

# Understanding Healthcare Service in a Complexity Context. Lessons from the turbulent Greek Healthcare Sector.

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Issue Date: 30 April 2013

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**Abstract:** Healthcare systems demonstrate characteristics of complex adaptive systems. Moreover, they acquire attributes that could not be analysed through traditional managerial techniques, not even dealt with. This study intends to analyse complexity and complex adaptive systems (CASs) as an integral component of health governance, especially in times of crisis, when countries are facing non-linear effects and are obliged to deal with emergence and self-organisation, as sources of novelty and surprise. Through complexity's lens, it is easiest to accommodate diversity and understand the special characteristics of healthcare.

Furthermore, by examining healthcare systems as CASs, this reveals a different mindset to preview. Here patterns of interaction are recognised as vital components, and participants, are the agents of the system. Such systems are familiar to emergence, co-evolution and self-organisation as a resilient practice which results from a robust response to external shocks. Giving the case of Greece, and healthcare sector's specialties and distortions, this study suggests picturing the current situation in a holistic view rather than reductive one. There is no chance to predict and to control in a complex adaptive system. It is possible though to put complexity into practice while in parallel apply tactics such as, minimising exposure, acquiring flexibility, doing observation, making sense of what happens, and developing mindfulness. In addition, improvisation and bricolaging, could be helpful techniques in dealing with complexity. While globalisation incorporates unknowability, the study on complexity encompasses remembering and forgetting history, which is nothing more than the capacity to learn. This study suggests that external shocks is the appropriate time for the systems to apply changes that were obliged but never had the chance or dared to do.

Within this framework we intend to understand the agent-based nature of the sector, identify the role of connectedness among healthcare groups and investigate the emergent dynamics. An exploratory research using qualitative analysis was performed. Semi-structured interview questionnaire was used as the research instrument. Sampling was convenient and judgmental and was consisted of 37 respondents, who are professionals from different groups of Greek healthcare sector.

Findings have revealed that sector is currently in a transitional stage. Outside imposed restructures, have activated a number of changes towards new self-organisation. The sector from doctor-centred is pushed to acquire new attributes through the emergence of new dynamics that are expected to bring forth a new structure. Nevertheless, changes will delay since there are still contradictions among groups and there is no clear understanding of the new status. Previous patterns and interdependencies have nurtured a blurred environment. The sector was accustomed to apply mechanistic approach which finally proved inadequate in the absorbent of signs for change. As a result, it is now obliged to perform too many changes in short time.

**Keywords:** health governance, healthcare, complex adaptive systems, complexity, Greek crisis

# 1. Introduction

The Greek healthcare sector is a complex adaptive system which demonstrates analogous characteristics. It is independent and in the same time interdependent with other systems that co-exist. This is the overall framework of current study through which we intend to approach the subject.

Dealing with complexity is the opposite of applying the mechanistic view. In times of crisis, systems leave order and tend to experience chaos and complexity as dynamic behaviours. Planning and controlling are gradually replaced by patterning and adapting in changing environments where prediction is impossible. Authority is not necessarily the source power rather than the emergent players who happen to find themselves in the centre of a whirl. However, self-organising is the ultimate target for a system to sustain. This may include the sad scenario of destructing those parts that are considered obstacles for self-preservation or vice versa in case of destructive innovation (the white-page strategy; *Klein, 2011*).

However, societies from time to time get into a mechanistic operation, in an effort to stabilise their prosperity and to exploit their achievements (*Goudelis, 1993*). Experience has shown that whenever there is a need for change, focus leaves the mechanistic-Newtonian approach, and tends to see people as inherently complex human beings. In complex systems any imposition of demanding measures has direct impact to their living parts, sometimes with uncontrollable outcomes. Healthcare systems usually are the first impacted in a society under pressure, especially when there are needs for repositioning.

Greece is experiencing a strong and violent set of pro-cyclical and counter-cyclical economic conditions which stem from continuous recession. On the other hand, due to certain specialties - oligopolistic market structure, small market size, and paternalistic mindset - the local economy demonstrates distortions such as an increased inflation in an aggravated downturn situation. The bulk of loans that Greece borrowed from external creditors, in combination with the policies for internal devaluation as imposed through memorandums, have created an explosive mix. Continuous public deficits and increased expenses of central government have revealed enormous weaknesses and inability of the country to finance its basic needs. After almost four years of economic isolation, the country has started to demonstrate signs of social decay. However, within the turbulence of entropy, the country has a unique opportunity to change its structures rather than simply change roles among players, rejecting for the first time in its history the "us against them" mindset (*Papadopoulos, 2003*). Therefore, this study discusses whether the sector is ready to perform changes as well as identifies the impact of complexity's characteristics under current situation.

## 2. Problem statement (the study's rationale)

### 2.1 The Greek healthcare sector

Greek healthcare sector, during the last two years, is experiencing a deep restructure aiming: (a) to decrease the number of hospitals and clinic units in operation, (b) to decrease the working hours of medical staff, especially the ones appeared as overtimes and (c) to decrease the number of employees in the sector. An additional general measure is to cut-off budgets regarding the whole healthcare supply-chain. Such changes are addressed mostly to the public sector which represents the bigger percentage of healthcare services in the country. Moreover, the imposed healthcare reforms include the radical decrease of pharmaceutical spending both for in-hospital and out-hospital cases. The ladder raises a series of perplexed consequences involving pharmaceutical industries, medical companies as well as any related company that the public system had cooperation with.

The immediate impact of cut-off policies was the inadequate healthcare service provisioning with multiple social effects. During 2012, the sector faced an enormous instability and uncertainty since planned reforms did not bring the desired results. Nevertheless, this was mostly due to social partners' opposition. Social groups that had cultivated a certain status quo demonstrated an increased sense of self-preservation. On the other side, government had postponed payments for healthcare services and products to private suppliers in an effort to re-negotiate and settle down a new framework of cooperation. For example, there was promoted the practice of using generic drugs instead of the branded ones. The aim was to rationalise expenses and apply a paying scheme which could be affordable according to financial abilities. Such decisions raised different behaviours among participants in the sector. Some multinational companies left Greek market and withdrew their products. Pharmacists started a series of strikes trying to push the system. Doctors are currently in a transitional stage since some of them do strikes while others continue to offer their services under the new regime. Medical staff mainly in public sector, works in a shrinking environment. The sector experiences a chaotic condition. Possibly this is the first time that social partners have to decide, what kind of healthcare they want to provide in the country; a purely privatised sector, controlled by the markets' rules, where the health capital could be the object of trading negotiations; or a balanced sector, following certain governance rules under the respect of health as a national asset of a country based primarily on reciprocity and solidarity.

In this environment, this study adopting the complexity perspective, tries to approach the sector as a complex adaptive system and discuss the complex characteristics of the system and how these affect healthcare service under current pressures.

### 2.2 The Greek crisis

Greece was always a geopolitical target for many reasons (*Stratfor, 2010*). The long-historical and cultural connection with East in contrast to its geographical placement close to the Western civilisation was always a source of conflict. It was primarily a country-region that belonged to different empires through time, had accommodated different people, and had absorbed mixed affections from different cultures. Besides that, although it had faced various challenges the country -in its different forms- managed to survive through certain practices. One of them, possibly emerged due to circumstances, was that inhabitants tried to innovate in order to differentiate and keep track with any changes. As a result, the risen natives developed similar skills through time.

However, for once more the country experiences tough conditions and remains in the centre of interest as a unique experiment; the case of a country which faces the dilemma of exiting from a strong monetary consortium in the 21<sup>st</sup> century, which may end to isolation and its consequences or remaining in Eurozone by devaluating its final product.

Although the economic crisis has global characteristics the country lives the consequences through its own specialties. A number of scientists have tried to discuss and present their findings on what crisis means and who is responsible for it. *Schneider and Kirchgassner (2009)* identified that global community is currently observing one of the most severe and deep world financial and economic crises in history. They both argued that the origin is USA. *Lang and Jagtiani (2010)*, as well as *Wallison (2010)* aligned in the same conclusion. On the other side, *Gross and Alcidi (2009)* highlighted that Europe had already internal weaknesses to cover and it was a matter of time for them to be revealed. In contrast, there were a number of scientists who argued that current crisis has antecedents in earlier crises, including the "Great Depression" of '30s (*Gaffney, 2009; Wheelock, 2010*). Nevertheless, a quick glance in the past demonstrates that humanity experienced economic crises even from the 12<sup>th</sup> century, when Europeans established their states.

Back to Greece, the global situation in combination with internal imbalances and distortions, directed the country in facing a multilevel economic recession, consisted of the following characteristics (*Provopoulos, Bank of Greece Annual Report, 2010*):

- A negative environment (both economic and social) due to: (a) the lasting structural weaknesses and distortions, (b) the macroeconomic imbalances, and (c) the non-sustainable development, as proved to be a-posterior, the growth during the years 1996-2007.
- The high risk for the country loosing the opportunity, to get advantage of the global recovery.
- The lack of confidence in country's prospects to overcome its problems and return to development and prosperity.
- The inability to get external financing due to the above characteristics.

The result was for the country to enter in 08 May 2010, officially under the economic supervision of the troika consisted of: (a) the International Monetary Fund (IMF), (b) the European Central Bank (ECB), and (c) the European Commission (EC). Practically this was done through a memorandum of recovery (Memorandum of Understanding of Specific Economic Policy and Conditionality) accompanied by a trilateral agreement (contract) which provided an enormous loan of 110 billion euro. It is interesting though, that Greece was represented separately in the agreement by: (a) the Greek government, and (b) the Bank of Greece.

Since the country could not secure external funds, it was unable to borrow through regular global financial channels of income. International funds were not willing to purchase Greek state bonds, requesting interest rates that were over 6% on that time. On the other side, Greece as a member of Euro zone (European Monetary Union-EMU), requested help from its euro partners who in response undertook the responsibility to provide help under certain conditions. The memorandum signed, as the ultimate saving plan, introduced a series of structural reforms that the country was obliged to perform in a very short time, within three years (until 2013). The government (*Socialist Party with G. Papandreou as Prime Minister and G. Papaconstantinou as Minister of Economics*) under the pressure and the panic of the situation directed the country into custody.

Therefore, after two years of implementation of the First Economic Adjustment Programme (Memorandum), the results were disappointing and almost catastrophic. The measures and reforms in the way that these applied or not applied had raised a series of negative consequences for the country instead of ensuring the opposite. Practice demonstrated that neither of the local political forces proved to be eligible to undertake the responsibility to perform the reformation plan not even able to present alternatives. Instead, on 09 February 2012, the country, after a series of negative evaluations by troika, adopted the Second Economic Adjustment Programme, under a new, more strict and dangerous for its sovereignty contract. This had duration of three years (till 2015) and was accompanied by an additional 130 billion euro loan. The money was agreed to be provided in small instalments depending on reviews related to the progress of the programme. The government applied part of the programme and did not proceed to structural reforms as it should. Instead, it decided to balance the situation through single fatal practices of decreasing horizontally wages and pensions in public and private sectors. That was done on the basis of collecting money and presents some results. Both First and Second Adjustment Programmes included a specific mindset of restructuring status quo but, this found strong opposition among social partners. It is very difficult to break links that were rooted for many years.

During 2012, the negative situation turned even worse, especially in terms of experiencing a kind of death-spiral effects like, increasing unemployment (over 25%) with increasing taxation, devaluation of labour cost, inflation and zero investments. No prospects were given by any social partner, while in the same time, predictions for recession for 2013 range 4% to 8%. Furthermore, current reformative implementations in combination with the imposed practice of internal economic devaluation which is the backbone of the whole change plan, creates an explosive social mix, with unexpected reactions. This reformation scheme had already a direct impact, primarily in devaluating cost of life while keeping the same currency and moving the cutting-cost among others in health and healthcare.

## 3. Aims and Objectives

### 3.1 The overall aim

The overall aim of the research is to identify and explore the **emergence** and **self organisation** as the major transitional components that stand between death and renewal in complexity. In practice, this is represented through certain **managerial practicalities** which, in this case, could be applied in healthcare sector, in terms of **putting complexity to work**. Being in the centre of turbulence, healthcare should sustain while preserve social principles but adopt a modernised mindset. The intention is definitely not to model any complexity's manipulation scheme. On the contrary, it is to investigate and analyse the significance of acting, based on limited knowledge and ambiguity.

### 3.2 The research objectives

Self-organisation is a characteristic of complex adaptive systems which could be considered as the end-result in a series of changes in behaviour, in combination with the emergence of dynamics which establish new forms and structures. Moreover, this comes as a result of the system's decision to acquire a new status and stabilise its components after renewal.

In order to realise the overall aim, it is more effective to divide it, into three parts identifying them as measurable supplementary objectives (*Figure 1*). These objectives are related to characteristics of complexity, and more specific to those that demonstrate healthcare's specialties based on literature. This helps current study to apply a more concrete approach to healthcare and conclude on results more accurate and valuable in relation to the overall aim.



*Figure 1. The Research Objectives of the study*

### 3.3 The research questions

Following the aim and objectives, the study poses a number of questions. The target is to discuss and suggest managerial practicalities in terms of complexity especially in current situation, where both healthcare sector and the country experience a shock effect. The research is going to follow a qualitative analysis since the subject demonstrates increased specialties. Therefore, in the next *Figure 2*, is given the concrete questions' framework to be used as a guide in the survey.

### Research Questions' Framework

**Information asymmetry:** does this exist among the agents of the healthcare sector and especially among the providers of the services, the receivers of the services and the payers of the services? (Agent-based nature)

**Interdependencies:** is information asymmetry a source of high interdependence among agents? Are there any weak links created through interdependencies? (Connectedness)

**Heterogeneity:** is there considerable professional and technological heterogeneity within healthcare organizations? Does this create difficulties in understanding the organization and the sector in extent? (Emergent dynamics)

**Attractor patterns:** how the system reacts and responds to certain issues of change? Is there any paradox regarding absorption of changes within the system? Does the system respond as a whole or diversified? (Emergent dynamics)

**Generative relationships:** is this a special complexity characteristic of healthcare sector? Who defines such relationships? Does this affect the behavior of agents? Does this affect the healthcare service itself? Do the specific relationships create contexts? (Connectedness)

**Collective reflexivity:** how this works within the sector? Is this a derivative of complexity thinking? Can this be further exploited? (Emergent dynamics)

*Figure 2. The Research Questions' Framework of the study  
(this Framework is used as a guide for interviews and data analysis)*

### **3.4 Overview of the study (the structure)**

In the current section (Section 3), there are presented the overall aim as well as research objectives and research questions of the study. In this section actually, is defined the framework of current research upon which literature review (Section 4) and methodology (Section 5) are unfold. Literature review analyses and discusses the issues of:

- Complexity and healthcare
- Characteristics of complexity
- Healthcare's complex characteristics and
- Greek economy

Literature review (Section 4) starts with the approach on complexity context and discuss the case of Greece both in overall and healthcare sector issues. In Section 5, is given in detail the methodology describing in steps the process of sampling, data collection and data analysis. Section 6 refers to ethics. Section 7 gives findings of the survey and discussion in correspondence to research questions framework. In the end, are given the conclusions of the study comparing results with literature and giving some elements for further research (Section 8).

## 4. Literature Review

### 4.1 The structure of Literature Review

Literature review follows a four-pronged approach, which is extended in: (a) to present and discuss the characteristics of complexity and complexity thinking (*section 4.2*), (b) to bring forth and reveal the relation of complexity and healthcare (*section 4.3*), (c) to identify and discuss the characteristics of Greek recession, including historical economic data (*section 4.4*), and (d) to discuss practicalities that could help the sector to define its complexity space and apply complexity thinking in terms of emergence and self-organising towards resilience and rebound (*section 4.5*).

This structure aims to reveal the path-dependence of healthcare sector in times of crisis, and how this is affected by the complexity metaphor.

### 4.2 Complexity

Holistic approach is still not a popular practice, especially in terms of analysis and synthesis of concerns and decisions. When new challenges are ahead, behaviours are more adaptive to complexity and follow similar adaptive cycles. The attempt to apply machine-metaphor thinking in dealing with complexity brings consequences of frustration within the system. Healthcare systems are not linear and additive. Therefore, their dynamic could not be obtained by summing up their parts. *McDaniel and Driebe (2001)* claimed that no one is smart enough to figure out where the healthcare system is going at any level. Both investors and practitioners are trying to predict the future of the healthcare, aiming to discover the component that will prosper. Besides, *Beautement and Broenner (2011)* have concluded that the evolution of the system is unknowable.

#### 4.2.1 Growth and Degrowth within Complexity

What Greece experiences is possibly a small part of a wide change. This is how the country confronts, within its microcosm, to a bulk of consequences stemmed from the change in global strategies. Yet, is normal claiming that the motives are planetary wise, implying the ultimate humankind's sustainability.

*Donella Meadows (1995)* defined as sustainability the equilibrium of co-existence between humanity and the planet. Such target incorporates the essence of the "complete vision", as she claimed, which necessitates the components of spirituality, of community, of decentralization, of a complete rethinking in the ways humankind is accustomed to do things. One could also say that there is a missing component in the above; this is solidarity, a historically common link especially in tough periods. *Meadows (1995)* clarified what sustainability means, by providing the following explication:

1. Renewable resources shall not be used faster than they can regenerate.
2. Pollution and wastes shall not be put into the environment faster than the environment can recycle them or render them harmless.
3. Non-renewable resources shall not be used faster than renewable substitutes (used sustainably) can be developed.
4. The human population and the physical capital plant have to be kept at levels low enough to allow the first 3 conditions to be met.
5. The previous 4 conditions have to be met through processes that are democratic and equitable enough that people will stand for them.

Nevertheless, it is difficult to realise how democracy co-exist with control of human population.

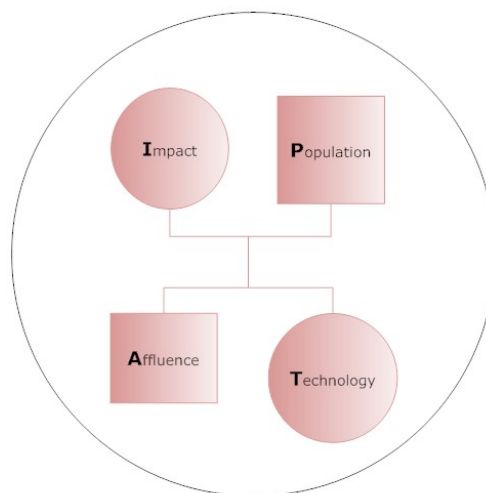
Years earlier, a scientific team delivered a report to the Club of Rome (*Meadows et al, 1972*) which briefly concluded that if humanity would maintain the same growth trends in a series of resultants, the limits to growth on this planet will be reached sometime within the next hundred years. This report was submitted on 1972 and it was the first time identified, that, infinite creativity has to confront with finite resources. This perception coincided years later, with the recently introduced green policies and the discussions on ecological footprints. There is a global challenge though that humanity follows an exponential growth in a finite and complex system. In these terms, *Meadows et al (1972)* were not restrained in identifications. They have recommended that if growth trends could be altered and stagnated in a state of global equilibrium, probably this could rebound sustainability.

As *Maskin (1983)* highlighted, according to Nash equilibrium, each player is expected to decide on his social choice rule taking into account the decisions of other players. This brings equilibrium

in a game where all powers find their position. The rapid population growth, the industrialisation, the depletion of non-renewable resources and the deteriorating environment, constitute an explosive mix which obviously jeopardises human evolution and raises increasing entropy just like the ice-melting in a warm room. Entropy appears when an entity starts to lose its cohesive attributes towards elimination. Under such circumstances, de-growth, slowing down development and re-orientating could be the alternatives.

De-growth, non-growth or even a-growthism are not newly introduced ideas. The bottom line of cultivating future expectations for a society is reminding to the local powers the meaning of their existence. It is probable that most of the times fear, greed and wishful thinking were hidden behind the modern practice of grasping opportunities for the benefit of growth. *Newman (2011)* presented his thoughts on the sarcastic question if finally “we live too many on this planet”, implying that may have come the time to reconsider our population models. Population bombing and the link with environment is not recent. *Ehrlich (1966)* introduced the IPAT Model in his effort to simplify the understanding of humanity’s impact to the planet. Much discussion is raised since then, whether such approach is adequate and scientifically valuable. Nevertheless, it is well-admitted that he, at least, tried to establish a set of measures in the perception of impact (*Figure 3*).

**The IPAT Model by Ehrlich (1966)**



$$\text{Impact} = \text{Population} \times \text{Affluence} \times \text{Technology}$$

*Figure 3. The IPAT Model*

It is interesting that Ehrlich, well early had identified that the derivative of affluence and technology as means used by the population, had direct environmental impact in a measurable way.

Either following growth or de-growth models, it is imperative for any power to develop a set of relationships within these parameters, in order to promote its policies. It is notable that the model was introduced in early '60s where technology had not yet achieved global penetration.

De-growth is not a policy rather than the mediatory situation between recession and growth. As *Georgescu-Roegen (1971)* claimed in his study on entropy law and economic process, de-growth is inescapable. Many years later, *Latouche (2004)* brought forth the issue again using the term contraction economics, to describe as de-growth the deconstruction of the matter of development. De-growth is not a practice rather than a guiding principle, which contradicts to growth being one of the doctrines of modern economics. It aims to present an alternative path which directs to self-sufficient and materially responsible societies.

#### 4.2.2 The relation with health and healthcare governance

Healthcare is considered one of the most valuable pillars for a society to sustain and progress in the global terrain. Since human capital and human intelligence is accommodated and protected

through healthcare practices, any external or internal shocks that generate crisis reveal sector's vulnerabilities. From industrial age to knowledge era humanity have experienced various cohesion and survival shocks. According to *Naomi Klein (2011)* there are three ways for a society to change. These are: due to natural disasters, wars, and economic burdens.

Nevertheless, modern times revealed that societies still have not yet seriously confronted with the diminishing health value of their members but they will. Further to knowledge era, the challenge is expected to be the welfare epoch. Regions that will keep the healthiness of their human capital in high levels are expected to acquire a unique advantage and opportunity for further progress. Therefore, healthcare would be an asset to escalate competition and create new terrains. In a continuous changing global environment, health governance plays the role of trustee who undertakes the responsibility to protect the rules of progress.

Adopting *Walters (2001)*, there is a suggestion to embed the mindset of building blocks health innovation. The building blocks of health innovation could aim to raise the powers of survival through certain practices such as:

- Implementing national welfare reforms
- Using information technology
- Pursuing process improvement
- Enlisting the help of both public and private sector
- Empowering communities (citizens)

Current study intends to accommodate further knowledge on this area given the case of Greece and the experiencing recession having impacted strongly the healthcare sector. Globalisation has brought strategies, which direct regions towards standardization and homogenization. Societies that will be unable to comply will experience a much more sharp alignment or isolation.

#### 4.2.3 The search-for-equilibrium

*Daskalakis et al (2005; 2006; 2009a; 2009b)* discussing the element of equilibrium in complexity concluded that in a game there is always equilibrium. May be the equilibrium is the complex system itself, and the challenge remains in exploring the rest of the game. Complex adaptive systems (CASs) are strongly experiencing change, emergence and co-evolution as phenomena which constantly push the system far from equilibrium. This happens due to players' willingness to change or not to change their behaviour, based on their motives (*Daskalakis et al, 2009a; 2009b*). In such a case, there is no optimal solution, but putting complexity to work while being alerted and ready for action; an action which stems from the capacity to learn.

Complexity is bind to far-from-equilibrium status. Nevertheless, for a real economy to rebound, it is necessary to achieve a level of stabilisation rather quickly. Any change should be performed effectively and transitional period should be of minimum length. Even if the society decides to bounce back as a result of its resilient practices, the request is to acquire stability. On the other side, in case the society bounces beyond, by changing structures and not roles, again the end-process is expected to be the search of stability. Therefore, economic stability remains as the primary objective since this, by itself, activates a series of positive consequences such as increase in foreign direct investments, high reserves, stable interest rates and business expectations. The main problem of Greece currently is economic instability. The situation as described in the previous section briefly creates a framework consisted of: fear-uncertainty-high risk. The stability mix, which may help the country to return quickly, is depended on (*Figure 4*):

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- 1. Anti-cyclical monetary policies**
  - 2. Debt management**
  - 3. Fiscal adjustments**

*Figure 4. The factors of stability mix*

The participation of the country in Eurozone, a currency consortium, demonstrates both advantages and disadvantages in this specific case. Euro is considered as tough currency. Taking into consideration that the use of a currency mirrors the status of an economy, Greece has a challenge ahead to confront. On the other side, the common currency between countries usually leads to lower volumes of trade especially when these transactions do not create overvalue. Therefore, in broader terms, countries tend to look for markets with different currencies and variable exchange rates. In this case this is not possible. Greece belongs to the complex adaptive system of Eurozone, and as such should be treated and researched.

Undoubtedly, monetary policies have direct impact to economic developments and the shape of business environment. Changes in the stock of money affect the economic activity interfering with a lag which creates cyclical fluctuations. Moreover, monetary policies could be exploited as leveraging tools for the countries. The practices of devaluation and overvaluation usually help the economy to adapt into broader changes following a cycle of recession-development. On the other side, monetary policies can be used as a mean to impose structural reforms, especially when this follows external shocks for an economy. This fits more to a “white-page strategy”; creating shocks and vibrating an economy trying to eradicate old status quo; turning a new page in its economic history and accomplishing a reposition.

Real economic progress comes at a price equals to creative destruction. Joseph Schumpeter, who first identified and linked the essences of creative destruction and destructive innovation, highlighted that both undermine human values. Moreover, he asserted that entrepreneurs, no matter where they operate, they are agents of a system and they unleash innovation and creative destruction. Therefore, it is almost impossible to look for equilibrium in an environment where the phenomenon of entrepreneurship exists. This is what *Pichler (2010)* alternatively defines as the ever-self-renewing entrepreneurial drive. Besides, he insisted that a reproduction of a system stems from its own forces, and from within.

Borrowing definitions from criminology, the perfect guilt elevates when there exist three parameters: (a) motive, (b) mean, and (c) opportunity. In correspondence, these could be in this case: (a) motive: to activate changes, (b) mean: the monetary policy, and (c) opportunity: the economic recession.

Understanding complexity seems close to managing change, managing crisis situations and realising the structures of a living entity. In an extent this is useful to realise the complex system of a country as a whole, especially when this experiences a time of recession and economic shock.

#### 4.2.4 Complexity and Complex Adaptive Systems (CASs)

As mentioned earlier, complexity science focuses on dynamic states that emerge in systems that find themselves in far-from-equilibrium status. The essence is the search and study of characteristics in such systems. This finds application in the study of patterns and relationships as well as the results of the interactions among the components of the systems. In complexity, this happens in a holistic view rather than a simplistic way. *McDaniel and Driebe (2001)* discussed the reductionist perspective, known as the Newtonian, which tries to understand the whole of a system through the understanding of its parts. Things can be broken into their constituent elements in order to be examined. This adapts to the mechanistic view of evolution, where systems are confronted as machine-like entities and run-like-a-clock is the dominant metaphor. *Batty and Torrens (2001)* defined as a complex system, an entity which is coherent in some recognizable way but whose elements, interactions and dynamics generate structures. They have recognised the existence of surprise and novelty in such systems, which cannot be defined a priori. Therefore, a complex system is more than the sum of its parts since it accommodates numerous interactions, dynamics and behaviours inside. The part, cannot replace the whole.

Various researchers (*Hassink, 2010; Simmie and Martin, 2010; Clark et al, 2010*) have attempted to understand complexity and complex systems through research of natural systems. A complex system demonstrates the attributes of a natural living system which incorporates different sub-entities with powers, links and concern. In other words, this could be perceived as the biology of business. Organisations, regions and countries has yet much to learn from biology and nature.

Complex adaptive systems (CAS) are self-organised systems which have the ability to adapt to any external affection including the radical change of inner structures, if necessary. *Scott (2008)* raised the issue of cooperative behaviours which could exist among the agents of a CAS. This is necessary to progress, if the system prefers to survive. Therefore, although a CAS demonstrates different dynamics and norms within its own substance, there must be some simple rules to survive. As *Janoff-Bulman (2009)* highlighted, although a self-regulatory environment seemed to

gather many advantages there is always the issue of who will undertake the complex thinking. *Begun et al (2003)* gave a concise definition of complex adaptive systems as follows:

**Complex** implies diversity, a wide variety of elements

**Adaptive** means the capacity to alter or change, the ability to learn from experience

**System** is a set of connected-interdependent agents

Complex adaptive systems can respond in more than one ways to their environment, although they hide a sense of unknowability, implying the high risk of unexpected outcomes. This incorporates the elements of extensiveness, process and surprise. Moreover, it complies with emergence, differentiation and path dependence, as it was raised, by *Schneider and Somers (2006)*.

#### 4.2.5 Characteristics of Complex Adaptive Systems

It seems that complexity is born from diversity. And there is no better way to understand complexity than studying its characteristics. No matter the behaviour of a complex system and the response to the environment, there is a certain number of characteristics that this owns. In the next figure it is provided a small diagram of these characteristics (*Figure 5*).

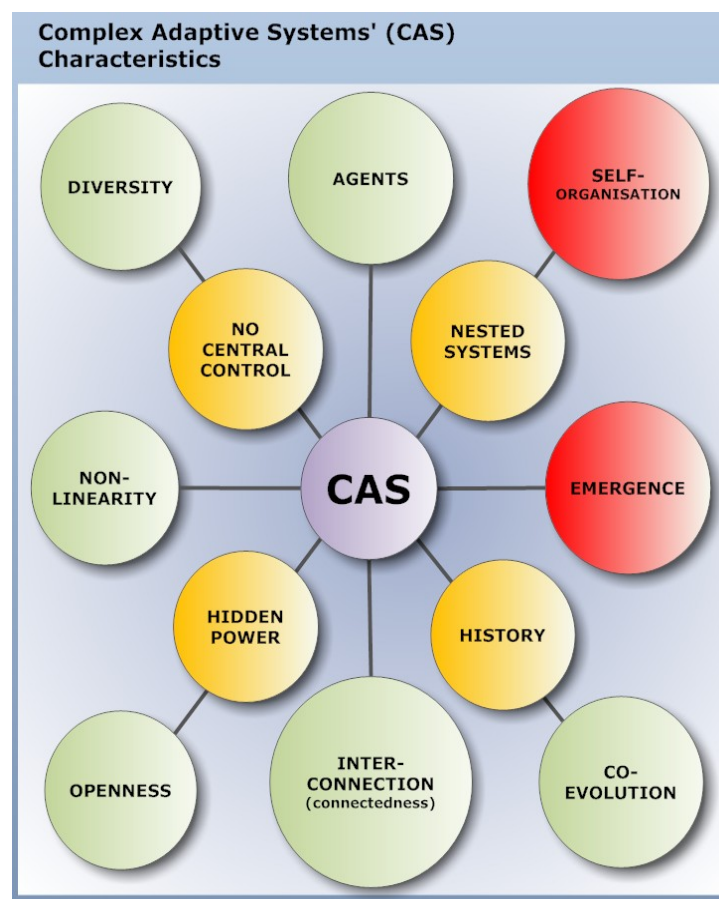


Figure 5. Characteristics of Complex Adaptive Systems

Some of the characteristics may encrypt greater significance (e.g. emergence, self-organisation), than others (e.g. history), but here is considered crucial to cover them all equally. The aim is to bring forth and analyse these characteristics, taking into consideration any specialties and what these represents. Catching the essence of characteristics enables the ability to understand complexity as well as the difference between mechanistic and holistic approach. The intention is not to deepen rather than use them as a guide to discuss the case of healthcare in the country.

**Complexity** stems from **diversity**. According to *McDaniel and Driebe (2001)* diversity is the source of novelty and adaptability and in extent the source of invention and improvisation. All four attributes are living elements of complex adaptive systems which are made from a large number of **agents**. *Easton and Solow (2011)* specified that CAS consist of agents who act and react based on self-generated stimuli, and the actions of other agents, either from inside or outside the system. This agrees with what *Daskalakis et al (2009a; 2009b)*, as discussed in previous section, had identified regarding the game theory and the potential behaviour of players. Definitely agents are the central actors in the system and demonstrate a dynamic state (*Begun et al (2003)*). The specialty though is that none of the agents can understand the system as a whole, since they tend to attend their local environment (or microcosm). Therefore, none of them can acquire central authority to manipulate the system; there is no central agent. On the contrary, they act and react with each other and adjust their behaviour accordingly. In terms of diversity, although this could be a positive source for the system, this in the same time may be a source of frustration among agents. Diversity raises difficulties in communication, perception and stimuli. *Psychogios (2011)* highlighted that agents select with whom and how they will interact. Therefore, they have an embedded the element of selective behaviour.

There is an ingredient which links agents with the system and this is: information. Agents are information processors who exchange, evaluate, and feedback information among them and with other systems. Information on the other hand, is the blood of the system, which enables reactions and defines concerns. Complex systems demonstrate acute similarities with living organisms. Human beings are social entities who tend to organise themselves in a manner that is considered approved and necessary for their survival. In complex systems this practice is expressed through building blocks. During the evolvement of the system, different agents, based on their role and level of pervasion are grouped and form various blocks. As the system unfolds the blocks change their reaction and behaviour. So far, it is realised that agents do not only interact, but they adapt and live in a complex system while they **co-evolve** with it.

**Co-evolution** does not necessarily imply progress, since agents may experience obstacles which raise conflicts between them. In any case, co-evolution is the development of the system through time under the prism of the micro and macro environment. Moreover, co-evolution incorporates the actions of agents as a result of their own evolution within the system (nested evolution). Any change that an agent introduces is expected to affect existed patterns and relationships. This triggers the environment in a manner that other agents are obliged to demonstrate functions of placement and repositioning in the new-formed framework. This action is what *McDaniel and Driebe (2001)* identified as, the fitness landscape. Nevertheless, it is questionable which might be the ultimate fitness landscape for a complex system, since there is no agent that owns the big picture of it. This is probably a reaction of compromise and cooperation that agents express, as a result of finding a workable solution for the system to continue evolving. In this case, it could be claimed that the structure of a system is the result of the interaction among the agents and their environment both the micro and the macro.

The essence of complex adaptive systems is encrypted in the relationships among agents. Such relationships form a framework of **interconnections** which affects not only the agents within the system but the system's broader environment. Interconnections among living organisms, such as organisations, show a stratification of **connectedness**. In other words, it is not only the number of interconnections among agents but the richness of these connections that determines the character and the behaviour of the system.

Besides that, relationships follow patterns which have been established through interactions and such patterns enfold certain dynamics. *Begun et al (2003)* claimed that relationships among agents are complicated and enmeshed, one could also say, these are massively entangled. Further to this, *Psychogios (2011)* explained that relationships among agents are **non linear**, thus a small stimulus may cause a large effect or no effect at all. Also he ascertained that actions and behaviours of small non-average groups may result in unintended consequences. Non-linearity is the ingredient of complexity. Due to partly non-linear input-output functions, complex systems demonstrate unpredictable behaviour (*Keune, 2012*).

In the same way, *McDaniel and Driebe (2001)* discussed that inputs are not proportional to outputs as simple deterministic equations may produce an unsuspected richness and variety of behaviour. However, complex and chaotic behaviour may enable ordered structures and relationships play an important role in this case, especially when these relationships are mostly received from near neighbours (*Psychogios, 2011*).

This in simple terms describes the range of interaction, but more important explains the range of influence among agents. The use of information, either through positive or negative feedback, either distorted or in plain terms, affects interaction and influence. Although these rules sound simple, complex behaviour can emerge from such rules. **Openness** is an additional characteristic of complex systems and this stands closer to patterns of interconnection and relationships. The exchange of energy and information opens the width of complexity. It is interesting though, that *Begun et al (2003)* had a different conclusion. He claimed that complex adaptive systems tend to maintain in general bounded behaviour regardless the small changes in initial conditions. This is called an **attractor**. Probably he saw that behind complex situations there are simple rules hiding, in terms of **self-organisation**. He doubted also the generality of butterfly effect. The sensitivity to certain small changes in initial conditions is depending in the exact path that the complex system follows. So, **emergence** is not only the product of context-dependent non linear interactions but also a product affected by the lock-in path, the path that the system will decide to follow. This is the ultimate behaviour of healthcare sector in Greece. An attractor pattern which denies to absorb changes and in response they build a lock-in path.

*Keune (2012)* defined **emergence** as a phenomenon that comes from the presence of simple components in a system that interact in a manner which cannot be explained by their individual characteristics. As a result, emergence is the source of novelty and surprise and this is one of the most critical characteristics of complex adaptive systems. Actually, emergence stimulates new structures and behaviours. It is not unrelated to other characteristics. On the contrary, according to *Psychogios (2011)*, new structures may emerge in a CAS, as a result of the patterns of relationships between agents. Interconnection, co-evolution and their inner elements may direct to emergence. The level of connectedness among diverse agents, in relation to agents' building blocks practice, and the properties of the system create a fertile ground for repeating emergence, based on unpredictability.

This is usually the stage where **resilience** comes up as reaction. There is **hidden power** in complex adaptive systems, and this is due to the ability of allowing a massively entangled group of diverse individual agents the freedom to be adaptable and resilient (*Easton & Solow, 2011*). Nevertheless, resilience has different natures or types. *Hassink (2010)* presented a four-dimension model of resilience assuming that a system always tends to find its equilibrium; these different types of equilibrium are: (a) the back to normal equilibrium, (b) the flip from certain equilibrium to another, (c) the path dependent equilibrium, and (d) the long-term equilibrium.

*Hudson (2010)* verified that resilience denotes the capacity of ecosystems, individuals, organisations or materials to cope with disruption and stress and retain or regain functional capacity and form. Therefore, although this is not incorporated in the characteristics that have been described so far, resilience is diffused as a mindset in the whole of a complex adaptive system. Above all, it is related to exogenous shocks and reflects the system's capacity to absorb disturbance and reorganise while undergoing change (*Bristow, 2010*). *Simmie and Martin (2010)* claimed that the primary ingredient of resilience is **learning** and in extent the capacity for a system to have mechanisms of knowledge acquisition and knowledge assimilation. Systems that do not succeed in capitalising knowledge will experience harder conditions in their effort to apply changes and to align with broader necessities.

The collective result of non-linear interactions among agents brings new structures and establishes new patterns of relationships and behaviours. Since complex adaptive systems are dynamic, most of the times depending on their motives, they follow a path of self-regulation. This happens, when agents decide to shift and change both internally and externally affecting each other (*Psychogios, 2011*). They demonstrate a self-organising behaviour which an adaptive response to the new situation and the new emergent properties. This is called **self-organisation** and is considered one of the important characteristics in complex adaptive systems. It is the situation where new status is adopted and the system operates through new patterns in a holistic way. There is no central body to administer this transformative situation but this arises as a new generated order.

Moreover, a complex system, as a living entity, has a **history** which cannot be ignored. Among others, such systems demonstrate **temporality**, meaning that they are reflecting their history, their memory of the past, in a selective non-linear manner (*Keune, 2012*). History should be considered

crucial in the effort to recognise and analyse other characteristics, since may hide repeating behaviours, attributes, reactions and structures. As mentioned earlier, complex systems own the problematic attribute of **reduction**. Any knowledge available for the system is nothing more than a reduction of its complexity; a micrograph; a simplification.

### 4.3 Healthcare and Complexity

#### 4.3.1 The Complex Characteristics of Healthcare

Healthcare systems demonstrate different specifications and characteristics. They are complex adaptive systems which have their own specialties and distortions, usually generated from the dominant metaphor of unknowability. Traditional administration in such systems still focuses in control which is defined by the following scheme: (a) better regulation, (b) financial restrictions, and (c) punishment of offenders (when possible). However, relationships and interconnections are critically important since healthcare incorporates many diverse agents. Besides, this is the challenge of the specific sector. There is a structure in the system but with variations.

In this section it is intended to bring forth some of the special characteristics of healthcare complex adaptive systems. It is considered that these characteristics are responsible for the differentiation of healthcare and the demand of a holistic approach rather than a common complex system.

Probably the most important special characteristic of the system is **information asymmetry** among agents. This applies between clinician providers of services and typical agents (patients and others) (*McDaniel and Driebe, 2001*). Such asymmetries create interdependencies. No matter if healthcare is offered through public or private services, there are **weak links** among the main agents in this service experience, as figured below (*Figure 6*).

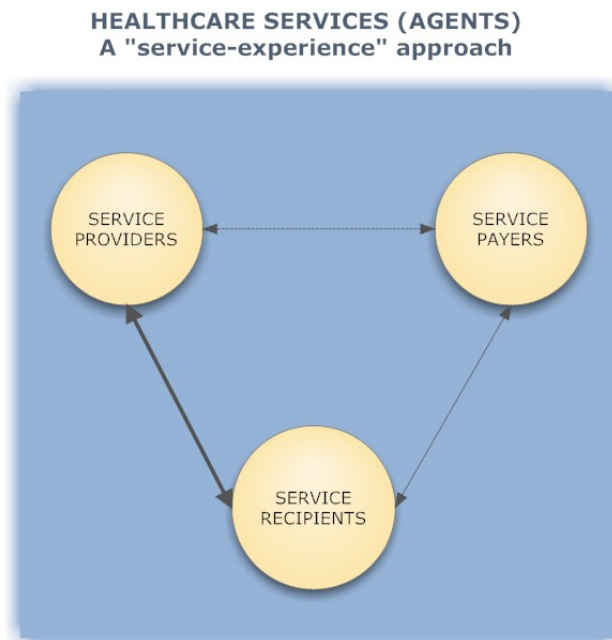


Figure 6. Healthcare services (agents' links)

There are three major agents in healthcare complex adaptive system depending on their role. Service providers are the one who holds inside information and this, by itself, position them in an advantageous place. Service payers may be either the same with service recipients (in case of private sector) or different (in case of public sector). In the former, the patient has a more direct participation while in the latter this is more or less indirect. According to relationships and patterns of behaviour, as provoked via power, the links among these agents are varied. Potential weaknesses in links lead to distortions.

*Pisek et al (2003)* highlighted that relationships is the central component to understand the system. The behaviour of the system is the result of the interaction among agents. To be precise these are **generative relationships**, meaning that these mainly affect the system. Furthermore, **actions** of the agents are mostly based on **internalised simple rules** and mental models. For example, the specialty of the relationship, developed between doctor and patient may direct in actions that follow instincts, constructs or mental models rather than predefined rules. The emergence of a case in Emergencies Section of a hospital stimulates initial instincts and puts aside administrative rules.

Besides that, the system enfolds attractor patterns which define the response to certain issues of change. *Pisek et al (2003)* for example, discussed the **desire for autonomy** as a strong attractor pattern. However, there is a paradox in healthcare and this stands in opposite practices that can be found simultaneously. There is one side in the sector which continuously adapt to changes, while the other side demonstrates a remarkable resistance. Non-linearity is inherent since healthcare accommodates nested complex systems. A hospital is a complex system embedded in a regional healthcare complex system, which in extent is part of the national healthcare complex system and so forth. Imagine that these systems co-evolve.

Additionally, there is considerable **technological and professional heterogeneity** within a healthcare organisation (*McDaniel and Driebe, 2001*). Such heterogeneity increases the difficulty of understanding the agents and the system. As *Orr et al (2006)* mentioned, two agents of the same system (regional healthcare organisation) may approach the same problem in a different way and with different resources, getting into different conclusions. For example the forthcoming problem of ageing population, is confronted differently by Public Health System and Ageing Networks. **Experimentation and pruning** is an ingredient of the system but it seems that applies to specific cases and not holistically. *Lessard (2007)* argued that **complexity thinking** is a characteristic of the sector but has to be collective. He introduced the issue of **collective reflexivity** as the mean that should be taken into account in terms of changes. Quantitative methods are not enough in assessing sector's results. On the contrary, healthcare needs to deal with complex social problems through multiple factors mediated by individual and social contexts. Tradeoffs across multiple objectives and perspectives of different stakeholders are parts of critical thinking in complexity. On top of all, concern should be given that decisions are strictly connected to human lives, quality-of-life and health of human capital.

These represent the so-called **ethical climate**. *Mills et al (2003)* have placed ethical climate as the decisive factor which either can endanger or empower the whole sector. She insisted that cost constraint and quality improvement cannot co-evolve. In the same manner, she claimed that placing sales techniques and market solutions in healthcare changes the nature of the service to market commodity rather than a social service. However, cost strategies and relevant measures should be placed carefully towards services' nature.

On the other side, healthcare systems financing is a considerable issue for World Health Organisation, as rising healthcare costs is the current challenge in global measures. The Organization through various surveys and reports concluded that 20-40% of all health spending is wasted inefficiently. Therefore, improving efficiency is the main target. Certain actions are suggested, which involve: (a) better procurement practices, (b) broader use of generic drugs, (c) better incentives for providers, as well as (d) streamlined financing and (e) efficient administrative procedures (*World Health Organisation, 2010*). Such recommendations obviously provoke industry and systems' restructuring not only in Greece.

The socioeconomic position of a country has a direct impact on its healthcare strategies (*Davey, 2000*). Poor strategies raise inequalities and diminish worthiness of human capital. When a system accommodates human beings, these have the freedom and ability to **respond to stimuli** in many different and unpredictable ways (*Mills et al, 2003*). Consequently, the relationship between environment and healthcare is the most challenging complex field, since contexts and relationships are ignored or marginalised in the attempt to make economic evaluations. *Batty and Torrens (2001)* highlighted wisely, that a complex system is one that can respond in more than one ways to its environment, revealing the mutual relationship between such systems and their environments. This statement incorporates the elements of extensiveness, process and surprise. Moreover, it aligns with emergence, differentiation and path dependence, as it was raised later in 2006, by *Schneider and Somers (2006)*. To this extent, emergence and non-linearity show an even sharper behaviour in healthcare; especially when unrecognised patterns reveal and unpredictable agents emerge without authority, but with power that stems from structural changes.

It is a matter of conceptualisation and how healthcare is perceived in terms of metaphor (complex or mechanistic). The most complex systems are social systems and healthcare sector is

the most complex within this sub-domain (*Begun et al, 2003*). Further, **resilience** fits the complexities of healthcare more effectively than principles of high reliability since this provides the framework to learn and adapt (*Jeffcott et al, 2009*). Complexity accommodates the view of human error and is the result of an environment that is fraught with gaps, hazards, trade-offs, and multiple goals. In addition, in the centre of it remain erratic people who have their personal initiatives.

#### 4.4 The case of Greece

After ten-years of seemingly strong growth, Greece started to experience the effects of the global downturn in early 2009. The large fiscal deficit from the one side and the external imbalances on the other side (the twin-deficits), have revealed the chronic vulnerabilities of the national economy.

Greece is a country member of the European Monetary Union (EMU) – using Euro, officially adopted since 2001 - with approximately 11 million inhabitants but 5 million of labour force, till the end of 2010. By that time, and since the country enters crisis this number is declining to less than 4 million, and so forth. According to calculations included in the recently issued Greece's Public Budget for 2013, the unemployment during 2012, has reached 23% while the forecasts for the next year exceeds 25% (*Stournaras, 2012*). A significant percentage of the labour force still is consisted of immigrants especially in sectors that are considered crucial for the country's economy (constructions, tourism, agriculture etc.), mostly in primary sector. Less than half of the registered population belongs to what-so-called economic active population. Regarding synthesis of country's domestic product and the labour force, in very general terms, 65% is occupied in services, 23% in industry and the rest 12% in agriculture.

##### 4.4.1 Historical economic data

Although the country in early 50s had been characterised by an increasing development in agricultural and industrial sectors, the gradual incorporation in European Economic Community (EEC) towards 1981 (year of official entry) (*European Union, 2012*) was the main reason that switched its orientation primarily to services. This directed in experiencing a de-industrialisation and an emphasis in non-intensive agricultural products.

The country experienced an enormous growth in the period of 1953-1973, hitting the upmost performance in the decade of 1951-1961 (*Bowles, 1966; Delipetrou, 2012*). In *Appendix A* is given a comparative table registering the country's GDP growth rate on that period, placing the country in the second place in the post-war advanced economies. Maintaining a growth rate of 6.1%, Greece was, with Italy and Germany the drive-wheel of Europe's reconstruction. In *Appendix B* is given the distribution of the country's growth rates per sector. Energy, construction and mining were the driving forces of country's rebound.

During 1961, Greece reached the enormous 11.15% GDP growth rate. The following years until 1973, the growth rate was ranged from 5.5% to 10% annually (*Indexmundi, 2012*). This positive tension sustained until 1980 (0.68%) with the exception of 1974 (-6.44) the year of state regime's change. It is strange though, that although the country had experienced a series of political instabilities during that period, the economy had demonstrated strong characteristics of resilience.

Nevertheless, starting from 1981 the country had been experiencing low growth rates comparing to previous years (around 3%) and even negative ones until 1999. The year of 2000 was linked to the Eurozone. The growth rates from 2000 to 2007 were positive, ranging approximately from 2% to 6% remaining very close to other European economies. Suddenly, since 2008, the growth rates were negative following a sharp decline reaching the surprising -7%, probably the highest de-growth rate in the Greek economic history for the last 60 years. Ever since, the country is facing a gradually deep recession.

In the same way, unemployment followed the GDP de-growth rates. In *Appendix C, Demekas and Kontolemis (1997)* present the unemployment rates in Greece which were considered the lowest in OECD countries especially prior to 1970. The foreign direct investments during that period were kept in high percentages since the state had demonstrated a clear will to support the capital and distribute the agglomerated premium both to investors through returns and to the labour force through social policies. Therefore, investments brought capitals which cultivated in extent social relationships in the country and enabled an environment for future social concerns. Probably, one of the determinants which played a significant role in keeping foreign investments in the country was that these were protected under definitive strict laws.

The development had been based primarily in external economic help from USA and rich European countries (the Marshall Plan) in combination with an internal 4-pillar source of financing originated from: (a) remittances, (b) maritime exchange, (c) tourism, and (d) export of agricultural

products. These four sources created the basis for further evolvement of more sectors which contributed to the country's GDP.

Greek economic history has demonstrated that the country always based a significant part of its progress in external loans (*Romaios, 2012*). In addition, there were always consortiums of local industries which supported development plans; this, in combination with the independent monetary policy and economic tools that the government exploited, they were used from time to time, either to absorb any fiscal pressures or to boost economy. Furthermore, the country had acquired strong placement in the global terrain, in a series of products and services. The country's product (GDP) consisted of a set of individual end-products which contributed to the final formation. In other words, there were multiple sectors to depend on, and make economic policy.

#### 4.4.2 Recent economic situation

Further to Eurozone enter, and rather gradually, the country experienced a loss of competitiveness, as that was identified by its EU partners (*Memorandum of Understanding of Specific Economic Policy and Conditionality, 2010; Memorandum of Understanding of Specific Economic Policy and Conditionality, 2012*). Thus, the real exchange rate was considered significantly overvalued compared to fundamentals. On the other side, local labour market was considered to be relatively weak. Also, the employment rate was low and the unemployment duration was among the highest among peers. Long-term unemployment turns to inactivity. Structural impediments hinder product market performance such as: limited liberalisation of utilities, insufficient internal competition due to high regulation, low ICT penetration, and high barriers to entry in the market, especially in services.

Further to the above, EU partners and other economic organisations identified that the country had one of the highest disparities between the number of public servants, as percentage of the workforce, and their compensation as percentage of total compensation. The compensation of civil servants in Greece was relatively high (*OECD, 2010*).

In terms of budget for 2009 revenues were of 109 billion dollars and expenditures of 145 billion dollars. Exports were estimated in 21.3 billion dollars and imports around 64.2 billion dollars (*CIA, 2010*). The fiscal deficit reached 13% of GDP in 2009 (*OECD, 2010*). Public debt was about 100% of GDP in 2008 and 113.4% of GDP in 2009 ranking the country in the 8<sup>th</sup> place globally. Defence spending was estimated at 4.25% of the GDP in the mid-2000s.

The country was considered as less developed than any other Eurozone country. At the same time, it registered higher rates of growth and inflation than other member countries. This was due to "a structural expensiveness" in the Greek market which still has an oligopolistic nature, with almost the unique exception of telecommunications (*Pelagidis and Toay, 2007*). The product market rigidities may be considered as the impact derived from excessive regulations, complicated hiring burdens and mediating costs that are keeping bended any free-will for investments. Moreover, there are serious obstacles in business activities due to bureaucratic issues. Such cases encourage money laundering and financial crimes.

Besides, there is a determinant between growth and development. Although these are related and co-evolve, this is not necessarily happens in a synchronous way, especially in the neo-liberalistic economic model. In the case of Greece, the country for more than a decade had demonstrated high indexes of growth but this was not penetrated in the real economy, which mirrors the level of development. Actually the country, during this time experienced an underdevelopment, which is a possible effect of modern practices adoption. Economies in their attempt to update and align with modernised techniques may fall into underdevelopment. Underdevelopment is the phenomenon of economic increase without development (*Argyris, 1983*). Obviously, this was confronted in the case of Greek economy due to its high dependence on distortions and restrictions, as well as other structural characteristics but most of all due to paternalistic mindset. Another factor was that the country lost its membership's economic orientation in Eurozone. What exactly want the partners from Greece to produce? What is the expected role of the country in Eurogroup?

According to Global Corruption Report 2009 (*Transparency International, 2009*), Greece was placed in the 57<sup>th</sup> out of 180 countries for the year 2008. Furthermore, a national survey presented by the Transparency International Greek branch, for the year 2009, estimated that the size of the total corruption (both public and private sectors) was increased at approximately 787 million euro, comparing to 748 million euro for 2008 (*Transparency International-Greece, 2009*). Levels of foreign investments remained low comparing to other OECD countries, as appeared in international reports (*Political Risk Services, 2009*). Openness to foreign investment could be considered rather restricted. Foreign and domestic investors face almost the same screening criteria. Foreign firms

are not subject to discriminatory taxation. Although there were various efforts to create a positive environment for investments - such as the "Invest in Greece Agency" which operates as a one-stop shop for assisting investments in the country – this, by itself was no more than a single attempt. The lack of a stable law-taxation framework towards investments is the primary cause of investors' aversion.

Greece's economy had been subject to intense governmental regulation (*Political Risk Yearbook, 2009*). Greek labour laws were restrictive in terms of working hours' limits, flexible employment (part-time, on demand etc) as well as hiring and dismissal of personnel (*Political Risk Services, 2009*). At least this was the situation prior to Memorandums' directives. The tax regime lacks stability, predictability and transparency. The government often applied small adjustments to tax levels and imposed retroactive taxation. Besides that, it is still difficult to measure productivity especially in the public sector where there is no knowledge of what is the value of goods and services offered, since there isn't an evaluation framework. But there have started attempts for improvement.

Nevertheless, it should be recognised that the country is currently making a strong effort to change the existed economic environment - November 2012 - through a series of new laws which aim to bring a radical restructure. The third memorandum of understanding, known as the Fiscal Strategy Framework 2013-2016, approved on November 2012 by the Greek Parliament, changes the structures in multiple levels trying to eliminate a series of distortions and cultivate a framework for real development.

Greece had more or less a fiscal deficit of fifteen percent (15%) during 2010, the year that finally entered in the first adjustment programme. The Greek government had to finance this deficit, in other words find ways to ensure that accounts will be paid and cash flow will not stop. By that time, growth had been financed by a private sector borrowing and a public sector borrowing and spending. A significant income channel came from the absorption of EU structural adjustment funds and the participation in a number of other EU programmes (*Political Risk Services, 2009*).

Now, during 2013, the country tries to balance its deficits and create a friendly and secure environment, in order to rebound. In the meantime, continues to receive money from troika, as agreed, through small instalments on certain periods and after thorough evaluation of progress.

#### 4.4.3 Consequences

Over the last fifteen years the country has exhibited a remarkable record of growth and monetary convergence with the euro zone which finally could not manage to exploit. Economic expansion had been largely based in (a) the liberalisation of the financial sector (provide cheap credits to households), (b) the reduction of interest rates due to EMU, (c) the migration inflows, (d) the pervasion to the southeast European markets, (e) the growth in public investments, (f) the inflows from EU programmes and (g) the consumption.

However, this growth - as mentioned earlier - was neither balanced nor in relation to labour productivity, employment participation and technology adoption. This growth did not direct to rearrangement of wealth distribution towards sectors that could lead further. Instead, the financial sector's liberalization and lower interest rates after euro adoption caused a demand booming. Nevertheless, inflation and labour cost growth exceeded that of trading partners and eroded competitiveness (*IMF, Country Report, 2009*). Imbalances persisted and in combination with the global financial crisis, that had weakened sentiment and had sent spreads soaring, causing financial scare. In addition, the lack of political consensus hampered any effort for effective policy making (*IMF, Country Report, 2009*). Revenue shortfall and the rising expenditure widened the fiscal deficit. In addition, the country felt the downturn beyond its own causes, due to Euro area's problems. Euro zone is still experiencing a recession, in terms of more countries that are facing similar to Greece economic problems, although of different nature.

Greece is expected to further decouple. Main reasons are lower investments and low exports of highly intense products, destocking and a decline in private consumption as confidence and employment have dropped (*IMF, Country Report, 2009*). Inflation remains high with unemployment rate reaching 24 percent within 2012. Uncertainty and high risks remain. It is questionable whether local social partners will continue to provide support for changes. Although the optimistic climate that is attempted to be created, numbers are still ahead. As *Monastiriotis (2009)* concluded, the recent economic turbulence had proved that Greek economy suffered of structural problems and weak fundamentals. Public debt, lack of international competitiveness, unemployment, eroding public finances and a credibility gap, plus inaccurate and misreported statistics, are forming an explosive mix which direct to economic instability (*CIA, 2010*). The falling state revenues and the increased government expenditures are two more ingredients of this unstable mix which moreover

accommodates: tax evasion, inelastic government expenditures, an ageing population and an unsustainable pension system. Structural problems are driving to low export penetration, unemployment and inactivity, low labour mobility and wage flexibility, low technological absorption, low educational performance (*Monastiriotis, 2009*).

Above all there is an economic duality which creates a framework; a given status-quo consisted of (a) a large shadow economy and (b) a disproportionately protected public sector (*Monastiriotis, 2009*), which still the country cannot administer effectively due to the political cost and the probable social explosion.

The fiscal position is further challenged from (a) the programmed reduction of European Union structural funds and (b) the cost pressures from rapid ageing. The consistent underperformance on applying the necessary structural reforms throughout the years will continue to lead in low productivity. The imbalances of the Greek public sector are driven by multiple structural factors. The dramatic rise of public expenditure and the inadequate control of government spending were the main cause of the widening fiscal deficit (*OECD, 2010*).

The International Political Economy "think tank" had issued an article on the devaluation of the Greek euro, where it was clearly presented the country's exit scenario of the Euro zone, although temporarily (*Aliber, 2010*). The Greek "product" is considered expensive, since costs are too high. As a result it cannot stand in the globalized markets; it is less competitive and provides no sustainable future. If there is no competitiveness there is no growth, according to the growth models of globalised markets.

On the other hand, high costs lead to a massive current account deficit and among others contribute to high levels of unemployment (*Aliber, 2010*). Unemployment directs to low level of fiscal revenues. A bigger economy makes it easier to absorb aging costs and improves the standard of living for all Greeks. Revenues need to increase and expenditures need to be cut. Greece will face incremental difficulties in placing additional debt not because the past debt, which has already been absorbed by the market, but because of the pressures from implicit future debt under current policies (*IMF, Country Report, 2009*). The longer the government waits to adjust the comprehensive net worth gap, the more difficult it gets, because the shortfall is projected to get deeper every year.

#### 4.4.4 Healthcare

Under this evolvement, healthcare sector was the first impacted. Various reports from global organisations have concluded that Greek healthcare system demonstrated specialties and monopolistic patterns which resulted in raising burdens to the country's deficit (*Davaki & Mosialos, 2005; IMF, Country Report, 2009; Memorandum of Understanding of Specific Economic Policy and Conditionality, 2010; Memorandum of Understanding of Specific Economic Policy and Conditionality, 2012*).

On March 2012, Greek government fully adopted the *Memorandum of Understanding on Specific Economic Policy and Conditionality (2012)* which was the framework including all necessary reforms for the healthcare sector, to be implemented until 2015. The efforts were directed mainly to the control of public pharmaceutical spending (*Appendix D*). More precisely focus is given on (a) the reasonable pricing of medicines, (b) the monitoring of prescribing, and (c) the increasing use of generic drugs (*Appendices E, F, G*). The target placed for the country was to increase the adoption of generic drugs from 32% to 60% by the end of 2013. This target challenged the existed system and was considered a direct intervention in how the medicines provision would be administered. Below, there is an attempt to illustrate how the old and new systems work. This is an eco-map of health operations in terms of pharmaceuticals provision to people (*Figure 7*).

The old system provided an essential independence on pricing and prescribing to the primary system's players, which were: (a) the pharmaceutical companies, and (b) the doctors. Government was actually isolated in identifying health needs and approving budgets originated from the Public Insurance Organization (EOPYY), who had a relative independence in administration and budgeting. The system was rather a flabby one, with lack of controls and absence of appraisals.

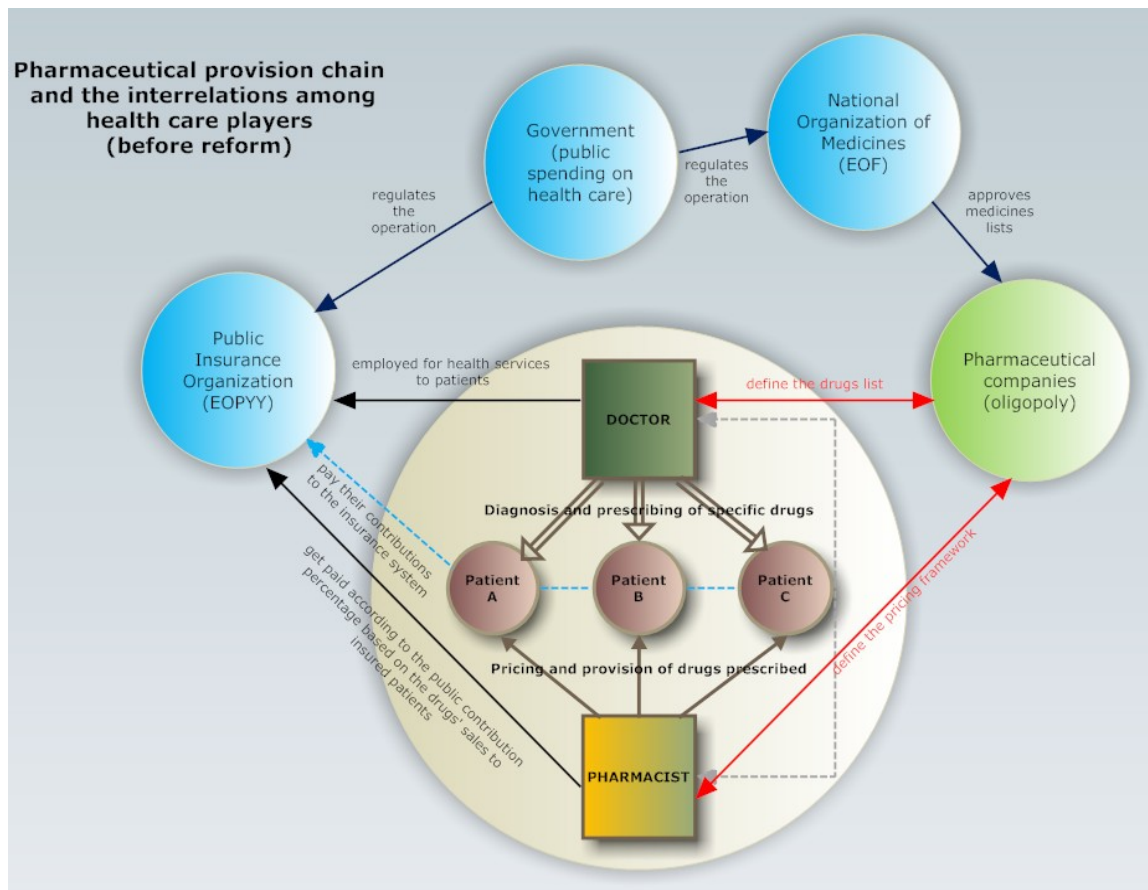


Figure 7. Eco-map of the pharmaceutical provision system – public spending (old system)

For example, doctors acted as decision making agents by defining which type of drug will be given to the patient. This practice though has global and old characteristics. Doctors' behaviour in terms of prescribing is based on information and incentives (Hellerstein, 1998). Such behaviour incorporates the supplier induced demand. When decisions are originated from asymmetric information and agent problem this creates social and health costs. Thus, the decisions are not cost-effective. Nevertheless, in common practice, pharmacists often substitute branded drugs prescribed by doctors with generics that are considered equivalent (Hellerstein, 1998).

In the new law there is an intervention to monitor the prescribing of medicines, and increase the use of generics in order to decrease healthcare spending (Hellenic Republic, 2012). In the next diagram (Figure 8), it is clearly demonstrated the change of roles and controls, as placed by government. Nevertheless, such changes reveal weaknesses mostly originated from the inability of public services to support effectively the altered operations. This stems from lack of budgets which are necessary to protect the new legal framework.

The reformed system introduced a close monitored process where prescribing and pricing is under continuous scrutiny. At this stage, primary market system's players are: (a) the government, (b) the National Medicines Organization, (c) the doctors, (d) the pharmaceutical companies, and (e) the pharmacists. Pharmacists are the ones who will decide the generic in the new system following the government rules. In the case of Norway, pharmacists demonstrate heterogeneity in drugs decision which stems from their professional specialties (Dalen et al, 2011).

The new health system started its operation during summer 2012, with many problems and a series of oppositions originated from the healthcare partners including doctors, paramedical staff, pharmacists and healthcare products companies (Hellenic Republic, 2012; the new Healthcare Law 4052/2012). In simple terms the reform, introduced policies for:

1. Reducing and controlling expenditures in the pharmaceutical sector.
2. Instituting a single universal social health insurance organisation (E.O.P.Y.Y, the National Organisation for the Provision of Health Services).
3. Reforming the hospital sector.

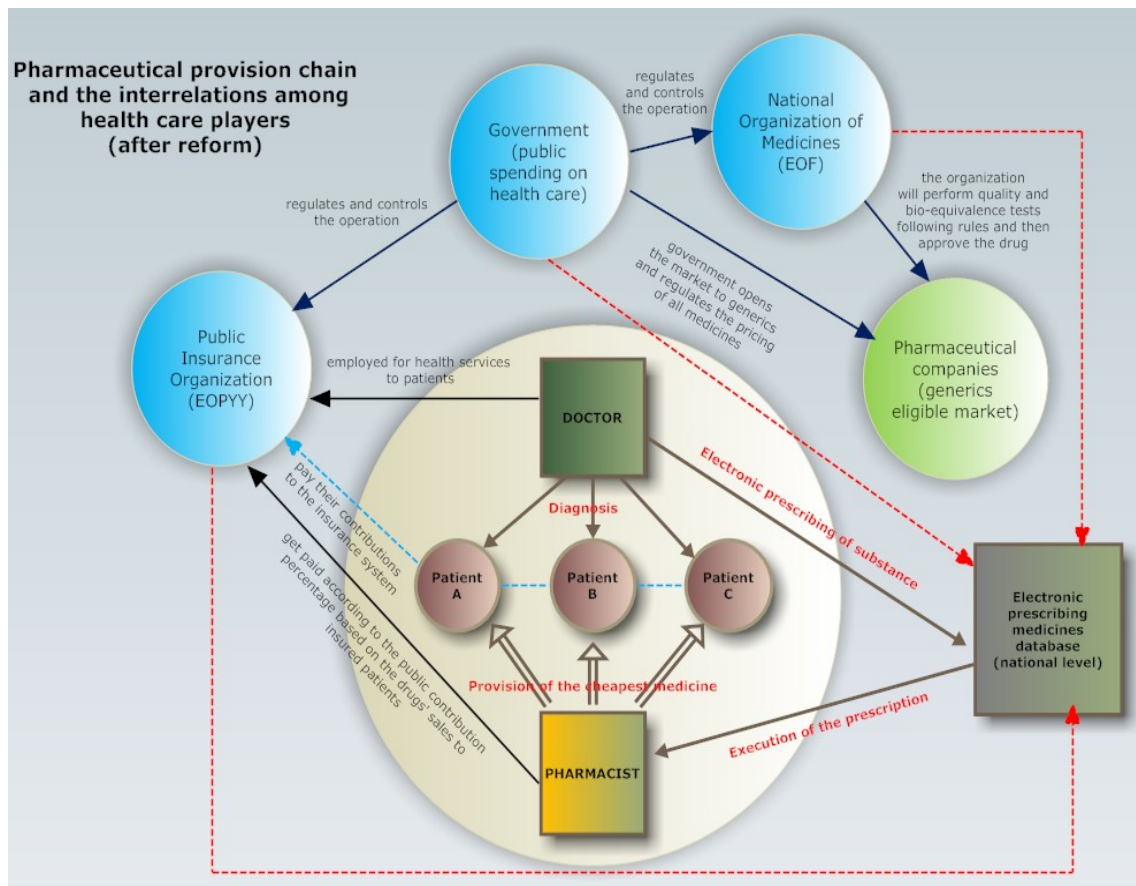


Figure 8. Eco-map of the pharmaceutical provision system – public spending (reformed system)

These reforms were nothing more than the ones already approved in the first Memorandum of Understanding, signed two years ago. Any laws and decrees since then were based on the above three-pronged strategy.

Moreover, some months later, during November 2012, the Government approved the Fiscal Strategy Framework 2013-2016, which went deeper in reforms regarding: (a) the stratification of medical staff's salaries, (not only), and (b) the pricing of logistics' costs and procedures for the supply of medical products and services. Nevertheless, the main structural health intervention for the country is considered the one of the unique Health Association Organisation (E.O.P.Y.Y, the National Organisation for the Provision of Health Services). This was done in the effort to centralise and control inputs and outputs of the system. All transactions should be made electronically and there will be periodic reviews (*Greece, Fiscal Strategy Framework 2013-2016, 2012*).

As it seems, November 2012, was a significant month for the country. The First Review of the Second Economic Adjustment Programme, by troika, was published on that month, as a result of the scrutiny which lasted for more than 4 months. The results were fairly disappointing. Lots of work still is necessary to be done in terms of prior strategies. Public health expenditure should be kept less than 6% of the country's GDP. On the other side, the new structures should be more efficient to maintain universal access to health services and improve the quality of healthcare delivery (*IMF-EC-ECB, First Review of the Second Economic Adjustment Programme, 2012*).

It is questionable though, how this will be achieved in terms of human capital, meaning the medical staff. The central idea of internal devaluation, as discussed in previous sections, affects among others the labour cost. For example the payroll of doctors in public hospitals will range from 1,000 to 1,700 Euro per month (gross income), while the Institute of Labour in Greece, has announced that the amount of 580 Euro (net income) is the poverty's borderline.

## 4.5 Demystifying Complexity

### 4.5.1 Using Complexity in practice

There is no ultimate model to suggest in the effort to use complexity as a one-size-fits-all strategy. On the contrary, the intention is to combine and apply practices taking into account what various researchers and practitioners have identified so far. Therefore, for each complex situation there is a critical path to follow by joining its points to reach the end-result.

This practice could be applied both for independent or broader cases of complexity, probably not only in healthcare. Recognising the specialties of each case, the practice will include the following three-pronged cyclical strategy:

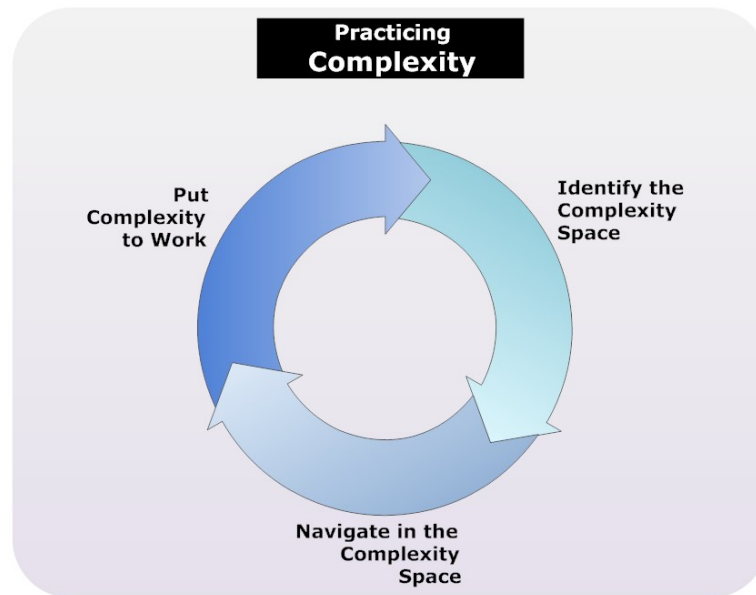


Figure 9. Practicing Complexity (perpetuity)

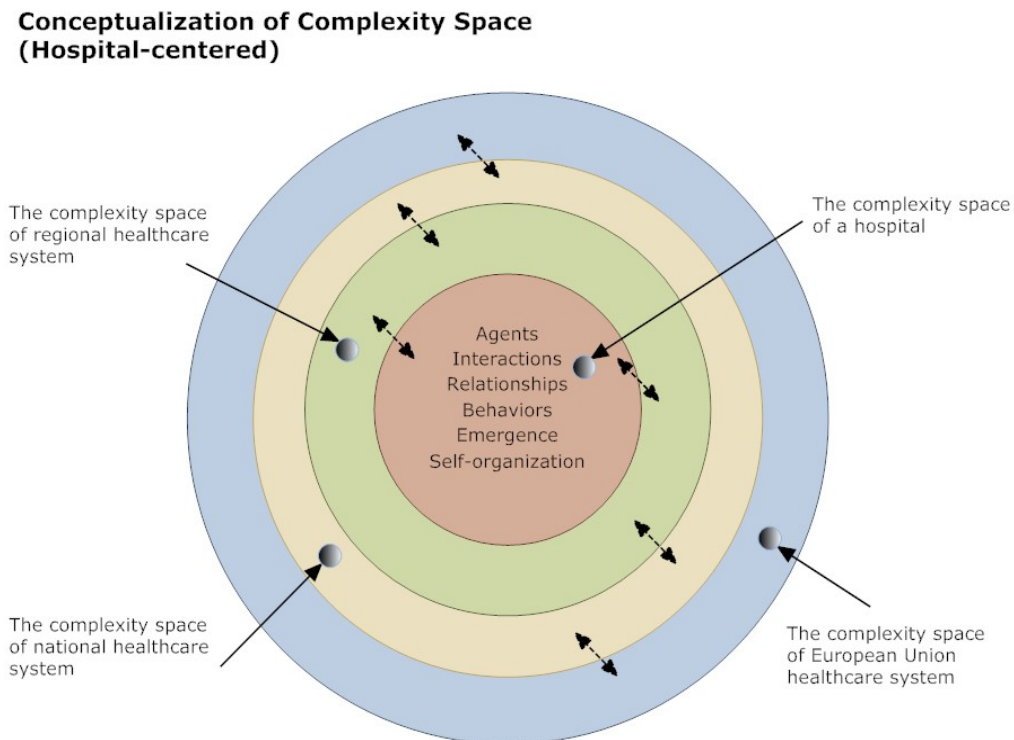
Zimmerman et al (1998), claimed that machine-metaphor is not adequate, in explaining complex practices. The apparent compressions of space and time, as well as the series of thoughts presented in the first section of this study, verify that there are strong connections of micro and macro phenomena. Likewise, complexity seems to incorporate biology and technology.

### 4.5.2 Identify the Complexity Space

Characteristics of complexity can be used as a guide to start framing the complexity space. Although complexity incorporates perpetuity, it is difficult for a human mind to capture something obscure unless this has certain attributes. When practicing complexity there are certain elements to discover, and can help in this attempt.

- Who are the central agents in healthcare CAS?
- Is a stakeholder analysis adequate to identify them?
- Which are the patterns of interaction among them?
- Is there any trust among them?
- Are there rich connections among agents?
- What is the level of connectedness (interconnections)?
- Are there any barriers?
- Which are the patterns of behaviour? Who defines them?
- Which are the interdependencies?
- Does the ability of alertness exist among agents to identify constant changes?
- Does the managerial ability exist to administer highly uncertain emergent properties?

The above could outline the framework within the system operates at present time and provide a possible space that complexity exists. It is difficult to determine boundaries of the system in complexity, since any attempt may raise ambiguities (*Psychogios, 2011*); but it would be practical to conceptualise the system in concentric circles in order to prioritise in a sense the components that are considered more important per case (*Figure 10*).



*Figure 10. Conceptualising the Complexity Space (in healthcare)*

Identification is imperative for realising and accepting the space of interest, the arena where practically the system evolves.

#### 4.5.3 Navigating in the Complexity Space

*Easton and Solow (2011)* have identified three key components to set the conditions for co-evolving in complexity. These are: (a) the Healthcare Ecosystem, (b) the Impact Variables, and (c) the Adaptive Change Cycle. It is almost inevitable to navigate in the sector unless the above are put into practice and serious consideration.

Healthcare Ecosystem is the embedded dimensions of the sector including human capital. To be more precise this includes the underlying patterns and context in which the healthcare sector operates. It is necessary to recognise them prior to any introduction of change. The aim is to perform the move from current to desired state with greater agility and fewer surprises.

Further to that, another weak link is the identification of variables that are more readily influenced (impact variables). This could be revealed during the study of smaller changes and how these take place within the sector. Such tactics help in uncovering patterns and in appreciating current dynamics. According to *Easton and Solow (2011)*, there are seven impact variables which are the components of the activity in the sector (*Figure 11*).

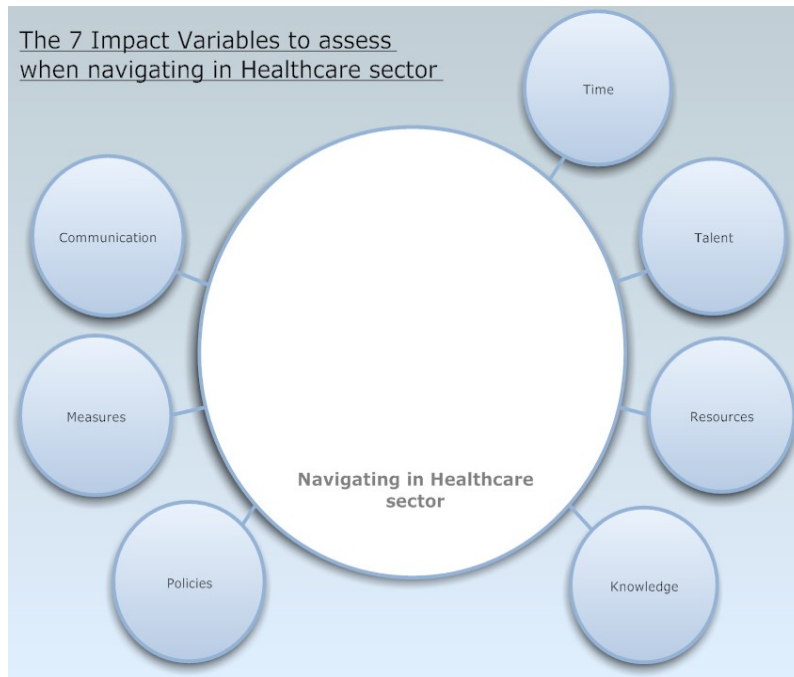


Figure 11. The 7 Impact Variables when navigating in healthcare sector

The intended or unintended affection in any of the specific variables influences the activities within the sector. Therefore, it is crucial to assess and monitor each one, in case of a change.

The third key component is the application of adaptive change cycle. Co-evolving with complexity implies a cycle of acquisition, adaptation, application, results and learning. This is a dynamic multi-process which needs to be accommodated in an organisation especially when changes are about to take place (Figure 12). Changes could be compared in regards to these steps between prior and new-introduced situation.

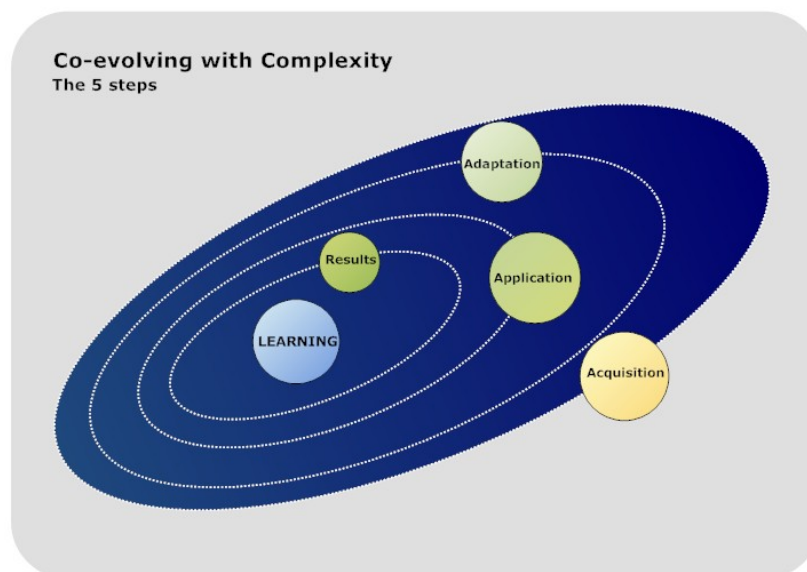


Figure 12. The 5 steps for Co-evolving with Complexity

This is an infinite operation, which starts from acquisition and ends in learning, as the ultimate component for performing a change. However, it is questionable if learning corresponds to knowledge. Here stands the difference between learning and knowledge. According to *Simmie and Martin (2010)*, economies are based on and driven by, knowledge. Knowledge is never static but constantly changes. There is a certain distance from knowledge acquisition to knowledge assimilation and how this is applied in practical terms. Therefore, the search of any equilibrium in a healthcare organisation is an on-going process which involves knowledge and learning. Living in the knowledge era successor of industrial age, new emerged structures come on top, especially when new knowledge is acquired and this is accompanied by capital accumulation. This directs living entities in performing faster the adaptive cycle, jeopardising their cohesion and questioning their resilience limits, close or far from equilibrium (*Figure 13*).

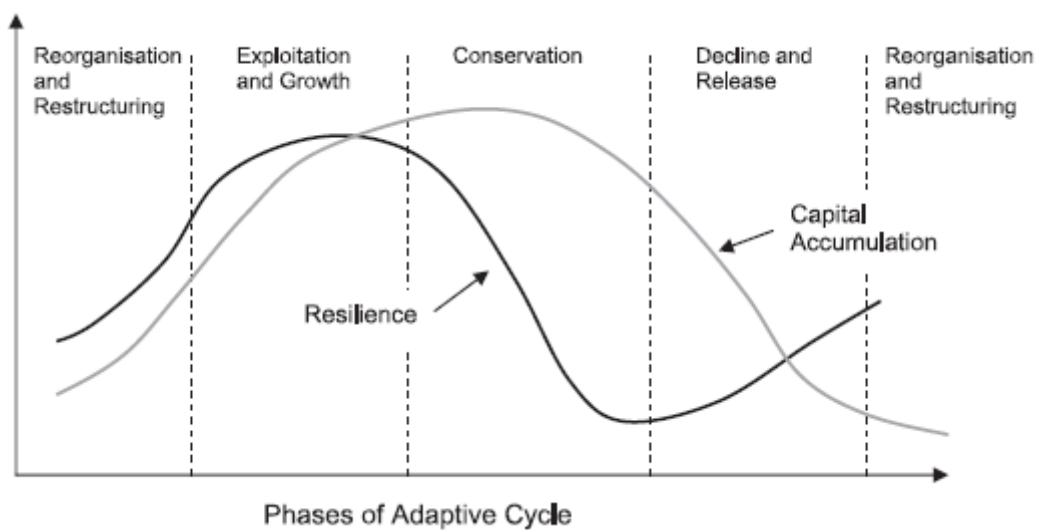


Figure 13. The phases of adaptive cycle (through resilience and capital accumulation)

(Source: Simmie, J. And Martin, R. (2010) The economic resilience of regions: towards an evolutionary approach. *Cambridge Journal of Regions, Economy and Society*, 3, p. 34)

Resilience is related to capital and both their progress follows supplementary paths during the adaptive cycle. When the process of capital accumulation decreases, resilience follows an increased path; it reaches its peak time during the reorganisation and restructuring phase of the entity. *Elliott (2009)* highlighted that the process of knowledge transfer and assimilation, is a key component for the learning framework in an organisation. He presented a mapping of this process which is given in *Appendix H*. Although local forces or other barriers block learning, learning from crisis directs to knowledge acquisition that depends on agents, and how they will handle and acclimatize it- which ultimately may be translated into new norms and practices or plain history. This is the phase where remembering or forgetting history plays its role.

Gaining knowledge on complexity is related to acting based on limited knowledge and ambiguity (*Keune, 2012*). Navigating in a specific complexity space, such as healthcare, imposes dealing with ambiguities and different types of dynamic behaviour, but towards rebound and sustainability.

#### 4.5.4 Putting Complexity to Work

*Easton and Solow (2011)* concluded that since you cannot control a complex system you have to understand how it works, thus penetrate in its DNA. Therefore, it is necessary to adopt the mindset where patterns replace predictions and adaptation replaces control. Such strategy incorporates the observation of conditions and the focus on patterns of interaction rather than reified structures. As *Sweeney and Mannion (2002)* discussed, it is imperative to scrutiny the healthcare system by investigating the coming together of the different elements that share the environment, check their interconnection and reveal their purpose. They have identified complexity as one of the four generic types of dynamic behaviour that a complex adaptive system exhibits (*Figure 14*).

### The 4 Generic Types of Dynamic Behavior in Complex Adaptive Systems

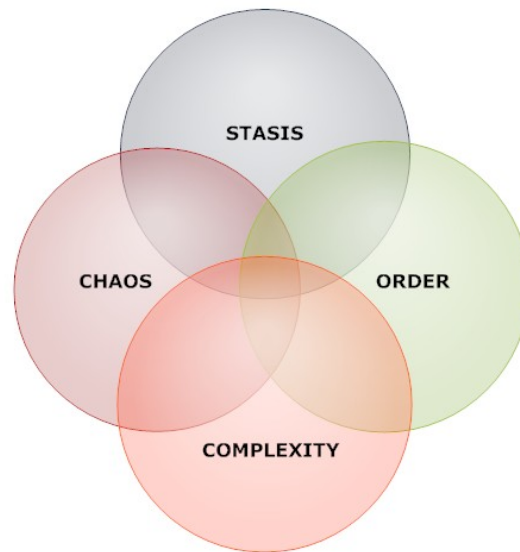


Figure 14. The 4 Generic Types of Dynamic Behaviour In Complex Adaptive Systems

It is important to identify where the system stands and “play” with the corresponded dynamic behaviour through emergence and towards self-organisation afterwards. Although it is not feasible to control, it may be practical to affect.

**Stasis**, actually depicts the absence of dynamic behaviour, while **Order** depicts a behaviour that is predictable, linear and stereotypical (*Sweeney and Mannion, 2002*). **Chaos** on the other side is a behaviour which appears randomly but with hidden order and determinism. Further to this, **Complexity** is the dynamic state, which operates as mediator between order and chaos. As discussed in earlier sections, in complex adaptive systems, agents have a degree of independence in terms of their possible actions. Adaptation and re-organisation cultivate a fertile ground to produce emergent behaviours. Such behaviours tend to affect the system’s attractors, which accommodate the practice of how things used to work so far. Thus, the heart of the healthcare system is that attractors. The way these entities accept, and react to external stimuli defines the behaviour of the whole system.

When changes are introduced, such entities tend to focus on what is going wrong in the system during the transition phase; this is considered as a reaction of survival, trying to prolong their status and avert risks. On the contrary, the healthy powers of the system focus on what succeeds and investigate why this results so. This is a method to recognise the positive powers that contribute in performing a plan effectively. Moreover, pushing emergence of new agents and introducing new patterns of interaction and relationships, this in extent, moves forward self-organisation processes and the system follows the lock-in path of change.

The way that the system deals with difference, defines its evolution in practical terms. One tactic is to collect and review different viewpoints and accept criticisms. This is a way to test the endeavour and define the ontological boundaries of the complex picture that is presented. Checking the robustness of our picture stems from applying correctly the practice of integrated assessment, focusing on stakeholders. This assessment could check four parameters; (a) ethics, (b) the notion of power, (c) who are the actors, and (d) which factors are important and relevant. By affecting one of the above, this might raise changes in structures.

Diversity is an important characteristic in healthcare complexity. The diversity of agents brings heterogeneity which could be seen as an advantageous potential to exploit any stemmed strengths. This diversity supports sense making, a useful strategy to follow for complexity. Sense making is the ability to observe, to capture, to process information, to follow rules and to connect and share with other agents. Therefore, it requires interaction. This strategy cultivates a collective mind among agents who - in this way - can deal better with emergence and self-organisation. Making sense of what you know in complexity is the replacement of decision making in

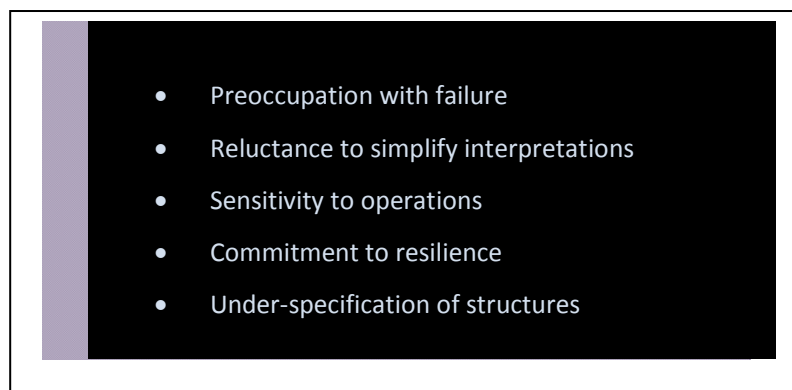
management, and stands forward from knowledge and learning. The capacity of learning can replace control in such a system especially when this endures through time. Time is a key factor and is strongly linked to the non-linear trajectory of the complex system.

Non-linearity is often the cause of time-dependent events (*McDaniel and Driebe, 2001*). In addition, the system has encrypted memory which is expressed with predisposition. This is another hidden ingredient of the healthcare system. Predisposition is a key factor either in enabling or inhibiting certain patterns of behaviour. The path through which agents have unfolded their capabilities to learn and act trying to co-evolve with the system creates a historical framework. This is history for the system and is useful for the newer agents to retrieve models of action and thinking ways. Nevertheless, knowing whether to stand on the remembering or forgetting side of history is a talent which could be proved saving in dealing with complexity.

Predicting the future is uncommon and cause-effect relationships are no longer in the centre of coping strategies. In thinking about the future, scenario planning still may help a system to deal with uncertainty but not with unknowability. In the first case, possible scenarios are given and there is uncertainty in terms of which will emerge while in the second case, there is no ability to define scenarios. In complexity, such cases could be confronted through bricolage. *Begun et al (2003)* defined as bricolage: the ability to make creative and resourceful use of whatever materials are at hand, regardless of their original purpose. This hides the ability to create positive outcomes from what emerges, through confusing and mixed-up situations. In other words, this means to create something out of nothing (*Zimmerman et al, 1998*). Healthcare system is a complex system of interconnections which accommodates social processes which in extent shape a significant part of its own environment.

Thinking about the future in complexity presupposes learning to deal with surprise. However, surprise drives evolution such as utopia motivates creation. Therefore, working with ambiguity in a system with the characteristics that discussed in previous sections, cannot be productive unless there is knowledge capacity, and innovation. Acute occasions demand analogical responses. Dealing with surprise requires improvisational behaviour. In complex adaptive systems loose-tight coupling is an attribute experienced many times. Traditional ways of reaction are not enough, as they need to be supplemented through intuition guiding actions. Agents could build a basic form of action using their instinct, knowledge, skills and risk. This is necessary especially in chaos-order-chaos phases. Action could focus in small inputs which always provide room for learning and development. In healthcare the essence of the system nests in relationships not in pieces, therefore quality of connections is important. Especially in healthcare complexity means interdependencies and the range of agents' influences. Taking action presupposes to find ways in: revealing new agents, unleashing hidden powers and creating the conditions for new structures. The widening of systems' actors is expected to resolve healthcare issues.

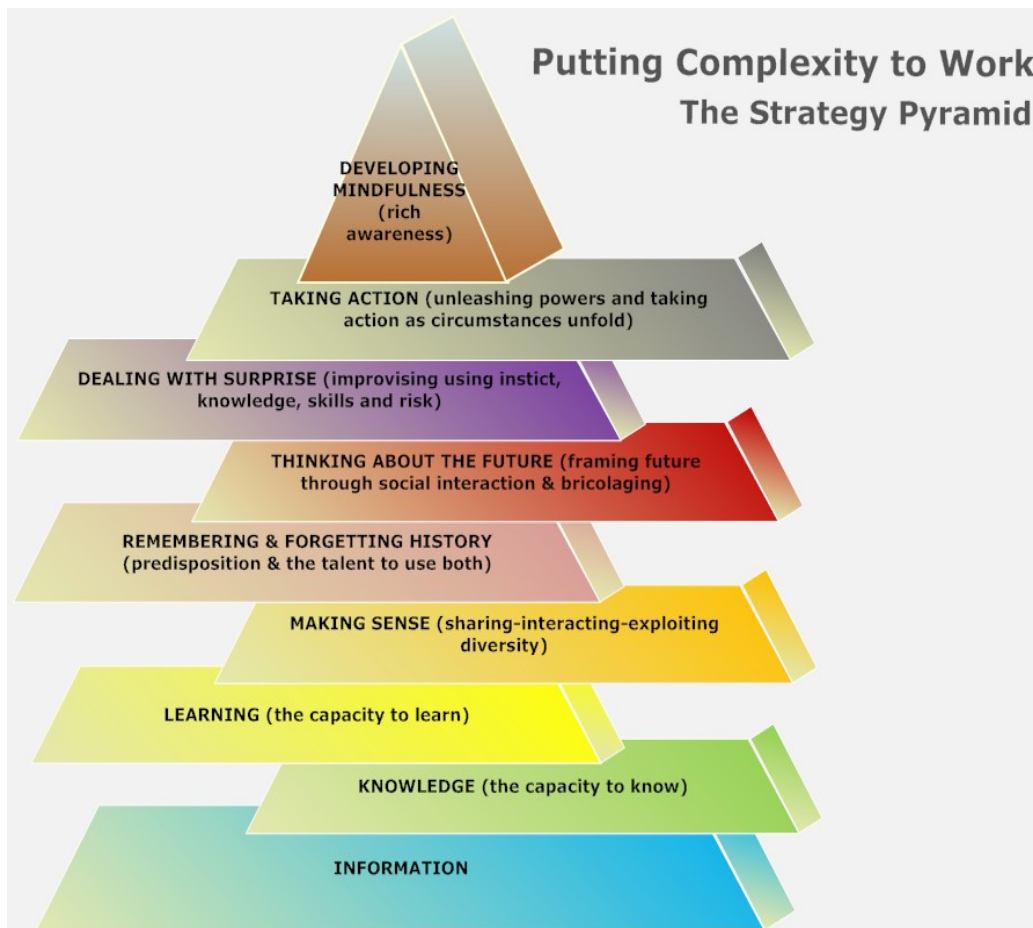
It is agreed that CAS cannot be controlled but there is a dynamic to administer effectively the predetermined complexity space; to achieve that, there is a need to develop a stable cognitive process. This is called mindfulness (*McDaniel and Driebe, 2001*). It is the capacity to induce a rich awareness of discriminatory detail and a capacity for action. It is necessary to apply continuously a set of processes as given in *Figure 15* which are supported by the acceptance that survival means a struggle for alertness.

- 
- Preoccupation with failure
  - Reluctance to simplify interpretations
  - Sensitivity to operations
  - Commitment to resilience
  - Under-specification of structures

*Figure 15. The processes for developing mindfulness*

Attention is another function, as important as, information in CAS. Healthcare systems do not stand in one-world but in a matrix of co-evolving worlds within which they must function. These processes are key practices where the mindset is the heart and observation is the blood for the system to survive. The observation should be done from the inside perspective, as agents of the system and not as external observers. Observation remains in the centre of behavioural patterns and is the essential component of the future non-linear interactions causing emergent behaviours.

In the next figure (*Figure 16*), there is an attempt to represent what have been discussed so far in the section; these are the strategic components, necessary to let complexity to work.



*Figure 16. Putting Complexity to Work (strategic components)*

Such components form a strategy in dealing with surprise and unknowability. Their presence is imperative. Lack in any of them diminishes the power of agents to affect the evolvement of the complex system.

#### **4.6 Conclusions and link with the study**

The characteristics of Greek recession were rather the mirror of its internal paradoxes. Greece is still considered a unique case since it is the first EU country which suffers such consequences although it is part of a strong group. Its economic history proved that the problems raised were not new. However, the country was always receiving external help in similar occasions in the past, but now the time changed and new powers have been emerged in global terrain.

Global rules and geopolitical relations are complex and cannot be confronted with old traditions. Economic recession affected healthcare sector and provoked a series of changes that are still

under construction. Society is still in shock and different groups are left in their own perceptions about the possible futures. The old-mechanistic view of thinking and acting is obsolete. Modern literature has proven that a more holistic view is necessary to be adopted and a different mindset to be diffused into locals.

Complexity and complex adaptive systems are already part of daily routine and the study on their characteristics is more important prior to any plan. The examination on mechanisms that affect behaviours (attractors), the groups (agents), the new and different members (emergent dynamics and diversity), the ways that healthcare people co-exist and co-evolve, are some of the objects of this work. There are ways to embrace complexity and enable a system to survive and succeed.

Current study aims to realise what is the perception among healthcare groups in terms of complexity and future outcomes, given the case of restructuring and changes imposed. It is important to identify, at least from the selected sample where the sector stands. This does not necessarily imply that we have identified a literature gap rather than a practical representation of living experience among peers.

# 5. Methodology

## 5.1 Introduction

The examination of current subject demonstrates difficulties; embedding healthcare service in a complexity context is considered a challenging case to analyse; therefore it was decided to apply an exploratory humanistic research. In this chapter is discussed the approach that we have applied (section 5.2), the data collection method and instrument (section 5.3), the sampling (section 5.4) and the data analysis (section 5.5).

Examining perceptions and analysing experiences of participants incorporates dilemmas in the translation of meanings.

## 5.2 Approach

The study followed a qualitative analysis. Besides, there were various quantitative approaches that already have demonstrated important results on aspects of the sector. Also, healthcare sector, as discussed earlier, is under tight control which is stemmed from health economics issues.

It was our intention to investigate the human experience as it is lived, felt, undergone and experienced by its actors. This implies the attempt for searching contents and patterns that current situation raises and provides ideas for further research. The approach is exploratory and humanistic. Healthcare complexity accommodates strong relationships and a reality which is constructed by its participants. Therefore, the challenge for this study was to generate text in grabbing patterns and perceptions from participants through collection process. This is mainly a process which focuses on aspects of human activity. The strategy was to observe and discuss healthcare complexity as a social phenomenon and consider its people as part of this social context.

## 5.3 Data Collection

The research instrument for the study was the semi-structured interview questionnaire with open-ended questions aiming to stimulate further discussion and reveal information sourced from participants' expertise and daily practice.

The initial questionnaire was in English language (*Appendix I.1*). However, since the survey was focused in the Greek case, and the target group was people who worked in healthcare sector, it was considered necessary to produce an additional questionnaire in Greek language (*Appendix I.2*). Another reason was that initial questions were too scientific in English language, as the questionnaire accommodated complexity's terminology which could be difficult for the respondents to understand easily. The questionnaire in Greek language was edited under a simplistic approach trying not to change meanings. So, respondents had access to both. It was crucial to secure that respondents should have a clear understanding of what was going to be discussed. The translation of meanings and comments during data registration was done by the author of the study.

Interview is the most suitable method of data collection, especially when the focus of the research is to generate qualitative data (*Whiting, 2008*). The bottom line in interview is reflexivity, which in the case of healthcare research may be proved valuable. Reflexivity could be applied during the whole process of data collection, since this will enable values, assumptions, and prejudices and influences to be acknowledged. To help this process, we have built interview questions as playing cards trying to stimulate interaction for discussion. Nevertheless, these were not used, as it was primarily planned, but may help in future research as an additional tool (*Appendix I.3*).

The rich framework of literature as discussed in the study demanded a more challenging interview type to be followed since the aim was to reveal the insights of healthcare experts. Therefore, it was necessary to establish a two-way communication with interviewees and secure a convenient environment where they would feel comfortable to discuss and share their opinions, thoughts and knowledge. This interaction fit to semi-structured type of interview (*DiCicco and Crabtree, 2006*). Although this follows a predetermined path, semi-structured interview demonstrates loose structure of open-ended questions, which aim to explore the area rather than get specific data. This method has the pitfall of not reaching a clear conclusion, if emerging insights are not recognised properly. For this reason, the key function was to identify concepts and variables that would emerge as different from what have been predicted (*Britten, 1995*). Questions intended to be clear, sensitive and neutral. They were based on: (a) behaviour or experience, (b)

opinion or value, (c) feeling, (d) knowledge, (e) sensory experience, and (f) background details, of the interviewee (Britten, 1995).

Initially it was scheduled to take 5 to 10 personal interviews, from professionals in healthcare sector. The interview included 20 open-ended questions which were based on research objectives and research questions' framework as presented in the beginning of this study. Baker and Edwards (2012) in their research about how many qualitative interviews are enough, they have tried to identify the figure asking a significant number of experts. This varies on the nature of research, in terms of what this intends to reveal.

The process included the options of either personal interview or the respondents to download and fill the interview questionnaire. The second option proved more convenient, since it enabled them to think, reply and raise further issues for consideration. Many of them got back for reconsideration after first thoughts. The estimated necessary time was 30-50 minutes.

Participants had the opportunity to visit in prior, the personal webpage of the author, where both questionnaires (English & Greek versions) were uploaded for helping respondents in getting an idea. The data collection process lasted almost three months.

#### 5.4 Sampling

Regarding the sampling process, based on the research objectives, it was recognised that this subject demands a different approach due to the specialties of the sector. The initial aim, in regards to selection of interviewees, was to include in the study the opinion of various experts from healthcare sector, and from different perspectives, specifically: (a) the medical, (b) the operational, (c) the market, and (c) the government perspective. Therefore, the focus was to include respondents from the following areas (Table 1):

• Government Officials (national, sub-national, local) (GOVERNMENT)
• Medical staff (doctors, nursing staff) (MEDICAL)
• Technical professional staff (paramedical, lab assistants) (OPERATIONAL)
• Administration and supportive professions (OPERATIONAL)
• Pharmaceutical companies, pharmacists, medical equipment companies (MARKET)

Table 1. Sampling categories

The initial target was to achieve the participation of two experts from each area in order to reach the maximum of 10 personal interviews, as mentioned earlier. Finally the number of respondents was 37 professionals. People in the sector seemed willing to participate in the survey, in general, except of little cases that denied. The final sample covers four of the five areas. We could not reach governmental staff. Respondents come from hospitals, both private and public, and the market. Moreover, sample demonstrates big diversity since it includes people from various areas of expertise in the sector (doctors, nursing staff, administration, technical and supportive staff, pharmacists, medical companies etc.). Sampling was convenient and judgmental.

#### 5.5 Data Analysis

Interview questionnaires with open-ended questions demonstrate specialties and difficulties in terms of interpretation and extraction of results. In general, qualitative data analysis lacks of specificity while sometimes the collected data give the sense of irrelevancy. On the other side, such information is rich and is considered crucial when there is a necessity to examine social context. Healthcare states at the base of governance for a society, thus studying a natural environment, especially when this incorporates service experience, may be proved useful. The sector is requested to cope with radical changes under extreme crisis situations. Therefore, instead of quantifying - and taking into consideration the complex characteristics of the sector, as discussed earlier – it was our attempt to apply a humanistic exploratory approach. We consider that experiences cannot be treated similarly, although they could be matched in patterns for the benefit of the study.

According to *Polit and Hungler (1991)*, qualitative research is based on the premise that gaining knowledge about humans is impossible without describing human experience as it is lived and as it is defined. Besides, in align to the research framework of the study, reality is constructed by participants (agents) while reality and social relationships need to be explained by the actual participants (interdependencies, attractor patterns, heterogeneity, reflexivity, information asymmetry). Therefore, data analysis is focused in meanings rather than measurements, although there is an attempt to give a quantitative concern, to enrich the presented findings.

Data analysis remained orientated to coding as this is considered the most significant element of qualitative approach. The method of interview followed enabled the researcher to improve it, while being in the process of research. In addition analysis started immediately and progressed incrementally, and provisional concepts were created. Important findings were easily matched with research objectives and this was proved a strong testing of research's progress in general.

Regarding coding, it was selected the thematic-content analysis. This type of analysis examines recording patterns (pattern-matching) in an attempt to categorize, compile and organize interviewees' personal opinion and experience. *Lincoln and Guba (1985)* raised four variables to exist in order for a study to have quality in its qualitative research: (a) credibility, (b) transferability, (c) dependability and (d) confirmability. All of them have a common characteristic. They try to protect the objectivity of data and the study in extent. Moreover, thematic analysis has a key process which is data familiarization. This process prerequisites the researcher to be familiar and to do in person the whole research. Both factors have been accomplished in current study. It could not be done otherwise, since interviews offers progressive modifications in the light of knowledge and ideas. In addition, due to that data were contradictory and respondents have different opinions, content analysis was the method which helped in interpretations of conflicting opinions (*Graneheim and Lundman, 2003*).

*Brown and Clarke (2006)* defined as a theme the capture of something important in the data in relation to the research questions which represents some level of patterned response or meaning within the data set.

In order to secure the coding process, it was considered useful to perform interview results' taxonomy (thematic analysis taxonomy-*Appendix M*), as a mean to identify and capture themes. Such technique enabled the study to categorize and unitize data. Then, it was easier to apply matching and comparison, in an effort to find variations or identify themes. This process operated towards research questions within research framework as this was initially decided. The identification and discussion on themes was the mediator to reach answers.

In *Appendix M* is given the registration of raw data from each interview, being translated from the original Greek language, as interviews took place in Greek language. In continuous, these data were categorized according to the 6 groups of research questions' framework. In *Appendices N1 to N6* are given the tables which were produced for each research category. Taxonomy helped the survey in the parts of content analysis and patterning.

## **6. Ethics and Ethical duties**

Ethical issues were a priority for this study. Since interviews intended to bring forth and discuss a series of thoughts, objections, inside information etc., of participants, the study focused on: (a) confidentiality and (b) respect for the potential vulnerability as may be derived through the interactive process. This means that interviewees' opinions will not be exploited for personal gain.

Protection of study's participants' remains in the centre of ethical duties, and this is reflected practically through anonymity, privacy and destruction of data, upon publication of this study. Moreover, they were provided in prior with adequate information about the nature of the study. The expectation was to ensure effective communication on the intent of the investigation.

## 7. Findings & Discussion

The experience of collecting information from different groups of the same sector was essential and constructive. Moreover this was significant since nowadays, the sector is placed in the centre of turbulence having to confront with radical restructures while being in the transitional stage of self-evaluation and reposition.

Data analysis followed the research questions' framework, as this could be helpful for the discussion on findings and any future suggestions.

### 7.1 Information Asymmetry

From data analysis it was extracted that not all participative groups have the same accessibility and power over information in healthcare sector. This means that some agents have more power to administer and manipulate the end service offered. This is called information asymmetry. And this exists in the sector according to responses. In the era, where information is capitalized and is object of trading, it is imperative to examine this characteristic in healthcare system of the country, trying to assess respondents' views and perceptions. According to a respondent "all involved groups have same kind of inside information" while another declared that "doctors and pharmaceutical companies have inside information since they both form it".

Adopting a more strict and commercial attitude, in information asymmetry, there was an effort to identify who is the boss in the system. Which is the dominant group and who is the attractor that remains in the centre gaining power and affecting any progress? Through the process of identifying, prioritizing and revealing, we have concluded in the strong agent-based nature of the Greek healthcare system, which in current situation is unbalanced, since there is one dominant group. Prior to this conclusion, respondents have identified a remarkable number of participants as agents in the complex healthcare system. Below is given the table (*Table 2*) including the agents (groups) in the sequence of the more often appeared in data analysis (a top-down approach where the more discussed is at the top).

Groups in Greek healthcare system	
1.	Doctors (University, Clinical, Private, Hospital, Insurance).
2.	Nursing staff.
3.	Administration and Administrative staff specifying Hospitals administration, Presidents and Councils of Hospitals as well as Public Insurance Organizations.
4.	Pharmaceutical companies and the network of distributors, wholesales (medical and pharmaceutical products).
5.	Pharmacists.
6.	Paramedical staff (first aid staff, lab assistants, and other supportive specialties, therapists).
7.	Other administrative supportive staff such as: cleaning services, cooking, safety and security, technicians.
8.	Other health supplementary specialties such as social and health workers, and similar professions who work in the system.
9.	Ministry of Health.
10.	Government, governmental legislators and political parties.
11.	Unions & professional associations.
12.	Patients.
13.	National Organization of Medicines (EOF)

*Table 2. The Groups in Greek healthcare system*

The above table reveals how the respondents perceive the sense of participating in the system. Although the data came from diverse groups, it is worthy to mention that awareness of State's penetration in the sector remains low in people's mind. Healthcare system in Greece means primarily medical groups. Possibly this is because through time, only these people were the ones who undertook full responsibility for any progress. Another significant point is that unions stay low

in the list, although there is a strong attitude towards unionization among professionals. Perceptions and views are varied regarding the cost-benefit relationship of unions' existence, and whether these finally helped the sector.

The views on prioritization of powers did not surprise. This is clearly a doctor-centered healthcare system where other groups position themselves depending on their relation and connectedness with them. It is interesting that the survey raised the issue of "different" doctors, implying the subgroups of doctors and the corresponded powers they can exercise over system. There was an effort to place hospital doctors higher in internal hierarchy than others. Nevertheless, this is a slightly blurred zone, since common practice in Greece reveals that doctors may have multiple roles. This is how operates the ethical climate, which is a strong characteristic of complexity in the sector.

Obviously, such multitask-orientated environment, positions them in a unique and distinct place in healthcare. Below is given the table which gives the prioritization of groups, in the row of power, as extracted by respondents' opinions.

<b>Prioritization of groups in terms of role and power in Greek healthcare system</b>	
<b>1.</b>	Doctors (including all subgroups giving the fact that in practice they may be part of different subgroups at the same time).
<b>2.</b>	Nursing staff.
<b>3.</b>	The building block of pharmacists and pharmaceutical companies - pharmaceutical distributors (wholesale & warehouses of medical and pharmaceutical products).
<b>4.</b>	The administration of Hospitals and people in administrative posts in general.
<b>5.</b>	Ministry of Health, Government, European Union directives, Politicians and Political Parties.

*Table 3. The most powerful groups in Greek healthcare system*

Nursing staff is considered a significant group in the sector. Being the direct co-operator of doctors and staying in the middle between them and other groups, it demonstrates a significant proximity to decision making centers. This is probably due to the nature and role of their job description. In other words, they are the operations department, undertaking various responsibilities, accomplishing difficult tasks on daily basis and many times are obliged to administer difficult situations. As a result, they develop problem solving and negotiation skills. They have both medical and managerial role which from time to time unavoidably raises contradictions. Discussion on this issue with respondents undermined the contribution of unions as a different power-group.

Healthcare people claim that unions, by themselves, do not form power groups. These exist supplementary. The above five groups are considered the major players in the system. Strange though that governmental power is considered low again. Taking into consideration current case of restructure in the country, it is weird to expect that the 5<sup>th</sup> powerful group will prevail and impose changes that are top-down driven. Beyond practical terms, the country, as discussed in literature, is experiencing a major restructure therefore building blocks, information and relations are expected to play primary role in the upcoming new structures.

From data analysis it is extracted that the first three groups create a monopolistic structure in terms of information administration in the sector. Information is diffused and shared through certain channels in a way that there are asymmetries. At this stage, some respondents were not clear or have a clear view whether these are monopolistic phenomena. However, the existence of monopolistic situations is not necessarily a result of imposition. There are various parameters that could enable or discourage them.

Respondents agreed that more use of technology will help, but they were not certain about the format of the new information framework. Although it was identified the doctors' privileged accessibility in building information, it was well admitted that they distribute their findings in cooperation with various and different networks.

Furthermore, monopolistic situations are identified in other sectors as well, where the closer you are in decision making centers the more inside information you acquire. The degree of technology acquisition and its effective adoption defines either the release or restraint of information to all involved parts.

Information asymmetry exists wherever and whenever technology suffers from paradoxes and paternalistic models ("I protect you-You protect me" attitude).

## **7.2 Relations and Interdependencies**

Healthcare sector, due to its nature and significance for the society, provides a fertile ground for the development of relations and interdependencies, which is rather more intense comparing to other sectors.

It is not accidental that powerful groups emerge from relationships' networks. In complex systems dominant groups are the ones which definitely have succeeded in creating and preserving mutual benefited relations in strategic and visionary ways. Such relationships are not necessarily negative for the system. They do play significant role in system's evolution and they do give certain characteristics, when we are trying to examine them holistically. It seems that Greek healthcare system is rather built on relations and interdependencies and not on clear organizational contexts. All respondents highlighted undoubtedly that relations do exist among groups and they do affect them. According to one of them "since the staff is obliged to cooperate and interact, it is inevitable not to exist relationships". More respondents declared that these are important and necessary for the progress of the system. Besides, in a human social system, to work, there must be a framework of relations and a social coding. Nevertheless, these relations become interrelations and in extend interdependencies. Medical staff demonstrates close binds to pharmaceutical companies due to their common ground in terms of prescribing medicines to patients and doing research. Pharmacists experience same direct binds with pharmaceutical companies. Doctors work closer to nursing staff and this, by itself, creates stronger affiliations. On the other side, in general terms, such binds could be found in other professions and sectors as well.

However, these relations are very important among agents as long as these are acting for the benefit of the sector, ensuring consensus towards certain targets. On the other hand, relationships direct to stratification of groups and people. This introduces a leader-follower model which under various circumstances resulted negatively for Greece. In this situation, the weaker groups having accepted that they are in backseat were waiting for things to change.

But, these relations helped in a way the knowledge progress and assimilation among groups no matter if this sounds odd. For example doctors having the financial support of pharmaceuticals developed research and produced high achievements. Consequently, the progress was rather distorted but with significant achievements as well. Not socially-orientated but science and medical-centered. This is like when focusing on targets, there is an increasing possibility of missing essential characteristics that are fundamental for the survival, even if you reach your targets.

Relations patterns are defined by the system. May be the groups that are responsible for relationships and prospective interdependencies but the system itself, defines the frames and the limits. Almost all respondents, being originated from diverse groups, have concluded that reference point is: the system. But who comprise the system. When the system is medical-centered, obviously dominant groups acquire the power to manipulate and apply accordingly relations patterns. A group-centered approach helps castes, and privileged members-leaders to reproduce specific models and restrain hidden powers keeping the system in hibernation. This has a rational and is not surprising. Dominancy and patriarchy was a usual combination of managing communities through time. This appeared as a natural tension in humanistic evolution. Such approach establishes mechanisms and norms trying to penetrate and embed its perceptions to group members. Respondents declared that the Greek healthcare system is organized in a paradoxical way which enables distortions and reveals weaknesses. Relations may create interdependencies, but what happens in the occasion of unbalanced relations. Therefore, this set of distorted principles when diffused all over the system, brings forth unproductive dependencies and unfair equivalences among members and groups.

Changes in relations patterns could enable changes in the system and vice versa. At this case, interdependencies play ultimate role in terms of how and how much emergence and self

organization will progress. Moreover, interdependencies affect any new powers and the level that these will be unleashed or not. New technologies, in general, may play an additional role in this framework. At least, this is what was discussed with some respondents. We could recall the significance of Communities of Practice and how these merge and accommodate different powers in an organization.

However, there is a perception that interdependencies serve only internal purposes, due to mentality, therefore, their existence restrain any emergence of new structures. There is an exception though in the case that this is the will of the system. This needs the cooperation among groups, the exchange of ideas, the common perspectives and the willingness to succeed. In addition, agents must be sure that there is benefit for them. An interesting view, extracted from interviews was that distorted relations direct to distorted interdependencies, where obviously any expectations are bind to close control and blocking. Usually such groups or systems are reluctant to any progress preferring to maintain low intelligence and restrained knowledge among members.

### **7.3 Heterogeneity and diversity**

Groups that operate in a complex system, although, they have common characteristics and same objectives, they do demonstrate high degree of difference.

It is interesting that most of respondents kept a neutral or slightly negative attitude, in terms of the role of diversity in the system. "Diversity could be a source of development" versus "diversity is more of a source of problems", as extracted from data. There was identified a small difficulty in understanding the meaning of heterogeneity. According to them, heterogeneity is synonymous to differentiation. Specifically, different groups in the sector demonstrate different approaches, where sometimes this is the main cause for the deviation from the common targets, as it was discussed. This differentiation is rather wide. In general terms, heterogeneity directs to different targets for each group in the sector. Moreover, heterogeneity states in differences among groups that could be found in knowledge, expertise, tasks and the nature of job itself, also rewarding, and personal interests.

In addition, it was identified that the sector is consisted of different groups that do not necessarily have common ground for cooperation. For example, any difference in aims, roles, motives and attitudes raise different responsibilities and in result different behavior.

In other words, this kind of diversity was rather harmful and not helpful for the sector. The system proved unable to handle heterogeneity or diversity in the sense that this was perceived by participants.

This differentiation was obvious and easily found in the workplace, especially in hospitals and public healthcare service areas. Specifically, the area of medical doctors and nursing staff is such an example. Diversity is considered as the origin of communication problems and difficulties in understanding. This becomes more intense when one group cannot understand the problems of the other.

As a result, in a complex system this raises weaknesses and possibly isolates groups in a way that they stop seeing the whole and the benefits of being together. It is difficult to integrate a mix of powers under a common target, especially when enough groups consider, a priori, that this is impossible. Interviews have revealed that a significant number of participants do not consider heterogeneity as a source of development. Furthermore, some consider it as source of problems and potential tensions. In the case of identifying it as a source of development, the respondents placed some prerequisites implying that there always must be present some factors.

### **7.4 Attractor and Attractor patterns**

Groups that live in the healthcare system demonstrate special behavioral characteristics as well as diversified reactions according to patterns. This refers to any changes that might arise. Such patterns are cultivated through time and under circumstances from dominant groups. It is interesting that each group that participated in this survey does not consider itself as an attractor. There is a contradiction on perceptions regarding who is the attractor that establishes patterns in the sector. As potential attractors may be considered the powerful groups that mentioned earlier, such as doctors, nursing staff, the Government, the unions. In terms of patterns definition, on the one side it was mentioned that this follows the Law framework and the Professional Code of Ethics, as introduced by the State.

On the other side, though, there is a stubborn, informal framework which nurtures a parallel entity with its own informal patterns and mindset. Therefore, different attractor patterns are

generated over the system's weaknesses. Lack of: control, measurements, indexes, objectives and specific guidelines, usually direct a system to self-correction in a way that it is not always desirable. Giving the fact that attractor patterns define behavioral models and cultivate mindsets, it is clearly understood that their role is more than significant in the system. The practice of affecting patterns directs in affecting behaviors which in extent defines how absorbent and receptive the system in changes is. Any monopolistic attitudes and restrained concerns create an aversive environment which blocks change of structures. In order for the dominant players to maintain current structures they impose contexts that operate positively for their benefit but disregard any upcoming challenges, keeping the system rather closed.

Nevertheless, a system cannot survive without attractors. Therefore, the question raised is, what we can do when current attractors do not serve anymore common targets but harm the system. At this point, respondents were in the middle. There is a number claimed that a system could not be rebuilt from scratch therefore it is necessary to use the old powers and help new powers to re-establish the system in a new self-organizing way. It is impossible to destroy a system and build it again, especially when this is the healthcare system of the country. The restructure comes from a blended approach where old and new mix-up towards adaptation. This approach mostly fits to the incremental progress, a natural evolvement of things under certain circumstances where entities know well the environment and prediction could stand adequately for the things ahead.

But what happens, when a complex system experiences sudden shocks and surprises, which impose radical changes. Almost half of the respondents concluded that a new system should be rebuilt from zero. This is a totally radical approach, where the system is expected to bring forth new attractors in order to gain new perspective and change mentality and lifestyle. If you keep old powers, it is not definite that the new system will not end in the same path. Therefore, we have to choose between: (a) a transitional period where old and new will mix and progress, or (b) a stage of new foundations, where the old system will be destroyed and new structures will emerge under new formations and players.

The more realistic solution depends on the current situation of the complex system, as well as the pressures that this experiences both internally and externally.

### **7.5 Generative relationships and patterns of behavior**

The special characteristics that prevail in healthcare sector, in regards to behavior, reaction and coping with change are stemmed also from generative relationships which are nothing more than the common root relations. Such relationships are built-in the healthcare components, and play an important role in the sector's evolvement. May be these are the stronger type of relationships within the system. Respondents accepted that such kind of relationships, although could be found elsewhere, in healthcare are wider, stronger and intensive. They operate on the basis of protection and solidarity among groups even if this demonstrates distortions. Additionally, they are based on the instinct of self-preservation enabling the reaction of inter-coverage and mutual help. Probably in healthcare generative relationships are more discrete.

As a result, they are embedding new contexts to members. Although they cannot impose new structures or direct rules, they imply and prepare the ground for further informal changes. Various results could be seen, such as cultivation of common interests or oppositions. Nevertheless, some of the respondents mentioned that generative relationships cannot impose new contexts especially when mentalities are offended or personal belongings and acquirements are jeopardized. There is always the red line of humanistic protection in any rule, no matter which group prevails.

Behavioral models that stem from these relationships play a significant role in any will for change since people define the system. So, although they cannot impose, they can both fight or enable changes towards self-organization. It is the informal relations and the uncontrolled principles that define the pathway for the change. Furthermore, closed relations damage the system and many times formal hierarchy is not considered so significant and decisive for future actions. Moreover, closed relations create problems, in terms of mechanisms of obstacles which operate in contrast to official rules and control. In the Greek healthcare sector, generative relationships and patterns of behavior are strictly connected and constitute the what-so-called "status-quo". This is responsible for the malfunctions in the system but it seemed that this was widely accepted. Through another perspective, aspirations of participants are not always the same.

## 7.6 Collective Reflexivity

Groups of the system demonstrate a common reaction against anything that originates from external factors. This happens also in the case that internal factors seem to unsettle the cyclicity of the system. In any of these, the system stimulates reactions as an unconscious and natural reflection. Reflection is linked to complexity since it is a common action observed in a system with living entities. It is interesting though, what respondents perceived as group reaction. Collective reflexivity is synonymous to fight and to opposition. It figures the way that different groups react against certain attacks on their interests, acquisitions and rights. Agents start feeling the pressure of change and external imposition, especially when these demand from them to change their work and behavioral patterns. As a result, agents demonstrate a homogenized negative reaction.

This reaction is mainly cultivated by dominant groups. There is an opinion that reflexivity is supported by the system and its endurance. However, as responsible for collective reflexivity, not effectively always, were recognized the unions, the political parties and the government. These groups have cultivated an environment of inertness in terms of positive reflexivity. Positive reflexivity is the preparation and alertness towards changes. On the contrary, negative reflexivity destroyed the good parts of the system through the years and developed a mindset of risk aversion and change resistance. Although there was always the potential emergence of new powers, these were restrained and kept away from decision-making centers.

## 7.7 Elements from NHS (The National Healthcare System of UK)

It is not accidental that UK's healthcare system is considered one of the most modern especially in terms of programming and organization. Although it has its own vulnerabilities, there are certain guiding principles and governance issues that define the operating framework.

This system is based in two primary entities which set policies.

1. Primary Care Trusts, Accountants
2. GPs, Doctors, Directors of Clinics and Consultants

The accountants are the mediators between Ministry of Health and Hospitals. There is no privileged accessibility from doctors or even pharmaceutical companies. Participants in the system have direct cooperation with Primary Care Trusts who define and negotiate based on KPIs and financial policies. Government is doing budgeting and define the strategy. Strategies are developed taking into consideration two factors: (a) demographics, and (b) finances. Different opinions as well as any kind of pressure against the system are expressed through Pressure Groups, which usually are consisted of General Practitioners (GPs), Nursing staff and Patients. Another significant group in the system is Research Groups of Hospitals. Relationships are mostly embedded among people of the same group and it is difficult to find this across different groups.

There is a strong competition among Research Groups in terms of better research results, better achievements and progress as this will enable them to look for more funds. Any conflicts lay rather in motives of competition and not protectionism.

Planning is strict and implementation is close monitored in regards to policies and budgeting. Healthcare sector accommodates experts and technocrats who undertake the responsibility to accomplish operations in alignment to predetermined targets.

It was considered significant to include in this study some information from a foreign healthcare system, such the one of UKs which is considered a model system. *Dr Polychronakis (2013)*, through his expertise in healthcare systems, have contributed in current study, giving the perspective of another system. This was considered helpful in the attempt to bring in this study a different approach and raise milestones towards changes that could take place in the Greek system. In the next figure (*Figure 17*) is given the structure of NHS which combined with the later provided *Figure 18*, provide a graphical representation of NHS.

## The structure of the NHS

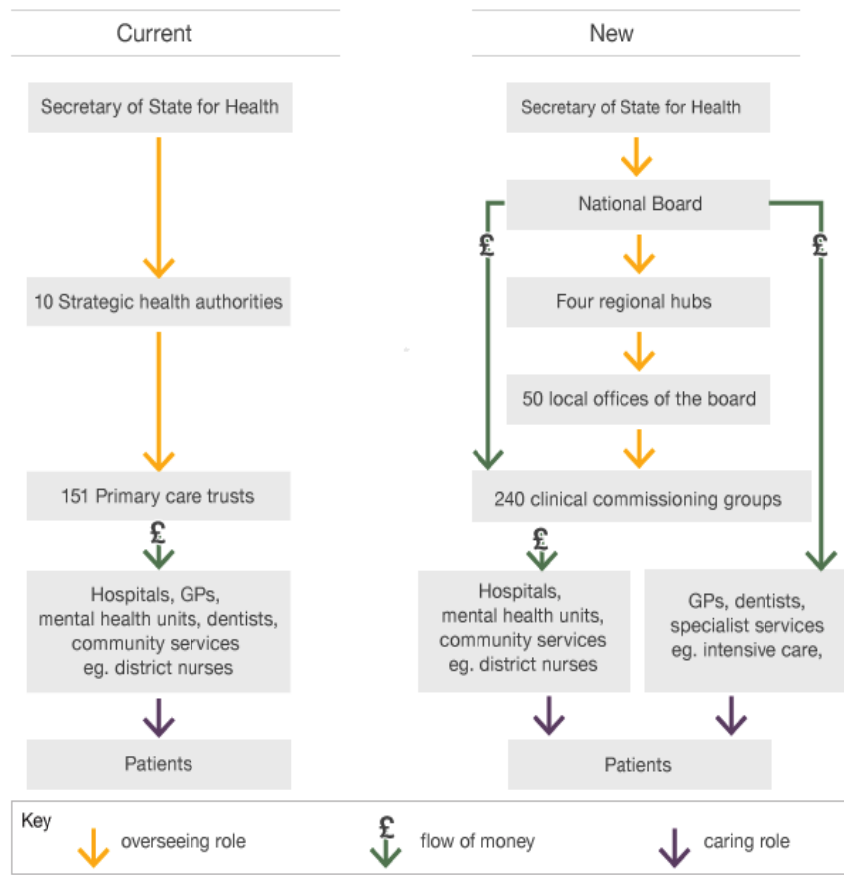


Figure 17. The structure of the National Healthcare System (NHS) in UK

(Source: Polychronakis, Y (2013) *Healthcare Management*, Lecture presentation in the Executive MBA course, University of Sheffield International Faculty, CITY College, April 2013)

It is clear that NHS uses more powers and distributes more roles among agents in the system. This is not a doctor-centred system and incorporates rather a strong entrepreneurial mindset. Currently, this system as well, is under restructure aiming to strengthen in elements like flow of money and the caring role. There are identified moves towards holistic perspective handling the three fundamental “things” of healthcare: (Polychronakis, 2013)

1. Services
2. Technology
3. Infrastructure

In the next figure is given in an effective way the context of healthcare which could be defined as the heart of the system (Figure 18).

# The context of Healthcare

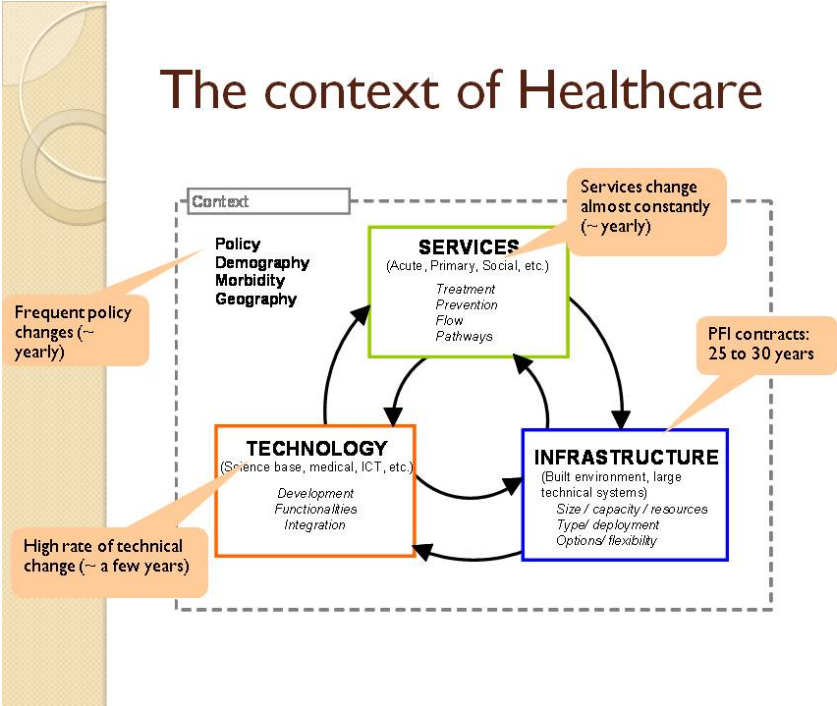


Figure 18. The context of Healthcare

(Source: Polychronakis, Y (2013) Healthcare Management, Lecture presentation in the Executive MBA course, University of Sheffield International Faculty, CITY College, April 2013)

This three-pillar approach is a model which could help in the endeavours of local players who wish to contribute towards the restructure of the system.

## 8. Conclusions of the study

### 8.1 Discussion on literature review

Greek healthcare system is currently looking for its stability. We conclude from the survey, that it demonstrates characteristics of a natural system which incorporates different groups with powers, links and concerns (doctors, nursing staff, administration, other groups etc), (*Simmie and Martin 2010; Clark et al, 2010*). Complexity was born from diversity (*McDaniel and Driebe, 2001*) but this is not clear in the respondents' perceptions. There is a significant number of respondents that opposed to diversity existing in the sector, and they consider it a problem for the evolution of healthcare. Unknowability is a problem for the professionals in the sector as well. However, groups still cannot identify the powers that could be a source of novelty and invention. Anything different, unlabeled and not-approved is considered a threat for the system. Co-evolution is more of a conflict nature rather than the possible fertile landscape for workable solutions (*McDaniel and Driebe, 2001*). Connectedness is still paradoxical and openness is selective. Non-linearity is eliminated through patterns of protection; therefore, we consider that any rebounds will delay.

Begun et al (*2003*) proved to be correct in terms that all these years the sector has demonstrated bounded behaviour regardless the necessity for changes. Finally, the system succeeded in maintaining certain attractors, in an attempt to minimise impacts from small changes. Emergence was rather disappeared. Absence of changes brought absence of self-organisation either bouncing-back or bouncing-beyond. So, the system forgot how to move on.

Respondents did not propose any specific alternatives besides that some of them prefer to keep old powers while others seek for new determinants in the new framework. Probably this is the result of the internalised simple rules that were in power all these years (*Pisek et al, 2013*). The answer states in ethical climate (*Mills et al, 2003*). The Greek healthcare sector nurtured a system that endangered the sector.

There is lack of consensus among peers and people are not certain, or convinced on any potential future positive outcomes. There are contradictions while the sector experiences a self-concern and a self-approval stage. The system is still vibrated from shocks and this is probably going to last for quite few years. The duration depends on the effective absorption of these shocks and the transformation to constructive results. However, this survey reveals that diversity will not be integrated easily. Emergent dynamics delay and this delays the new organisation of the sector.

Furthermore, although this survey cannot generalise its findings, we could conclude that the Greek system did not manage to penetrate in the DNA of complexity. On the contrary, it experienced signs of uncertain autonomy. As a result, the adoption of mechanistic view of things has made the sector even weaker in complexity's characteristics. There are two ways to change things: incrementally or radically; this means either naturally and controllable or suddenly with violence. Decisions of a society define its path-dependence. If we multiply these decisions over time, the position of the society is the result of its choices.

In times of prosperity, groups are reluctant to changes. The dominant perception is that you do not change a team that wins. This, in extent cultivates a fake environment of endless security and grows the mentality of "too big to fail". However, in times of prosperity, societies could be entrapped in inertia.

Restructures as imposed by memorandums should take place, and fast. Consequences were and still are catastrophic, but this is the result for the societies that do not foresee changes and do not adapt accordingly when resources are enough and available.

Beyond, re-organization of things and during the phase of changes (the phase of living the crisis) certain practicalities should take place and these are:

- Clear orientation and plan of what the sector should achieve towards crisis; each unit should make and apply immediately a contingency plan for its operation.
- Administration should be enriched with healthcare experts who will undertake the responsibility to apply changes using more technology and enabling more groups in the effort to build the new system.
- Healthy old powers could be used but only if they meet their job description requirements. More managerial control should be assigned and the system could incorporate modern techniques in terms of health economics, logistics and policies.
- New poles of power should be revealed in order to change balances towards a modern healthcare framework for the country.

Fastness of changes depends on the participants. The Strategy Pyramid as introduced by the author (Figure 15), is an example for further study. Real progress comes when restructures and changes drive society towards a fair distribution of resources and wealth. This in extend implies a fair and unhindered provision of healthcare services to citizens. It is still questionable though, among many local players, whether the mechanistic metaphor stands below or above complexity.

In the doorstep of *quantal complexity*, the country is obliged to confront with inevitable challenges. In response, putting complexity to work may prove to be wise choice. But this demands consensus among social partners and this is questionable. It is hard to predict if Greek society hold on the transitional stage towards new organisation of things.

Interfering in local economies through monetary policies is a productive and decisive strategy to impose changes in rather short time. Resources and in extent money is the basic component for a social system. Lack of resources seems that are not the permanent fear of managers but for societies as well, especially nowadays where changes are happened through different ways. Being in the fourth year of recession, it's rather certain that the country experiences a dilemma. Complexity demands holistic approach.

Another issue is that there is no replacement of generations in terms of changing patterns and mindsets. Things are changing quickly and attitudes have to do the same. The prolongation of life as well as modern lifestyles enables longer status-quo narrowing the potential for space for new powers.

The map given below (Figure 18), is an attempt to illustrate the factors that define the complexity space on healthcare. This examines healthcare through global lens.

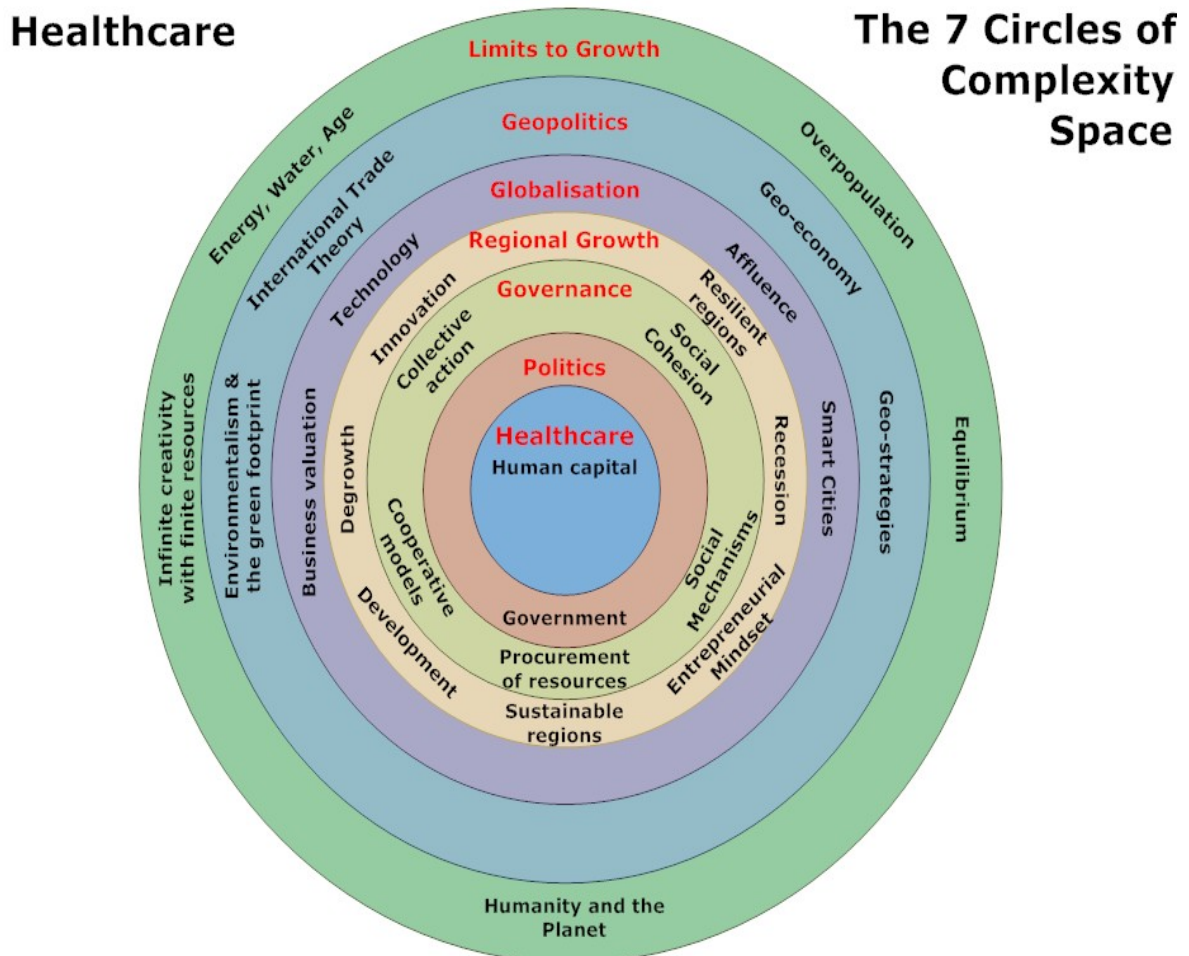


Figure 19. Healthcare – The 7 Circles of Complexity Space (a global approach)

Circles of Complexity is an attempt to prove that no system could survive in isolation, neglecting global environment and emergent powers that push towards renewal.

Greek healthcare sector as a complex adaptive system is rather obliged to move on fast and recap things that had to do but did not succeed to, so far. No matter the external demands, this is the way for the sector and the country to reposition itself, capitalise the experience and prepare for the next challenges.

The system cannot oppose to current pressures. It does not have the resources and the background. Moreover, as discussed through literature review, there is no way to administer complexity. Past strategies that proved to be successful have been out-dated and changes that were deliberately omitted all these years, reappeared.

Therefore, it is essential to perform changes using the good elements provided from the agent-based nature, the connectedness and the new dynamics of the healthcare sector.

Greece had been trapped in a path-dependence that was organised and administered by old powers, which had demonstrated certain distorted characteristics. Not only in healthcare but also in other sectors, an ever-lasting-inertia created a pseudo-development. This is a situation which could be reversed only through practicalities. And current crisis is an opportunity for this. Lack of resources and tight controls enable improvisation, enrich mindsets and alter attitudes.

History has proven that changes happened all these years outside the country, had not been diffused in order to stimulate the internal environment. Discussions about democracy and dead-ends given current conditions are not realistic. Of course, there are dead-ends and the systems are obliged to regenerate and renew themselves whenever this is imposed, either from internal or external powers. Emergence of new dynamics should be considered as healthy sign of progress. The dead-end in real, technocratic world is called: resources, which does not imply only materials but the capacity to learn as well.

## **8.2 Implications**

This study did not intend to extend beyond research objectives. The discussion on impacts and outcomes are expected to contribute for future reference, further study and for any additional consideration.

The case of Greece is unique globally, at least until current times where this paper is in process, since there was no prior example of an advanced country belonging to a strong currency consortium but demonstrating such economic indicators. The intention of the research was to analyse, discuss and bring forth any issues related to health governance stemmed from the difficult situation that country experiences.

However, it is expected to reveal chronic weaknesses of the sector, which actually illustrate the willingness and motives of societal partners.

## **8.3 Limitations**

The major limitation in this study is that findings could not be generalised since these are considered biased due to the method followed. Nevertheless, intention was to study on experience perceptions of respondents and capture a part of current implications in the sector.

In addition, regarding sampling, there were initial concerns on how to reach governmental officers. This was proved difficult during the survey. Therefore, most of the respondents come from medical group and from different posts and areas. We have tried to balance the absence of governmental officers with variety of groups within sector. Nevertheless, this may raise a weakness since there is no view included from the government's side. Due to time restrictions, we did not insist or go after any further opportunities.

## **8.4 Further research**

The case of Greek healthcare sector could be a model case for further research, in terms of how complexity applies in living systems which experiences shocks.

It would be interesting though if continue to study on the selected sample throughout the different stages of crisis and restructuring, as we are experiencing it now. The aim should be to analyse perceptions and study on their incremental or radical potential changes. Some proposed questions for research are given below:

- Do modern times of crisis demonstrate different change characteristics across people, compared to older periods?
- Does complexity affect the way people decide to change through time?
- Do finally, people learn how to learn during tough periods or prefer to remain in stasis?
- Is complexity a recent phenomenon or exists through ancient years playing always its role at the background?

### **8.5 Contribution of the study**

Initial motive of this study was to investigate complexity and identify the links with healthcare sector given the Greek case. We have resulted in capturing current situation through examination of healthcare sector's professionals. Actually, the intention was to bring forth their perceptions under shock conditions. We have tried to identify the consequences that turbulent situations raise as well as any reactions towards this.

Our exploratory humanistic approach aimed to register the impact in healthcare from inside information. This was performed in combination with the examining of the role of complexity in what the country currently experiences.

Although our conclusions may not be used for general declarations, we consider that our findings provide an evidence-based report that reflects the result of linking complexity and healthcare in a modern developed society which did not follow holistic approach.

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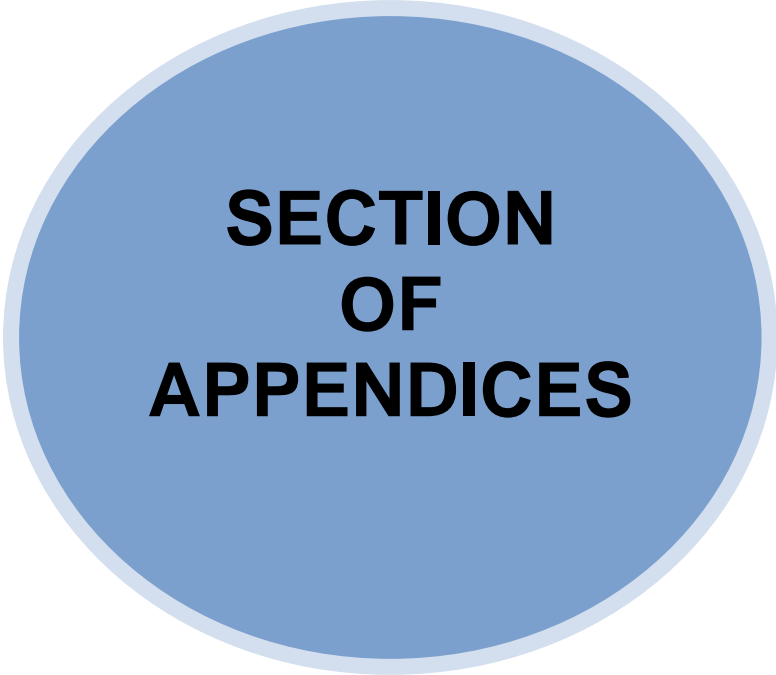
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**SECTION  
OF  
APPENDICES**

## APPENDIX A

GREECE: GDP in the decade 1951-1961 (growth rates)  
Comparison with other OECD countries

### GROWTH RATES OF GDP FOR SELECTED COUNTRIES,<sup>a/</sup> 1951-1961

	<u>Growth Rate</u> <sup>*</sup>
Austria	5.5
Denmark	3.5
Germany	7.5
GREECE	6.1
Iceland	4.9
Italy	6.1
Netherlands	4.6
Norway	3.8
Portugal	4.7
United Kingdom	2.4
United States	3.2

<sup>a/</sup> Similar data for the remaining OECD countries were not available.

<sup>\*</sup> Calculated at constant (1954) prices

Source: OECD, Statistics of National Accounts, 1951-61.

(Source: Bowles, Samuel (1966) Sources of growth in the Greek Economy, 1951-1961.  
*Harvard Economic Development Report*, No. 27, p. 9).

## APPENDIX B

GREECE: GDP in the decade 1951-1961  
Distribution of growth rates per sector

### RATES OF GROWTH OF GDP BY SECTOR IN THE GREEK ECONOMY, 1951-61

	<u>Rate of Growth</u> <sup>*</sup>
Agriculture, Forestry, Fishing	4.8
Mining	11.3
Manufacturing	7.3
Construction	13.5
Electricity, Gas, and Water	12.1
Transportation and Communication	5.4
Wholesale and Retail Trade	5.6
Banking, Insurance, Real Estate	6.6
Ownership of Dwellings	9.6
Public Administration, Defense	1.1
Health and Education	4.1
Miscellaneous	5.2

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<sup>\*</sup> Calculated at constant (1954) prices

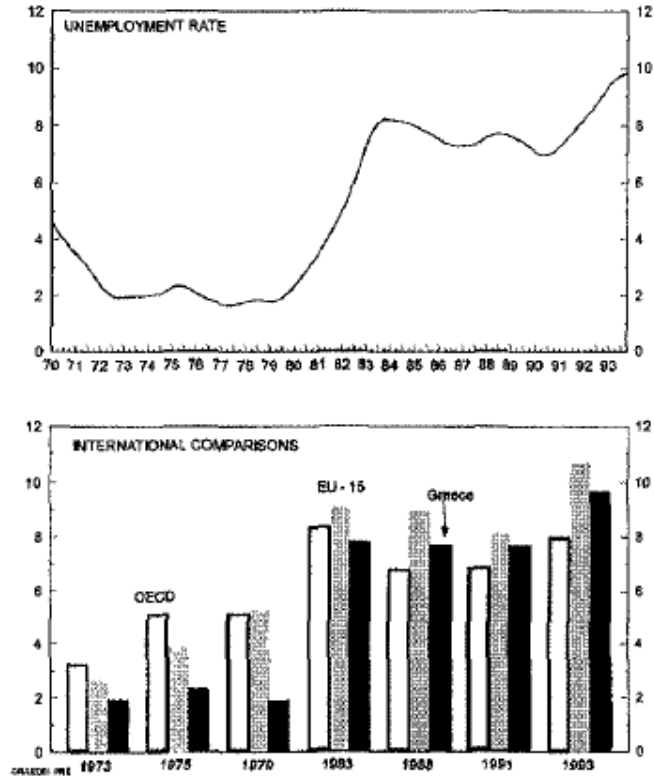
Source: OECD, Statistics of National Accounts, 1951-61, p. 107, Table 2B.

(Source: Bowles, Samuel (1966) Sources of growth in the Greek Economy, 1951-1961.  
*Harvard Economic Development Report*, No. 27, p. 10).

## APPENDIX C

### GREECE: Unemployment 1970-1993

UNEMPLOYMENT IN GREECE AS A PERCENTAGE OF THE LABOUR FORCE



Source: OECD Labour Force Statistics; and European Economy No. 60, 1995

(Source: Demekas, Dimitris and Kontolemis, Zenon (1997) Labour Market Performance and Institutions in Greece. *Journal of South European Society and Politics*, 2(2), p. 79).

**APPENDIX D**  
**Directives in controlling pharmaceutical spending**  
**(Structural fiscal reforms in Greece)**

*Controlling pharmaceutical spending*

In order to achieve EUR 1 billion of reduction in outpatient pharmaceutical spending in 2012, the Government will simultaneously implement a set of consistent policies comprising changes in pricing, prescribing and reimbursement of medicines that enhance the use of less expensive medicines, control prescription and consumption and prosecute misbehaviour and fraud. The Government defines a consistent set of incentives and obligations for all participants along the medicines supply chain (including producers, wholesalers, pharmacies, doctors and patients) to promote the use of generic medicines.

The Government will revise the co-payment system in order to exempt from co-payment only a restricted number of medicines related to specific therapeutic treatments. [Q1-2012]

(Source: IMF-EU-ECB (2012) Memorandum of Understanding on Specific Economic Policy Conditionality, p. 13).

**APPENDIX E**  
**Directives in adopting the use of generic medicines**  
**(Structural fiscal reforms in Greece)**

*Increasing use of generic medicines*

A comprehensive set of measures is adopted simultaneously to promote the use of generic and less expensive medicines. The aim of these measures is to gradually and substantially increase the share of the generic medicines to reach 35 percent of the overall volume of medicines sold by pharmacies by **end-2012**, and 60 percent by **end-2013**. This will be achieved by:

- reducing the maximum price of the generic to 40 percent of the price of the originator patented medicine with same active substance at the time its patent expired. This is set as a maximum price; producers can offer lower prices, thus allowing an increased competition in the market. [Q1-2012]
- automatically reducing the prices of originator medicines when their patent expires (off-patent branded medicines) to a maximum of 50 percent of its price at the time of the patent expiry. Producers can offer lower prices, thus allowing an increased competition in the market. [Q1-2012]
- creating dynamic competition in the market for generic medicines through price reductions of at least 10 percent of the maximum price of each generic follower. [Q4-2012]
- associating a lower cost-sharing rate to generic medicines that have a significantly lower price than the reference price for reimbursement (lower than 40 percent of the reference price) on the basis of the experience of other EU countries, while increasing substantially the co-payment of more expensive medicines in the reference category and of new molecules. [Q1-2012]
- allowing the reimbursement of newly patented medicines (*i.e.* new molecules) only after at least 2/3 of the EU countries are already reimbursing them and on the basis of a proper assessment of their cost-effectiveness carried out in other European countries. [Q1-2012]
- excluding from the list of reimbursed medicines those which are not effective or cost-effective on the basis of the experience of other countries. [Q1-2012]
- making it compulsory for physicians to prescribe by international non-proprietary name for an active substance, rather than the brand name. [Q1-2012]
- mandating the substitution of prescribed drugs by the lowest-priced product of the same active substance in the reference category by pharmacies (compulsory "generic substitution"). [Q1-2012]

The Government takes further measures to ensure that at least 40 percent of the volume of medicines used by public hospitals is made up of generics with a price below that of similar branded products and off-patent medicines. This should be achieved, in particular by making compulsory that all public hospitals procure pharmaceutical products by active substance, by using the centralised tenders procedures developed by EPY and by enforcing compliance with therapeutic protocols and prescription guidelines. [Q2-2012]

The Government, pharmaceutical companies and physicians adopt a code of good conduct (ethical rules and standards) regarding the interactions between pharmaceutical industry, doctors, patients, pharmacies and other stakeholders. This code will impose guidelines and restrictions on promotional activities of pharmaceutical industry representatives and forbids any direct (monetary and non-monetary) sponsorship of specific physicians (sponsorship should be attributed through a common and transparent allocation method), based on international best practice. [Q1-2012]

The Government simplifies administrative and legal procedures, in line with EU legal frameworks, to speed up the entry of cheaper generic medicines. [Q2-2012]

(Source: IMF-EU-ECB (2012) Memorandum of Understanding on Specific Economic Policy Conditionality, p. 15-16).

**APPENDIX F**  
**Directives in pricing of medicines**  
**(Structural fiscal reforms in Greece)**

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*Pricing of medicines*

The Government continues to update, on a quarterly basis, the complete price list for the medicines in the market, using the new pricing mechanism based on the three EU countries with the lowest prices. [Q1-2012]

The Government introduces an automatic claw-back mechanism (quarterly rebate) on the turnover of pharmaceutical producers which guarantees that the outpatient pharmaceutical expenditure does not exceed budget limits. [Q1-2012]

Starting from Q1-2012, the pharmacies' profit margins are readjusted and a regressive margin is introduced - *i.e.* a decreasing percentage combined with flat fee of EUR 30 on the most expensive drugs (above EUR 200) - with the aim of reducing the overall profit margin to below 15 percent.

Government produces an implementation report on the impact of the new profit margins by Q1-2013. If it is shown that this new model to calculate profit margins does not achieve the expected result, the regressive margin will be further revised.

Starting from Q1-2012, the wholesalers' profit margins are reduced to converge to 5 percent upper limit.

(Source: IMF-EU-ECB (2012) Memorandum of Understanding on Specific Economic Policy Conditionality, p. 13).

**APPENDIX G**  
**Directives on prescribing and monitoring**  
**(Structural fiscal reforms in Greece)**

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*Prescribing and monitoring*

The Government

- takes further measures to extend in a cost-effective way the current e-prescribing to all doctors, health centres and hospitals. E-prescribing is made compulsory and must include at least 90 percent of all medical acts covered by public funds (medicines, referrals, diagnostics, surgery) in both NHS facilities and providers contracted by EOPYY and the social security funds. [Q1-2012]
- introduces a temporary and cost-effective mechanism (until all doctors are able to use the e-prescription system) which allows for the immediate and continuous monitoring and tracking of all prescriptions not covered by e-prescription. This mechanism will make use of the web-based e-prescription application established by IDIKA, which allows the pharmacies to electronically register manual prescriptions from a specific doctor to a specific patient. For medicines to be reimbursed by EOPYY (and other funds), pharmacies must register in the web-based application all manual prescriptions. For this service, doctors who prescribe manually will be charged a monthly administrative fee by EOPYY to compensate the pharmacies. The introduction of this temporary mechanism would ensure that all prescriptions are electronically recorded, allowing for the full and continuous monitoring of doctors' prescription behaviour, their compliance with prescription guidelines. [February 2012]
- continues publishing prescription guidelines/protocols for physicians. Starting with the guidelines for the most expensive and/or mostly used medicines the government makes it compulsory for physicians to follow prescription guidelines. Prescription guidelines/protocols are defined by EOF on the basis of international prescription guidelines to ensure a cost-effective use of medicines and are made effectively binding. [Q1-2012]
- enforces the application of prescription guidelines also through the e-prescription system, therefore discouraging unjustified prescriptions of most expensive medicines and diagnostic procedures. [Q1-2012]
- produces (Ministry of Health and EOPYY together with the other social security funds until they merge) detailed monthly auditing reports on the use of e-prescription in NHS facilities and by providers contracted by EOPYY and other social security funds (until they merge). These reports are shared with the European Commission, ECB and IMF staff teams. [Q1-2012]
- implements (Ministry of Health and EOPYY together with the other social security funds until they merge) an effective monitoring system of prescription behaviour. They establish a process to regularly assess the information obtained through the e-prescribing system. [Q2-2012]
- produces regular reports, at least on a quarterly basis, on pharmaceutical prescription and expenditure which include information on the volume and value of medicines, on the use of generics and the use of off-patent medicines, and on the rebate received from pharmacies and from pharmaceutical companies. These reports are shared with the European Commission, ECB and IMF staff teams. [Q1-2012]
- provides feedback and warning on prescription behaviour to each physician when they prescribe above the average of comparable physicians (both in NHS facilities and contracted by EOPYY and other social security funds until they merge) and when they breach prescription guidelines. This feedback is provided at least every month and a yearly report is published covering: 1) the volume and value of the doctor's prescription in comparison to their peers and in comparison

to prescription guidelines; 2) the doctor's prescription of generic medicines vis-à-vis branded and patent medicines and 3) the prescription of antibiotics. [Q2-2012]

- enforces sanctions and penalties as a follow-up to the assessment and reporting of misconduct and conflict of interest in prescription behaviour and non-compliance with the EOF prescription guidelines. Continuous or repeated non-compliance with the prescription rules will lead to the termination of the contract between the doctor and the EOPYY and the doctor's permanent loss of his/her capability/right to prescribe pharmaceuticals which are reimbursed by the government/EOPYY in the future. [Q1-2012]
- continuously updates the positive list of reimbursed medicines using the reference price system developed by EOF. [Q1-2012]
- selects a number of the most expensive medicines currently sold in pharmacies, to be sold in hospitals or EOPYY pharmacies, so as to reduce expenditure by eliminating the costs with outpatient distribution margins, and by allowing for a strict control of the patients who are being administered the medicines. [Q1-2012]

If the monthly monitoring of expenditure shows that the reduction in pharmaceutical spending is not producing expected results, additional measures will be promptly taken in order to keep pharmaceutical consumption under control. These include a prescription budget for each doctor and a target on the average cost of prescription per patient and, if necessary, across-the-board further cuts in prices and profit margins and increases of co-payments. [Q2-2012]

In compliance with EU procurement rules, the Government conducts the necessary tendering procedures to implement a comprehensive and uniform health care information system (*e-health system*). [Q1-2012]

(Source: IMF-EU-ECB (2012) Memorandum of Understanding on Specific Economic Policy Conditionality, p. 14-15).



## Appendix I.1 Semi-structured interview questionnaire

### Discussing Complexity in the Greek Healthcare Sector

This paper can be used as a guide to perform the semi-structured interview with the participant in the study. There are 20 questions grouped in 6 categories according to Research Questions Framework.

#### 1. Information Asymmetry

1.1 Who are the players/agents in healthcare?
1.2 Can we prioritize them according to their power in regards to health services supply chain? Who are the agents that play primary role?
1.3 Who has inside information due to current structure? Can this change? What is necessary to do in order to restrain information asymmetry?

#### 2. Interdependencies

2.1 How important are the relations among agents in healthcare? Do relations play a decisive role for the system? Is this positive or negative or even neutral?
2.2 Who defines the relations patterns in the system? Who is responsible for the relations; the system or the building blocks of agents?
2.3 Do relations create interdependencies? Does this create paradoxes in the system? Does this reveal weaknesses?
2.4 What is the real nature of interdependencies? Do they enable or block emergence and self-organisation?

#### 3. Heterogeneity

3.1 What is heterogeneity in healthcare?
3.2 Where and how this is identified? What kind of problems does this create?
3.3 Can heterogeneity be a source for development?

## Discussing Complexity in the Greek Healthcare Sector

### 4. Attractor Patterns

4.1 What is an attractor pattern? Who is an attractor in the current healthcare system in the country?

4.2 How these patterns work in the system? Do these impose contexts? Is this possible for a new attractor to emerge from changes in structures?

4.3 Can the system work without attractors? When attractors take responsibility and protect the system?

### 5. Generative Relationships Patterns of Behavior

5.1 What are the generative relationships and what is the difference with relationships as discussed earlier?

5.2 Do generative relationships create contexts in the system? Who is the main source of such relationships?

5.3 Do generative relationships have responsibility for fighting or enabling changes in structures towards self organization?

5.4 Which is the relation between generative relationships and patterns of behavior? Can this relationship be the cause of emergence?

### 6. Collective Reflexivity

6.1 What is collective reflexivity? What is the relation with complexity?

6.2 Who is responsible for reflexivity? The system or the agents?

6.3 How reflexivity works in healthcare sector?

**Appendix I.2**  
**Semi-structured interview questionnaire (in Greek language)**

# Η πολυπλοκότητα στον τομέα υγείας της Ελλάδας



**ΙΑΝΟΥΑΡΙΟΣ 2013**

Η συγκεκριμένη έρευνα έχει ως στόχο να προσεγγίσει την τρέχουσα κατάσταση στον τομέα υγείας της χώρας, κάτω από το πρίσμα της πολυπλοκότητας. Πραγματοποιείται στα πλαίσια της μεταπτυχιακής εργασίας του κ. Ευάγγελου Εργέν, φοιτητή στο πρόγραμμα MBA του Πανεπιστημίου του Sheffield, UK που προσφέρεται στην Ελλάδα από το Διεθνές Τμήμα του Πανεπιστημίου, CITY College. Η μεταπτυχιακή εργασία έχει τίτλο "Using Complexity as a guide for acting in Healthcare" και όλα τα στάδια προόδου της θα δημοσιεύονται στην ιστοσελίδα <http://www.ergen.gr/HealthCare.html>.

Η εργασία γίνεται υπό την επίβλεψη του Δρ Αλέξανδρου Ψυχογιού, Επίκουρου Καθηγητή του Διεθνούς Τμήματος του Πανεπιστημίου του Sheffield.  
([a.psychogios@city.academic.gr](mailto:a.psychogios@city.academic.gr))

Ακολουθεί ένα ερωτηματολόγιο συνέντευξης με ανοικτές ερωτήσεις που απευθύνεται σε συμμετέχοντες που έχουν επαγγελματική σχέση (ή είχαν σχέση) και δραστηριοποιούνται στον τομέα της υγείας στην Ελλάδα.

Ο σκοπός είναι να συλλέξουμε και να επεξεργαστούμε απόψεις ειδικών τις οποίες θα αναλύσουμε σε σχέση με την βιβλιογραφία αλλά και την πρακτική, όσο αναφορά την πολυπλοκότητα. Αυτό στοχεύουμε να βοηθήσει στην κατανόηση εκείνων των χαρακτηριστικών και ιδιαιτεροτήτων που παρουσιάζει το σύστημα υγείας της χώρας μας.

Η συμπλήρωση του ερωτηματολογίου (συνέντευξης) γίνεται κατόπιν πρόσκλησης που θα λάβουν μέσω e-mail οι συμμετέχοντες. Το κείμενο είναι σε μορφή επεξεργάσιμη προκειμένου οι συμμετέχοντες να έχουν την ευελιξία να δώσουν τις απαντήσεις τους και να εισάγουν στην συζήτηση και νέες πτυχές που πιθανόν κατά την άποψη τους δεν καλύπτονται.

Τα αποτελέσματα της έρευνας θα αναρτηθούν στην παραπάνω ιστοσελίδα, μέχρι το τέλος Ιουνίου 2013. Η συμπλήρωση και η υποβολή του εν λόγω ερωτηματολογίου, χρονικά ορίζεται έως και τις 15 Μαρτίου 2013. Η υποβολή γίνεται μέσω email στο [ergen@ergen.gr](mailto:ergen@ergen.gr)

Σας ευχαριστώ πολύ για τον χρόνο σας αλλά και την διάθεση να συμβάλλεται στην συγκεκριμένη έρευνα.

Με εκτίμηση  
Ευάγγελος Εργέν  
([ergen@ergen.gr](mailto:ergen@ergen.gr))

## ΑΝΟΙΚΤΕΣ ΕΡΩΤΗΣΕΙΣ (ΣΥΝΕΝΤΕΥΞΗΣ)

1. Ποιές είναι οι ομάδες που απαρτίζουν το σύστημα υγείας της χώρας μας? (π.χ. γιατροί, νοσηλευτές, φαρμακευτικές εταιρείες κλπ). Παρακαλώ καταγράψτε όσες ομάδες νομίζετε ότι συμμετέχουν.
2. Μπορείτε να τις χωρίσετε σε κατηγορίες ανάλογα με την δυναμική τους στον κλάδο? Ποιές/Ποιά είναι η ισχυρότερη/ες? Ποιές κατά την άποψη σας παίζουν πρωταρχικό ρόλο στις τρέχουσες αλλαγές που πραγματοποιούνται στην χώρα?
3. Ζούμε στην εποχή της πληροφορίας. Ποιά/Ποιές ομάδες πιστεύετε ότι διαμορφώνουν την πληροφορία? Ποιά/Ποιές έχουν ενδεχομένως προνομιακή πρόσβαση? Υπάρχουν μονοπωλιακά φαινόμενα στον κλάδο? Μπορεί η χρήση τεχνολογίας να βελτιώσει την διαχείριση της πληροφόρησης για το καλό όλων?
4. Υπάρχουν σχέσεις αλληλεξάρτησης μεταξύ ομάδων στον τομέα της υγείας στην χώρα μας? Πόσο σημαντικές είναι αυτές και πόσο επηρεάζουν την λειτουργία της υγείας? Ανάλογες σχέσεις μπορεί να συμβάλλουν θετικά ή αρνητικά σε οποιεσδήποτε εξελίξεις?
5. Ποιός καθορίζει τις σχέσεις αλληλεξάρτησης? Κάποια ομάδα, συνδυασμός ομάδων, μήπως το σύστημα το ίδιο λόγω της οργάνωσης του?
6. Μπορεί μια σχέση αλληλεξάρτησης να δημιουργήσει παραδοξότητες ή να επιφέρει στρεβλώσεις?
7. Μπορούν αυτές οι σχέσεις να προκαλέσουν αλλαγές στο σύστημα? Μπορούν να βοηθήσουν στην απελευθέρωση νέων υγιών δυνάμεων? Μπορούν να οδηγήσουν σε μια νέα αυτο-οργάνωση?
8. Στο σύστημα υγείας συμμετέχουν διάφορες ομάδες? Υπάρχει διαφορετικότητα μεταξύ των ομάδων, παρόλο τους κοινούς στόχους που ενδεχομένως έχουν? Εάν υπάρχει διαφορετικότητα, πόσο ευρεία είναι αυτή?
9. Σε ποιούς χώρους του τομέα, μπορούμε να διαπιστώσουμε εάν υπάρχει διαφορετικότητα? Εάν τελικά υπάρχει διαφορετικότητα, αυτό αποτελεί πρόβλημα για την χώρα?
10. Πιστεύετε ότι η διαφορετικότητα μπορεί να είναι πηγή εξέλιξης?
11. Ποιοί καθορίζανε και καθορίζουν τα πρότυπα συμπεριφοράς μέσα στο σύστημα υγείας της χώρας μας?
12. Πως λειτούργησαν και λειτουργούν τα πρότυπα συμπεριφοράς όσο αναφορά την εξέλιξη του συστήματος? Μπορούν τα πρότυπα συμπεριφοράς να αλλάξουν σε ένα νέο σύστημα οργάνωσης?
13. Θα μπορούσε ένα καινούριο σύστημα υγείας να προοδεύσει βασιζόμενο στις υπάρχουσες και παλιές δυνάμεις του? Θα μπορούσε να αντέξει τις έντονες μεταβάσεις στην νέα αυτο-οργάνωση? Ή θα ήταν καλύτερο να διαλυθεί και να ξαναχτιστεί σε νέα θεμέλια?
14. Εκτός από τις ευρύτερες σχέσεις αλληλεξάρτησης, υπάρχουν και ειδικότερες σχέσεις προστασίας και αλληλοβοήθειας μεταξύ ομάδων μέσα στον τομέα υγείας. Αυτό είναι ένα γενικευμένο φαινόμενο, ή αποτελεί ιδιαιτερότητα του συγκεκριμένου κλάδου?
15. Μπορούν αυτές οι σχέσεις ιδιότυπης αλληλεγγύης να επιβάλλουν κανόνες στο σύστημα?
16. Μπορούν αυτές οι σχέσεις να καθορίσουν νέες δομές και οργάνωση?
17. Προφανώς αναφερόμαστε στις κλειστές σχέσεις μεταξύ ομάδων συνήθως του ίδιου επαγγέλματος ή ιδιότητας. Τελικά αυτό μπορεί να δημιουργήσει εμπόδια, σε ένα πολύπλοκο σύστημα, όπως είναι η υγεία μιας χώρας?
18. Τι θα χαρακτηρίζατε ως συλλογική αντίδραση? Υπάρχει σύνδεση μεταξύ αντίδρασης και πολυπλοκότητας?
19. Ποιοί μπορεί να καλλιεργούν την συλλογική αντίδραση? Μπορεί να είναι ομάδες? Μπορεί να είναι το ίδιο το σύστημα? Μήπως συνδυασμός ή κάτι άλλο?
20. Πως λειτούργησε και πως λειτουργεί η αντίδραση και τα αντανακλαστικά των ομάδων στον τομέα υγείας όλα τα προηγούμενα χρόνια, μέχρι και σήμερα?

Appendix I.3  
Semi-structured interview questionnaire (the playing cards version)

**Agents**

1.1 Who are the major players/agents in healthcare sector?

1.2 Can we prioritise them according to their power in regards to healthcare services supply chain?

1.3 Who has inside information given the current structure?

What is necessary to do in order to restrain Information Asymmetry?

Can this change?

**Others**

**PHARMACEUTICALS**

**MEDICAL COMPANIES**

**HEALTH PAYER**

**ΕΟΠΥΥ**

**ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ & ΚΟΙΝΩΝΙΚΗΣ ΑΛΛΗΛΕΓΓΗΣ**

**UNDER CONTRACT**

**ΕΘΝΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ ΠΑΡΟΧΗΣ ΥΠΗΡΕΣΙΩΝ ΥΓΕΙΑΣ**

**Discussing Complexity in the Greek Healthcare Sector**

*Interview process part of the dissertation: "Using Complexity as a guide for acting in Healthcare", by Evangelos ERGEN2012*

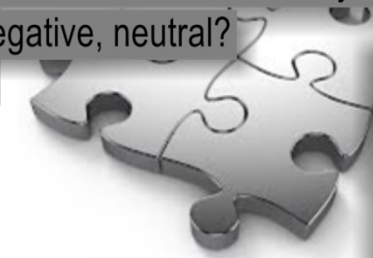


# Relations

2.1 How important are the relations among agents in healthcare?

2.4 What is the real nature of interdependencies?  
Do they enable or block emergence and self-organisation in the complex adaptive system of healthcare?

Do relations play a decisive role for the system?  
Is this positive, negative, neutral?



2.3 Do relations create interdependencies?  
Does this reveal weaknesses?  
Does this create paradoxes in the system?  
Does this reveal weaknesses?

2.2 Who defines the relations' patterns in the system?  
Who is responsible for the relations; the system or the building blocks of agents?

Discussing Complexity in the Greek Healthcare Sector

Interview process part of the dissertation: "Using Complexity as a guide for acting in Healthcare", by Evangelos ERGEN2012

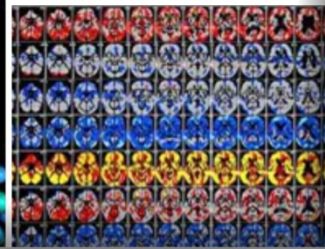


# Heterogeneity

3.1 What is heterogeneity in healthcare?



HETEROGENEOUS CATALYST



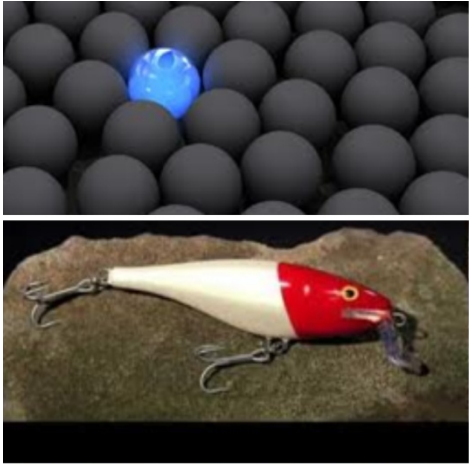
3.2 Where and how this is identified?  
What kind of problems does this create?

3.3 Can heterogeneity be a source for development?

Discussing Complexity in the Greek Healthcare Sector

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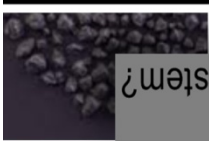
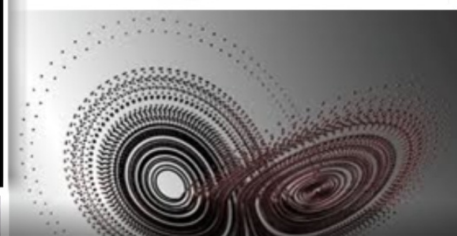
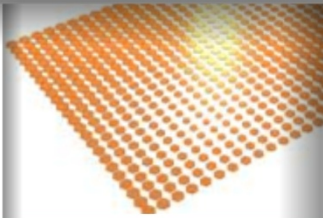
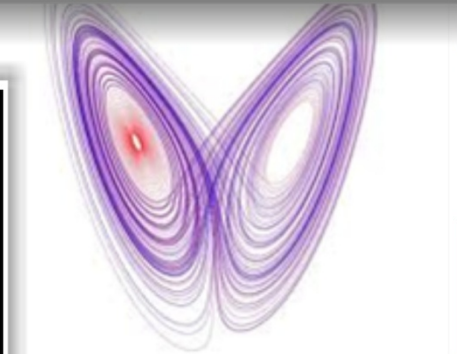
# Attractor Patterns



4.1 What is an attractor pattern?  
Who is an attractor in the current healthcare system in the country?

Strange  
Attractor

PATTERN PATTERN  
PATTERN PATTERN



4.3 Can the system work without attractors?  
When attractors take responsibility and protect the system?

4.2 How these patterns work in the system?  
Do these impose contexts?  
Is this possible for a new attractor to emerge from changes in structures?

Discussing Complexity in the Greek Healthcare Sector

Interview process part of the dissertation: "Using Complexity as a guide for acting in Healthcare", by Evangelos ERGEN 2012

# BEHAVIOUR

## Generative Relationships Patterns of Behavior

5.1 What are generative relationships and what is the difference with relationships as discussed earlier?

5.2 Do generative relationships create contexts in the system?  
Who is the main source of such relationships?

5.4 Which is the relation among generative relationships and patterns of behavior?  
Can this relationship be the cause of emergence?



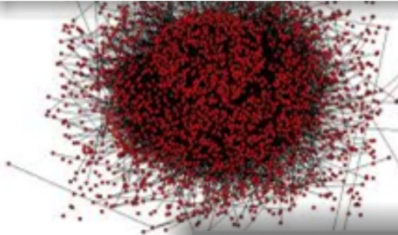
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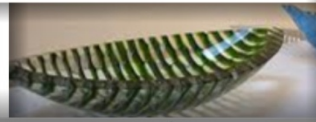


# Collective Reflexivity

6.1 What is Collective Reflexivity?  
What is the relation with Complexity?



6.2 Who is responsible for reflexivity?  
The system or the agents?



6.3 How reflexivity works in healthcare sector?

Discussing Complexity in the Greek Healthcare Sector

Interview process part of the dissertation: "Using Complexity as a guide for acting in Healthcare", by Evangelos ERGEN2012

**Appendix J**  
**The study at a glance**  
**(Structural mind-map of literature review**  
**and main thoughts and findings)**

# **Appendix K**

## **Characteristics of Complex Adaptive Systems**

**Appendix L**  
**Characteristics of**  
**Complex Adaptive Systems**  
**in Healthcare**

**Appendix M**  
**Data Registration (translated raw data)**

**Appendix N**  
**Data Categorisation**  
**According to Research Questions' Framework**

1. Information Asymmetry
2. Interdependencies
3. Heterogeneity
4. Attractor Patterns
5. Generative Relationships
6. Collective Reflexivity

# Thematic Analysis Taxonomy

## Research Questions Framework

### Interviews' results on INFORMATION ASYMMETRY

Interview questionnaire (English version)	Who are the players/agents in the Greek healthcare system?	Can you prioritise them according to their power in regards to healthcare services supply chain? Who are the agents that play the primary role?	Who has inside information due to current structure? Can this change? What is necessary to do in order to restrain information asymmetry?
Interview questionnaire (Greek version)	Ποιές είναι οι ομάδες που απαρτίζουν το σύστημα υγείας της χώρας μας? (π.χ. γιατροί, νοσηλευτές, φαρμακευτικές εταιρείες κλπ). Παρακαλώ καταγράψτε όσες ομάδες νομίζετε ότι συμμετέχουν.	Μπορείτε να τις χωρίσετε σε κατηγορίες ανάλογα με την δυναμική τους στον κλάδο? Ποιές/Ποιά είναι η ισχυρότερη/ες? Ποιές κατά την άποψη σας παίζουν πρωταρχικό ρόλο στις τρέχουσες αλλαγές που πραγματοποιούνται στην χώρα?	Ζούμε στην εποχή της πληροφορίας. Ποιά/Ποιές ομάδες πιστεύετε ότι διαμορφώνουν την πληροφορία? Ποιά/Ποιές έχουν ενδεχομένως προνομιακή πρόσβαση? Υπάρχουν μονοπωλιακά φαινόμενα στον κλάδο? Μπορεί η χρήση τεχνολογίας να βελτιώσει την διαχείριση της πληροφόρησης για το καλό όλων?
1	Doctors, Nursing staff, Pharmacists, Pharmaceutical companies, Paramedics.	1. Doctors, 2. Pharmacists, 3. Pharmaceutical companies and 4. European Union Directives.	Information is formed by the above 3 first categories plus nursing staff. Information is diffused in a monopolistic way and through definite channels. Nevertheless more use of technology can affect and change this phenomenon.
2	Medical Doctors, Nursing staff, Lab Doctors, Healthcare Administrative Services, Paramedical staff, Supportive staff (assistants, cleaning services, cooking services, safety and technical support).	1. Healthcare Administration, 2. Doctors, 3. Nursing staff, 4. other administrative supporting services (law services).	Information is formed by nursing staff, doctors and administratives in healthcare. I cannot say if someone has specifically more inside information, may be the administratives but it is not clear. There is not monopolistic use in the sector though, but more technology definitely is expected to help more the sector.
3	Doctors, administrative staff, nursing staff, technical and support staff (e.g. Computer department).	1. Computer staff, 2. Doctors, 3. Nursing staff, 4. Administrative, 5. Technical staff.	People that have mainly access in information is the administrative Computer people who have access in data and information. It is true that such people have more and direct access. Nevertheless, i do not know if this creates monopolistic status. The more use of technology will make situations more controllable and sharing.

4	President of Hospital, Directors of Departments, Nursing staff, Medical doctors, Paramedical staff, Administrative staff.	1. President of Hospital, 2. Director of Nursing staff, 3. President of Union.	Technology can help in general terms, but can also create problems. Information is provided by the Ministry of Health and its staff.
5	Doctors, Nursing staff, Therapists, other Health professionals, Technical lab staff, Technical assistants, Administrative staff.	1. Doctors, 2. Nursing staff, 3. Administrative-Technical staff.	All groups have inside information and define information in a sense, but each group process the information owns seperately and differently.
6	Doctors, pharmaceutical companies (medical and pharmaceutical visitors salesmen), pharmacists.	1. Doctors, 2. Pharmacists.	The groups that are more familiar to technology are the younger people, although the biggest market of healthcare is the older ones.
7	Doctors, nurses, pharmacists, technical staff, lab assistants.	1. Doctors, 2. Nursing staff.	Information is defined by all groups equally and all have access to it. There are monopolistic phenomena but more technology can help in balancing such occassions.
8	Doctors, dental doctors, nursing staff, other medical staff, social workers.	1. Doctors who hold and administrative positions, 2. University doctors, 3. Doctors, member in unions, 4. Doctors in pharmaceutical companies, 5. Nursing staff.	Information is defined mainly by political staff and medical staff. The increasing use of technology helps in the elimination of monopolistic situations. The management of information is not necessarily always effective and helpful.
9	Doctors, Administration, Pharmaceutical companies, Nursing staff, Political parties and Government, Patients, Administrative support.	1. Doctors, 2. Government, 3. Administration	Inside information have the doctors, pharmaceutical companies, patients and the administration. The use of technology can change and improve the administration of information.
10	Doctors, nursing staff, paramedical staff, technical staff, administrative staff.	1. Doctors	Inside information is controlled by doctors and technical staff who have access in information.
11	Doctors, nursing staff, technical staff of labs, social workers, administrative staff, cleaning and other suportive staff (drivers, workers etc), employees in information management office.	1. Doctors, 2. Nursing staff	There were some monopolistic phenomena of inside information but now this has changed due to increasing use of technology. Now, anyone who interest can find the information.
12	Doctors, nursing staff, pharmacists, administrative staff, supportive staff in hospitals, paramedical staff, technical services and technicians.	1. Doctors, 2. Paramedical staff, 3. Nursing staff, 4. Administrative staff.	Doctors and pharmaceutical companies have inside information and they form the information for the others. There are still monopolistic phenomena. Technology may help in improving the information administration.
13	Pharmacists, therapists, doctors, administrative staf, nursing staff, paramedicals, technical staff.	1. Doctors, 2. Nursing staff, 3. Paramedicals, 4. Administratives, 5. Technical assistants.	All involved groups have some kind of inside information. Technology can definitely improve the information administration.
14	Doctors, nursing staff, paramedical staff, administrative staff, Ministry of Health.	1. Doctors / this is the most important group which plays crucial role in current changes of the system as well.	Doctors has inside information and they are responsible for the formation and administration of information. They are responsible for the monopolistic phenomena which could be eliminated if technology penetrates.
15			
16	Hospitals Administration, Doctors, Nursing staff, Paramedical staff, Administrative staff, Pharmaceuticals staff.	1. Hospitals Administration, 2. Doctors, 3. Pharmaceutical companies	Information is formed by outside centers such as Mass Media.
17	Doctors, nursing staff, technical staff, administration.	1. Doctors, 2. Nursing staff	Doctors have inside information and they are responsible for forming the information as well. There are no monopolistic situations in terms of information administration, and technology can help in the development and restrain information asymmetry.

18	Doctors, nursing staff, pharmacists	1. Doctors, 2. Pharmacists, 3. Nursing staff	Information is administered outside the sector. Journalists and centers of press are responsible for the infusion of relevant information. Use of technology can help theoretically but not in practice.
19	Doctors, nursing staff, physiotherapists, pharmaceutical companies, pharmaceutical central warehouses, pharmacists.	There are two strong groups which demonstrate their own hierarchy; 1st group: (a) Doctors, (b) Nursing staff, © Physiotherapists; 2nd group: (a) Pharmaceutical companies, (b) Pharmaceutical central warehouses, © Pharmacists.	Information is actually administered from pharmaceutical companies; Monopolistic phenomena are referred to medicines and their markets. These contribute in the rolling of information in the system. Use of technology can definitely help in restraining information asymmetry.
20	Doctors, nursing staff, pharmaceutical companies, administrative staff, other supportive staff (cleaning, cooking, security etc), social services that participate in the system.	1. Pharmaceutical companies, 2. Doctors, 3. Nursing staff that belong to unions.	Inside information exists among pharmaceutical companies, doctors and University medical staff. Use of technology could help in terms of clarity in the system and the relations among groups.
21	Doctors, nursing staff, administrative staff, supportive staff (technicians, cleaning etc).	The most powerful group is the one that has the capitalised strength to impose changes in the system. This is troika. The privatisation of healthcare in the country is supported towards specific interests. Therefore outside interferes due to political decisions.	Actually none has full access to information. For example doctors have restrained access. Nevertheless, it is absolutely necessary to ensure accessibility to information, especially for the modern doctors.
22	Doctors, nursing staff, paramedical staff.	In a healthcare system which is doctor-centered, naturally the main role is played by doctors. Second, the nursing staff is significant, since this is a new dynamic group which plays a significant role as well and tries for advancement.	Pharmaceutical companies play the significant role in information administration in the system. These companies decide who will have access in information and the range of this access as well. Use of technology is the door for the modernisation and democratisation of information for all.
23	Doctors, nursing staff, pharmacists, pharmaceutical companies, supportive staff, physiotherapists, other technical staff.	1. Doctors, 2. Pharmaceutical companies. These two powers play the major role in the sector.	Privileged accessibility in information is focused on doctors who are the main receivers of various information mostly from pharmaceutical companies through pharmaceutical representatives. Free access in technology and information will help the administration information.
24	Doctors, nursing staff, pharmacists, pharmaceutical distributors, hospitals, ministry of health, pharmaceutical companies, associations, unions, government, legislators.	1. Government, 2. Legislators, 3. Ministry of Health, 4. Unions, 5. Doctors-Pharmacists-Pharmaceutical distributors-Hospitals, 6. Pharmaceutical companies.	Inside information has every group in terms of its own priorities. Technology can improve information administration as well as the control over information. It is true that during last years many groups have access in information. Steps taken so far are small though but to the right direction.
25	Doctors (private/hospital/clinical/insurance/University), Nursing staff, Paramedical staff, Pharmacists, Pharmaceutical companies, Pharmaceutical and Medical distributors and wholesalers.	1. Pharmacists (due to their strong union), 2. Doctors, 3. Nursing staff, 4. Paramedical staff.	Information asymmetry exists everywhere, since any group can gain access depending on the resources it acquires. Information administration is a broader issue of fair treatment and credibility.

26	Doctors, nursing staff, pharmacists, physiotherapists, speechtherapists, ergotherapists, biologists, biochemists, technology labs professionals, chemists, pharmaceutical companies, pharmaceutical warehouses, technical assistants, government, administrative staff of hospitals, insurance organisations, insurance companies, state public services, the national organisation of medicines.	Group A: Doctors, State, Pharmaceutical companies and warehouses, Group B: Patients, Group C: Public Insurance Organisations, Group D: Supply companies, Group E: Administration, Group F: Lab professionals, Group G: Nursing and paramedical staff.	There is information asymmetry since some groups form and administer the information and these are groups A, D and F because they have the ability to cooperate with external scientific communities and have the knowledge. Nevertheless, the adoption of technology gradually helps also patients and others. Monopolistic phenomena in regards to information exist mostly from pharmaceutical companies. Regarding the supply of goods, the monopolistic situation is less. Regarding the information created by the government still the access is restricted especially in terms of any changes in healthcare system.
27	Healthcare system is divided into public and private sectors in the country. Players are: doctors, nursing staff, pharmacists, dentists, paramedical staff, other supportive professions such as drivers of ambulances, assistants etc.	All groups have power and play significant role but if we would like to prioritise them we have to consider the level of healthcare provision (First-Second-Third). In first healthcare level, doctors, nursing staff and paramedical staff are important. In the other two levels of provision, doctors, nursing staff, dentists, paramedicals, assistants. In all these provisions, it is necessary the existence of pharmaceutical companies. Most powerful groups are doctors and nursing staff. These two groups with the cooperation of pharmaceutical companies play significant role in the system.	Inside information has to do with two issues. First with the information that is produced by private companies and non-governmental organisation which create information and promote it for various reasons, e.g. advertisements, mostly for their personal interests. Such groups have direct access to the society. Regarding medical issues, pharmaceutical companies still have the power to form information. They create monopolistic situations and this affects the economy of the country. Pharmacists used to be a powerful monopolistic group as well, at least until some time ago. Regarding doctors, any inside information has to do mostly with their scientific tasks, since their job is too specialised. Any monopolistic behaviour is related to the nature of their job and expertise which among others, is very significant for the society.
28	Doctors, nursing staff, administrative staff, paramedical staff, psychologists, economists, lawyers, politicians.	1. Politicians, 2. Doctors, 3. Lawyers, 4. Economists, 5. others.	All groups have access and form information. Possibly doctors might have some privileged access. There are no monopolistic phenomena in the sector. Technology can help in the administration of information.
29	Doctors, nursing staff, politicians, technical staff, supporting staff.	1. Politicians	Politicians have more accessibility to information. Technology could improve information administration.
30	Doctors, nursing staff, pharmaceutical companies, administrative staff, pharmacists.	Most powerful groups are: 1. Doctors, 2. Nursing staff (Heads). In current situation, primary role are playing pharmacists.	Information is administered by nursing staff and the pharmacists. Pharmacists have privileged access to technology. Technology, as a mean could help in better information administration.

31	Doctors, paramedical staff, pharmaceutical companies, administrative staff.	All categories have power in the sector.	There are monopolistic phenomena in the sector, in regards to information administration, but technology will help and it is necessary.
32	Doctors, nursing staff, paramedical staff, pharmacists, pharmaceutical companies, administrative staff, political staff.	1. Administrative staff	Doctors have better access to information since they form it as well. Pharmaceutical companies on the other side create monopolistic phenomena in terms of information administration. More use of technology will help definitely the sector.
33	Doctors, nursing staff, pharmaceutical companies, administrative staff.	1. Doctors, 2. Nursing staff.	Doctors and administrative staff are responsible for the information generation. Use of technology may improve information administration.
34	Nursing staff, Doctors, Technical medical lab assistants, pharmacists, administrative staff, technicians, biomedical staff, physiotherapists, ergotherapists, psychologists, social workers.	1. Doctors, 2. Administrative staff, 3. Nursing staff, 4. Technical staff, 5. Paramedical staff.	Doctors and nursing staff are the groups that create information. There is no privileged access for any group. Use of technology could help in the improvement of information administration.
35	Doctors, nursing staff, paramedical staff.	The one group supports the other.	There is no actually a unique group that has more access in information. Information administration is a matter of personal initiative. As a result groups have restrained access. The use of technology will definitely help.
36	Government and Ministry of Health, Administration of Hospitals, Unions, professional associations, pharmaceutical companies, doctors, companies that are involved in the sector.	The most powerful group is Government. Government does not want any changes.	Government continues to administer information which still creates problems although we live in the era of free information. Issues that should have been solved remain unsolved.
37	Ministry of Health (central government), pharmaceutical companies, doctors and nursing staff.	The most powerful group is Government. All other groups have been eliminated.	Information administration is done by mass communication media. It is not clear whether there are monopolistic phenomena.

# Thematic Analysis Taxonomy

## Research Questions Framework

### Interviews' results on INTERDEPENDENCIES

Interview questionnaire (English version)	How important are the relations among agents in healthcare? Do relations play a decisive role for the system? Is this positive, negative, neutral?	Who defines the relations patterns in the system? Who is responsible for the relations; the system, the building blocks of agents?	Do relations create interdependencies? Does this create paradoxes in the system? Does this reveal weaknesses?	What is the real nature of interdependencies? Do they enable or block emergence and self-organisation?
Interview questionnaire (Greek version)	<p>Υπάρχουν σχέσεις αλληλεξάρτησης μεταξύ ομάδων στον τομέα της υγείας στην χώρα μας? Πόσο σημαντικές είναι αυτές και πόσο επηρεάζουν την λειτουργία της υγείας? Ανάλογες σχέσεις μπορεί να συμβάλλουν θετικά ή αρνητικά σε οποιοσδήποτε εξελίξεις?</p>	<p>Ποιός καθορίζει τις σχέσεις αλληλεξάρτησης? Κάποια ομάδα, συνδυασμός ομάδων, μήπως το σύστημα το ίδιο λόγω της οργάνωσης του?</p>	<p>Μπορεί μια σχέση αλληλεξάρτησης να δημιουργήσει παραδοξότητες ή να επιφέρει στρεβλώσεις?</p>	<p>Μπορούν αυτές οι σχέσεις να προκαλέσουν αλλαγές στο σύστημα? Μπορούν να βοηθήσουν στην απελευθέρωση νέων υγιών δυνάμεων? Μπορούν να οδηγήσουν σε μια νέα αυτο-οργάνωση?</p>
1	<p>There are strong relationships among agents in healthcare, such as: (doctors-nursing staff, doctors-pharmacists, doctors-pharmaceutical companies). These relations are significant for the healthcare operation. They might have either positive or negative effect.</p>	<p>Responsible for the definition of relations patterns is the system. The way that this is organised creates such distortions.</p>	<p>Since the system is organised in a rather paradoxical way it is inevitable to avoid distortions and unbalanced relations.</p>	<p>Only changes in relations patterns could enable changes in the system.</p>
2	<p>Yes, there are relations among agents which affect healthcare operations. Might be positive and negative at the same time.</p>	<p>Relations patterns are defined by the Law and Institutional framework in general. In continuous, agents-groups and the system are responsible for the application.</p>	<p>Yes, relations may create interdependencies.</p>	<p>Relations cannot create changes in the system. They can help though the release of new powers and they can help in a new self-organisation.</p>

3	It is true that there are relations among groups. It is imperative for all services to operate in a correct manner to gain results. Otherwise this cannot be achieved.	Relations patterns are defined by the system itself and they way this is organised.	Interdependencies are not necessarily negative. If they do not operate in a correct manner this of course may raise paradoxes and create weaknesses.	There happen new attempts for the improvement of relations and the interdependencies existed. The introduction of new technologies is expected to alter and help current situation towards emergence and self-organisation.
4	There are relations among agents which can affect healthcare either positive or negative.	Relations patterns are defined by the system.	Relations do create interdependencies which in continuous create paradoxes and distortions.	Interdependencies could be positive and could help in unleash of new powers towards self-organisation.
5	There are relations among agents which are considered very important. These do play a significant role in the system.	Relations patterns are defined by everyone, every group and the system itself.	Interdependencies create paradoxes and generate different perceptions about information and other characteristics in the sector.	Such relations can direct to unleash of new powers and self-organisation.
6	There are interrelations among agents. These days that the system is in transition, still doctors have the full power since they decide which drug to give in the patient. Although the system is on-line, doctors define which medicines will be given and patients do not have the option to buy substance instead of a given brand.	Relations patterns are defined by the system which is badly organised.	Relations create interdependencies as a natural outcome of the system's setup. Nevertheless, such closed relations could be avoided by placing boundaries.	Interdependencies could be proved beneficial for the system. For example these could be direct to the decrease of pharmaceutical spending and improvement of relations among doctors-patients.
7	Relations among agents are very important. These must exist since they help in the advancement of healthcare as service and science.	The system is responsible for the patterns of relations.	Relations create interdependencies and such a characteristic creates paradoxes in the system. It may create distortions and reveal weaknesses.	Real interdependencies could direct in new organisation, through generation of new powers.
8	There are relations among agents. Such relations are obvious on daily practice, but when there are problems in collective level, these does not necessarily work. Cooperation among agent is too difficult and this does not help the sector.	The system imposes the relations patterns. Sometimes responsible for the relations are the leaders of the groups who act on behalf of other motives. The system demands the groups to work independently in order to avoid further correlations, but this is not feasible in the end.	Relations create interdependencies and may direct even in the change of management and people in charge.	Interdependencies serve internal purposes for the system. They could enable emergence but this requires change of mentality as well. Interdependencies cannot help positively unless there is cooperation among agents, exchange of ideas, common perspectives and willingness to succeed. All these are too difficult to take place in the sector.
9	There are relations among agents, which are considered very significant. Such relations can affect either positive or negative.	Relations patterns are defined by the system itself. The interdependencies developed are mutual for all groups in the system.	Interdependencies create distortions and paradoxes.	Interdependencies enable emergence and self-organisation especially in the case of a clear, balanced and mutual benefit cooperation among groups in the sector.
10	There clear relations among agents and these raise positive contribution to the system.	The relations patters are defined by the healthcare system.	Relations create interdependencies.	Interdependencies help in revealing new powers and may direct to self-organisation.

11	The relations among agents are very important as long as these are acting as groups and not as leaders who would like to stratify people into leaders and followers. Healthcare is affected negative whenever groups are not acting as real groups. Therefore, there is a need for consensus and link which will act positively.	The relations patterns are defined both by the groups and the system in combination with knowledge and common interest towards better services to patients. The system due to inadequacies is an obstacle in any development.	Interdependencies are not negative as long as there exists the common knowledge of intersupport and mutual respect among members. The good organising, programming and consensus does not bring paradoxes in the system.	Real interdependencies bring new powers and changes in the system, along with better results. Self-organisation requires better schooling to be effective.
12	There are relations among agents, which are very decisive in affecting healthcare services. Such relations may raise positive or negative effects.	Relations patterns are defined by the system itself.	Interdependencies as a result of relations patterns followed, create paradoxes and distortions.	Interdependencies can reveal new powers.
13	Relations exist among agents and these are very important.	Relations patterns are defined by a group of groups.	Relations do create interdependencies.	Interdependencies can direct to new structures and self-organisation.
14	There are relations among groups for example doctors with nursing staff, these are very significant and play crucial role in the sector.	Relations patterns are defined by the system.	Relations create interdependencies.	Such relations and interdependencies could cause changes in the system. They could lead to a new self-organisation as well.
15				
16	Relations among groups exist and are very significant.	Relations patterns are defined both by the system and some groups. Actually the structure of the system helps preservation of current patterns.	Relations create interdependencies and this creates paradoxes and distortions.	Current powers cannot help in self-organisation and cannot contribute in revealing new powers.
17	The relations among agents are very important and there are strong interdependencies which affect the progress of the system as a whole.	Relations patterns are defined by the system.	Interdependencies may raise paradoxes but from time to time, not always.	Interdependencies may help in unleashing new powers towards a new self-organisation of the system, but I do not know if they can direct to changes.
18	Of course there are relations among agents in the sector. Although these are not considered important, there exist and unfortunately affect the sector. As a result such relations might play either a positive or negative role.	Relations patterns are defined by a combination of groups and the competition.	Yes, relations create paradoxes and distortions and actually this happens very often.	Such relations might enable changes but in a small range. Regarding emergence and self organisation this necessitates the cooperation of various factors and powers.
19	There are strong pairs of relations among agents such as: doctors-pharmaceutical companies, pharmacists-pharmaceutical warehouses and distributors, pharmaceutical companies-pharmaceutical distributors. Such relations play significant role in the sector since these define the framework upon the system works on. These contribute both negatively and positively since these define any developments.	The answer is the system. The system has been structured in such a way that nobody can proceed alone. Everybody needs everybody.	There is equivalence among groups and interdependencies demonstrate a kind of equivalence among the groups as well. Such organisation of powers could create paradoxes.	Groups and their interdependencies have the power either to block or boost emergence and self organisation.

20	Relations among agents exist and are very important.	Relations patterns are defined by the government and its agencies which create the framework.	Interdependencies are result of relations which exist, such as between doctors-pharmaceutical companies. A paradox stemmed from interdependencies is that many valuable staff decide to leave healthsector and go abroad.	Such relations may destroy the whole system. Healthy powers cannot succeed if current system remains.
21	The whole system is built on relations and interdependencies. This is how it is structured. In any case, this implies the definition of a system. Any progress is result of how such relations operate and affect participants and groups.	The system defines relations patterns in general terms. Of course this, from time to time, is affected by personal interests of groups.	Certainly such relations create paradoxes.	The system is strongly structured and with strong interdependencies and relations. As a result, given the current situation, it is difficult for the system to reach a new self-organisation and new powers to be revealed.
22	Doctors have direct relationship with pharmaceutical companies, something that is acceptable to an extent, but beyond this, in general, it is dangerous for the fair treatment of patients.	There are strong castes within medical group which affect the system and reproduce current mentality for the benefit of these groups.	Certainly relations create interdependencies which generate paradoxes. Such relations affect patients negatively.	Personal and independent reaction is much more important than interdependencies. Every participant in the system should consider carefully his/her participation and action and should fight for the best.
23	The relations among agents in healthcare, are relations of interdependence and interaction. Such relationships could boost knowledge on the one side, while on the other side could affect negatively.	The healthcare system itself, and the way this is structured defines the internal relationships.	There are specific relations that create interdependencies in the system. Such relationship is between doctors and pharmaceutical representatives which damage the sector and bring paradoxes.	No comment
24	The relations among agents are very important and to an extent that affects the supply chain of the system.	The governments so far and their mechanisms are responsible for the relations patterns.	These relations exist and have definitive stress regarding any evolvments in the sector. They do create paradoxes and problems in healthcare.	State and government are the entities who usually block any progress due to their low level of intelligence, information and knowledge they have.
25	Certainly there are relations among agents especially between doctors and pharmaceutical companies. This relationship has both negative (over-prescriptions of medicines) and positive (pharmaceutical companies fund research and organise congresses) effects. The wrong manipulation of such relationship may direct to commercialisation of healthcare.	Mainly the system defines relations patterns and this is due to the existed ankylosis.	Relations create interdependencies since the human factor demonstrates emotional vulnerabilities or even money dependencies.	It would be wrong to allow the sector to a new self-organisation at least without control, unrestrained.

26	Of course, there are relation and interdependencies among groups in the sector. Actually there is a chain of relations among groups which is very significant for the survival of the sector. Such interrelations define policies and how these are applied. On the other side, these different relations are responsible for the different implementations of the same policies in the same sector.	The system defines the interrelations. The system and its organisation, enables groups and allows such relations.	Relations do create interdependencies and these raise paradoxes mostly stem from the groups that are in the beginning of the chain of relations. These are: administration-government, administration-doctors, doctors-pharmaceutical companies.	Interdependencies create obstacles and block any new powers. Current system does not have a fair system of evaluation and control. For example, doctors choose specific medicines and promote specific health tests. Under these circumstances, any progress is difficult. In addition, the sector has many groups which have many interrelations, therefore it is difficult to find its self-organisation.
27	Of course there are interrelations among groups. A classic relation is among doctor-nurse in the level of daily practice within the clinic. Interrelations are also among other groups in terms of cooperation for the benefit of the sector, in areas that is not so obvious. There are though some interrelations that should be stopped such as between health professionals and pharmaceutical companies for personal benefits.	The system defines the relations patterns in a certain extent. Since the staff is obliged to cooperate and interact, it is inevitable not to exist relationships. The nature of such relationships and whether these are positive or harm the system depend on the personalities of the participants.	Paradoxes and distortions do exist only in the occasion of misusing these relations for personal benefits.	It is possible for the interdependencies to enable new structures and organisations without creating problems in a hospital for example. Good relations and interdependencies could create new units, clinics and develop the environment for new cooperations. Such services though should always be available to all patients and not only to the rich ones.
28	There are relations among groups which are important because they affect the operation of healthcare provision. In addition they affect both positively and negatively the progress in the sector.	The system defines the relations patterns. This is due to how this is organised and the existed structures. Current system is doctor-centered focusing in classical ways of managing and hierarchy.	Interdependencies could create paradoxes only in the cases of individuality, competition, introversion, intolerance and autarchy.	Interdependencies may cause changes but this prerequisites a good administration of change, knowledge, persistence and cooperation.
29	There are relations among agents which are important and may contribute in any evolvments in the sector both positively and negatively.	Relations patterns are defined by personal initiatives.	Relations do create interdependencies.	Such interdependencies can cause changes in the system.
30	There are strong relations among groups. However, now that prices are controlled, relations change especially between doctors and pharmaceutical companies.	All the above, are responsible for defining relations patterns.	An interdependence might create paradoxes in the system.	It is difficult for interdependencies to enable new powers and a new self-organisation in the system. I see this accomplishment as very difficult.
31	There are relations among agents which are very important and contribute positively in the progress of the sector.	Both the system and the building blocks of groups are responsible for defining relations patterns.	Relations create interdependencies and this enables paradoxes and distortions.	Interdependencies could enable changes, as long as, there will take place some radical changes in the structures of the system.
32	There relations among agents which are important.	The system defines relations patterns.	Relations create interdependencies and these create distortions.	Such interdependencies could enable emergence of new powers in the system.
33	Relations among agents are important and contribute positively in the progress of the sector.	The system defines relations patterns. The Directors of Clinics are responsible for the relations.	Relations and interdependencies create paradoxes in the system.	Such relations could help the system. They could help in unleashing new powers subject to successful selection of new staff. This needs patience and persistence.
34	There are relations which are important and could be used for the benefit of the healthcare sector. Especially for the benefit of patients.	The interrelations and relations patterns are defined by the system and the groups.	When relations are not equivalent then there are distortions.	Relations could enable changes in the system and if these relations are healthy could change the whole system.

35	Interrelations are inevitable in an environment where strong relations exist. These are positive and necessary for the system.	The groups define relations patterns.	Distortions are the result of personal actions and not the result of interdependencies.	Interdependencies can cause changes through a series of interactions among groups.
36	There are relations among groups that create dependencies in a degree of high protection.	The system defines relations patterns and founds itself at the beginning of chain.	There are no paradoxes in the system since each group knows that depends on the others.	Such relations could enable changes.
37	Healthcare is affected by all its members. Relations are very important. When a sector malfunctions affects others as well and decrease the level of healthcare provision.	The system defines relations patterns.	There are paradoxes and distortions for which the system has therapies.	New healthy powers will direct to new self-organisation.

## Interviews' results on HETEROGENEITY (DIVERSITY)

Interview questionnaire (English version)		Where and how this is identified? What kind of problems does this create?	Can heterogeneity be a source for development?
Interview questionnaire (Greek version)	Στο σύστημα υγείας συμμετέχουν διάφορες ομάδες? Υπάρχει διαφορετικότητα μεταξύ των ομάδων, παρόλο τους κοινούς στόχους που ενδεχομένως έχουν? Εάν υπάρχει διαφορετικότητα, πόσο ευρεία είναι αυτή?	Σε ποιούς χώρους του τομέα, μπορούμε να διαπιστώσουμε εάν υπάρχει διαφορετικότητα? Εάν τελικά υπάρχει διαφορετικότητα, αποτελεί αυτό πρόβλημα για την χώρα?	Πιστεύετε ότι η διαφορετικότητα μπορεί να είναι πηγή εξέλιξης?
1	There is heterogeneity in the participative agents and this is the main cause for the deviation from the common target which is providing good healthcare services.	This could be observed mostly in nursing area and the pharmaceutical care provision. Especially in these two areas heterogeneity is a problem for healthcare.	Heterogeneity could be, in general, a source of development for the sector.
2	There are differentiated groups in healthcare and there is heterogeneity among them. This differentiation is rather wide in terms of different approaches in the sector.	The areas of medical doctors is a suitable area to identify this diversity. This is more obvious in hospitals and within administrative services. Referring to hospitals we may include Health Centers of the country (Kentra Ygeias), Peripheral Medical Units and Hospital across country. This diversity becomes a problem for the sector.	Heterogeneity and diversity could be a source of development but could become also a brake in any kind of evolution for the sector.
3	There is diversity and in extent heterogeneity in healthcare. Different groups are participating.		
4	There is heterogeneity in Greek healthcare sector which demonstrates rather a wide range.	Heterogeneity and diversity could be observed mostly in medical and administrative staff as well as in nursing staff. The differences among these groups creates problems in healthcare and especially in the operation of hospitals.	Diversity and heterogeneity could not be a source of development.

5	Heterogeneity is the normal result of the different targets that each group has in the sector. For example: Doctors and nursing staff have same targets which in the same time are different from administrative and technical staff. Different groups, different targets.	Heterogeneity is not a problem, since different groups have different actions because off the different objectives.	Heterogeneity and diversity can be a source of development.
6	There exists heterogeneity in the Greek system, but most of the times this is not accepted. As a result diversity means minority.		
7	There is diversity in the sector and it is wide.	Diversity and heterogeneity could be observed in many places and is rather a problem, not only for the sector but for the country as well.	Heterogeneity could be a source of development.
8	Heterogeneity in healthcare is the difference among agents in various areas such as knowledge, expertise, tasks, nature of job itself. There is much difference but common elements are many and all groups in healthcare have things that unite them.	Diversity and difference usually create problems in communication and understanding between people. This is more obvious when one group cannot understand the problems of the other group. In a complex system this weakness, isolates the groups and they cannot see the benefit for the whole system.	Heterogeneity can only be a source of development if groups can find common ground to meet and discuss. Only in this situation pluralistic approaches could be beneficial for all and each group will realise that emphasis should be given in strong points rather than weaknesses.
9	Heterogeneity exists in terms of rewarding, personal interest, specialised duties. Such characteristics create contradicted relations.	Heterogeneity exists in all areas of the sector. This can be a problem for the country unless there exists a framework of common principles accepted and applied from everyone.	Diversity could be a source of development.
10	There is no real heterogeneity among groups in healthcare sector.	Heterogeneity does not exist and does not create any problems in the healthcare system of the country.	Real heterogeneity and diversity, if exist, can be source of evolvement.
11	Heterogeneity in healthcare stems from the different professions that exist in healthcare. Heterogeneity is cultivated through education most of the times but through years is eliminated through experience.	Hererogeneity is everywhere and usually does create problems.	By itself cannot be a source of development, but it can be in combination with other factors.
12	Heterogeneity is the phenomenon of the existence of different groups in the system. This heterogeneity is wide in healthcare.	Heterogeneity exist mainly in medical and paramedical areas, but it does not consist a problem for the country unless it affects the cooperation of groups.	Heterogeneity may be a source of development.
13	There is heterogeneity in healthcare, and this is due to the different objectives of the groups. Nevertheless, they have common targets in the frame of healthcare.	Heterogeneity is mostly identified in administrative sector.	It can be source of development.
14	Heterogeneity exists and mostly refers to development and financial decisions.	Hererogeneity could be better identified in hospitals.	Yes, heterogeneity can be a source of development.
15			
16	There is heterogeneity and this is rather wide in the sector.	Heterogeneity sometimes blocks cooperation and consensus, therefore this is a problem for the sector.	Heterogeneity may be a source for development.
17	In healthcare there are different groups which produce heterogeneity. This difference among groups is huge.	Heterogeneity could be observed everywhere in the sector and this does not create any problem for the country.	Heterogeneity could be a source of development.
18	Heterogeneity stems from different initiatives and targets that different groups have. This heterogeneity demonstrates a big range.	Motives and results are the main attributes of diversity. Heterogeneity creates problems for the country in general. The only way to help positively is when this contributes in forming a clear competitive environment.	Heterogeneity could be a source of development only when this operates productively and correctly.
19	There is heterogeneity and its width is defined by the initiatives and wills of each group seperately. Heterogeneity demonstrates an additional grouping such as Pharmacists-pharmaceutical companies-distributors.	Heterogeneity could be observed and found everywhere. If heterogeneity is administered succesfully it will not create problems.	Heterogeneity can be a source of development.

20	There is no heterogeneity in healthcare system.	There is no heterogeneity in healthcare system.	Heterogeneity and difference do not exist in terms of evolvement.
21	Definitely, heterogeneity exist in the sector. This stems from the different aims, roles, motives and attitudes of the groups that work in the sector. Responsibilities are different as well. Some specific employees, especially doctors, have the primary responsibilities in the system.	Heterogeneity could be observed in any place, especially where the clinical work takes place. In back up operations, such as lab assistants, administration, heterogeneity is not so obvious.	Heterogeneity is more of a source of problems and tensions rather than a source of development. Heterogeneity is something that I do not recognise.
22	In the sector there are different groups which do not necessarily have common ground for cooperation. There is heterogeneity which is revealed through evolvement of things. Every group is an equally active member and a possible attractor for change, attracting the others to better prospects.	Heterogeneity is sourced from people mostly and not groups.	Heterogeneity should be a source for development.
23	No comment	No comment	No comment
24	No answer	No answer	No answer
25	Diversity-heterogeneity is a general phenomenon in all labour fields. Of course, each group has its own specific aspirations and this by itself brings differences.	Heterogeneity could be observed mostly in hospitals and this is not found only in Greece but in other countries as well.	Heterogeneity could be a source of development.
26	Heterogeneity exists especially in terms of scientific orientation and education, the level of knowledge and abilities, the level of responsibilities. Also heterogeneity includes any personal ambitions and individuality.	Heterogeneity could be seen in all sectors and this is not negative for the country.	Heterogeneity can be a source of development if personal differentiation could be homogenised for the common benefit under an effective administration.
27	There are different groups in the sector but with common targets and common vision. There is heterogeneity but this does not make them different for the benefit of the services provided.	Heterogeneity could be mostly seen in hospitals. Sometimes heterogeneity is cultivated by the system and transforms internal groups since they do not have the same treatment from the system. For example, during crisis, there are hospitals that are obliged to cope with much more patients although they do not have the appropriate budgets. This is more intense in specific areas such as in the hospitals of Epirus. Therefore, there are not only the given heterogeneities but also the ones that are nurtured by the system itself. If the situation was better heterogeneity and interdependencies would be creative and finally would help much more.	Probably heterogeneity is the source of development but it cannot progress alone without the help of society and vision from the staff which abort any negative relationships.
28	There is heterogeneity but this is not wide. Since groups have common targets they interrelate and co-exist in a common route.	Heterogeneity exists and starts from the education of different groups. This is not a problem though as long as there is consensus and groupwork.	Yes, heterogeneity could be a source of development but with the help of cultural changes and change in mentality.
29	Heterogeneity exists due to different obligations and different targets of the groups that exist in the system.	Heterogeneity do not create problems as long as there is effective cooperation among member groups.	Heterogeneity could be a source of development.
30	There is heterogeneity among groups and this is based on the difference in responsibilities and tasks. Doctors care for patients, companies work for keeping doctors satisfied, nurses are in the middle and administration might or might not interfere in these relations.	Heterogeneity could be seen in hospitals. Sometimes it could be a source of problem especially when there are no controls, e.g. unknown medicines that are used in the sector.	Heterogeneity could not be a source of development.
31	There exists heterogeneity but not in a wide sense.	Heterogeneity is not a problem for the country.	Heterogeneity could be a source of development.
32	Heterogeneity exists in the system.	Heterogeneity could be seen in hospitals.	Heterogeneity could be a source of development.

33	There is heterogeneity which stems from different purposes and targets. These differences could break balances.	Heterogeneity is a problem, especially in the workplaces. This is more emphatic when incapable people work in the sector affecting badly the quality of employment.	It is not necessary that heterogeneity is a source of development.
34	There is heterogeneity among groups in the sector and this is due to the specialties of each profession.	Heterogeneity exists between two main groups. From the one side doctors and nursing staff and from the other side administrative, paramedical and technical staff.	If heterogeneity is creative then could be a source of development.
35	Heterogeneity exists due to different groups. This is wide and necessary for the sector.	Heterogeneity stems from the multiple roles of structures in healthcare. The bottom line is the effective therapy and treatment of patients. As a result heterogeneity is not a problem since this does not affect the quality of offered services.	Yes for sure, diversity is always a leverage for thinking and acting towards results.
36	There is heterogeneity but the target is the same. More profit from the sector.	The heterogeneity is not accepted in the sector because if this was accepted we wouldn't enter in crisis.	Heterogeneity creates progress and this is the solution.
37	Heterogeneity depends on different groups and these groups converge. The more diversity exists among groups the more diminishing services are offered.	Heterogeneity could be identified in central government, universities and hospitals. Nevertheless this is not a problem for the country.	Heterogeneity could be a source of development if all groups decide to evolve.

# Thematic Analysis Taxonomy

## Research Questions Framework

### Interviews' results on ATTRACTOR PATTERNS

Interview questionnaire (English version)	<p>What is an attractor pattern? Who is an attractor in the current healthcare system in the country?</p>	<p>How these patterns work in the system? Do these impose contexts? Is this possible for a new attractor to emerge from changes in structures?</p>	<p>Can the system work without attractors? When/Under which circumstances attractors take responsibility and protect the system?</p>
Interview questionnaire (Greek version)	<p>Ποιοί καθορίζανε και καθορίζουν τα πρότυπα συμπεριφοράς μέσα στο σύστημα υγείας της χώρας μας?</p>	<p>Πως λειτούργησαν και λειτουργούν τα πρότυπα συμπεριφοράς όσο αναφορά την εξέλιξη του συστήματος? Μπορούν τα πρότυπα συμπεριφοράς να αλλάξουν σε ένα νέο σύστημα οργάνωσης?</p>	<p>Θα μπορούσε ένα καινούριο σύστημα υγείας να προοδεύσει βασιζόμενο στις υπάρχουσες και παλιές δυνάμεις του? Θα μπορούσε να αντέξει τις έντονες μεταβάσεις στην νέα αυτο-οργάνωση? Ή θα ήταν καλύτερο να διαλυθεί και να ξαναχτιστεί σε νέα θεμέλια?</p>
1	<p>Firstly, the Law framework, but since there is absence of control, reporting and evaluation, such patterns are defined by personal or agents' interests.</p>	<p>Attractor patterns plays a crucial role in the system's evolution. I consider that these patterns will not change easily in a possible change of the system.</p>	<p>It is impossible to destroy and re-build the healthcare system of the country. There must take place radical changes based on existed and new powers.</p>
2	<p>Attractor patterns are defined by the informal institution's framework, the informal professional organisations, trade unions, and social prejudices.</p>	<p>Existed attractor patterns have been negative for healthcare and it is imposed to be changed.</p>	<p>I consider that the system should be re-established.</p>
3	<p>Attractor patterns are the Ministry of Health and the Law framework. These groups direct patterns of behaviour.</p>	<p>In general terms these patterns of behaviour worked positively. If the system changes the patterns of behaviour will change as well.</p>	<p>The new system should be based in current and older powers to rebuild using attractors and trying to overpass previous distortions. We do not need another catastrophe.</p>
4	<p>The main attractor in the healthcare system is the Public Code of Professional Ethics for the employees in the sector.</p>	<p>Patterns of behaviour should be followed from everyone. They could change in a new system.</p>	<p>The system cannot work without attractors. Healthcare should be re-built but with the exploitation of older powers. Nevertheless, the characteristic that should be changed is mentality.</p>
5	<p>The attractors in the system are all agents themselves. The system defines the Professional Codes of Ethics, but groups implement them or not.</p>	<p>Patterns of behaviour may change in a new system.</p>	<p>The rules have to change, the operational processes have to change, the Management of hospitals need to change.</p>

6	Attractor patterns are defined by the system and its organisation. In continuous this is exploited by groups such as doctors, pharmacists, companies etc. When there is no control and measurement in a system then there is no punishment and decay.		The old system should be kept and be re-structured.
7	All agents that participate in the system are attractors and contribute in the formation of attractor patterns.	Patterns of behaviour operate both negative and positive. They can affect and change the system towards new structures.	The system should be destroyed and rebuilt from scratch based on new axes.
8	Attractor patterns and patterns of behaviour are defined by the educational system of the country. Especially University education and the mentality of academic professors play a significant role in the perception of healthcare system. For example, the traditional view about the doctors' status in the system.	Attractor patterns does not help the evolvement of system, but they maintain it in the same position. A new system demands new patterns. The challenge is to create a new system based on existed patterns but adapted to new needs and new targets. To copy patterns from others is not useful.	The system cannot work without atractors. It would be ideal to destroy the system and build it from the beginning but this is unrealistic. Unavoidably we should follow a transition stage where older powers will mix with newer and together will lead changes.
9	Attractor patterns are not specific groups or persons rather than our mindset, cultural approaches, job environment and personal interests.	Patterns of behaviour can change the system. But this demands time since the prerequisite is to introduce and accept first new prototypes.	The new system could be born from the old one, could be rebuilt, could be regenerated, but not destroyed.
10	Pharmaceutical and medical companies are the attractor patterns who additionally define the behavioural patterns in the system.	Behavioural patterns and attractor patterns operate in terms and towards profit making. This target, defines behaviours and development in the system.	The system should be rebuilt from scratch.
11	Attractor patters are generated over the system's weaknesses. Wherever there is a gap there is something new born. And this was a mistake so far.	Current attractor patterns do create problems. But these can contribute in changing structures.	The system should restructure itself using old and new powers as much as possible.
12	Attractor patterns are affected by our education system and administration which cultivates this system.	Behavioural patterns were affected by attractor patterns in a monopolistic and backward way for the system.	The system should be destroyed first. Then we should built on new foundations.
13	Attractor is the Ministry of Health for the system in Greece.	Attractor patterns can enable changes and can impose contexts.	The system should be built on new foundations.
14	Doctors are attractors in the system.	Attractors form patterns for their own benefit. As a result they may either block or help changes in structures.	The system cannot work without attractors and should be built on older and new powers.
15			
16	Attractors are the top management of hospitals and the doctors.	Behavioural patterns will not work unless managers and doctors change their patterns.	Unfortunately the new system should be built from zero and the old one should be destroyed.
17	Attractors are not persons or groups rather than the law, ethics and the framework that exists and everybody follows.	Behavioural patterns can certainly change	A new system could be based both in old and new powers.
18	As attractors we can define doctors and pharmaceutical companies and these groups form the relevant patterns as well. Mainly this starts from pharmaceutical companies.	These patterns work both positively and negatively. Nevertheless, these impose contexts and they additionally can help changing the structures.	The system should be destroyed and be rebuilt from the zero.
19	Attractor patterns are formed by attractors who are the leaders of the groups that participate in the system. These leaders define the behaviour of the members.	Patterns operate both negatively and positively and these may change contexts or even create new contexts in the sector.	On the one side the system cannot work without attractors. A system cannot be based in its old powers, if this wants to survive. There are needed dramatic changes which mostly deal with the existing culture and mindset. Such a system cannot withstand a transition in a new stage. Therefore, i consider that the system should be destroyed, and be created from the beginning.

20	Attractors in current system are trade unions and parties who cultivate the relevant patterns. Rest of participants just follow and do simply their jobs. Some of them could be really good examples for the ones though who are ready to see the difference.	Current contexts and behavioural patterns are imposed by the pair: government-unions who have destroyed productivity.	The system needs new attractors, in order to gain a new perspective. The new system cannot base itself in old powers and mostly based on existed mentality and culture. As a result, the old system should be destroyed.
21	Current attractors are the political mouthpieces who operate under their own interests, such as the Administration of Clinics in Hospitals, Directors etc., who are motivated by personal, economic, legal and job distribution motives.	Behavioural patterns are always expressed within the system's limits. Systems do not self-organised. Such an attempt is rather failed. On the contrary all members should work towards the structure of the system.	The destruction and building on new foundations is the only solution, as it seems from rational explanations. Current system does not allow for restructuring and repairings.
22	There are no attractors. There are no examples and prototypes to follow. This is something that we have to dig and find.	Behavioural patterns and the system can accept many changes and everyone is responsible.	Nothing is possible to be built from zero. Everything is a result of progress. Under this case there must be a progressive power which will undertake the responsibility to lead changes.
23	The Greek healthcare system is doctor-centered. Doctors are attractors. The Government is an attractor as well. These two define the patterns.	No comment	It would be better for the system to be structured from zero level without the commitments and the past previous practices.
24	State defines patterns in the system, so the State is the main attractor who using the legal framework places guidelines and restrains.	Such patterns introduce contexts. The main issue though is who controls these contexts and who is responsible for being applied.	No answer
25	Regularly attractors should be the Ministry of Health and the Code of Ethics of the sector. But nowadays patterns are affected and followed differently from different groups and seperately.	Patterns affect the system and may change the structures as long as these are working for the benefit of healthcare.	The system cannot work without attractors. It would be better to keep a combination of old and new powers in an effort to make changes in the system. We should keep good practices from past.
26	Patterns are defined by the groups. Individuality plays a significant role. Nevertheless, since healthcare is a significant element for the society, patterns are defined also under the requests of society in extent.	Patterns of behaviour can change. Already current restructure have helped in better administration. Of course this mostly concerns public services and organisations. Groups that work on private sector follow other patterns under different schemes.	A system could progress based on knowledge, abilities and money. The better use of resources and a better administration are enough for the changes to take place.
27	Attractors are mainly the health professionals of the system. Then, the government.	History has proved that patterns of behaviour followed did not help the system. The change of the system is expected to alter the behaviours as well. The turn to privatisation will possibly help the system by creating competition and healthy ground for new patterns.	The system could progress keeping the good elements from the past. However it is necessary to apply new competitive techniques and destroy any monopolistic phenomena for the benefit of healthcare provision in the country.
28	Behavioural patterns are defined by the educational institutes.	Behavioural patterns can change in a new system and this is common expectation in healthcare sector. A new system with a new management towards quality and progress.	To destroy and build again a system that incorporates the negative action of catastrophe. Our system is not so decayed. It needs a change of culture, renewal and stimulation.
29	Attractor patterns are defined by the dominant groups.	Patterns do not change in a system.	The system should be destroyed and rebuilt from the beginning.
30	Attractors define patterns and these usually are the unions of the groups. These are the professional associations that represent employees.	Behavioural patterns have affected either positively or negatively the sector. These patterns cannot change since the country does not have enough resources.	The system should be destroyed and rebuilt on new foundations.
31	The system itself defines behavioural patterns and each agent separately.	Behavioural patterns have operated negatively so far for the system. They can change though.	It would be better for the system to be rebuilt from the beginning on new foundations.

32	Human resource is responsible for the definition of the patterns in the system.	Behavioural patterns are definitive for the progress of the system. But it is very difficult to be changed, there are few possibilities.	The system could be better to be built from the beginning.
33	The ones who participate in the system are responsible for attractor patterns.	Patterns work both negatively and positively.	The system should be rebuilt in new foundations.
34	Patterns and behaviours are defined by the society and its citizens in every different phase.	Patterns could impose contexts and have the power to change systems and their organisation.	A new system needs also the old healthy parts of the previous system. It can improve the old parts through time.
35	Attractor patterns is the result of evolution. There is no any specific dominant power that defines patterns rather than interaction among members.	I have already replied based on the above.	Nothing can be rebuilt on totally new foundations. Everything is under a developmental relation between yesterday and today. This is a detailed relationship to the end.
36	The powers that define attractor patterns are the ones who are responsible for the current situation in healthcare sector and in Greece.	Yes, the attractor patterns can impose contexts but there were not the corresponded evolution all these years.	It would be better to build again the system on new foundations.
37	Attractor patterns are defined by the politicians, the educators and the church.	Behavioural patterns are not independent from the healthcare operators. Behavioural patterns follow the rules of new self-organisation.	The system should depend on both old and new powers. In this way the system will handle the transition normally and not through catastrophe.

# Thematic Analysis Taxonomy

## Research Questions Framework

### Interviews' results on GENERATIVE RELATIONSHIPS

Interview questionnaire (English version)	<p>What are generative relationships and what is the difference with relationships as discussed earlier?</p>	<p>Do generative relationships create contexts in the system? Who is the main source of such relationships?</p>	<p>Do generative relationships have responsibility for fighting or enabling changes in structures towards self-organisation?</p>	<p>Which is the relation between generative relationships and patterns of behaviour? Can this relationship be the cause of emergence?</p>
Interview questionnaire (Greek version)	<p>Εκτός από τις ευρύτερες σχέσεις αλληλεξάρτησης, υπάρχουν και ειδικότερες σχέσεις προστασίας και αλληλοβοήθειας μεταξύ ομάδων μέσα στον τομέα υγείας. Αυτό είναι ένα γενικευμένο φαινόμενο, ή αποτελεί ιδιαιτερότητα του συγκεκριμένου κλάδου?</p>	<p>Μπορούν αυτές οι σχέσεις ιδιότυπης αλληλεγγύης να επιβάλλουν κανόνες στο σύστημα?</p>	<p>Μπορούν αυτές οι σχέσεις να καθορίσουν νέες δομές και οργάνωση?</p>	<p>Προφανώς αναφερόμαστε στις κλειστές σχέσεις μεταξύ ομάδων συνήθως του ίδιου επαγγέλματος ή ιδιότητας. Τελικά αυτό μπορεί να δημιουργήσει εμπόδια, σε ένα πολύπλοκο σύστημα, όπως είναι η υγεία μιας χώρας?</p>
1	<p>There are strong generative relationships in the sector, but this does not mean that these could not be found elsewhere, on other sectors, as well. Perhaps in healthcare, this phenomenon is more intense.</p>	<p>Yes, unfortunately this is possible to be done in the sector.</p>	<p>Generative relationships define new structures and organisation of the system. (people defines systems and not vice versa).</p>	<p>Yes, this creates obstacles. Closed relationships direct to narrow perspectives, ideas and in restrained changes and additions, which in continuous complicate any reforms.</p>
2	<p>Generative relationships could be found in other professional sectors as well. Probably in the Greek healthcare sector this is more wide and intense.</p>	<p>Generative relationships may impose contexts but in circumstantial and not in holistic approach.</p>	<p>Yes, from time to time this is possible.</p>	<p>The relation among generative relationships and patterns of behaviour is close, therefore this specialty may create obstacles for any further developments, this is very possible.</p>
3				<p>Closed relationships always create problems, on every aspect and in every sector.</p>
4	<p>Generative relationships are the basis of protection and solidarity among agents, but this is a broader phenomenon. In healthcare there are such specialised relationships.</p>	<p>Generative relationships could imply informally new contexts in the system.</p>	<p>Generative relationships could enable changes in structures and organisation.</p>	<p>Closed relations is the link between generative relationships and patterns of behaviour. Such relations create obstacles in healthcare and may be the cause of emergence.</p>

5	There are generative relationships among groups.	Generative relationships cannot create rules or imply contexts. Contexts are defined by the Administration of hospitals. Nevertheless, groups can work for the alteration of such contexts.	Generative relationships cannot create new structures by themselves.	Closed relations operate negatively and create obstacles in the system.
6	Wherever there is no control, there are more closed relationships even if these are generative due to common interests and status.	Usually the system does not allow closed and distorted relations among agents.	Such relations include people that stand outside healthcare sector. Therefore, it is difficult generative relationships to enable changes within the sector.	Closed relations create obstacles and quarrels among groups. This does not help neither the sector nor the players themselves.
7	Generative relationships is a broader phenomenon which could be found in other sectors and not only on healthcare.	Generative relationships create contexts and could impose rules in the system.	In addition, generative relationships can define new structures, or even enable a series of changes towards self-organisation.	Closed relations and closed groups are obstacles in the system's progress.
8	The phenomenon of generative relationships is a general characteristic and refers to all sectors.	In healthcare, generative relationships create contexts. From time to time these create new informal rules which in long range harm the sector. For example the reward and promotion of specific persons do not always take place with wide accepted criteria, rather than with personal.	Such relationships could enable changes which in addition could direct to right direction. The new organisation of the system should guarantee daily evaluation, objectivity in criteria and agreed framework from all.	Relationships are linked to behaviour. Closed relations affect behaviour. Nevertheless, healthcare should be placed above personal or professional relations. The system must ensure that health is the ultimate service for all with equal access and treatment. All agents should be rewarded and be paid under a strict logical scheme.
9	There are relations among groups which are special and this is due to the sector's characteristics. In general there are everywhere generative relationships but in healthcare are more specialised.	Generative relationships can impose rules, either with direct or indirect ways.	Generative relationships enable changes but there must be also governmental willingness to support this decision.	Relationships and patterns of behaviour may raise obstacles but this again depends on mechanisms of control. Rules and control are the opposite of closed relations.
10	Generative relationships does exist in any sector. This is rather a general attribute in communities.	Such relationships, in extent, could define prototypes and create contexts.	In addition, such relationships could define new structures and organisation.	The closed relationship among generative relationships and behavioural patterns may be an obstacle or a cause for emergence.
11	Generative relationships is a general characteristic but in healthcare this may be more intense.	Generative relationships create contexts but they lack of good organising and educated members.	Such relationships play a significant role but they are not the only one in enabling changes in structures.	This relationship could raise obstacles. Every kind of relationship needs strong base. This relationship is responsible for the local mentality that cultivated all these years.
12	Generative relationships are a discrete characteristic of healthcare sector.	Such relationships may impose contexts in the system.	They may define new structures and enable changes.	They cannot though raise obstacles, but be the cause of emergence.
13	Generative relationships is a rather general characteristic in various sectors but probably demonstrates some extra specialties in healthcare.	Such relationships are embedding new contexts.	Such relationships possibly enabling and not fighting changes in structures.	Nevertheless, the relation between generative relationships and patterns of behaviour can create obstacles instead of emergence.
14	Such generative relationships are specialty of healthcare sector.	Generative relationships do create contexts in the system.	Such relationships may define new structures.	Closed relations such as the link between generative relationships and patterns of behaviour raise obstacles.
15				
16	Generative relationships is a general phenomenon.	Generative relationships may impose new contexts in the system, if the system wishes to do that.	Generative relationships can define new structures and new organisation, if the system wishes to.	The relation between behavioural patterns and generative relationships can and definitely create obstacles.

17	Generative relationships exist in other sectors as well but in healthcare this is more intense.	Generative relationships may impose new contexts in the system. This is possible.	Yes, such relationships can define new structures.	Closed relations create obstacles and raise blocks in a system.
18	I consider that there is no other relationships. There are no generative relationships.	Since such relations do not exist they cannot create contexts or affect the system.	There are some kind of relationships in the sector which enable changes in structures and organisation.	There are some kind of closed relations which may create obstacles.
19	The existance of generative relationships is a characteristic of all sectors and professions in the country.	Generative relationships could be used as a leverage for changing contexts but the issue is for the benefit of whom, this usually happens.	Generative relationships have the responsibility for enabling or fighting changes. But this depends on the groups that will try to exploit this priviledge.	Relation between generative relationships and patterns of behaviour exist. The manipulation of them can create problems or the opposite, help progress of the sector.
20	Generative relationships is a social phenomenon result from the instict of self-presevation of a group which lives in a broader complex system.	Generative relationships cannot impose new contexts especially when mentalities are offended and personal belongings are jeopardised.	Generative relationships are not responsible for any changes. The system as a whole is much stronger and administers information.	Any special relations cannot affect or block any system.
21	Generative relationships is rather a general phenomenon but each sector such as healthcare demonstrates its own characteristics during the adoption of this phenomenon.	Such relationships could impose contexts and they do it already.	Generative relationships include a set of informal principles. These principles are rather responsible for structures, behaviours and organisation in the system. On the contrary, the formal hierarchy is not so significant and decisive in future actions.	Closed relationships as a result of generative relationships and behaviours is what is known as "status quo" in the sector. These are responsible for the malfunctioning of the system, but it seems that they have wide acceptance.
22	It is impossible for a sector such as healthcare not to have generative relationships and solidarity.	Generative relationships should be more active and support a humanistic environment in the sector.	Certainly, generative relationships are carriers of change in a fluid and redefined environment.	The relation between generative relationships and patterns of behaviour can find obstacles but not create. It is required though such relationships to be based on equality and fairness.
23	There are special relationships of mutual help and intercoverage among healthcare groups.	Generative relationships may create contexts. For example they impose silence and camouflage in problematic situations.	Such relationships should be changed first, and then create new structures.	No comment
24	No answer	No answer	No answer	No answer
25	Generative relationships is rather a general phenomenon.	Generative relationships create contexts in the system which operate either positively (cultivation of common interests) or negatively (oppositions).	Nevertheless, generative relationships do not have such power to define new structures and new organisation of the system.	In a complex system, closed and special relations may certainly raise problems in the system. Not to forget that aspirations of participants are not always the same.
26	There are relationships of protection and help among groups which enable mistakes and restrain prosperity for the people. In the public sector, generative relationships are stronger and decisions are taken on group basis where any mistakes are undertaken by the responsibility of the whole group.	Such relationship may create contexts in the system. It is good though to take into consideration patients' status.	Not necessarily. The healthcare system demonstrates weaknesses but this is not due to weak relations of protection and help. Generative relationships may direct to new structures and organisation, but the issue is who will make the decisions.	Generative relationships is possible to create problems in the system of a country, especially when dominant groups take decisions. Dominancy creates distortions, since every part of the system is useful and not only dominant groups.

27	Generative relationships do exist, and this is a general phenomenon which could be found in many other sectors. These relationships are closer and more protective and sometimes they could not be identified directly.	Depending on their power, such relationships can affect and introduce new contexts in the system.	Usually, generative relationships do not affect positively the sector. It for sure that such relationships should be separated from the sector and the general provisional scheme.	These close relations are not always bad or negative for the system. Sometimes these are necessary. This does not mean that they cannot create problems in patients. However, such closed relations are not so important because they represent a small percentage.
28	Solidarity and help among groups is a general phenomenon while in healthcare this is more intensive due to the nature of the sector.	Generative relationships create contexts in the system and this does happen in daily routine.	There have to be made new mixes and interactions, in order the relations to change structures and organisation.	Closed relations means cliques. Such relations are obviously obstacles in any progress and improvement in the sector.
29	Generative relationships are a general phenomenon.	Such relationships could impose contexts in the system.	Also, generative relationships could enable changes in structures.	Closed relations create obstacles in the system and block emergence.
30	Generative relationships are rather a general phenomenon.	No, the specific relationships cannot impose contexts.	It might be possible to enable changes in structures though.	No comment
31	Generative relationships exist elsewhere as well, but in healthcare sector could be found more often.	These relationships could impose contexts.	They could enable new structures and organisation.	Closed relations could not create obstacles in the system.
32	Generative relationships is a specialty of healthcare sector.	This kind of relationships could impose contexts.	Generative relationships enable new structures and organisation.	Such closed relations may be an obstacle for the sector.
33	Generative relationships is rather a general phenomenon.	Generative relationships create contexts in the system.	Generative relationships enable changes in structures towards self-organisation.	The relation between generative relationships and patterns of behaviour creates problems in the sector and in the country. It is questionable who finally manages the system.
34	Generative relationships os rather an isolated phenomenon and not a general one.	Generative relationships could impose rules in the system.	But they cannot define new structures and organisation.	Yes this relation can cause problems.
35	Generative relationships are the basis for interaction, solidarity, humanity and help among members. We have to consider that the final receiver in the system is the human being.	Generative relationships impose an informal rule and a code of ethics among their members. Since this is rather a flabby approach we could talk also for formal rules.	Generative relationships can define new structures but it takes time.	The problem is where the new system will be based on. The emerging powers will be the result of the mix of different powers.
36	Generative relationships harm the system because these are maintained from the groups that have damaged it.	No they cannot.	No they cannot.	Closed relations are the problem. It is time for clarity.
37	Generative relationships are the characteristic of healthcare sector.	Yes they can.	It should be.	Closed relations remain a problem and an obstacle.

**Thematic Analysis Taxonomy**  
**Research Questions Framework**

**Interviews' results on COLLECTIVE REFLEXIVITY**

Interview questionnaire (English version)	What is collective reflexivity? What is the relation with complexity?	Who is responsible for reflexivity? The system, the agents?	How reflexivity works in healthcare sector?
Interview questionnaire (Greek version)	Τι θα χαρακτηρίζατε ως συλλογική αντίδραση? Υπάρχει σύνδεση μεταξύ αντίδρασης και πολυπλοκότητας?	Ποιοί μπορεί να καλλιεργούν την συλλογική αντίδραση? Μπορεί να είναι ομάδες? Μπορεί να είναι το ίδιο το σύστημα? Μήπως συνδυασμός ή κάτι άλλο?	Πως λειτούργησε και πως λειτουργεί η αντίδραση και τα αντανακλαστικά των ομάδων στον τομέα υγείας όλα τα προηγούμενα χρόνια, μέχρι και σήμερα?
1	Collective reflexivity is the practice of coordinated attempt for changes	Collective reflexivity can be cultivated by groups.	Unfortunately, there is inertness during last years in the sector, in terms of reflexivity. Groups do not present alertness in the coming changes.
2	Collective reflexivity is anything that demonstrates a practice of group reaction such as: protest, strike, absence, retention, mass pension. There is collective reflexivity and is result of reaction.	Responsible for reflexivity are the politicians and political groups plus trade unions of the sector.	Reflexivity did not operate in an effective way so far. It used to operate with no organisation, no programming, and with no targets.
3			I do not know.
4	Reflexivity is synonymous to reaction (e.g. strike). Any reaction has direct link with complexity in healthcare.	Political parties and trade unions are responsible for collective reflexivity and reactions.	Reflexivity works negatively in the sector and harms the whole system. In general terms the system does not help qualified and valuable employees.
5	Collective reflexivity is collective movement as reaction.	Trade unions and professional unions are responsible for collective reflexivity in the sector.	No clear to me, if reflexivity works positively or negatively.
6	Collective reflexivity is a group reaction but this does not exist anymore under the new system, since healthcare professionals will be obliged sooner or later to work independently and sign individual contracts.		After so many years the result is that there is no consensus among groups in healthcare.

7	Collective reflexivity is the unique reaction of a group for its benefit. It is not clear if reaction is linked to complexity.	Not only the agents but also the system is responsible for reflexivity.	There is no solidarity, or consensus among the agents during the years. This, in consequence, stops healthcare system from progress and keeps it stacked in the past.
8	There is connection among reflexivity and complexity. Complexity actually suspends collective reflexivity. In a complex system it is difficult for a group to react effectively.	Reflexivity is directed from political parties and unions. All of them are part of the system in any case. So, the system has its own antidote which is collective reflexivity.	Reflexivity did not work effectively so far. It worked though in occasions when basic rights were considered to be broken. The main reason was that there was no consensus and group mindset in the sector. Each group had its own beliefs and the reaction was rather periodic without strength and duration.
9	Collective reflexivity incorporates elements of self-imposement towards new rules of work and behaviour.	Both the system, the groups and the employees themselves are responsible for reflexivity.	Ineffectively, without concrete and definite results but rather with inertia.
10	Collective reflexivity is expressed through any practice of opposition. This usually comes as a result of complexity that implies reactions.	Trade unions are responsible for reflexivity.	Reflexivity works under the supervision of political parties all these years.
11	Collective reflexivity is the action of doing smth in changing, canceling, rejecting tactics that are considered wrong. This is a result of the relation between reaction and complexity.	Both the system and the agents may be responsible for reflexivity.	So far there was no reflexivity in healthcare rather than predefined data and rules which were imposed and were followed through time.
12	Collective reflexivity is the unique, homogenised reaction of a group.	The combination of agents and the system is responsible for reflexivity.	There is no actual reflexivity in healthcare.
13	There is collective reflexivity.	The system itself is responsible for reflexivity.	Reflexivity is based on interdependencies and the combination of groups' powers.
14	No comment	No comment	No comment
15			
16	Not understand the question.	The system does not create or support reflexivity. On the contrary the system tries to divide collective reactions.	Which reaction? Which reflections?
17	Collective reflexivity is like the action of strike. I consider that there is link between reaction and complexity.	Trade unions and parties are mainly responsible for reflexivity. Moreover, government, the system itself and groups are also responsible for cultivating reflexivity.	Reflexivity have operated negative for the system.
18	Collective reflexivity is a way of group reaction such as strikes, protests and in general group reactions of any nature. There is relation between reflexivity and complexity.	A combination of all is responsible for reflexivity (the system and the agents).	Reflexivity works in both ways. Positively and negatively.
19	Collective reflexivity are the mass movements. There is a link between reaction and complexity.	Trade unions are responsible in the country for collective reflexivity. Especially there are specific groups in the country that lead this reflexivity. Finally reflexivity is a combination of the systems and individual groups.	Collective reflexivity has operated successfully so far, but now, any things that have been acquired by the groups is about to be lost.
20	Collective reflexivity does not actually exist, because it proved difficult for people and groups to communicate and cooperate in terms of challenging new things.	Reflexivity is something which is technically produced by the system in order to be canceled by it in the end.	Reflexivity operates like having experienced a brain stroke and now does not understand anything at all.
21	Collective reflexivity is the group reaction and the cooperation towards common targets. Though, there are not common targets and desires in the sector. Reaction has not to do with complexity itself rather with current prototypes of self interests that are cultivated by current system.	Reflexivity comes when groups realise that they have more commons than differences. Poverty, undervalue and other difficulties probably will direct groups in collective reflexivity. Such situations drive majority towards the desire for reaction.	Reflexivity does not work. Every time that any group tries to react there are always oppositions in the system, which try to terrify, and blackmail. The only way for reflexivity to work effectively is when there is a decision for final abruption.
22	Collective reflexivity is the collective attitude towards a phenomenon. It is probable such attitude to forward progress. This is a healthy behaviour for the system.	The system and its groups are responsible for reflexivity,	Reflexivity was based in the strategy of splitting the powers in order to weaken them. It is time for a different "modus vivendi".

23	Collective reflexivity is the group reaction against something specific.	The system and the agents are responsible for the cultivation of reflexivity.	Reflections of groups are delayed in the sector.
24	No answer	No answer	No answer
25	Collective reflexivity is considered the reaction of a group of individuals that oppose to a certain attack in their interests. Usually this covers their common interests and not necessarily their personal interests.	Usually, unions are responsible for collective reflexivity as well as any other associations.	Reflexivity works ineffectively and unevenly so far.
26	Collective reflexivity is the action of people towards common goals. There is connection between reflexivity and complexity since groups that participate in the common action do not necessarily have the same motives. Therefore, it is not always given that groups will reach their goals.	The system is responsible for reflexivity and the groups are responsible for the cultivation of reactions.	Reflexivity works positively in terms of pushing for changes in the system which finally accept to do. There were always reactions from groups for various issues (economical, human resource issues etc), especially nowadays where the system works with many difficulties. Nevertheless, reactions have impacts to weaker groups, such as the patients. In addition, reactions are taken into consideration with delays which harms the system.
27	Collective reflexivity is the sum of the efforts of a group with common expectations, targets, desires. Complexity sometimes is possible to fire reflexivity and the opposite. As a result complexity and reflexivity have a bothway relationship.	Collective reflexivity is created by the system. Nevertheless it is possible to be created by closed groups which create general problems and operate against the system with war mentality.	Reflexivity works a-posteriori in the sector, when problems have already created and impacts are diffused. On the other side we should not forget that due to reflexivity both staff and patients acquired some rights.
28	Collective means altogether. Reflexivity has a negative meaning and complexity a positive one. Collective reflexivity in the framework of complexity is still something we are looking for.	Everyone is responsible for reflexivity. The creation of an environment of collectivity is necessary to create a dynamic healthcare system.	Unfortunately, the rule of "action-reaction" works very negatively in healthcare, just as in other sectors as well. This operates for the benefit of personal motives and interests. Nevertheless, healthcare should be a multi-side place, an open place of communication and professionalism.
29	Collective reflexivity is the mass strikes.	Responsible for reflexivity are the groups' representatives.	Reflexivity worked unevenly so far in the sector.
30	Collective reflexivity means group reaction and cooperation among groups. This is not possible though, since there is strong diversity and each group has its own targets and motives.	Both system and agents are responsible for reflexivity.	Reflexivity works both positively and negatively. The truth is that in this period the sector is going to experience very bad situations due to crisis.
31	There is connection between reflexivity and complexity.	Both the system and agents are responsible for reflexivity.	Reflexivity did not work as expected, since the system was not organised well.
32	Collective reflexivity is any kind of group reaction. This has a link with complexity.	Both the system and the agents are responsible for reflexivity.	There is no consensus and group reaction all these years in the sector.
33	Collective reflexivity is the concurrent reaction of a group.	The system and the agents are responsible for reflexivity.	There is lack of solidarity due to personal ambitions, disinterest and unwillingness for actions.
34	Collective reflexivity is every action of workers against decisions that insult their interests. There is a direct relation between collective reflexivity and complexity.	Collective reflexivity is cultivated by groups and the system itself.	Reflexivity is not intensive although the sector experiences rather sudden changes.
35	Collective reflexivity is the new power of complexity.	The system is responsible for reflexivity. The system is consisted of many groups.	Healthcare sector cannot survive only through formal rules but also through deep thinking and ethical regeneration.
36	Collective reflexivity will exist if the system will be rebuilt on new foundations.	Non of them. Something else.	Reflexivity does not operate effectively or there is no reflexivity.
37	Collective reflexivity appears in anything against the common sense. Responsibility lies to everyone and reactions are the same each time.	Reflexivity is a way to protect common good and maintain responsibility.	Reflexivity works for the benefit of groups and the society.

the issue of stabilisation and how quickly this could affect the real economy (is depended on):  
 - anticyclical monetary  
 - debt management  
 - fiscal adjustments

the question in the transition phase is how long this will last for the real economy  
 - this phase is called: "the length of the lag"  
 - changes in the stock of money exert an independent influence on cyclical fluctuations in economic activity with a lag that is both long and variable relative to the average length of such fluctuations

the strong relation between monetary change and economic developments / business conditions  
 - one can seldom get something for nothing in economics  
 - there is no bounce-back resilient practice but instead bounce-beyond meaning a change to the bones  
 - the society has to change its structures and not its roles

the stability of equilibria: a necessity to achieve  
 - therefore, in the long run they tend to look for markets with different currencies and variable exchange rates

the common currency between countries lead to much lower volumes of trade especially when they do not create overvalue through this transaction  
 - on the contrary, crashes occur when FDI inflows dry up, when reserves are low, when domestic credit growth is high, when interest rates rise, and when the real exchange rates shows overvaluation, and of course when we face sharp recessions

curiously, neither current account, nor government budget deficits appear to play an important role in a typical currency crash

**monetary change**

**CAS: complex** implies diversity, a wide variety of elements/ **adaptive** means the capacity to alter or change, the ability to learn from experience/ **system** is a set of connected-interdependent agents

the dependence on market expectations which cannot be finally adhered from different groups direct to multiplicity  
 - the multiplicity problem is raised by preferences and constraints of the different groups plus the government itself

expectations create new equilibria  
 - complexity science looks not at the parts but in the wholes and results from the interactions between the components of a system  
 - complexity try to explain why there is an order in the universe although this is consisted of seemingly unrelated powers

**the essence of complexity science is in the study of patterns and relationships and in the search of characteristics of systems far from equilibrium**  
 - complexity science focuses on how order can emerge from a complex dynamical system  
 - complexity means we have structure with variations

complexity and chaos  
 - the study of chaos focuses on how complexity can arise from simplicity

**complexity science focuses on dynamic states that emerge in far from equilibrium systems**  
 - there is the Newtonian perspective which is a reductionist perspective, where understanding the whole of a system is dependent on understanding its parts. Things must be broken into their constituent elements in order to understand them.  
 - run like a clock is the dominant metaphor  
 - this is a mechanistic view of evolving things, machine-like systems  
 - but healthcare systems demonstrate different specifications and characteristics

it is a challenge to identify the collective result of nonlinear interactions in the CAS of health-healthcare  
 - healthcare organisations are complex adaptive systems and share the characteristics of CAS  
 - there are many diverse agents and the effort to manage such systems of agents creates major concerns  
 - relationships and interconnections are critically important  
 - healthcare organisations have the capacity for self-organising and emergence and they co-evolve  
 - better regulation  
 - financial restrictions  
 - punishment of offenders

**Healthcare organisations as CAS**  
 - healthcare organisations accommodate **unknowability** since there are always under changes, self-organising and emergent properties  
 - managers should use complexity to re-focus attention from creating a better run organisation to maximise the potential for the organisation to co-evolve in ways that increase the organisational fitness  
 - managers are agents in the system and not external controllers who manipulate the system with some well thought out logic  
 - the patterns of interaction between the manager and other agents in the system affects the dynamic behaviour of the system  
 - there is no guarantee though that this affection will have a predictable outcome

managers in healthcare organisations  
 - when a manager realises that hc org are CAS then his focus shifts from knowing the system to making sense of the system, from forecasting the future to prepare to meet the **unknowable future**, from controlling the system to **unleashing the system's potential**  
 - there are three proposed ways for long term success:  
 1. being prepared to understand and adapt to unanticipated consequences  
 2. to be ready to respond to emerging opportunities  
 3. to implement business practices based on the nature of CAS

**1 making sense**  
 - sense-making vs decision making  
 - sense making requires interaction among agents  
 - sense making enhanced through paying attention  
 - sense making requires agents with: processing information ability, rule following ability, ability to connect with other agents  
 - the characteristics of CAS suggest heterogeneity as the most fruitful managerial strategy for enriching sense making  
 - get advantaged from the existed diversity of agents

managers help order emerge in CAS through sense making but this is not a stable equilibrium  
 - when facing non linear connections with emergent properties people in hc should develop a **collective mind** about: what the situation is, who we are, why we are here, an what is going on around us  
 - the difference between knowing and making sense  
 - sense making requires interaction among agents  
 - sense making enhanced through paying attention

the arrow of time is a key factor and the non linear trajectory of the system is often a function of the time-dependent events that occur  
 - Predisposition is a key factor in both enabling and inhibiting hc organisational behaviour  
 - success in the CAS is coming for the capacity to learn and learning replaces control as a key managerial function  
 - the most important learning comes from the **trial-and-error action** as well as the reactions taken during this  
 - remembering history is important because gives examples of how the agents on that period unfolded their capabilities to learn and act trying to co-evolve with the system  
 - it is the capacity to learn rather the capacity to know the significance encrypted in a CAS

traditional planning based on cause-effect relationships is an inappropriate managerial strategy in CAS  
 - predicting future states and feed forwarding modelling are not useful  
 - scenario planning is a managerial strategy widely used as this helps an organisation to deal with surprise  
 - it helps in developing organisational capabilities for dealing with uncertainty

**2 remembering and forgetting history**  
 - CAS is about **bricolage**  
 - **bricolaging** means creating positive outcomes from what emerging usually through confusing and mixed-up situations  
 - **bricolage: to make creative and resourceful use of whatever materials are at hand (regardless of their original purpose)**  
 - being a **bricoleur** rather than a traditional manager  
 - CAS maintains capacity to think about the future through framing the future by social interaction  
 - CAS are systems of interconnections and they produce or construct through co-evolutionary social processes, a significant part of the environment they face  
 - innovation depends on a sort of knowledge no one can gather in a central place  
 - **improvisation: intuition guiding action in a spontaneous way**  
 - dealing with surprise requires improvisational behaviour  
 - surprise is the constant companion in a CAS  
 - order-chaos-order are phases experienced in a CAS  
 - loose-tight coupling is an attribute and status experienced in a CAS

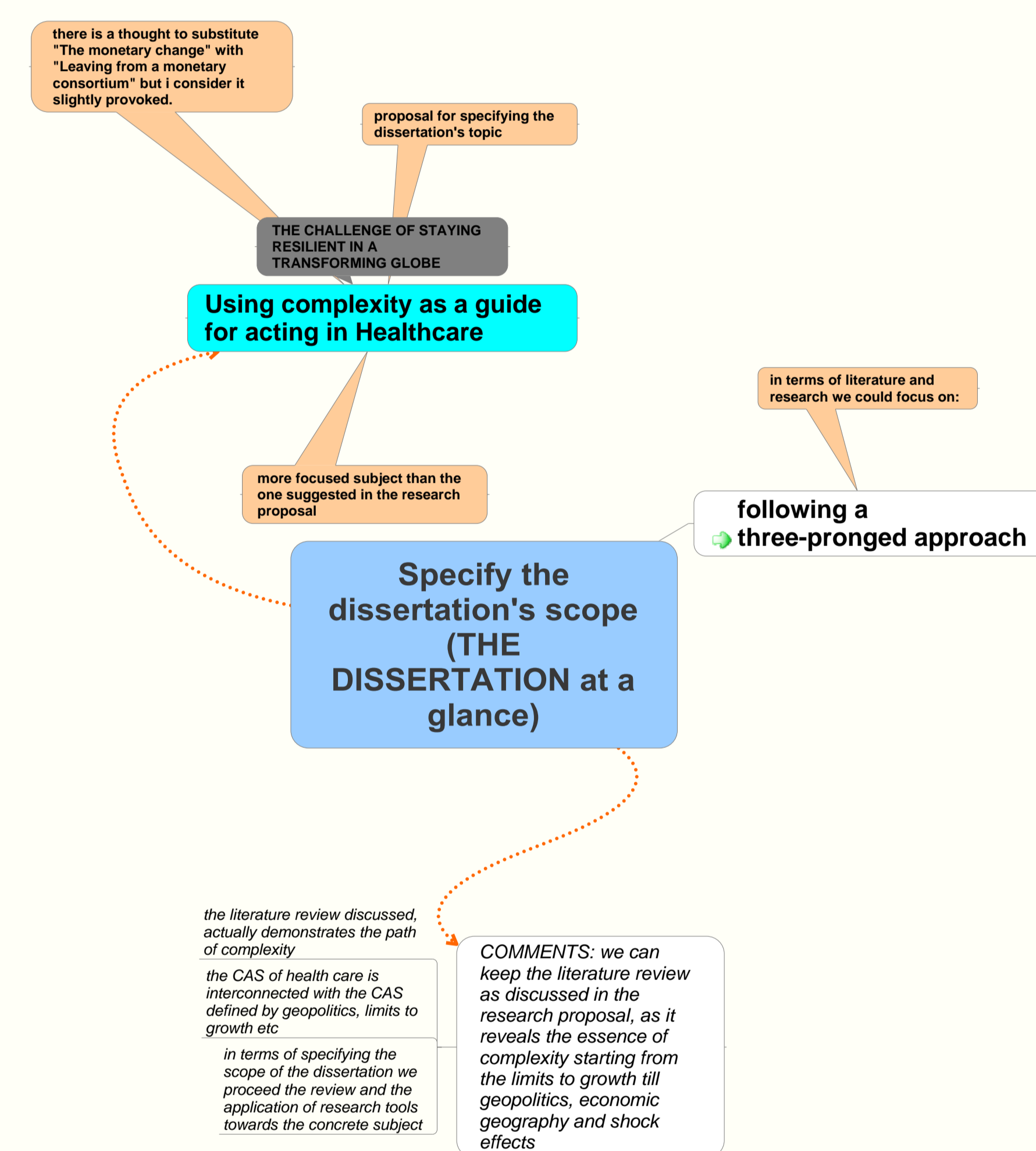
**3 thinking about the future**  
 - **managers help order emerge in CAS through sense making but this is not a stable equilibrium**  
 - the arrow of time is a key factor and the non linear trajectory of the system is often a function of the time-dependent events that occur  
 - Predisposition is a key factor in both enabling and inhibiting hc organisational behaviour  
 - success in the CAS is coming for the capacity to learn and learning replaces control as a key managerial function  
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**4 dealing with surprise**  
 - source of surprises in a CAS could be: the non linear trajectory of the system; bifurcations; qualitative changes in behaviour resulting from parameter changes or sensitivity to initial conditions;  
 - working with ambiguity necessitates improvisation  
 - improvisation recognises the existence of a basic form of structure where each player should build upon it using its instinct, knowledge, risk to further maintain the development of CAS

**5 taking action**  
 - managers should help agents to develop skills to identify changes in their small environments  
 - participation in decision making may be a tactic to resolve healthcare issues, which brings increased information in the decision table, creates increased sense-making capacity and broadens the organisational factors  
 - unleashing local actors' powers enables emerging networks that could bring in return new structures for coping with surprise

**6 developing mindfulness**  
 - traditional mindset on HC implies that since managers could understand the cause-effect relationships then organisations function in an efficient way  
 - the HC system should be understood in terms of non-linear dynamics, self-organisation, emergence and co-evolution  
 - **mindfulness** is the capability to induce a rich awareness of discriminatory detail and a capacity for action  
 - to cultivate **mindfulness you need a set of processes** to apply continuously:  
 - preoccupation with failure  
 - reluctance to simplify interpretations  
 - sensitivity to operations  
 - commitment to resilience  
 - under-specification of structures

attention is most important than information in CAS  
 - do accept that survival means a struggle for alertness  
 - **observation** and mind process are key practices  
 - remember that we do not live in one-world but in a matrix of co-evolving worlds in which we must function  
 - but, **observation as agents** of the system and not as external observers, do realise that our behaviour is a fundamental part of the pattern of non-linear interaction that is causing emergent behaviour



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# Characteristics of Complex Adaptive Systems (CAS) (adapted in health-healthcare)

## OTHER CHARACTERISTICS

complex systems have a **history** which cannot be ignored

**HISTORY** **Temporality**: complex systems echo their history, their memory of the past in a selective, non-linear manner

**NESTED SYSTEMS** complex systems are nested systems  
the components of the system are themselves complex systems  
boundaries of the system is difficult to be determined since any attempt may raise ambiguities

**NO BOUNDARIES** the importance of local; what happens to an agent depends on the response of other agents at a particular place

**MICRO-DIVERSITY** **DIVERSITY**

**THERE IS NO CENTRAL CONTROLLER**

**Non-linearity**: due to partly non-linear input-output functions, complex systems will show unpredictable behaviour

**UNPREDICTABILITY**

any knowledge we have about the system is a reduction of its complexity

reduction=micrograph  
reduction=simplification

the problematic issue of **Reduction**

there is a **hidden power** in CAS and this is its ability to allow a massively entangled group of diverse individual agents the freedom to be adaptable and resilient

CASs are dynamic, massively entangled, emergent and robust

when CAS self organises and emerges in a dynamic fashion, this also affects the world around CAS

agents do not simply adapt and interact, they co-evolve with the environment in a constant ambient of change

there will always be an agent who will pose new patterns and introduce new methods in a way that this will change the overall environment and simply impose other agents to adapt and co-evolve

co-evolution means that each change in CAS fundamentally influences its environment and vice versa

co-evolution encrypts **the function of placement and repositioning** since each agent tries to place itself in the new framework

repositioning is necessary for the agents to find their **fitness landscape**

Healthcare systems are constantly attempting to improve their functioning through seeking new places of competitive advantage on their fitness landscape  
nevertheless, its difficult to find the fitness landscape since no agent has the big picture of CAS

compromise and cooperation may lead to a workable solution

the structure of a system is not a result of an a priori design rather than a result of interaction between the system and its environment

real organisms constantly circle and chase each other in an infinitely complex dance of co-evolution

arise from the changing patterns of relationships in CAS

self organisation usually describes the situation where new emergent properties may arise without being imposed

there exists a **self-organising behaviour**

nevertheless, more tightly coupled structures tend to **lock-in** to a certain response

many changes depend on the nature of structure of the agents and the CAS

**resilience** usually derives from a **robust response** in the effort to adapt to a wide range of environmental change

## CO-EVOLUTION

## SELF-ORGANIZATION

this is the spontaneous emergence of new structures and new forms of behaviour in CAS

the structure and form of CAS is a function of patterns of relationships among agents and interactions of these agents with their environment

CAS has distributed control rather than centralised control

in the complex systems approach the order is not only the sum of individual intentions but the collective result of nonlinear interactions

self organisation is linked to order and the capacity of self organisation is the function of the number of connections among agents and the intensity of these connections

CAS consist of agents, interconnected, generating order

there is **no central body** that controls CAS

CASs are **robust** or **fit**, since they exhibit the ability to alter themselves in response to feedback

moreover, they are **dynamic** depending on their motives

also order in the system may be the result of the properties of the system itself

it is not true that the more connections the better

on the contrary, too many connections may lead to behaviour that never settles into any recognizable pattern of self organisation

on the other hand, too few connections may lead to frozen behaviour rather than dynamical self organisation

the conditions for self-regulation happen when agents decide to shift and change both internally and externally affecting each other

## AGENTS

CAS are made of a large number of agents

agents process information and react to changes

agents are information processors

they exchange information between themselves and with the environment

agents have different information about the system

they can adjust their behaviour

they are acting and reacting to what other agents are doing

agents are diverse from each other

nevertheless, this diversity among agents can be a source of frustration

agents select with whom and how they will interact

diversity is the source of novelty and adaptability

additionally could be the source of invention and improvisation

none of the agents can understand the system as a whole

this consists the bottom line of complexity

if an agent could perceive the system as a whole then he would accommodate all the complexity on his own

there is no any central agent who could manipulate the system

each agent pays attention to its local environment

the agents in a complex system cannot know what is happening in the system as a whole

agents are the central actors in abstract models of CASs

agents at any one level in a CAS serve as building blocks for agents at a higher level

different agents take different roles as the dynamic of the CAS unfolds

**BUILDING BLOCKS** CAS are constantly revising and rearranging their building blocks as they gain experience

as building blocks change over time the whole system/organisation changes

CAS consist of agents who act and react based on self-generated stimuli, and the actions of other agents from either inside or outside the system

agents demonstrate a **dynamic state**

## INTERCONNECTIONS (the essence of connectedness)

agents interacting in a non linear fashion may self organise and cause system properties to emerge

individual agents do not know the **behaviour** of the whole system and they cannot control emergence of the system

emergence is the **source of novelty and surprise** in CAS

emergence is a product of context-dependent non-linear interactions

the properties of the whole system are distinctly different from the properties of the parts

it comes from the presence of a great number (often simple) of system components that interact in a manner that cannot be explained by the characteristics of individual components

organizational mergers and their issues need to be viewed through the complexity perspective in order to detect their emerging properties

but it is more than connectivity

emergence rises from the pattern of connections among diverse agents

it is an emergent property of the whole unit

e.g the quality of a surgical team is the properties and the talents of the individual medicals but it is not reducible to this

emergent order is always changing in unpredictable way

emergence is mostly related to the generation of new properties at the macro level of analysis as a result of non linear dynamics

some behaviours and patterns emerge in complex systems as a result of the patterns of relationships between the elements

emergence is a repeating attribute in a CAS since there are emergent structures and agents which in result modify the self organising characteristics of CAS

the existence of **building-blocks** is crucial since, when constrained by simple rules can generate an unbounded stream of complex patterns

as a result in a CAS, there may be many interdependent agents who interact with each other in many ways

the dynamics of these interactions makes CAS qualitatively different from static complicated systems

e.g the personal relationship between the patient and the physician is a significant moderating factor

e.g the relationship among the clinical staff is critical to the overall performance of the organisation

e.g failure to resolve relationships problems is the major cause of difficulty to apply any progress in the health system such as information technology practices, tele-medicine etc

to understand a CAS it is necessary to understand the **patterns of relationships** among agents and not simply their nature

the essence of CAS is captured in the **relationships** among agents

**relationships** among agents are complicated and enmeshed

**massively entangled**

It is not simply the number of connections that determines the character of a CAS, but **the richness of these connections**

the environment of the agents is the function of interconnections that each agent has with other agents in the system and with agents in the system's environment

inputs are not proportional to outputs

actions and behaviours of small non-average groups may result in unintended consequences

small changes can lead to big effects and big changes can lead to small effects

simple deterministic equations may produce an unsuspected richness and variety of behaviour

complex and chaotic behaviour can give rise to ordered structures

relationships are short-range mostly received from near neighbours

relationships among agents are non-linear

another issue, **except the range of influence** is the **range of influence** of an agent to the others

interactions may be pooled, sequential or reciprocal and define the level of adaptability of CAS

both positive and negative feedback are key ingredients of the relationship and the system itself

information that is carried out through feedback mechanisms create **patterns of interaction**

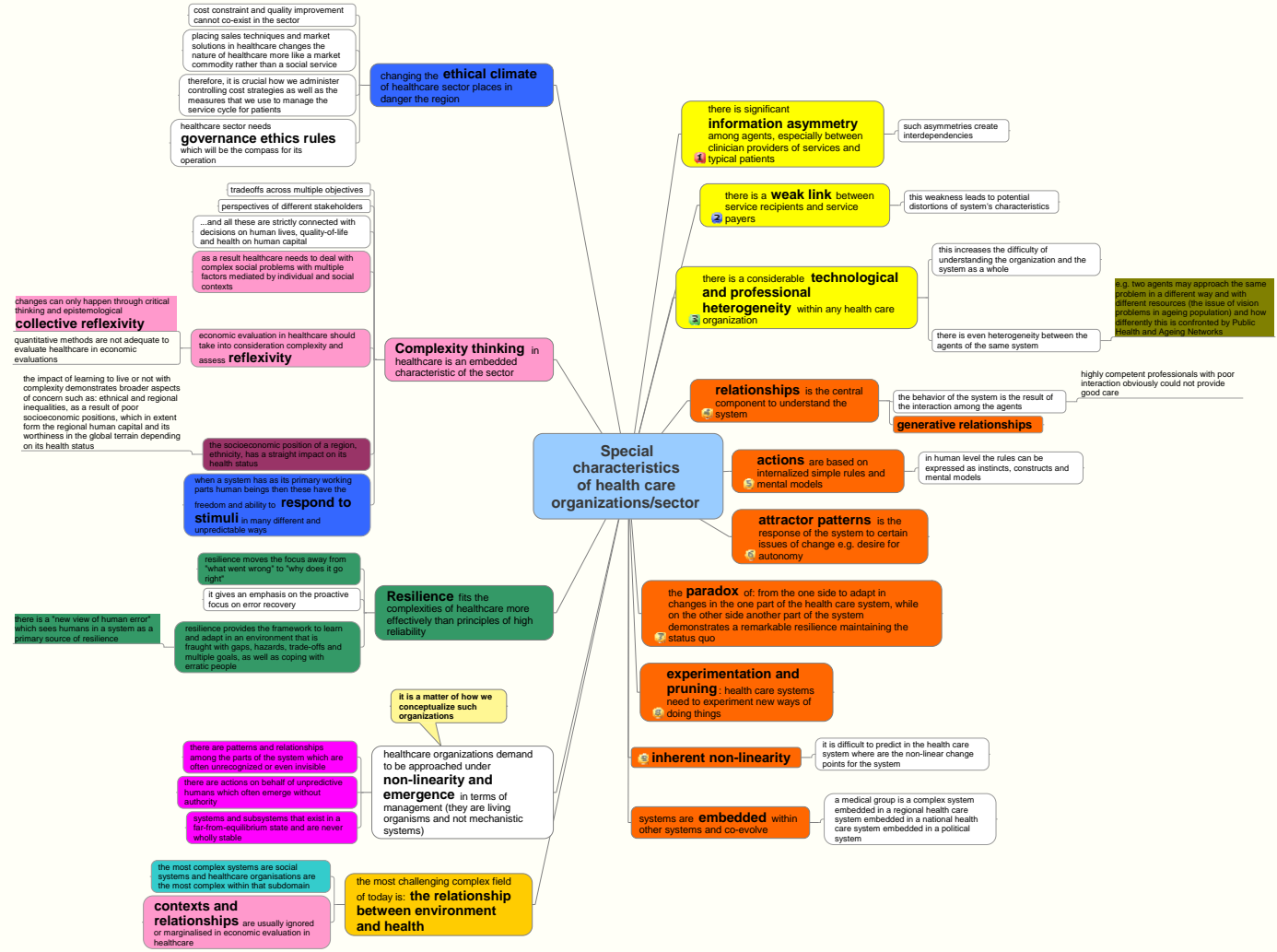
such patterns of interconnection can follow simple rules and **complex behaviour** can emerge from these rules

interconnections among agents define the width of complexity

the different interactions as derived among agents' interconnection create **patterns of interconnection** and in turn introduce non-linearity in the dynamics of the system

complex systems are **open** exchanging energy and information

CASs tend to maintain in general **bounded behaviour**, called an **attractor**, regardless of small changes in initial conditions



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	10	Can heterogeneity be a source for development?	Πιστεύετε ότι η διαφορετικότητα μπορεί να είναι πηγή εξέλιξης?	Heterogeneity could be, in general, a source of development for the sector.	Heterogeneity and diversity could be a source of development but could become also a brake in any kind of evolution for the sector.	Diversity and heterogeneity could not be a source of development.	Heterogeneity and diversity can be a source of development.		Heterogeneity could be a source of development.	Heterogeneity could be a source of development.	Diversity could be a source of development.	Real heterogeneity and diversity, if exist, can be source of evolution.	By itself cannot be a source of development, but it can be in combination with other factors.	Heterogeneity may be a source of development.	It can be source of development.	Yes, heterogeneity can be a source of development.
Attractor Patterns	11	What is an attractor pattern? Who is an attractor in the current healthcare system in the country?	Ποιοι καθορίζανε και καθορίζουν τα πρότυπα συμπεριφοράς μέσα στο σύστημα υγείας της χώρας μας;	Firstly, the Law framework, but since there is absence of control, reporting and evaluation, such patterns are defined by personal or agents' interests.	Attractor patterns are defined by the informal institution's framework, the informal professional organisations, trade unions, and social prejudices.	Attractor patterns are the Ministry of Health and the Law framework. These groups direct patterns of behaviour.	The main attractor in the healthcare system is the Public Code of Professional Ethics for the employees in the sector.	The attractors in the system are all agents themselves. The system defines the Professional Codes of Ethics, but groups implement them or not.	Attractor patterns are defined by the system and its organisation. In continuous this is exploited by groups such as doctors, pharmacists, companies etc. When there is no control and measurement in a system then there is no punishment and decay.	All agents that participate in the system are attractors and contribute in the formation of attractor patterns.	Attractor patterns are not specific groups or persons rather than our mindset, cultural approaches, job environment and personal interests.	Pharmaceutical and medical companies are the attractor patterns who additionally define the behavioural patterns in the system.	Attractor patterns are generated over the system's weaknesses. Wherever there is a gap there is something new born. And this was a mistake so far.	Attractor patterns are affected by our education system and administration which cultivates this system.	Attractor is the Ministry of Health for the system in Greece.	Doctors are attractors in the system.
	12	How these patterns work in the system? Do these impose contexts? Is this possible for a new attractor to emerge from changes in structures?	Πως λειτουργήσαν και λειτουργούν τα πρότυπα συμπεριφοράς όσο αναφορά την εξέλιξη του συστήματος? Μπορούν τα πρότυπα συμπεριφοράς να αλλάξουν σε ένα νέο σύστημα οργάνωσης;	Attractor patterns plays a crucial role in the system's evolution. I consider that these patterns will not change easily in a possible change of the system.	Existed attractor patterns have been negative for healthcare and it is imposed to be changed.	In general terms these patterns of behaviour worked positively. If the system changes the patterns of behaviour will change as well.	Patterns of behaviour should be followed from everyone. They could change in a new system.	Patterns of behaviour may change in a new system.		Patterns of behaviour operate both negative and positive. They can affect and change the system towards new structures.	Attractor patterns does not help the evolution of system, but they maintain it in the same position. A new system demands new patterns. The challenge is to create a new system based on existed patterns but adapted to new needs and new targets. To copy patterns from others is not useful.	Behavioural patterns and attractor patterns operate in terms and towards profit making. This target, defines behaviours and development in the system.	Current attractor patterns do create problems. But these can contribute in changing structures.	Behavioural patterns were affected by attractor patterns in a monopolistic and backward way for the system.	Attractor patterns can enable changes and can impose contexts.	Attractors form patterns for their own benefit. As a result they may either block or help changes in structures.
	13	Can the system work without attractors? When/Under which circumstances attractors take responsibility and protect the system?	Θα μπορούσε ένα καινούριο σύστημα υγείας να προοδεύσει βασιζόμενο στις υπάρχουσες και παλιές δυνάμεις του? Θα μπορούσε να αντέξει τις έντονες μεταβολές στην νέα αυτο-οργάνωση? Η θα ήταν καλύτερο να διαλυθεί ή και να ξαναχτιστεί σε νέα θεμέλια?	It is impossible to destroy and re-build the healthcare system of the country. There must take place radical changes based on existed and new powers.	I consider that the system should be re-established.	The new system should be based in current and older powers to rebuild using attractors and trying to overpass previous distortions. We do not need another catastrophe.	The system cannot work without attractors. Healthcare should be re-built but with the exploitation of older powers. Nevertheless, the characteristic that should be changed is mentality.	The rules have to change, the operational processes have to change, the Management of hospitals need to change.	The old system should be kept and be re-structured.	The system should be destroyed and rebuilt from scratch based on new axes.	The system cannot work without attractors. It would be ideal to destroy the system and build it from the beginning but this is unrealistic. Unavoidably we should follow a transition stage where older powers will mix with newer and together will lead changes.	The new system could be born from the old one, could be rebuilt, could be regenerated, but not destroyed.	The system should be rebuilt from scratch.	The system should restructure itself using old and new powers as much as possible.	The system should be destroyed first. Then we should built on new foundations.	The system should be built on new foundations.
Generative Relationships and Patterns of Behaviour	14	What are generative relationships and what is the difference with relationships as discussed earlier?	Εκτός από τις ευρύτερες σχέσεις αλληλεξάρτησης, υπάρχουν και ειδικότερες σχέσεις προστασίας και αλληλοβοήθειας μεταξύ ομάδων μέσα στον τομέα υγείας. Αυτό είναι ένα γενικευμένο φαινόμενο, ή αποτελεί ιδιαιτερότητα του συγκεκριμένου κλάδου?	There are strong generative relationships in the sector, but this does not mean that these could not be found elsewhere, on other sectors, as well. Perhaps in healthcare, this phenomenon is more intense.	Generative relationships could be found in other professional sectors as well. Probably in the Greek healthcare sector this is more wide and intense.	Generative relationships are the basis of protection and solidarity among agents, but this is a broader phenomenon. In healthcare there are such specialised relationships.	There are generative relationships among groups.	Wherever there is no control, there are more closed relationships even if these are generative due to common interests and status.	Generative relationships is a broader phenomenon which could be found in other sectors and not only on healthcare.	The phenomenon of generative relationships is a general characteristic and refers to all sectors.	There are relations among groups which are special and this is due to the sector's characteristics. In general there are everywhere generative relationships but in healthcare are more specialised.	Generative relationships does exist in any sector. This is rather a general attribute in communities.	Generative relationships is a general characteristic but in healthcare this may be more intense.	Generative relationships are a discrete characteristic of healthcare sector.	Generative relationships is a rather general characteristic in various sectors but probably demonstrates some extra specialties in healthcare.	Such generative relationships are specialty of healthcare sector.
	15	Do generative relationships create contexts in the system? Who is the main source of such relationships?	Μπορούν αυτές οι σχέσεις ιδιαιτερές αλληλεγγύης να επιβάλλουν κανόνες στο σύστημα?	Yes, unfortunately this is possible to be done in the sector.	Generative relationships may impose contexts but in circumstantial and not in holistic approach.	Generative relationships could imply informally new contexts in the system.	Generative relationships cannot create rules or imply contexts. Contexts are defined by the Administration of hospitals. Nevertheless, groups can work for the alteration of such contexts.	Usually the system does not allow closed and distorted relations among agents.	Generative relationships create contexts and could impose rules in the system.	In healthcare, generative relationships create contexts. From time to time these create new informal rules which in long range harm the sector. For example the reward and promotion of specific persons do not always take place with wide accepted criteria, rather than with personal.	Generative relationships can impose rules, either with direct or indirect ways.	Such relationships, in extent, could define prototypes and create contexts.	Generative relationships create contexts but they lack of good organising and educated members.	Such relationships may impose contexts in the system.	Such relationships are embedding new contexts.	Generative relationships do create contexts in the system.
	16	Do generative relationships have responsibility for fighting or enabling changes in structures towards self-organisation?	Μπορούν αυτές οι σχέσεις να καθορίσουν νέες δομές και οργάνωση?	Generative relationships define new structures and organisation of the system. (people defines systems and not vice versa).	Yes, from time to time this is possible.	Generative relationships could enable changes in structures and organisation.	Generative relationships cannot create new structures by themselves.	Such relations include people that stand outside healthcare sector. Therefore, it is difficult generative relationships to enable changes within the sector.	In addition, generative relationships can define new structures, or even enable a series of changes towards self-organisation.	Such relationships could enable changes which in addition could direct to right direction. The new organisation of the system should quarantine daily evaluation, objectivity in criteria and agreed framework from all.	Generative relationships enable changes but there must be also governmental willingness to support this decision.	In addition, such relationships could define new structures and organisation.	Such relationships play a significant role but they are not the only one in enabling changes in structures.	They may define new structures and enable changes.	Such relationships possibly enabling and not fighting changes in structures.	Such relationships may define new structures.
	17	Which is the relation between generative relationships and patterns of behaviour? Can this relationship be the cause of emergence?	Προφανώς αναφερόμαστε στις κλειστές σχέσεις μεταξύ ομάδων συνήθως του ίδιου επαγγέλματος ή ιδιότητας. Τελικά αυτό μπορεί να δημιουργήσει εμπόδια, σε ένα πολύπλοκο σύστημα, όπως είναι η υγεία μιας χώρας;	Yes, this creates obstacles. Closed relationships direct to narrow perspectives, ideas and in restrained changes and additions, which in continuous complicate any reforms.	The relation among generative relationships and patterns of behaviour is close, therefore this specialty may create obstacles for any further developments, this is very possible.	Closed relations is the link between generative relationships and patterns of behaviour. Such relations create obstacles in healthcare and may be the cause of emergence.	Closed relations operate negatively and create obstacles in the system.	Closed relations create obstacles and quarrels among groups. This does not help neither the sector nor the players themselves.	Closed relations and closed groups are obstacles in the system's progress.	Relationships are linked to behaviour. Closed relations affect behaviour. Nevertheless, healthcare should be placed above personal or professional relations. The system must ensure that health is the ultimate service for all with equal access and treatment. All agents should be rewarded and be paid under a strict logical scheme.	Relationships and patterns of behaviour may raise obstacles but this again depends on mechanisms of control. Rules and control are the opposite of closed relations.	The closed relationship among generative relationships and behavioural patterns may be an obstacle or a cause for emergence.	This relationship could raise obstacles. Every kind of relationship needs strong base. This relationship is responsible for the local mentality that cultivated all these years.	They cannot though raise obstacles, but be the cause of emergence.	Nevertheless, the relation between generative relationships and patterns of behaviour can create obstacles instead of emergence.	Closed relations such as the link between generative relationships and patterns of behaviour raise obstacles.
	18	What is collective reflexivity? What is the relation with complexity?	Τι θα χαρακτηρίζατε ως συλλογική αντίδραση? Υπάρχει σύνδεση μεταξύ αντίδρασης και πολυπλοκότητας;	Collective reflexivity is the practice of coordinated attempt for changes	Reflexivity is synonymous to reaction (e.g. strike). Any reaction has direct link with complexity in healthcare.	Collective reflexivity is collective movement as reaction.	Collective reflexivity is a group reaction but this does not exist anymore under the new system, since healthcare professionals will be obliged sooner or later to work independently and sign individual contracts.	Collective reflexivity is the unique reaction of a group for its benefit. It is not clear if reaction is linked to complexity.	There is connection among reflexivity and complexity. Complexity actually suspends collective reflexivity. In a complex system it is difficult for a group to react effectively.	Collective reflexivity incorporates elements of self-imposition towards new rules of work and behaviour.	Collective reflexivity is expressed through any practice of opposition. This usually comes as a result of complexity that implies reactions.	Collective reflexivity is the action of doing smth in changing, concealing, rejecting facets that are considered wrong. This is a result of the relation between reaction and complexity.	Collective reflexivity is the unique, homogenised reaction of a group.	There is collective reflexivity.	No comment	
19	Who is responsible for reflexivity? The system, the agents?	Ποιοι μπορεί να καλλιεργούν την συλλογική αντίδραση? Μπορεί να είναι ομάδες? Μήπως συνδυασμός ή κάτι άλλο?	Collective reflexivity can be cultivated by groups.	Responsible for reflexivity are the politicians and political groups plus trade unions of the sector.	Political parties and trade unions are responsible for collective reflexivity and reactions.	Trade unions and professional unions are responsible for collective reflexivity in the sector.	Not only the agents but also the system is responsible for reflexivity.	Reflexivity is directed from political parties and unions. All of them are part of the system in any case. So, the system has its own antidote which is collective reflexivity.	Both the system, the groups and the employees themselves are responsible for reflexivity.	Trade unions are responsible for reflexivity.	Both the system and the agents may be responsible for reflexivity.	The combination of agents and the system is responsible for reflexivity.	The system itself is responsible for reflexivity.	No comment		
20	How reflexivity works in healthcare sector?	Πως λειτουργήσαν και πως λειτουργεί η αντίδραση και τα ανταντασιατικά των ομάδων στον τομέα υγείας όλα τα προηγούμενα χρόνια, μέχρι και σήμερα?	Unfortunately, there is inertness during last years in the sector, in terms of reflexivity Groups do not present alertness in the coming changes.	Reflexivity did not operate in an effective way so far. It used to operate with no organisation, no programming, and with no targets.	Reflexivity works negatively in the sector and harms the whole system. In general terms the system does not help qualified and valuable employees.	No clear to me, if reflexivity works positively or negatively.	After so many years the result is that there is no consensus among groups in healthcare.	There is no solidarity, or consensus among the agents during the years. This, in consequence, stops healthcare system from progress and keeps it stacked in the past.	Reflexivity did not work effectively so far. It worked though in occasions when basic rights were considered to be broken. The main reason was that there was no consensus and group mindset in the sector. Each group had its own beliefs and the reaction was rather periodic without strength and duration.	Ineffectively, without concrete and definite results but rather with inertia.	Reflexivity works under the supervision of political parties all these years.	So far there was no reflexivity in healthcare rather than predefined data and rules which were imposed and were followed through time.	There is no actual reflexivity in healthcare. Reflexivity is based on interdependencies and the combination of group's powers.	No comment		

16th interview questionnaire	17th interview questionnaire	18th interview questionnaire	19th interview questionnaire	20th interview questionnaire	21st interview questionnaire	22nd interview questionnaire	23rd interview questionnaire	24th interview questionnaire	25th interview questionnaire	26th interview questionnaire	27th interview questionnaire	28th interview questionnaire	29th interview questionnaire	30th interview questionnaire	31st interview questionnaire	32nd interview questionnaire
Hospitals Administration, Doctors, Nursing staff, Paramedical staff, Administrative staff, Pharmaceuticals staff.	Doctors, nursing staff, technical staff, administration.	Doctors, nursing staff, pharmacists	Doctors, nursing staff, physiotherapists, pharmaceutical companies, pharmaceutical central warehouses, pharmacists.	Doctors, nursing staff, pharmaceutical companies, administrative staff, other supportive staff (cleaning, cooking, security etc), social services that participate in the system.	Doctors, nursing staff, administrative staff, supportive staff (technicians, cleaning etc).	Doctors, nursing staff, paramedical staff.	Doctors, nursing staff, pharmacists, pharmaceutical distributors, hospitals, pharmaceutical companies, supportive staff, physiotherapists, other technical staff.	Doctors, nursing staff, pharmacists, pharmaceutical distributors, hospitals, ministry of health, pharmaceutical companies, associations, unions, government, legislators.	Doctors (private/hospital/clinical/insurance/University), Nursing staff, Paramedical staff, Pharmacists, Pharmaceutical companies, Pharmaceutical and Medical distributors and wholesalers.	Doctors, nursing staff, pharmacists, physiotherapists, speech therapists, ergotherapists, biologists, biochemists, technology labs professionals, chemists, pharmaceutical companies, pharmaceutical warehouses, technical assistants, government, administrative staff of hospitals, insurance organisations, insurance companies, state public services, the national organisation of medicines.	Healthcare system is divided into public and private sectors in the country. Players are: doctors, nursing staff, pharmacists, dentists, paramedical staff, other supportive professions such as drivers of ambulances, assistants etc.	Doctors, nursing staff, administrative staff, paramedical staff, psychologists, economists, lawyers, politicians.	Doctors, nursing staff, politicians, technical staff, supporting staff.	Doctors, nursing staff, pharmaceutical companies, administrative staff, pharmacists.	Doctors, paramedical staff, pharmaceutical companies, administrative staff.	Doctors, nursing staff, paramedical staff, pharmacists, pharmaceutical companies, administrative staff, political staff.
1. Hospitals Administration, 2. Doctors, 3. Pharmaceutical companies	1. Doctors, 2. Nursing staff	1. Doctors, 2. Pharmacists, 3. Nursing staff	There are two strong groups which demonstrate their own hierarchy: 1st group: (a) Doctors, (b) Nursing staff, (c) Physiotherapists; 2nd group: (a) Pharmaceutical companies, (b) Pharmaceutical central warehouses, (c) Pharmacists.	1. Pharmaceutical companies, 2. Doctors, 3. Nursing staff that belong to unions.	The most powerful group is the one that has the capitalised strength to impose changes in the system. This is troika. The privatisation of healthcare in the country supported towards specific interests. Therefore outside interferes due to political decisions.	In a healthcare system which is doctor-centered, naturally the main role is played by doctors. Second, the nursing staff is significant, since this is a new dynamic group which plays a significant role as well and tries for advancement.	1. Doctors, 2. Pharmaceutical companies. These two powers play the major role in the sector.	1. Government, 2. Legislators, 3. Ministry of Health, 4. Unions, 5. Doctors-Pharmacists-Pharmaceutical distributors-Hospitals, 6. Pharmaceutical companies.	1. Pharmacists (due to their strong union), 2. Doctors, 3. Nursing staff, 4. Paramedical staff.	Group A: Doctors, State, Pharmaceutical companies and warehouses, Group B: Patients, Group C: Public Insurance Organisations, Group D: Supply Companies, Group E: Administration, Group F: Lab professionals, Group G: Nursing and paramedical staff.	All groups have power and play significant role but if we would like to prioritise them we have to consider the level of healthcare provision (First-Second-Third). In first healthcare level, doctors, nursing staff and paramedical staff are important. In the other two levels of provision, doctors, nursing staff, dentists, paramedicals, assistants, in all these provisions, it is necessary the existence of pharmaceutical companies. Most powerful groups are doctors and nursing staff. These two groups with the cooperation of pharmaceutical companies play significant role in the system.	1. Politicians, 2. Doctors, 3. Lawyers, 4. Economists, 5. Others.	1. Politicians	Most powerful groups are: 1. Doctors, 2. Nursing staff (Heads). In current situation, primary role are playing pharmacists.	All categories have power in the sector.	1. Administrative staff
Information is formed by outside centers such as Mass Media.	Doctors have inside information and they are responsible for forming the information as well. There are no monopolistic situations in terms of information administration, and technology can help in the development and restrain information asymmetry.	Information is administered outside the sector. Journalists and centers of press are responsible for the infusion of relevant information. Use of technology can help theoretically but not in practice.	Information is actually administered from pharmaceutical companies. Monopolistic phenomena are referred to medicines and their markets. These contribute in the rolling of information in the system. Use of technology can help in the development and restraining information asymmetry.	Inside information exists among pharmaceutical companies, doctors and University medical staff. Use of technology could help in terms of clarity in the system and the relations among groups.	Actually none has full access to information. For example doctors have restrained access. Nevertheless, it is absolutely necessary to ensure accessibility to information, especially for the modern doctors.	Pharmaceutical companies play the significant role in information administration in the system. These companies decide who will have access to information and the range of this access as well. Use of technology is the door for the modernisation and democratisation of information for all.	Privileged accessibility in information is focused on doctors who are the main receivers of various information mostly from pharmaceutical representatives. Free access in technology and information will help the administration information.	Inside information has every group in terms of its own priorities. Technology can improve information administration as well as the control over information. It is true that during last years many groups have access in information. Steps taken so far are small though but to the right direction.	Information asymmetry exists everywhere since any group can gain access depending on the resources it acquires. Information administration is a broader issue of fair treatment and credibility.	There is information asymmetry since some groups form and administer the information and these are groups A, D and F because they have the ability to cooperate with external scientific communities and have the knowledge. Nevertheless, the adoption of technology gradually helps also patients and others. Monopolistic phenomena in regards to information exist mostly from pharmaceutical companies. Regarding the supply of goods, the monopolistic situation is less. Regarding the information created by the government still the access is restricted especially in terms of any changes in healthcare system.	Inside information has to do with two issues. First with the information that is produced by private companies and non-governmental organisation which create information and promote it for various reasons, e.g. advertisements, mostly for their personal interests. Such groups have direct access to the society. Regarding medical issues, pharmaceutical companies still have the power to form information. They create monopolistic situations and this affects the economy of the country. Pharmacists used to be a powerful monopolistic group as well, at least until some time ago. Regarding doctors, any medical issues, pharmaceutical companies have some privileged access. There are no monopolistic phenomena in the sector. Technology can help in the administration of information.	Doctors have better access to information since they form it as well. Pharmaceutical companies on the other side create monopolistic phenomena in terms of information administration. More use of technology will help definitely the sector.				
Relations among groups exist and are very significant.	The relations among agents are very important and there are strong interdependencies which affect the progress of the system as a whole.	Of course there are relations among agents in the sector. Although these are not considered important, there exist and unfortunately affect the sector. As a result such relations might play either a positive or negative role.	There are strong pairs of relations among agents such as: doctors-pharmaceutical companies, pharmacists-pharmaceutical warehouses and distributors, pharmaceutical companies-pharmaceutical distributors. Such relations play significant role in the sector since these define the framework upon the system works on. These contribute both negatively and positively since these define any developments.	Relations among agents exist and are very important.	The whole system is built on relations and interdependencies. This is how it is structured. In any case, this implies the definition of a system. Any progress is result of how such relations operate and affect participants and groups.	Doctors have direct relationship with pharmaceutical companies, something that is acceptable to an extent, but beyond this, in general, it is dangerous for the fair treatment of patients.	The relations among agents in healthcare, are relations of interdependence and intersection. Such relationships could boost this, in general, it is dangerous for the other side could affect negatively.	The relations among agents are very important and to an extent that affects the supply chain of the system.	Certainly there are relations among agents especially between doctors and pharmaceutical companies. This relationship has both negative (over-prescriptions of medicines) and positive (pharmaceutical companies fund research and organise congresses) effects. The wrong manipulation of such relationship may direct to commercialisation of healthcare.	Of course, there are relation and interdependencies among groups in the sector. Actually there is a chain of relations among groups which is very significant for the survival of the sector. Such interrelations define policies and how these are applied. On the other side, these different relations are responsible for the different implementations of the same policies in the same sector.	There are relations among groups which are important because they affect the operation of healthcare provision. In addition they affect both positively and negatively the progress in the sector.	There are relations among agents which are important and may contribute in any evolutions in the sector both positively and negatively.	There are strong relations among groups. However, now that prices are controlled, relations change especially between doctors and pharmaceutical companies.	There are relations among agents which are very important and contribute positively in the progress of the sector.	There relations among agents which are important.	
Relations patterns are defined both by the system and some groups. Actually the structure of the system helps preservation of current patterns.	Relations patterns are defined by the system.	Relations patterns are defined by a combination of groups and the competition.	The answer is the system. The system has been structured in such a way that nobody can proceed alone. Everybody needs everybody.	Relations patterns are defined by the government and its agencies which create the framework.	The system defines relations patterns in general terms. Of course this, from time to time, is affected by personal interests of groups.	There are strong castes within medical group which affect the system and reproduce current mentality for the benefit of these groups.	The healthcare system itself, and the way this is structured defines the internal relationships.	The governments so far and their mechanisms are responsible for the relations patterns.	Mainly the system defines relations patterns and this is due to the existed anyloous.	The system defines the interrelations. The system and its organisation, enables groups and allows such relations.	The system defines the relations patterns in a certain extent. Since the staff is obliged to cooperate and interact, it is inevitable not to exist relationships. The nature of such relationships and whether these are positive or harm the system depend on the personalities of the participants.	The system defines the relations patterns. This is due to how this is organised and the existed structures. Current system is doctor-centered focusing in classical ways of managing and hierarchy.	Relations patterns are defined by persons initiatives.	All the above, are responsible for defining relations patterns.	Both the system and the building blocks of groups are responsible for defining relations patterns.	The system defines relations patterns.
Relations create interdependencies and this creates paradoxes and distortions.	Interdependencies may raise paradoxes but from time to time, not always.	Yes, relations create paradoxes and distortions and actually this happens very often.	There is equivalence among groups and interdependencies demonstrate a kind of equivalence among the groups as well. Such organisation of powers could create paradoxes.	Interdependencies are result of relations which exist, such as between doctors-pharmaceutical companies. A paradox stemmed from interdependencies is that many valuable staff decide to leave healthcare and go abroad.	Certainly such relations create paradoxes.	There are specific relations that create interdependencies in the system. Such relationships is between doctors and pharmaceutical representatives which could damage the sector and bring paradoxes.	These relations exist and have definitive stress regarding any evolutions in the sector. They do create paradoxes and problems in healthcare.	Relations create interdependencies since the human factor demonstrates emotional vulnerabilities or even money dependencies.	Relations do create interdependencies and these raise paradoxes mostly stem from the groups that are in the beginning of the chain of relations. These are administration-government, administration-doctors, doctors-pharmaceutical companies.	Paradoxes and distortions do exist only in the occasion of missing these relations for personal benefits.	Interdependencies could create paradoxes only in the cases of individuality, competition, introversion, intolerance and authority.	Relations do create interdependencies.	An interdependence might create paradoxes in the system.	Relations create interdependencies and this enables paradoxes and distortions.	Relations create interdependencies and these create distortions.	
Current powers cannot help in self-organisation and cannot contribute in revealing new powers.	Interdependencies may help in unleashing new powers towards a new self-organisation of the system, but I do not know if they can direct to change.	Such relations might enable changes but in a small range. Regarding emergence and self-organisation this necessitates the cooperation of various factors and powers.	Groups and their interdependencies have the power either to block or boost emergence and self-organisation.	Such relations may destroy the whole system. Healthy powers cannot succeed if current system remains.	The system is strongly structured and with strong interdependencies and relations. As a result, given the current situation, it is difficult for the system to reach a new self-organisation and new powers to be revealed.	Personal and independent reaction is much more important than interdependencies. Every participant in the system should consider carefully his/her participation and action and should fight for the best.	No comment	State and government are the entities who usually block any progress due to their low level of intelligence, information and knowledge they have.	It would be wrong to allow the sector to a new self-organisation at least without control, unrestrained.	Interdependencies create obstacles and block any new powers. Current system does not have a fair system of evaluation and control. For example, doctors choose specific medicines and promote specific health tests. Under these circumstances, any progress is difficult. In addition, the sector has many groups which have many interrelations, therefore it is difficult to find its self-organisation.	It is possible for the interdependencies to enable new structures and organisations without creating problems in a hospital for example. Good relations and interdependencies could create new units, clinics and develop the environment for new cooperations. Such services though should always be available to all patients and not only to the rich ones.	Interdependencies may cause changes but this prerequisites a good administration of change, knowledge, persistence and cooperation.	Such interdependencies can cause changes in the system.	It is difficult for interdependencies to enable new powers and a new self-organisation in the system. I see this accomplishment as very difficult.	Interdependencies could enable changes, as long as, there will take place some radical changes in the structures of the system.	Such interdependencies could enable emergence of new powers in the system.
There is heterogeneity and this is rather wide in the sector.	In healthcare there are different groups which produce heterogeneity. This difference among groups is huge.	Heterogeneity stems from different initiatives and targets that different groups have. This heterogeneity demonstrates a big range.	There is heterogeneity and its width is defined by the initiatives and wills of each group separately. Heterogeneity demonstrates an additional grouping such as Pharmacists-pharmaceutical companies-distributors.	There is no heterogeneity in healthcare system.	Definitely, heterogeneity exist in the sector. This stems from the different aims, roles, motives and attitudes of the groups that work in the sector. Responsibilities are different as well. Some specific employees, especially doctors, have the primary responsibilities in the system.	In the sector there are different groups which do not necessarily have common ground for cooperation. There is heterogeneity which is revealed through involvement of things. Every group is an equally active member and a possible attractor for change, attracting the others to better prospects.	No comment	No answer	Diversity-heterogeneity is a general phenomenon in all labour fields. Of course each group has its own specific aspirations and this by itself brings differences.	Heterogeneity exists especially in terms of scientific orientation and education, the level of knowledge and abilities, the level of responsibilities. Also heterogeneity includes any personal ambitions and individuality.	There are different groups in the sector but with common targets and common vision. There is heterogeneity but this does not make them different for the benefit of the services provided.	There is heterogeneity but this is not wide. Since groups have common targets they interrelate and co-exist in a common route.	Heterogeneity exists due to different obligations and different targets of the groups that exist in the system.	There exists heterogeneity but not in a wide sense.	Heterogeneity exists in the system.	
Heterogeneity sometimes blocks cooperation and consensus, therefore this is a problem for the sector.	Heterogeneity could be observed everywhere in the sector and this does not create any problem for the country.	Motives and results are the main attributes of diversity. Heterogeneity creates problems for the country in general. The only way to help positively is when this contributes in forming a clear competitive environment.	Heterogeneity could be observed and found everywhere. If heterogeneity is administered successfully it will not create problems.	There is no heterogeneity in healthcare system.	Heterogeneity could be observed in any place, especially where the clinical work takes place. In back up operations, such as lab assistants, administration, heterogeneity is not so obvious.	Heterogeneity is sourced from people mostly and not groups.	No comment	No answer	Heterogeneity could be observed mostly in hospitals and this is not found only in Greece but in other countries as well.	Heterogeneity could be seen in all sectors and this is not negative for the country.	Heterogeneity could be mostly seen in hospitals. Sometimes heterogeneity is cultivated by the system and transforms internal groups since they do not have the same treatment from the system. For example, during crisis, there are hospitals that are obliged to cope with much more patients although they do not have the appropriate budgets. This is more intense in specific areas such as in the hospitals of Epirus. Therefore, there are not only the given heterogeneities but also the ones that are nurtured by the system itself. If the situation was better heterogeneity and interdependencies would be creative and finally would help much more.	Heterogeneity exists and starts from the education of different groups. This is not a problem though as long as there is consensus and groupwork.	Heterogeneity do not create problems as long as there is effective cooperation among member groups.	Heterogeneity could be seen in hospitals. Sometimes it could be a source of problem especially when there are no controls, e.g. unknown medicines that are used in the sector.	Heterogeneity is not a problem for the country.	Heterogeneity could be seen in hospitals.

Heterogeneity may be a source for development.	Heterogeneity could be a source of development.	Heterogeneity could be a source of development only when this operates productively and correctly.	Heterogeneity can be a source of development.	Heterogeneity and difference do not exist in terms of evolution.	Heterogeneity is more of a source of problems and tensions rather than a source of development. Heterogeneity is something that I do not recognise.	Heterogeneity should be a source for development.	No comment	No answer	Heterogeneity could be a source of development.	Heterogeneity can be a source of development if personal differentiation could be homogenised for the common benefit under an effective administration.	Probably heterogeneity is the source of development but it cannot progress alone without the help of society and vision from the staff which sort any negative relationships.	Yes, heterogeneity could be a source of development but with the help of cultural changes and change in mentality.	Heterogeneity could be a source of development.	Heterogeneity could not be a source of development.	Heterogeneity could be a source of development.	Heterogeneity could be a source of development.
Attractors are the top management of hospitals and the doctors.	Attractors are not persons or groups rather than the law, ethics and the framework that exists and everybody follows.	As attractors we can define doctors and pharmaceutical companies and these groups form the relevant patterns as well. Mainly this starts from pharmaceutical companies.	Attractor patterns are formed by the groups that participate in the system. These leaders define the behaviour of the members.	Attractors in current system are trade unions and parties who cultivate the relevant patterns. Rest of participants just follow and do simply their jobs. Some of them could be really good examples for the ones though who are ready to see the difference.	Current attractors are the political mouthpieces who operate under their own interests, such as the Administration of Clinics in Hospitals, Directors etc., who are motivated by personal, economic, legal and job distribution motives.	There are no attractors. There are no examples and prototypes to follow. This is something that we have to dig and find.	The Greek healthcare system is doctor-centered. Doctors are attractors. The Government is an attractor as well. These two define the patterns.	State defines patterns in the system, so the State is the main attractor who using the legal framework places guidelines and restrains.	Regularly attractors should be the Ministry of Health and the Code of Ethics of the sector. But nowadays patterns are affected and followed differently from different groups and separately.	Patterns are defined by the groups. Individually plays a significant role. Nevertheless, since healthcare is a significant element for the society, patterns are defined also under the requests of society in extent.	Attractors are mainly the health professionals of the system. Then, the government.	Behavioural patterns are defined by the educational institutes.	Attractor patterns are defined by the dominant groups.	Attractors define patterns and these usually are the unions of the groups. These are the professional associations that represent employees.	The system itself defines behavioural patterns and each agent separately.	Human resource is responsible for the definition of the patterns in the system.
Behavioural patterns will not work unless managers and doctors change their patterns.	Behavioural patterns can certainly change	These patterns work both positively and negatively. Nevertheless, these impose contexts and they additionally can help changing the structures.	Patterns operate both negatively and positively and these may change contexts or even create new contexts in the sector.	Current contexts and behavioural patterns are imposed by the pair: government-unions who have destroyed productivity.	Behavioural patterns are always expressed within the system's limits. Systems do not self-organise. Such an attempt is rather failed. On the contrary all members should work towards the structure of the system.	Behavioural patterns and the system can accept many changes and everyone is responsible.	No comment	Such patterns introduce contexts. The main issue though is who controls these contexts and who is responsible for being applied.	Patterns affect the system and may change the structures as long as these are working for the benefit of healthcare.	Patterns of behaviour can change. Already current restructuring have helped in better administration. Of course this mostly concerns public services and organisations. Groups that work on private sector follow other patterns under different schemes.	History has proved that patterns of behaviour followed did not help the system. The change of the system is expected to alter the behaviours as well. The turn to privatisation will possibly help the system by creating competition and healthy ground for new patterns.	Behavioural patterns can change in a new system and this is common expectation in healthcare sector. A new system with a new management towards quality and progress.	Behavioural patterns have affected either positively or negatively the sector. These patterns cannot change since the country does not have enough resources.	Behavioural patterns have operated negatively so far for the system. They can change though.	Behavioural patterns are definitive for the progress of the system. But it is very difficult to be changed, there are few possibilities.	
Unfortunately the new system should be built from zero and the old one should be destroyed	A new system could be based both in old and new powers.	The system should be destroyed and rebuilt from the zero.	On the one side the system cannot work without attractors. A system cannot be based in its old powers, if this wants to survive. There are needed dramatic changes which mostly deal with the existing culture and mindset. Such a system cannot withstand a transition in a new stage. Therefore, I consider that the system should be destroyed, and be created from the beginning.	The system needs new attractors, in order to gain a new perspective. The new system cannot base itself in old powers and mostly based on existed mentality and culture. As a result, the old system should be destroyed.	The destruction and building on new foundations is the only solution, as it seems from rational explanations. Current system does not allow for restructuring and repairs.	Nothing is possible to be built from zero. Everything is a result of progress. Under this case there must be a progressive power which will undertake the responsibility to lead changes.	It would be better for the system to be structured from zero level without the commitments and the past previous practices.	No answer	The system cannot work without attractors. It would be better to keep a combination of old and new powers in an effort to make changes in the system. We should keep good practices from past.	A system could progress based on knowledge, abilities and money. The better use of resources and a better administration are enough for the changes to take place.	The system could progress keeping the good elements from the past. However it is necessary to apply new competitive techniques and destroy any monopolistic phenomena for the benefit of healthcare provision in the country.	To destroy and build again a system that incorporates the negative action of catastrophe. Our system is not so decayed. It needs a change of culture, renewal and stimulation.	The system should be destroyed and rebuilt from the beginning.	The system should be destroyed and rebuilt on new foundations.	It would be better for the system to be rebuilt from the beginning on new foundations.	The system could be better to be built from the beginning.
Generative relationships is a general phenomenon.	Generative relationships exist in other sectors as well but in healthcare this is more intense.	I consider that there is no other relationships. There are no generative relationships.	The existence of generative relationships is a characteristic of all sectors and professions in the country.	Generative relationships is a social phenomenon result from the instinct of self-preservation of a group which lives in a broader complex system.	Generative relationships is rather a general phenomenon but each sector such as healthcare demonstrates its own characteristics during the adoption of this phenomenon.	It is impossible for a sector such as healthcare not to have generative relationships and solidarity.	There are special relationships of mutual help and intercoverage among healthcare groups.	No answer	Generative relationships is rather a general phenomenon.	There are relationships of protection and help among groups which enable mistakes and restrain prosperity for the people. In the public sector, generative relationships are stronger and decisions are taken on group basis where any mistakes are undertaken by the responsibility of the whole group.	Generative relationships do exist, and this is a general phenomenon which could be found in many other sectors. These relationships are closer and more protective and sometimes they could not be identified directly.	Solidarity and help among groups is a general phenomenon while in healthcare this is more intensive due to the nature of the sector.	Generative relationships are a general phenomenon.	Generative relationships exist elsewhere as well, but in healthcare sector could be found more often.	Generative relationships is a speciality of healthcare sector.	
Generative relationships may impose new contexts in the system, if the system wishes to do that.	Generative relationships may impose new contexts in the system. This is possible.	Since such relations do not exist they cannot create contexts or affect the system.	Generative relationships could be used as a leverage for changing contexts but the issue is for the benefit of whom, this usually happens.	Generative relationships cannot impose new contexts especially when mentalities are offended and personal belongings are jeopardised.	Such relationships could impose contexts and they do it already.	Generative relationships should be more active and support a humanistic environment in the sector.	Generative relationships may create contexts. For example they impose silence and camouflage in problematic situations.	No answer	Generative relationships create contexts in the system which operate either positively (cultivation of common interests) or negatively (oppositions).	Such relationship may create contexts in the system. It is good though to take into consideration patients' status.	Depending on their power, such relationships can affect and introduce new contexts in the system.	Generative relationships create contexts in the system and this does happen in daily routine.	Such relationships could impose contexts in the system.	No, the specific relationships cannot impose contexts.	These relationships could impose contexts.	This kind of relationships could impose contexts.
Generative relationships can define new structures and new organisation, if the system wishes to.	Yes, such relationships can define new structures.	There are some kind of relationships in the sector which enable changes in structures and organisation.	Generative relationships have the responsibility for enabling or fighting changes. But this depends on the groups that will try to exploit this privilege.	Generative relationships are not responsible for any changes. The system as a whole is much stronger and administers information.	Certainly, generative relationships are carriers of change in a fluid and redefined environment.	Such relationships should be changed first, and then create new structures.	No answer	Nevertheless, generative relationships do not have such power to define new structures and new organisation of the system.	Not necessarily. The healthcare system demonstrates weaknesses but this is not due to weak relations of protection and help. Generative relationships may direct to new structures and organisation, but the issue is who will make the decisions.	Usually, generative relationships do not affect positively the sector. It for sure that such relationships should be separated from the sector and the general provisional scheme.	There have to be made new mixes and interactions, in order the relations to change structures and organisation.	Also, generative relationships could enable changes in structures.	It might be possible to enable changes in structures though.	They could enable new structures and organisation.	Generative relationships enable new structures and organisation.	
The relation between behavioural patterns and generative relationships can and definitely create obstacles.	Closed relations create obstacles and raise blocks in a system.	There are some kind of closed relations which may create obstacles.	Relation between generative relationships and patterns of behaviour exist. The manipulation of them can create problems or the opposite, help progress of the sector.	Any special relations cannot affect or block any system.	Closed relationships as a result of generative relationships and behaviours is what is known as "status quo" in the sector. These are responsible for the malfunctioning of the system, but it seems that they have wide acceptance.	The relation between generative relationships and patterns of behaviour can find obstacles but not create. It is required though such relationships to be based on equality and fairness.	No comment	No answer	In a complex system, closed and special relations may certainly raise problems in the system. Not to forget that aspirations of participants are not always the same.	Generative relationships is possible to create problems in the system of a country, especially when dominant groups take decisions. Dominance creates distortions, since every part of the system is useful and not only dominant groups.	These close relations are not always bad or negative for the system. Sometimes these are necessary. This does not mean that they cannot create problems in patients. However, such closed relations are not so important because they represent a small percentage.	Closed relations means cliques. Such relations are obviously obstacles in any progress and improvement in the sector.	Closed relations create obstacles in the system and block emergence.	No comment	Closed relations could not create obstacles in the system.	Such closed relations may be an obstacle for the sector.
Not understand the question.	Collective reflexivity is like the action of strike. I consider that there is link between reaction and complexity.	Collective reflexivity is a way of group reaction such as strikes, protests and in general group reactions of any nature. There is relation between reflexivity and complexity.	Collective reflexivity are the mass movements. There is a link between reaction and complexity.	Collective reflexivity does not actually exist, because it proved difficult for people and groups to communicate and cooperate in terms of challenging new things.	Collective reflexivity is the group reaction and the cooperation towards common targets. Though, there are not common targets and desires in the sector. Reaction has not to do with complexity itself rather with current prototypes of self interests that are cultivated by current system.	Collective reflexivity is the collective attitude towards a phenomenon. It is probable such attitude to forward progress. This is a healthy behaviour for the system.	Collective reflexivity is the group reaction against something specific.	No answer	Collective reflexivity is considered the reaction of a group of individuals that oppose to a certain attack in their interests. Usually this covers their common interests and not necessarily their personal interests.	Collective reflexivity is the sum of people towards common goals. There is connection between reflexivity and complexity since groups that participate in the common action do not necessarily have the same motives. Therefore, it is not always given that groups will reach their goals.	Collective reflexivity means group reaction and cooperation among groups. This is not possible though, since there is strong diversity and each group has its own targets and motives.	Collective reflexivity means group reaction and cooperation among groups. This is not possible though, since there is strong diversity and each group has its own targets and motives.	There is connection between reflexivity and complexity.	Collective reflexivity is any kind of group reaction. This has a link with complexity.		
The system does not create or support reflexivity. On the contrary the system tries to divide collective reactions.	Trade unions and parties are mainly responsible for reflexivity. Moreover, government, the system itself and groups are also responsible for cultivating reflexivity.	A combination of all is responsible for reflexivity (the system and the agents).	Trade unions are responsible in the country for collective reflexivity. Especially there are specific groups in the country that lead this reflexivity. Finally reflexivity is a combination of the systems and individual groups.	Reflexivity is something which is technically produced by the system in order to be cancelled by it in the end.	Reflexivity comes when groups realise that they have more commons than differences. Poverty, undervalued and other difficulties probably will direct groups in collective reflexivity. Such situations drive majority towards the desire for reaction.	The system and its groups are responsible for reflexivity.	The system and the agents are responsible for the cultivation of reflexivity.	No answer	Usually, unions are responsible for collective reflexivity as well as any other associations.	The system is responsible for reflexivity and the groups are responsible for the cultivation of reactions.	Collective reflexivity is created by the system. Nevertheless it is possible to be created by closed groups which create general problems and operate against the system with war mentality.	Everyone is responsible for reflexivity. The creation of an environment of collectivity is necessary to create a dynamic healthcare system.	Responsible for reflexivity are the groups' representatives.	Both system and agents are responsible for reflexivity.	Both the system and agents are responsible for reflexivity.	Both the system and the agents are responsible for reflexivity.
Which reaction? Which reflections?	Reflexivity have operated negative for the system.	Reflexivity works in both ways. Positively and negatively.	Collective reflexivity has operated successfully so far, but now, any things that have been acquired by the groups is about to be lost.	Reflexivity operates like having experienced a brain stroke and now does not understand anything at all.	Reflexivity does not work. Every time that any group tries to react there are always oppositions in the system, which try to terrify, and blackmail. The only way for reflexivity to work effectively is when there is a decision for final abruption.	Reflexivity was based in the strategy of splitting the powers in order to weaken them. It is time for a different "modus vivendi".	Reflections of groups are delayed in the sector.	No answer	Reflexivity works ineffectively and unevenly so far.	Reflexivity works positively in terms of pushing for changes in the system which finally accept to do. There were always reactions from groups for various issues (economical, human resource issues etc), especially nowadays where the system works with many difficulties. Nevertheless, reactions have impacts to weaker groups, such as the patients. In addition, reactions are taken into consideration with delays which harms the system.	Reflexivity works a posteriori in the sector, when problems have already created and impacts are diffused. On the other side we should not forget that due to reflexivity both staff and patients acquired some rights.	Unfortunately, the rule of "action-reaction" works very negatively in healthcare, just as in other sectors as well. This operates for the benefit of personal motives and interests. Nevertheless, healthcare should be a multi-side place, an open place of communication and professionalism.	Reflexivity worked unevenly so far in the sector.	Reflexivity works both positively and negatively. The truth is that in this period the sector is going to experience very bad situations due to crisis.	There is no consensus and group reaction all these years in the sector.	

33rd interview questionnaire	34th interview questionnaire	35th interview questionnaire	36th interview questionnaire	37th interview questionnaire
Doctors, nursing staff, pharmaceutical companies, administrative staff.	Nursing staff, Doctors, Technical medical lab assistants, pharmacists, administrative staff, technicians, biomedical staff, physiotherapists, ergotherapists, psychologists, social workers.	Doctors, nursing staff, paramedical staff.	Government and Ministry of Health, Administration of Hospitals, Unions, professional associations, pharmaceutical companies, doctors, companies that are involved in the sector.	Ministry of Health (central government), pharmaceutical companies, doctors and nursing staff.
1. Doctors. 2. Nursing staff.	1. Doctors. 2. Administrative staff. 3. Nursing staff. 4. Technical staff. 5. Paramedical staff.	The one group supports the other.	The most powerful group is Government. Government does not want any changes.	The most powerful group is Government. All other groups have been eliminated.
Doctors and administrative staff are responsible for the information generation. Use of technology may improve information administration.	Doctors and nursing staff are the groups that create information. There is no privileged access for any group. Use of technology could help in the improvement of information administration.	There is no actually a unique group that has more access in information. Information administration is a matter of personal initiative. As a result groups have restrained access. The use of technology will definitely help.	Government continues to administer information which still creates problems although we live in the era of free information. Issues that should have been solved remain unsolved.	Information administration is done by mass communication media. It is not clear whether there are monopolistic phenomena.
Relations among agents are important and contribute positively in the progress of the sector.	There are relations which are important and could be used for the benefit of the healthcare sector. Especially for the benefit of patients.	Interrelations are inevitable in an environment where strong relations exist. These are positive and necessary for the system.	There are relations among groups that create dependencies in a degree of high protection.	Healthcare is affected by all its members. Relations are very important. When a sector malfunction affects others as well and decrease the level of healthcare provision.
The system defines relations patterns. The Directors of Clinics are responsible for the relations.	The interrelations and relations patterns are defined by the system and the groups.	The groups define relations patterns.	The system defines relations patterns and founds itself at the beginning of chain.	The system defines relations patterns.
Relations and interdependencies create paradoxes in the system.	When relations are not equivalent then there are distortions.	Distortions are the result of personal actions and not the result of interdependencies.	There are no paradoxes in the system since each group knows that depends on the others.	There are paradoxes and distortions for which the system has therapies.
Such relations could help the system. They could help in unleashing new powers subject to successful selection of new staff. This needs patience and persistence.	Relations could enable changes in the system and if these relations are healthy could change the whole system.	Interdependencies can cause changes through a series of interactions among groups.	Such relations could enable changes.	New healthy powers will direct to new self organisation.
There is heterogeneity which stems from different purposes and targets. These differences could break balances.	There is heterogeneity among groups in the sector and this is due to the specialities of each profession.	Heterogeneity exists due to different groups. This is wide and necessary for the sector.	There is heterogeneity but the target is the same. More profit from the sector.	Heterogeneity depends on different groups and these groups converge. The more diversity exists among groups the more diminishing services are offered.
Heterogeneity is a problem, especially in the workplaces. This is more emphatic when incapable people work in the sector affecting badly the quality of employment.	Heterogeneity exists between two main groups. From the one side doctors and nursing staff and from the other side administrative, paramedical and technical staff.	Heterogeneity stems from the multiple roles of structures in healthcare. The bottom line is the effective therapy and treatment of patients. As a result heterogeneity is not a problem since this does not affect the quality of offered services.	The heterogeneity is not accepted in the sector because if this was accepted we wouldn't enter in crisis.	Heterogeneity could be identified in central government, universities and hospitals. Nevertheless this is not a problem for the country.

It is not necessary that heterogeneity is a source of development.	If heterogeneity is creative then could be a source of development.	Yes for sure, diversity is always a leverage for thinking and acting towards results.	Heterogeneity creates progress and this is the solution.	Heterogeneity could be a source of development if all groups decide to evolve.
The ones who participate in the system are responsible for attractor patterns.	Patterns and behaviours are defined by the society and its citizens in every different phase.	Attractor patterns is the result of evolution. There is no any specific dominant power that defines patterns rather than interaction among members.	The powers that define attractor patterns are the ones who are responsible for the current situation in healthcare sector and in Greece.	Attractor patterns are defined by the politicians, the educators and the church.
Patterns work both negatively and positively.	Patterns could impose contexts and have the power to change systems and their organisation.	I have already replied based on the above.	Yes, the attractor patterns can impose contexts but there were not the corresponded evolution all these years.	Behavioural patterns are not independent from the healthcare operators. Behavioural patterns follow the rules of new self-organisation.
The system should be rebuilt in new foundations.	A new system needs also the old healthy parts of the previous system. It can improve the old parts through time.	Nothing can be rebuilt on totally new foundations. Everything is under a developmental relation between yesterday and today. This is a detailed relationship to the end.	It would be better to build again the system on new foundations.	The system should depend on both old and new powers. In this way the system will handle the transition normally and not through catastrophe.
Generative relationships is rather a general phenomenon.	Generative relationships os rather an isolated phenomenon and not a general one.	Generative relationships are the basis for interaction, solidarity, humanity and help among members. We have to consider that the final receiver in the system is the human being.	Generative relationships harm the system because these are maintained from the groups that have damaged it.	Generative relationships are the characteristic of healthcare sector.
Generative relationships create contexts in the system.	Generative relationships could impose rules in the system.	Generative relationships impose an informal rule and a code of ethics among their members. Since this is rather a flabby approach we could talk also for formal rules.	No they cannot.	Yes they can.
Generative relationships enable changes in structures towards self-organisation.	But they cannot define new structures and organisation.	Generative relationships can define new structures but it takes time.	No they cannot.	It should be.
The relation between generative relationships and patterns of behaviour creates problems in the sector and in the country. It is questionable who finally manages the system.	Yes this relation can cause problems.	The problem is where the new system will be based on. The emerging powers will be the result of the mix of different powers.	Closed relations are the problem. It is time for clarity.	Closed relations remain a problem and an obstacle.
Collective reflexivity is the concurrent reaction of a group.	Collective reflexivity is every action of workers against decisions that insult their interests. There is a direct relation between collective reflexivity and complexity.	Collective reflexivity is the new power of complexity.	Collective reflexivity will exist if the system will be rebuilt on new foundations.	Collective reflexivity appears in anything against the common sense. Responsibility lies to everyone and reactions are the same each time.
The system and the agents are responsible for reflexivity.	Collective reflexivity is cultivated by groups and the system itself.	The system is responsible for reflexivity. The system is consisted of many groups.	Non of them. Something else.	Reflexivity is a way to protect common good and maintain responsibility.
There is lack of solidarity due to personal ambitions, disinterest and unwillingness for actions.	Reflexivity is not intensive although the sector experiences rather sudden changes.	Healthcare sector cannot survive only through formal rules but also through deep thinking and ethical regeneration.	Reflexivity does not operate effectively or there is no reflexivity.	Reflexivity works for the benefit of groups and the society.