The EVA tool: a decision support tool for the evaluation of surveillance systems

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Within the framework of RISKSUR WP5 (Evaluation of epidemiological and economic effectiveness of surveillance systems)

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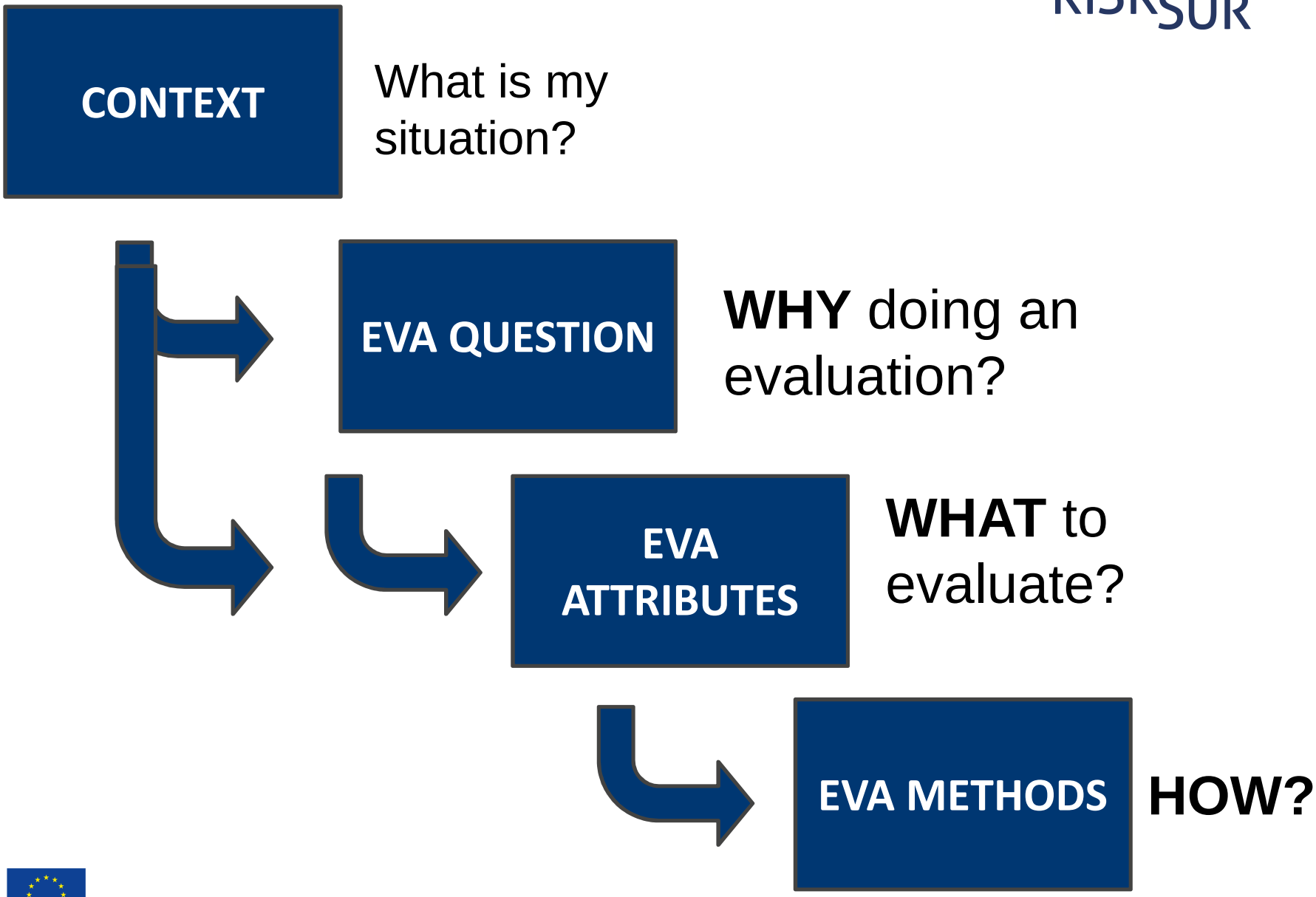
Objectives of the EVA tool

1. To provide guidance on the evaluation process
2. To provide a tool kit to perform the evaluation
   a) Links with existing methods and tools
   b) Innovative tools
3. To provide information on feasibility of the evaluation
4. To provide strenghts and limits of the evaluation
5. **Not an evaluation tool**

Calba, C, Goutard, F. L, Hoinville, L., Hendrikx, P., Lindberg, A., Saegerman, C. & Peyre, M. Surveillance systems evaluation: a review of the existing guides. BMC Public Health (under revision)

EVA TOOL Process



Introduction to Evaluation concepts

Surveillance system | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- The EVA tool
- Evaluation concepts
- Describe Evaluation context
- Select Evaluation question
- Evaluation attributes and economic criteria
- Economic evaluation
- Epidemiological assessment
- Final list of attributes
- Summary and Report

What is the EVA tool?

EVA tool is a decision making tool for the design of Surveillance system evaluation protocol: **Why do I need/want to evaluate my system ? What should I assess ? How can I do the evaluation?**

Objectives of the EVA tool

TEXT (What the tool can do + What the tool can not do)

A 4 steps process

1. Describe the evaluation context
2. Select the evaluation question
3. Identify the evaluation attributes to be assessed
   a. Identify the evaluation attributes
   b. Identify the methods
   c. Select measurable attributes
4. Summary and report

Introduction to Evaluation concepts

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What is Evaluation?

TEXT/ definition

- Definition of system vs component
- What is an evaluation attribute

What is Economic Evaluation?

TEXT/ definition

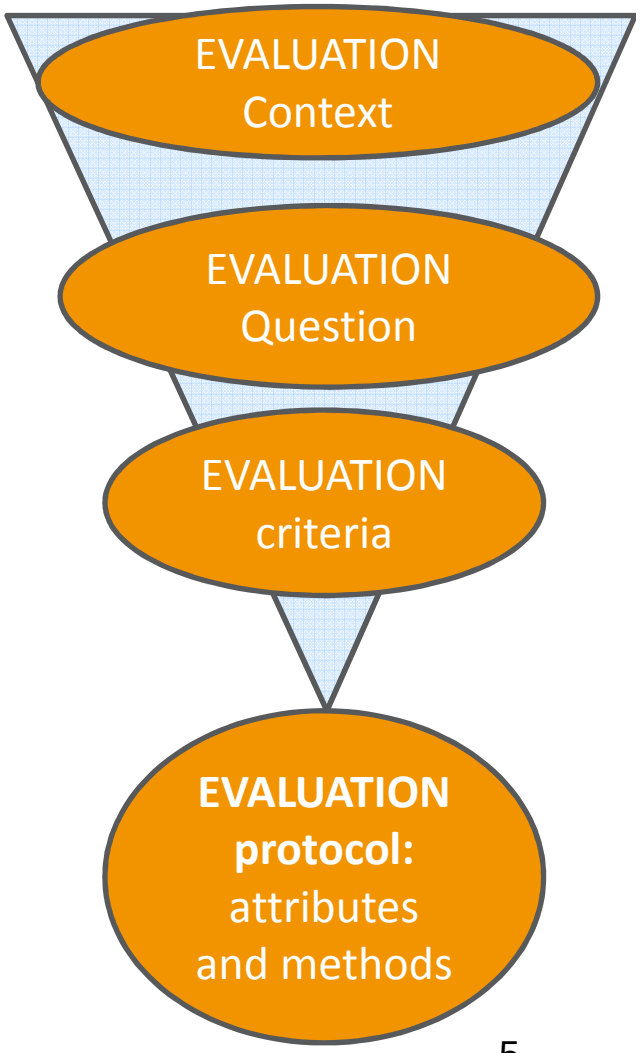
What is an assessment criteria?

-performance assessment criteria

TEXT/ definition

- Economic assessment criteria

What is en evaluation attribute?



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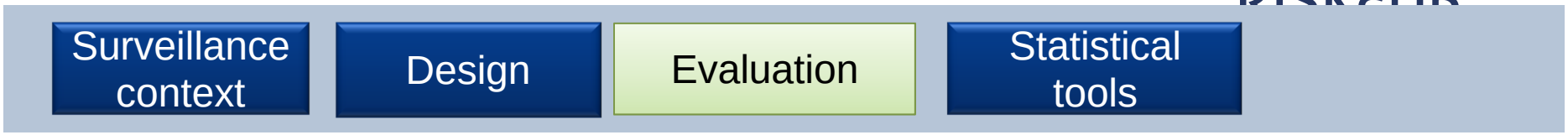
- Cost analysis → Definition, Method, link to tools → Cost analysis tool
- Least-cost analysis → Definition, Method, link to tools
- Cost-effectiveness analysis → Definition, Method, link to tools
- Cost-benefit analysis → Definition, Method, link to tools

Introduction to Evaluation concepts



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STRUCTURAL

- Organisation and management
- Training provision
- Performance indicators and evaluation
- Resource availability
- Internal communication
- External communication and dissemination
- Laboratory testing and analyses
- Data analysis
- Quality assurance
- Data storage and management
- Sampling strategy
- Data collection

FUNCTIONAL

- Stability and sustainability
- Acceptability and engagement
- Simplicity
- Flexibility
- Portability
- Interoperability
- Data completeness and correctness
- Historical data

PERFORMANCE

- Coverage
- Representativeness
- Multiple utility
- False alarm rate
- Bias
- Precision
- Timeliness
- Sensitivity
- NPV
- PPV
- PPV
- Repeatability
- Robustness

ECONOMIC

- Cost
- Benefits
- Optimal economic efficiency
- Economic acceptability
- Least choice choice

Step 1: Describe the evaluation context

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
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Selected surveillance system	AI surveillance

Name of the Evaluation design process

Automatic upload of the name

Strengths and weaknesses of current appro

Any concerns about current approach

Stakeholder concerns about current appro

Alternative strategies to consider

Current cost estimate

Proposed change to budget

Budget limit

Summary of the surveillance context

Hazard	**Highly Pathogenic Avian Influenza (HPAI) H5N1**
Target species	Domestic poultry, Wildbirds
Surveillance purpose	Case finding and early detection
Study region	Nationwide
Hazard situation in this region	• 2006: first introduction • 2007-2015: endemic
Components	• Active participatory surveillance • Passive surveillance (voluntary reporting of poultry cases) • Active surveillance in wildbirds

NEXT

Step 2: Select the evaluation question

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
  - Guidance Evaluation question
  - Evaluation question – pi
- Evaluation attributes and economic criteria
- Summary and Report

Step 2: Select the evaluation question

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
  - Guidance Evaluation question
  - Evaluation question – pick
- Evaluation attributes and economic criteria
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Evaluation question (pick list)	Select
Q1. Ascertain if one or more surveillance component(s) or system(s) is/are capable of meeting a technical objective or target	●
Q2. Assess the costs of surveillance component(s) or system(s) (out of two or more) that achieve(s) a defined objective and rank them according to costs to identify the least-cost option(s)	○
Q3. Assess the effectiveness of 2 or more surveillance component(s) or system(s) in relation to a surveillance objective and rank the options accordingly	○
Q4. Assess if there is/ are (a) surveillance component(s) or system(s) that achieve a higher effectiveness than another one at the same cost	○
Q5. Ascertain if a surveillance component or system generates a net benefit in monetary terms for society, industry, animal holder	○
Q6. Ascertain if a surveillance component or system generates a net benefit in non-monetary terms for society, industry, animal holder	○
Q7. Identify the surveillance system (out of two or more) that generates the biggest net benefit in monetary terms for society, industry, animal holder	○
Q8. Identify the surveillance system (out of two or more) that generates the biggest net benefit in non-monetary terms for society, industry, animal holder	○
Q9. Identify how surveillance attributes could be improved	○
Q10. Identify how surveillance attributes could be improved and the priority for corrective action in terms of costs	○

Step 2: Select the evaluation question

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
- Guidance to define the Evaluation question
- Evaluation question – pick list
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Introduction to the guidance process

- Please answer the following 7-10 questions.
- At the end of the process you will be directed to an evaluation question which is adapted to your context and needs.
- If you feel that none of the proposed evaluation questions are relevant, please go through the process again
- If you already know what your evaluation question is, you can select directly your question from the pick-list

NEXT

Step 2: Select the evaluation question

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
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Introduction to the guidance process

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1. Evaluations can be carried out at system or component level, at what level would you like to carry out your evaluation /improvement?

- (●) Evaluate / improve one or more distinct surveillance components
- ( ) Evaluate a surveillance system

NEXT

Step 2: Select the evaluation question

Introduction to Evaluation of surveillance
Describe Evaluation context
Select Evaluation question
Guidance to define the Evaluation question
Evaluation question – pick list
Evaluation attributes and economic criteria
Summary and Report

Pathway answers
1 Eva level? Components

2. What is your evaluation objective

- ○ Evaluate how well surveillance is performing
- ● You know that your effectiveness needs to be improved and you want to evaluate it (within a redesign process)
- ○ Re-design surveillance to improve its performance

Go to DESIGN section

NEXT

Step 2: Select the evaluation question

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
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Pathway answers
1 Eva level? Components
2. Eva objective? Improve effectiveness (Re-design)

3. Do you want to consider the costs?

○ YES

● NO

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Evaluation question pathway: **Example 1**

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
- Guidance to define the Evaluation question
- Evaluation question – pick list
- Evaluation attributes and economic criteria
- Summary and Report

Pathway answers
1 Eva level? Components
2. Eva objective? Improve effectiveness (Re-design
3. Costs considered? NO

3. Do you have a technical target to meet?

(●) YES

EVA Q1 Assess whether one or more surveillance component(s) is/are capable of meeting a technical effectiveness target

( ) NO

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Evaluation question pathway: **Example 1**

Surveillance context | Design | Evaluation | Statistical tools

Introduction to Evaluation of surveillance

Describe Evaluation context

Select Evaluation question

Guidance to define the Evaluation question

Evaluation question – pick list

Evaluation attributes and economic criteria

Summary and Report

Pathway answers
1 Eva level? Components
2. Eva objective? Technical performances/design &Re-design
3. Costs considered? NO

3. Do you have a technical target to meet?

○ YES

● NO

EVA Q4a Assess the technical effectiveness of one or more surveillance components

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Step 2: Select the evaluation question

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
  - Guidance to define the Evaluation question
  - Evaluation question – pick list
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Pathway answers

1. Eva level? Components
2 Which objective? Evaluation
3. *Which step*? Evaluate the efficiency and/or effectiveness of component
4. *Compare alternatives*? YES
5. *Alternatives have same objectives*? YES
6. *What do you want to include*? COSTS and EFFECTIVENESS

7. Do the alternative components you are comparing achieve a target effectiveness?

● YES There is a target effectiveness

EVA Q2a. Assess the costs of surveillance components (out of two or more) that achieve a defined effectiveness target

○ NO There is no target effectiveness

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Step 4: Select the evaluation attributes

Surveillance system | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
- Evaluation attributes and economic criteria
  - Economic evaluation
  - Epidemiological assessme
  - Final list of a
- Summary and Report

Selected components	**1. Active surveillance in wildbirds (random sampling)** **2. Active surveillance in wild birds (risk-based sampling)**
Surveillance goal	Early detection
Evaluation question	Assess the costs of surveillance components (out of two or more) that achieve a defined effectiveness target
Assessment criteria	Effectiveness and Least-cost

Cost	Definition and methods (TEXT)
Least-cost	Definition and methods (TEXT)
Optimisation	Definition and methods (TEXT)
Benefit	Definition and methods (TEXT)

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Bon boutons

Step 4: Select the evaluation attributes

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
- Evaluation attributes and economic criteria
  - Economic evaluation
  - Epidemiological assessment
  - Final list of attributes
- Summary and Report

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Selected components	**Active surveillance in wildbirds**
Surveillance goal	Early detection
Evaluation question	Assess the costs of surveillance components (out of two or more) that achieve a defined effectiveness target
Assessment criteria	Effectiveness and Least-cost

Attribute name	Attribute definition	Rank	Relevance	Assessment method
SENSITIVITY	probability that disease will be detected if present at a certain level (prevalence) in the population	**Highly relevant**	Target effectiveness measure as defined by regulation	Fill in assessment form
Acceptability	Willingness of persons and organisations to participate in the surveillance system, the degree to which each of these users is involved in the surveillance.	**Highly relevant**		Fill in assessment form
False alarm rate	Proportion of negative events (e.g. non-outbreak periods) incorrectly classified as events (outbreaks). (This is the inverse of the specificity)	**Not relevant**	less important for early detection and least-cost analysis	**N/A**

NEXT

Step 4: Select the evaluation attributes

Surveillance context | Design | Evaluation | Statistical tools

Introduction to Evaluation of surveillance

Describe Evaluation context

Select Evaluation question

Evaluation attributes and economic criteria

Economic evaluation

Epidemiological assessment

Final list of attributes

Summary and Report

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SENSITIVITY

Attribute assessment form

Selected method	Assessment method	Data requirement	Expertise required	Are the data available?	References
●	Capture Recapture Multilist approach	- 2 independent sources of data or 3 sources Data collection protocol	- Logistic modeling - R software	o yes o no o data collection needed	*Vergne et al. 2012* *Vergne et al. 2014*
○	Capture Recapture Unlist approach	- 1 list of data - Sufficient number of case/suspicions Data collection protocol	- Logistic modeling - R software	o yes o no o data collection needed	
○	Scenario tree analysis			o yes o no o data collection needed	

Step 4: Select the evaluation attributes

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
- Summary of Evaluation criteria
- Evaluation attributes and economic criteria
  - Economic evaluation
  - Epidemiological assessment
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Selected components	**Active surveillance in wildbirds**
Surveillance goal	Early detection
Evaluation question	Assess the costs of surveillance components (out of two or more) that achieve a defined effectiveness target
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Attribute name	Attribute definition	Rank	Relevance	Assessment method
SENSITIVITY	probability that disease will be detected if present at a certain level (prevalence) in the population	**Highly relevant**	Target effectiveness measure as defined by regulation	Multilist Capture recapture Data available
Acceptability	Willingness of persons and organisations to participate in the surveillance system, the degree to which each of these users is involved in the surveillance.	**Highly relevant**		Fill in assessment form
False alarm rate	Proportion of negative events (e.g. non-outbreak periods) incorrectly classified as events (outbreaks). (This is the inverse of the specificity)	**Not relevant**	less important for early detection and least-cost analysis	**N/A**

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Step 4: Select the evaluation attributes

Surveillance context | Design | Evaluation | Statistical tools

- Introduction to Evaluation of surveillance
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  - Print pdf report

Selected components	**1. Active surveillance in wildbirds (random sampling)** **2. Active surveillance in wild birds (risk-based sampling)**
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Evaluation question	Assess the costs of surveillance components (out of two or more) that achieve a defined effectiveness target
Assessment criteria	Effectiveness and Least-cost

Final list of evaluation attributes

Attribute name	Assessment method	Data collection needed
SENSITIVITY	Multilist Capture recapture Data available	NO
Acceptability	Participatory approaches	YES
COSTS	Assessment of variable costs, differences between component 1 and 2. Cost calculation spread-sheet	NO

Summary of the Evaluation protocol for the case study: XXX……

Date	21 October 2014
Report filled in by (surveillance system expert or coordinator)	Lucy Snow, AHPA
Report validated by (Evaluation expert)	Marisa Peyre, Cirad

Characteristic	Details
Case study description	
Hazard	
Target species	
Surveillance purpose	
Study region	
Hazard situation in this region	
Components	
Evaluation questions	1. 2.

……Saut de page ……

Assessment criteria	Technical target=effectiveness Economic criteria=none? Or cost (compare the cost of the most effective options?)
Evaluation attributes (final list)	

Evaluation attribute selected	**Rank**	**Assessment methods and tools**	**Data availability**	**Competence availability**
Sensitivity	1	CR/ Unilist zero inflated model (current component) and Simulation model (risk-based component)	Yes, simulation data for novel design	Yes
Timeliness	1	OASIS (current component); Simulation model (novel design)	Yes	Yes
Risk criteria selection	1	EVARisk (method developed within RISKSUR)	Yes	Yes
False alarm rate	2			
Multiple utility	1	Not available Qualitative: to be developed within RISKSUR?	*NA*	*NA*
Availability and sustainability	1	Qualitative: OASIS tool	Yes	Yes
Acceptability and engagement	1	Participatory survey	NO, not possible to collect	NA
Simplicity	1	Qualitative: OASIS tool	Yes	Yes
Cost	1	OASIS cost analysis module	No to be estimated, simple information to be collected	Yes

Advantages of this case study	
Disadvantages of this case study	

OUTPUTS

- Decision Support Tool: guidance and documentation of decision process
- Practical tool: link to methods, tools
- Emphasize challenges of the evaluation process
  - Feasibility of the evaluation
  - Quality of the evaluation
  - Interpretation of the results

Innovations

- Evaluation of acceptability using participatory approaches
- Risk-selection criteria evaluation tool (EVARIsk)

PERSPECTIVES

- Positioning the results back in the global context

- Integration of surveillance in general context and priorities

Thanks for your attention!

Contact

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