(A)syndromic surveillance
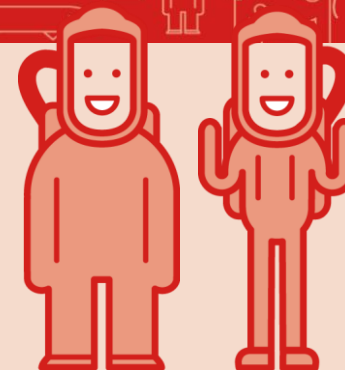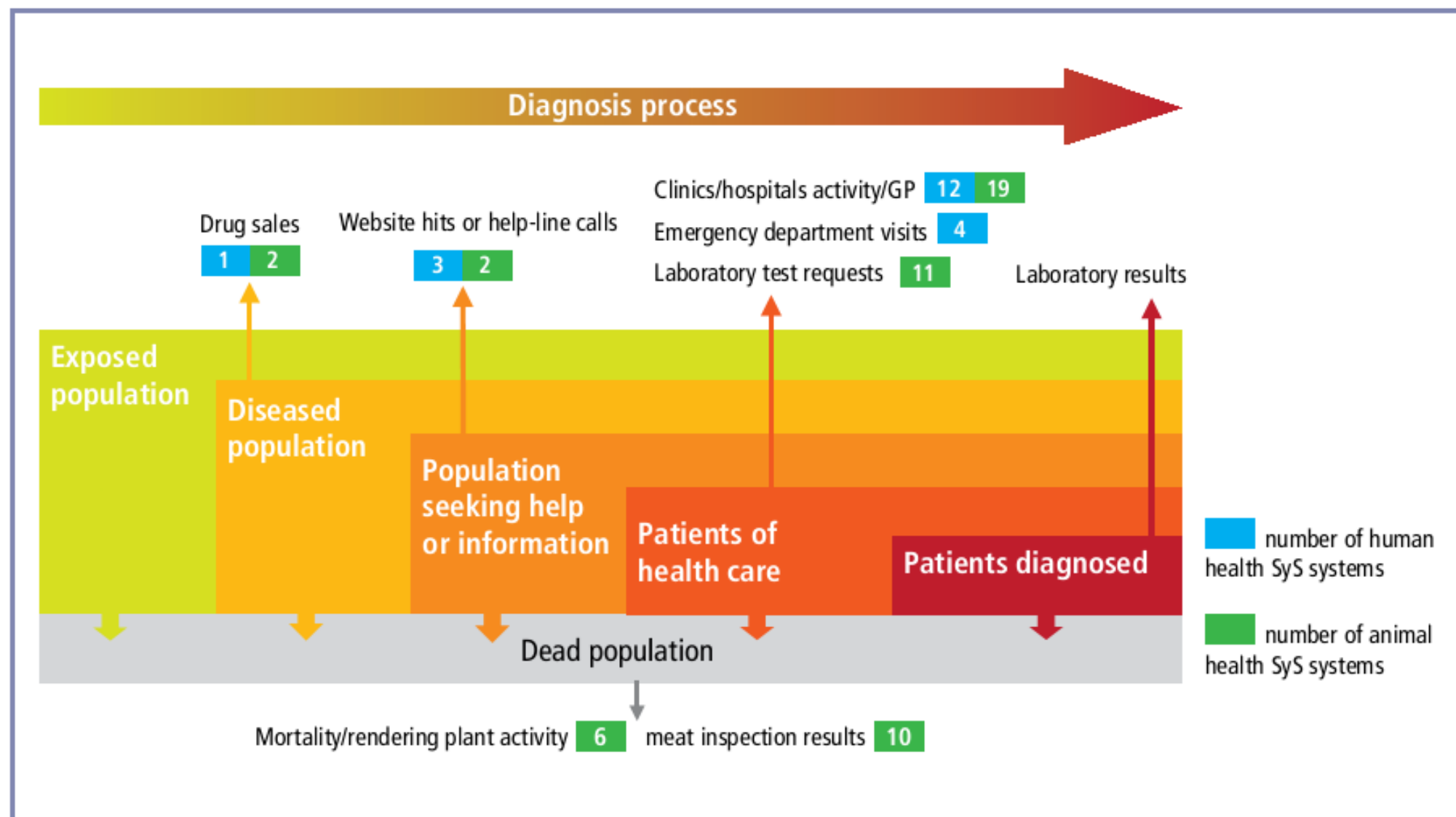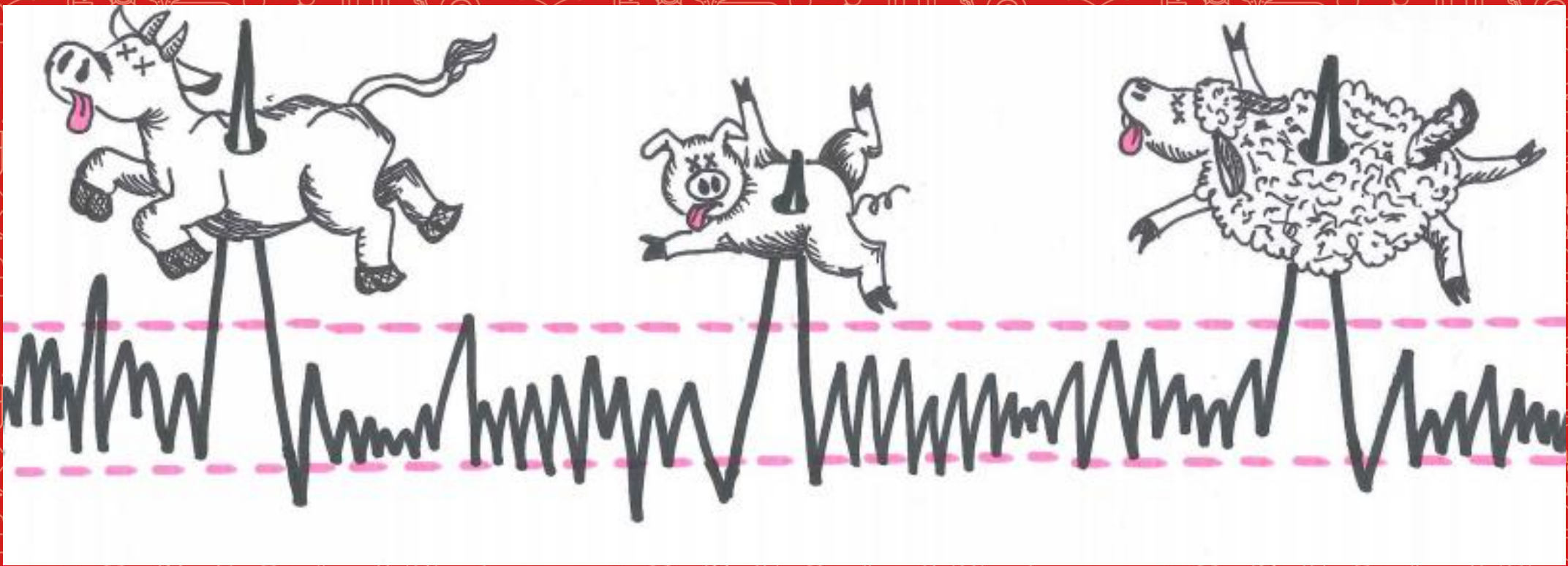
Fernanda C. Dórea

WHAT IS "SYNDROMIC SURVEILLANCE"

- Syndromic surveillance, CDC, 2006
  - *approaches* which make use of "health-related data that **precede diagnosis** and signal with sufficient probability of a case or an outbreak to warrant further public health response"

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European human and animal SyS systems by data source

Diagnosis process

Clinics/hospitals activity/GP `12` `19`
Emergency department visits `4`
Laboratory test requests `11`   Laboratory results

Drug sales `1` `2`

Website hits or help-line calls `3` `2`

Exposed population

Diseased population

Population seeking help or information

Patients of health care

Patients diagnosed

`number of human health SyS systems`

`number of animal health SyS systems`

Dead population

Mortality/rendering plant activity `6`   meat inspection results `10`

Fact #1: Our data are not that *syndromic…*

Fact #2: Our data are not that *early…*

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WHAT IS "SYNDROMIC SURVEILLANCE"

- Syndromic surveillance, CDC, 2006
  - *approaches* which make use of "health-related data that **precede diagnosis** and signal with sufficient probability of a case or an outbreak to warrant further public health response"

- Syndromic surveillance, Triple-S, 2013
  - *the **real-time (or near real-time)** <u>collection, analysis, interpretation and dissemination</u> of **health-related data** to enable the early identification of the impact (or absence of impact) of potential human or veterinary public-health threats which require effective public health action*
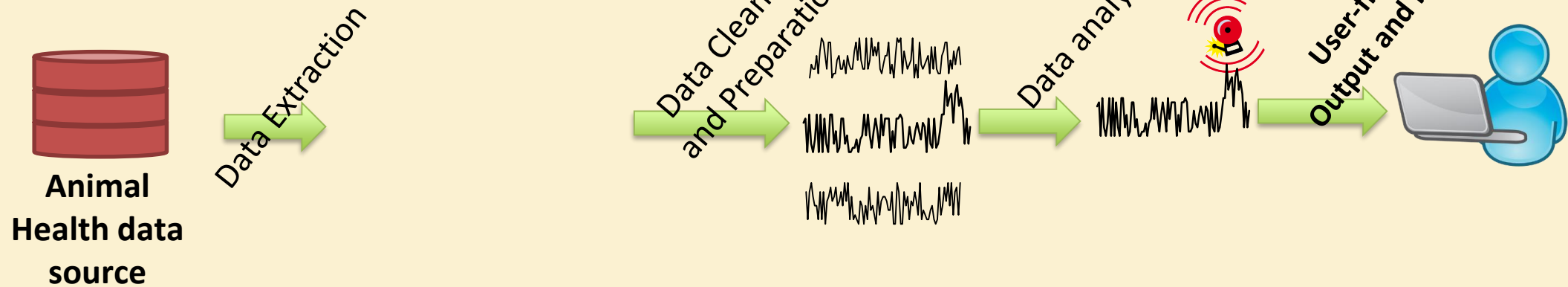
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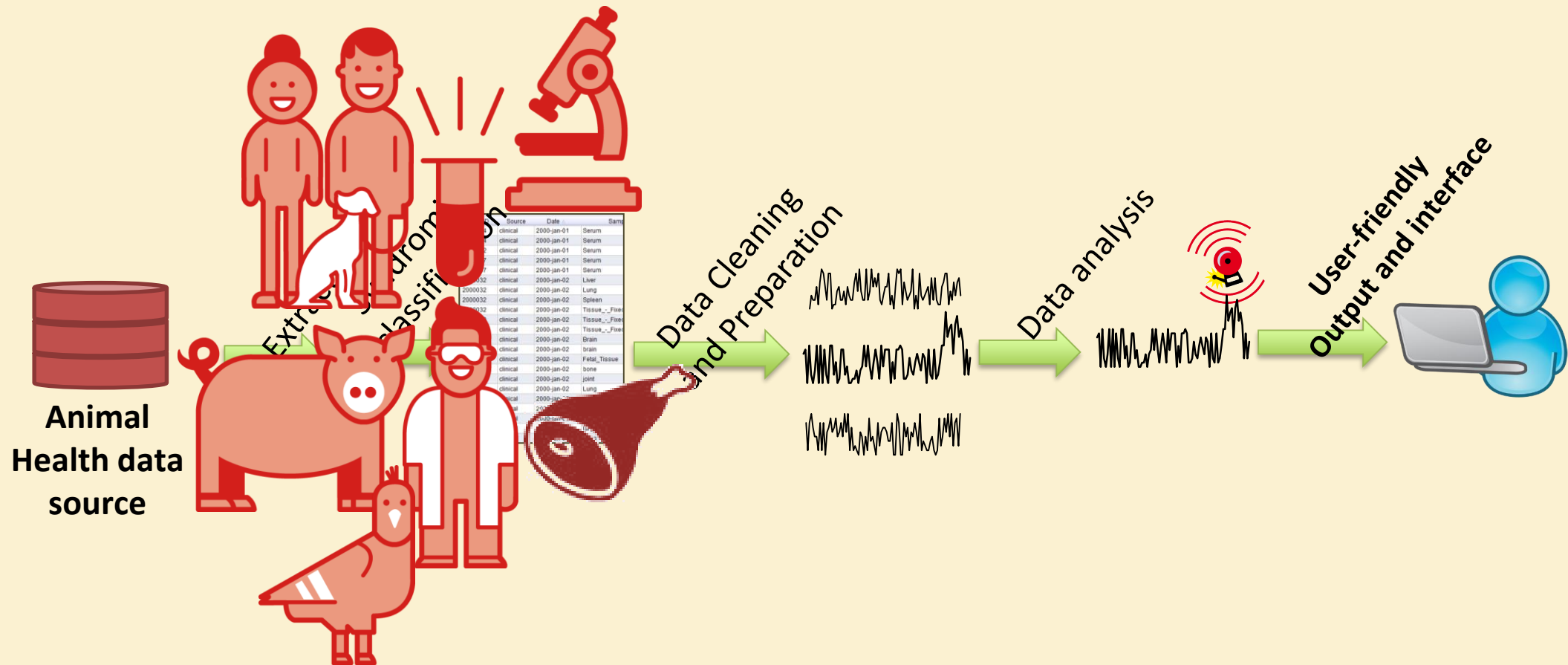# About data sources for syndromic surveillance

Choice of data source can affect the performance of the system

Syndromic surveillance (SyS) systems usually make opportunistic use of existing data sources that are readily available. They do not employ data designed and collected especially for this function, and data fields and formats can rarely be modified for the sake of surveillance. Users of SyS systems should therefore understand what type of information a particular data source can provide, and how that information will affect the focus or performance of the system (see overleaf for aspects to be taken in account when selecting a data source).

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HOW IT IS DONE

Animal Health data source → Extraction, syndromic classification → Data Cleaning and Preparation → Data analysis → User-friendly output and interface

Challenge #1: Using data secondarily

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About data sources for syndromic surveillance

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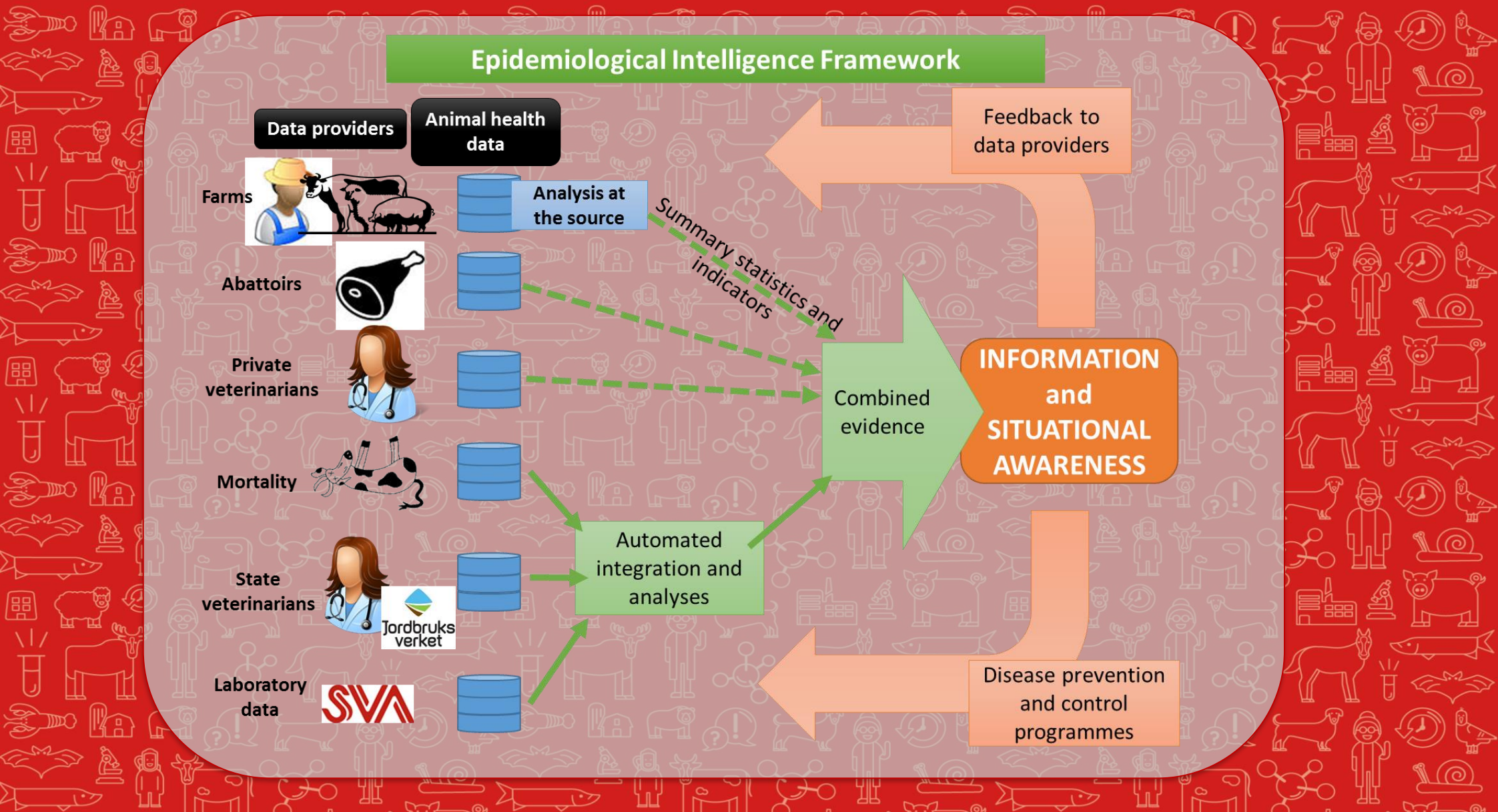**Challenge #2: We can rarely influence (and certainly never standardize) data recording practices**

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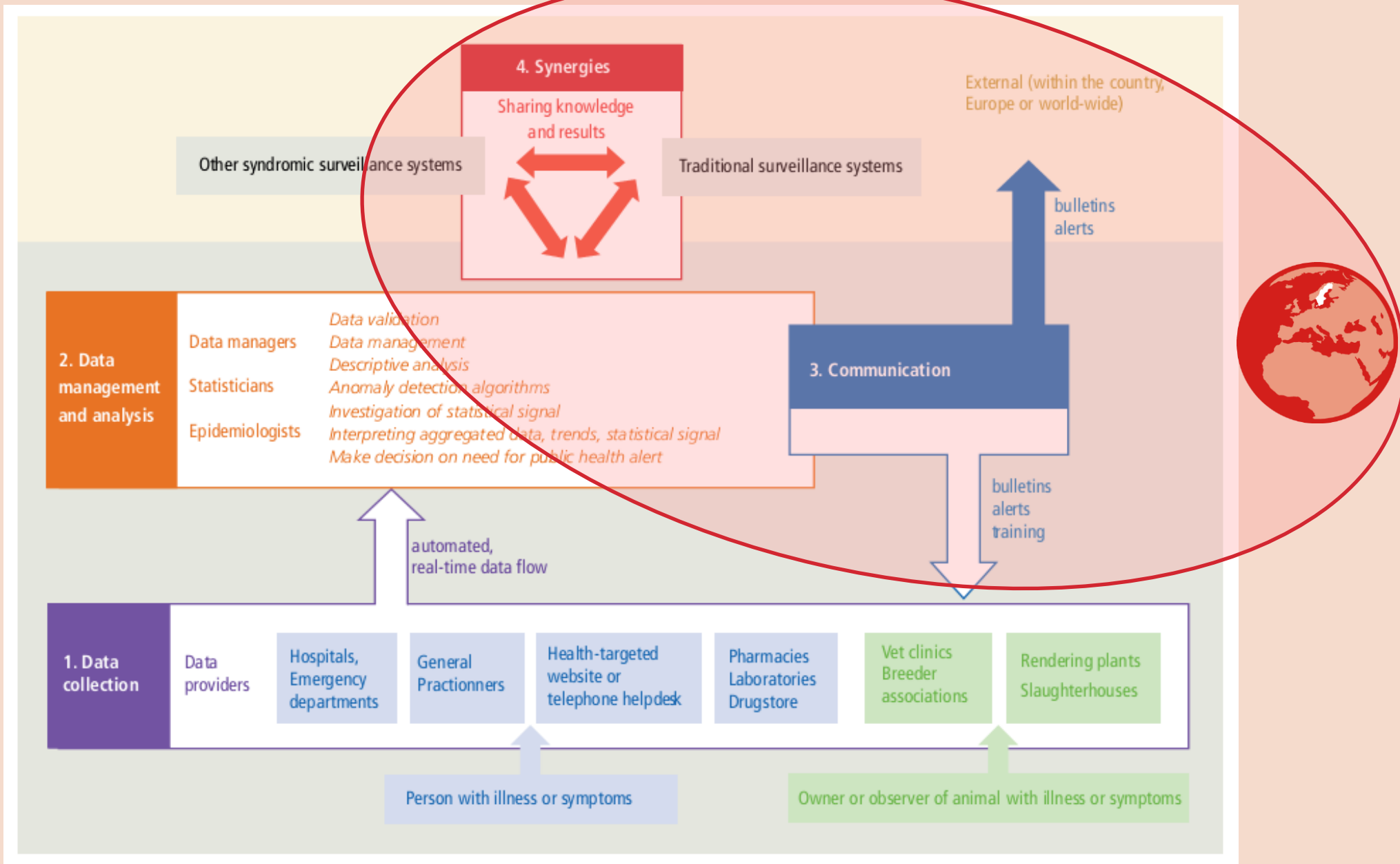# About data sources for syndromic surveillance

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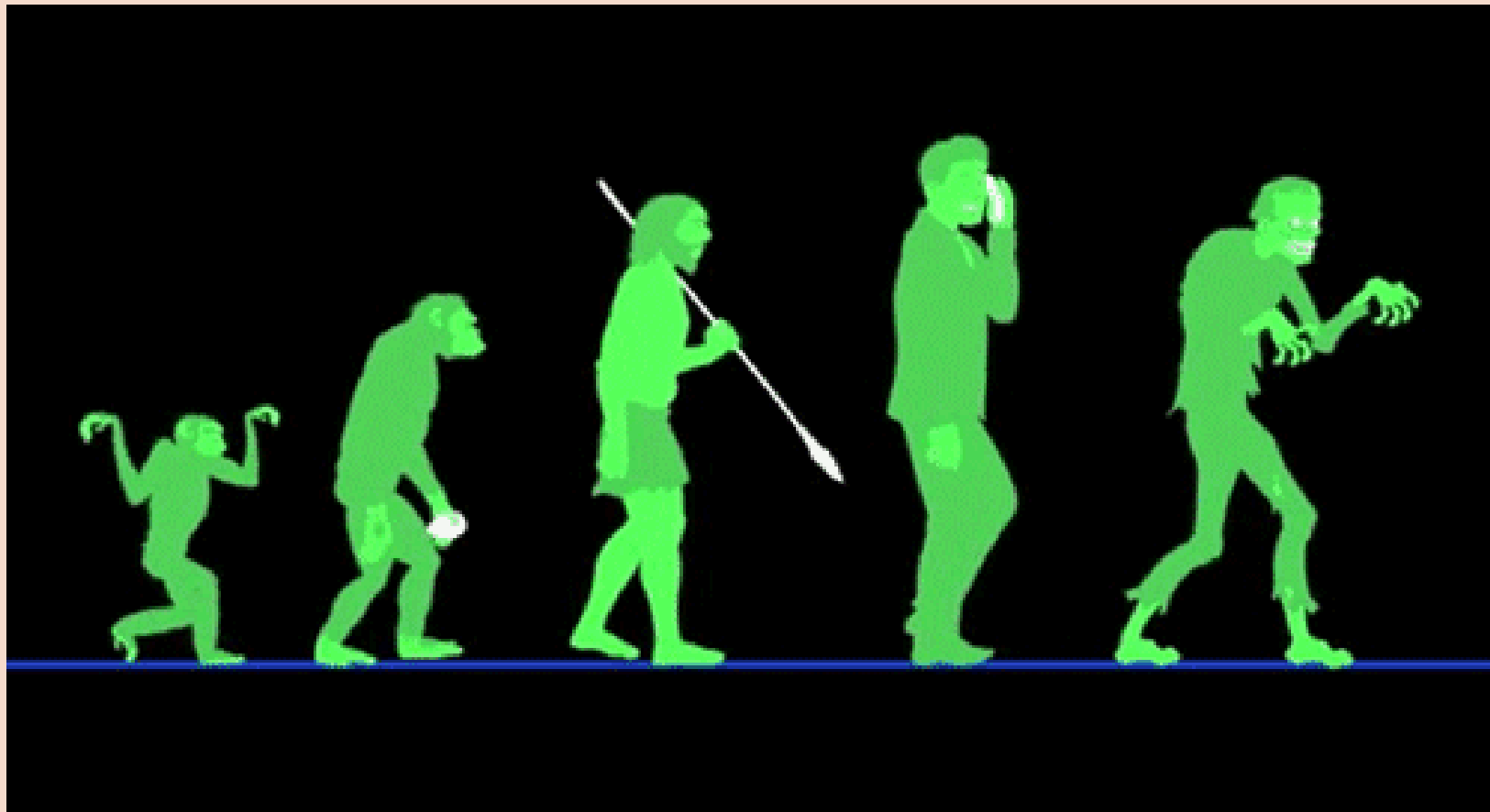
Know what you want and what you can get from the data

Epidemiological Intelligence Framework

Data providers | Animal health data

Farms
Abattoirs
Private veterinarians
Mortality
State veterinarians — Jordbruksverket
Laboratory data — SVA

Analysis at the source

Summary statistics and indicators

Combined evidence

Automated integration and analyses

INFORMATION and SITUATIONAL AWARENESS

Feedback to data providers

Disease prevention and control programmes

Challenge #3: We want too many things from our data

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Challenge #4: Our needs are not the only ones to consider…

Challenge #5: Our priorities can change over time

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Fact #1: Our data are not that *syndromic...*

Fact #2: Our data are not that *early...*

Challenge #1: Using data secondarily

Challenge #2 : We can rarely influence (and certainly never standardize) data recording practices

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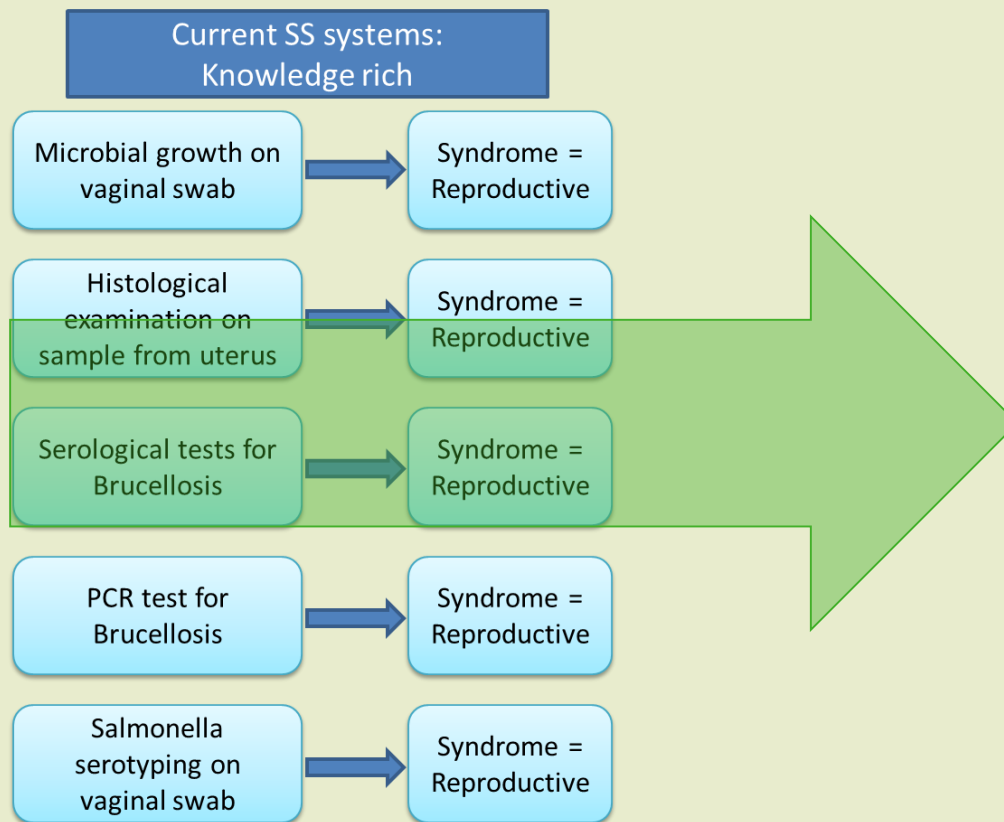Challenge #4: Our needs are not the only ones to consider...

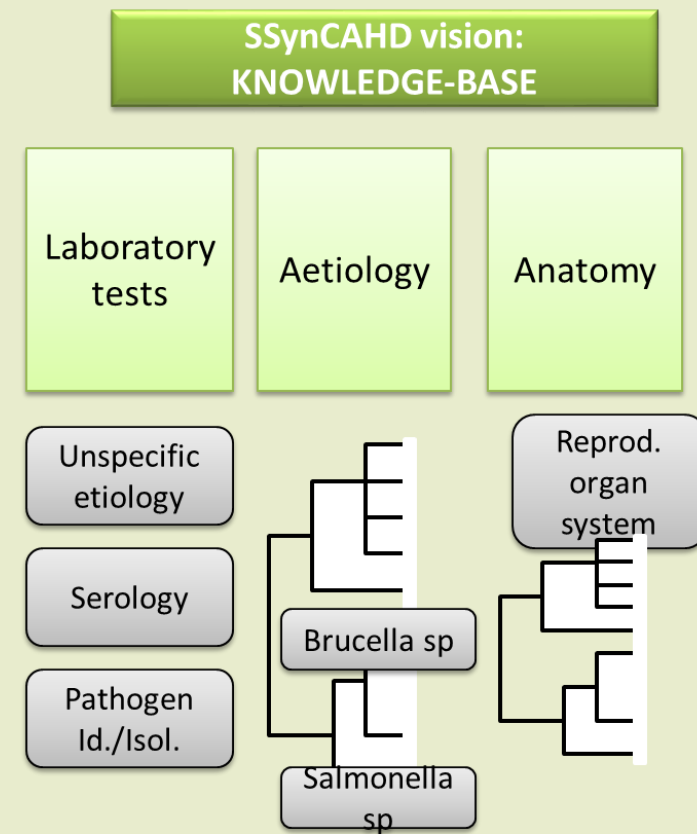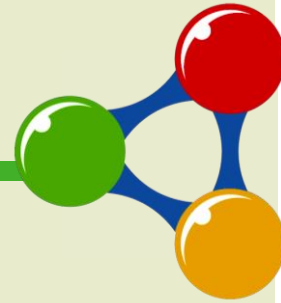Challenge #5: Our priorities can change over time

?

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ONE SOLUTION

Smarter data

Current SS systems:
Knowledge rich

Microbial growth on vaginal swab	→	Syndrome = Reproductive
Histological examination on sample from uterus	→	Syndrome = Reproductive
Serological tests for Brucellosis	→	Syndrome = Reproductive
PCR test for Brucellosis	→	Syndrome = Reproductive
Salmonella serotyping on vaginal swab	→	Syndrome = Reproductive

Smarter systems

SSynCAHD vision:
KNOWLEDGE-BASE

| Laboratory tests | Aetiology | Anatomy |

Unspecific etiology

Serology

Pathogen Id./Isol.

Brucella sp

Salmonella sp
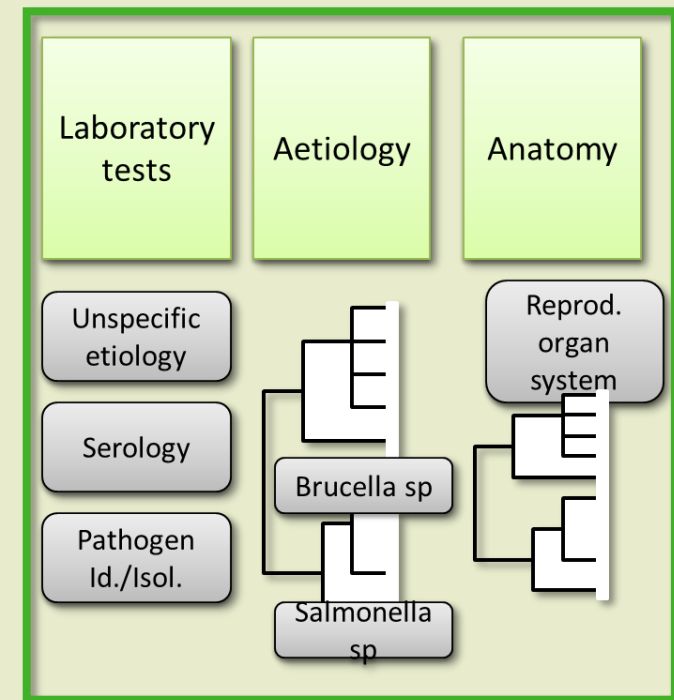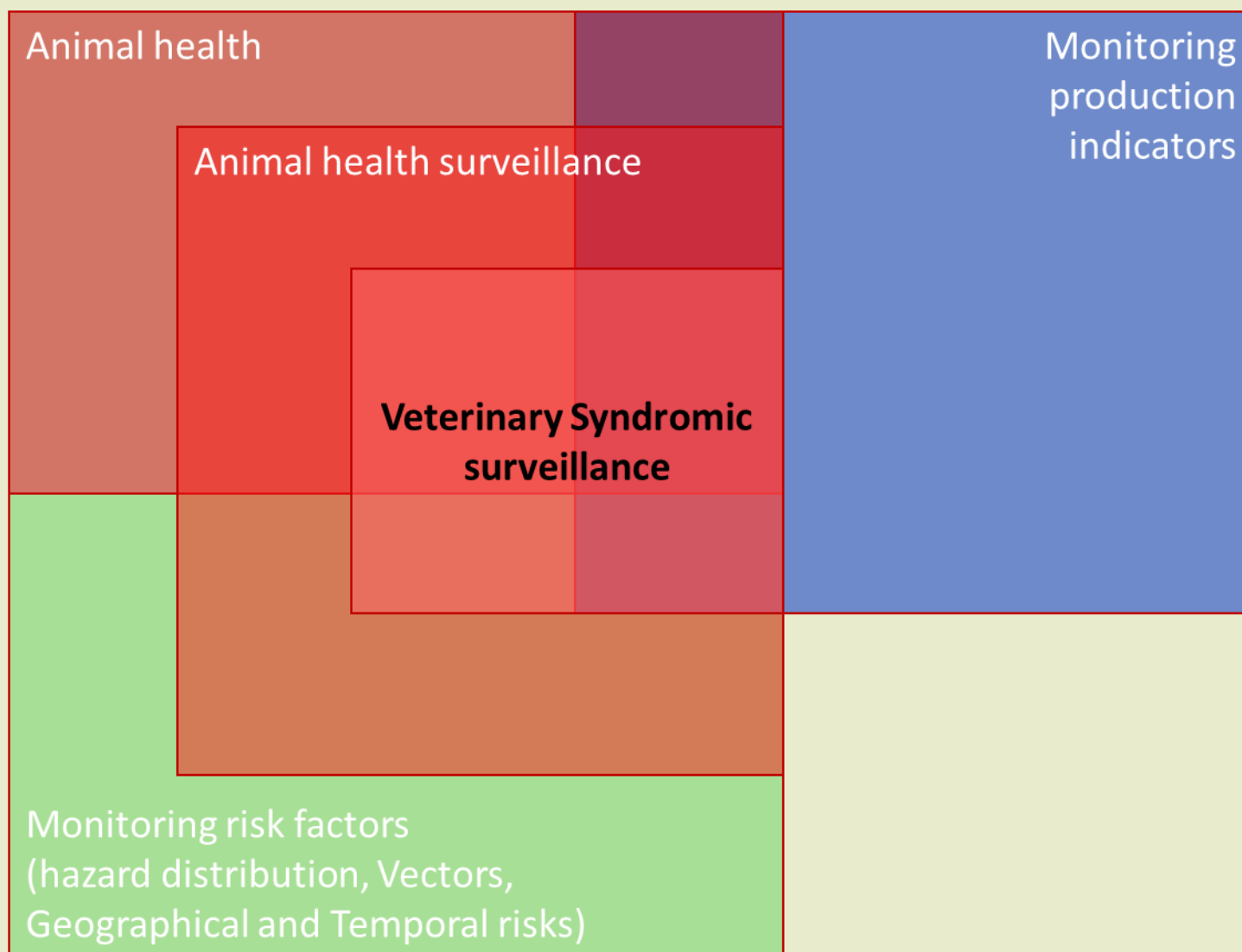
Reprod. organ system

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ONTOLOGIES

- *"An ontology defines a common vocabulary for researchers who need to share information in a domain. It includes **machine-interpretable** definitions of basic <u>concepts</u> in the domain and <u>relations</u> among them"*

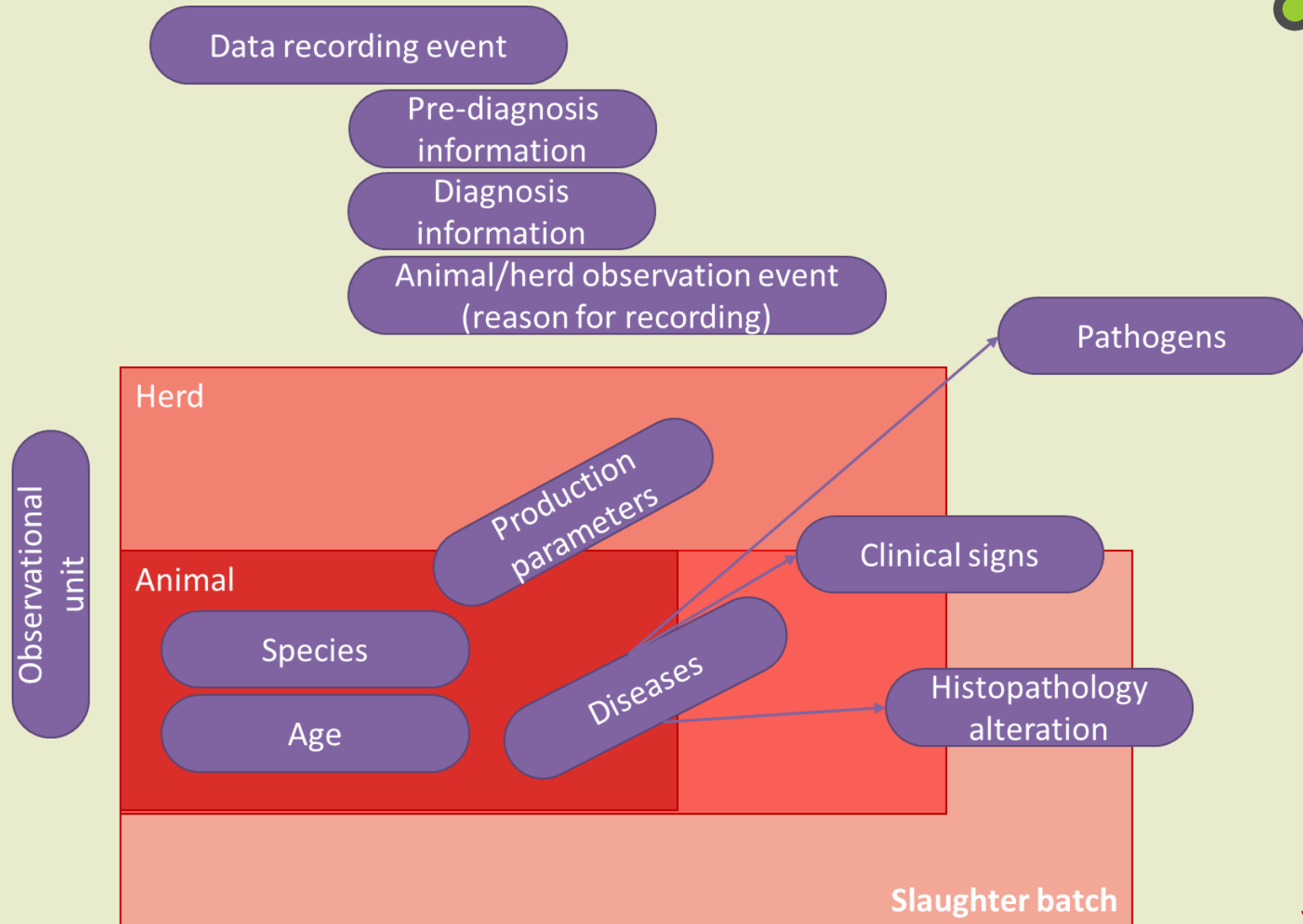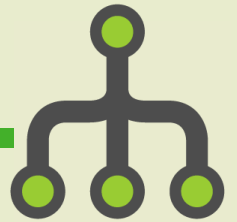   (Noy and McGuinness, 2001)

SPECIFIC GOAL/DOMAIN

Animal health

Animal health surveillance

Veterinary Syndromic surveillance

Monitoring production indicators

Monitoring risk factors
(hazard distribution, Vectors,
Geographical and Temporal risks)

DATA MODEL

Data recording event

Pre-diagnosis information

Diagnosis information

Animal/herd observation event (reason for recording)

Pathogens

Herd

Observational unit

Production parameters

Animal

Clinical signs

Species

Diseases

Age

Histopathology alteration

Slaughter batch

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DATA MODEL

Lab data example:

Data recording event

Pre-diagnosis information

Diagnosis information

Lab submission type

Anatomical entities

Lab result type

Organ system

Pathogens

Clinical signs

Histopathology alteration

Animal observation event

Observational unit

Herd

Animal

Production parameters

Species

Age

Diseases

Slaughter batch

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ONTOLOGY DEVELOPMENT

TECHNICAL development	Community involvement

Defines needs

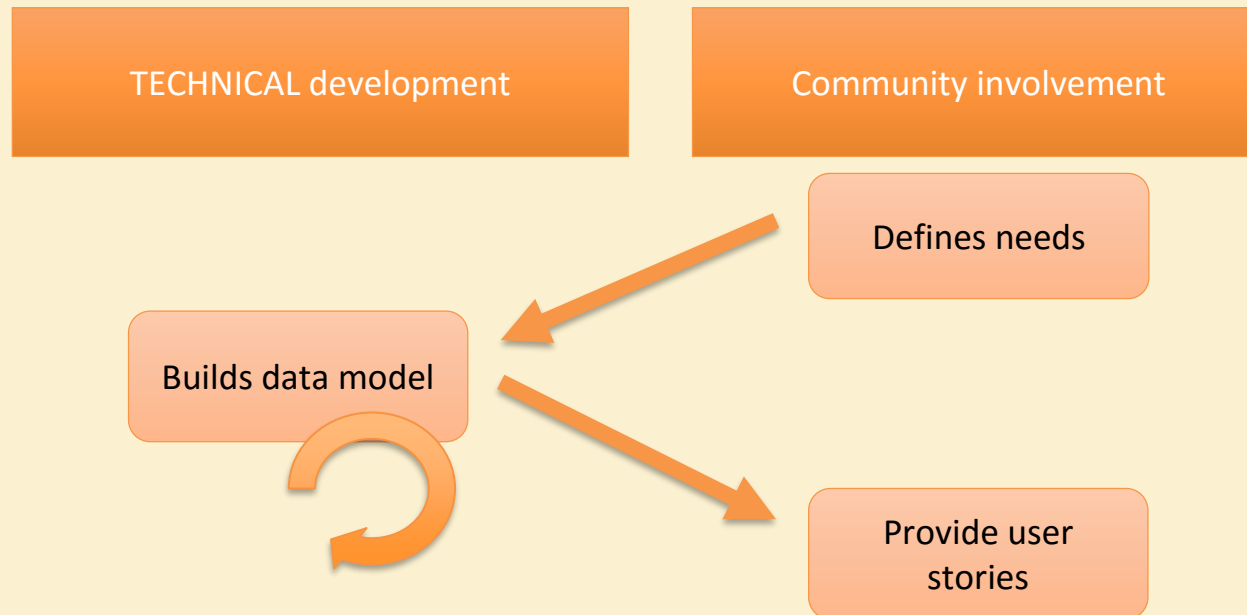Builds data model
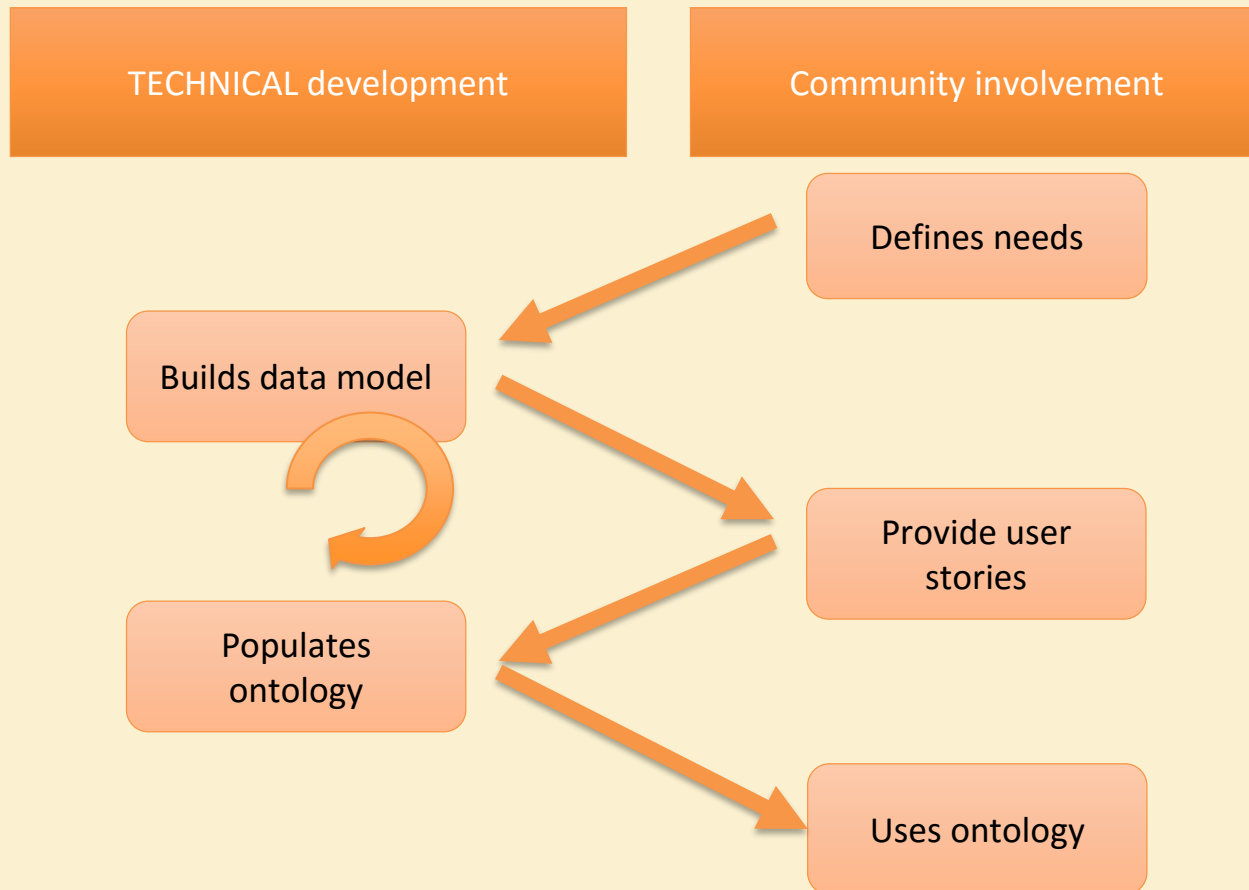
Provide user stories
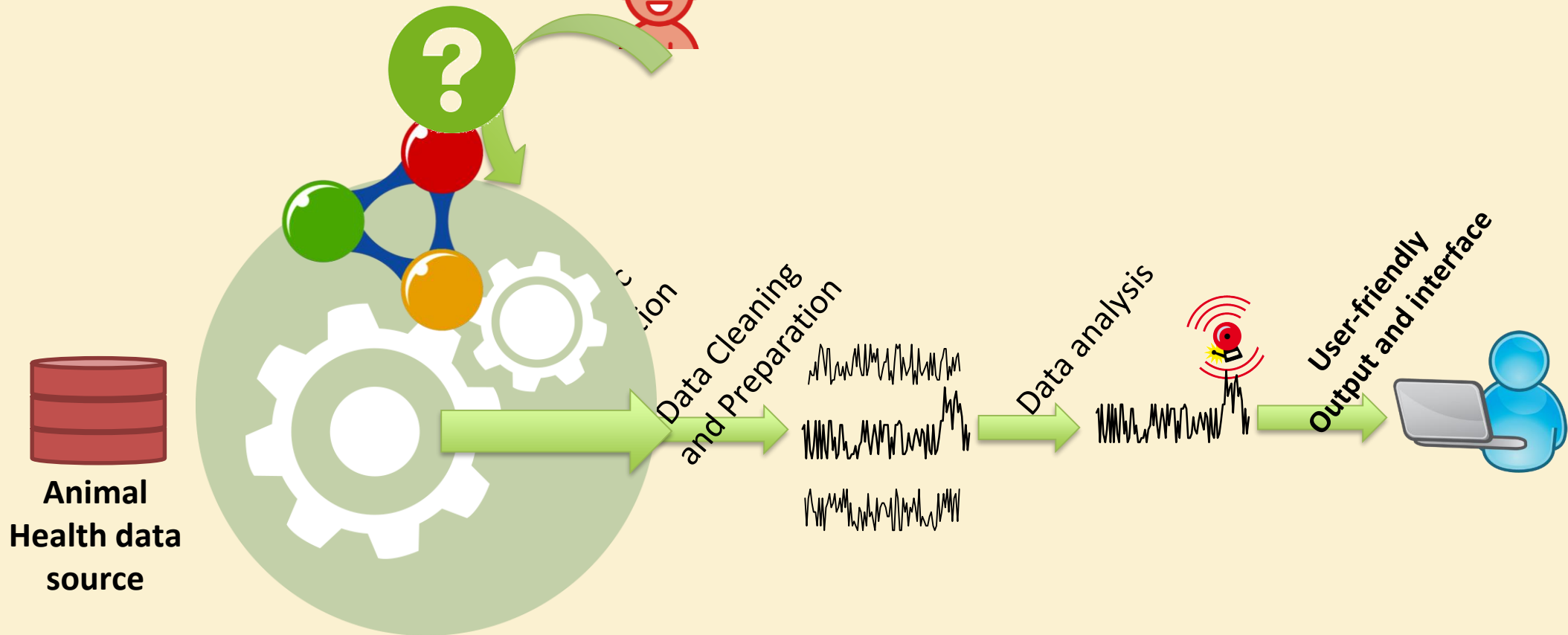
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ONTOLOGY DEVELOPMENT

Farmer Nilsson, during his morning visit of his stables in Skåne on the 10th of June 2015, notices that his cow Daisy gave birth during the night to a calf that was dead-at-birth. He calls his vet Dr Carlsson and asks her to come and examine Daisy. The vet comes on the same day to examine Daisy, and in view of her fever, decides to take samples from both Daisy herself and the aborted foetus to send for laboratory testing. In the meantime, Farmer Nilsson notifies the abortion to the electronic cattle register. Both samples are sent to the SVA and received/processed the following day. The samples are tested for Brucellosis, BVD and neospora. On the 14th of June, the results are back and only Daisy's blood sample tested positive for BVD, all other tests were negative.

(credit to **Flavie Vial**)

ONTOLOGY DEVELOPMENT

TECHNICAL development	Community involvement

Defines needs

Builds data model

Provide user stories

Populates ontology

Uses ontology

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How it is done

Animal Health data source → Data Cleaning and Preparation → Data analysis → User-friendly Output and interface

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Military intelligence

This article **needs additional citations for verification**. Please help improve this article reliable sources. Unsourced material may be challenged and removed. *(December 2015) (L this template message)*

"Defense intelligence" redirects here. For other uses, see Defense intelligence (disambiguation).

Military intelligence is a military discipline that uses information collection and analysis approaches to provide guidance and direction to commanders in support of their decisions. This is achieved by providing an assessment of data from a range of sources, directed towards the commanders' mission requirements or responding to questions as part of operational or campaign planning. In order to provide an analysis, the commander's information requirements are first identified. These information requirements are then incorporated into intelligence collection, analysis, and dissemination.

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EPIDEMIOLOGICAL INTELLIGENCE

Fact #1: Our data are not that *syndromic…*

Fact #2: Our data are not that *early…*

Challenge #1: Using data secondarily

Challenge #2 : We can rarely influence (and certainly never standardize) data recording practices

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Challenge #5: Our priorities can change over time

- ***real-time (or near real-time)** collection, analysis, interpretation and dissemination of **health-related data** to ..*

- *…to provide guidance and direction to commanders in support of their decisions*

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- Syndromic surveillance, Triple-S, 2013
  - *the **real-time (or near real-time)** collection, analysis, interpretation and dissemination of **health-related data** to enable the early identification of the impact (or absence of impact) of potential human or veterinary public-health threats which require effective public health action*

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Healthy
animals,
safe
people.

THANK YOU!

fernanda.dorea@sva.se

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