

# ZERO DISEASE

THE BIRTH OF THE COLLABORATIVE MODEL  
(COMMONS) OF HEALTH. THE BIRTH OF  
HEALTH SMART GRID DIGITAL.

ANGELO BARBATO



**Angelo Barbato**  
**Zero Disease**

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ZERO DESEASE

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ZERO DISEASE

The birth of the health collaborative model (Commons).

The birth of digital networks for health (Health Smart Grid

Digital).

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## Presentation

The book stems from the desire of the authors to disseminate tools and transformation of models in health care, inspired by Jeremy Rifkin's theory 'Zero Marginal Cost'.

The ambitious attempt to make an accessible and usable participative model of health, illness and treatment, meets the need of the human being to recover the relationship with himself and with the world around him. The environmental, economic, social and technological should be geared towards preserving the human being and the environment he lives in. The inevitable repercussions on health will become increasingly avoidable using the new paradigm of communication, through conscientious choices and the essential support of the internet. The transition from a Hierarchical and Structured Medicine to a Capillary and Distributed one sees the human being involved in the role of being responsible for himself. The health-oriented community

will be the arrival point, not only a start, and a social duty prior to being a fundamental right.

This probably represents a visionary shift which, in the words of our intellectual reference "It's Already Happening".

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Foreword by Angelo Consoli â## The Health Communities

The Third Industrial Revolution is not only a change from  
a centralized, top-down energy/economic model towards a  
distributive and interactive one.

The Third Industrial Revolution is also and mostly a  
paradigmatic shift for the human race.

An epical passage from an individualistic and utilitarian  
lifestyle to a biospheric and empathic one. In a society in which  
the marginal cost of production and distribution of goods and  
services is closer and closer to zero, where information, objects,  
ideas, services and people travel at infinitesimal costs compared  
to a hundred years ago, and in timeframes then unimaginable; the  
human genre is emerging from an economy of scarcity, entering



a sustainable system of abundance. An economy in which its activity will no longer develop according to the canons and standards of the traditional market economy based on profit, but according to canons and standards of a social economy based on collaborative Commons.

Jeremy Rifkin lucidly describes Energy Commons as composed of millions of prosumers (both producers and consumers) able to generate almost all their green energy needs at a marginal cost close to nothing, the Commons of Logistics able to project, print and distribute goods and services at almost null marginal costs, and the Commons of Health, Education and Culture able to guarantee scholastic, health and cultural services of same condition; or Mobility Commons for the movement of humans in increasingly sustainable, efficient and economic ways.

The new generations are projected beyond the capitalist market and the centralized, hierarchical, closed, patriarchal, property-tied model towards a distributed model, which is collaborative, open, transparent, equal and empathic.

It is what Rifkin calls power on a lateral scale, or **Lateral Power**.

Today's youth, linked together in a virtual sphere (by social networks through which information travels with abundance and freely) and in a physical space (thanks to low cost flights, unimaginable ten years ago, or faster and more efficient metropolitan transport lines), are rapidly getting rid of the remaining ideological cultural and commercial ties that have

long been separating the mine from the yours, in the frame of a capitalistic system characterized by relationships of private property, market exchanges and national borders. Open Source has become the mantra of a generation that sees power relations in a completely new way compared to their parents and grandparents who have lived in a world dominated by geopolitics. (cit. Jeremy Rifkin, Society at Zero Marginal Cost, pag. 429-430)

In a new empathic civilization profoundly integrated in the biosphere community, all our natural resources will become shared patrimony and the way that they are used will become everyone's business. Even the planning of urban spaces, be it industrial or rural, will not be an exception to this rule.

The construction of large industrial and infrastructure installation networks of the third millennium and the third industrial revolution cannot therefore continue to proceed according to the dissipative and unsustainable canons of the fossil era. Networks were built in disregard of the principles of efficiency, space optimization of urban and rural spaces were ravaged repeatedly and savagely for the construction of tens of thousands of power lines, pipelines, cable ducts, aqueducts, road infrastructure, electronic networks and lighting networks.

In the collaborative Commons idea, the internet of things offers new and unreleased possibilities of doing more with less (the principle of energetic efficiency affirmed by the European Union) taking advantage of the existing networks and

enriching them with new functions, useful to expand the sharing economy and empathy among human beings.

The collaborative Commons is based on the idea that the thermodynamic laws cannot be ignored, minimized, avoided or violated. The first law of thermodynamics clearly tells us that nothing is destroyed but everything is transformed. Therefore, burning an object to close the waste cycle does not at all entail its elimination or freedom from it, but simply having changed its state, from solid to gas and making it even more dangerous not only for the environment but also for human health. All the energy of the second industrial revolution is based on the violation of the laws of thermodynamics. The combustion of a fuel to bring about propulsion or the turning of turbines is a thermodynamic folly with lethal consequences to human health. Changing the paradigm from the fossil cycle to the solar cycle, therefore entails activating a new, less harmful economy, consequently more in line with an illness prevention policy and closer to the objective of zero disease.

The Third Industrial Revolution is creating healthier and cleaner societies, an agriculture without pesticides or genetically modified organisms (GMO), a distributed industry instead of one centralized on very reduced emissions. On the contrary, continuing with the vertical logic will inevitably produce health pollution as an effect of soil, water and waste landfills contamination and the poisoning of air by incinerators.

However, with his new book, Rifkin causes us to reflect ,

he also covers the correlations between environment and health, he illuminates us on how the doctor/patient relation is changing in the dynamic of a new community of distributed health. Rifkin reaches this considerable result described also as the Commons of Health.

Why not imagine, in fact, beyond the Commons of Information, the Commons of Energy, also the Commons of Health? A Commons in which modern technologies of distributed and interactive information permit Dr Gille Frydman, founder of ACOR (Association of Cancer Online resources) to develop a model of participative medicine in which different subjects converge in a sole Commons. Patients, researchers, doctors, financiers, producers of medical equipment, therapists, pharmaceutical companies and health professionals, would all be committed in collaborating to improve the care of the patient (Rifkin, Society at Zero Marginal Cost, page 343).

This is not a remote or an unrealistic hypothesis. Patientslikeme, a social network of over 200,000 e-patients already fights 1,800 diseases. An important achievement they have obtained has been exposing the scandal of lithium-based pharmaceuticals used for Amyotrophic Lateral Sclerosis. A study based on information received online showed how these drugs were totally uninfluent in the treatment against ALS. Such an example shows how the open source approach in medical research can produce important results, as opposed to competitive research, through which data remains trapped under

a vertical, limited and secretive system.

In medicine, more than in any other sector, it becomes increasingly fundamental to dispose of **big data** with adequate algorithms, following the crowdsourcing model in order to identify sanitary models at low marginal costs and yet with very high efficiency. In the chapter **Everyone is a doctor** of his latest book, Jeremy Rifkin reminds us that, nowadays, the Internet counts with hundreds of health Open Source Commons. Rifkin consequently highlights that **everything** suggests that their number will increase significantly in the coming years, when in various countries the electronic storage of health data will make health care support services more fluid and efficient... The big data, that will therefore be made possible to generate in the United States as in all other countries, will form a pool of information that, if properly exploited by open source Commons oriented health by patients, may, subject to appropriate safeguards on confidentiality, revolutionize the health sector (Rifkin, Ibidem, page 348) .

Hence, the message launched from the collective of sensitive and intelligent doctors interpreting Rifkinian thought, among whom are Dr. Angela Meggiolaro, Dr Bruno Corda and Dr Angelo Barbato, completes the vision of a society of zero emissions, waste, kilometres and of a zero marginal cost economy.

The **Zero** vision expressed in the book-manifesto Zero Zone, written by professor Livio de Santoli and myself, thanks to

the contribution of Angelo Barbato, has permitted us to trigger the spread of awareness around the Zero Disease concept. This occurs in a scenery in which the internet of things and the Third Industrial Revolution bring the centre of health care precisely onto the territory, calling for the necessity to increase prevention as a Pillar of the distributive model of health in medicine in the zone.

The new vision highlights that the traditional model based in the hospital has become ineffective for the treatment of chronic diseases which are increasingly diffused due to the lifestyles and occupations imposed since the Second Industrial Revolution, and which can be reduced by enhancing the prevention pillar. Telemedicine, home care, fight against chronic diseases, doctor's actions on the territory's schools and public administrations and especially the adoption of proactive methods by the citizen-patients, will increasingly revolutionize how we deal with health, moving the focus from the institution to the area.

This new health model of the third Industrial Revolution will revolutionize the current paradigms of health care, reaching extraordinary and very rapid results, mainly through prevention. The new care model is the heart of the book Zero Disease. The realization of such a possible future depends entirely on us, starting from public administrations and health care enterprises. Notwithstanding citizens and their propulsive aggregating force which lead increasingly rapidly towards a

biospheric, empathic, collaborative and sustainable lifestyle, where Community becomes Zero Zone.

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1. The wellness and health management in the ideological framework of Jeremy Rifkin

Bruno Corda Angelo Barbato

Jeremy Rifkin is one of the world's most recognized economists who in his recent work<sup>1 2</sup> has stressed the progressive rise of a new economic system, gradually alternating and replacing capitalism. The engine of this transformation is the digital revolution, allowing the internet of things. Telecommunications' Internet of things (or, more properly, the Internet of Things or IoT), is a neologism referring to the extension of Internet to the world of objects and concrete places<sup>3</sup>. The internet of things is made up of a network between the energy internet, the communication internet and the logistics internet<sup>4</sup>. Rifkin summarizes his economic thinking in three basic paradigms (energy, communications and logistics), stating that in the evolutionary change of these archetypes, man becomes the star of a new industrial revolution.

The first industrial revolution (about 1760-1870) was an economic transformation process or industrialization of society in which the agricultural and craft-trade systems became modernized and industrialized. Characterized by the generalized use of power-driven machines and of new, inanimate energy sources (such as fossil fuels - steam engines), the scheme was favored by a strong component of technological innovation. This was additionally accompanied by the phenomena of growth, economic development and profound socio-cultural and even political changes. This first industrial revolution began in the textile (cotton), metallurgical (iron) and mining (hard coal) industries.

The insurgence of the second industrial revolution (about 1870-1970) is conventionally set to 1870 with the introduction of electricity, chemicals and oil.

The third industrial revolution (1970) refers to the effects of mass introduction into industry of electronics, telecommunications and informatics<sup>5</sup>.

In recent years a new generation of scholars and specialists have begun to realize that the management and centralized control of commerce is giving way to peer production and horizontal distribution. The scale of property exchange on the market is becoming less important than access to goods and services on the network. Additionally, conscience is rising around the social capital as true economic value rather than the market capital.



The main result will be a more equitable society based on sharing and cooperation between citizens and a sustainable economic model, particularly from an environmental point of view.

The new paradigm will lead to a progressive market decline as we know it today, parallel to the development of a sharing economy based on the cooperation of the consumer who meanwhile also becomes producer (prosumer). This is the first new economic system to make its appearance since the birth of capitalism and socialism at the beginning of the 1800. A free economy is emerging, a mix between capitalism and collaboration. In 2050 Jeremy Rifkin predicts that capitalism will still exist, but it won't be the sole economic system. Young people today collaborate with all sorts of things, produce and share their videos, their music, their news.

Online training courses are open and free, all this with marginal costs equal to zero. In fact, when producing a video, the marginal cost to distribute it to a billion people is virtually zero.

We're starting to see a new economic system in which there aren't only producers and consumers, owners and workers but also prosumers; millions of people who access the Internet platforms of things and are able to produce, consume and share any virtual service: news, knowledge, music, video. We are bypassing the great twentieth-century organizations at almost zero marginal cost: free of charge, in abundance and outside the market. This is a revolution.

What will happen to Multinationals?

Many of the big and vertical ones of the twentieth-century have already been destroyed, as has happened, is occurring and will continue to take place in the music and video industry, in editorials and in television.

At the same time, thousands of other new companies have emerged in the economy of sharing. Not just Google, Facebook and Twitter, but thousands of profit and nonprofit companies that are building the sharing economy, thereby enabling young people to share what they create.

It 'a very destructive process to the market economy as we know it today, but it is only the beginning of a revolution towards the democratization of economic life.

Germany is leading this revolution, and even small countries like Denmark and Costa Rica are doing well. Germany is ahead in the internet of energy with 27% of the energy produced by sun and wind. It will be over 35% by 2020 and 100% by 2040. The costs of technologies for energy production are significantly reducing as has happened in the computer industry. A solar watt costed \$ 150 in 1970, now it's charged 64 cents and it will drop to 35 within 18 months. Once Germany has paid off the investment expenses, the marginal cost of energy produced will be close to zero. The sun and the wind do not send any bill to be paid to the Germans. It's free. Germany is heading towards an energy system at zero marginal cost that will make the economy more productive and efficient in the world, hugely benefitting its

businesses and families.

China, too, has begun to change its energy policy with investments starting at 82 billion dollars in 2015 to digitize the electric grid smart. Millions of Chinese will be able to produce solar and wind energy in their home and share it in the national electricity grid.

In electrical engineering and telecommunications, a smart grid (intelligent network) is the combination of an information network and an electrical distribution network in a manner allowing to manage the power grid *smartly*.

Precisely the "intelligent" characteristic must be highlighted under various aspects or features as the efficient distribution of electrical energy for its more rational use, minimizing any overloads and variations in voltage around its nominal value<sup>6</sup>.

Digital smart grid is a concept which, carried from the power supply, will be increasingly developed in the computer network connections. This has implications not only for Wi-Fi, broadband and big data. It is needed to move towards the trend of digitizing the three major paradigms of the economy: energy, communications and logistics (including transport systems).

There are no longer virtual or natural boundaries facing the great global problems such as population growth, food resources, over-exploitation of land resources, pollution of the planet and consequently uncontrolled problems at the limit of survival, of space and of the biosphere's balance. These represent problems towards which consciousness is growing, issues we can

no longer postpone, or worse, ignore.

A new global and social consciousness is inevitably making its way, demanding a complete change of paradigms. Vertical and power relations will gradually give way to relations of cooperation and sharing of forces.

Empathy and assertiveness, keywords of sharing and collaboration, will integrate the necessarily narcissistic, closed and conservative communities of all sizes and places.

As masterfully described by Jeremy Rifkin, history shows that a shift in energy, communication and logistics represents the dawn of a substantial economic revolution in all societies of the world. Consequently, as always happens during great changes, it is crucial for the future of society to seize the opportunities of such shifts, renewing and adapting their inner world to a new global vision. At present, the history of man and of civilization has reached a global dimension.

The paradigmatic events of the third industrial revolution described by Jeremy Rifkin have produced the greatest evolutionary acceleration in human history. As always, it is up to man to know how to seize new opportunities. The faster man makes this happen, the deeper and more aware the willingness to change themselves will be.

The first big change is radical, the gradual transition from a self-centered individual awareness to an open and multifocal collective. In summary, the ability to combine oneself with others and with the surrounding world is needed. This

three-dimensional view, which effectively defines the so-called biosphere consciousness is the new interior condition absolutely necessary to be able to rapidly take advantage of the great benefits that this revolutionary global process can generate.

Not knowing how to seize this great opportunity, or worse, not wanting to participate in the change can result in unfavorable social events, which are already perceivable, if not visible.

History is continually proposing this.

Individuals and companies are therefore becoming increasingly collaborative, more involved, more empathetic, more attentive to the world in which they live in. The change will impact our lives more rapidly the more we are active participants.

This will happen in the production of goods, but above all in the collective sphere of relations, so-called services. First and foremost, is health, where the value of empathy is one of the anchors of the modern conception of the doctor-patient relationship.

The doctor-patient relationship has always been the cornerstone and the centerpiece of the "cure" process in all its stages, from prevention to diagnosis to therapy.

In some national contexts, such liaison has gradually shifted towards the establishment of mathematical sterile space protocols of production chain in the Health "Companies", sometimes operated by speculative organizations. These companies are both public and private. Speculative, in this context, because the enterprises, rather than focusing on

the "production of health", end up feeding themselves and their survival.

Why are the delivery systems for health care services continually reviewed? What is constantly changing? Why do public health systems tend towards privatization and not vice-versa? Why is an important profession such as health care more than any other at the centre of debates and controversies? Why is one of the most important services that every state should give priority to so different from country to country?

The evolution of society has gradually shifted its focus to the level of the hierarchy of needs, as has inevitably been the case also for one of the basic services organized for citizens in modern societies, "health protection".

Today, the close individual-environment connection is undeniable, seeing the correlations between environmental degradation and health risks. This awareness has been gradually triggering growing consciousness and the culture of prevention.

The environmental crisis, the crisis of health and the crisis of values are closely linked and interdependent. The system responds to the request for health with an increasing number of expensive and technologically sophisticated performances; trying to modify the natural history of "disease", which in itself already implies "lost health". Neglecting, instead, primary prevention which is to be made both on the polluted and unhealthy environment around us, as well as on individuals, accompanied by an appropriate policy of information and health

education in search of a more simple and sustainable lifestyle.

Ethical and social values are sometimes contrasted by economic value, hence the need to make the health system sustainable while ensuring conditions of equality and universality.

All countries in the world are committed to finding answers for the enhancement of its citizens' health.

Various countries, principally the developed ones, have established health care management models essentially of two types: a predominantly public model named Beveridge after the Englishman who at the end of World War II brought public insurance coverage to the United Kingdom, the "National Health Service"; and the Bismarck model, which takes its name from the Prussian/German statesman who introduced the private health insurance system.

Different countries have tried, even with customizations, to adjust such organizational models to the ever-changing demand for health, in the variable environmental and economic contexts, in order to maximize their population's health.

In the 1990s, the World Health Organization altered the attention level of health protection systems, shifting attention from the treatment of diseases, to seeking the psychological well-being of individuals and the environmental determinants of health.

To organize health care, man began his fight against diseases that in the nineteenth century was focused on therapies against

infectious diseases. Around 1850, the construction of the first pavilion hospitals began, which soon showed the potential of hosting and connecting specialized activities that were beginning to emerge. These were mostly surgical, as a result of the revolutionary scientific discoveries and practices of the birth era of the foundations for anesthesia, microbiology, antisepsis and asepsis, but also diagnostic laboratory support, followed by diagnostic radiology (X-ray, 1901 Nobel prize), to which electrocardiographic diagnostics<sup>7</sup> would be added soon after (Einthoven, 1908).

In order to organize health care in addition to acute patient management and thus urgency/ emergency, you need an increasing ability to manage chronic illness through a holistic vision that includes active handling of the disease, more often chronic diseases to be centered on prevention.

In recent years the traditional and hierarchical health care model that is identified with hospital care has begun to falter, not only due to the high cost of energy, technology and management but also because of the profound epidemiological changes in diseases. Traditionally, the cure of acute illnesses has reportedly developed a standby medicine in the top-down hospital context, a facility increasingly dedicated to users, emergency and to the treatment of high intensity and in need of advanced technologies. The hospital has become ineffective for the treatment of rising widespread chronic diseases in need of multidimensional interventions, also linked with social health.



The increase in life expectancy with the progressive ageing of the population has led to the augmentation of chronic degenerative and debilitating diseases, for which the traditional hospital standby model is inadequate.

The attempt to create within the hospital outpatient sectors for specialized external uses has proved unsuccessful for a number of reasons: the structural and hospital management costs are too high for such activities, and the type of performance is completely different since the acute patient must be treated in the hospital and the chronically ill should be treated in the zone, through the enhancement of organizational models characterized by prevention.

Merging the management of activities for acute disease with the management of the activities for chronic illness inside the hospital deviates high-tech and urgency resources from interventions for the acutely ill. The center of gravity of care for chronic conditions needs to be moved into the territory, with the need for increased effectiveness also through avoidance interventions. Prevention becomes the pillar of the distributive model of territorial health care: not only due to its undisputed importance in the promotion and maintenance of health, but also for the better utilization of resources, resulting in cost reduction. The new strategies for the integration of health policies must necessarily take into account environmental sustainability.

After a period of constant evolution and adaptation of the specific structure for increasingly accurate, effective, technically

advanced and prognostically favorable treatments, - the hospital - the focus, has opened itself towards the territorial zone for several reasons.

The hospital is a highly sophisticated structure with high technological trends, high management costs only justifiable for performance-intensive care given to a patient in acute emergency and made possible only in a protected environment.

The territory consequently gains importance not only to provide care and treatment to low-intensity patients and to guarantee care continuity and the patient's recovery. But above all, to prevent and anticipate the disease (early detection!). In addition, the territory also represents an important input filter and selector for hospitalization.

The hospital, by vocation, treats (or should treat!) 100% of the acutely ill, while health outside the hospital treats (or should treat!) mainly the healthy to ensure a minimal occurrence of sickness.

The primary care target is therefore made up of 40% of healthy individuals, 40% of healthy individuals with risk factors and the remaining 20% of ill individuals (of which 10% have disabilities).

The hospital's mission is maximum repair and cure of the individual's biological damage, while the mission of the zone is to avoid health damage through multiple strategies on population health, even informing and educating people of the best way to live .

In a distributed model of medicine of the territory, health professionals and family physicians are the central figures in order to achieve a proactive medicine. Proactive medicine is centered on the promotion of good health and the prevention of bad health. The health of a community is determined by socioeconomic and environmental factors, lifestyle and access to services. It is evident that only the model of distributed medicine in the territory with a central role in prevention can ensure the implementation of a wide range of initiatives, projects and policies necessary for effective health promotion.

Hence, the necessity emerges for an integrated strategy between governmental bodies and non-governmental bodies, in the possible fields for regional action. From the action of doctors on the territory and in schools, to interventions by the public authorities through training activities based on epidemiological evidence. The concept of integration is essential and must be developed in a distributed model of Zero Zone, cornerstones of which is home medicine and telemedicine: i.e. trying to bring care closer to the patient-citizen.

Modern medicine (with the exception of acute illnesses) should become "initiative-based", since it must not be the citizen-patient to contact the hospital system but the Zero Zone to take the burden of health in a proactive manner by trying to prevent the development of chronic disease. Proactive medicine has the primary objective of avoiding the disease (primary interception with its information tools, health education, empowerment,

control and information on the risk factors). Secondly, its tasks are early recognition of onset pathological conditions (secondary prevention) through targeted interventions and rapid, highly qualified, epidemiological study and monitoring of collective health, determinants of well-being and illness.

To develop the model of Zero Zone, synonymous of active and preventive approach, multidisciplinary, integrated, non-hierarchical, structured network; high computerization (internet of things) is required. Among the tools in exponential development we find apps, increasingly becoming key elements in the communication between doctor and patient (bidirectional energy binomial), essential for effective therapeutic action thanks to its significant synergistic effect.

The sustainability of the health system in a distributed model that can not be separated from an integration with the social in the Zero Zone logic (sharing economy).

ZERO Zone is simultaneously a basic and complex operation. The idea is simple: to program a society that tends towards zero entropy. The work to get there is complex since it involves new mental paradigms, new educational models, new business strategies, new administrative measures. Examples are the overcoming of departments of energy, economic development, environment, agriculture, in favor of departments to commons goods or land resources. Smart grids are the digital infrastructures of the Internet of things that allow the connection between energy, communications and logistics. In electrical

engineering and telecommunications, a smart grid represents the combining of an information network and an electrical distribution network in such a way as to allow the management of the electrical network in an "intelligent" manner under various aspects or features. In other words, the efficient distribution of electrical energy and a more rational use of energy; thereby minimizing any overloads and variations of the voltage around its nominal value<sup>8</sup> .

According to the ideological picture of Jeremy Rifkin, a distributed model (Commons) should be applied to the way in which food and energy are produced and the creation of polluting waste at the end of the fuel cycle is avoided. According to the authors, this also concerns the way in which health care is organized in the territory, through the distributed pillar of prevention (Zero Disease) which can only be formed in the Commons. The smart grid digital health is thus being born.

In "The zero marginal cost society" Jeremy Rifkin argues that a new economic system is emerging on the world stage, the rise of the Internet of things is giving life to the "Collaborative Commons", the first new economic paradigm to take hold by the advent of capitalism and socialism in the nineteenth century. Collaborative Commons is transforming the way we co-ordinate economic life opening up the possibility to a drastic reduction in income inequality by democratizing the global economy and creating a more environmentally sustainable society.

In a distributed scenario of the Third Industrial Revolution,

it is unimaginable to think of a health care model based on concentration as during the second industrial revolution, which must therefore be overcome once and for all by introducing prevention practices across the geographical zone.

It can not be said that a public health system of a state or region (model "Beveridge") is always better than a private health care system of a state or region (model "Bismarck").

On the contrary, states or regions, in order to have an efficient and effective health service must put in place a model where public and private sectors are in competition with each other.

The ideological framework of Jeremy Rifkin sees three basic paradigms (energy, communications and logistics) complementing each other in a hierarchical and top-down economy, evolving distributively through cost-sharing economic systems. health care is a service, and as such tends to evolve towards the sharing economy and collaborative community (commons).

In the social model indicated by Jeremy Rifkin, can health services also be alternatives to the two historical organizational models of Bismarck and Beveridge?

Even for health services, it emerges that, to appropriately meet the growing and new health requirements, it is necessary to improve the economic system with the best cost/ benefit ratio and the lowest possible entropy. The new route also in health care is the development of the economy of sharing and the development of collaborative communities (commons)

where the comparison between institutions, citizens and health specialists will be revolutionized by a new patient-citizen as an increasingly active element and aware of his rights. The intelligent digital networks for health will spread increasingly (Health Smart grid Digital).

The fundamental paradigms of intelligent digital networks for health, which set the new model, correspond to a complementarity between the paradigms of a Zero Zone oriented towards a society at a zero marginal cost, with Zero Disease turned towards an exponential contrast of the disease with an ideal trend of making it null.

ZERO ZONE	ZERO DISEASE
ENERGY	HEALTHY BEINGS
COMMUNICATION	DOCTOR/PATIENT RELATIONSHIP (role of internet in prevention and prediction)
LOGISTICS	HEALTHCARE (management)

Jeremy Rifkin's prediction is applicable not only to the production of all goods and to all services but even more importantly to service excellence in the protection of health.

The paradigm of energy Zero Zone finds reciprocity with the maintenance of health (to be healthy), of zero disease .

The paradigm of Zero Zone communication finds reciprocity

in the evolution of the doctor/ patient relationship through the development of the internet and the strengthening of preventive medicine and predictive zero disease.

The archetype of Zero Zone logistics bares reciprocity in the organizational model of health management (healthcare).

Even in healthcare a third way will come to develop through the use of specific energy elements (consciousness biospheric), communication (empathy, empowerment and assertiveness) and health care logistics; the health Commons or the sharing economy and collaborative communities (commons).

## 2. Historical evolution of healthcare assistance



## **2.1 From Hippocrates to the discovery of antibiotics**

Hippocrates was born in Greece in 460 B.C. and died also in Greece in 377 B.C. He is considered the father of medicine. Treating disease and the sick has been a necessity formed with the very origin of man; as a spontaneous need of the patient to live in the community while not being alone against an illness. "Medicus" is not only the one who mediates between the patient and the disease, but also who stands between evil and death, often taking over the centuries a mystic or priestly role. The first medical schools were developed in the area of present-day Greece and Ancient Greece, including in Sicily and Calabria. In Croton, Calabria, the school of Pythagoras (570 BC - 495 BC)<sup>9</sup> was famous. At the center of the Hippocratic conception there was not the disease but rather a man with an extreme attention towards nutrition and the environment. This was the precursor of the knowledge of the first determinants of disease related to nutrition and healthy air. The writings of Hippocrates (or assumed so) were analyzed in the universities until the 1700. Such manuscripts were oriented towards prudence and caution before intervening with the moderate use of therapy also since in those days there were few remedies available, pharmacology was not yet known and herbal medicine was in its infancy, growing

about a century later with Theophrastus (371 B.C. - 287 B.C.), a pupil of Aristotle (384 B.C. - 322 B.C.) to whom we owe an enormous boost of natural sciences.

Hippocrates gave medicine a holistic imprint centred on man and the environment, becoming in fact the precursor of the most advanced modern environmentalist theories, including the economic and ecological ones of our economist of reference, Jeremy Rifkin: our guide in describing the new paradigm of medicine that with this paper we disseminate: Zero Disease.

Hippocrates introduced the first concepts of medical ethics and it is to his school that the doctor's oath is attributed:

â##I swear by Apollo the healer, by Asclepius, by Hygieia, by Panacea, and by all the Gods and Goddesses, making them my witnesses, that I will carry out, according to my ability and judgment, this oath: I swear to to honour like I honour my parents he who taught me the art of medicine (concept of pupil-teacher); to share with him my sustinment and satisfy his needs, if he may need it;

to consider his sons as my own brothers, and to teach them this art, if they want to learn it, without fee or indenture;

to impart precept, oral instruction, and all other instruction to my own sons, the sons of my teacher, and to indentured pupils who have taken the physicianâ##s oath, but to nobody else (concept of caste);

I will apply the diet regime for the advantage of the ill, according to my ability and judgement, I will spread them against anything harmful and unjust;

I will not administer a poison to anybody when asked to do so, nor will I suggest such a course. Similarly I will not give to a woman a pessary to cause abortion;

I will keep pure and holy both my life and my profession. I will not operate on who suffers from stone, and will leave such practice to professionals;

Into whatever house I enter, it will be to help the sick, and I will abstain from all intentional corruption, especially from seducing women, men, free and slaves. And whatsoever I shall see or hear in the exercise of my profession as well as outside my profession that I can hear or see regarding the life of others that should not be divulged, I shall tacite, holding such things as secrets (concept of professional secret);

I carry out this oath all the way and honour it, may I be able to enjoy the fruits of my life and of this art, forever honoured by all men; but if I transgress it and forswear myself, may the opposite befall me.

Hygiene, from greek "salutare", is the branch of medicine that deals with health in a holistic way from its earliest conception that studies the wholesomeness of air, soil and water to its most modern conception that studies how to organize in public

and private health care the health services as efficiently and effectively as possible. Hygiene has always dealt with how to prevent disease.

Democritus (460 B.C. - 370 B.C.) developed the theory of pores that came to condition the scarcity of hygiene that was found in the Middle Ages. For the school of Democritus, depending on whether the pores were open or closed, there would have been a condition respectively of relaxation or tension. According to this theory, it was necessary to try to maintain the pores naturally open with resulting attention on how to wash and on the water temperature. This concept was misinterpreted in the Middle Ages condemning water as a cause for the closure of the pores.

Fortunately, the erroneous theories of Democritus were uptaken only many centuries later (Middle Ages) while during the Greek and Roman era there was a remarkable development of hygiene. The water was the key element of Roman society that allowed the realization of impressive aqueducts passing through the streets of the empire and considerable construction of spas and saunas with an advanced water and sewage system.

The contrast to infectious diseases was conducted over the centuries especially thanks to the different hygiene techniques that, as we will see, will lead to the development of preventive medicine to the very recent predictive medicine and personalized medicine.

To fight diseases, medical facilities with a high concentration

doctors and technology called hospitals, have developed over the past centuries. The modern hospital's origins can be traced back to the early twentieth century and initially it was the wealthy landowners who left a will in favor of places that dealt with poor and dying patients. These were charitable structures, almost always managed and organized by religious people.

Despite the catastrophic plague pandemics and raging leprosy and tuberculosis of the fourteenth and seventeenth centuries there was no awareness that the disease could be contagious to another living organism. The modes of transmission of infectious diseases were unknown and the most accepted theory was that odors carried the contagion, but no one knew how. In the Middle Ages there was no concept of hygiene and the sick were put on the beds with dirty sheets that was recycled without washing.

The hospital of the first industrial revolution can be traced back to the eighteenth century, a large and promiscuous operation between social and health care, where febrile patients were hospitalized with women in childbirth, psychiatric cases, surgical patients at risk of nosocomial gangrene but also the poor in need of shelter and food.

With the rise of environmental health knowledge to counter infectious diseases the pavilion hospital model began its development, built with low buildings separated from each other to avoid to a maximum contagion from one patient to another. Around 1850 began the construction of the first hospitals in pavilions that can still be seen today in the center of ancient

metropolitan cities such as the Umberto I General Hospital and the San Camillo Hospital in Rome.

Gerolamo Fracastoro (1478 - 1553)<sup>10</sup> doctor, mathematician and poet, taught logic in the University of Padua. He wrote the latin poem *Syphilis sive de morbo gallico* (1530), which tells of a young and handsome shepherd who, having offended Apollo, is punished with a terrible ulcerative colitis. Syphilis, a venereal disease at the time newly spreading, took its name from this poem. Fracastoro was among the first to believe that epidemic diseases were transmitted by a sort of seminal entity that carries the contagion (*De contagione et contagiosis morbis*, 1546).

Carlo Francesco Cogrossi (1682-1769) was the first who noticed that bovine plague had living organisms that transmitted the plague, but his argument fell on deaf ears.

Edward Jenner (1749-1823) was a british naturalist and doctor, know for introducing the vaccine against smallpox and considered the father of immunization.

The use of certain molds and plants for the cure of infections was already recognized in ancient cultures- greek, egyptian, chinese - their effectiveness was due to antibiotic substances produced by the vegetale species or by the mold. However, there was no possibility to distinguish the effectively active component nor isolate it. Vincenzo Tiberio, Molisane doctor in the University of Naples, already in 1895 described the antibacterial power of some molds<sup>11</sup> .

Modern research began with Alexander Flemmingâ##s casual

on penicillin in 1928. More than ten years later, Ernst Chain and Howard Walter Florey managed to obtain antibiotics in pure form. The three obtained for their merits the Nobel Prize for medicine in 1945.

2.2. The healthcare systems: public (welfare state and Beveridge) and private (Bismark)

Bruno Corda, Angelo Barbato, Angela Meggiolaro

The welfare state is based on the principle of equality and characterizes the modern states of law. The rights and the welfare state guaranteed services are basically health care, public education and social security. The ordinances of the nations with a greater development of the welfare state also provide greater investment and programs for the defense of the natural environment and unemployment benefits (citizen income).

The health care models are essentially two: a mutualistic system (Bismarck) based on private appeal and a National Health Service (Beveridge) with public and universal vocation.

In relation to the welfare state of the post-war Europe until the 80s, four main areas can be classified: Scandinavia, Anglo-Saxon, Continental Europe and Southern Europe. Although for large schematization it can be said that historically the north of Europe as a matrix refers to the universal model (Beveridge) while continental Europe and southern historically is characterized as originally mutualistic (Bismarck).

Scientific and popular literature offer a wide variety of treaties on the History of Public Health, providing a definitely eclectic

and comprehensive view on the various aspects and focus areas. In 1989, Mullan wrote about the history of public health in the US; Duffy in 1992 focused on the work of Health Care Workers; Fee in 2002 has followed a wide variety of articles on the historical aspects of public health while Warner and Tighe in 2006 have emphasized the link between Public Health and Clinical Medicine<sup>12</sup> .

In ancient civilizations, public health was geared exclusively towards the protection of public hygiene. During the Roman Empire, the care of the poor sick was entrusted to archiatrists paid by the city. The creation of the first hospital-like structures dates back to the Middle Ages: they were centers who had a more charitable rather than health purpose, in fact the first institutions of its kind developed in the vicinity of bishoprics, monasteries and along pilgrimage routes<sup>13</sup> .

During the Renaissance the first attempt of a systematic classification of diseases was undertaken; while during the Enlightenment took place the first investigation of diseases and of the overall health of the population. The French Revolution and the first industrial revolution (about 1760-1870 ) with the consequent urbanization, contributed to giving a strong incentive to the concept of public health.

The Health Movement has been a product of the second industrial revolution, a new approach to public health developed in England between 1830 and 1840. With the growing industrialization and urbanization, increasing awareness about



the importance of personal hygiene and the human waste treatment has led as a strategic choice in the fight against infectious diseases to sanitation and removal of filth from the cities. However, as understood by Edwin Chadwick, urban cleaning in the literal sense, has become, over time, a deviant figurative meaning, and was seen as the removal of a potential health threat represented by "dangerous classes." Other European cities such as Paris and Naples followed suit, undertaking reconstruction projects on a large scale. However, these technological reforms marked an undeniable step forward for public health, often leading to the exclusion of economic and educational reforms<sup>14</sup> .

The concept of Public Health, therefore, has over time expanded its scope of application and interest, taking shape first as action towards the Community for the prevention of diseases and threats to health, for the wellbeing of individuals and the population; successively reaching to include both the promotion and the protection of health<sup>15</sup> .

In the eighteenth century, in Europe, the organization of Public Health was the exclusive competence of judicial and police organs with tasks limited to the management of epidemics and outbreaks.

In England, the British factory act is approved for the regulation of the workloads in factories (1833) and in 1948 the NHS (National Health Service) is founded. Doctors of Public Health were appointed: the Medical Officer of Health.

Surprisingly, it is up to America to lead the first attempt to establish a Health System of Universalistic nature, extended to the majority of the population. In 1910 C. Chapin wrote what later became the reference text of the 'Public Health', not only American.

Appearing between the lines of the ideal of a Public Health, is not only 'science and art of preventing disease' but also the promotion of a quality of life, preservation and extension of the state of health and physical efficiency. In that sense, the participatory role of the entire community becomes fundamental. In this model of 'distributed' Public Health, the community becomes, albeit with still a passive role, starring in ensuring the maintenance of adequate living standards, appropriate for the extension of health conditions. Among the main action lines of the document was education of the patient on common preventive measures, the elementary rules of hygiene, and the promotion of environmental health.

Public Health therefore becomes 'Health System', beginning to take a tangible organizational configuration and initially structured in centers of power and control and in systems of provision of health actions. Just as we will see later in the historical evolution of these public models in different countries, the inability to keep separate and distinct the commissioners's roles (the centres of power and control) and the role of the regulator has heavily contributed to the crisis of the system.

Currently, the concept of New Public Health <sup>16</sup> is emerging,

according to which health is an investment in the life of the community. The New Public Health focuses on the behavior of individuals in their environment and the conditions that influence such behavior.

The application fields of public health include not only the scientific, but also the social, cultural and political spheres.

In addition to the classic notion of disease prevention, the work of Public Health is dedicated to promoting physical and mental health of individuals. Those objectives are reflected in trying to influence the habits and living conditions, but also in promoting self-esteem, human dignity and respect.

Public Health is the set of actions undertaken by the company to improve the health of a population.

A commonly accepted classification of health systems is based on the terms of financing and is distinguished between insurance-based systems (Social Health Insurance) and tax-based systems (general taxation).

The more established Health Systems in Europe are: the Beveridge model, the Bismarck model, the Mixed model and the Semasko model.

While the last two have hybrid features, among the first two substantial differences can be identified.

The mixed model instead provides for the simultaneous presence of taxation mechanisms and forms of social insurance, providing coverage of the entire population.

The Semasko model, finally, is typical of those countries

which currently or in the past decade have seen a political and social environment in transition (Central Europe and the former Soviet Union). This system is similar to the Bismarck model for the connotations related to social insurance mechanisms, even though it is funded by directly withholding tax on salary.

In the Beveridge model, health systems are primarily financed through tax revenues and should provide all of the services. The taxation may be direct or indirect, national or local.

The British National Health Service, or NHS, was founded in 1948 in order to provide free healthcare to the entire population of Britain. It is the first National Health System of the Beveridge style: universal, free, financed by general taxation<sup>17</sup> .

A first attempt of de-verticalization of the healthcare system took place in Britain in 1990 with the 'NHS and Community Care Act', better known as the Thatcher Reform.

History, ever since the first reforms and the Darwinian evolution of the healthcare system would not seem to have favored vertically integrated organizational models, centralized or monocratic in the regulation of supply and demand, but have rather veered towards more 'distributed forms' for the provision and management of health. In the specific case of the Thatcher Reform, this was targeted towards precise incentivizing objectives to enhance the efficiency of Services. Therefore the hierarchical and monolithic model was shattered in favor of a separationist approach between buyer and distributor, introducing competition mechanism between

producers; nevertheless maintaining the underlying principles of solidarity financing and access to the proper services of a public system.

In the late '80s, the proposal of the economist Enthoven [1988] to reform European healthcare systems in the light of the US HMO integrated organizations meets the favor of conservative governments, such as Reagan and, precisely, Thatcher. With the reform of 1990, England adopts a quasi-market variant called the internal markets model, in which the competition between public or private producers is enabled by special public agencies that act as patient representatives (sponsors) and, given a default loan, buy from producers through health services contracts for the assisted population. The idea of the quasi-market goes from England to the rest of Europe, with diverse applications in different European healthcare systems, oscillating between the two opposite poles of the total programming and pure market, thereby adopting intermediate hybrid forms of health care organization with various combinations of hierarchical mechanisms of control and competition<sup>18</sup> .

In the Bismarck model, born in Germany in 1883 and introduced by Chancellor Otto von Bismarck to help reduce the mortality and injury in the workplace and to establish an early form of social security, the systems are financed by social insurances. The private style Bismarck model is characterized, on one hand by contributions generally assessed based on salaries,

and on the other hand the organizations, which are called Funds diseases, act as administrative structures of the system and payers for care. The number of funds and their size vary widely with respect to the number of members and their employment status. In most cases up to the government to determine the contribution rates. In some countries you can choose the fund to support, (as is the case for example in Germany, Holland, and Switzerland), in others not. As regards to the German health system we must go back in time, until January 18, 1871 at the time of birth of the German Empire or Deutsches Kaiserreich, the Second Reich, following the victory of Germany in both the Austro-Prussian and the Franco-Prussian wars. After which, comes a period characterized by a strong fear by the part of the monarchies of the various states that the French Revolution could also happen in Germany. German nationalism rapidly moves from its liberal and democratic character in 1848 to Otto von Bismarck's authoritarian Realpolitik, which uses the "carrot and stick approach". The socialist movement was banned, but an especially advanced welfare state is created; based on compulsory social insurance, financed by contributions from companies and workers. In 1883, insurance for illness is established, in 1884 for accidents on the workplace, in 1889 disability and old age pensions are institutionalized.

This created what was at the time the most advanced welfare system in the world. A model (Bismarck model) that became an example, since the early twentieth century, adopted in most of

the industrialized countries and which still exists in Germany and other countries. An expensive model, since - after the US - in the Organisation for Economic Co-operation and Development (OECD) ranking regarding the percentage of GDP spent on health care (year 2012), appear all countries belonging to the Bismarck model, with Germany in 5th place with 11.3%.

The same applies to the health expenditure per capita, which is \$ 4,811 in Germany in 2012 (of which \$ 3,651 - 75.9% - public health expenditure). This represents a much lower cost than the one corresponding to the US (\$ 8,745), but much higher than the OECD average (\$ 3,484), or that of Britain (\$ 3,289) and Italy (\$ 3,209).

Following the financial crisis of 2008, Germany, parallelly to the average of the OECD countries, has seen a sharp slowdown in annual growth in health spending that from + 4% in 2008 rose to a little less than +1%, while other Southern European countries have suffered a net reduction of resources available in real terms: -2% Spain, Italy -3%, Portugal 6%, Greece -10%.

In terms of burdens on citizens, Germany spends a lot on health care, but still produces a huge amount of services, with a low level of direct spending by patients. This shows that we are faced with a technically efficient system.

The German population consists of 81.8 million citizens. The 85% of them are enrolled in one of the 132 social "compulsory" insurances (Krankenkassen). These are "non-profit" insurances, "friendly societies", not definable as public, nor private. Until

1996 the inscription was attached to the profession; since then a liberalization has taken place, thereby allowing the possibility of choice between different insurance companies competing with each other for charges and coverings offered to its members.

The registration requirement applies to all employees (and their families) with a gross monthly income equal to or less than 4462.60. It is the state itself that pays, through specific funding of the L nder, for assistance of the disabled, the unemployed, minors or for categories that otherwise can not subscribe to insurance.

The contribution paid to the Krankenkassen varies depending on the employee's income and corresponds to 15.5% of the monthly salary (53% of which is paid by the employee and 47% by the employer). Thus a financial equalization is applied to compensate for the different capacity of contribution of members: Each person pays proportionally to their income. The contribution of employees and businesses has grown over the past 15 years, going from 13.6% in 1998 to currently 15.5% of the monthly income.

On top of the monthly contribution, supplements (Zuzahlungen) are added: you have to pay 10 every three months to take advantage of medical consultations with all doctors recognized by the health insurance funds, and thereafter each time that you are using one visit to the doctor or dentist (including those covered by the policy) you have to pay a fee of 10 (this "Praxisgeb hr" has led to an observed reduction



of 10% of the accesses). Even for the medicines you pay 10% of the price, and 10 € per day for hospitalization. Recently, an annual limit for additional expenses has been set (generally 2% of annual income, 1% for recipients of a continuing care because of a serious chronic disease), those who pass such percentage are reimbursed their insurance. Minors do not pay any additional charge.

In Germany there is an obligation to be insured; those with a monthly income of more than € 4462.60 may choose to subscribe to private insurances (Private Krankenversicherung-PKV), rather than social ones.

Private insurances, unlike the mutualistic funds in which the contribution depends on income, calculate the premium depending on the personal risk (in fact, it is provided thorough medical examination before enrolling). Private insurances often offer superior services of social insurance, pay better doctors, and also offer reimbursements for hospitalization in non-contracted private clinics. For young people with a high salary and no health problem, the contribution towards the private enterprises often costs much less; with age the insurance policy increases in price. However, even in case of serious diseases it may not exceed certain standard levels (for this reason it is custom for young people to appeal to insurances to create a capital backup with their savings). Nine million Germans, equal to 11% of the population are privately insured. The use of private insurance can also be a complementary purpose for

those who are enrolled in the Krankenkassen (about 23 million). The main reason is to expand the financial protection in case of illness or hospitalization. The remaining 4% of the population is represented by people who get insurance coverage through special channels, such as the military or those with refugee status.

The funding of the German health system is mainly based on the takings of the compulsory social insurance (57%) and on private insurances (9%). The central government is not involved in the health system neither as a financier nor as manager, or as the owner of sanitary manufacturing companies (except detailed cases, such as military hospitals). However, it governs the whole system, defining the rules by which the actors can move. Mutual aid societies and associations of physicians operate within administrative rules, only modifiable by the central government, just as they are regulated by laws and relations between the different actors of the system. Although the general health policies for the country are decided by the Central State, the management and the funding of the system takes place at regional level, where there are three institutions: the Land (through its Ministry of Health), mutual aid societies, associations of panel doctors and hospitals. It is the individual L  nder who plan and finance investments and infrastructure (hospitals, departments, equipment, access to the conventions and specialized training), credit the volume of production, finance the hospital-area system integration and perform the review of legality. These can, for instance, control the activity

of doctors and guide their prescription behavior towards less expensive drugs, as well as carry out surveillance on the quality of hospital care.

The sickness insurance funds programming negotiate and acquire the services for their patients. The German system's financing mechanism is therefore dualistic: the Land defines and funds investment, while the mutual aid society negotiates and finances the current healthcare costs by dealing with both hospitals and affiliated physicians.

For hospital functions, the regional association for mutual aid signs a contract with each hospital, while for outpatient functions it negotiates a global agreement with the regional association of doctors.

Mutual aid is called to protect the interests of its members, trying to influence the volume and the producer's case mix, as well as to respect the insurance spending thresholds, implicitly set out by the Government through the maximum rate of contributions payable by the subscribers.

With an excess of hospital beds (8.3 per 1,000 inhabitants compared to the OECD average of 4.8 and 2.6 in Sweden and 3.4 in Italy), the rate of hospitalization (25 admissions per 1,000 inhabitants compared to the OECD average of 15.5, 16.2 in Sweden and 12.8 in Italy) and the average duration of hospital stay (9.2 days compared to the OECD average of 7.4, 6.0 in Sweden and 7.7 in Italy); in terms of financial resources, Germany has the most important hospital network in Western

Europe<sup>19</sup> .

The acute care hospitals were 2,017 in the year 2012, with 501,475 beds: 601 public, 719 private non-profit and 697 private for-profit, with a split percentage split of respectively 48%, 34% and 18% of beds. In addition to acute care hospitals, 1212 structures specializing in rehabilitation exist, holding 168,968 bed places. Among these institutions, only 19% are public, 26% are private non-profit and 55% private for-profit. 18% of hospital beds are in public facilities while the other structures respectively host 16% and 66%. Next to a progressive reduction of beds for acute illnesses, the number of beds in rehabilitation and psychiatric facilities has more than doubled.

German citizens have full freedom of choice of care and professional place, with no distinction between general practitioners and medical specialists.

This model - which does not include the role of a gatekeeper doctor, or a doctor who acts as a filter for access to specialist care - is typical of the Bismarck model, but is rapidly changing as a result of a reform approved in 2004.

Such reform, since 2004, has introduced several innovations in order to strengthen local services (and to reduce the pressure on hospitals): among them is the need to encourage the enrollment of the clients to a general practitioner who in addition to playing the role of filter for access or "gatekeeper", also is responsible for the coordination of care. There is no obligation, but who does not comply is subject to reduced co-payments and

waiting lists. The number of patients assisted by the "gatekeeper" or General Practitioner (GP) is growing (in 2012 to 4.6 million).

Another innovation is the overcoming of the model of care based a single physician, with the development of medical centers of interdisciplinary care (increased from 70 to 1,814 from 2004 to 2012).

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