The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement N° 305169.

Within the framework of RISKSUR WP5
(Evaluation of epidemiological and economic effectiveness of surveillance systems)
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 strengths and limits of the evaluation
5. Not an evaluation tool

EVA TOOL Process

CONTEXT

What is my situation?

EVA QUESTION

WHY doing an evaluation?

EVA ATTRIBUTES

WHAT to evaluate?

EVA METHODS

HOW?
Introduction to Evaluation concepts

**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

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 an evaluation attribute?
# Introduction to Evaluation concepts

<table>
<thead>
<tr>
<th>Surveillance context</th>
<th>Design</th>
<th>Evaluation</th>
<th>Statistical tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Evaluation of surveillance</td>
<td>Cost analysis</td>
<td>Least-cost analysis</td>
<td>Cost analysis tool</td>
</tr>
<tr>
<td>The EVA tool</td>
<td>Cost-effectiveness analysis</td>
<td>Cost-effectiveness analysis</td>
<td>Definition, Method, link to tools</td>
</tr>
<tr>
<td>Evaluation concepts</td>
<td>Evaluation attributes</td>
<td>Cost-benefit analysis</td>
<td>Definition, Method, link to tools</td>
</tr>
<tr>
<td>Economic Evaluation methods</td>
<td>Select Evaluation question</td>
<td></td>
<td>Summary and Report</td>
</tr>
<tr>
<td>Evaluation attributes and economic criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Introduction to Evaluation concepts

## Introduction to Evaluation of surveillance

### The EVA tool
- 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

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

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

## Surveillance context

### Design

### Evaluation

### Statistical tools
### Summary of the surveillance context

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

### Evaluation 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

### Selected surveillance system

- **AI surveillance**

### Evaluation context

- **Name of the Evaluation design process:**
  - Automatic upload of the name

- **Strengths and weaknesses of current approach:**

- **Any concerns about current approach:**

- **Stakeholder concerns about current approach:**

- **Alternative strategies to consider:**

- **Current cost estimate:**

- **Proposed change to budget:**

- **Budget limit:**

---

**Step 1: Describe the evaluation context**

**Surveillance context**

**Design**

**Evaluation**

**Statistical tools**

- Introduction to Evaluation of surveillance
- Describe Evaluation context
- Select Evaluation question
- Evaluation activities and economic criteria
- Summary and Report

**Print pdf report**
Step 2: Select the evaluation question

Introduction to Evaluation of surveillance
Describe Evaluation context
Select Evaluation question
Guidance Evaluation question
Evaluation question – pick
Evaluation attributes and economic criteria
Summary and Report
Step 2: Select the evaluation question

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

Evaluation question (pick list)

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
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.
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 or select directly your question from the pick-list.

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
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

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
Step 2: Select the evaluation question

Pathway answers
1. Eva level? Components
   2. Eva objective? Improve effectiveness (Re-design)

3. Do you want to consider the costs?
   - YES
   - NO
Evaluation question pathway: **Example 1**

**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**
Evaluation question pathway: **Example 1**

**Surveillance context**

Introduction to Evaluation of surveillance

Describe Evaluation context

**Design**

**Evaluation**

**Statistical tools**

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
- [x] NO

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

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NEXT
Step 2: Select the evaluation question

- Surveillance context
- Design
- Evaluation
- Statistical tools

**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
   - NO There is no target effectiveness

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

Print pdf report
### Step 4: Select the evaluation attributes

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

#### Design
- Summary and Report

#### Evaluation
- 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

#### Statistical tools
- Cost
  - Definition and methods (TEXT)
- Least-cost
  - Definition and methods (TEXT)
- Optimisation
  - Definition and methods (TEXT)
- Benefit
  - Definition and methods (TEXT)
**Step 4: Select the evaluation attributes**

### Selected components

<table>
<thead>
<tr>
<th>Active surveillance in wildbirds</th>
</tr>
</thead>
</table>

### 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

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

---

**Print pdf report**

---

**NEXT**
### Attribute assessment form

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

**Notes:**
- **Capture Recapture Multilist approach**
  - Requires 2 independent sources of data or 3 sources.
  - Expertise required: Logistic modeling using R software.
  - Data collection protocol.
  - Are the data available? Yes...

**References:**
- Vergne et al. 2012
- Vergne et al. 2014
### Surveillance context

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

### Design

### Evaluation

#### 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

<table>
<thead>
<tr>
<th>Attribute name</th>
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<th>Relevance</th>
<th>Assessment method</th>
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<td><strong>SENSITIVITY</strong></td>
<td>Probability that disease will be detected if present at a certain level (prevalence) in the population</td>
<td><strong>Highly relevant</strong></td>
<td>Target effectiveness measure as defined by regulation</td>
<td>Multilist Capture recapture Data available</td>
</tr>
<tr>
<td><strong>Acceptability</strong></td>
<td>Willingness of persons and organisations to participate in the surveillance system, the degree to which each of these users is involved in the surveillance.</td>
<td><strong>Highly relevant</strong></td>
<td></td>
<td>Fill in assessment form</td>
</tr>
<tr>
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<td><strong>Not relevant</strong></td>
<td>less important for early detection and least-cost analysis</td>
<td>N/A</td>
</tr>
</tbody>
</table>

---

### Economic assessment

- **Examples**
- **Statistical tools**
- **Admin Evaluation**
- **Design**
- **Surveillance context**

---

**Step 4: Select the evaluation attributes**

- **Evaluation context**
- **Design**
- **Evaluation**
- **Statistical tools**
## Step 4: Select the evaluation attributes

<table>
<thead>
<tr>
<th>Surveillance context</th>
<th>Design</th>
<th>Evaluation</th>
<th>Statistical tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Evaluation of surveillance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe Evaluation context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select Evaluation question</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation attributes and economic criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic evaluation</td>
<td></td>
<td></td>
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<tr>
<td>Epidemiological assessment</td>
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<tr>
<td>Final list of attributes</td>
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<tr>
<td>Surveillance context</td>
<td>Design</td>
<td>Evaluation</td>
<td>Statistical tools</td>
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<tr>
<td>Surveillance context</td>
<td>Design</td>
<td>Evaluation</td>
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</tr>
<tr>
<td>Surveillance context</td>
<td>Design</td>
<td>Evaluation</td>
<td>Statistical tools</td>
</tr>
</tbody>
</table>

**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

**Final list of evaluation attributes**

<table>
<thead>
<tr>
<th>Attribute name</th>
<th>Assessment method</th>
<th>Data collection needed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SENSITIVITY</strong></td>
<td>Multilist Capture recapture Data available</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Acceptability</strong></td>
<td>Participatory approaches</td>
<td>YES</td>
</tr>
<tr>
<td><strong>COSTS</strong></td>
<td>Assessment of variable costs, differences between component 1 and 2. Cost calculation spread-sheet</td>
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</tr>
</tbody>
</table>
### Summary of the Evaluation Protocol for the Case Study: XXX

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study description</td>
<td>X</td>
</tr>
<tr>
<td>Hazards</td>
<td>X</td>
</tr>
<tr>
<td>Target species</td>
<td>X</td>
</tr>
<tr>
<td>Surveillance purpose</td>
<td>X</td>
</tr>
<tr>
<td>Study region</td>
<td>X</td>
</tr>
<tr>
<td>Hazard situation in this region</td>
<td>X</td>
</tr>
<tr>
<td>Components</td>
<td>X</td>
</tr>
<tr>
<td>Evaluation questions</td>
<td>1. X</td>
</tr>
<tr>
<td></td>
<td>2. X</td>
</tr>
</tbody>
</table>

Date: 21 October 2014

Report filled in by (surveillance system expert or coordinator): Lucy Snow, AHPA

Report validated by (evaluation expert): Marisa Peyre, CIRAD
<table>
<thead>
<tr>
<th>Assessment criterion</th>
<th>Technical criteria</th>
<th>Economic criteria</th>
<th>Evaluation attribute selected</th>
<th>Rank</th>
<th>Assessment methods and tools</th>
<th>Data availability</th>
<th>Competence availability</th>
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</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td></td>
<td></td>
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<td>1</td>
<td>CR/Utilist zero-inflated-model (current component) and Simulation model (risk-based component)</td>
<td>Yes, simulation data for novel design</td>
<td>Yes</td>
</tr>
<tr>
<td>Timeliness</td>
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<td>OASIS (current component); Simulation model (novel design)</td>
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<tr>
<td>Risk criteria selection</td>
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<td>1</td>
<td>EVARisk (method developed within RISKSUR)</td>
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<td>Yes</td>
</tr>
<tr>
<td>False alarm rate</td>
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<td></td>
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<td>2</td>
<td></td>
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</tr>
<tr>
<td>Multiple utility</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>Not available; Qualitative: to be developed within RISKSUR?</td>
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<td>NA</td>
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<tr>
<td>Availability and sustainability</td>
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<td>Qualitative: OASIS tool</td>
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<tr>
<td>Acceptability and engagement</td>
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<td>Participatory survey</td>
<td>NO, not possible to collect</td>
<td>NA</td>
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<tr>
<td>Simplicity</td>
<td></td>
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<td>1</td>
<td>Qualitative: OASIS tool</td>
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<td>Yes</td>
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<td>Cost</td>
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<td>OASIS cost analysis module</td>
<td>No-to-be-estimated, simple information to be collected</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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!
The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement N° 305169.

Contact

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