

Welcome to the Disease BioPortal



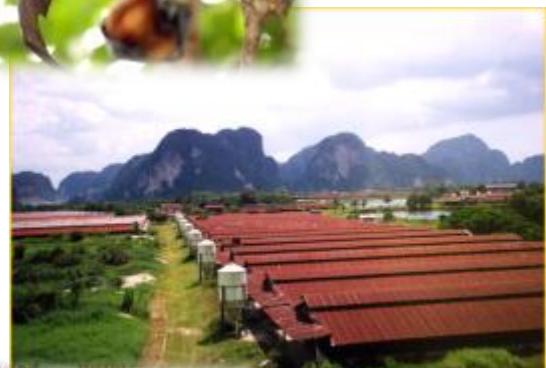
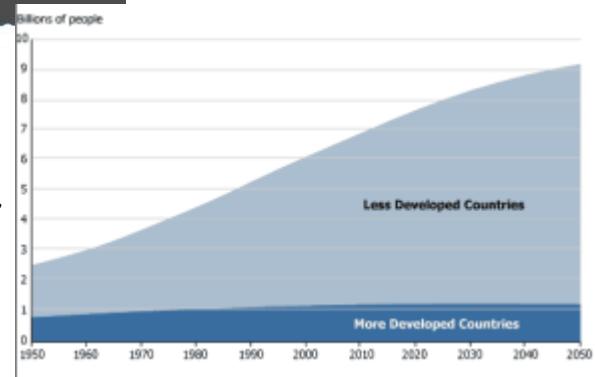
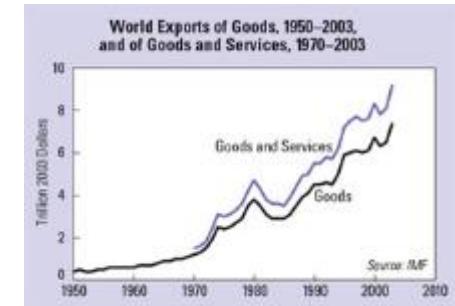
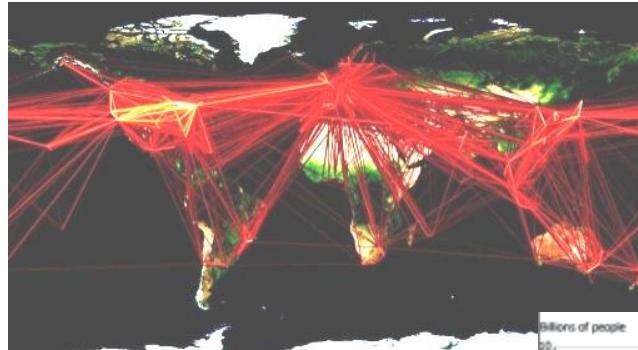
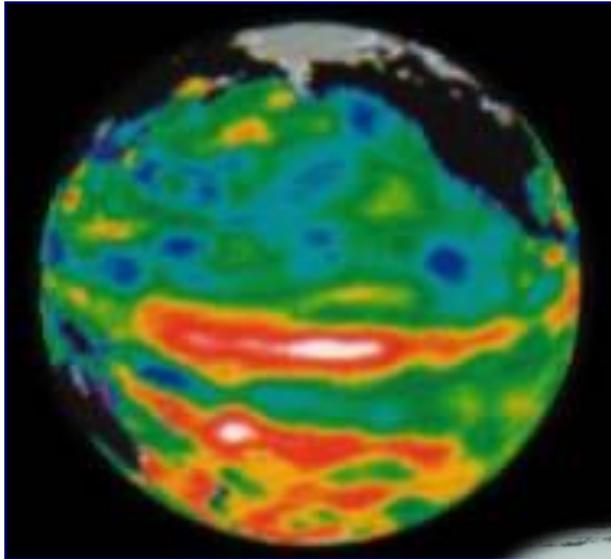
Illustrating the new capabilities of Disease BioPortal® for risk-based disease surveillance, prevention and control: the example of Avian Influenza in Malaysia

CENTER FOR ANIMAL DISEASE MODELING AND SURVEILLANCE (CADMS),
SCHOOL OF VETERINARY MEDICINE, UC DAVIS

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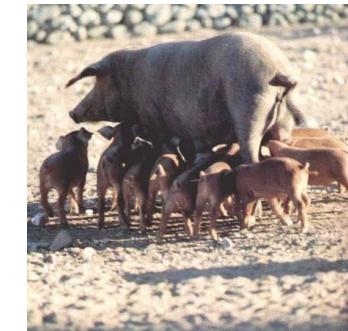
Global changes...



Global changes...



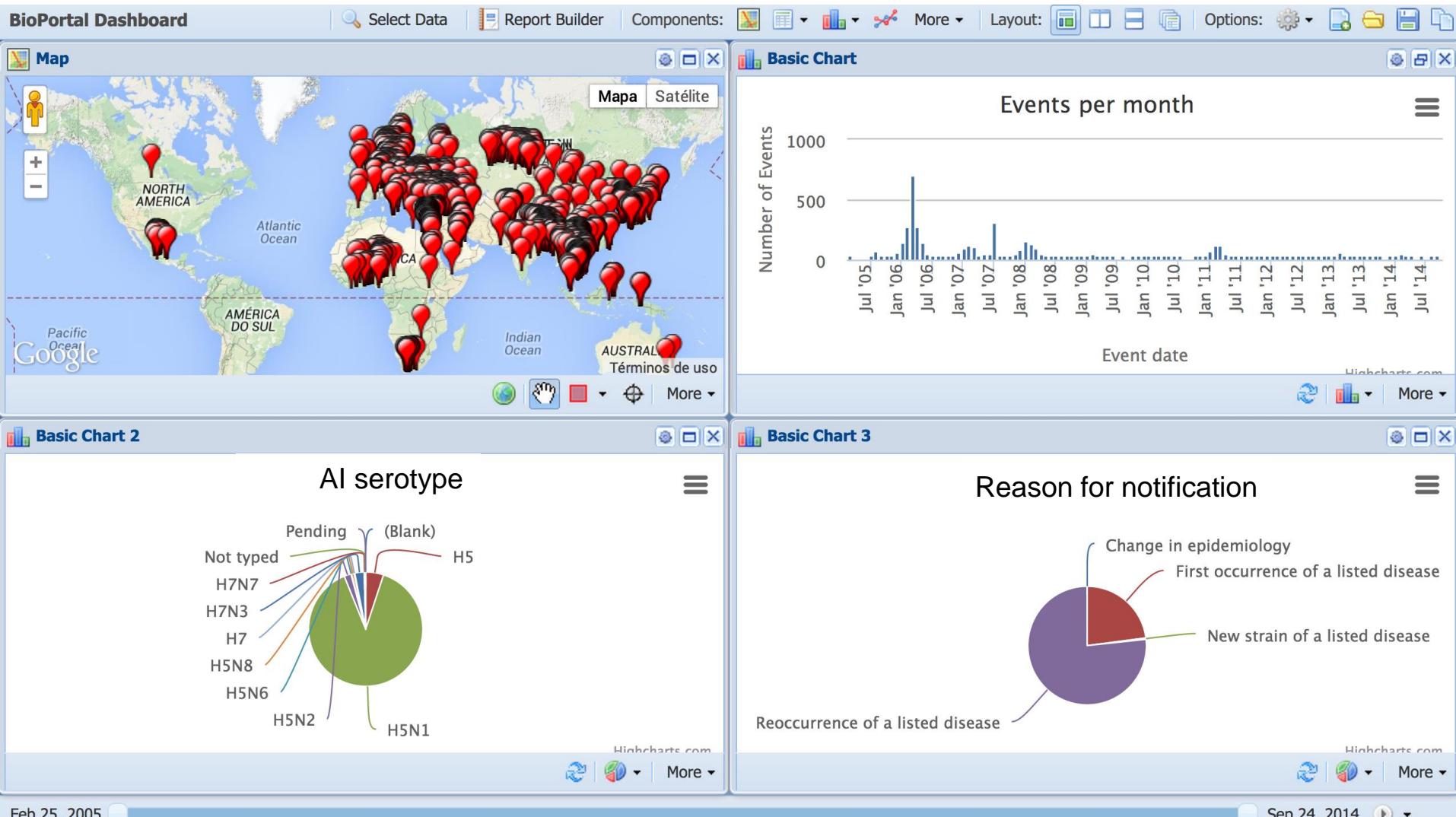
Increased
interaction



Complex epidemiological scenarios → All is interrelated

Worldwide distribution of Avian Influenza

2005 - 2014



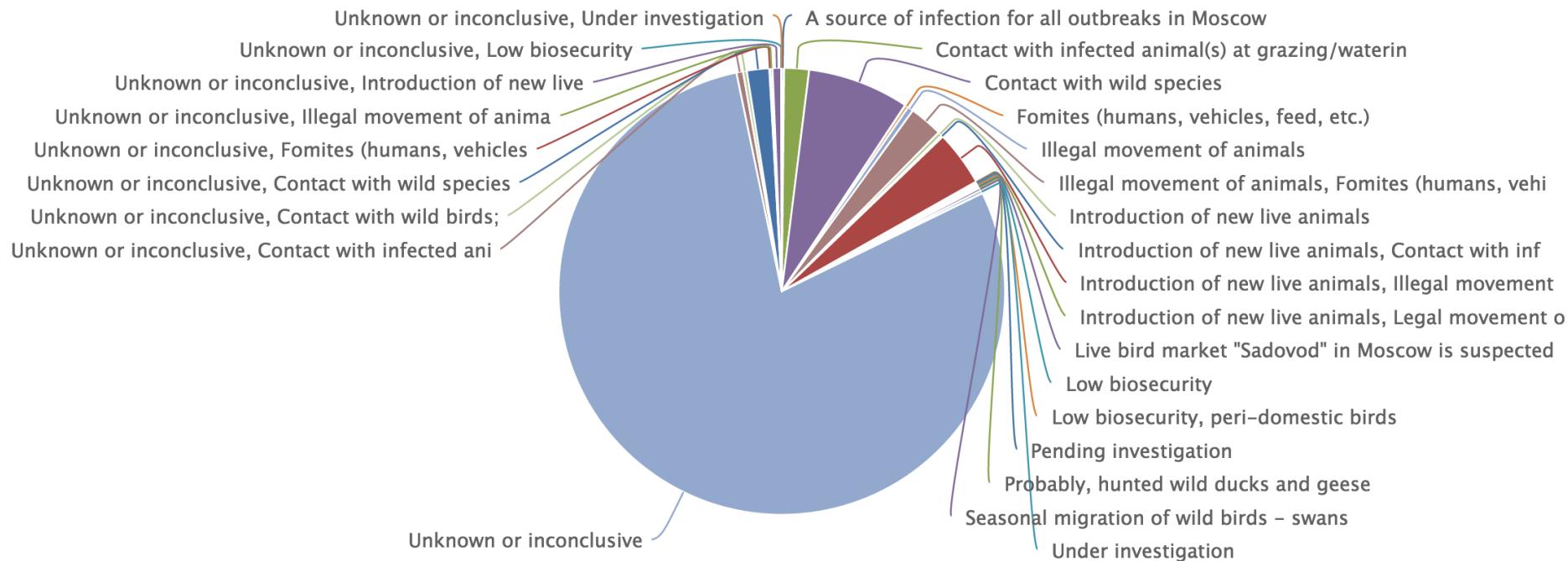
Source: OIE, 2014

Source of infection

Basic Chart 2



Source of infection



Highcharts.com



THE CHALLENGE:

Early detection

Rapid Control

Risk Mitigation and Adaptation



THE CHALLENGE:

Early detection

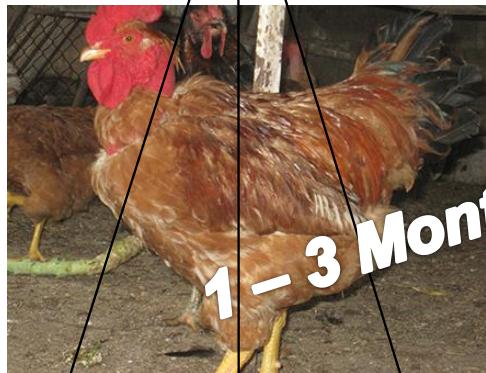
Rapid Control

Risk Mitigation and Adaptation

ARE WE
PREPARED?

THE PROBLEM: LACK OF EQUILIBRIUM IN SURVEILLANCE SYSTEMS

Time for detection on the field?



1 – 3 Months

FIELD DETECTION

BUT... SAMPLES
ARRIVED LATE!

Time to detection in the lab?



4 hours

LAB DETECTION

Good and rapid
diagnostic tests

THE PROBLEM: LACK OF EQUILIBRIUM IN SURVEILLANCE SYSTEMS

Time to detection on the field?



WHAT CAN WE DO?

FIELD DETECTION

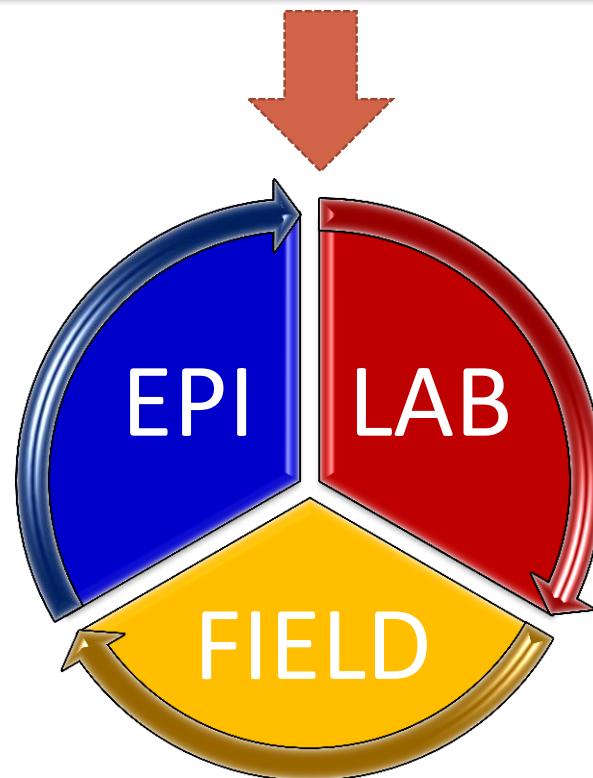
BUT...SAMPLES
ARRIVED LATE !!



LAB. DETECTION

Good and rapid
diagnostic tests

Need to develop a **new integrated, near real-time system** to increase the sensitivity and cost-effectiveness of the surveillance and control strategies



Welcome to the Disease BioPortal

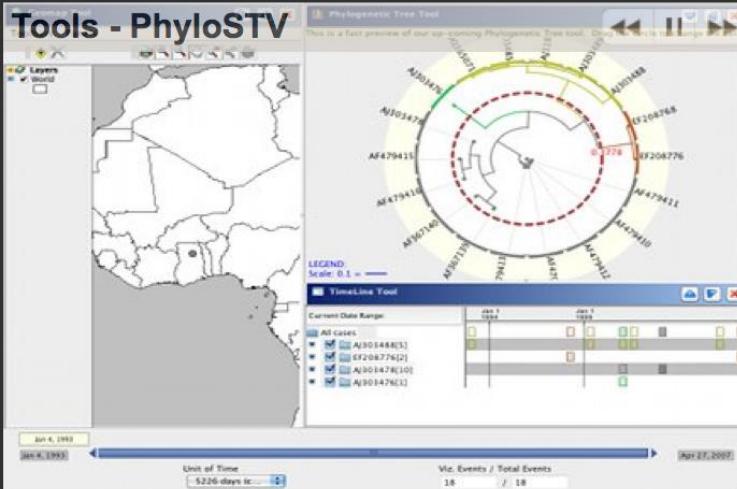


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REAL-TIME DISEASE SURVEILLANCE

The dynamics that foster disease emergence and transmission world-wide continue to expand in complexity and scope, thus creating unprecedented new challenges to solving local, regional, and global problems of animal and human health and to mitigating their social, economic, and political consequences. Global efforts toward sustaining animal and human health must have knowledge of disease incidence, as well as rapidly changing influences of competing factors in global health, including environmental changes, global warming, economic and political landscapes, and international movement and travel of humans and animals. Prerequisite to understanding changing local, regional, or global distributions of disease or disease risks is the rapid access to current information that can provide the necessary situational awareness of disease and of factors potentially associated with disease risk. [Read more...](#)

Tools - PhyloSTV



Get started now

—Login

Username:

Password:

[Login](#) [Register](#)

Having problems accessing your account?

<http://bioportal.ucdavis.edu>

DISEASE BIOPORTAL

Web-based IT system for near-real time access to local, regional, and global disease information

Just Register to try it!

Goal - Vision

To create a long-term system
for sustainable research,
development, and operation
of *global animal disease
surveillance and modeling*

Multiple streams of information

Data Sources

Secure transfer to lab

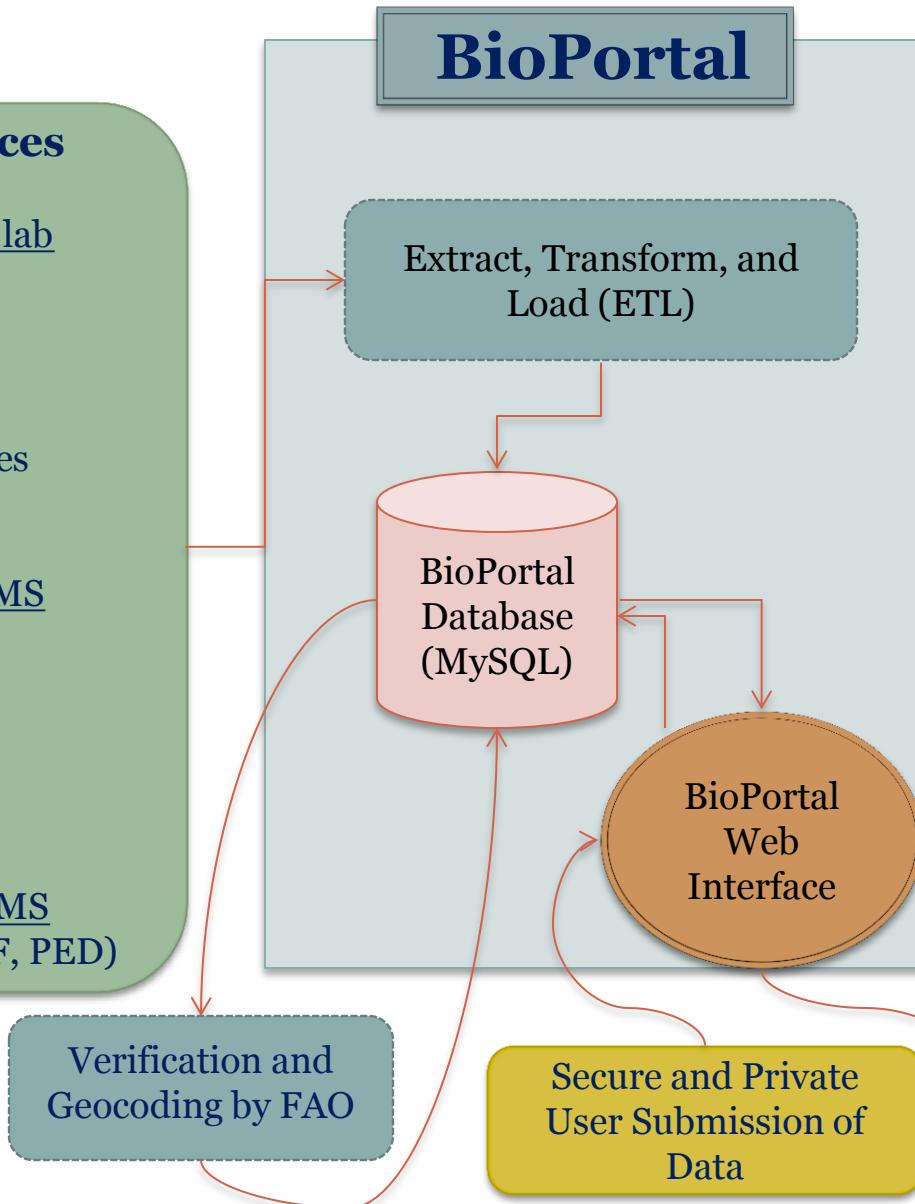
- Reference Labs
- Pirbright
- AHVLA
- FAO
- National databases
- more

Collected by CADMS

- OIE
- PANAFTOSA
- Surveys
- GenBank
- more

Produced by CADMS

- News (FMD, ASF, PED)



Data Query and Retrieval

- Flexible and powerful searching capabilities
- Export to Excel (CSV), XML, other formats

Visualization

- Google Earth/Maps
- Spatio-Temporal-Genomic Visualizer (STV)

Phylogenetic Analysis

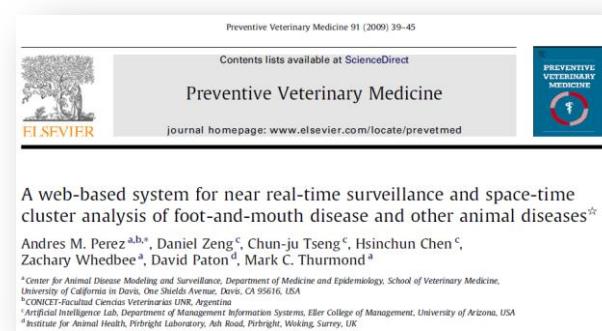
- Multiple Sequence Alignment & Distance Matrices
- Phylogenetic tree creation
- PhyloSTV
- Interfacing with GenBank

Other Features

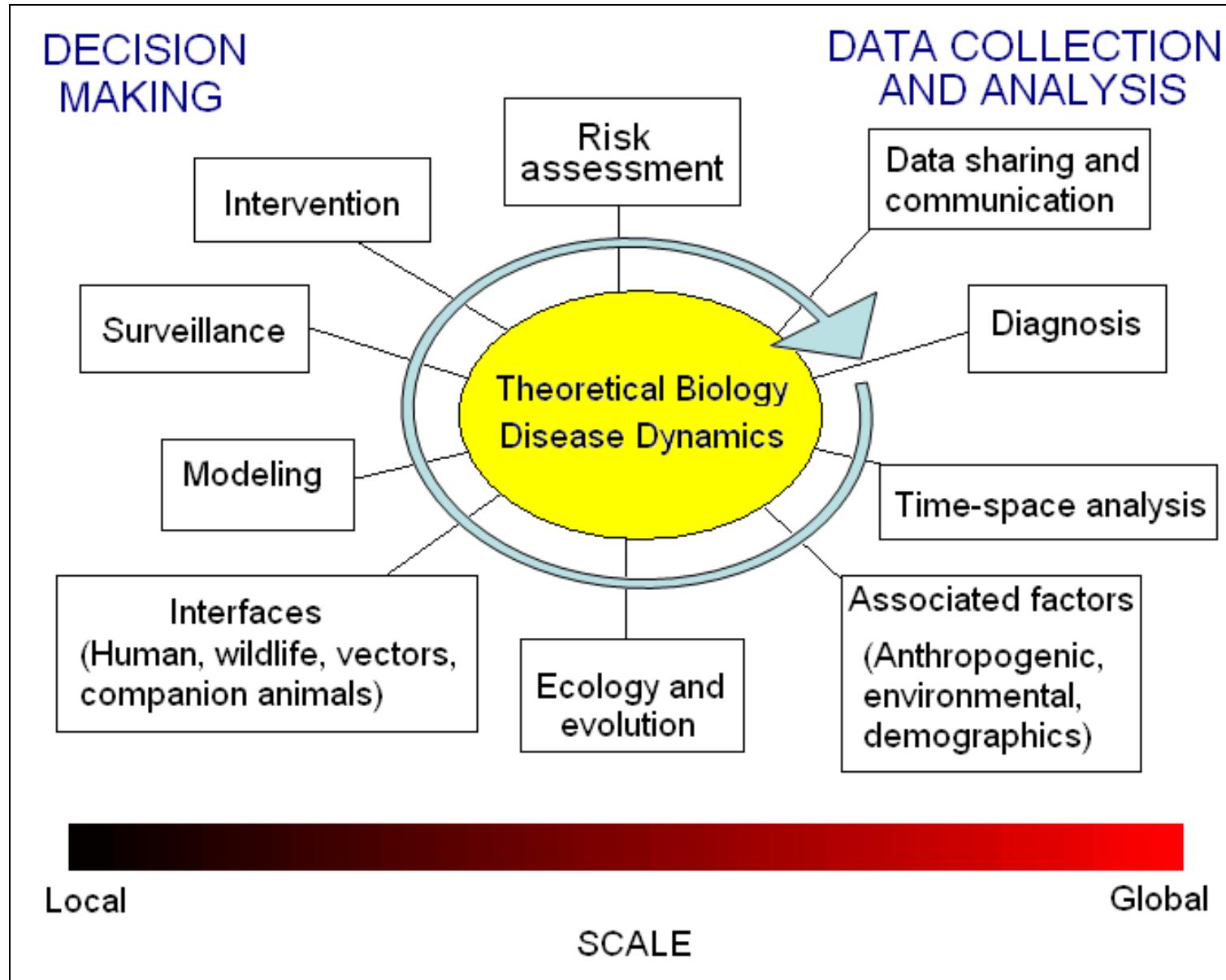
- Social network analysis
- Cluster analysis
- Anomaly Detection
- Customizable alerts
- RSS Feeds

Attributes of the Disease BioPortal

- **Operational** since 2007 (> 1300 users in 106 countries)
- **Near-real time** surveillance
- **Multiple streams** of information
- **International involvement** (data providers and users) and **coordinated as a consortium**
- **Analytical capabilities** and **subject matter expertise –not just an IT system**
- **Continuing development**
- **Space-time-genomic surveillance**
- **Cluster analysis** and anomaly detection
- **Prediction models**
- **Decision support tool**

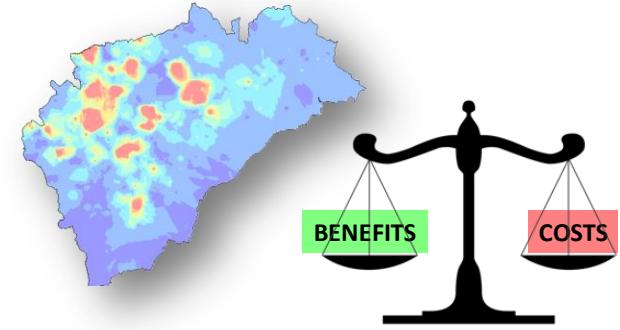
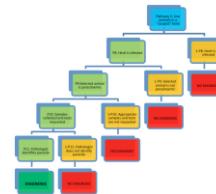
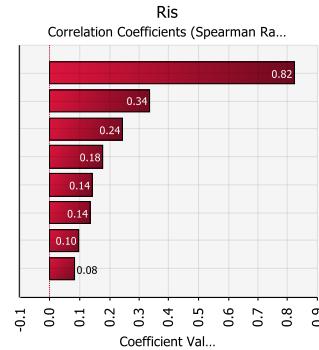


Ultimate goal...





EDUCATION, TRAINING AND COMMUNICATION



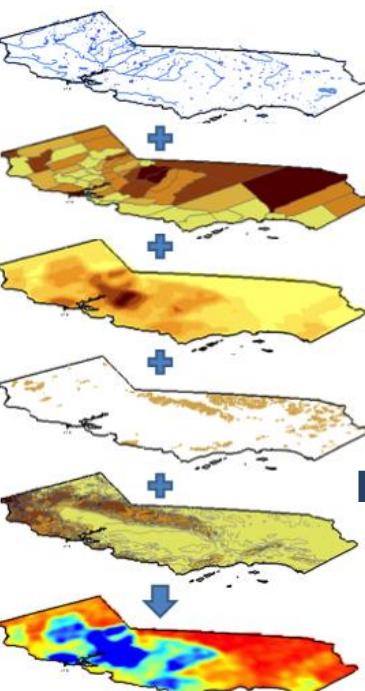
Susceptible → Infected → Removed

SPATIAL AND STOCHASTIC DISEASE SPREAD AND ECONOMIC MODELS

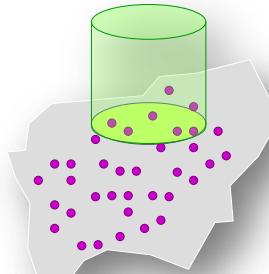
RISK ASSESSMENT AND RISK FACTOR ANALYSIS

METHODS USED

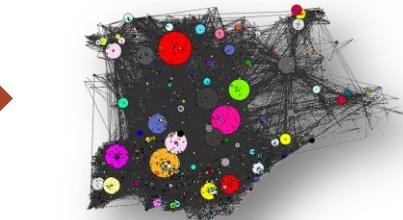
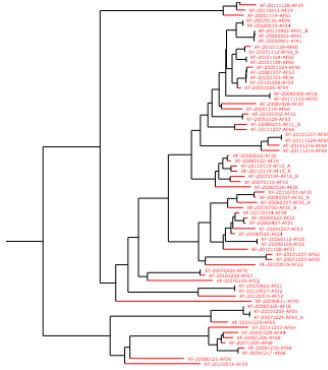
RISK MAPPING, CLIMATIC AND ENVIRONMENTAL MODELS



CLUSTER ANALYSIS AND ANOMALY DETECTION



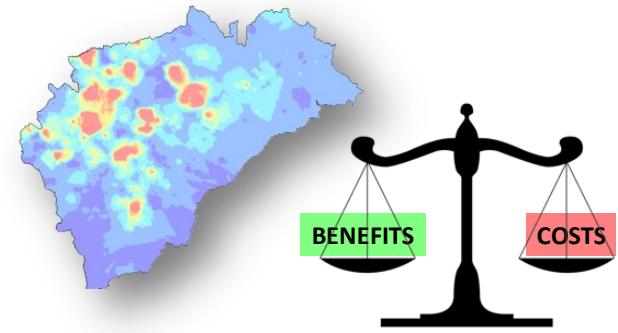
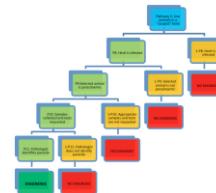
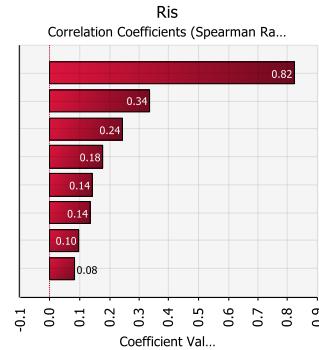
MOLECULAR EPIDEMIOLOGY



SOCIAL NETWORK ANALYSIS



EDUCATION, TRAINING AND COMMUNICATION



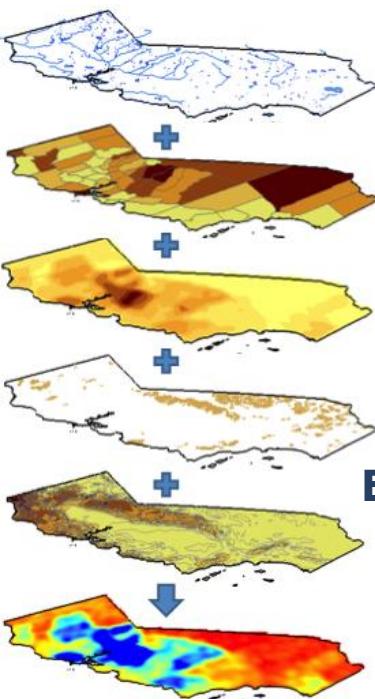
RISK ASSESSMENT AND RISK FACTOR ANALYSIS

Susceptible → Infected → Removed

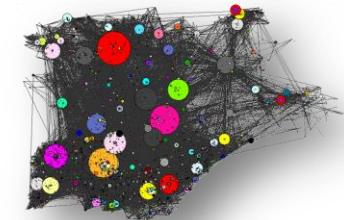
SPATIAL AND STOCHASTIC DISEASE SPREAD AND ECONOMIC MODELS



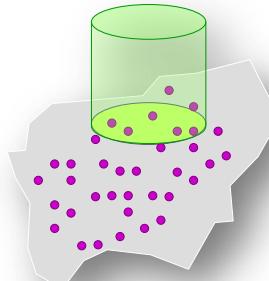
RISK MAPPING, CLIMATIC AND ENVIRONMENTAL MODELS



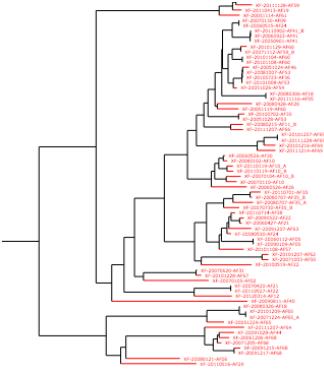
CLUSTER ANALYSIS AND ANOMALY DETECTION



SOCIAL NETWORK ANALYSIS



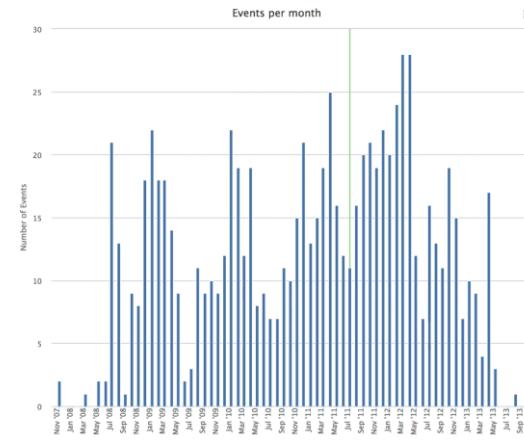
MOLECULAR EPIDEMIOLOGY





Example: risk-based surveillance for Avian influenza in Malaysia

Evaluation of the contact network structure among premises (i.e. farms, markets, etc)



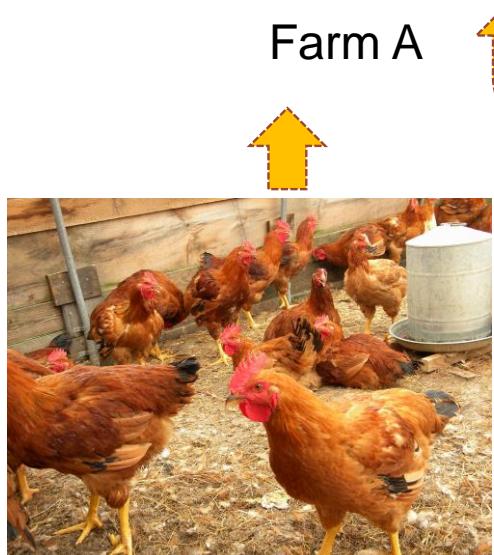
Temporal evolution of movements

Ghani et al. (in preparation)

Poultry industry, an intricate network of contacts



Farm B



Farm A

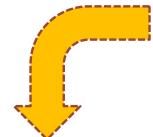


slaughterhouse
shops

Farm C



Market

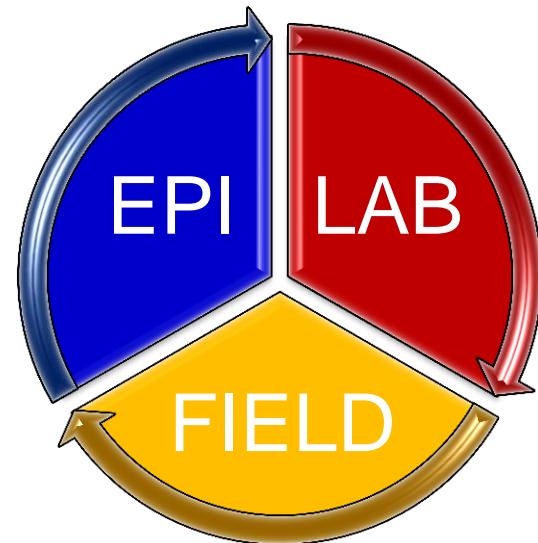


OPPORTUNITIES FOR COLLABORATION

- ✓ Use of the system to analyze and display data routinely collected by veterinary services or Ref. labs.
- ✓ Ability to link to other sources of data and databases (OIE, GenBank, other reference laboratories) without requirements of changing local databases and keeping confidentiality!
- ✓ Secure access and limited visualization/download of sensitive data

OPPORTUNITIES FOR COLLABORATION

- ✓ Contribution to the development of a **global surveillance system** for emerging and transboundary diseases (e.g. avian influenza) managed as a consortium of different groups and organizations.
- ✓ **Standardized nomenclature** will not be necessary to link, use, and share disparate databases



Acknowledgements



UTM
UNIVERSITI TEKNOLOGI MALAYSIA



UCDAVIS
UNIVERSITY OF CALIFORNIA

*Many thanks for your
attention!*

