



**UPEI**  
UNIVERSITY  
of Prince Edward  
ISLAND



CVVER

## Early detection of outbreaks through continuous monitoring of laboratory test requests

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CAHLN 2011

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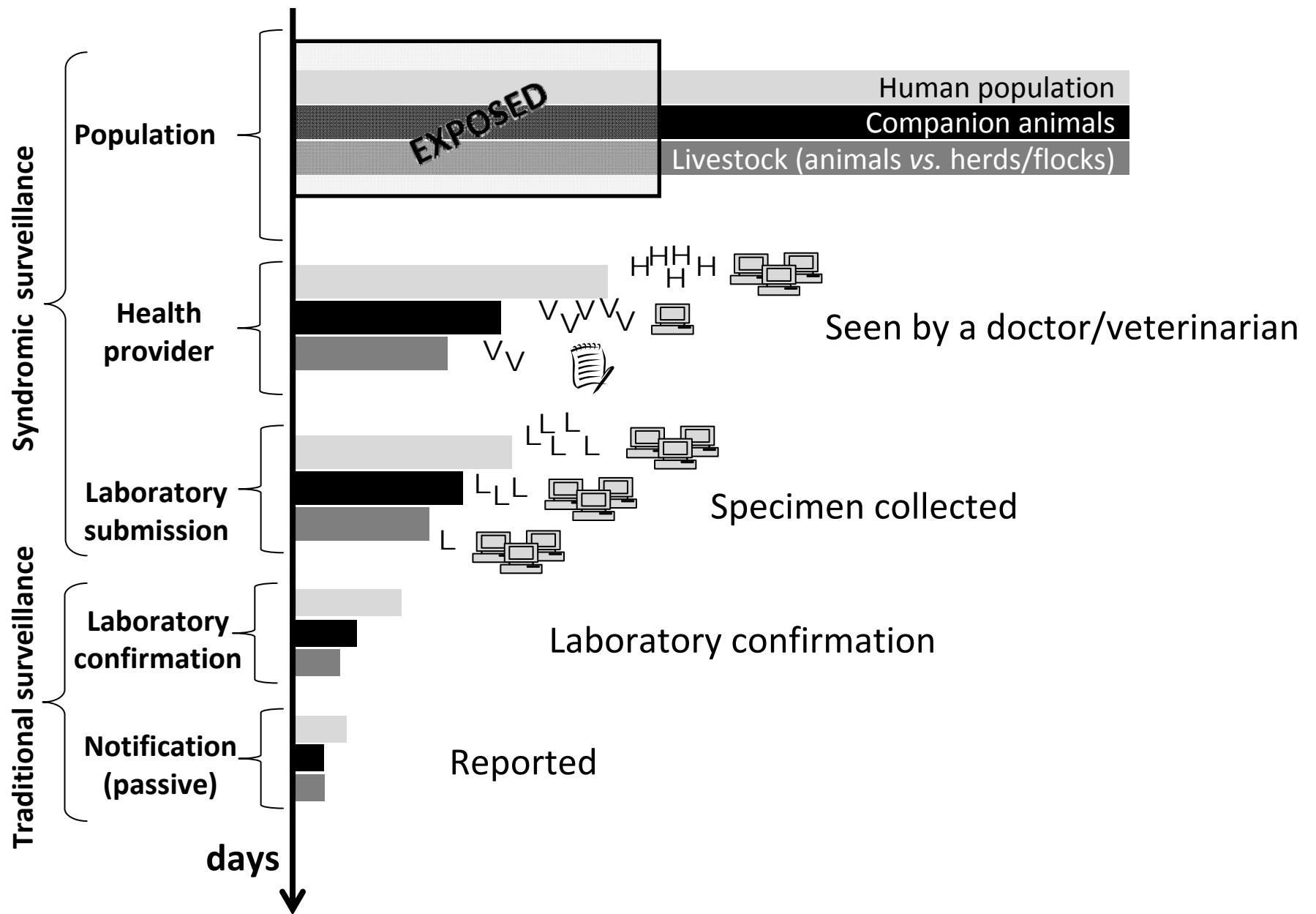
David Kelton – UoG

Catherine Anne Muckle – UPEI

J Trenton McClure – UPEI

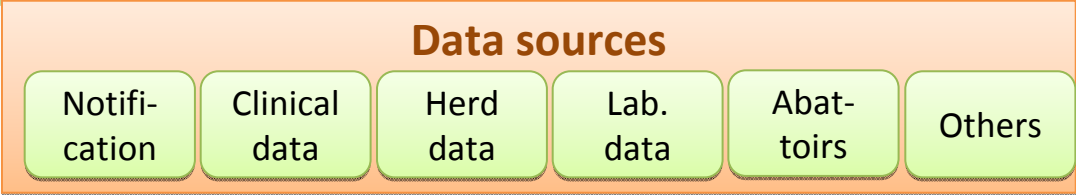
Crawford Revie – UPEI

Javier Sanchez - UPEI



# Laboratory submission data

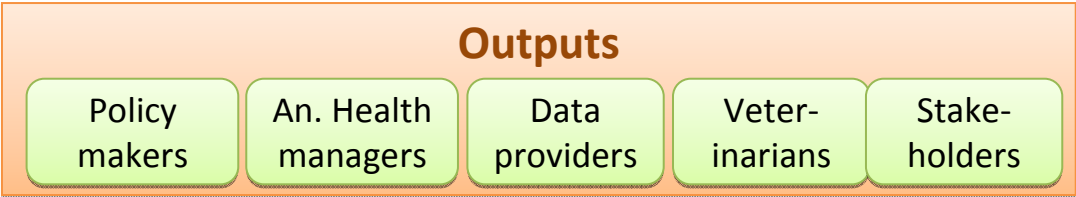
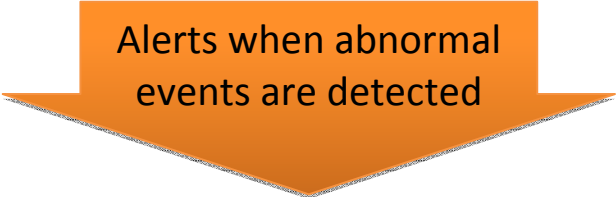
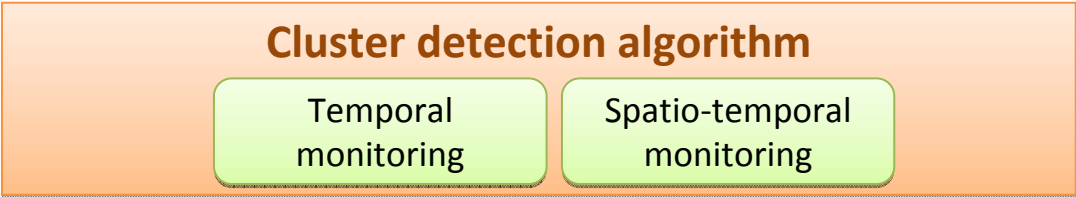
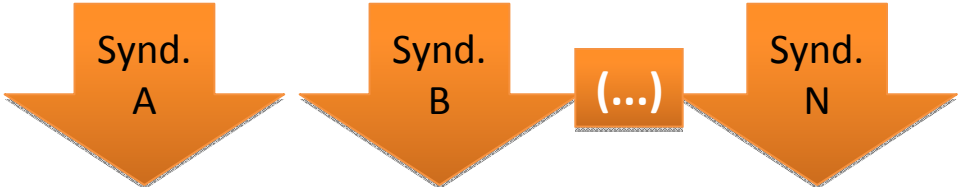
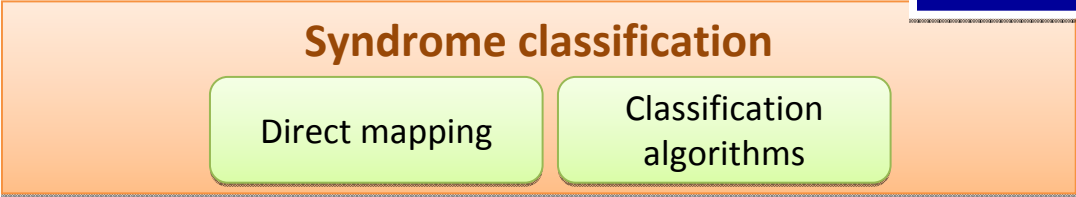
- Strengths
  - Automated and routinely collected
  - Computerized
  - Centralized
- Sustainable system



Notifi-  
cation    Clinical  
data    Herd  
data    Lab.  
data    Abat-  
toirs    Others



Case = 1 herd  
1 syndrome



Policy  
makers    An. Health  
managers    Data  
providers    Veter-  
inarians    Stake-  
holders

Evaluation

# Data classification into syndromes

- Based on TEST requested
  - Direct mapping
- Based on the SAMPLE submitted
  - Word recognition → Rule based decision

# Syndromes – Keywords

	E	F	H	
1	CLIENTSAMPLEID	SAMPLETYPEDESC	PARAMLISTDESC	PARAM
13823	885 MAY 7	Milk	Bacterial culture	Culture
13824	326- Mes LN	Swab	Bacterial culture	Culture
13825	CHER #4 (COW) lung	Fetal Tissue	Bacterial culture	Culture
13826	CHER #4 (COW) stomach content	Tissue	Bacterial culture	Culture
13827	CHER #4 (COW) placenta	Tissue	Bacterial culture	Culture
13828	Florrie RF	Milk	Bacterial culture	Culture
13829	None Given	Feces	Bacterial culture	Culture
13830	1-1368-V-1-04/06/10	Swab-Anaerobic	Bacterial culture	Culture
13831	138	Milk	Bacterial culture	Culture
13832	632	Milk	Bacterial culture	Culture
13833	440	Milk	Bacterial culture	Culture
13834	#92	Milk	Bacterial culture	Culture
13835	UTERUS & UTERINE CONTENT	Tissue Pooled	Bacterial culture	Culture
13836	LIVER & KIDNEY	Tissue Pooled	Bacterial culture	Culture
13837	LUNG	Tissue	Bacterial culture	Culture
13838	1-13110 ASHMORE 110-145	Semen	Bacterial culture	Culture
13839	2-13062 COASTAL 110-140	Semen	Bacterial culture	Culture
13840	3-11970 MAPLE 110-155	Semen	Bacterial culture	Culture
13841	4-13246 JULY 110-155	Semen	Bacterial culture	Culture
13842	OWNER-79 LF	Milk	Bacterial culture	Culture
13843	1	Milk	Bacterial culture	Culture
13844	Maplehurst NO ID	Milk	Bacterial culture	Culture
13845	RAW MILK	Milk	Bacterial culture	Culture
13846	LUNG	Tissue	Bacterial culture	Culture
13847	STOM. CONT.	Tissue	Bacterial culture	Culture

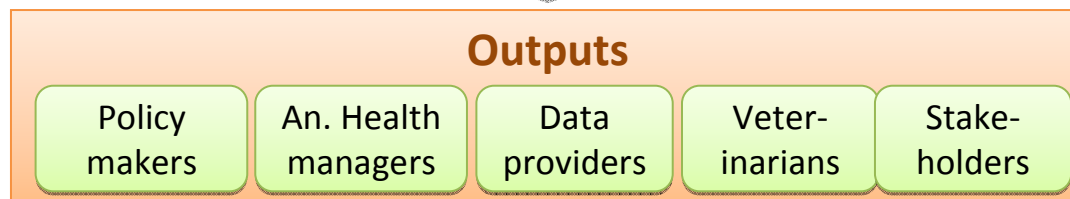
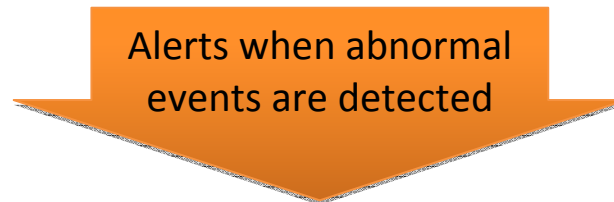
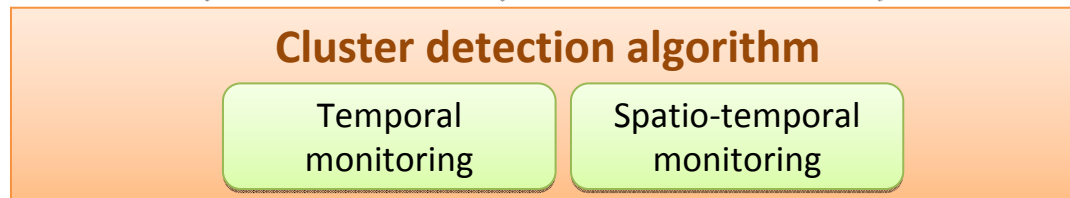
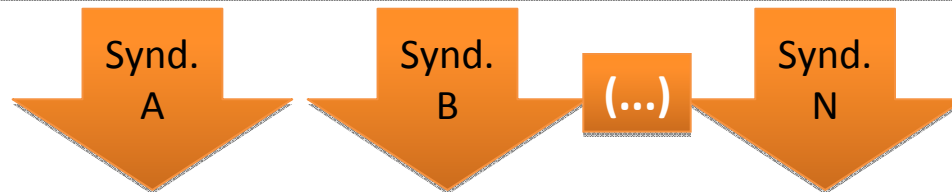
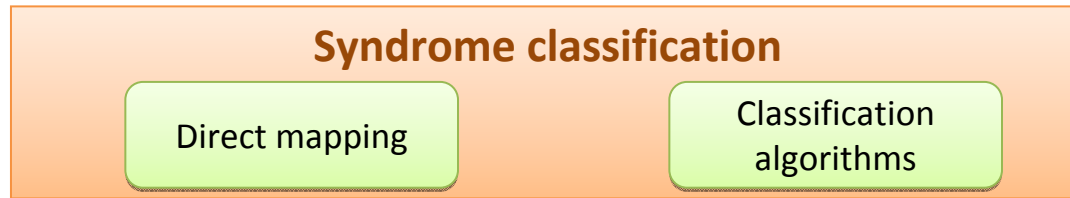
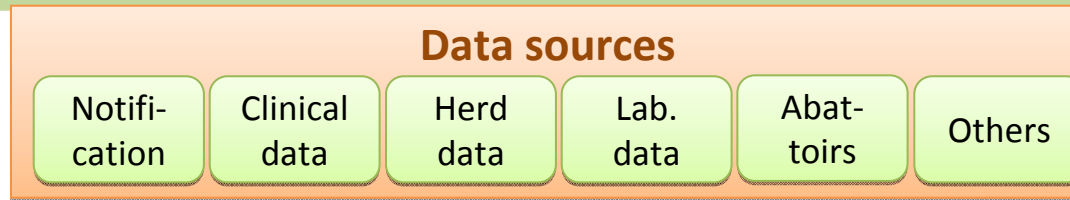
# Syndrome classification based on KEYWORDS

- “Tokenize” all historical data
- Create a list of medically relevant words
  - Abbreviations
- Determine a classification method based on this list
  - Words to syndrome      **Feces = GIT**
  - Hierarchy                      **Fetus > Lungs**
  - Exclusion criteria              **Ear = Eyes/Ears IF NO “TAG”**
  - Combinations                **Heart+Liver = Systemic**

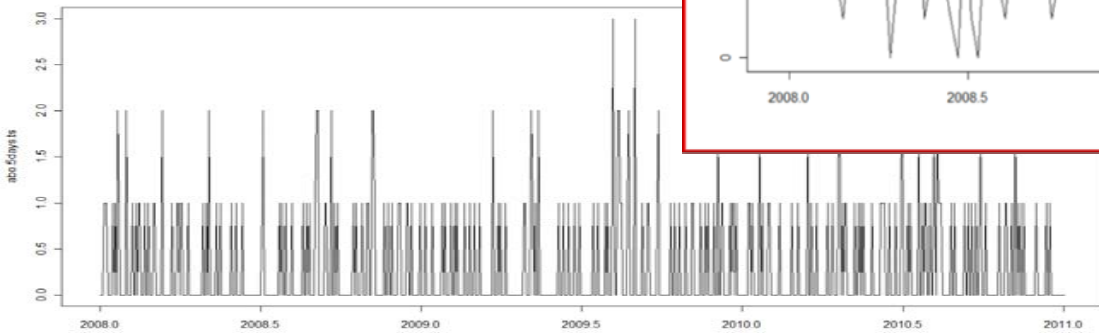
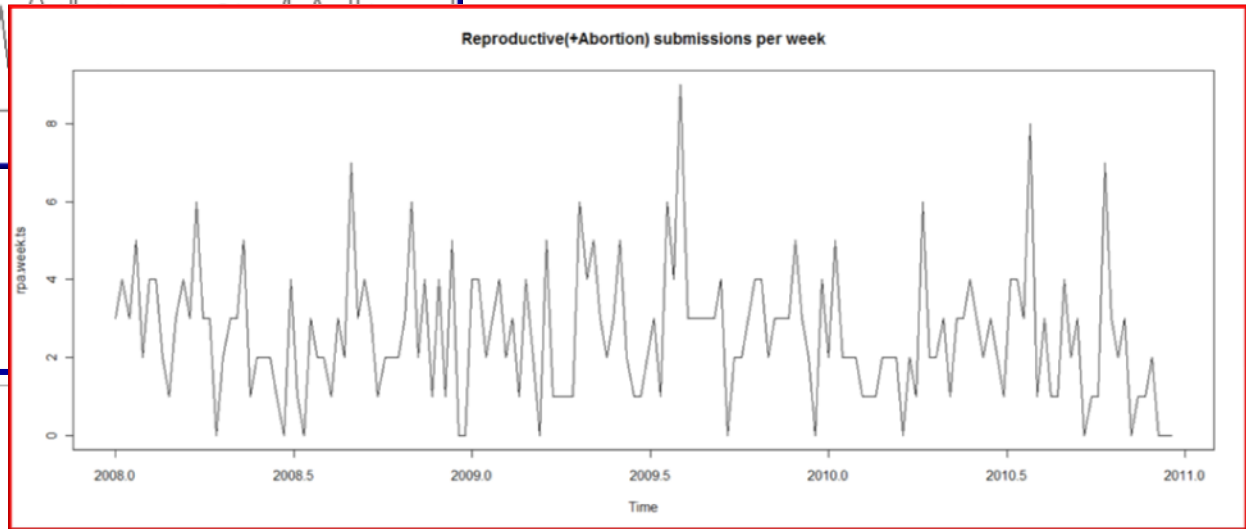
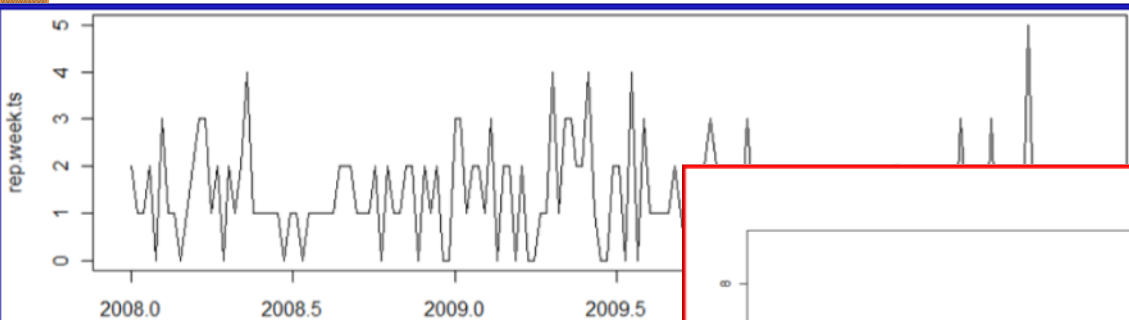
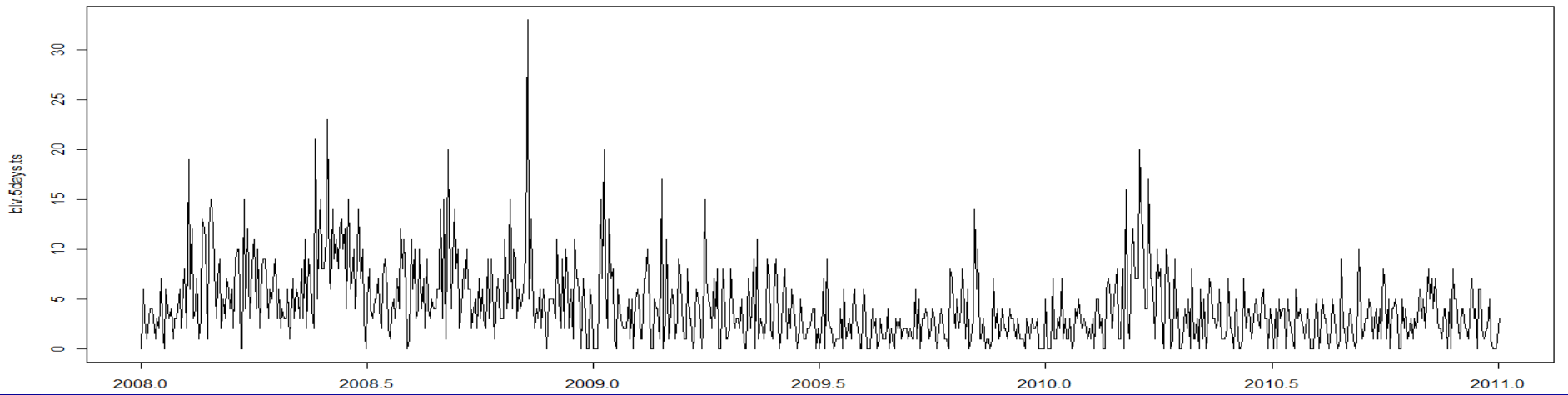
# Data classification into syndromes

Abortion	Musculoskeletal	<i>Neospora caninum</i>	Clinical Pathology
Circulatory	Nervous	Johnes disease	Toxicology
Environmental	Reproductive	BSE	MIC
Eyes and ears	Respiratory	BVD	<u>NONSPECIFIC</u>
GIT	Systemic		
Haematopoietic	Urinary		
Hepatic	Skin and tegument		
Mastitis			





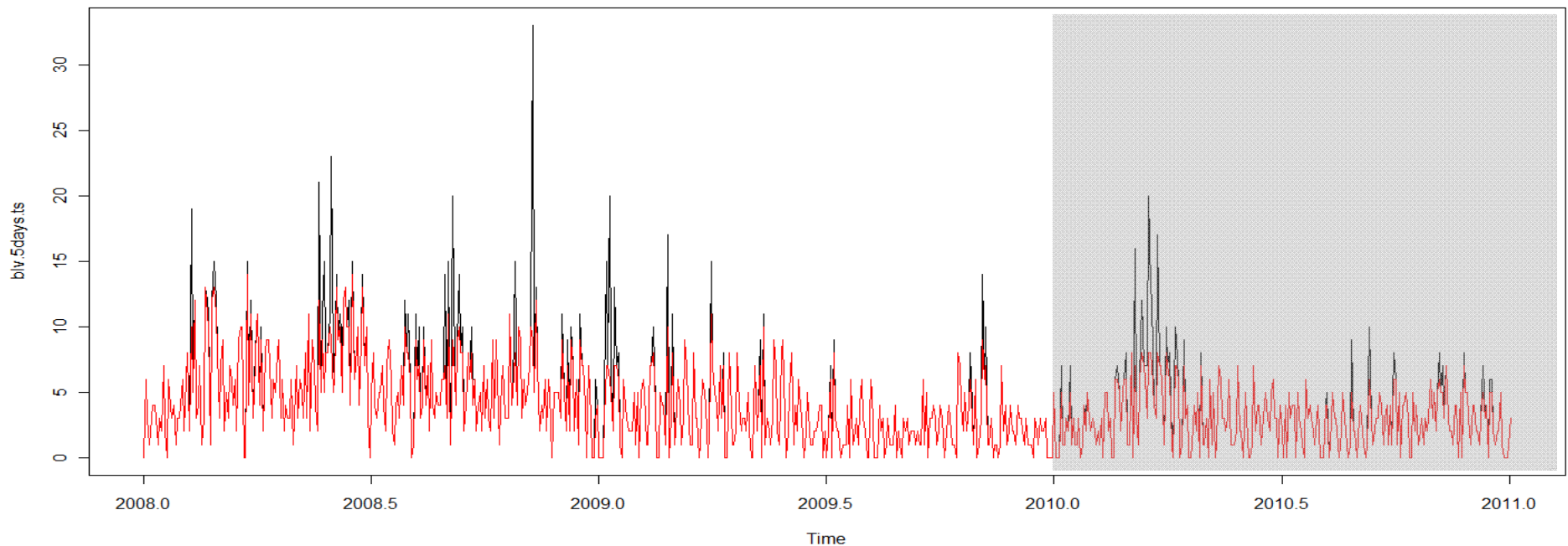
Evaluation



# Time series analysis

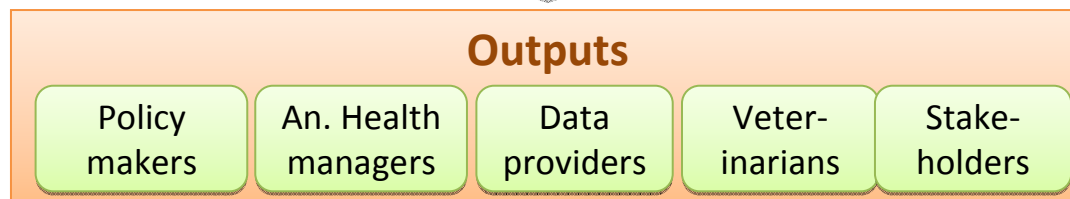
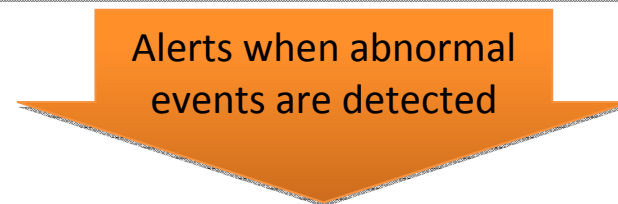
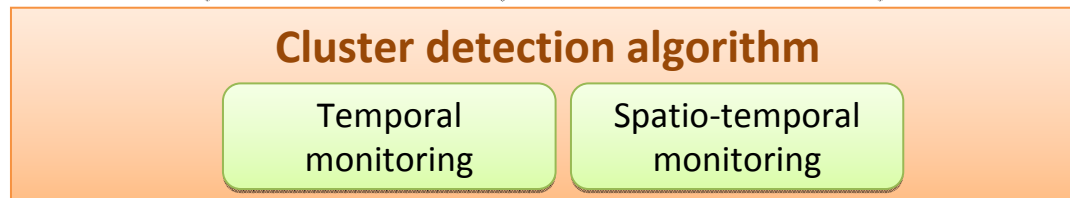
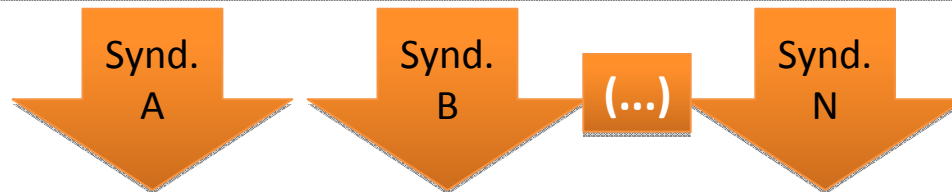
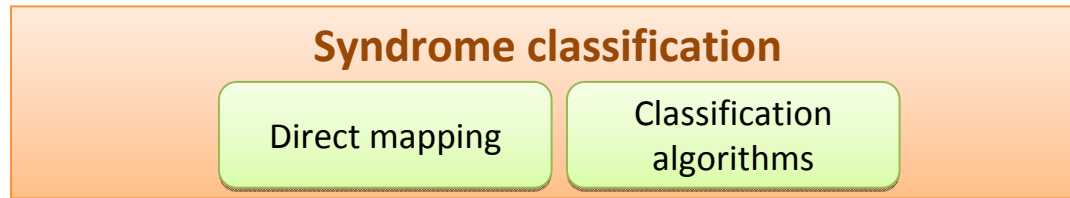
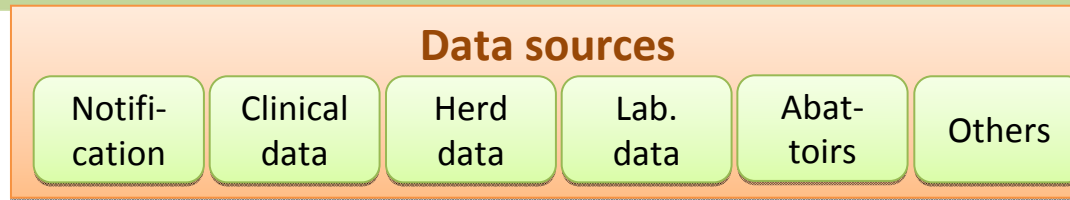
- Retrospective
  - “Clean” historical data
- Prospective
  - Detect aberrations

BLV submissions per day, on Weekdays (Sat and Sun added to Monday)



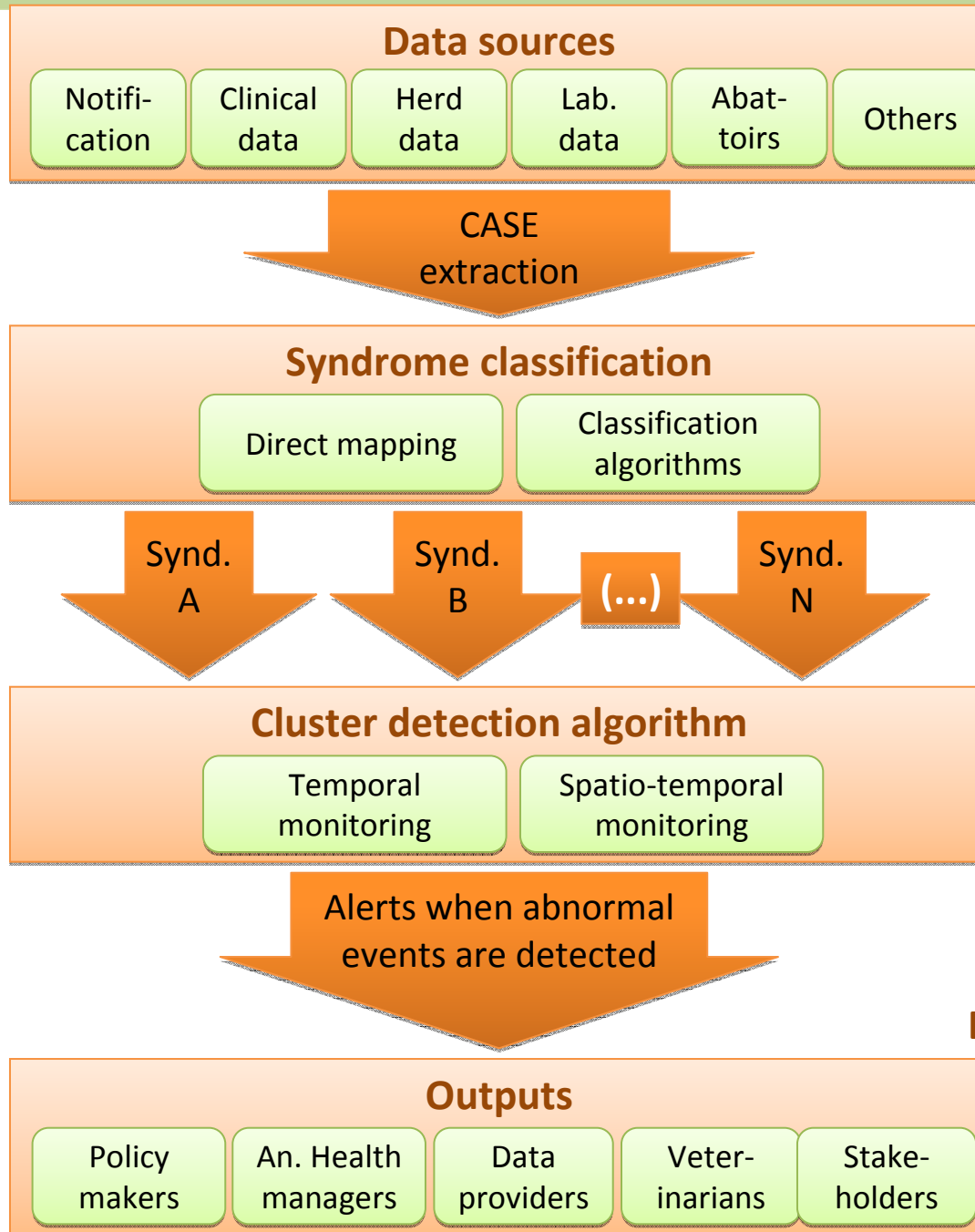
# Implementation

- Large dataset
- Automatically, daily once system implemented
- Free software



Evaluation





Evaluation

# Conclusion

- Implementation of the system will improve
  - Disease detection
  - Preparedness
  - Situation awareness
- Cost of implementation only
- Data already available

# Acknowledgements

- OMAFRA
- Animal Health Laboratory – University of Guelph
- Crawford Revie
- Javier Sanchez
- Bruce McNab - OMAFRA
- Beverly McEwen – AHL
- David Kelton – UoG
- Catherine Anne Muckle – UPEI
- J Trenton McClure - UPEI



Ontario

Ministry of Agriculture,  
Food and Rural Affairs

UNIVERSITY  
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LABORATORY SERVICES

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ISLAND





Questions?

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