

# **Complexity & Foreign Aid**

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# A (well-known) parable

A man was walking home one dark and foggy night. As he made his way through the murk he nearly tripped over someone crawling around by a lamp post.

*“What are you doing?”* asked the traveler.

*“I’m looking for my keys”* replied the other.

*“Are you sure you lost them here?”* asked the traveler.

*“I’m not sure at all,”* came the reply, *“but if I haven’t lost them near this lamp I don’t stand a chance of finding them.”*



# Development and humanitarian aid efforts are dominated by certain mental models

- The machine metaphor - universe as Newtonian clockwork, Taylorist scientific management principles rule
- The future is knowable given enough data
- Development and disaster recovery broken down to simple cause-and-effect relationships
- Breaking down parts would reveal how the whole system worked
- Aid is the search for the search for the right inputs



This way of thinking is associated with some underlying assumptions

- About **systems**
  - About **networks**
    - About **behaviours**
      - About **change**

# Such approaches work well in certain situations... *i.e.*

‘...where machines work well. Such approaches would be ideal where there is a **straightforward task to perform, a stable context and operating environment, identical, duplicable products, and compliant, predictable and reliable parts** – which includes the human ‘components’...”

GARETH MORGAN  
IMAGES OF ORGANIZATION

# Do such assumptions match the realities of development and humanitarian work?



**In the face of this mismatch, there  
is an observable tendency to  
“tame complex problems”**

- **Lock down the problem definition for ease of measurement**
- **Cast the problem as ‘just like’ a previous problem that has been solved**
- **Declare that there are just a few possible solutions**
- **Give up on trying to find a good solution**
- **Game the system**

“... [we] act as if development were  
something other than the complex and  
often opaque set of interactions that we  
know it to be

**[we are all] boxed into a collective illusion...**

because of our urgency to end poverty,  
we act as if development is a construction,  
a matter of planning and engineering...”

THOMAS DICHTER

“...The linear model is staggering about  
the global stage like a mortally  
wounded Shakespearean actor...”

DUNCAN WATTS,  
YAHOO CHIEF SCIENTIST & SFI FELLOW

**Growing numbers of experts are pointing to the ideas of complex adaptive systems as an alternative theoretical model for development**

# Many models & ways to define complexity

## Quantitative approaches

- Computational complexity
- Algorithmic complexity
- Language complexity
- Logical depth
- Thermodynamic depth
- Effective complexity

## Qualitative approaches

- Organised complexity
- Architecture of complexity  
- degree of hierarchy
- Simple-Complicated-Complex
- Agreement-Certainty Matrix
- Cynefin Framework
- Wicked Vs Tame Problems



How hard is it to describe?

How hard is it to create?

What is its degree of organisation?

# Weaver: What kind of scientific mindset is necessary for different problems?



- **Organised simplicity**
- **Disorganised complexity**
- **Organised complexity**

# Murray Gell-Mann on “effective complexity”

Effective complexity is high in the region intermediate between total order and complete disorder

# Zimmerman: What kind of problem?

## Simple

### Following a Recipe

- The recipe is essential
- Recipes are tested to assure replicability of later efforts
- No particular expertise; knowing how to cook increases success
- Recipe notes the quantity and nature of “parts” needed
- Recipes produce standard products
- Certainty of same results every time



## Complicated

### A Rocket to the Moon

- Formulae are critical and necessary
- Sending one rocket increases assurance that next will be ok
- High level of expertise in many specialized fields + coordination
- Separate into parts and then coordinate
- Rockets similar in critical ways
- High degree of certainty of outcome



## Complex

### Raising a Child

- Formulae have only a limited application
- Solving one problem gives no assurance of success with the next
- Expertise can help but is not sufficient; relationships are key
- Can't separate parts from the whole
- Every problem is unique
- Uncertainty of outcome remains



# Cynefin: What kind of space?

## Complex

Cause and effect coherent in retrospect, repeat accidentally – unpredictable

**Patterns and perspectives matter**

**Multiple parallel interventions to learn**

## Complicated

Cause and effect separated over time & space but repeat – analysable

**A range of possible answers**

**Determine facts and options through analysis**

Disorder

## Chaos

No cause and effect relationships generally perceivable

**Take action first**

**Multiple actions to stabilise**

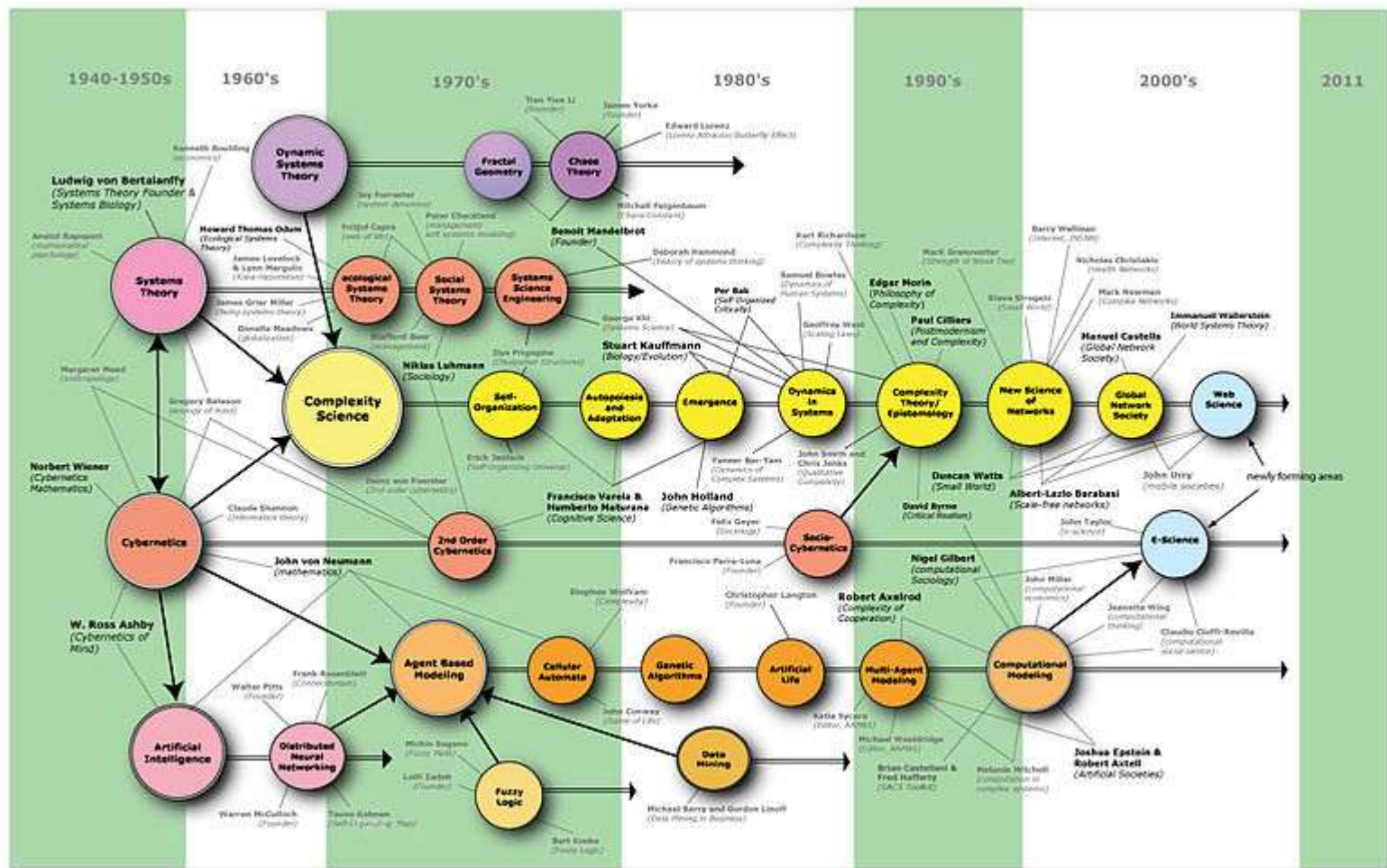
## Simple

Cause and effect relations repeatable & predictable

**One or a few good answers**

**Standard operating procedures & measures**

# Complex systems research is a large and diverse body of knowledge



# **Complex systems research seeks understand the range and diversity of elements, linkages, behaviours and dynamics within a system and with its environment**

- **Emergent systems: how do the properties and patterns of the system as a whole arise from the properties of its individual components? How do they change over time?**
- **Diverse networks: what are the underlying structures of social, economic and political systems and how do they change over time?**
- **Adaptive and evolutionary behaviours: how do 'agents' think & make decisions, individually and collectively? How to they adapt, self-organise and evolve with each other & their environment?**
- **Nonlinear change: how do small changes in one part of the system can lead to massive and unpredictable changes elsewhere?**

# Putting the pieces together: a new set of assumptions (building on Beinhocker)

## Conventional development thinking

## A complexity perspective

### Systems

Systems are closed, static, linear systems in equilibrium exhibiting normal behaviours

Systems are open, dynamic, non-linear systems far from equilibrium. macro patterns emerge from micro behaviors and interactions, long tails are common

### Behaviours

Homogeneous individualistic agents that only use rational deduction, make no mistakes, have no biases and have perfect knowledge for future outcomes

Heterogeneous agents that mix deductive/inductive decisions, are subject to errors and biases, and which learn, adapt, self-organise and co-evolve over time

### Networks

Agents are atomised and can be treated as independent actors; formal relations most important

Relationships and interactions matter, in form of culture, economic ties, values, beliefs, peers. Informal matters, relationships are path dependent and historical

### Change

Change is proportional, predictable, ceteris paribus, linear

Change is non-linear, unpredictable, with phase transitions

## **SYSTEMS**

- Holistic management of anti-desertification programmes in Zimbabwe (Operation Hope)
- Complex adaptive systems applied to rural development (World Vision)
- Rehabilitating health systems after crisis (WHO)
- Power laws in international trade (NYU) and disaster deaths (Tufts)

## **NETWORKS**

- Complexity, networks and growth (Harvard Center for International Development)
- Social network analysis of disaster responses (Red Cross)
- Irrigation and water temple networks in Bali (Santa Fe)
- Resilience to disasters (DFID) and food crises (Princes Trust)

## **BEHAVIOURS**

- Evolutionary approaches to dealing with malnutrition (Save the Children)
- Agent-based modelling in agriculture (UK research councils)
- Agent-based models of HIV-AIDS, migration and dynamics (Sussex University)
- Evolutionary approach to malaria reduction (Maastricht)

## **CHANGE**

- Outcome Mapping – a complexity inspired approach to P, M and E (IDRC, ODI, others)
- Developmental evaluation in humanitarian aid (UNHCR, ALNAP)
- Planning Water and Sanitation from a Complex Systems perspective (IRC)
- Complexity and theories of change (Oxfam)
- Scaling up health interventions (Future Health Systems Consortium)



“Complexity sciences are an engine for intuition”

David Krakauer,  
Santa Fe Institute

‘We cannot solve problems by using  
the same kind of thinking  
we used when we created them.’

ALBERT EINSTEIN

