(A)syndromic surveillance

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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"
European human and animal SyS systems by data source

Exposed population
- Drug sales
- Website hits or help-line calls

Diseased population
- Clinics/hospitals activity/GP
- Emergency department visits
- Laboratory test requests

Population seeking help or information
- Laboratory results

Patients of health care

Patients diagnosed

Dead population
- Mortality/rendering plant activity
- Meat inspection results

Diagram shows the flow of data from exposure to diagnosis, with different data sources indicated for each stage.
Fact #1: Our data are not that *syndromic*…

Fact #2: Our data are not that *early*…
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• 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) 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
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).
Animal Health data source
How it is done

Challenge #1: Using data secondarily
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Challenge #2: We can rarely influence (and certainly never standardize) data recording practices
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Know what you want and what you can get from the data
Challenge #3: We want too many things from our data
Challenge #4: Our needs are not the only ones to consider…
Challenge #5: Our priorities can change over time
| Fact #1: Our data are not that *syndromic*... |
| Fact #2: Our data are not that *early*... |
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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
  Unspecific etiology
  Serology
  Pathogen Id./isol.
  Brucella sp
  Salmonella sp

- Aetiology
  Reprod. organ system

- Anatomy
"An ontology defines a common vocabulary for researchers who need to share information in a domain. It includes **machine-interpretable** definitions of basic concepts in the domain and relations among them"  
(Noy and McGuinness, 2001)
SPECIFIC GOAL/DOMAIN

- Animal health
- Animal health surveillance
- Veterinary Syndromic surveillance
- Monitoring risk factors (hazard distribution, Vectors, Geographical and Temporal risks)
- Monitoring production indicators
Ontology Development

TECHNICAL development

Builds data model

Community involvement

Defines needs

Provide user stories
ONTOMETRY 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.

(c credit to Flavie Vial)
**Ontology Development**

**Technical Development**
- Builds data model
- Populates ontology

**Community Involvement**
- Defines needs
- Provide user stories
- Uses ontology
Animal Health data source

HOW IT IS DONE

Data Cleaning and Preparation

Data analysis

User-friendly Output and Interface
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.
EPIDEMIOLOGICAL INTELLIGENCE

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SVA
Healthy animals, safe people.

THANK YOU!
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