# What is an epidemiological surveillance network?

**FETPv Training session**

Design and evaluation of animal health surveillance systems

25th and 27th April 2016, Qingdao, China



**cirad**
LA RECHERCHE AGRONOMIQUE
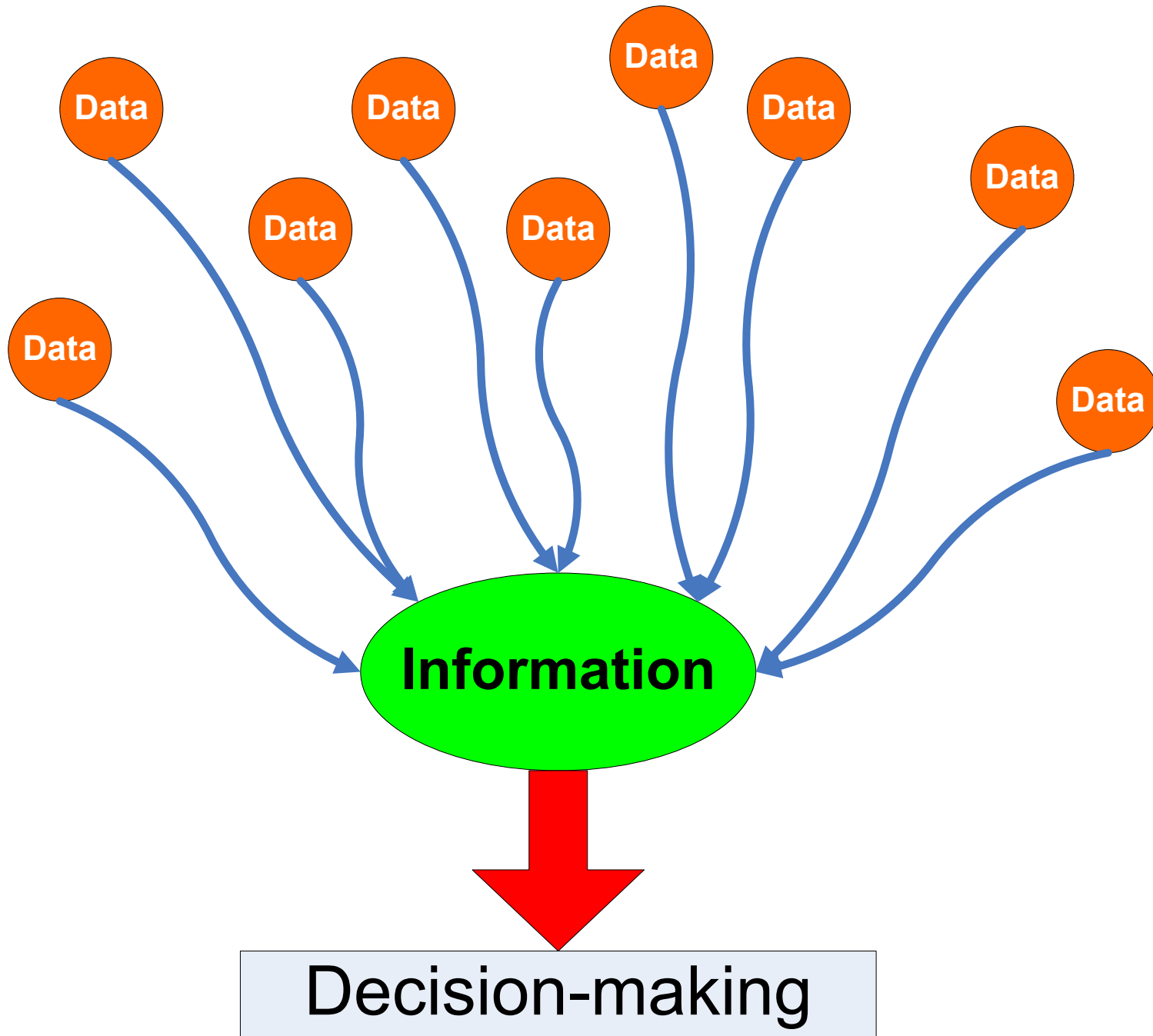POUR LE DÉVELOPPEMENT

# Definition of surveillance

- Disease surveillance in animal health is the ongoing systematic collection, analysis and interpretation of data and the dissemination of information to those who need to know in order to take action.

Zepeda C. 2009

Zepeda C. 2009

Zepeda C. 2009
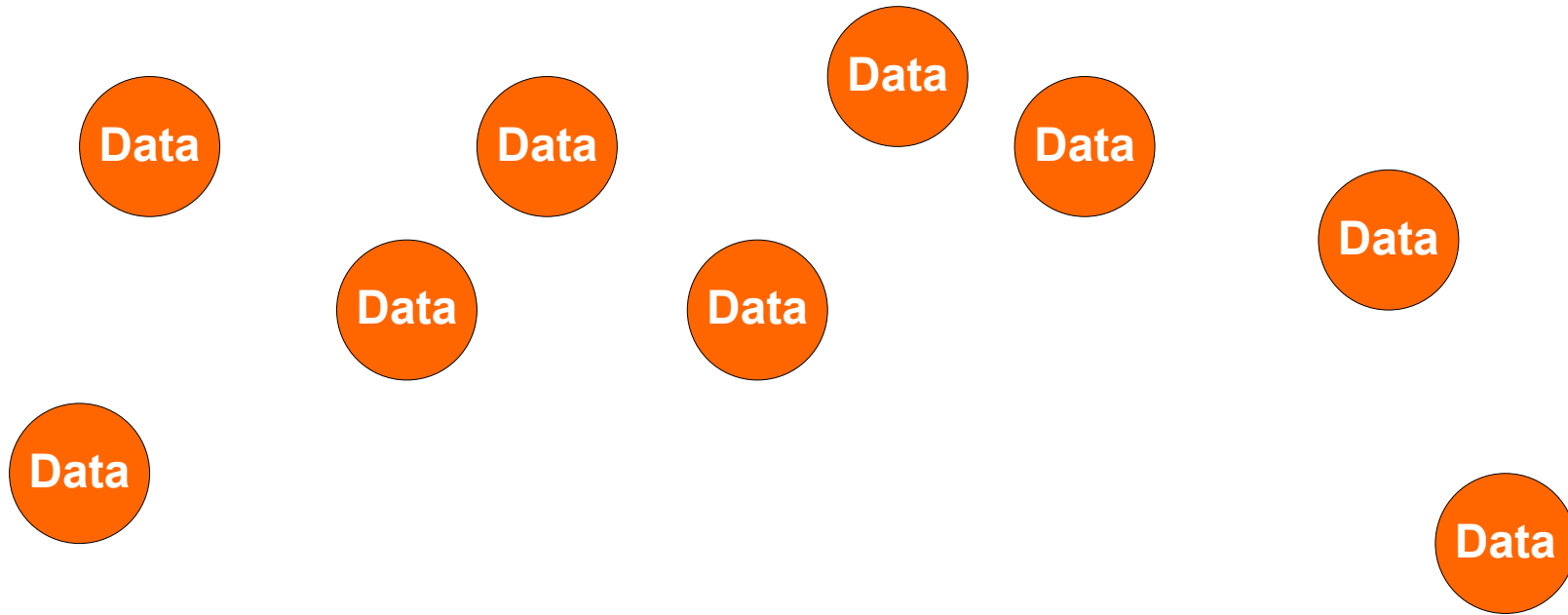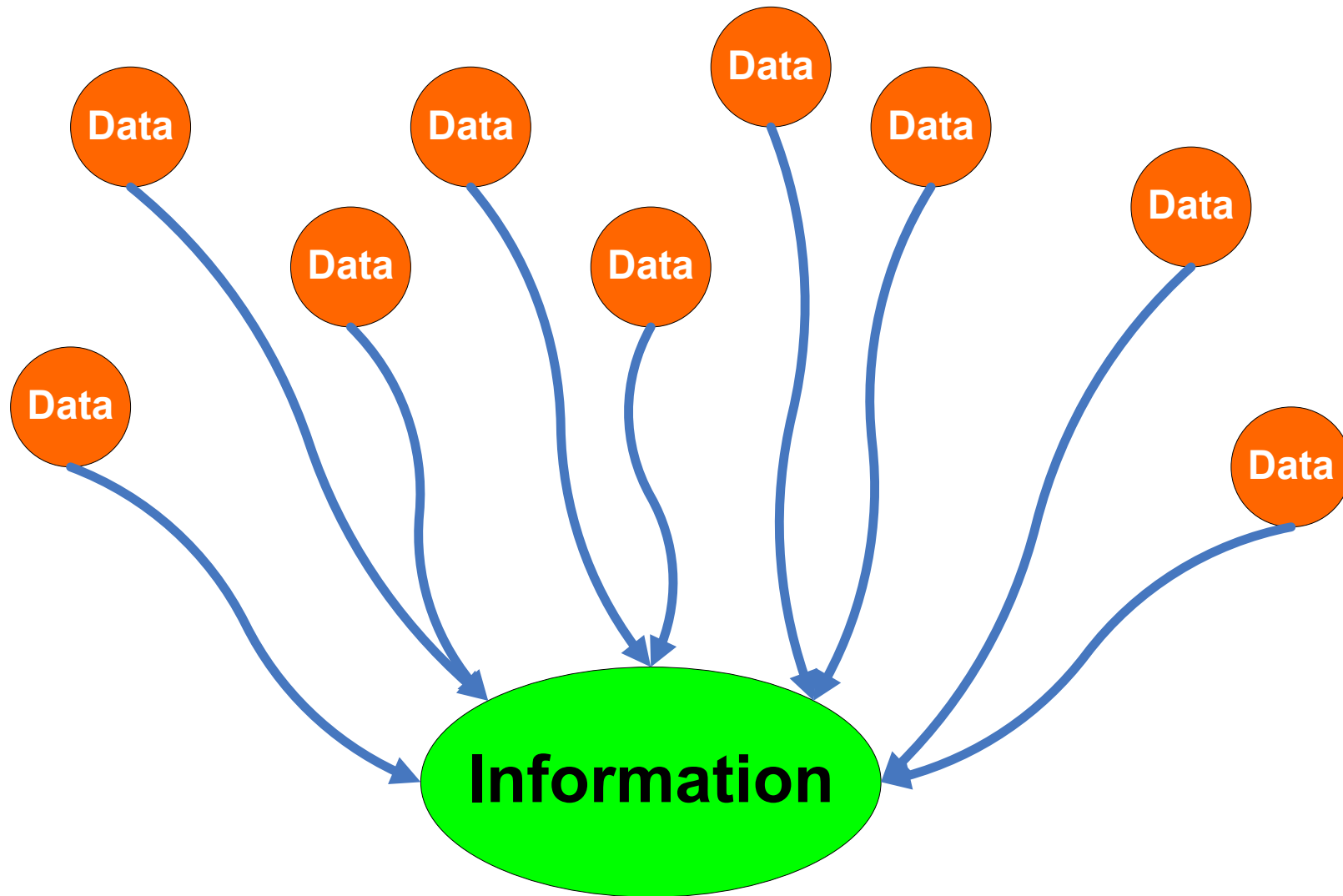
# Surveillance vs. survey

- **Surveillance is usually based on information collected as part of routine health system**
  - although it may sometimes be based on repeated structured surveys.

- **A survey may be defined as an investigation in which specific information is collected during restricted time.**
  - May be used to test hypothesis.

# Surveillance and monitoring

## Surveillance

- Transforms data into information

- Implies an action

- Essential for diseases under a control program

## Monitoring

- Overview of disease occurrence

- Does not imply an action

- Basis for the development of a control program

**Both activities require the support of competent diagnostic laboratories**

cirad

LinkTADs

Linking Epidemiology and Laboratory Research on Transboundary Animal Diseases and Zoonoses in EU and China

# Objectives & uses of surveillance

- Main purpose of surveillance is the early detection and control of animal diseases of importance to national economy, food security and trade
  - Early warning ➡ Early reaction
  - Outbreak investigation
  - Monitoring of progress in control and eradication programs
- Fulfilling international reporting needs

# Organisation of the system

■ Need to define :

- ❑ what will be the **legal framework** for the surveillance to be implemented,

- ❑ who is going to **manage** the surveillance,

- ❑ the **duties and rights** of all actors (with detailed job description and TOR, surveillance protocols)

- ❑ what will be the **needs for training** and for whom,

- ❑ what will be the sources of **funding** : for running cost, equipment, staff, awareness campaigns,

- ❑ how the reporting and the co-ordination will organised

- ❑ How the **evaluation** will be done

# Surveillance network: general structure



Information

Data sources

Provincial level

Central Unit

Local level

Data collection
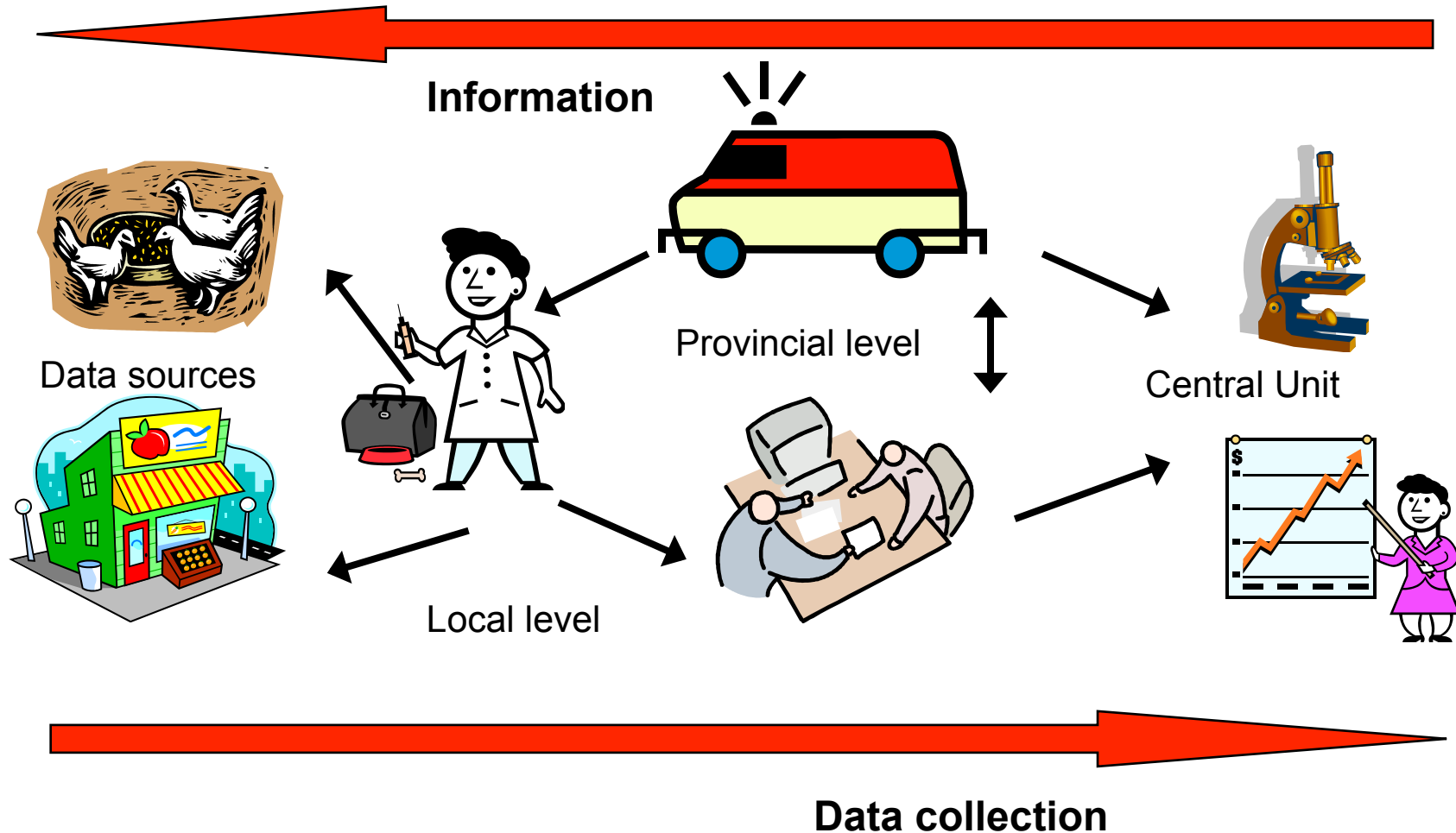
# General institutional organisation

- **Steering committee**
  - ❑ Take decisions
  - ❑ Responsible for organisation
- **Technical committee**
  - ❑ Development of surveillance protocols
  - ❑ Multi-disciplinary
- **Central unit**
  - ❑ Coordination of the surveillance
  - ❑ To centralise, analyse and diffuse the information

- **Laboratory**
  - ❑ Service provider for the samples analysis
  - ❑ Scientific expertise for the conception of protocol surveillance
- **Field team**
  - ❑ Supporting epidemiological survey
  - ❑ Coordination of the field actors
- **Regional unit**
  - ❑ Management of field activities
  - ❑ Validation of data collection
- **Surveillance station**
- **Farmers**

# Design of the information network

## 1. To determine the source of data

- ❑ What are the data collected in the field ?
    - ■ To answer the objectives of the surveillance
    - ■ Cf. surveillance protocol

# Data collection

- ## Need to define :
  - ### the **objectives** of the surveillance system (What?)
    - early detection of exotic disease? (eg country free
      of HPAI) early reporting of outbreaks? (eg country infected with HPAI)
    - follow-up of the patterns of the disease?
    - freedom declaration?
    - follow up of the strains circulating in the animal population (eg LPAI)
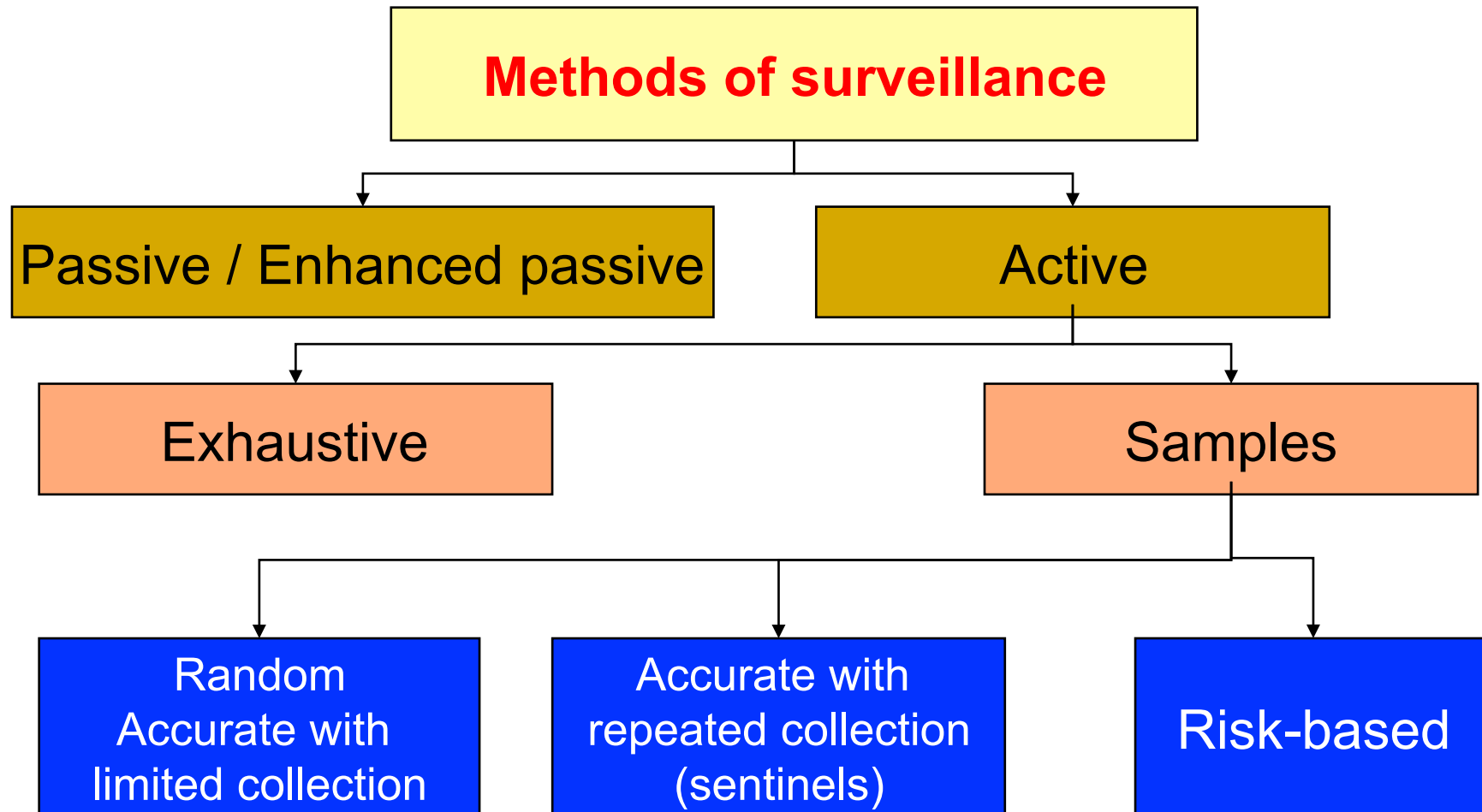
# Definition of surveillance protocol (1)

- **These questions need to be answered by the surveillance protocol:**

  - Which *health event* will be under surveillance?

  - What is/are the objective(s) of the surveillance system?

  - What is the targeted population? Criteria?
    - according to the species / age / husbandry system
    - according to the geographical location : the entire country or a part of it?

  - Frequency?

  - Way of collecting of data?

# Passive and Active Surveillance

- **Passive (observer-initiated) surveillance**: accompanying the health disease status, basically relying on breeder's and vets reports and visual observations

- **Active (investigator-initiated) surveillance :** frequent and regular effort to determine the animal health status in a given sub-population

# Methods of surveillance

# Definition of surveillance protocol (1)

■ **These questions need to be answered by the surveillance protocol:**

- Which *health event* will be under surveillance?

- What is/are the objective(s) of the surveillance system?

- What is the targeted population? Criteria?
  ■ according to the species / age / husbandry system
  ■ according to the geographical location : the entire country or a part of it?

- Frequency?

- Way of collecting of data?

- What is the case definition?

# Case-definition

- Case-definition is essential in epidemiology
  - harmonization
  - standardization
  - for comparisons



BIRD FLU...

ME?? I FEEL GREAT! HONESTLY! JUST FINE. NOT EVEN A HINT OF A SNIFFLE... NEVER BEEN BETTER...

©Fewings
fewings.ca

cirad

LinkTADs

Linking Epidemiology and Laboratory Research on Transboundary Animal Diseases and Zoonoses in EU and China
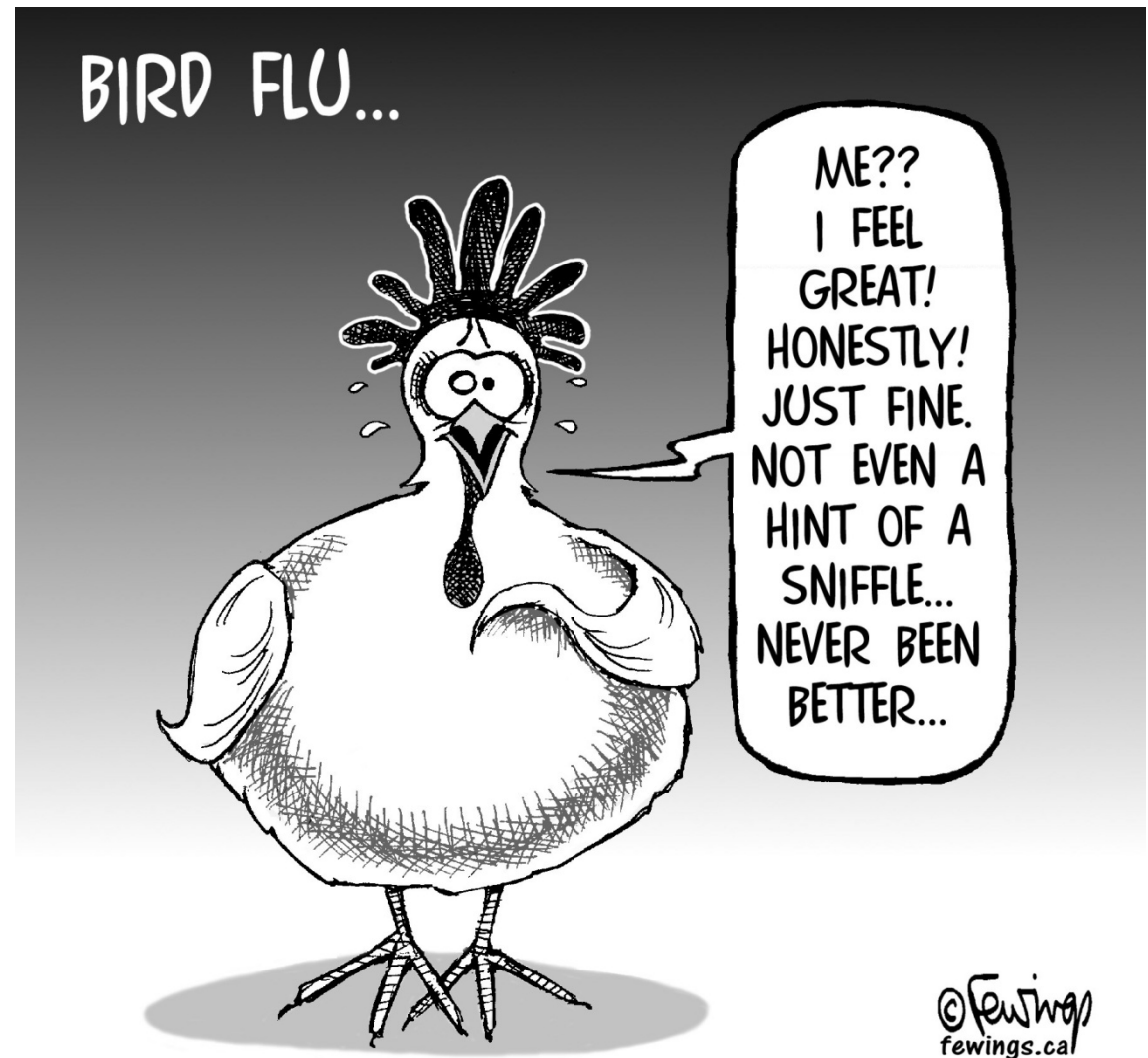
# What is a case-definition?

**Define the event under surveillance**

**Suspected case** **:** when an animal shows symptoms or has lab results that cannot lead to the exclusion of the disease under surveillance

**Confirmed case :** when the causative agent has been found and can be linked with the observed signs

# How to make a case – definition?

The case-definition **depends on the objectives**.

1.  Surveillance of exotic disease
    - Objective = early detection of any suspicion of the disease in the targeted population.
    - *We cannot afford to miss too many suspicions, we do not care to have too much false positive suspicions*

2.  Surveillance of an endemic chronic disease
    - Objective = regular detection of confirmed case.
    - *We do not want to overload the system with too much false positive suspicions.*

cirad

FETPv Training Session – Design and evaluation of animal health surveillance systems 25th and 27h April 2016 Qingdao, China

LinkTADs    Linking Epidemiology and Laboratory Research on Transboundary Animal Diseases and Zoonoses in EU and China

# Application of sensitivity and specificity to surveillance to a surveillance network

■ **Sensitivity =**

$$\frac{\text{cases detected by surveillance}}{\text{all animals with the disease}}$$

■ **Specificity =**

$$\frac{\text{Animal w/o disease and negative on surveillance}}{\text{All animals w/o the disease}}$$

cirad

LinkTADs

Linking Epidemiology and Laboratory Research on Transboundary Animal Diseases and Zoonoses in EU and China

# How to play on the network Se?

- **Sensitivity is affected by**:
  - Whether farmers are in contact with vets and paravets (☞ depends on the national vet services organisation)
  - Whether the disease is diagnosed (☞depends on actors training / public awareness ⇨ **Stimulation of a network**)
  - Whether the disease is reported (☞ depends on compensation policy / on awareness of the actors on their duties)

# Design of the information network (2)

1. To determine the source of data
   - What are the data collected in the field ?
   - To answer the objectives of the surveillance
   - Cf. surveillance protocol

## 2. To identify the actors

- Who is collecting the data ?

- Who contributes in transmission and management of data ?

# Design of the information network (3)

1. To determine the source of data
   - What are the data collected in the field ?
   - To answer the objectives of the surveillance
   - Cf. surveillance protocol
2. To identify the actors
   - Who is collecting the data ?
   - Who contributes in transmission and management of data ?

## 3. To design forms to collect data

- Questionnaire

- Register

# Design of the information network

# Design of the information network (4)

1. To determine the source of data
   - What are the data collected in the field ?
   - To answer the objectives of the surveillance
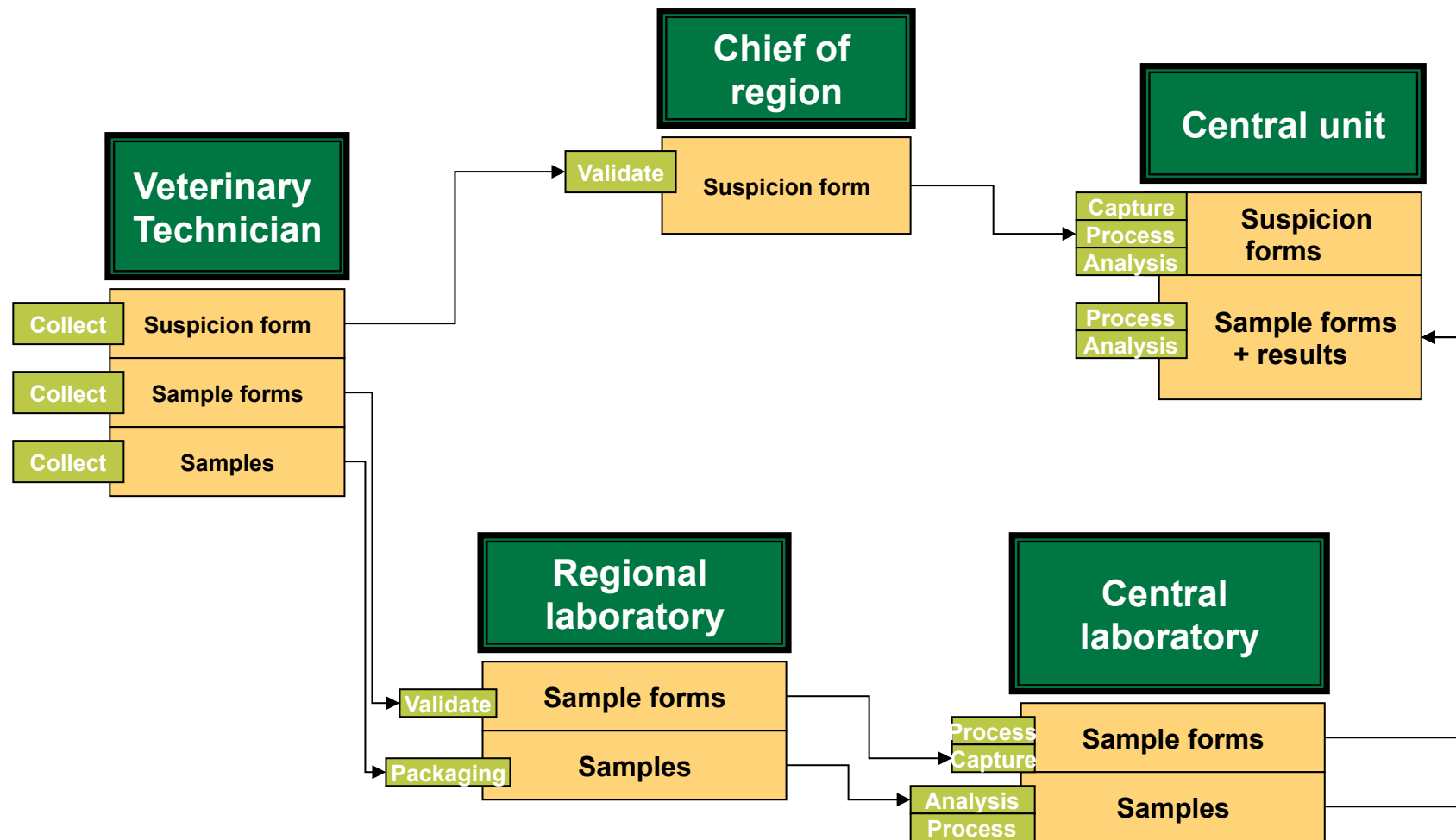   - Cf. surveillance protocol
2. To identify the actors
   - Who is collecting the data ?
   - Who contributes in transmission and management of data ?
3. To design forms to collect data

   - Questionnaire

   - Register

## 4. To define the expected results from analyses

   - To control the relevance of number and quality

      - Data not useful or missing data

      - Data not precise

   - Rate of analysis

   - Way of presenting the results

# Data standardisation

- In epidemiology, standardisation concerns the tools and the surveillance methods in order to limit bias related to the data selection or collection.

<p style="text-align:center;color:red;"><strong>Why standardisation is necessary in epidemiosurveillance ?</strong></p>

- Because many actors are involved in the data collection and the data collected must be similar

- Because the data collection is spread out over a long period, so there is a risk of modification in the way the data are collected / analysed or interpreted if no clear procedures are available for each step of the surveillance system

cirad

LinkTADs

Linking Epidemiology and Laboratory Research on Transboundary Animal Diseases and Zoonoses in EU and China

# What are the steps of standardisation?

- Standardisation of the case-definition : must be precise and adopted by all the members of the surveillance system,

- Stand. of the samples : need details about the sampling method / packaging / storage and transport conditions / delay to get to the lab

- Stand. of the information collected thanks to questionnaire / forms…

- Stand. of the analysis to be made (referenced protocol / identification of the reagents / need for proficiency test)

- Stand. of the centralisation of the data in order to get similar data flow

- Stand. of the data seizure and analysis with max delay

# Design of the information network (4)

1. To determine the source of data
   - What are the data collected in the field ?
   - To answer the objectives of the surveillance
   - Cf. surveillance protocol
2. To identify the actors
   - Who is collecting the data ?
   - Who contributes in transmission and management of data ?
3. To design forms to collect data

   - Questionnaire

   - Register
4. To define the expected results from analyses
   - To control the relevance of number and quality
     - Data not useful or missing data
     - Data not precise
   - Rate of analysis
   - Way of presenting the results

## 5. To design the contents of feed-back

   - Which data or information will be restored ?
   - Rate of feed-back ?

# Data dissemination

- **to whom?**
  - **Internal communication**: Actors of the Network (Dynamic link among the actors, Demonstrate the usefulness of the network to the farmers)
  - **External communication:** Partners (National, Regional, International Levels, Information for the policymakers, Demonstrate to regional and international partners the dynamics of the network, Certification for free zones, Trade…)

- **how** the data will be disseminated?

- **in which delay?**

# Factors affecting the effectiveness of surveillance systems

- **Geographic coverage**

- **Awareness of field veterinarians and farmers**
  - What to report? To whom? What happens if I do?
  - Poor feedback to health workers and communities

- **Economic incentives**
  - Possible consequences of disease reporting
  - Conflicts of interest

- **Compensation**
  - Inadequate or inexistent programs

- **Time-lag**
  - Failure to report on time
  - Incomplete and late reporting
  - Duplication of efforts

- **Data analysis**
  - Inadequate data analysis
  - Failure to use available information to check trends
  - Under utilization of surveillance information in decision making

# What is an epidemiological surveillance network?

**FETPv Training Session**
Design and evaluation of animal health surveillance systems
25th and 27th April 2016, Qingdao, China

# THANK YOU !