# Evaluation attributes and economic criteria

Hoinville L *and al.* 2013

## 1. Organisational attributes

### 1.1. Attributes aimed at evaluating the management processes

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| Organisation and management | An assessment of organisational structures of the surveillance including whether the objectives are relevant and clearly defined and the existence of steering and technical committees whose members are representative of the surveillance stakeholders. The members of these committees should have appropriate expertise, clearly defined roles and responsibilities and should hold minuted meetings regularly to oversee the function of the system. |
| Training provision | Provision of adequate initial training and an ongoing program of training for those implementing the surveillance system, particularly those collecting the data |
| Performance indicators and evaluation | Whether performance indicators are routinely used to monitor system performance and whether periodic external evaluations are used to assess the system outputs in relation to its objectives |
| Resource availability | An assessment of the financial and human resources available for implementing the surveillance activity including the expertise and capability of personnel |

### 1.2. Attributes aimed at evaluating the technical processes

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| Data collection | The use of appropriate data sources and collection methods including automation of data collection where appropriate and the existence of a case definition and data collection protocol including an appropriate sampling strategy |
| Sampling strategy | The use of appropriate sampling strategies including the use of risk-based approaches and pooled sampling where appropriate. This could include a risk-based requirement calculations or risk-based sampling. The basis of the risks used in the design of the risk-based sampling strategy should be assessed. |
| Data storage and management | Appropriate use and documentation of data management systems for processing information, including data processing protocols, and effective use of data verification procedures and data storage and back-up procedures |
| Internal communication | An assessment of the methods used and ease of information exchange between all those involved in providing, managing, analysing and disseminating information for the surveillance system . The methods used to provide feedback to data providers and to increase their awareness about hazards and surveillance activities should also be assessed. |
| External communication /dissemination | An assessment of the data and information provided to those outside the surveillance system including the timeliness and types of output produced. The efforts made to disseminate these outputs including the use of web-based systems should also be assessed. |
| Laboratory testing and analyses | Whether testing is carried out using appropriate methods, including an assessment of diagnostic test sensitivity and specificity, with quality assurance scheme and timely and accurate delivery of results. |
| Data analysis | Whether appropriate methods are used for the analysis and interpretation of data at an appropriate frequency |
| Quality assurance | Whether the laboratory or other surveillance processes are quality assured or accredited |

## 2. Functional attributes

### 2.1. Attributes aimed at evaluating the system function

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| Stability and sustainability | The ability to function without failure (reliability), to be operational when needed (availability) and the robustness and ability of system to be ongoing in the long term (sustainability). |
| Acceptability and engagement | Willingness of persons and organisations to participate in the surveillance system, the degree to which each of these users is involved in the surveillance. Could include an assessment of stakeholder awareness of the system and their understanding of it. Could also assess their beliefs about the benefits or adverse consequences of their participation in the system including the provision of compensation for the consequence of disease detection. |

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| Simplicity | Refers to the surveillance system structure, ease of operation and flow of data through the system. |
| Flexibility | The ability to adapt to changing information needs or operating conditions with little additional time, personnel or allocated funds. The extent to which the system can accommodate collection of information about new health-hazards or additional/alternative types of data; changes in case definitions or technology; and variations in funding sources or reporting methods should be assessed. |
| Portability | Evaluating the possible use of the system in other circumstances or at a different location |
| Interoperability | Compatibility with and ability to integrate data from other sources and surveillance components |

### 2.2. Attributes aimed at evaluating the quality of the data collected

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| Data completeness and correctness | The proportion of data that was intended to be collected that actually was and the proportion of data entries that correctly reflect the true value of the data collected |
| Historical data | Quality and accessibility of archived data |

## 3. Attributes related to surveillance effectiveness

### 3.1. Attributes aimed at evaluating inclusion

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| Coverage | The proportion of the population of interest (target population) that is included in the surveillance activity. |
| Representativeness | The extent to which the features of the population of interest are reflected by the population included in the surveillance activity, these features may include herd size, production type, age, sex or geographical location or time of sampling (important for some systems e.g. for vector borne disease) |
| Multiple utility | Whether the system captures information about more than one hazard |

### 3.2. Attributes aimed at evaluating the quality of the evidence provided

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| False alarm rate (inverse of specificity) | Proportion of negative events (e.g. non-outbreak periods) incorrectly classified as events (outbreaks). This is the inverse of the specificity but is more easily understood than specificity. |
| Bias | The extent to which a prevalence estimate produced by the surveillance system deviates from the true prevalence value. Bias is reduced as representativeness is increased |
| Precision | How closely defined a numerical estimate is. A precise estimate has a narrow confidence interval. Precision is influenced by prevalence, sample size and surveillance approach used. |

**Attributes aimed at evaluating the quality of the evidence provided (3.2 continued)**

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| Timeliness | Timeliness can be defined in various ways<br>• This is usually defined as the time between any two defined steps in a surveillance system, the time points chosen are likely to vary depending on the purpose of the surveillance activity.<br>• For planning purposes timeliness can also be defined as whether surveillance detects changes in time for risk mitigation measures to reduce the likelihood of further spread<br>The precise definition of timeliness chosen should be stated as part of the evaluation process. Some suggested definitions for the RISKSUR project are;<br>**For early detection**<br>Measured using time - Time between introduction of infection and detection of outbreak<br>Measured using case numbers - Number of animals/farms infected when outbreak detected<br>**For demonstrating freedom**<br>Measured using time - Time between introduction of infection and detection of presence by surveillance system<br>Measured using case numbers – Number of animals/farms infected when infection detected<br>**For case detection to facilitate control**<br>Measured using time - Time between infection of animal (or farm) and their detection<br>Measured using case numbers – Number of other animals / farms infected before case detected<br>**For detecting a change in prevalence**<br>Measured using time - Time between increase in prevalence and detection of increase |

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| | Measured using case numbers - Number of additional animals/farms infected when prevalence increase is identified. |
| Sensitivity | Sensitivity of a surveillance system can be considered on three levels.<br>• **Surveillance sensitivity (case detection)** refers to the proportion of individual animals or herds in the population of interest that have the health-related condition of interest that the surveillance system is able to detect<br>• **Surveillance sensitivity (outbreak detection)** refers to the probability that the surveillance system will detect a significant increase (outbreak) of disease. This may be an increase in the level of a disease that is not currently present in the population or the occurrence of any cases of disease that is not currently present. **Surveillance sensitivity (presence)** –refers to the probability that disease will be detected if present at a certain level (prevalence) in the population. |
| PPV | Probability that health event is present given that health event is detected |
| NPV | The probability that no health event is present given that no health event is detected |
| Repeatability | How consistently the surveillance component performance can be maintained over time. |
| Robustness | The ability of the surveillance system to produce acceptable outcomes over a range of assumptions about uncertainty by maximising the reliability of an adequate outcome. Robustness can be assessed using info-gap models. |

## 4. Attributes assessing surveillance value

### 4.1. Attributes aimed at assessing value

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| Cost | The evaluation should list and quantify each of the resources required to operate the surveillance system and identify who provides this resource. These resources could include: time andpersonnel (labour), services (e.g. laboratory tests, postage), travel, consumables, and equipment. |
| Technical impact | This indicates the changes that have been 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 behaviour and changes in mitigation measures and particularly changes in disease occurrence |
| Benefit | The benefit of surveillance quantifies the monetary and non-monetary positive direct and indirect consequences produced by the surveillance system and assesses whether users are satisfied that their requirements have been met. This includesfinancial savings, better use of resources and any losses avoided due to the existence of the system and the information it provides. These avoided losses may include the avoidance of<br>• Animal production losses<br>• Human mortality and morbidity<br>• Decrease in consumer confidence<br>• Threatened livelihoods<br>• Harmed ecosystems<br>• Utility loss<br>Often, the benefit of surveillance estimated as losses avoided can only be realised by implementing an intervention. Hence, it is necessary to also assess the effect of the intervention and look at surveillance, intervention and loss avoidance as a three-variable relationship.<br>Further benefits of surveillance include maintained or increased trade, improved ability to react in case of an outbreak of disease, maintaining a structured network of professionals able to react appropriately against a (future) threat, maintaining a critical level of infrastructure for disease control, increased understanding about a disease, and improved ability to react in case of an outbreak of disease. |

## 5. Economic efficiency criteria

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| Optimal economic efficiency | The net benefit to society shall be maximised. Achieved where the marginal costs of least-cost combinations of surveillance and intervention resources equal the marginal benefits of mitigation (=loss avoidance). |
| Economic acceptability | Ensuring that the benefits (=loss avoidance) generated by a mitigation policy at least cover the costs for surveillance and intervention. |
| Least-cost choice | Ensuring that a technical target for disease mitigation (e.g. time to detection) is achieved at minimum cost without quantifying the benefit. |