EUROPEAN SCIENCE FOUNDATION
Exploratory Workshops

SCIENTIFIC REPORT

Can Complexity Improve European Health Policy?
23rd – 25th September 2009
Lancaster House Hotel, Lancaster University

Co-Applicants

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1. Executive summary

Aim

The aim of this Workshop was to explore the application of *Complexity* approaches and tools to health care.

Methods

As a relatively new scientific framework, *Complexity*, offers a novel way for understanding health at the micro- and macro-levels i.e. individual, group and societal levels. Using these three divisions, the two and one half days workshop examined if a Complexity framework enables both service providers and users to rethink their relationship in more positive ways and how Complexity tools can be used to improve these systems. The programme encompassed presentations, pre-elected discussants and round table discussions based on three core themes of health and Complexity:

- Chronic Illness and Complexity
- The Complexity of National Health Systems
- Using Complexity to help manage health in Europe

Outcomes: main points arising

1. Expansion of health care in European countries has produced an ever increasing demand for efficient, effective and equitable services tailored to meet individual need.
2. Health care continues to be dominated by the mechanistic model of acute illness despite the growing global prevalence of chronic conditions such as diabetes, obesity, heart disease, asthma, mental illnesses etc.
3. Management of chronic illness requires an approach that emphasises inter- and intra-connectivity between all the systems that are involved in care and management.
4. To meet the ever increasing demands of chronic illness, a cultural transition is required so the pendulum (attractor pattern) 'swings' to a new point of custom and practice.
5. Complexity provides a new pendulum, a way of viewing the realities of illness and health care alongside working tools which are more likely to support improvements in health.
6. Complexity embeds the idea that not all phenomena can be reduced to orderly and predictable arrangements; that in fact, physical, biological and social worlds contain phenomena which are orderly, complex and disorderly, and all exist at any one time and interact with each other.
7. It is this notion of interaction and unpredictability which sets complex systems apart from simple and complicated systems.
8. Complexity makes us aware of the interactions both within and between systems and the implications this has for health care at all levels.
9. Complexity is useful in defining zones where different management methods are appropriate focusing on integration, co-operation, and innovation at local levels, alongside continuous learning. It recognises that there is no end-point to change, rather the need for time to allow changes to be embedded.
10. The underpinning culture of '*evidence based health care'* means that there is a need to increase awareness of the utility of Complexity through:
    a. rigorous research to provide a sound evidence-informed platform on which policy and practice can be based;
    b. development of a multi-disciplinary *'Think Tank'* at EU health policy level.

11. Such work needs to have the cross-cutting goal of raising awareness and use of Complexity within health care but with local flexibility in relation to methods employed.
12. Complexity needs to be integrated into all strata of professional education and training.

2. Scientific content

For much of the 20th century, two frameworks have dominated health care in the Western world: the reductionist biomedical model with its focus on the physical processes, such as the pathology, biochemistry and physiology of a disease, and later, the bio-psychosocial model with its focus on the mind-body connection (Annandale 1998, Engel 1977, Epstein *et al.* 2005). Both models, founded on the earlier Newtonian paradigm of order, are based on four core beliefs (Capra 1991, Gulbenkian Commission 1996, Mainzer 1997):

1. **Causality** – causes and effects can be known and their relationship accurately demonstrated.
2. **Reductionism** – health can be reduced to its separate parts and the interaction of these parts can be understood in a mechanical clockwork fashion.
3. **Predictability** – once the phenomenon/system is defined, the ends are knowable.
4. **Determinism** – given key parameters, the actions/development of the phenomena/systems can be known and determined.

Inherent within both these models is an emphasis on the growth of health knowledge, scientific and empirical testing, the rise of knowledge elites, evidence based knowledge and practice, and the growing tokenistic involvement of the patient/service user/carer within the health system. In general, the models have been the foundation for many achievements in health care knowledge and in major improvements in a huge variety of treatments. However, it has also created a system where:

- Health policy is centrally driven by governmental elites that have little connection to local actors, yet at the same time demand detailed and continuous control over these actors.
- Primary and Secondary care are organised into traditional hierarchical structures that consume large amounts of resources and yet seem unable to adapt to the normal and continuous social changes that surround them.
- At the individual level, patients/service users/carers feel stifled by and distanced from large scale organisational changes making them feel alienated in relation to their own health care management.
- Targets (outcomes) are still measured in terms of biophysical parameters that fail to reflect the realities of first world diseases such as diabetes mellitus and obesity which depend upon cultural and individual responses (Epstein 2005).

These problems are all well known and have been debated in numerous books, conferences, workshops, etc. The conclusions from these efforts generally involve greater effort, more spending, more oversight by central actors and more patient compliance. The fundamental problem is that these strategies generally amplify the underlying weaknesses rather than resolve them.

Complexity

To avoid these, one must go beyond the traditional biomedical model and re-evaluate the theoretical paradigm that it rests upon. A practical and applicable framework for moving beyond the limitations of the current orderly, so-called Newtonian, paradigm has recently emerged from the physical/natural sciences and is generally labelled Complexity (Casti 1994, Kauffman 1993, Prigogine 1997). During the later half of the 20th century, Complexity inspired thinkers continued to find physical and natural phenomena that were not amenable to the traditional Newtonian scientific framework and method. Examples included fluid dynamics, weather patterns, neural networks and quantum mechanics. In these cases, there was a degree of order and predictability, but also disorder and unpredictability, reductionism and holism, certainty and uncertainty. Since the 1990s, Complexity thinking began to spill over into the human and social sciences (Bogg and Geyer 2007). Today, there are Complexity based academic works in virtually every major

area of public policy (Byrne 1998, Gaddis 2002, Geyer and MacIntosh 2005, Rihani 2002, Urry 2003) and a growing number in the fields of health and health policy (Blackman 2006, Cooper and Geyer 2007, Fraser et al. 2001, Gatrell 2005, Holt 2004, Kernick 2004, Plesk et al.2001, Steinberg 2005, Sturmberg 2007, Sweeney 2006).

The Complexity sciences are developing rapidly internationally. The USA hosts several major centres of Complexity research (University of Michigan, University of Texas, Santa Fe Institute, etc.). The EU Open Network of Centres of Excellence in Complex Systems www.once-cs.net and Complex Systems Society http://cssociety.org coordinate a multitude of projects throughout Europe while the EU also funds a variety of Complexity projects through its Framework 6 NEST Programme. However, in the field of Complexity and health the main developments have been concentrated in the USA, UK and Australia. This workshop provided an opportunity to develop a European network of Complexity and health actors.

3. Assessment of the results and contributions to the future directions of the field

The Workshop had the following objectives:

- To review and examine the strengths and weaknesses of the biomedical/bio-psychosocial models at all levels of health care.
- To explore understanding of the emergence and impact of different paradigms of health care.
- To promote research on Complexity and its tools.
- To encourage the application of Complexity approaches and tools and use this practical experience to inform larger research debates and perspectives.
- To develop a broad-ranging network of European Complexity and health academics and practitioners.
- To examine how EU health policy could promote the diffusion and use of Complexity ideas and tools.

- To develop a strategy for integrating Complexity concepts and tools into European Union health policy.

To meet these aims and objectives, the Workshop covered 3 themes:

1.	**Chronic Illness and Complexity**	Complexity as a framework for exploring how we can go beyond a restrictive traditional biomedical scientific framework with its focus on control, toward one that appreciates the management of chronic illness as a 'complex adaptive system'.
2.	**The Complexity of National Health Systems**	Complexity as a framework to enable both service providers and users to rethink their inter-relationships in more positive ways.
3.	**Using Complexity to help manage health in Europe**	Complexity as a tool for understanding and influencing constraints at national levels including the role the European Union health policy might contribute to the debate and what policy options are available to the EU to promote Complexity related strategies and developments.

Discussions resulted in agreement regarding the potential benefits of Complexity in health care including:

(i) application: integration of elements: theory & real life
(ii) technocratic: grounded around functional spheres
(iii) labour market preparation: adaptability, flexibility, transferable skills
(iv) communicative: common discourse/unification of reasoning
(v) epistemological: creating contexts for new kinds of thinking
(vi) critical: development of capacity to challenge
(vii) normative: vehicle for political and social reform
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A cross-cutting goal of raising awareness about and use of Complexity within health care was agreed. To pursue this goal three objectives were set:

i. To increase awareness of the utility of Complexity through rigorous research to provide a sound evidence-informed platform on which policy and practice can be based. In the field of health, Complexity offers a scientifically grounded framework for moving beyond the limits of the earlier paradigm. Fundamentally, the classic scientific works of Complexity have already been written. The cutting edge of research now lies in exploring how these new concepts and tools can be brought down from a theoretical level and integrated into a more practical sphere.

ii. To develop education and training with regard to Complexity.

iii. To develop a 'Complexity Think Tank' through the European Public Health Alliance.

These three goals, combined with an individual, group and societal approach, provided a model for integrating a 'top down' with a 'bottom up' tactic to development. An international network of Complexity thinkers has been established and discussion is now on-going regarding the development of an international group of PhD students exploring use of Complexity in health policy in each country and a series of case studies to identify application.

4. Final programme of events

Day 1, 23 September 2009	
17.00-17.10	**Welcome** by **Robert Geyer** (University of Lancaster, UK) and **Helen Cooper** (University of Chester, UK), Co-convenors.
17.10-17.30	**Presentation of the European Science Foundation (ESF)** **Asile Gürsoy** (Turkey) Standing Committee for Social Sciences (SCSS)
17.30 – 19.00	**Session A: Introduction to Complexity and applying the tools of complexity** **Robert Geyer** **Discussants**: **Diedre Kirke** (Ireland) & **Michel Bloch** (France)
19.30	*Dinner at Lancaster House Hotel*
Day 2, 24 September 2009	
09.00 - 12.30	**Theme One: Chronic Illness and Complexity**
09.00 – 10.30	**Session B: Using Complexity Tools to Manage Chronic Illness: The case of diabetes** **Helen Cooper** (University of Chester, Chester, UK) **Discussants**: **Rob Anderson** (USA) & **Barna Iantovics** (Romania)
10.30-11.00	*Coffee / Tea Break*
11.00-12.30	**Session C: Complexity and Childbirth** **Soo Downe** (University of Central Lancashire, Preston, UK) **Discussants: Peter Molnar** (Hungary) & **Helen Cooper** (UK)
12.30-13.30	*Lunch at Lancaster House Hotel*
13.30-17.00	**Theme Two: The Complexity of National Health Systems**
13.30-15.00	**Session D: Complexity and NHS Reorganisations** **Samir Rihani** (University of Liverpool, Liverpool, UK) **Discussants: Tony Shannon** (UK) & **Harri Laihonen** (Finland)
15.00-15.30	*Coffee / tea break*
1530-17.00	**Session E: Complexity and Primary Care Systems** **Joachim Sturmberg** (Monash Univesity, Victoria, Australia) **Discussants: Angelina Kouroubali** (Greece) & **Itziar Vergara** (Hungary)
19.00	*Conference Dinner at Restaurant in Lancaster*
Day 3, 25 September 2009	
09.00-12.30	**Theme 3: Using Complexity to Help Manage Heath in Europe**
09.00-10.30	**Session F: The State of European Union Health Policy** **Monika Kosinska** (European Public Health Alliance, Brussels, Belgium) **Discussants: Declan Murphy** (Ireland) & **Diana Payne** (Ireland)
10.30-11.00	*Coffee / Tea Break*
11.00-12.30	**Session G: Introduction to EU health research funding** **Chris White** (Brussels Office of NorthWest Health, Belgium) **Discussants: Joachim Sturmberg** (Australia) & **Soo Downe** (UK)
12.30 -14.00	*Lunch at Lancaster House Hotel* **Discussion on follow-up activities/networking/collaboration**
14.00	*End of Workshop and departure.*

5. Statistical information on participants

Gender Balance: Male 11: Female 9

Country of Origin:		
	UK	6
	USA	1
	Australia	1
	France	**1**
	Turkey	**1**
	Romania	**1**
	Ireland	**3**
	Belgium	**2**
	Greece	**1**
	Finland	**1**
	Spain	**1**
	Hungary	**1**

6. Final list of participants

Robert Anderson, Department of Medical Education, University of Michigan Medical School
Michel Bloch, Mount Vernon Consulting
Helen Cooper, Department of Community and Child Health, University of Chester
Soo Downe, School of Public Health and Clinical Sciences, University of Central Lancashire.
Robert Geyer, Department of Politics and International Relations, Lancaster University.
Akile Gursoy, Department of Anthropology, Yeditepe University.
Barna Iantovics, Informatics and Artificial Intelligence, Petru Mior University of Targu Mures.
Deirdre Kirke, Department of Sociology, National University of Ireland
Monika Kosinska, European Public Health Alliance.
Angelina Kouroubali, Hellas Institute of Computer Science
Harri Laihonen, Department of Business Information, Tampere University of Technology.
Itziar Miceltorena Vergara, Fundación Vasca de Innovación e Investigación Sanitarias
Peter Molnar, Department of Behavioural Sciences, University of Debrecen
Declan Murphy, Johns Green Medical Centre
Diana Payne, UCD Geary Institute, University College Dublin
Samir Rihani, School of Politics and Communication, University of Liverpool

Tony Shannon, NHS Connecting for Health
Joy Spencer, Department of Community and Child Health, University of Chester
Joachim Sturmberg, Department of General Practice, Monash University
Chris White, Brussels Office of North West Health

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