at "assisting humans and machines in their discovery of, access to, integration and analysis of, task-appropriate scientific data and their associated algorithms and workflows". *Findability* requires that the entire dataset or data source have sufficiently rich metadata and a unique and persistent identifier. *Reusability* is ensured by clear usage licenses and accurate information on provenance. These issues are related to the way organizations choose to publish their datasets, and their chosen model of provenance, and are therefore outside the scope of the OHS Codex.

Interoperability relies on (meta)data annotation using a formal, accessible, shared, and broadly applicable language for knowledge representation. When such knowledge representation is written in models understandable to humans *and* machines, *Accessibility* is also supported.

OHS demands several levels of interoperability - between institutions, across health surveillance sectors, and among regions and countries. Interoperability is used here to mean "the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged"[17]. EFSA and ECDC have done significant work, in their respective domains, to solve the problem of **structural interoperability** among datasets from different countries. As a result, standardised datasets collating surveillance information at the European level already exist, and can be accessed through different resources made available by these agencies. **Semantic interoperability**, on the other hand, is concerned with ensuring the integrity and meaning of the data across systems. Semantic interoperability is particularly important in OH in order to allow data reuse across sectors, and even reuse of data for research and knowledge discovery.

Semantic interoperability is achieved by marking up data and metadata using an explicit knowledge model that can be understood by humans and by machines.

Resources developed in ORION aimed to support achieving this goal:

(1) The development of a knowledge model for health surveillance - the Health Surveillance Ontology

(2) Tools for explicit annotation of surveillance data using this model

The use of these tools in surveillance practice will support the creation of FAIR data workflows, as exemplified in the section "Examples & Lessons Learned", further below.

5.3.1 Health Surveillance Ontology (HSO)

"*An ontology defines a common vocabulary for researchers who need to share information in a domain. It includes machine-interpretable definitions of basic concepts in the domain and relations among them*"[18].

In order to attend the need for a human- and machine-readable knowledge model for surveillance, ORION has developed a **Health Surveillance Ontology** reusing knowledge from existing ontologies, as well as reusing terminologies already commonly used in practice, such as those adopted by EFSA and ECDC. Identification of concepts and their specialization was informed by data examples from the various "OH pilots" carried out in the One Health EJP H2020 ORION project.

The ontology is publicly available at a globally unique and eternally persistent identifier: https://w3id.org/hso. Content management is used - humans accessing this link via browser will be referred to a page listing all ontology documentation and additional resources, such training materials. Software agents pointed to the same address will find the machine-readable codes for the knowledge model (written using the Web Ontology Language - OWL[19]).

The Health Surveillance Ontology is a full FAIR resource.

[16] Findable, Accessible, Interoperable, Reusable. https://www.force11.org/group/fairgroup/fairprinciples

[17] HIMSS Dictionary of Healthcare Information Technology Terms, Acronyms and Organizations, 2nd Edition, 2010, Appendix B, p190

[18] Natalya F. Noy and Deborah L. Mcguinness. 2001. Ontology Development 101: A Guide to Creating Your First Ontology. Available at http://protege.stanford.edu/publications/ontology_development/ontology101.pdf

[19] https://www.w3.org/OWL/

Ontology link: https://w3id.org/hso

HSO is a member of the Open Biomedical Ontologies Foundry: http://www.obofoundry.org/ontology/hso.html

Browsable view on Bioportal: https://bioportal.bioontology.org/ontologies/HSO

Supporting materials: http://datadrivensurveillance.org/ontology/

5.3.2 Tools to annotate data using HSO

As HSO is, on itself, FAIR, it provides the required data annotation model for any data source to attend the FAIR principle of interoperability, as stated in the data principle I2 (*"To be interoperable: I2 (meta)data use vocabularies that follow FAIR principles"*).

The data annotation process is highly dependent on the data management tools used at each institution. In ORION we have identified that epidemiologists most frequently manipulate and exchange in flat formats, in ".xls", ".xlsx" or ".csv" formats. For that reason, we have, in collaboration with other projects, developed a tool for semantic annotation of data in Excel, and subsequent export of the data in Resource Description Framework (RDF) format[20], a standard model for data interchange on the Web. The Excel plug-in is free and open source. Codes for developers, as well as a guide to install the plug-in for users are available at https://github.com/RealEstateCore/ExcelRDF.

5.3.3 FSKX format guidance document

The Food Safety Knowledge eXchange (FSKX) guidance document aims at harmonizing the exchange of food safety knowledge (e.g. predictive models or data analysis procedures) including the associated metadata. It specifically supports the exchange of models that were developed in a software or language dependent format. The FSKX format guidance document is primarily designed for software developers or project managers and describes in detail how data or models should be encoded in a FSKX file.

The FSKX format provides also rules on how to annotate models and simulation settings with partly model-class specific metadata. It has been successfully applied to exchange models implemented in different script-based programming languages (like R or Python) while providing enough flexibility to incorporate models in other languages or even to describe models only available as web service. The FSKX format also describes how to encode combined models and how other model-related information (e.g. simulation results, software packages, and visualization scripts) can be included. Thus, all these FSKX format features allow creating information objects that can be made available in a FAIR way.

Link: https://foodrisklabs.bfr.bund.de/fskx-food-safety-knowledge-exchange-format/

5.3.4 One Health Linked Data Toolbox (OHLDT)

The One Health Linked Data Toolbox (OHLDT) was developed to investigate the application of the Health Surveillance Ontology in the context of One Health Surveillance. The OHLDT was designed as an extendable platform providing web services to bring the One Health Surveillance Ontology into action. The OHLDT consists currently of the following tools:

i) a Linked Data Converter, that converts Excel files into a HSO-RDF files (a linked data format) and vice versa

ii) the Health Surveillance Ontology (HSO) data list that allows to select HSO concepts and then search and filter data from a number of surveillance-related linked data source and finally automatically generate dashboards

[20] https://www.w3.org/RDF/

iii) a demonstrator to showcase how surveillance data from EFSA and ECDC can be linked based on metadata and HSO-RDF to provide a disease specific dashboard to compare the data across sectors.

iv) a set of utility services for HSO enrichment and maintenance that help to semi-automatically extend the HSO with concepts from existing controlled vocabularies.

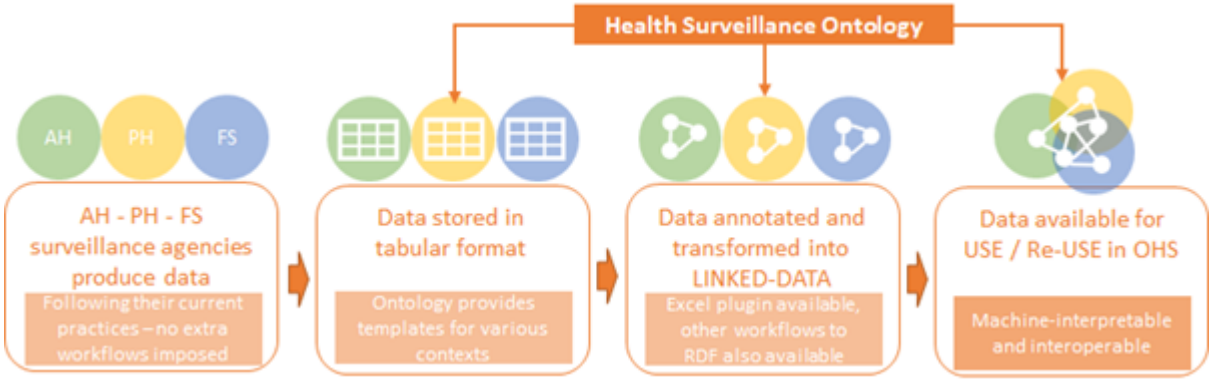
Link:

1. Linked Data Converter Tools (RDF to Excel, Excel to RDF)
2. Health Surveillance Ontology data list
3. Linked Data Use Case EFSA-ECDC Surveillance Data
4. Health Surveillance Ontology enrichment and maintenance web services

5.4 Examples & Lessons learned

Establishing a workflow of data annotation **in surveillance practice** must take into account the current practices within the agencies involved in OHS. While the adoption of data annotation practices can increase the value of data - potentially minimizing efforts in other steps of the continuum of data production and consumption - it can also be perceived as an "extra-burden". It is important to help institutions in establishing effective data workflows, incorporating the adoption of the knowledge model into their existing practices.

The figure below is a schematic representation of the overall workflow to adopt linked data solutions in one health surveillance.



Lessons learned through the One Health pilots carried out in the OHEJP 2020 ORION project can be found at http://datadrivensurveillance.org/data-interoperability-needs-in-one-health-surveillance/. The page also contains example datasets and workflows for FAIR data publishing.

References

CHAPTER 6

5. The Dissemination principle: Supporting external communication of One Health Surveillance outcomes

6.1 Purpose

The dissemination principle defines that better surveillance data integration and interpretation needs improved cross-sector One Health Surveillance report integration and harmonization. The resources provided within this principle are meant to support the cross-sector harmonized provisioning of metadata in OHS reports and e.g. to provide a foundation for advice to risk managers. Best practice examples illustrate how the reporting of surveillance outputs using new checklists and templates relying on cross-sectoral analysis of surveillance outputs, will improve the value for all stakeholders. It also demonstrates that such activities support the cross-sector understanding of contextual information in future OH surveillance reports.

6.2 Scope

The resources provided within this principle are directed towards the activities linked to report generation or dissemination of surveillance data and results. Proposed solutions were designed to be generically applicable for any surveillance activity in all OH sectors, including those that were not directly involved in their development e.g. the environmental sector. In addition they should be applicable to all European countries, geographic areas and administrative levels.

6.3 Methods

6.3.1 One Health Consensus Report Annotation Checklist (OH-CRAC)

To achieve OHS report harmonization we are proposing the establishment and adoption of a so-called **"One Health Consensus Report Annotation Checklist" (OH-CRAC**). The adoption of OH-CRAC will allow all existing OHS metadata to be mapped to one concurrent metadata schema, instead of cross-mapping metadata between several sectoral and institutional metadata systems as illustrated in Figure 5. The implementation and comprehension of the OH-CRAC will thereby cause minimal efforts for all

involved parties. OH-CRAC is also available as an interactive online tool that allows the provisioning of surveillance meta-information in an easy and user-friendly manner

Link: https://aflex.vrac.iastate.edu/checklist/?t=OH-CRAC

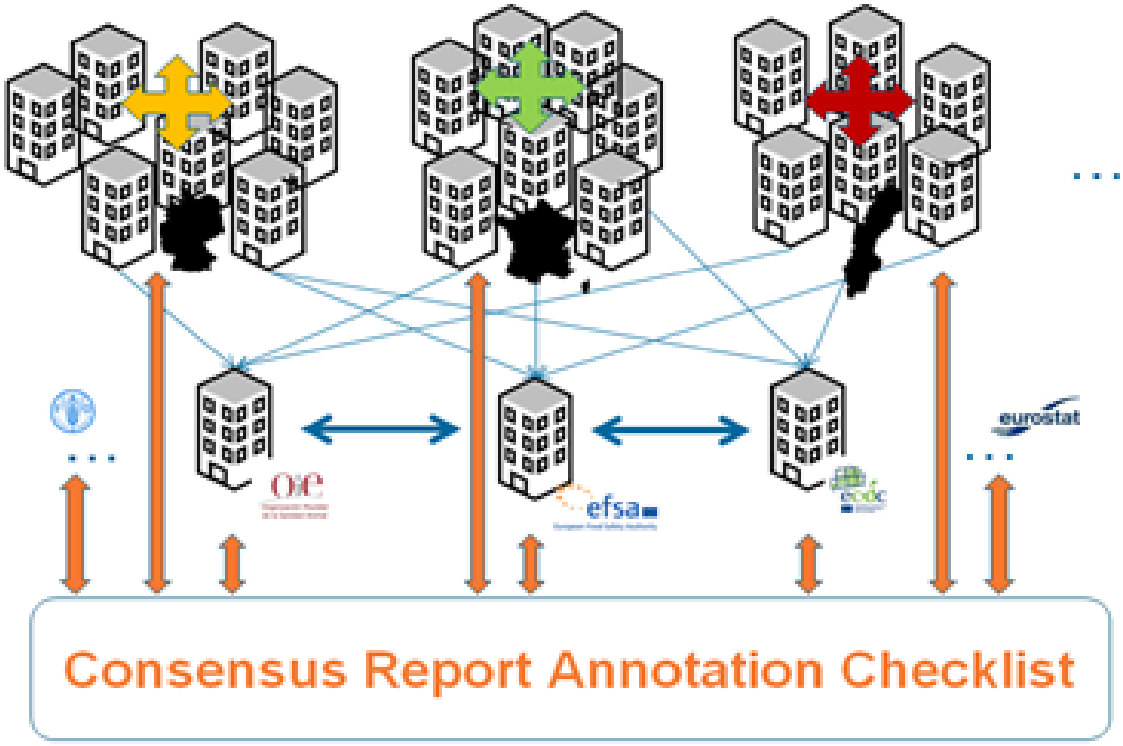


Fig. 1: Fig. 5: Schematic drawing of OH-CRAC that is proposed to map and structure metadata in One Health surveillance reports. Orange arrows indicate the mapping of metadata from federal/national systems (top) and European/international stakeholders (bottom) systems to the proposed OH-CRAC.

6.3.2 National OHS Report Templates

Surveillance of zoonoses and antimicrobial resistance (AMR) is often carried out in multiple animal species, foods and/or people and reported separately. Sometimes, outputs from different sectors are reported in the same report or in the same chapters, but usually every author/sector provides their own text and graphics. This tends to present the providers' perspective rather than focussing on the receiver needs and may not interpret the data from a One Health perspective. To support One Health reporting, examples or templates to report different types of hazards with a One Health focus have been developed. The templates demonstrate how to report e.g. AMR in foodborne zoonoses throughout the food chain and focusing on the consequences for humans and animals or how to report zoonotic trends, whilst enhancing the One Health focus.

Guidance on reporting antimicrobial resistance in a One Health perspective: https://drive.google.com/file/d/1qvWe5_dnNGoipMbHbbjBHqT0fLvQ01ar/view?usp=sharing

Example: https://www.danmap.org/-/media/arkiv/projekt-sites/danmap/danmap-reports/danmap-2018/danmap_2018.pdf?la=en

6.4 Training materials and examples for OHS reports

6.4.1 Outbreaks of infectious diseases in Norway in 2020. Annual report (Utbrudd av smittsomme sykdommer i Norge i 2020. Årsrapport)

This report provides an overview of outbreaks that have been notified to the Norwegian Institute of Public Health in 2020. It is important to point out that this overview does not provide a full and complete picture of outbreaks in Norway during this period. The degree of underreporting varies considerably. This report is based on information from the outbreak alert system, Vesus (www.vesuv.no)which contains information on outbreaks of infectious disease in the population and the cause of the outbreaks.

Link: https://www.fhi.no/publ/2021/utbrudd-av-smittsomme-sykdommer-i-norge-i-2020/

6.4.2 Norwegian Annual report 2020 - Surveillance of infections from food, water and animals including vector borne diseases

This annual report describes the incidence of the most common diseases that are transmitted by food, water and animals, including vector-borne infections, which have been reported to the Norwegian Institute of Public Health in 2020. The report includes interactive links to websites with further background information on the various diseases mentioned in the report.

Link: https://www.fhi.no/publ/2021/arsrapport-2020-smitte-fra-mat-vann-og-dyr/

6.4.3 Surveillance of infectious diseases in animals and humans in Sweden 2020

Surveillance of infectious diseases in animals and humans is the annual report describing the surveillance activities carried out in Sweden during the year. The report covers surveillance for important animal diseases and zoonotic agents in humans, food, feed and animals, carried out and compiled by experts from several Swedish governmental agencies, university and the private industry with surveillance mandates along the entire food chain, from farm to fork.

Link: https://www.sva.se/media/8d93fbc7f66d298/surveillance-of-infectious-diseases-in-animals-and-humans-in-sweden-2020.pdf

6.5 Examples & Lessons learned

The pilot studies carried out in the ORION project confirmed that the impact of surveillance activities largely depends on the effectiveness of the dissemination process. In the execution of the pilot studies in the ORION project it was highlighted the importance of involving relevant actors participating in the surveillance activity during the writing of the dissemination outputs. This means not only participants from within each organisation but also from all other agencies, collaborators and stakeholders involved to ensure that the output is correctly contextualised. Another practical aspect that complicates surveillance result dissemination is the fact that despite agreements for data sharing across different bodies/institutions might exist the different internal policies can make the dissemination of data complicated and slow.

The Belgian and Danish pilots conducted during the One Health EJP H2020 ORION project considered as important the dissemination of results, not only at national level but also to other countries (pilot reports provided as annexes under the deliverables JIP1-2.7 and JIP1-2.9, re-

spectively)[21],[22]. In general, it was highlighted that the dissemination of surveillance outputs should be more frequent transparent and concise in the future. In the German[23], Swedish[24] and Danish[22] pilots it could be shown, that in order to create OH oriented surveillance reports it might be useful to change the structure of current surveillance reports, e.g. by introducing new sections, re-structuring them into OH chapters to harmonise the provisioning of the outputs or by using checklists like OH-CRAC. From the experience within the ORION pilots one can conclude that the efforts needed to implement such improvements are well invested, as the newly designed surveillance reports were very well accepted by policy users. Also the application of the new OH-CRAC checklist was tested extensively and received positive feedback.

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CHAPTER 7

Summary and Outlook

The OHS Codex/KIP is a new framework that helps to establish and strengthen inter-institutional collaboration and transdisciplinary knowledge transfer in the area of surveillance data integration and interpretation, along the One Health (OH) objective of improving health and well-being.

It is based on the observation that improved surveillance data integration and interpretation can only be achieved if responsible institutions perform practical steps in at least one of the two action areas:

1. Improve existing sector specific surveillance data reporting such that data and reports can be better used in the context of One Health in the future
2. Plan, execute or improve joint surveillance efforts that consider the One Health needs right from the beginning.

To support such practical steps the OHS Codex/KIP has been designed in such a way, that it can act as a resource itself, i.e. it provides a collection of methods, tools and resources that could be used or customized by interested institutions. Compared to the guidance available in the Tripartite Guide the OHS Codex/KIP focus on the needs of national European institutions. It has also been designed as a living document, so that it can be updated continuously. The OHS Codex/KIP framework specifically takes into account that implementation of improvements into established surveillance routines is an extraordinary challenge. For that reason the OHS Codex/KIP acts as an "umbrella" for solutions supporting better surveillance data integration and interpretation in the future. The OHS Codex/KIP aims at raising awareness of the work achieved by other One Health EJP H2020 projects highlighting the outcomes from other scientific and integrative activities that can be of help by the One Health community such as the inventory described below.

7.1 One Health EJP Outcome Inventory

The One Health EJP Outcome Inventory is a public online database that catalogues the outcomes and updates of the Joint Research and Joint Integrative Projects of the One Health EJP. It actively links stakeholders' needs and interests with the scientific and integrative results from the consortium. Given its public nature, it is targeted towards a wide range of stakeholders, including national stakeholders like ministries of authorities, other One Health networks, and EU and international agencies"

Link: https://onehealthejp.eu/outcome-inventory/

7.2 Upcoming events

One Health EJP H2020 project events: https://onehealthejp.eu/events/

One Health EJP H2020 MATRIX project webinars: https://onehealthejp.eu/wp-content/uploads/2022/03/MATRIX-Webinars-invitation_final.pdf

CHAPTER 8

Guidelines for OHS Codex/KIP contributors

The OHS Codex/KIP is a living resource that continuously evolves adapting to the needs of the One Health practitioners. Therefore, we welcome and encourage the One Health community to contribute to the OHS Codex/KIP.

8.1 How to contribute to the OHS Codex/KIP

Under this link you can find the most recent version of the OHS Codex/KIP as a Google Doc. As a contributor you can navigate through the document and add your comments, suggest new text or modify existing content.All the changes will appear as suggestions that will be evaluated by the OHS Codex/KIP team. If you cannot log in the document with a gmail account, please provide some contact details together with each change request so we can contact you in case it is needed. If you have any further questions or comments, you can send us an email to ejp-orion@bfr.bund.de.

8.2 Types of contributions

Methods

The new methods should be introduced by a short description that allows the OHS Codex/KIP users to decide whether this particular method can be relevant to their specific situation. Please remember that the OHS Codex/KIP is not designed as an exhaustive guide but as a list of existing resources related to each of the defined principles. Further information about the method can be provided by a link or reference where a more detailed description about the method can be accessed.

Enter the new method under the principle this new method applies and specify how it helps to overcome the barriers addressed under this specific principle with an One Health perspective.

Lessons learned

Here you can share the experience of applying/implementing any of the methods listed in the OHS Codex/KIP. Under this section you can link to reports that describe success stories as well as limitations and challenges.

General improvement

Here we consider:

- typo corrections
- fixing broken references or links
- inaccurate or out-of-date information (new features, links or references
- addition of better explanations through clearer writing and/or additional examples of lessons learned.

Principles

Currently, the OHS Codex/KIP is structured according to four core principles that were jointly defined by One Health EJP H2020 ORION and MATRIX project members as critical to enhance OHS data analyses and interpretation. If you consider that the scope and objective of the OHS Codex/KIP can be extended to other areas of action and this way support a wider One Health community, propose a new principle section under the OHS Codex/KIP document providing a description of the purpose and scope of this principle. If possible include existing solutions or methods available to support One Health surveillance researchers, organisations or stakeholders. Proposal to extend the scope of the OHS Codex/KIP will only be considered if the author provides contact information, so the OHS Codex/KIP team can invite that author to the OHS Codex/KIP steering board discussions.

8.3 Evaluation of the contributions

The new contributions will be evaluated by the OHS Codex/KIP steering board, which meets on a regular basis to ensure the continuous update and maintenance of the OHS Codex/KIP. The steering board will evaluate your add/change request and contact you in case more information is necessary.

For further questions please contact us via ejp-orion@bfr.bund.de.

8.4 Contributor agreement

As a contributor to the OHS Codex/KIP you agree that we may redistribute your work under the license that the One Health EJP H2020 ORION and MATRIX projects use. We expect all contributors to comply with the *Contributor Covenant Code of Conduct,* version 1.4, available at https://www.contributor-covenant.org/version/1/4/code-of-conduct.html.

CHAPTER 9

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CHAPTER 10

Abbreviations/ Acronyms

AMR	Antimicrobial Resistance
AH	Animal health
DCF	Data Collection Framework
ECDC	European Center for Disease Control
EFSA	European Food Safety Authority
EJP	European Joint Programme
EU	European Union
EUSR	European Summary Reports
FS	Food safety
JIP	Joint Integrative Project
MS	Member states
OH	One Health
OHEJP	One Health European Joint Programme
OHS	One Health Surveillance
ORION	One health suRveillance Initiative on harmOnization of data collection and interpretatioN
PH	Public health
TESSy	The European Surveillance System
URI	Uniform Resource Identifier

CHAPTER 11

References