

Complexity Based Business Decision Support Tools for Telecommunications Applications

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Introduction

- Complexity approaches to forecasting in BT
- The modelling approach, process
- An example, Customer Relationship Management (CRM) investment

Environment

- Liberalised market – regulation, competition, cooperation.
- Technological change
 - Mobile, Internet, broadband, services....

“Change is the only constant”

Prediction is very difficult, especially about the future - *Niels Bohr*

Our Aim:

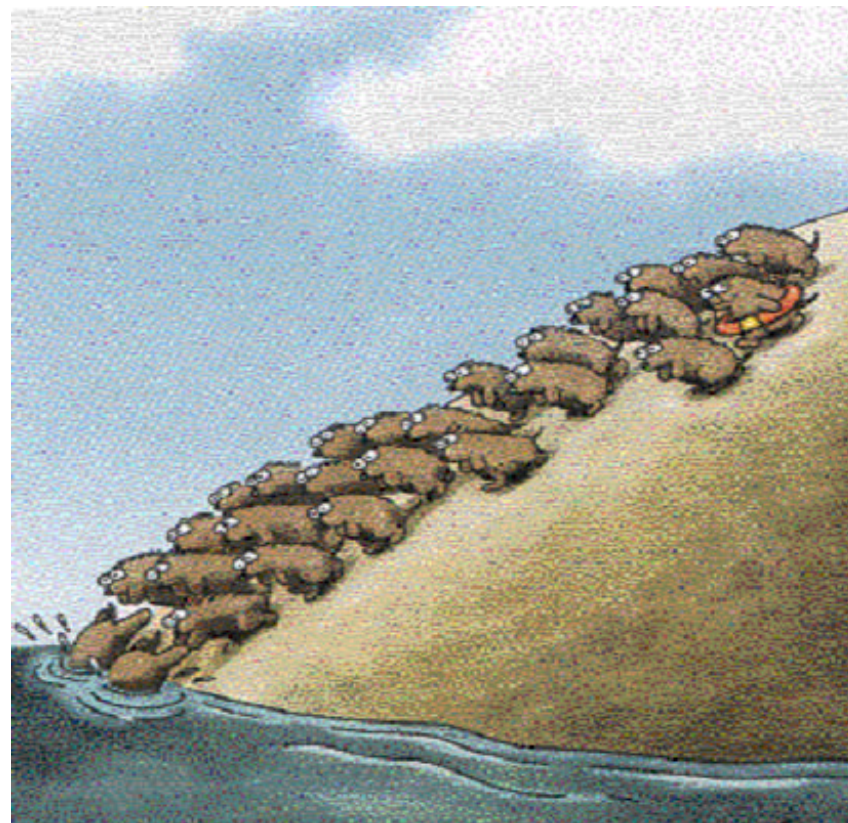
Create and adapt emerging concepts and apply them to solve practical business and economic problems

Alternatives to convention

Non-aggregate view

(essential philosophy)

Antidote to neoclassical view



Application Areas

- Economic modelling (markets, industries, auctions)
- Social systems (consumers)

Tools

- ABM (markets, consumers)
- Networked simulation (auction simulation)
- Game theory (strategy analysis)

Contribution/Impact

- Influence the regulator : perception of competition
- Improving Existing Approaches : Marketing strategies
- Training & Strategy Development : 3G Spectrum Auction (£4bn = \$6bn)
- New business : Bandwidth markets
- External Influence : CIA
- Managing the Organisation : Change management

Forecast and Understanding

- Businesses need the means to forecast **and** understand the consequences of change (exogenous and endogenous)
- The forecast – results from a model as a representation
- The understanding – created through the process by which the model is **constructed** and in its **use**

A Model

- Form of abstraction
- Simplifications (choice) – processes, boundaries
- Limitations (imposed) – medium of expression, cognitive ability, available data

- Common to all forms of representation – art, science, economics.....

“The best material model of a cat is another, or preferably the same, cat” – Norbert Wiener

Models and Representations



ITU Expert Dialogues - October 2004



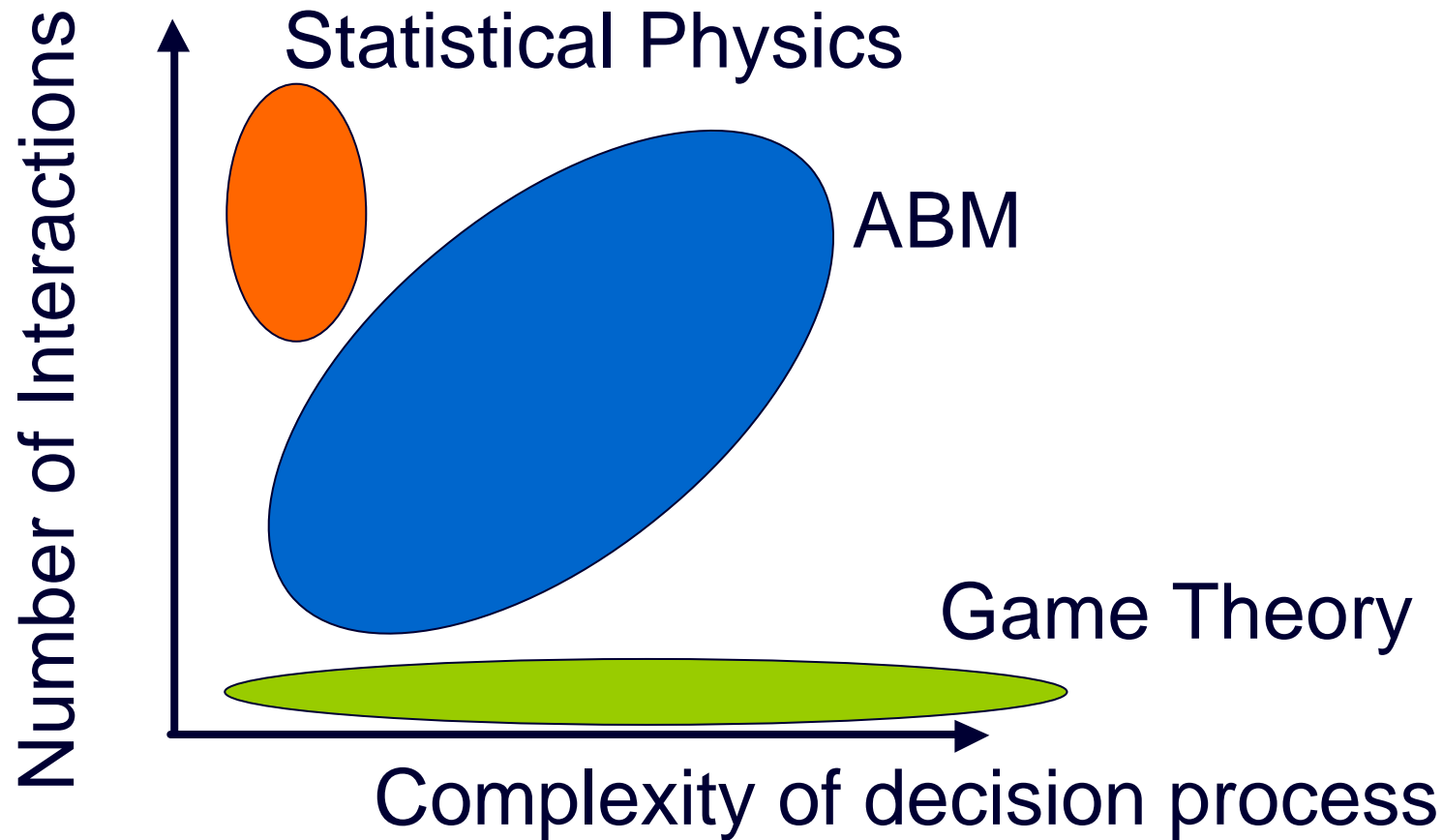
The Creation Process

- Aspect often neglected (important when working with client)
 - Involvement of users allows extraction and sharing of knowledge, facilitation of dialogue with stake holders
 - > ***understanding***
 - Explores extent and precision of the understanding
 - Reveals assumptions and clarifies limitation
 - > ***trust***

The Use of Complexity Approaches in Forecasting

- Business problems involve complex socio-economic systems – environment, self, customers
- Socio-economic systems – characterised by interactions between entities
- Form of interaction and decisions vary in number and sophistication

Possible Techniques



The ABM Approach

- Complexity approach ideal for representing large numbers of interactions with complex behaviours
- 1:1 mapping (model : real world)
- Flexible detailed description of behaviours and interactions
- Capture network effects, network externalities, info flows
- Go beyond simple cause and effect

Model – computer based, quantitative, scenario testing

Process – natural description, intuitive

– captures knowledge, data

-- creates trust

Accurate rendering + framework for understanding the processes

An Example of ABM in Socio-Economic System

- Product adoption within a population
- Forecast the effects of interventions by the company on its customer population

The Traditional Way cont..

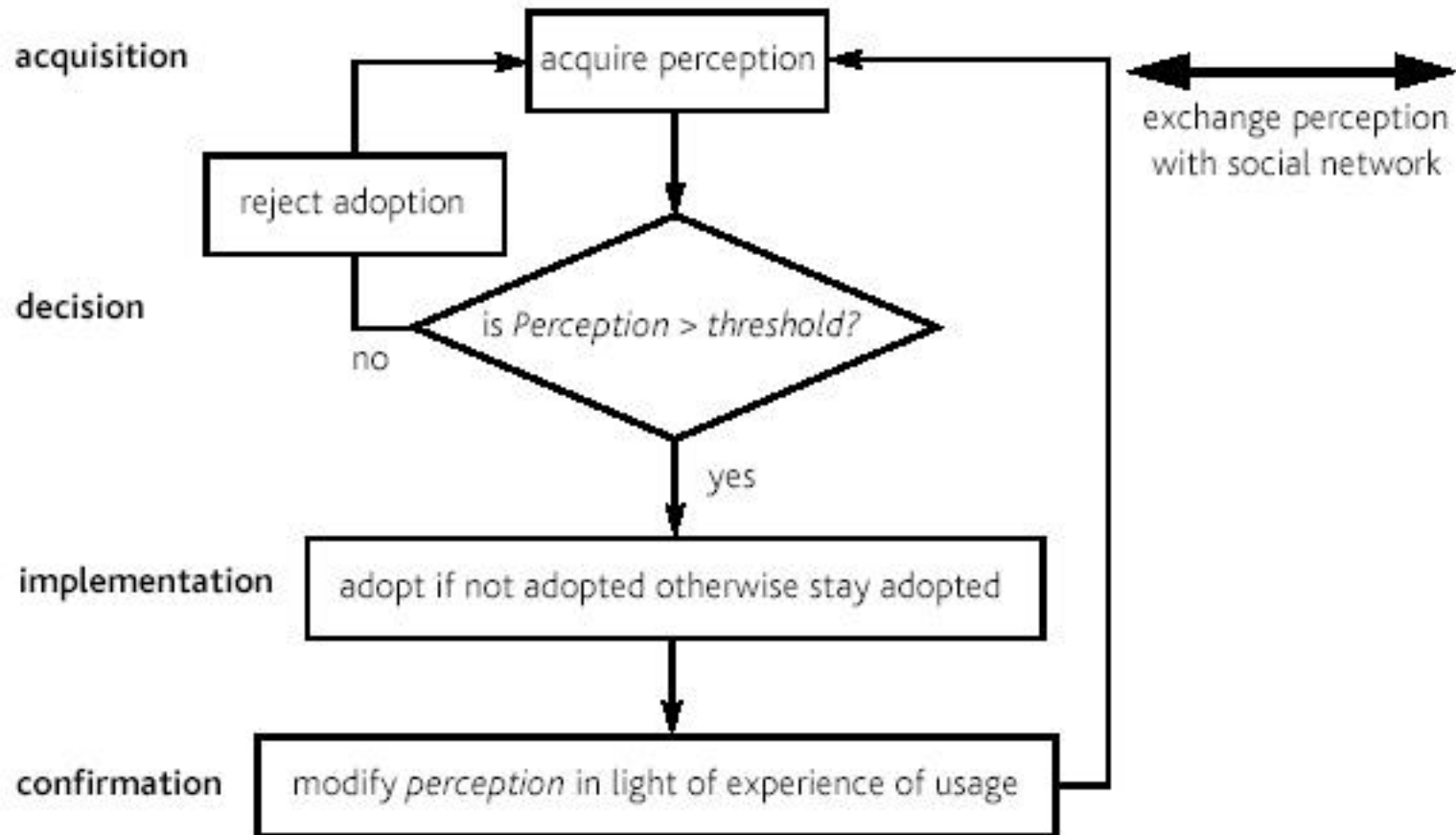
$$\frac{dN(t)}{dt} = g(t, N)[N_T - N(t)]$$

- Highly abstract
- Simplistic
- Description of macroscopic properties

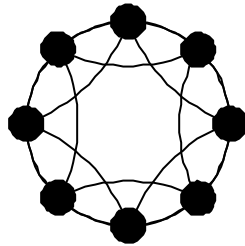
The ABM Way

- Description of population –
 - individual description of adoption process
 - Description of the linkages between the customer
 - Cognitive process and the social network

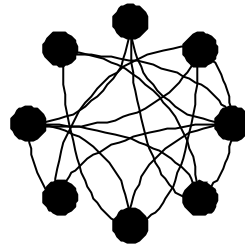
The Cognitive Process



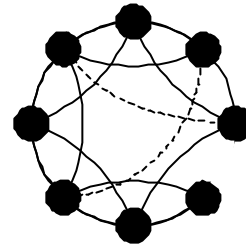
The Social Network



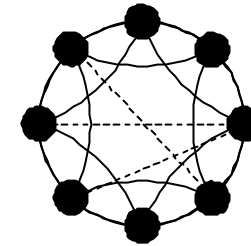
Regular



Random



Small World



“It’s a small world but I wouldn’t like to paint it”
– Steve Wright

The Results

- The Model
 - Computer based implementation
 - Quantitative interactive simulation tool
- The Modelling Process
- At microscopic level
 - Allows a description of the processes
 - Description of the networks
 - Incorporation of the users knowledge and experience

 - Reveals the key levers
 - Understanding of the consequences of the influence of the company

An Example with a Customer

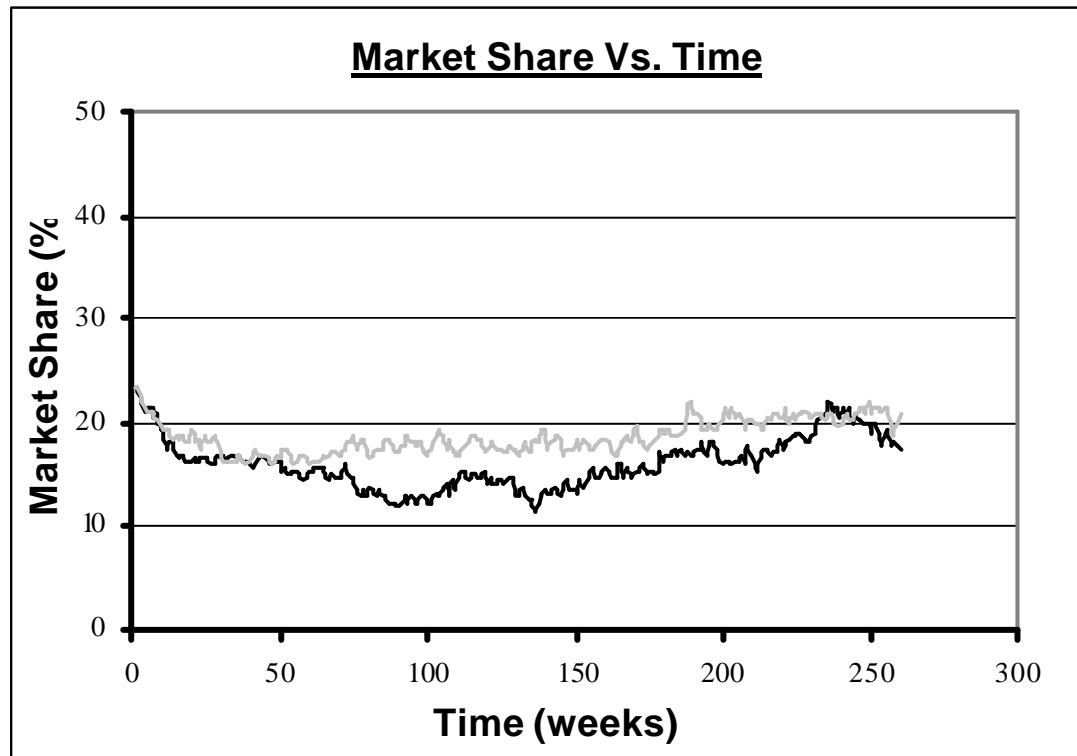
- The business problem
 - Clients within BT were interested in the effects of word of mouth on purchases and repeat purchases
 - Changes in WOM as a result of changes in CRM strategy
 - Tool to capture their knowledge and understanding of the processes
 - Explore the effects of WOM on customer recruitment and retention
 - Lead to idea about of the ROI

The Model and Modelling Construction

- ABM
- The representation of customers -
 - 500 customers (agents), single product
 - Heterogeneous agents (own interpretation of products attributes, thresholds, information) based on survey data and independent research
 - Social network (based on survey and studies)
- The company`s influence
 - advertising
 - CRM interactions (complaints, repairs, billing...)
 - frequency and impact

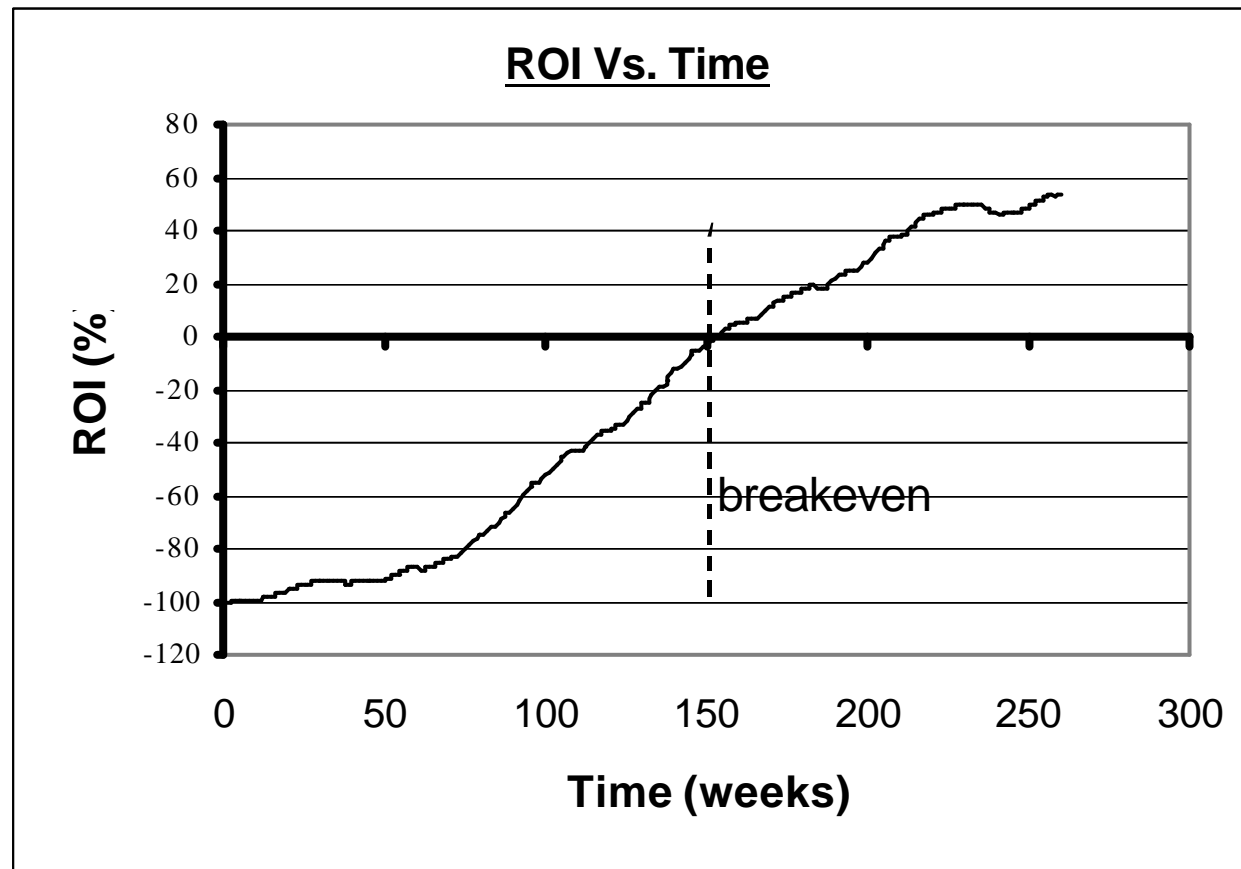
Using the Model

- Refinement and calibration of base case
- Experiments with different scenarios of CRM enhancement
 - time delays in the system lag and diffusion - trust and understanding



Using the Model

- Addition of financial data



Summary

- Models are always have limitations
 - There is such a thing as a useful model
 - A good modelling process -
 - extraction and sharing of knowledge
 - facilitation of discussion
 - clarification of limitations
- > more accurate rendering, understanding + trust

Summary

- Model should allow experimentation and the manipulation of parameters that exist in real life
- Especially important in Socio-economic systems I.e. many business problems
- Complexity approach (ABM) ideal
- Forecast + understanding - key