

International Development and Complexity Science

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Overview

- **Part I**

- The UKCDS Project
- International Development Examples

- **Part II**

- Complexity Science/Methods
- Applications to Development
- Complex Policy

Part I

Project and examples

UKCDS Project

- UK Collaborative on Development Sciences
- Exploratory Report...
- ... and Workshop
- Further work



International Development

- Both
 - Long term developmental efforts
 - Crisis response capability



Development and Science

- Want to recognise science as a **tool** for providing evidence and discovering solutions
- “... *most important book on development since Fritz Schumacher’s [...] Small is Beautiful*”

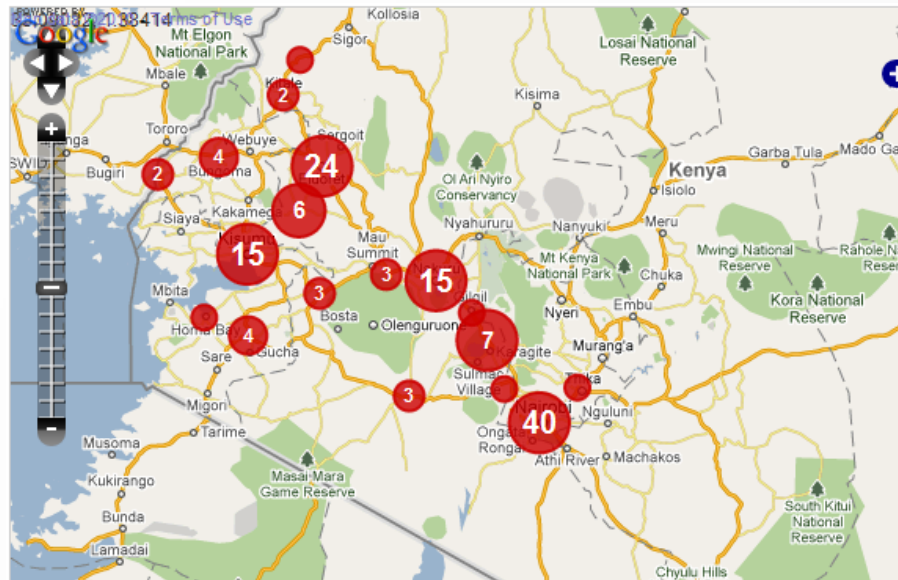


Overseas Development Institute

- Ben Ramalingam et al, Exploring the science of complexity: Ideas and implications for development and humanitarian efforts, 2008.



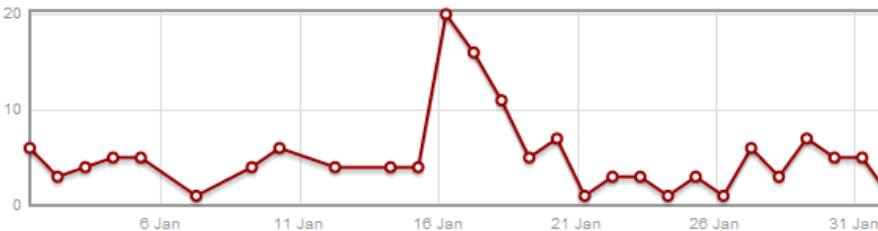
Ushahidi



From: To:

▶ PLAY

Jan 2007 Oct 2007 Jul 2008 Dec 2009



ALL CATEGORIES

RIOTS

DEATHS

PROPERTY LOSS

SEXUAL ASSAULT

INTERNALLY DISPLACED PEOPLE

GOVERNMENT FORCES

CIVILIANS

LOOTING

PEACE EFFORTS

EXTRA-JUDICIAL KILLINGS

EXTRA-JUDICIAL LINKED DISAPPEARANCES

HOW TO REPORT

1. By sending a message to 254713606944 or 12052181783
2. By sending an email to kenya@ushahidi.com
3. By sending a tweet with the hashtag/ [#KEVarsityDemo](https://twitter.com/KEVarsityDemo)
4. By filling a form at the website

Ushahidi Platform

- Anyone can gather distributed data via SMS, email or web and visualize it on a map or timeline.
- The goal: create the simplest way of aggregating information from the public for use in crisis response.
- Free and Open Source project

Crowdsourced mapping

- 2010 Haiti earthquake
- Open Street Map



Operation Hope

- Reverse desertification
- 6,500 acres of parched and degraded grasslands in Zimbabwe into healthy pastures despite extended periods of drought
- Uses “Holistic Management”:
 - Actions are guided by **complex** realities, rather than by rational and abstract concepts, **goals must change continuously**
 - ‘Letting things go where they will’ implies accepting that **things will unfold in unexpected ways**, and there is a need to be flexible to that, taking up unforeseen opportunities as they arise and being prepared to abandon unrealistic aspirations along the route

THE **BUCKMINSTER FULLER** CHALLENGE

Open Data

data.gov.uk 

THE WORLD BANK

Open Data

 **DATA.GOV**
EMPOWERING PEOPLE

developmentdata.org

Open Data Challenge



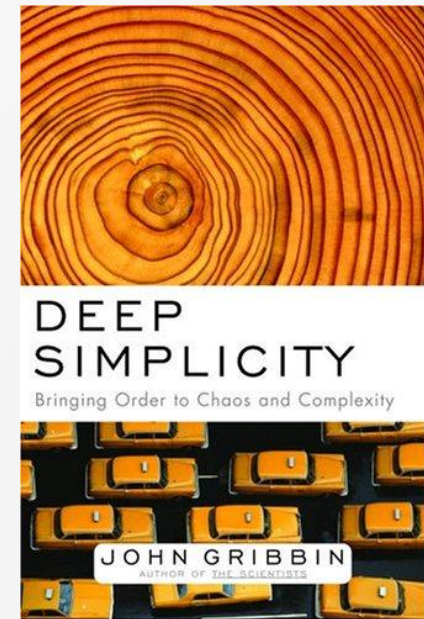
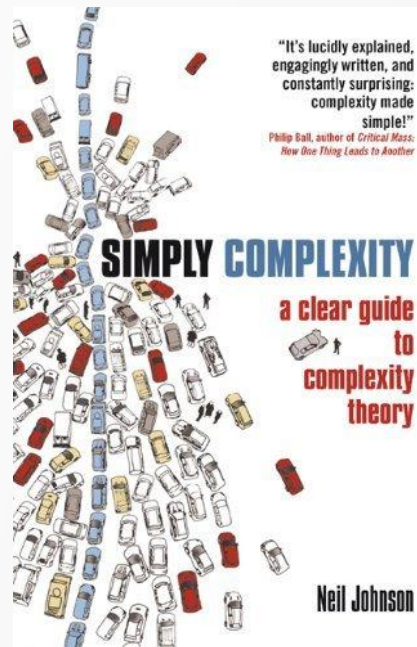
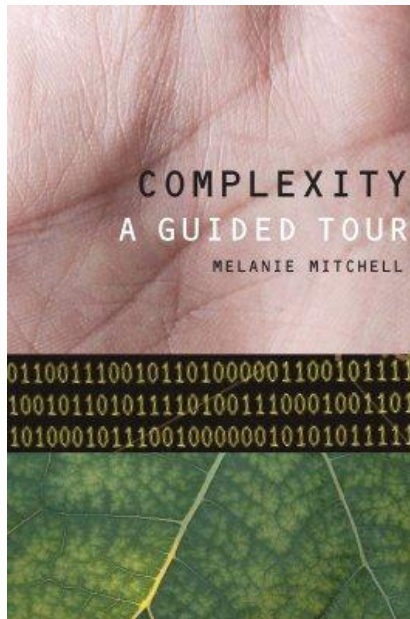
\$15000

Part II

Complexity Science and International
Development

Complexity?

o Ideas?



Complex if...

- Interconnected components
- Nonlinearity
- Self-organisation/self-organised criticality
- Adaptive agents
- Evolution
- Emergent properties

Complexity Science

- Scientific, interdisciplinary study of complex systems?

Complex(ity) Methods

- Things taught here in Complexity Science MSc...
 - Nonlinear dynamics
 - Stochastic processes
 - Statistical physics
 - Machine learning
- Not taught here...
 - Decision theory
 - Agent-based modelling
 - Evolutionary game theory

Applications to Development

- Data
- Computational modelling
 - Network models

Data

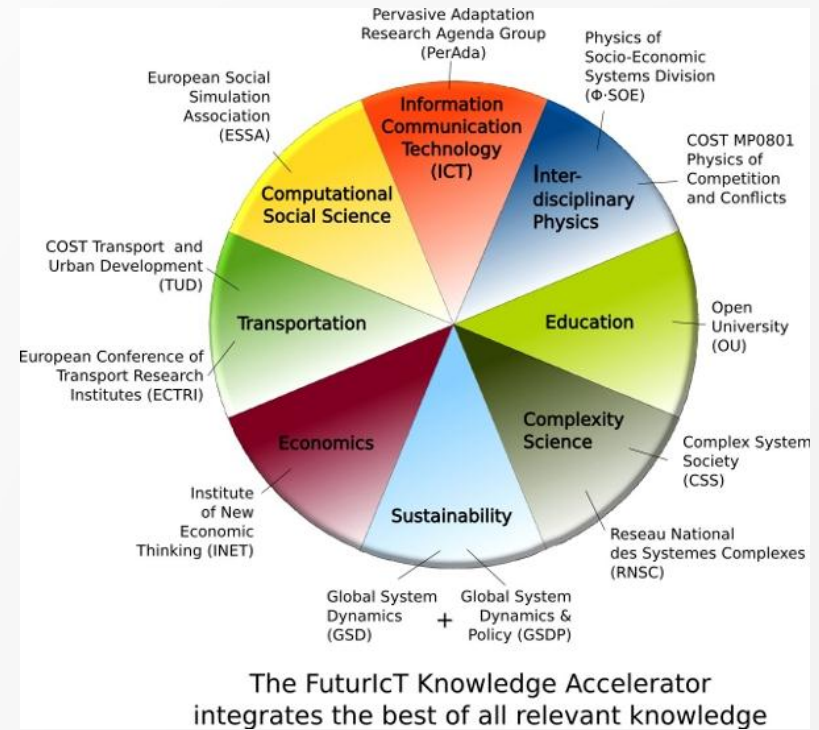
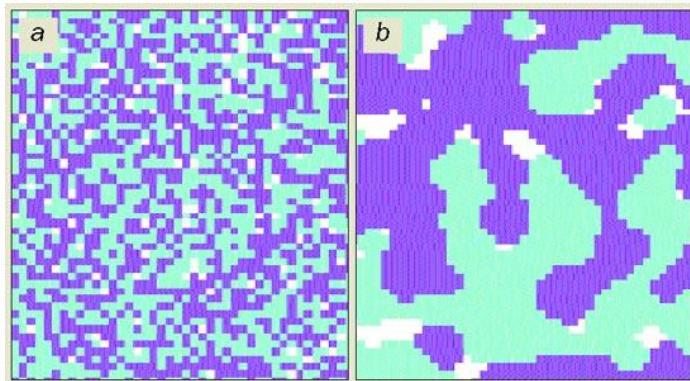
- Machine Learning
- Data Mining

Agent-Based Modelling

- Simple qualitative models
- Realistic Models
- Something in-between

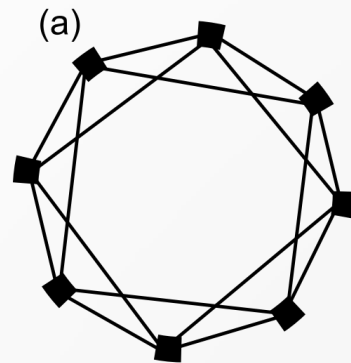
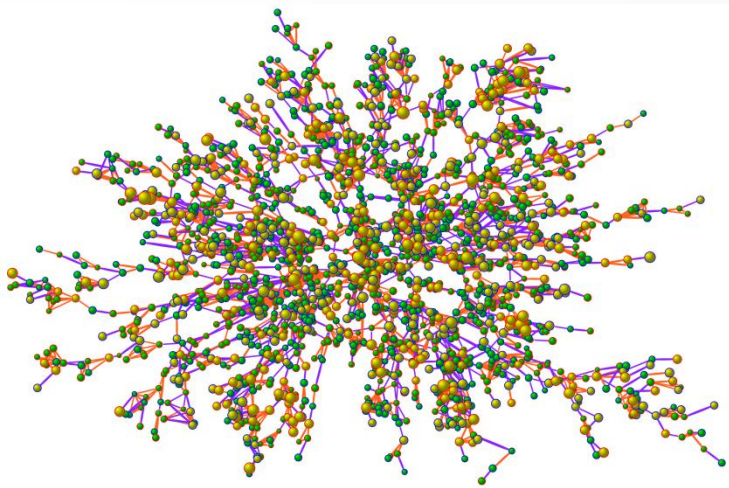
Agent-Based Modelling Applications

- Schelling Segregation model
- FuturICT
- ?

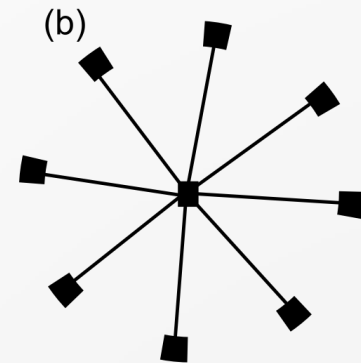


Network Modelling

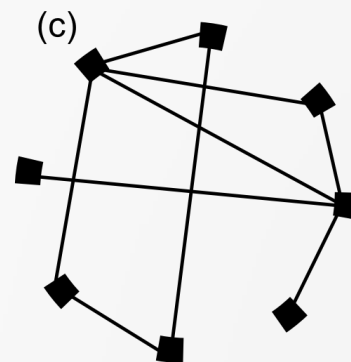
- Epidemiology
- Health effects



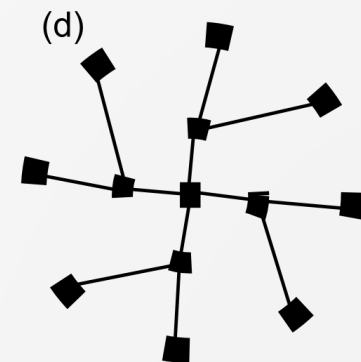
"ring" network



"star" network



random network



"hierarchical" network

Applications of Network Models

- Guiding policy
 - Structuring networks
 - Targeting

Complex Policy

- **Uncertainty/stochasticity**
 - **Complex development**
 - **Multiple objectives**
 - **Multiple stakeholders**

Uncertainty

- **(Knightian) Uncertainty**
- **Risk**

International Panel on Climate Change

Fourth Assessment Report:

- That warming of the climate system is “*unequivocal*”.
- World temperatures could rise by between 1.1 and 6.4 °C during the 21st century and sea levels will probably rise by 18 to 59 cm.
- There is a high confidence level that there will be more frequent warm spells, heat waves, and heavy rainfall.

Complex Development

- What is development?
- Polarisation
- Aspiration

Multiple objectives

- Economics = optimisation of one objective ?

Millennium Development Goals (MDGs)

- 8 goals
- 21 (measurable) targets

Analytical intractability

- Is it actually a problem?
 - Arrow's impossibility theorem
 - UK electoral system

Multiple stakeholders

- Collaborative decisions
- Collaboration
 - “Crowdsourcing”

Conclusions

- Changing availability of data
- Short term: ideas
- Long term: methods

Questions/Comments

- Thanks to everyone who has offered ideas/suggestions/feedback