Certain Things about Uncertainty: The School of Statistics 60 Years After

Erniel B. Barrios

Professor of Statistics

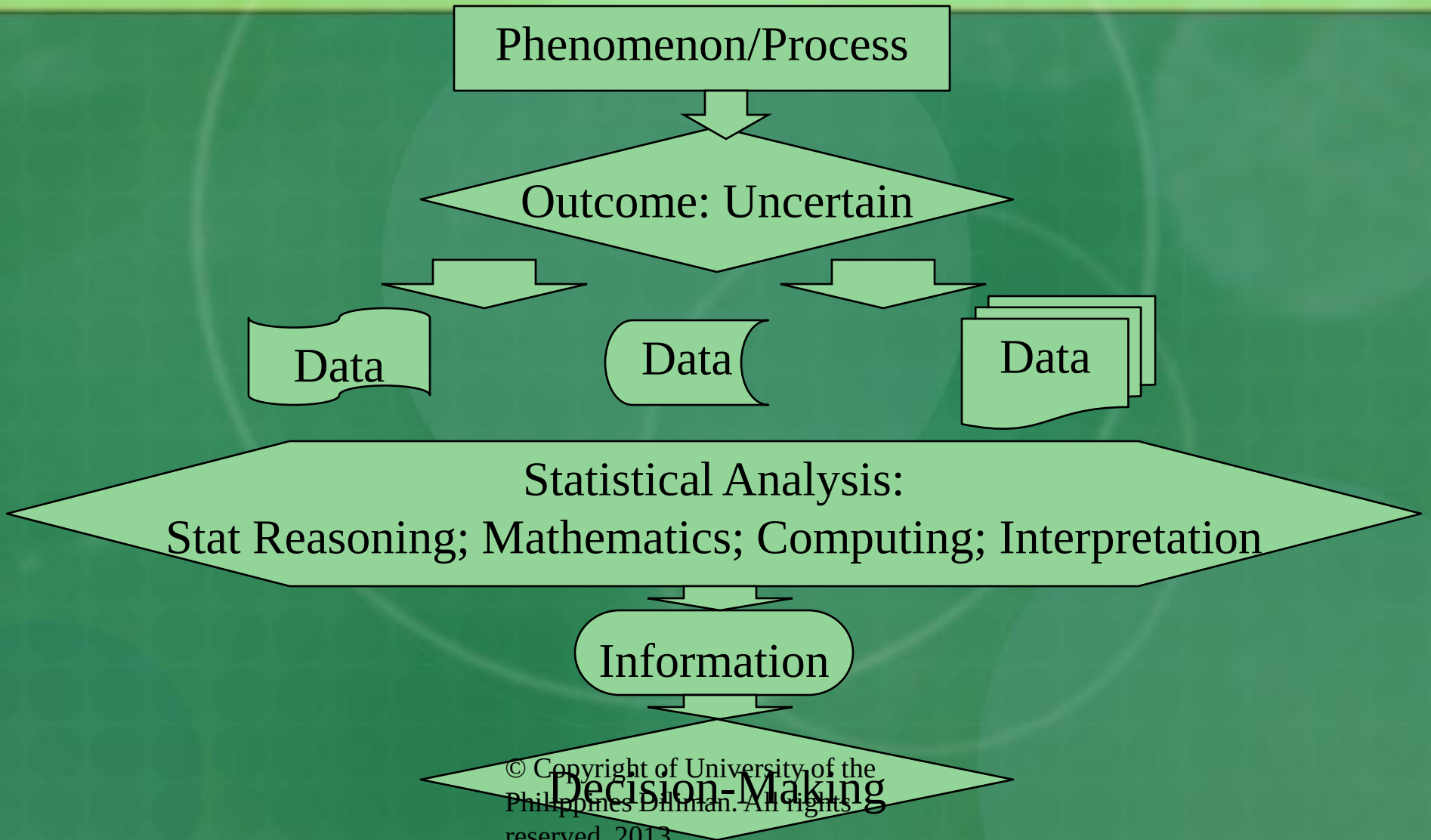
The School of Statistics

- September 1953: Training Center
- To support post-war reconstruction efforts among governments in the region.
- Focus then was on official statistics
  - Household, Business Establishments, Economy-wide Income
  - Agricultural production
  - Birth rate
  - Inflation rate

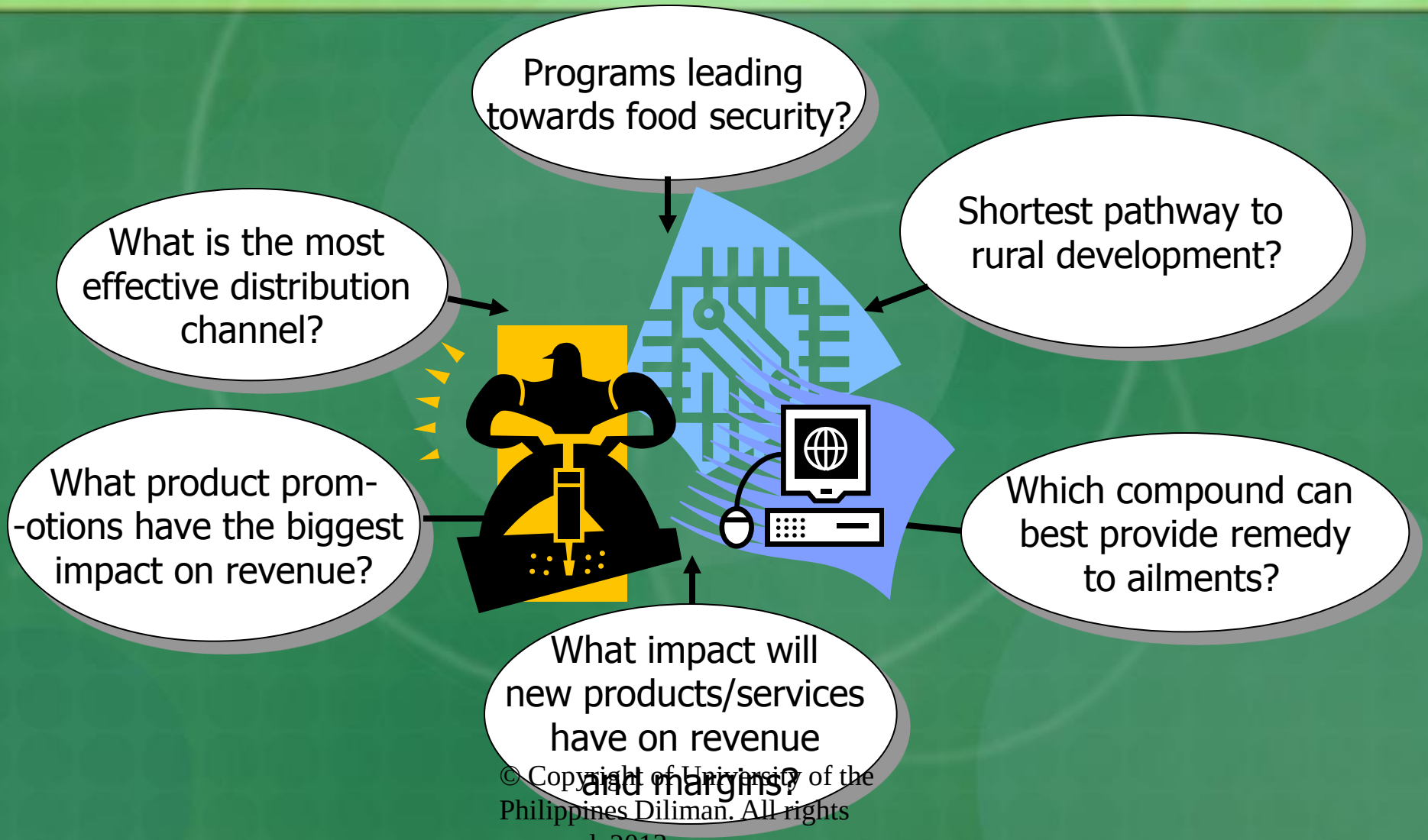
The School of Statistics

- In 1970's-1980's, focus of mathematical statistics
- Late 1980's opened to statistical consulting practice
- 1990's-2000's exponential growth in computing facilities

Now…From Government to a Wide Areas of Concern



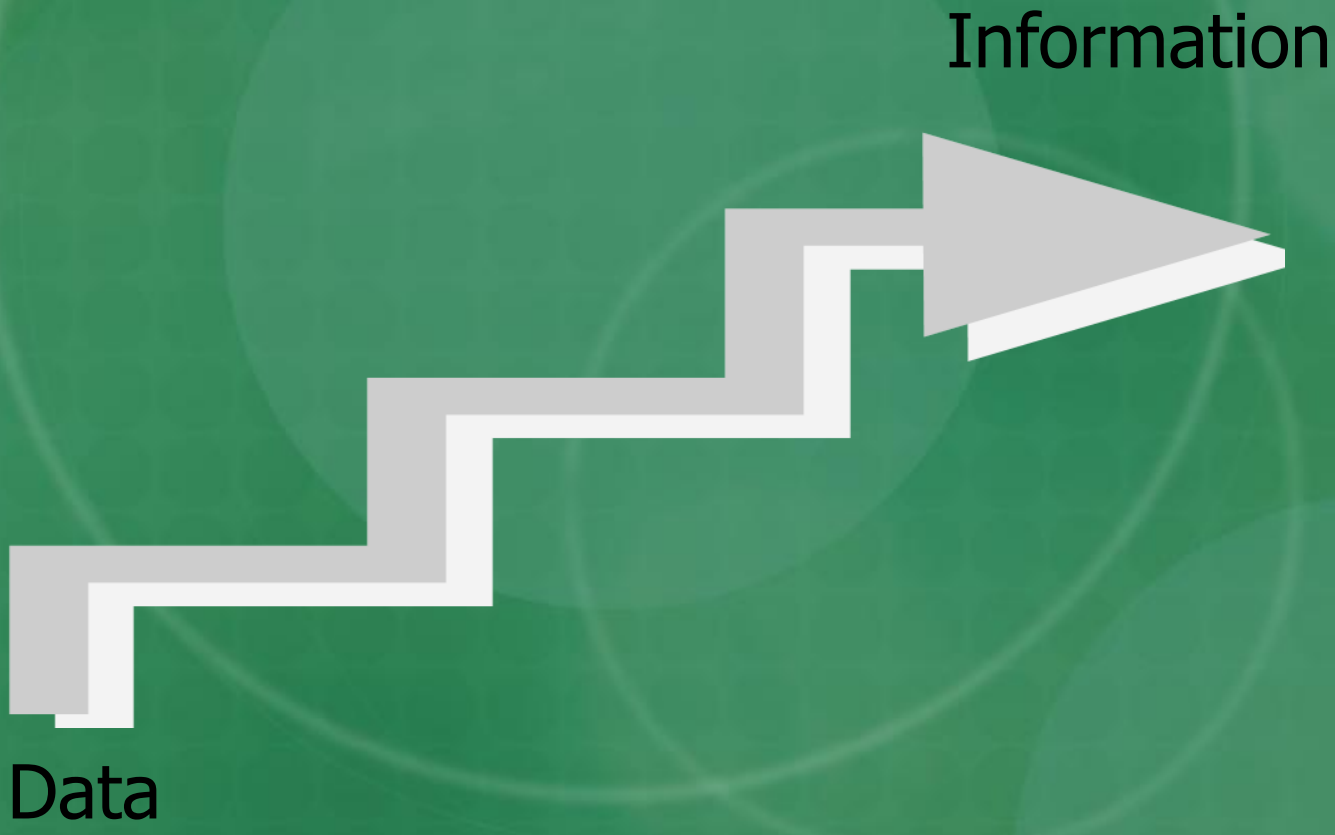
Some questions….



The Big Data

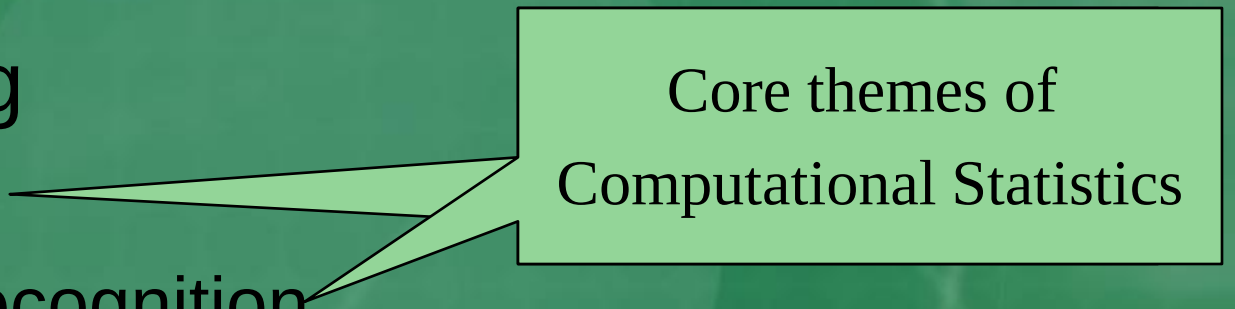
- ATM Transactions
- Point of Sales Machines
- Credit Card Usage
- Telecommunication Usage
- Loyalty Cards
- Bank Transactions: Deposits, Loans
- e-commerce
- Survey Archives

Data Warehousing?



Business Analytics

- Data Extraction
- Data Mining
  - Modelling
  - Pattern Recognition
- Applications
  - Prediction
  - Segmentation
  - Tailor-fitted activities



Computational Statistics

Traditional Statistics	Computational Statistics
Small to Moderate Sample Size	Large to Very Large Sample Size
Indep. and Ident. Dist. Data Sets	Nonhomogeneous Data Sets
One or Low Dimensional	High Dimensional
Manually Computational	Computationally Intensive
Mathematically Tractable	Numerically Tractable
Well Focused Questions	Imprecise Questions
Strong Unverifiable Assumptions	Weak or No Assumptions
Statistical Inference	Structural Inference
Statistical Optimality	Statistical Robustness

Wegman, E, 1988, A View of Computational Statistics and Its Curriculum, *Proceedings of the Section on Statistical Education*, American Statistical Association, 1-6.

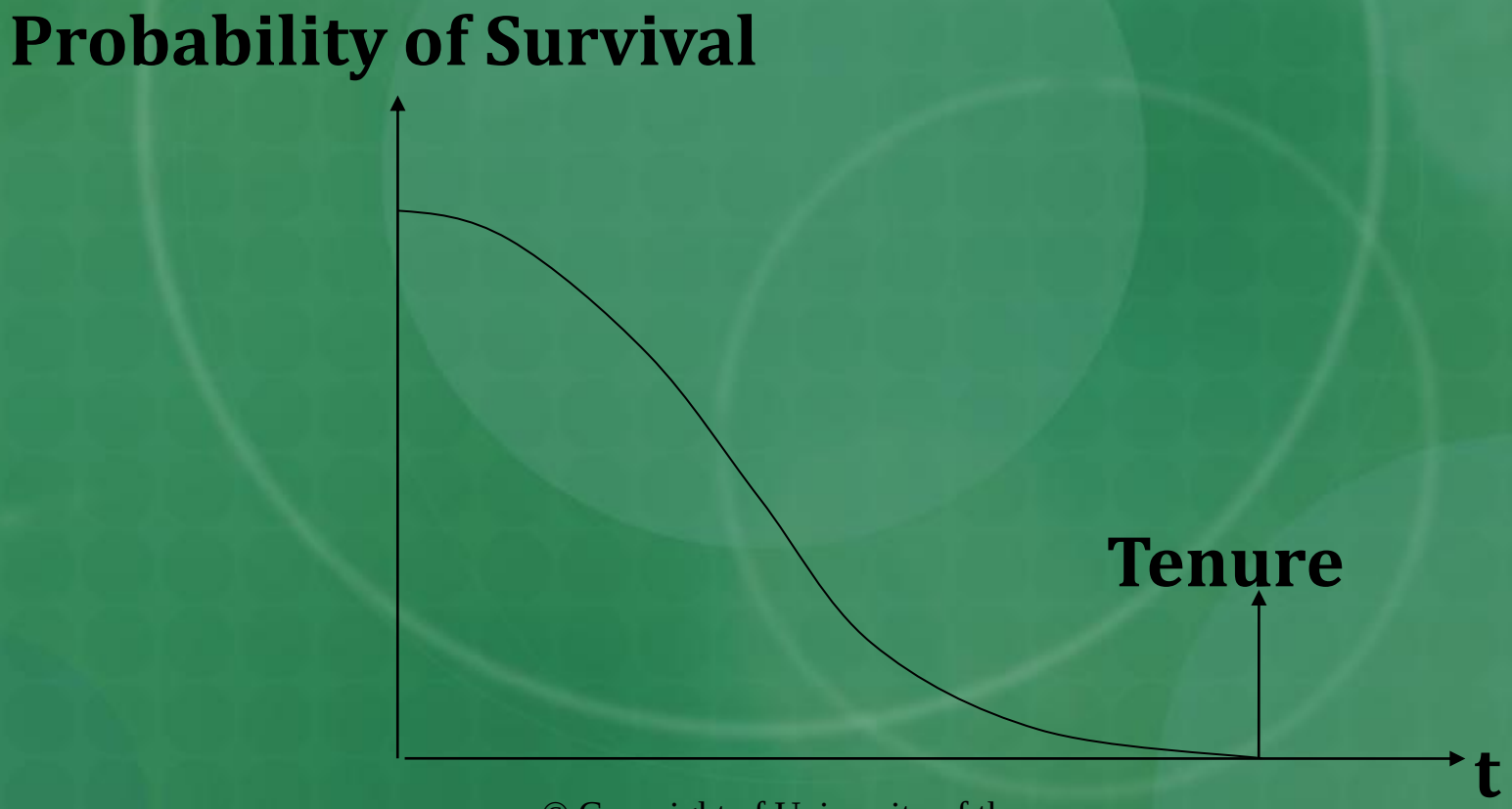
Customer Lifetime Valuation
with J. Lansangan

- High Competition: High cost of recruitment than retention
- Attracting customers=>Patronize the products
- Strategy: lockup period
  - Examples: loyalty cards, contracts, credit cards, etc.

Customer Lifetime Valuation
with J. Lansangan

- How to engage them?
  - Incentives: to convince them to enter into the contract!
- Value of the offer vs. Duration of the lock up period
  - Based on Lifetime Profitability of the Customer

Customer Lifetime Valuation
with J. Lansangan



Multiple Time Series Model
with R. Veron Cruz

$$Y_{i,t} = \phi Y_{i,t-1} + \lambda_i + \varepsilon_{i,t}$$

- A loan portfolio composed of individual loans
- Y_{it} outstanding balance of the i^{th} customer of the portfolio, at some time point t
- Autoregressive=>account for common policies applicable to all cardholders
- Random component represent the customer's periodic personal transactions like payments.

Multiple Time Series Model
with R. Veron Cruz

- Prediction of default
- Impact of policy changes
- Lesser cost, negative repercussions on the stakeholders
- Risk management

Spatiotemporal Model w/ Structural Change *with R. Bastero*

$$Y_{it} = \beta_d X_{it} + \gamma_d W_{it} + \lambda_{oi} \cdot e^{-\lambda_1 t^*} + \varepsilon_{it}$$

$$\beta_d = \beta I(i)_{\{i \in N^d\}} + \beta^* I(i)_{\{i \in N^d\}}$$

$$\gamma_d = \gamma I(i)_{\{i \in N^d\}} + \gamma^* I(i)_{\{i \in N^d\}}$$

$$\varepsilon_{it} = \rho \varepsilon_{it-1} + a_t$$

- Describes an epidemic scenario
- Epidemics can be effectively manage if the dynamics are fully understood.
- We provide a tool that can be used in modelling an epidemic scenario.

On-going

- Book on spatial-temporal models (computational statistics approach)
- 15 Graduate Students
  - More complicated dependence structure
  - Clustering of observations (contagion, epidemics)
  - Hidden and latent structures (more computationally expensive)
  - High dimensionality (n<p).

Lessons Learned

- Statistical practice (consulting) enhances teaching (more realistic examples, illustrations)
- Real-life problems stimulates statistical thinking
- Statistical thinking drives research in statistics
- Output: useful methods.

Thank you.