



## **Deliverable D-WP4.1**

### **OHEJP JIP MATRIX - WP4**

Responsible Partner: ANSES and UoS



## GENERAL INFORMATION

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# SELECTED SET OF CRITERIA FOR EVALUATION OF EPIDEMIOLOGICAL CAPACITIES FOR ONE HEALTH SURVEILLANCE

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## 1. Introduction

The MATRIX project aims to advance the implementation of One Health Surveillance (OHS) in practice by building onto existing resources, adding value to them and creating synergies among the sectors at the national level. Within work package 4 (WP4), a generic benchmarking tool (EU-EpiCap) is being developed for characterizing, monitoring and evaluating epidemiological surveillance capacities and capabilities, which directly contribute to OHS. The tool aims to identify and describe the collaborations among actors involved in the surveillance of a pathogen/hazard and to characterise (with a set of indicators) the One Health-ness (OH-ness) of the surveillance system. The tool will support identification of areas that could lead to improvements in existing OH surveillance capacities and capabilities, embracing the concept of “information for action”, as well as the comparison across systems or member states (e.g. (1,2)).

MATRIX aims to propose an EU-EpiCap tool that is generic and user friendly, to be implemented easily and regularly in European countries for the mapping of key epidemiology services and OH capacities and capabilities for surveillance of foodborne hazards (i.e. *Salmonella*, *Campylobacter*, *Listeria*) and emerging threats (broadly defined).

## 2. EU-EpiCap development

The EU-EpiCap tool for OHS evaluation is being developed in two main phases: 1) a review of existing methods for surveillance system evaluation and case studies; and 2) the identification and definition of evaluation indicators, followed by the development of the scoring methods based on a semi-quantitative approach.

### 2.1. Review of existing methods for surveillance system evaluation

An inventory of existing methods of evaluation of surveillance systems, for both the systems themselves as well as multi-sectoral collaborations, was conducted based on existing knowledge of collaborators in WP4 and literature search. A large array of tools and guides were identified (non-exhaustive list):

- Animal health surveillance evaluation framework (SERVAL) (3),
- Assessment tool of epidemiological surveillance systems in animal health and food safety [outil d'analyse des systèmes de surveillance] (OASIS) (4),
- Evaluation of collaboration for surveillance (ECoSur) (5),
- FAO assessment tool for laboratory and AMR surveillance systems (ATLASS),
- FAO progressive management pathway (PMP-AMR) for Antimicrobial Resistance,
- FAO surveillance evaluation tool (SET),
- IHR joint external evaluation (JEE) (6),
- Network for evaluation of one health (NEOH) (7),
- One health assessment for planning and performance (OH-APP),
- One health systems mapping and analysis resource toolkit (OH-SMART) (8),
- RISKSUR surveillance evaluation tool (SURVTOOL) (9),
- Surveillance and information sharing operational tool (SIS OT),
- Surveillance evaluation framework (surf) (10),
- Integrated surveillance system evaluation project (ISSEP) (11).

The objectives, assessment type (qualitative, semi-quantitative, etc.) and functioning (including a description of the criteria, scoring system and outputs) of these tools were explored. Previous literature reviews assessing their strengths and weaknesses and providing guidance on how to choose a fit-for-purpose tool were also consulted (<https://guidance.fp7-risksur.eu/>).



## 2.2. Case studies

An assessment of the literature was performed to identify case studies applying the selected evaluation methods across the hazards prioritized within MATRIX, as well as other hazards. The literature search was conducted using Web of Science, Medline, Google Scholar, CAB abstract and Scopus to identify articles. The search focused on papers published and written in English language. Several keywords were included in the search under three domains: surveillance (“surveillance or report\* or monitor\*”), evaluation (“evaluat\* or assess\* or analys\*”), and framework (“framework or guideline or method\* or tool”). Scientific articles citing the evaluation methods listed in 2.1 were also searched for.

The literature selection process consisted of screening of titles and abstracts, followed by review of full texts. For the title and abstracts, the following exclusion criteria were applied: articles not stating at least one of the following terms: public health, animal health/disease, environmental health, bioterrorism, public security, performance indicators; articles describing the importance of the evaluation rather than the evaluation process; and articles not related to the evaluation of surveillance.

In addition to the literature search, MATRIX consortium partners were solicited (during MATRIX consortium meetings) for additional, unpublished, case studies in their countries. Moreover, questions regarding previous evaluations of surveillance systems conducted in member states were included in the questionnaires implemented in WP2 about surveillance of hazards in animal health, food chain and human health sectors.

From the articles finally selected, the following data were identified: the surveillance sector (human or animal health); the category of surveillance system considered; the evaluation objectives; the evaluation process; and practical applications (if any). A comparative analysis of completeness and practicality of the different evaluation approaches (RISKSUR, ECOSUR, NEOH, and OH-APP) was performed.

Applications were found for several tools on AMR (OASIS, ECOSUR, NEOH, AMR-PMP, RISKSUR, ATLASS and SURVTOOL (<https://guidance.fp7-risksur.eu/>)) and *Salmonella* (unpublished results of OASIS and ECOSUR evaluations in France), but no application of those evaluation methods were found for *Campylobacter* and *Listeria* in our search. Results from the questionnaires implemented in WP2 indicated that some evaluations had been previously conducted for *Salmonella*, *Listeria* and *Campylobacter* using the OASIS method or an ad-hoc auto-evaluation.

## 2.3. Defining indicators for the EU-EpiCap tool

A comparative analysis of the criteria used in selected existing tools, i.e. those that focused on the evaluation of integrated / One Health approaches to surveillance (RISKSUR, ECOSUR, NEOH, and OH-APP), was conducted in order to characterise the overlap and differences between them. This comparison aimed to identify a limited set of strategic indicators, to be included in the EU-EpiCap tool.

Following the structure of the EULabCap tool (a similar tool assessing the capacity and capabilities for European microbiology laboratories to provide essential public health functions) (2), our framework is organized around three dimensions: organization, operational activities, and impact of the OHS system. Each dimension is then divided into four targets, as described in Figure 1. At this stage, three to six indicators were identified for each target. The list of indicators is presented in annex.

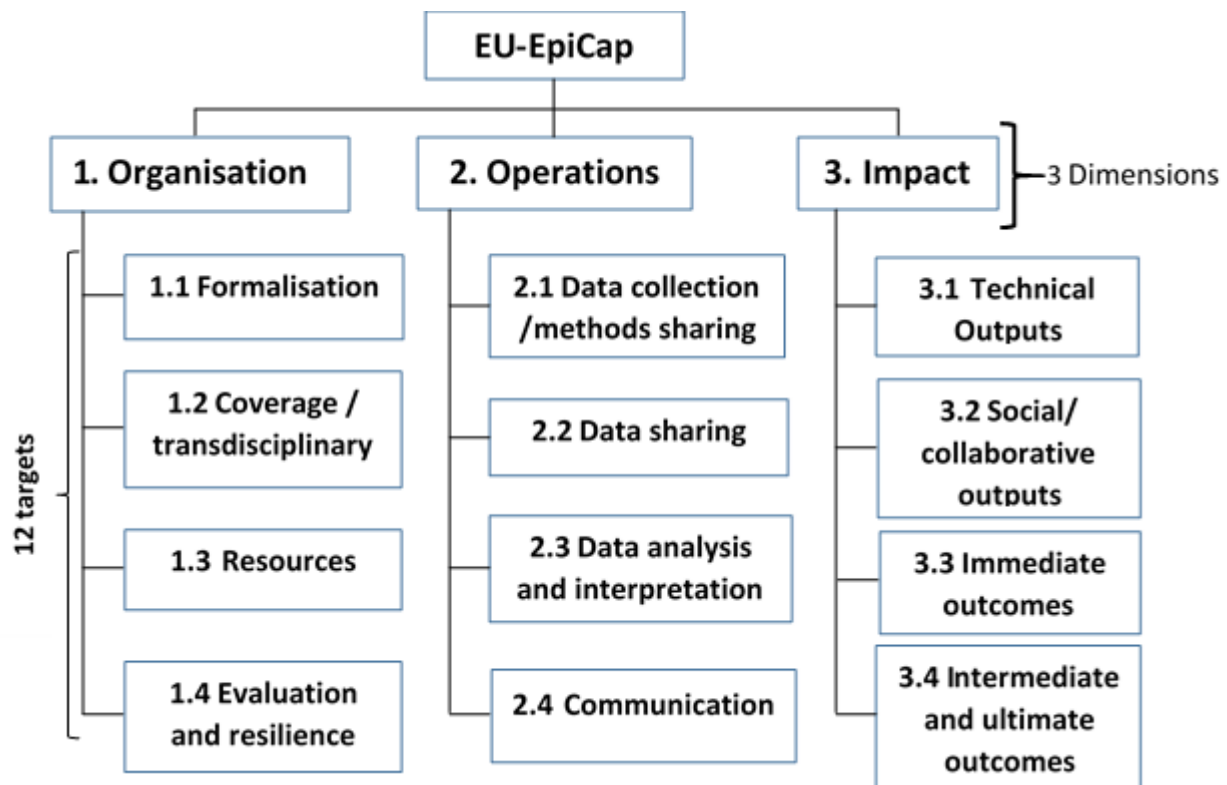


Figure 1: Structural overview of the EU-EpiCap indicators as grouped by dimension and target.

#### 2.4. Scoring process

Once specific indicators for collaboration were defined, we singled out the necessary criteria to support their evaluation. To this end, we identified specific elements that could be included in the definition of indicators. A semi-quantitative scoring scale was established to score each indicator depending on the level of fulfilment achieved by the collaborative situation under evaluation. In this document, only the requirements for the high and low scores are defined; the number and requirements of intermediate scores will be defined at a later stage. A scoring guide is being developed to describe the situation in which they should be awarded. In some cases, the value “Not applicable” can be used if the indicator is not relevant to the surveillance system under evaluation. The outputs of the EU-EpiCap tool are analysed at the target level, where currently a simple approach of summing the scores across the indicators is used to get a final score. The allocation of weights to indicators and targets will be considered at a later stage.

#### 2.5. Validation of indicators and scoring options

The indicators will be refined and validated through expert elicitation. Connections were made with FAO partners in charge of developing the ATLASS and PMP-AMR tools (both tools require FAO training before they can be used/accessed to), and the Surveillance and Information Sharing Operational Tool (SI SOT) being developed between FAO, OIE and WHO. Additional experts will be selected based on previous involvement in research consortiums working either on integrated surveillance evaluation (CoEvalAMR project, Risksur project) or OH evaluation (NEOH) and/or authors of articles related to OHS systems. The experts will be asked to comment on all proposed indicators and identify any missing indicators. Open comments and justifications regarding indicators will be analyzed and categorized. Based on experts' answers and comments, the initial list of evaluation indicators will be refined and validated.



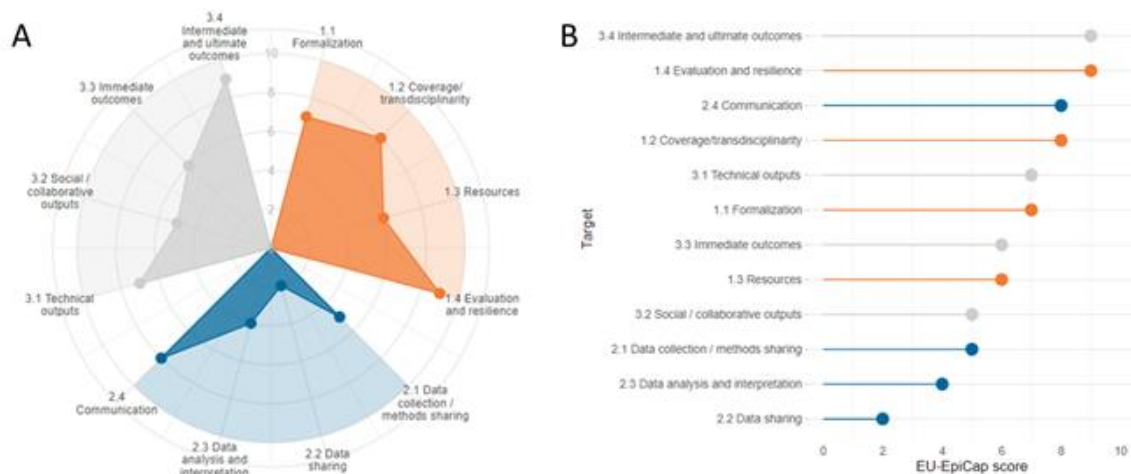
We are actively engaging with ECDC partners involved in the development of the EULabCap (2), allowing EU-EpiCap to build on previous experience from EULabCap. A common workshop between MATRIX and the OH-HARMONY-CAP project (which aims to develop a benchmarking tool “OHLabCap”, by surveying OH laboratory interoperability, capacity and performance across EU) will allow to streamline the methodologies for detecting and defining capacity, interoperability and performance to those of MATRIX.

After finalizing the list of indicators and scoring options, the tool will be tested in a pilote-stage in several countries with the collaboration of Matrix partners. Different hazard tracks (i.e. *Salmonella*, *Campylobacter*, *Listeria*) and emerging threats (i.e. AMR) would be targeted. Feedback from these pilot studies will enable further improvements of the tool.

## 2.6. Data visualization and webapp/dashboard development

An R Shiny-based EU-EpiCap webapp/dashboard is under development. Here, users will be able to complete the EU-EpiCap tool interactively, or alternatively upload the results from EU-EpiCap assessments completed previously or in a different modus. The app will allow exploration of the completed and/or uploaded assessment(s) by way of multiple visualizations.

EU-EpiCap results across the three dimensions will be visualized in the form of interactive radar charts and/or lollipop plots (Figure 2). By interacting with these plots, the user will be able to further explore the breakdown of scores for each target. An additional feature (design in progress) could include mapping of actors and interactions in the OHS network.



**Figure 2:** Alternative visualisations for EU-EpiCap scores across targets and dimensions: (A) radar chart; (B) lollipop plot.



### 3. References

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## Annex

### Definitions used in indicators

**Epidemiological surveillance:** Observational method based on continuous recording to follow health status or risk factors in a defined population, and particularly to detect the appearance of pathological processes and study their development over time and in space, with a view to adopting appropriate control measures (12).

**Surveillance system/network:** All individuals or agencies organised to ensure surveillance in a given region of one or more pathological entities constitute an epidemiological surveillance network (13).

**One Health surveillance (OHS) system / OH framework:** A OHS system is a system in which collaborative efforts exist across at least two sectors (among human health, animal health, food safety and environment) in the surveillance process to produce and disseminate information with a purpose to improve any of human, animal or environmental health (12), <https://aginfra.d4science.org/web/orionknowledgehub/catalogue>.

**Actors:** Actor in a OHS system is defined as an individual or organization that operates with a primary intent to improve health of people, animals and the environment.

**Stakeholders:** The stakeholders in OH include the ultimate beneficiaries (i.e. animals, people and the environment) and the organisations that work to protect them (i.e. research institutes, government ministries, international organisations and professional bodies) (12).

**Impacts:** Impacts of a OHS system correspond to the changes that have been made based on the results of the surveillance, providing a measure of the usefulness of the surveillance system in relation to its aims. This should include details of actions taken as a result of the information provided by the surveillance system (e.g. changes in protocols or behavior, changes in mitigation actions and especially changes in disease occurrence).

**Outputs:** Output is defined as the act of producing something, the amount of something that is produced or the process in which something is delivered. OHS outputs provide information for those responsible for taking the control and prevention action. Typically surveillance outputs will be in the form of tables or graphs showing counts or rates of cases/events, or proportional morbidity or mortality, categorized by demographic, geographic or other risk factors.

**Outcomes:** An outcome in OH is the level of performance or achievement that occurred because of the integrative effort of multiple disciplines working to attain optimal health for people, animals, and the environment and it is a benefit that the integrative is designed to deliver. Expected outcomes in OHS system include the information resulting from the surveillance effort, which is then used for decision-making, policy development, and action.

**OH team:** Consists of members of different disciplines, working collaboratively, to set goals, make decisions and share resources and responsibilities to achieve better health outcomes.

**Central/Intermediate/Field levels:** Central level in a OHS system is the level of management. It consists of the highest-ranking executive, whose primary responsibilities include making major decisions, managing the overall operations and resources, oversees the goals, policies, and procedures of the surveillance and collaborations. Their main priority is on the strategic planning and execution of the overall surveillance success. Intermediate level of leadership in OHS is a middle level of a hierarchical organization that is subordinate to the executive management and responsible for 'team leading' and line managing. Intermediate level is between the field and the central unit. Their role is to coordinate activities in the field, and to validate, and if necessary correct, the data collected before they are sent to the central unit. Field/local level is primarily concerned with the execution of day-to-day work (12).



## Initial list of indicators for each dimension and target

### Dimension 1: Organisation

#### Target 1.1 Formalisation

Indicators	Definition of indicators	Scoring options
<b>1.11 Common objective of the surveillance system/ collaboration</b>	Expectations of all actors have been identified and taken into account in the setting of common overarching cross-sectoral and -disciplinary goals.	<b>Low score:</b> Actors' expectations regarding the collaboration and surveillance have not been identified or taken into account. <b>High score:</b> Actors' expectations regarding the collaboration and surveillance have been identified and considered.
<b>1.13 Official documentation (supporting / formalizing the OH approach)</b>	There is clear and up-to-date documentation that defines the objective of the OHS system and the modalities of functioning of the collaboration (e.g. legal agreement, terms of references, etc.).	<b>Low score:</b> The objectives of the OHS system and modalities of functioning have not been defined in any documentation. <b>High score:</b> The objectives of the OHS system and modalities of functioning have been defined in official documents, shared among all actors of the OHS system.
<b>1.14 Clear, shared leadership / steering committee</b>	There is a clear and shared leadership, with a steering committee to guide the operations of OHS system. The committee provides a trustworthy environment where stakeholders can freely express their views and be heard, creating mutual understanding.	<b>Low score:</b> No steering committee, nor clear and shared leadership to guide the OH collaboration. <b>High score:</b> Emplaced steering committee with clear and shared leadership to guide the OH collaboration.
<b>1.15 Central coordination (roles and composition defined at central level)</b>	There is coordination and shared responsibility at central level (defined in terms of roles and composition across sectors and disciplines, staff positions and involvement, participating institutions, networks, communication pathways, leadership, etc.).	<b>Low score:</b> No clear definition of the role and composition of the central coordination unit, or no effective coordination of the OHS system by the central level. <b>High score:</b> The unit of coordination at central level has a defined role and composition and coordinates the OHS system effectively.
<b>1.16 Intermediate level coordination (roles and composition defined at intermediate level)</b>	There is coordination and shared responsibility in the units at intermediate level (defined in terms of roles across sectors and disciplines, staff positions and involvement, participating institutions, networks, communication pathways etc.). The coordination units at intermediate levels coordinate the	<b>Low score:</b> No clear definition of the role and composition of the units at intermediate level, or no effective coordination of field activities. <b>High score:</b> The units of coordination at intermediate level have a defined role and composition, coordinate the field activities effectively, and validate the data collected before they are sent to the central unit.



	field activities, and validate the data collected before they are sent to the central unit.	
<b>1.17 Field level coordination (roles defined at field level)</b>	There is coordination and shared responsibility in the units at field/local level (defined in terms of roles across sectors and disciplines, staff positions and involvement, participation, networks, communication pathways, etc., at field level).	<p><b>Low score:</b> No clear definition of the role and composition of the units at field/local level, or no effective execution of field activities.</p> <p><b>High score:</b> The units of coordination at field/local level have a defined role and composition, and execute the field activities effectively.</p>

### Target 1.2 Coverage/ transdisciplinary

Indicators	Definition of indicators	Scoring options
<b>1.21 Degree of collaborative effort between sectors (human, animal, environment; where relevant)</b>	The collaborative effort that exists in practice between all sectors (such as human, animal, environment, etc.) relevant to the hazard under surveillance.	<p><b>Low score:</b> No intersectorial collaborative effort exists, or not all relevant sectors are included.</p> <p><b>High score:</b> Intersectorial collaborative efforts exist and all relevant sectors are included.</p>
<b>1.22 Degree of collaborative effort between disciplines (epidemiology, surveillance, microbiology, etc.; where relevant)</b>	The collaborative effort that exists in practice between all disciplines (such as epidemiology, surveillance, microbiology, etc.) relevant to the hazard under surveillance.	<p><b>Low score:</b> No interdisciplinary collaborative effort exists, or not all relevant disciplines are included.</p> <p><b>High score:</b> Interdisciplinary collaborative efforts exist and all relevant disciplines are included.</p>
<b>1.23 Degree of collaborative effort between stakeholders (e.g. public-private, academia, general public, etc; where relevant)</b>	The collaborative effort that exists in practice between all stakeholders (such as public-private, academia, general public, etc.) relevant to the hazard under surveillance.	<p><b>Low score:</b> No collaborative effort exists between stakeholders, or not all stakeholders are included.</p> <p><b>High score:</b> Collaborative efforts exist between stakeholders and all relevant stakeholders are included.</p>
<b>1.24 Geographic coverage</b>	The geographic coverage of the collaboration encompasses all the local, intermediate and global levels relevant to the hazard under surveillance.	<p><b>Low score:</b> The collaboration does not cover all relevant geographical areas.</p> <p><b>High score:</b> The collaboration covers all relevant geographical areas.</p>
<b>1.25 Between hazards of the same category (e.g. vector-borne hazards)</b>	The collaborative effort covers all hazards of the same category (e.g. vector-borne hazards), where relevant to OHS.	<p><b>Low score:</b> No collaborative efforts between actors involved in OHS of hazards of the same category.</p> <p><b>High score:</b> Collaborative efforts exist between actors involved in OHS of hazards of the same category.</p>



### Target 1.3 Resources

Indicators	Definition of indicators	Scoring options
<b>1.31 Budget dedicated to coordination/steering</b>	Acquisition, utilization, and management of resources/ funds for governance and executives/steering for the delivery of OHS.	<b>Low score:</b> No budget allocated for governance. <b>High score:</b> Sustainable allocation of adequate budget for governance.
<b>1.32 Budget dedicated to collaborative operational activities</b>	Funding availability, allocation and expenditure for operational activities that encourage collaboration between sectors (e.g. payment for platforms needed for data sharing )	<b>Low score:</b> No budget allocated for collaborative operational activities. <b>High score:</b> Sustainable allocation of adequate budget for collaborative operational activities
<b>1.33 Human resources (personnel or time) dedicated to collaborative activities</b>	Appropriate human resources (personnel and time) are available and dedicated to OHS system and collaborative time	<b>Low score:</b> No human resources allocated to the OHS system. <b>High score:</b> Sustainable allocation of adequate human resources to the OHS system.
<b>1.34 Mutualisation of resources (e.g. equipment)</b>	Availability and sharing of platforms, tools, raw data and information among actors, stakeholders and target groups in the OHS system.	<b>Low score:</b> No mutualisation of resources. <b>High score:</b> Adequate mutualisation of resources.
<b>1.35 Training in OH approaches (human resources)</b>	Availability of continuous training, training materials, funds and trainers to enhance OH skills, capabilities and knowledge of staff involved in OHS system, leading to quality performance.	<b>Low score:</b> No OH training and training resources are available. <b>High score:</b> OH training has been given. Adequate OH training resources are available.

### Target 1.4 Evaluation and resilience

Indicators	Definition of indicators	Scoring options
<b>1.41 Monitoring and evaluation plan of the OHS system</b>	Periodic monitoring and external evaluation of collaboration of the OHS system.	<b>Low score:</b> No periodic monitoring or external evaluation before the current evaluation. <b>High score:</b> Regular external evaluations with an appropriate focus on collaboration or OHS.
<b>1.42 Feedback loop (implementation of corrective measures)</b>	Implementation of corrective measures, if deemed necessary following performance monitoring and evaluation results.	<b>Low score:</b> No implementation of corrective measures recommended by evaluators. <b>High score:</b> All correctives measures recommended by evaluators have



		been implemented.
<b>1.43 Adaptability to internal and external changes (e.g. emerging hazards)</b>	Ability of the system to adapt to internal and external changing needs such as removal or inclusion of additional tools/methods, modification of the reporting frequency, data requirement needs, etc.	<b>Low score:</b> The system cannot be adapted to internal and external changing needs. <b>High score:</b> The system is highly adaptable to internal and external changing needs.
<b>1.44 Institutional memory (e.g. written standard operational procedures (SOP))</b>	Clear guidelines and protocols on the processes that should be followed to ensure coordination of the OHS system.	<b>Low score:</b> No clear guidelines or protocols exist on the processes that should be followed to ensure coordination of the OHS system. <b>High score:</b> Appropriate guidelines and protocols exist on the processes that should be followed to ensure coordination of the OHS system.
<b>1.45 Evaluation of actors' perception regarding the functioning of the collaboration</b>	Evaluation of actors' expectations, perception, experience and practice regarding the functioning of OHS system.	<b>Low score:</b> No evaluation; or evaluation shows a mismatch for all or most actors between their expectations and practice regarding the collaboration. <b>High score:</b> Evaluation shows a good fit for all or most actors between their expectations and practice regarding the collaboration.
<b>1.46 Performance indicators of the OHS system</b>	Indicators have been identified, and objectively measure the performance of the OHS system (timeliness, etc.).	<b>Low score:</b> No indicators identified, or no calculation of the performance indicators. <b>High score:</b> Definition and validation of a set of performance indicators, which are applied for evaluation of the OHS system.

## Dimension 2: Operations

### Target 2.1 Data collection/ methods sharing

Indicators	Definition of indicators	Scoring options
<b>2.11 Official documentation supporting / formalizing collaborative data collection or method sharing</b>	Official documentation supporting/ formalizing collaborative data collection or method sharing between sectors	<b>Low score:</b> Data collection/ methods sharing have not been defined in any documentation. <b>High score:</b> Data collection/ methods sharing have been clearly defined in documentation.
<b>2.12 Collaborative design of surveillance protocols</b>	Collaboration across institutes, disciplines, and sectors to design surveillance protocols.	<b>Low score:</b> Surveillance protocols designed in a non-collaborative manner. <b>High score:</b> Appropriate collaborations exist across institutes,



		disciplines, and sectors to design surveillance protocols.
<b>2.13 Collaborative data collection</b>	Collaboration across institutes, disciplines and sectors for collection of surveillance data.	<b>Low score:</b> Surveillance data are collected in a non-collaborative manner. <b>High score:</b> Appropriate collaborations exist across institutes, disciplines and sectors for collection of surveillance data.
<b>2.14 Harmonization of laboratory techniques and procedures between sectors or surveillance components</b>	Sharing protocols to achieve homogeneity of laboratory results, or at a minimum, a means of the conversion of laboratory results across multiple sectors in order to use the data obtained interchangeably.	<b>Low score:</b> No harmonization of laboratory techniques and procedures between sectors/ surveillance components. <b>High score:</b> Laboratory techniques and procedures between sectors/ surveillance components are adequately harmonized.
<b>2.15 Evaluation and validation of data quality</b>	Evaluation and validation of the accuracy and the quality of source data (validity of samples for laboratory analysis, recording of history data, respect of delays between data collection and lab results).	<b>Low score:</b> No evaluation/ poor data quality for most actors. <b>High score:</b> Good data quality for all/ most actors.

## Target 2.2 Data sharing

Indicators	Definition of indicators	Scoring options
<b>2.21 Data sharing agreement</b>	Potential partners, strategies, guidelines and agreements (between data custodian and the data requestor) for data sharing have been identified.	<b>Low score:</b> No strategies, guidelines or agreement with partners for data sharing in the OHS system. <b>High score:</b> Appropriate strategies, guidelines and agreements for data sharing are in place.
<b>2.22 Completeness of shared data</b>	The shared data can serve its purpose in a particular context (such as data analysis, for example), including accuracy, completeness, reliability, relevance, and timeliness.	<b>Low score:</b> Shared data is not complete and cannot serve its purpose in a particular context. <b>High score:</b> Data is complete and can serve its purpose in a particular context.
<b>2.23 Data storage and accessibility</b>	The collaborators and stakeholders have the ability to access or retrieve data stored within a database or other repository. Users who have data access can store, retrieve, move or manipulate data.	<b>Low score:</b> Data are not accessible to collaborators and stakeholders. <b>High score:</b> Data are accessible to all collaborators and stakeholders identified as potential data sharing partners.
<b>2.24 Data management plan (mapping of available data)</b>	There is appropriate documentation describing how the data are acquired or produced, managed, described, and stored,	<b>Low score:</b> No proper data production, management, description, and storage plan. No standards about how to handle and





	what standards are used, and how data are handled and protected during and after the surveillance.	protect data during and after the surveillance. <b>High score:</b> Data production, management, description, and storage plans exist. Standards about how to handle and protect data during and after the surveillance are implemented.
<b>2.25 Interoperability (e.g. interoperable format)</b>	The system established to create, exchange and use data is based on clear and shared expectations regarding the content, context and meaning of data across sectors and disciplines in the OHS system.	<b>Low score:</b> The system is not based on clear and shared expectations regarding the content, context and meaning of data across sectors and disciplines. <b>High score:</b> The system is based on clear and shared expectations regarding the content, context and meaning of data across sectors and disciplines.

### Target 2.3 Data analysis and interpretation

Indicators	Definition of indicators	Scoring options
<b>2.31 Integrated data analysis between sectors or surveillance components</b>	Combining data from different sources into a single, unified view begins with the collection process, and includes steps such as cleaning, mapping, and transformation which, ultimately enables analytics tools to produce effective, meaningful and actionable surveillance results between sectors or surveillance components.	<b>Low score:</b> No/ poor integration of data analysis between sectors or surveillance components. <b>High score:</b> Integrated data analysis between sectors or surveillance components.
<b>2.32 Sharing of statistical analysis techniques (e.g. syndromic surveillance scripts)</b>	Data analysis and visualisation procedures, modalities and tools are shared between actors of the OHS system.	<b>Low score:</b> No sharing of data analysis and visualisation procedures, modalities and tools. <b>High score:</b> Data analysis and visualisation procedures, modalities and tools are adequately shared.
<b>2.33 Sharing of scientific expertise to interpret the results (e.g. to assess public health impact)</b>	The scientific expertise to explore, analyse and interpret the results is shared between actors of the OHS system.	<b>Low score:</b> No sharing of scientific expertise. <b>High score:</b> Appropriately shared scientific expertise.
<b>2.34 Common indicators used to analyse the data</b>	The data collected are consistent and use harmonized indicators for measuring trends over time are used across sectors and disciplines in OHS system.	<b>Low score:</b> No consistency or harmonization of collected data or of indicators across sectors and disciplines. <b>High score:</b> Collected data and indicators are consistent and



		harmonized across sectors and disciplines.
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## Target 2.4 Communication

Indicators	Definition of indicators	Scoring options
<b>2.41 Internal communication (within the OHS system)</b>	There is effective and timely communication, cooperation, coordination, and collaboration among actors within the surveillance system regarding what is expected or agreed.	<b>Low score:</b> No communication/ unacceptable delay in communication (regarding expectations and agreements) or in updating of joint communication platforms. <b>High score:</b> Communication as needed/expected or as planned in official documentation or agreed among actors.
<b>2.42 External communication policy/plan (e.g. joint communication to relevant stakeholders)</b>	There is effective and timely communication with relevant stakeholders in the surveillance system regarding what is agreed among actors.	<b>Low score:</b> No communication/ unacceptable delay in external communications <b>High score:</b> Communication (at least annually or) as planned in official documentation
<b>2.43 Dissemination to decision-makers (e.g. joint seminar intended for ministry officers)</b>	The OHS system relies on appropriate modalities for information dissemination and communication to decision-makers (conference, seminars intended for civil servants, etc.).	<b>Low score:</b> No appropriate modalities for information dissemination and communication to decision-makers. <b>High score:</b> Adequate systems exist for dissemination and communication of information to decision-makers.
<b>2.44 Recognition of the consequences of sharing information about a suspicion/event</b>	There is real-time sharing of information about the detection of a suspicion or case in one sector to other sectors, even in case of severe constraints related to the suspicions or cases in that sector (movement bans, reinforcement of controls, etc.)	<b>Low score:</b> No real-time sharing of information about the detection of a suspicion or case in one sector to other sectors. <b>High score:</b> Real-time sharing of information about the detection of a suspicion or case in one sector to other sectors.





## Dimension 3: Impact

### Target 3.1 Technical Outputs

Indicators	Definition of indicators	Scoring options
<b>3.11 Up-to-date information on hazard epidemiological situation</b>	Up-to-date information sharing and communication on (suspected) changes in the epidemiological situation. For example, increased animal-human spillover rates, or identification of traits that increase transmissibility.	<b>Low score:</b> No up-to-date information sharing and communication on the hazard. <b>High score:</b> Up-to-date information sharing and communication on the hazard.
<b>3.12 Detection of emergence (if relevant to the system under evaluation) or of an increased risk</b>	Timely detection of emerging pathogens (if relevant to the system under evaluation), or of an increase in risk of spillover from animals to humans.	<b>Low score:</b> No (timely) detection of emergence. <b>High score:</b> Timely detection of emergence, and assessment of associated risks.
<b>3.13 Increased effectiveness of the surveillance (timeliness, sensitivity, precision, robustness, etc.)</b>	Indicators to evaluate the effectiveness of the surveillance are defined and measured regularly. Indicators (timeliness, sensitivity, precision, robustness or other relevant indicators) show an increase in surveillance effectiveness.	<b>Low score:</b> No evaluation or no change (or loss) in effectiveness. <b>High score:</b> Marked increase in effectiveness.
<b>3.14 Reduced surveillance costs (financial, material, human)</b>	The costs and benefits associated with the surveillance are evaluated regularly. Surveillance efficiency is estimated in terms of resource use for implementation of surveillance and costs of communication campaigns (including financial, material, human resources).	<b>Low score:</b> No evaluation, or no change (or increase) in costs. <b>High score:</b> Marked decrease in costs.

### Target 3.2 Multisectorial added value

Indicators	Definition of indicators	Scoring option
<b>3.21 OH team (e.g. actors involved in surveillance)</b>	Consists of members of different disciplines working collaboratively, to set goals, make decisions and share resources and responsibilities to achieve better health outcomes.	<b>Low score:</b> No/limited number of actors identified as participating in the OHS system are involved in collaboration. <b>High score:</b> All actors in the domains of the OHS are involved in collaboration.
<b>3.22 OH network (e.g. stakeholders targeted by surveillance)</b>	Coordination of organizations or units using social mechanisms to achieve better health outcomes.	<b>Low score:</b> No/limited stakeholders across the domains are involved. <b>High score:</b> All/most of stakeholders across the domains are involved.



<b>3.23 Increased trust between surveillance actors</b>	Establishing, developing, and maintaining successful relational exchanges and trust among OHS actors.	<b>Low score:</b> Relations and trust between sectors have not improved. <b>High score:</b> Collaborations in the context of the OHS system have improved relations and trust between sectors.
<b>3.24 International collaboration/cooperation</b>	Establishing and developing cooperation for OH surveillance at an international level (among countries or/and with international agencies).	<b>Low score:</b> Limited efforts for establishing cooperation at international level. <b>High score:</b> Cooperation for the surveillance of the hazard of interest are established with international agencies or among countries.

### Target 3.3 Immediate outcomes

Indicators	Definition of indicators	Scoring options
<b>3.31 Capacity to inform epidemiology of hazard</b>	Capacity to inform the distribution, patterns, determinants, potential damage, harm or adverse effects of the hazard of interest in defined human and animal populations as well as on the environment, across all sectors.	<b>Low score:</b> No capacity to inform distribution, patterns, determinants, potential damage, harm or adverse effects of the hazard of interest in defined human and animal populations as well as on the environment. <b>High score:</b> Capacity to inform distribution, patterns, determinants, potential damage, harm or adverse effects of the hazard of interest in defined human and animal populations as well as on the environment.
<b>3.32 Increased awareness</b>	There is a good knowledge and understanding by OHS stakeholders and target groups of the distribution, patterns, determinants, potential damage, harm or adverse effects of the hazard of interest in defined human and animal populations as well as on the environment.	<b>Low score:</b> Surveillance stakeholders and target groups are not sufficiently aware of distribution, patterns, determinants, potential damage, harm or adverse effects of the hazard of interest in defined human and animal populations as well as on the environment. <b>High score:</b> Surveillance stakeholders and target groups are sufficiently aware of distribution, patterns, determinants, potential damage, harm or adverse effects of the hazard of interest in defined human and animal populations as well as on the environment.
<b>3.33 Research opportunities</b>	OHS system opens up insight to develop new research questions	<b>Low score:</b> No multisectoral/multidisciplinary collaborative



<b>(beyond surveillance)</b>	and opportunities to conduct multisectoral/ multidisciplinary collaborative research.	research exists. <b>High score:</b> Multisectoral/ multidisciplinary collaborative research initiatives were formed, based on the OHS system.
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### 3.4 Intermediate and ultimate outcomes

Indicators	Definition of indicators	Scoring options
<b>3.41 Interventions</b>	Evidence-based, effective and efficient intervention programs have been developed and implemented based on the OHS system, if deemed necessary.	<b>Low score:</b> No effective and efficient intervention programs developed and implemented. <b>High score:</b> Effective and efficient intervention programs have been developed and implemented.
<b>3.42 Policy changes</b>	Policy changes based on, or informed by, rigorously established objective evidence are derived from the OHS system.	<b>Low score:</b> No policy changes, based on surveillance results, were implemented. <b>High score:</b> Policy changed based on surveillance results.
<b>3.43 Behavioural changes</b>	Occurrence of behavioural changes (i.e. changes in habits and attitudes) to reduce disease risk, following interventions or activities related to the OHS system.	<b>Low score:</b> No behavioural changes have been observed in the target population. <b>High score:</b> Behavioural changes, aimed at reducing disease risks, have been observed in the target population.
<b>3.44 Advocacy</b>	Includes activities and publications to influence public policy, laws and budgets, and to educate government officials and the public about the importance of OH surveillance for the reduction of the risk related to the hazard.	<b>Low score:</b> There is no activity to support OHS. <b>High score:</b> Some activities are implemented to promote OHS.