

# New “Smarter” solutions for the Healthcare Complex Service System

Luca Carrubbo<sup>1</sup>, Fabio Clarizia<sup>2</sup>, Xhimi Hysa<sup>3</sup>, Alberto Bilotta<sup>4</sup>

## Abstract<sup>5</sup>

The National Healthcare Service (NHS) can be seen as a complex service eco-systems, because of evolving rules, continuous innovating processes, technologies, protocols/standards relationship, involvement of numerous actors, different levels of interaction, increasing contribution from end-users, social and ethical inferences of health as a collective/community issue; organizations need to develop a number of smart solutions (facilities) today, to maximize the use of available resources inside the service provision process, improving their performances within.

The aim of the work is to verify empirically a new kind of perspective in managing smart solution for e-health service systems in an efficient NHS. The attempt help us to demonstrate that, observing this specific context in a systems view, each Actor (considered as part of the system) has to present own personal value proposition as sustainable, contributing to the quality enhancement of the NHS System in general. To do that they try frequently to innovate in new tools, practicalities, measures, communication channels, connections; then we try to represent that the most important spillover in this sense is the increase in competitiveness of the System as a whole.

An analysis of the Italian NHS has been made, in order to interpret a real case study focused on IT solutions in Lombardy Region, regarding the integration of communication systems and the information sharing. Further has been realized a comparison between that local complex service system and others, operating in Italy, that are unable to be efficient. The analysis has been based on the assumptions proposed by recent advances in the Viable Systems Approach (VSA), when applied to Service Research (S-D logic and SS), especially about systems complexity, systems behavior, systems design/configurations, multi-agents dynamic interactions. The paper fosters scientific reflections on the systems approach and service-centred logics applied on the NHS eco-system, in terms of efficiency, QoS, value co-creation, user satisfaction, highlighting their direct influences for the comparison between different real smarter service systems and for the evaluation of relative performances: any complex service system that is able to improve *smart* solutions and catches a sustainable success becomes a *viable* system!

Both the service logic, the systems approach, the technological progress and the vision patient-centric help us to find some new possible evidences for that.

**Key words** – Complex Service Systems; Viable Systems Approach; Service Research; Shared NHS; Smart Healthcare Facility.

**Paper type** – Conceptual paper

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<sup>1</sup> Corresponding Author. Ph.D. in Business Management. University of Cassino and Southern Lazio, Dept. of Economics and Law; [l.carrubbo@unicas.it](mailto:l.carrubbo@unicas.it).

<sup>2</sup> Ph.D. in Information Engineering. University of Cassino and Southern Lazio, Dept. of Economics and Law; [fclarizia@unicas.it](mailto:fclarizia@unicas.it).

<sup>3</sup> Ph.D. in Business Management. Sapienza University of Rome, Department of Management and Technologies; [xhimihysa@yahoo.it](mailto:xhimihysa@yahoo.it).

<sup>4</sup> Ph.D. in Business Management. Sapienza University of Rome, Department of Management and Technologies; [bilotta.alberto@gmail.com](mailto:bilotta.alberto@gmail.com).

<sup>5</sup> Although the present work is the result of joint discussions, the introduction, the paragraphs 1.1, 1.2, 2.1 and 2.2 are to attribute to Luca Carrubbo, the paragraphs 3.1, 3.2, 3.3, 3.4, and 3.5 are to attribute to Fabio Clarizia, the paragraphs 4 and 4.1 are to attribute to Xhimi Hysa, the paragraphs 5 and 5.1 are to attribute to Alberto Bilotta, the paragraph 6 derives from a merge of multi-contributions.

## ***Introduction. Paper structure and finalities***

We live in a service age where individuals developed over time a spirit of service in all operations. We follow the service-logic in most of the relations, and we promote a service culture everywhere, especially for entrepreneurial activities. Within our daily life the term service forces the relevance and importance of these reflections applied (Polese, Di Nauta, 2012). From a practical point of view, routinely organizational activity is attributable to a logic of service, currently affecting both the world of academic research and the organizational realities, industrial and not.

The raising of the service as core of many organizations that are increasingly taking into account the possibility of expanding its offering in terms of services, looks for more interaction with the own specific context (Grönroos, 2006), in an attempt to reach a stable position in the market during the time. Relationships, networks, interactions, value co-creation are all considered to characterize modern organizations (Rust, 2004). The service offered by modern organizational systems, regardless of the sector or segmentation, has to meet too the requirements of dynamic characteristics, adaptation, efficiency, in order to address and solve the growing levels of complexity and turbulence of the evolving global market (Ng, et al 2010; Ng, et al. 2012).

Despite the path towards a unifying terminology does not seem finished yet, we can define more generally a service as an activity performed by an individual or a group, that benefit other people. It is therefore a type of activity that provides assistance and experience, as an advantage for all parties involved in a particular exchange, before, during and after it.

The present work aims to investigate all these aspects, related to the logic of the service, applied in healthcare, in order to better define the operation and interaction (under a logic of value co-creation, Payne, Storbacka, Frow, 2008) existing between operators in such a complex environment just like the National Health Service Eco-system (NHS).

In particular, it was in reference to the Italian system and some of its excellence (especially the Lombardy Region), in order to highlight the winning characteristics of innovative organizational, managerial, technological solutions.

In this sense, the document focuses on a description of recent advances in Service Research in terms of service systems, on their interpretation within the context of health care, the identification of best practices related to the implementation of new solutions, innovative techniques improving the quality of the supplies, on a general survey of the local context of the health system in Lombardy, in order to understand if and how much is actually being applied the principles of operation and organization of the service system, especially in terms of perspective and sustainability of the value propositions.

## ***1 – The help of System thinking and Service Research for understanding complex phenomena:***

### ***1.1, Evolving Service Systems***

The service-oriented organizational culture implies the recognition of the service as a success key factor of all organizations. This culture creates and promotes actions and behaviors aimed to meet the expectations of stakeholders. The service orientation is reflected, for the organization, within the long-term policies, aimed to support and recognition of behaviors and attitudes, the business systems can create and provide excellence in service (Gummesson, Lusch, Vargo, 2010).

Thus, the service represents a goal, a purpose, on the basis of a significant change in the organization of all the businesses, services and not only (Vargo, Lusch, 2011). Ultimately, the growing importance of services and service culture involves a reorganization of productive visible structures, but also the consequent diffusion of innovative technologies and new business logic, now more service-oriented.

Defined the role of the service and its well-known importance, the conceptualization of space, within which it is developed, delivered and received, has undergone continuous changes over time, which led to numerous interpretations of so-called service Systems (Maglio, Spohrer, 2008). A service system, first of all, it is related to interactions supplier/customer and therefore is seen as an open system (Golinelli, 2010), able to strengthen their state of equilibrium through the acquisition, sharing and the provision of resources.

According to IBM researchers, the smallest service system is the single person; at the other hand, the bigger is the global economy as a whole. Service systems, according to the first real definition of the Service Science, represent configurations of people, technology, value propositions and shared information that can co-create value, such as language, laws, measures and methods (Spohrer, Maglio, Bailey, Gruhl, 2007). Each service system is then, at the same time, a provider and user of services, structured according to the need as a value chain, a network of value, a system value (Vargo, Maglio, Akaka, 2008). The service system can be simply a software application, a business unit within an organization and can be caused by a work group, a business department and can be an institution, an agency governmental organization, a city, a nation; it can be a composition of several collaborative service systems inter and intra organization (Qiu, Fang, Shen, Yu, 2007). A service system can, therefore, act to supplement resources, interpretable in terms of the set of elements belonging to a single work system (Spohrer, Anderson, Pass, Ager, 2008), able to favor the specialized skills, be they operational and active, such as knowledge, skills, know-how, people, products, materials, finances (Vargo, Lusch, 2006; 2008). The service systems are defined as work systems, where the service providers and consumers share knowledge and information within a specific dynamic networked value supply chain (Alter, 2008). The service systems can interact more or less formally, informal interactions acquire significance through implicit or explicit commitments and respecting social norms for public governance, the formal interactions are, however, linked to official statements that establish rules for contracts, licenses, rights and protected and guaranteed by the presence of a recognized authority (Maglio, Srinivasan, Kreulen, Spohrer., 2006). Suppliers and customers are complex service systems that lead actions in the market, in order to obtain the expected results as solutions and experiences (Mele, Polese, 2011). The service systems are able to foster connections and interactions between the various Actors (Vargo, Lusch, 2011) involved in a process of exchange, following several channels of communication between businesses, consumers and various stakeholders (Gummesson, Polese, 2009).

Everything that exists is configurable as a system, or as a component of a system. Studies on the characteristics of the systems are useful to understand and try to govern the complex phenomena of any kind. According to the main Systems Theory<sup>6</sup> (GST, OST, VSA), a system is essentially a structured configuration of interrelated and interacting elements, equi-finalized, balanced, organic, organized. This definition is scalable at any observed reality, whether in the study of natural phenomena, the analysis of our society, deepening in the sciences, implementation of IT tools, the development of new models in the economy, the growth of organizations (Mele, Pels, Polese, 2010).

The evolution of the Service Research has proposed the development of a study, which focuses on modern service systems, intelligent, smart, driven in particular by the progress made at international level in ICT. The idea is based on the need to consider more organizations better able to deal with changing conditions in of a more responsive, adaptive, proactive, dynamic context. In order to deepen the new reflections on the concept of S.M.A.R.T. (acronym of "specific, measurable, agreed, realistic and timely", from the IBM Researchers, IfM, IBM, 2008), many researchers have in recent years been investigating all potential service applications, defined "on stage", referring to the practice evidence of something truly iterative, interactive, interconnected, intelligent, and that is representative of a smarter planet. Considering a real overview, we wanted to understand how to achieve the sustainable development of a complex system, characterized by many actors (workers, citizens, producers, suppliers, authorities, consumers, users, etc.) and many facilitators (retail sales, distribution roads, informative networks, agriculture, financial services, healthcare government), which are fundamental for the improvement of management capacity and implementation of collaborative strategies (Prahalad, Ramaswamy, 2000; Polese, 2004; 2009). In this sense, the intelligence service systems not derived from intuition or chance, but by systematic methods, continuous learning, data collection, rational innovation, social responsibility and governance network. Applying an intelligent service, practices smart, inserted in smart cities, with intelligent organizations, through intelligent operations, for intelligent results, there may be some major changes in our daily lives.

With regard to healthcare organizations, the service that they are required to provide, or in favor of collective health and its sustainability, becomes a true corporate vision on the basis of health care companies and the various stakeholders interact with the social context , government agencies,

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<sup>6</sup> All originated from studies of Von Bertalanffy (1968) and after of Beer (1972).

instances ethical and legal issues in order to improve the average level of quality proposed/perceived. The structure of service systems for this purpose is therefore characterized by sustainable interactions and mutual influences in the work of all the actors involved. The behaviors and decisions have therefore place in a complex environment, which deserves to be analyzed, and which requires all organizations to modify or re-invent their own strategies and policies, in a manner designed to achieve their specific goal, in the advantage of the service eco-system.

### *1.2, Logics and Design of Complex Service Systems*

In a smarter planet, progressively, the new technologies have to be increasingly able to reconfigure themselves and systems, including businesses which they are dedicated, and companies will be able to reformulate and reorganize all of their assets, in order to maintain a stable and sustainable equilibrium over time. In the future everything will be related, interconnected, articulated (and therefore more complex, Barile, Saviano, 2010) and for this reason it is already increased attention to learning processes, innovative processes, technological progress. In a smarter planet, there are space only for real service systems, defined as "complex", that are able to manage themselves in the best way, in all areas of application, especially in water management, as in the distribution of electricity, public transport, professional education, in health care. Among the most direct consequences, we include of course the participation of the various actors in the process of value creation, products customization, the increased ability to react in real time, the current level of high quality service, expectations, behaviors, needs, development of new systems.

The changing role of interconnections, the facilitators, measures, quality standards, procedures, represent the theoretical evidence of this evolution, and smart grids and energy metering, intelligent transport, manufacturing productivity, the tourist destination, however, appear today as obvious practical application of complex systems able to better serve customers (Barile, Polese, 2010).

In the study of the Viable Systems Approach (VSA), that are relevant to the present work particularly, therefore assume the considerations on the complexity of the systems and its management, on the relationship between consonance (structural) and resonance (systemic) and the consequences of interpretation of the phenomena in terms of organizations' behavior (Barile, et al. 2011; Barile, et al. 2012).

Given that, two identical systems do not exist, each is distinguished by the characteristic of its "structural" elements which have resulted and also (in the case of a same structure) for the presence of improvements in knowledge (technicalities), operational experience (practicalities), skills (abilities) and iterations (even unknowingly) can mature, it is important to understand what leverages can be considered to facilitate the development and implementation of a synergy. Following the main reflection of most important VSA main scholars (Golinelli, 2010; 2011; Barile, 2008; 2009) we can say that:

From a structural point of view, we see that:

- The structure of an organization originates from a given set of shared rules and relational connections.
- The system "realizes" the structure and the relationship qualifies both of them.
- The structure can be studied (what it is? how it is made?), A system can only be interpreted instead (what tools and logics does it follow?)
- The structure aims to survive in function of various systems associated with it, even if not at the same time for each of them.
- The contexts are subjective as a function of specific objectives and changing.
- Contingency is influence, planning is critical, their composition is relevant.
- The supra-systems are capable to influence the decisions of a system, in particular in direct effects on its own sub-systems.

From a behavioral point of view, we see that:

- Visible skills result of the inherent capabilities.
- From the same relation originate more interactions, respecting the same distinction between function and role in the moment in which the second can express the first.

- Education is the form, the routine determines that the act is substance.
- The rule is the application of a law, and determines how that often can also change the rule itself, if considered to be positive.
- The valuable categories form the basis for the personal interpretation of events.
- The interpretive schemes shape the information and categories establish their priorities.
- The choices represent the realization of decisions as result of the interpretative scheme staff actions.

From a systems point of view, we see that:

- A viable system lives and its goal is to survive in an environment populated by other viable systems.
- Each context is perceived subjectively by each viable system as decision makers, by analyzing macro environment in which it is immersed adaptively.
- Each viable system distinguishes and identifies the various supra-systems relevant in his context, because of its specific end goal.
- A viable system has the ability to regulate and manage independently the dynamics of its adjustment.
- The convergence towards a same point starting from different starting positions is defined consonance (synthesis of compatibility, tune, affinity) and the variation of the gradient of this displacement vector (with a direction and a direction defined) represents the its measurement.
- The acceleration (wanted) of this relation between the two elements (o more) is the resonance (harmony).
- The viability is commensurate with the realization of the dispositions to change.

All this affects the analysis of complex phenomena, the design of (complex) service systems that operate in complex environments and is declinable in different fields of application (Barile, et al. 2012), among them the Health, considerable a real example of a complex service eco-system.

## **2 – The NHS as a Complex Service System**

### *2.1, Nowadays smart organizations in NHS*

A healthcare system is an organization of people, institutions and resources aimed at providing health care services for a community. According to the World Health Organization (WHO), the objectives of a health system are the health safe, the responsiveness to the expectations and a fair cost. The evaluation of these goals depends on how the systems performances are able to follow the four important functions of: health promotion, resource generation, financing and management.

A health care system can be assessed with other parameters, including the quality, efficiency, eligibility to care and fair treatment. In our country (in Italy), the health, as a fundamental right of individuals and collective interests, are guaranteed under art. n. 32 of the Constitution, while respecting the dignity and freedom of the human person, through the National Health System (NHS).

Established by Law n. 833 of 1978, the Italian NHS (MAPELLI, 2012) has a universal nature and solidarity, that provides health care to all citizens irrespective of gender, residence, age, income, work and comply with the following fundamental principles:

- public accountability of health;
- universality and equity of access to health services;
- global coverage based on the care needs of each individual, in accordance with the essential levels of care;
- public funding through general taxation;
- "portability" of their rights throughout the national territory and mutual assistance with other regions.

The NHS therefore ensures access to services while respecting the principles of human dignity, of the needs of health, equity, quality and appropriateness of care and cost-effectiveness in the use of resources.

People makes the free choice of place for care and professionals in the public and private accredited field, exercising its "right to health" to get health benefits, inclusive of prevention, care and rehabilitation.

The NHS government is exercised principally on state and regions, according to the distribution of powers established by the recent revision of the Law.

The constitutional provisions bear a complex distribution of expertise in the field of health. On the one hand, the state legislation entrusted the determination of the essential levels of services concerning civil and social rights that must be guaranteed throughout the national territory (by virtue of the letter. m, of art. n. 117, parag. 2), on the other hand, the protection of health falls within the competence vested in the Regions.

Therefore, the region may legislate in accordance with the fundamental principles set by state legislation as well as the "basic level" (identified with the art. 1 of Legislative Decree December 30, 1992. 502, as replaced art. 1, of Legislative Decree 19 June 1999, n. 229).

The NHS is therefore not a single administration but a collection of bodies and organism that contribute to the achievement of the objectives of protecting the citizens health.

In fact it is up to:

- the Ministry of Health, which coordinates the national health plan;
- a series of offices and organizations at the national level, such as:
  - The Board of Health (CSS);
  - The National Institute of Health (ISS);
  - The National Institute for Occupational Safety and Prevention (ISPESL) – recently deleted;
  - The National Institute for Insurance Accidents at Work (INAIL);
  - The Agency for Regional Health Services (ASSR);
  - The research institutions for hospitalization and care (IRCCS);
  - The institutions experimental zooprophyllactic (I.I.ZZ.SS.);
  - The Italian Medicines Agency (AIFA);
- regional health services. These, in turn, comprise:
  - The regions and the autonomous provinces of Trento and Bolzano;
  - The local health authorities (ASL) and hospitals (AO), through which the regions and the autonomous provinces assuring health care.

Within the scope and purpose of safeguarding and integrated management of health and social services and the protection of constitutional rights to human dignity and health, are assigned to the Ministry of Health functions belonging to the State in the following areas: health human co-ordination of the national health, veterinary health, health protection in the workplace, hygiene and food safety (Legislative Decree n. 300/1999 and subsequent amendments). The NHS is characterized by a system of health planning, governed by art. n. 1 of Legislative Decree n. 502/1992, which is articulated in the National Health Plan and regional health plans. The National Health Plan (NHP) for three years (although it may be modified during the three-year period), is adopted by the Government and acts as macro objective of the National Health Service not only for the promotion of public health, but also for the well-being of individuals and communities in the knowledge that "the real wealth of the health system is the health of citizens". The regional health plans (RHP) represent the strategic plan of actions for the objectives of health and functioning of services to meet the specific needs of the regional population in relation to the objectives of the National Health Plan.

Compared to what we said about, NHS can be seen as a complex service eco-system, constituted by a significant number of institutional actors which are added various categories of private Participants (Saviano, 2007) that are involved in the supply chain of the health service and corresponds to the process of value co-creation. (Saviano, et al. 2010)

Among these, we can mention the importance in actions of Pharmaceutical Companies, Clinics, Pharmacies, diagnostic centers, laboratories, professional studios, all actively involved and

interrelated NHS described. If we add to these actors, the universities, centers of specialization and high education we get a better picture of this organic and integrated service eco-system.

Inevitably, the presence of many interests, different ways of acting and thinking, the difference of internal procedures, languages, systems of dating, the goals of medium to long term destabilizes the system as a whole and forces organizations to continually reconfigure themselves in search of a sustainable balance (Ciasullo, Troisi, 2011). For all these reasons we define our NHS as a complex eco-system service:

- due to the number and heterogeneity of the actors involved,
- due to the continuous development of new technologies, for different levels of interaction,
- due to the attempt to involve end-users in the supply/use of the service offered,
- due to the socio-ethical inferences that make good health in the Community,
- due to the constant development of reference standards and culture of the society in the field of Health.

In system-based logic, the Italian NHS can be understood as a complex service eco-system because: i) is a formalized set of connected and interacting parties; ii) is a set of elements, complex, dynamic, integrated, aimed; iii) its objective is to ensure an adequate level of health to the local authority; iv) this is common to all interested and involved parties; v) for its operation is connected with numerous subjects over-ordered and inferencing; vi) often external changes let it to re-adapt in order to survive; vii) the ability to interact allows Actors to improve; viii) the level of its performance improvement of the quality of the service offered is for the benefit of all the participants (win-win logic).

In service-centred perspective we can conclude that within a NHS in different ways and from various perspectives we can highlight the leading role of the Service. Any form of assistance (basic, hospital, rehabilitation, home care, pharmaceutical, specialist outpatient, preventive, diagnostic, social and health care in general) needs to focus on quality of performances, the attention to the users, the relationship with them, the sharing of the real problem, the solutions definition in a mutual interest. It could not be otherwise. Providing a good service (by the suppliers, operators, brokers, distributors) makes their offer more sustainable, more competitive, more quality defined. This can be applied in Health Care? Of course!

## *2.2, The Healthcare quality management*

Within the health system, each Actor (considered an integrated and active part of the system) act in a functional and efficient way, in respect of its own personal objectives, including through the development of specific innovative processes, inevitably contributing to the improvement of the quality level of the average system as a whole, developing new procedures, innovative communication systems or data management, promoting the up-grade tools (measuring and free), stimulating and supports a type of systemic growth (Adinolfi, Troisi, 2012).

The idea of value linked to the concept of health is inevitably subjective. In this sense the service provided, the attempt to encourage greater participation and the desire to improve the quality offered represent the field between what is proposed in terms of value (from the providers) and then what is actually perceived and received (by users). This is because:

- There is an interest of the patient promptly to communicate in detail their specific needs and conditions.
- There is an interest of any Doctor to acquire in time the latest updates in health, administrative procedures, processes, diagnostic and prevention.
- There is an interest of the pharmaceutical company in the understanding of what are the real needs of the market in terms of quality reliable solutions to customers.
- There is an interest of hospitals to offer right space and adequate expertise to ensure a high standard of quality to their users.
- There is an interest of the University to form suitably qualified profiles and specializations helpful.

- There is an interest of the Ministry of Education to establish operational guidelines and sponsor workable, affordable and strategic.
- There is an interest of the government in promoting the integration of the communication system, through the unification of the database, the simplification of procedures for application and payment, the wide dissemination of information on funding.
- There is an interest of pharmacies, clinics, laboratories, diagnostic centers and physicians to try to do a network (especially at local level).

In order to do all this, on the whole health sector, the innovation is considered the main source for success. Many Actors (including especially the pharmaceutical companies) invest a large portion of their earnings to improve the solutions currently available on the market, with the dual aim of solving the greatest number of possible problems related to human health and to draw the right profit.

Progress in Medicine (more than elsewhere) is closely related to innovation, considerable in this sense what root for any kind of evolution. The main result is a constant drive towards the quality improving in offered services and the development of innovative proposals for new management of the resulting processes of value generation.

The concept of quality in health care is a difficult topic to cluster. The quality is linked to the characteristics of the services supply and the opportunity to benefit from it. The quality is inherent in the responsiveness of the solutions to the needs of end-users, in the dissemination of information, interactivity between the players of the eco-system, in the right and proper involvement of the end-user (i.e. mainly the Patient) implementation of policies patient empowerment, in adapting the structures to the changing standards, in the attention to the different needs of the Legislature, in their desire to participate in the realization of a good service and to improve it constantly.

In this sense, the quality is related to the concept of value, given by the offered downstream of their personal consumption process, and therefore pertains to the modern process of co-creation of value, in which all actors are active and work also for the interest of others. The quality is still needed, defense, and if possible implemented, including through innovative processes aimed at developing solutions (value propositions) sustainable, scalable, flexible, intelligent, functional, because of its quality.

### ***3 – The Innovation leverages for the Healthcare: IT solutions***

#### *3.1, The Innovation in service*

In order to manage and succeed in nowadays challenging scenario, a great attention has to be deserved to innovation activities characterized by high levels of complexity (Shilling, 2008) and focused both on technological developments, human resources and organizational innovations (Nahapiet, Ghoshal, 1997).

Technological innovation is a phenomenon involving different types of firms belonging to manufacturing and services, public and private. One of the most striking aspects of this phenomenon is the investment for the acquisition and development of new systems or new software applications, activities that generally involve a function of R&D. It is less immediate to quantify, but is undoubtedly significant improvement of the efficiency of production processes and the effectiveness of the offer that these innovations enable you to get.

Nowadays, attention to the processes of technological innovation has grown due to the emergence of new technologies that are producing changes - more evident than in the past - in relationships that are established between supply and demand. These are mainly Information and Communication technologies (ICT) which, exploiting old and new infrastructure, offers applications that rely on speed, interactivity and customizing their innovative features.

Looking the realities where new applications are introduced, emerges as service companies are able to develop faster ICTs and they are able to grasp the opportunities in terms of managing that flow from it. This assumption is based on the fact that most of the organizations that provide services works on collection, processing and distribution of information that are the raw material of ICT. By



focusing on companies whose core business is the provision of services, the meaning of the terms "innovation" and "technology"<sup>7</sup> must, however, be extended to the investigation into the innovation process.

In fact it is difficult to find in the literature a detailed and comprehensive description of how does innovation in the service sector: the main difficulties are related to the heterogeneity of delivery processes and the availability of models and conceptual tools of the "innovation economy" focused mainly on the manufacturing sector

Some interesting researches (Isrds-Cnr-ISTAT, 1998, OECD-EUROSTAT, 1997) represented the attempt to extend the innovation surveys to the Services using the methodological approach of manufacturing sector striving to redefine the survey methods for organizational and process aspects. This last approach appears to be the best to grasp the relevant aspects of the phenomenon within the service sector. Therefore it is necessary to observe innovation of product as well as of process and consider technology when it is merged in the offer and/or it supports productive activities.

The aim of this paper is to analyze the process of technological innovation in services within the National Health Service eco-system, where the characteristics of the system allow further reflections on the topic. The choice fell on this organization because it stands out from most of the firms in services for the particular network structure that links the various operating units and for the importance of information as a productive resource and coordination.

Hence, to conduct the possible future empirical analysis we need to apply the framework analysis of the case and evaluate as widely as possible the impact of the innovation process within the organization.

Although the analysis of this scenario, emerge some further issues related to the "technological innovation and services", i.e. the qualitative dimensions of the impact of new technologies on the efficiency and effectiveness of the processes of service delivery, with this approach it will possible to:

- highlight the critical role of patient/user/co-producer, especially in the case in which he has new technological equipment;
- observe how the buying/benefits behavior of the user can be guided through ICTs;
- identify the contributions made by various entities belonging to the production system and how their coordination can be optimized thanks to the ICTs;
- make visible the moments in which the user interacts with the organizational network and evaluate the impact of innovation on the quality of the final service.

### *3.2, The relevance of ICT in the service*

As well known, Information and Communication Technologies (ICT) were initially introduced in order handle complex processes better, for instance simplifying (automating) tasks that required human involvement. Nowadays, the role of ICT in healthcare processes, due the introduction of new internet and intranet technologies, has definitely changed, embracing not only internal performance improvement actions, but also more challenging external competitive programs based upon the simultaneous involvement of structures (Laboratory, Universities, Hospitals, etc.) along with partners, suppliers, customers and/or patient, other social actors, etc.

In general, the impact of technological innovation on the supply system of services must necessarily cover the components of output, all users connected to the complex (healthcare for our case) network and the operating procedures of disbursement.

#### *1. ICT for the de-localization of the purchase.*

Innovation can be applied to the operational elements of dispensing. In fact, some technologies allow the "*de-localization of the act of purchase*", as meaning that the customer can access and use the service in other places than where it is located the production source. A good example is the case of computer applications definable as *telemedicine*: diagnosis and remote monitoring of the patient. In most cases, the output does not change nature, but through the support of technology changes the spatial representation of the client - server relationship.

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<sup>7</sup> The term "technology" is used in its broadest sense: a combination of knowledge, skills, procedures, equipment and technical solutions that are applicable to any functional activity that takes place in the organization to obtained the production / distribution (Porter, 1985; Rispoli, 1991)

2. *ICT for de-temporalization of the purchase*

New technologies allow for the "*de-temporalization of the purchase*": they are less time constraints for access to the service. This is, once again, of an innovation process rather than product innovation. The "*de-temporalization*" gives the customer the ability to fragment the buying process, distributing the different phases over time. For example, the interaction with the information can be divided and investigated independently of physical interaction.

3. *ICT for the simplification of procedures: the user's role*

Technological innovation can be oriented to the simplification of procedures. However, this combination of benefits is more easily catchable from most active users/customers that have a strong propensity to participate in the delivery chain of the service - to know and control the manufacturing processes of the service. A further advantage linked to the technology is the potential reduction of the number of parties with which the customer interacts. The uniqueness of the supplier (i.e. an automated system) can mean a radical simplification of procedures.

4. *ICT for geographic coverage.*

No doubt that technology can be a powerful means to develop the network of services. A communication network, for example, allows the organization to be visible without physical duplication of the delivery points. However, the potential of new technologies, in response to the need for proximity to the customer, must not forget that a structure physically accessible is currently considered more effective than a structure immaterial -only available for customer with good computer skills.

In conclusion, new technologies are enabling the transition from interpersonal relationship in "*Human-Machine*" ones and affect the customer's perception on the QoS(Cantrill 2010). So that the customers can move from operative traditional modes into advanced ones, it is necessary that they agree to use these innovations, may enjoy the incremental benefits and learn their use (Wei, Zhiming, 2012). In other words, the customers should see the technology as enhancement of their ability to use the services and the minimization of their error probability. Differently, if the innovations in operating systems and procedures are valued too difficult to use or to understand, some problems can arise for all people connected with the service. The organizations that innovate need to consider some aspects, such as the psychological characteristics (values, needs and motivations), the benefits sought (use, risk and perceptions), the intrinsic characteristics of the purchase (market and use conditions, social rules reference) and the technological maturity of the their sector/activity.

The health care sector has explored how information and communication technology might improve patient service for the past 50 years, but there is evidence that many, even most, health care information systems are failures (Avison, Young, 2007). In the healthcare field the effectiveness of the investment in new technologies depends largely on the organizational context or, in other words, the relationships between the various Actors involved. The successful use of new technologies is not solely due to the quality of the materials used, to the technical staff and a good financial management, but also to the concept that the organization has of the "relationship with users". Generally, the healthcare organizations operate with various systems more sophisticated in terms of quality and technology. At the same time they are obliged to collaborate inside and outside the public health institutions for autonomy and participation but also for the higher levels of integration. The combination of these factor leads to describe the NHS as a network organization, designed to make it more functional and responsive to the needs of the market.

The socio-demographic composition of the population, the need to balance available resources and quality of the healthcare provided are a stimulus to developing new ways of providing health services to able to trace the path of the patient efficiently from his first healthcare network interactions. The realization of an integrated service system assumes considerable importance especially in a context with deep changes and high-fast evolution as the NHS: for the Italian case, the system is characterized also by a predominant elderly share in the population and local-centered assistance services for the chronic diseases. In this context, the application of new technologies represents a good opportunity to establish a better balance between the need for increased quality of care and the informed use of available resources.

### 3.3, The NHS as a complex interconnected network

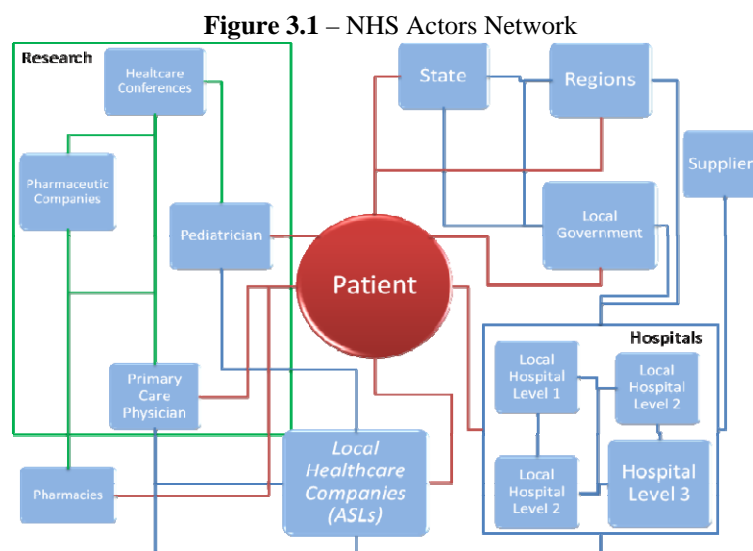
The concept of the network as the dominant organizational principle able to explain how the world really works attracts a growing number of multidisciplinary efforts. Physicists, mathematicians, sociologists, economists are working to refine the results of such research and draw practical guidance in their respective fields of inquiry.

In a world that becomes more "connected" it is important to understand the mechanisms and the general laws that allow efficient transmission of information, energy or anything, but it is the same important to understand what can make tremendously vulnerable such a network.

In the last years, the studies of complex networks has experienced a tumultuous development. The most frequently examples are represented by networks of computers connected by telephone lines, metabolic networks within a cell (or more complex biological organism) in which the various elements are linked by chemical reactions, different relationships between the persons belonging to a community, the network of neurons within the brain, the actors of NHS.

A brief analysis of the literature shows dozens of different names and forms about the variety, complexity and heterogeneity of networks. The connections between the actions of different individuals and the characteristics of a system that are observed are not always obvious. In many cases and considering only the large size of these systems, their behavior cannot be derived by simply adding the individual behavior and/or intentions of the single elements.

If we take for example a flock of birds, we see it hovering in the sky, heading towards a certain direction, change course, react to weather conditions etc. For this case, the birders have discovered that there is not a leader of the group and none of the single birds have the overall characteristics of the group - which are mainly due to the local interaction between decentralized components (Reynolds, 1987). It is a great example of a system in which complex collective behavior is due to the interaction of individuals. The systems whose behavior cannot be explained by summing the partial actions of its parts are known as non-linear systems and they exhibit extremely complex dynamics. The Italian NHS can be seen as a complex non-linear system represented by the following figure:

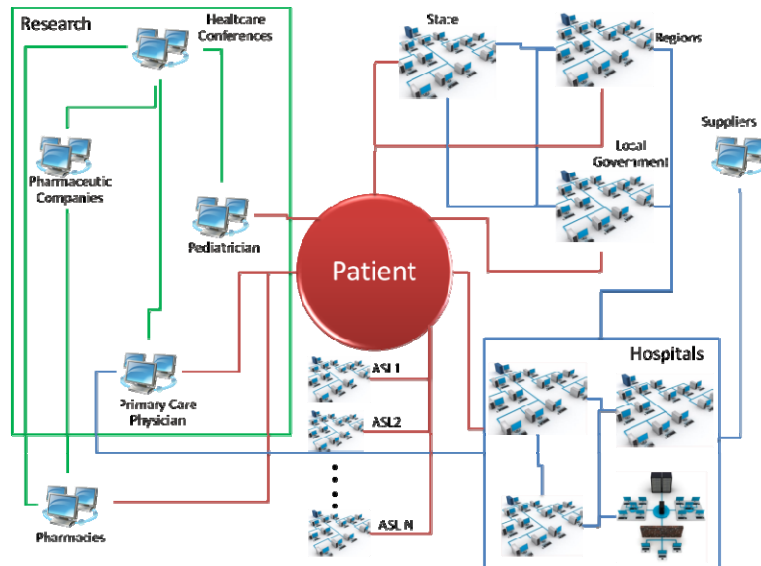


Source: Our elaboration

where the various players/actors (ITU 2008) have the possibility (apparently) to exchange information and data within the entire system: the focus of the communication process is necessarily the patient that benefit of the various services provided from the other actors (Haux 2006). In addition to the difficult conceptual representation of the system and therefore the inability to predict the temporal evolution (at least with deterministic methods), the figure highlights the many difficulties of communication that exist between the various parties. Sometime happens that the different sectors of the NHS do not speak the same language or, worse, do not share data and information necessary for the optimization of individual jobs. As the following figure shows through

the different colors of the links, only the patient communicates with the others actors of the NHS: for example, does not exist (or they are in minimum number) the direct exchange of information, or rather, of data between *Primary Care Physician* and *Hospitals structures* creating their dangerous redundancies.

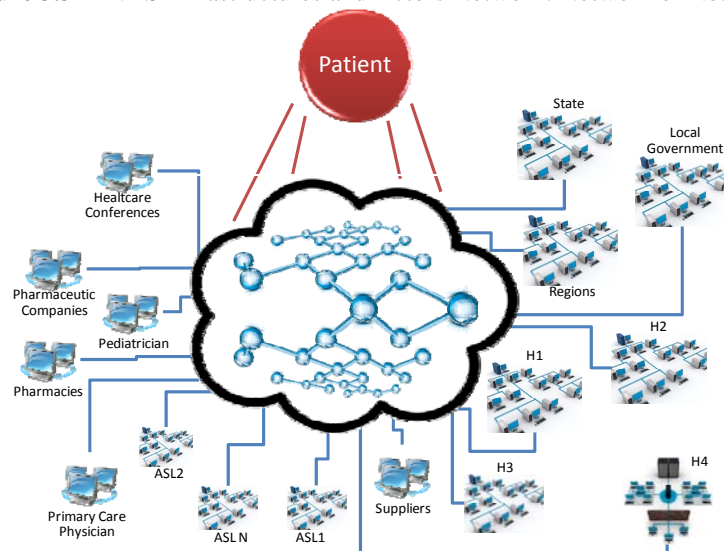
**Figure 3.2 – NHS Infrastructures Network**



Source: Our elaboration

Each network is so unplugged from whole system and it works on the data asynchronously collected with the system itself. Proceeding in this way, certainly emerges a big waste of resources and a basic inefficiency which leads to increase moodiness of the patient for the NHS. A virtuous system should integrate all information directly to the infrastructure layer and optimize the efforts of individual actors. A representation of this idea can be the following figure which sees the patient - at the center of system always - able to interact simply with the NHS but also all links between the networks (of networks) considered independent above.

**Figure 3.3 – NHS Infrastructures and Actors Network: Network of Network**



Source: Our elaboration

A real implementation of efficient healthcare network and the correct information sharing can be considered the healthcare system in the Lombardy region that uses many databases interconnected with the various players in the local NHS. As described in section 5.1, the perception of the quality

of service by the citizen/patient is very high and it certainly pays off the initial economic effort for the technological system deployment (Wei, Zhiming, 2012). The experiments on a relatively small land - which the Lombardy region - suggests that only through interconnected networks and efficient exchange of data we will be able to improve the whole Italian NHS.

#### **4. “Business” Opportunities in NHS**

In the title of this paragraph the term business is in quotation marks because when an opportunity is evidenced it doesn't mean that is a business opportunity or an opportunity individuated by a business organization. Generally, an opportunity arises as a consequence of an observation act<sup>8</sup> of a non fulfilled need or desire and as identification of a value proposition to fulfill it. According to Peter Drucker (2009, p.18), was probably Frederick Winslow Taylor, who coined the terms management and consulting. The main question that arises is: does Taylor meant by management and consulting simply “*business consulting*” and “*business management*”? The answer can be retrieved in 1912, referring to the speech Taylor performed in front of the special committee of the United States House of Representatives (Taylor, 1947). When Taylor explained the principles of his *scientific management* (Taylor, 1911), he cited as a perfect example of management, not a business but a non-profit organization: the prestigious healthcare organization Mayo Clinic. Talking about management in healthcare signifies referring mainly to service management. The central point is what kind of service trend should healthcare service systems follow and which should be their value proposition and constellation?

##### *4.1. New Healthcare Trends: Market Opportunities and New Organizational Models*

According to what said above, the non-profit has been, is and it will be one of the most important megatrends (by purpose, or by organizational type) of the healthcare industry. The non-profit is not so much “*naive*” as it seems. “*Many non-profits operate just like for-profit businesses. They make huge profits, pay handsome salaries, build office towers, invest billions of dollars in stocks and bonds, employ lobbyists and use political action committees to influence legislation*” (Gaul, Borowski 1993, p.4). Given the importance, the non-profit sector has too much to explain to the business sector in terms of mission, environment, community, gratification of human resources, etc. (Drucker 1989, 2002). An example of non-profit organization in Italian NHS is the so-called ONLUS<sup>9</sup> (non-profit organization of social utility) that provides social and healthcare assistance to the categories in need of care.

Recently, a different global trend similar to non-profit but different from it due to a modest amount of profit seeking is the social business. It was proposed by the Nobel Peace Prize, Muhammad Yunus (2007). A social business can be qualified as a middle sector between businesses and non-profits. From the business standpoint the social business intend to gain profits but all the surpluses are reinvested. So the social business is a non-loss and a non-dividend self-sustaining organization (Yunus, et al. 2010). From the non-profit standpoint the social business is created for a social purpose, let say for a social cause. The primary purpose is to serve society and improve the life quality of the poor categories even though a modest profit is required to ensure the business survivor.

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<sup>8</sup> The observation act cannot be seen outside the observer. In our vision, an opportunity is defined in subjective terms in a reality which is psychologically constructive. For further details see: Maturana and Varela (1980, 1992); Von Foerster (1987); Watzlawick (2006); Ceruti (2009).

<sup>9</sup> It is necessary to remember that an ONLUS can be constituted not only for healthcare purpose, but also for providing service in other sectors (e.g. cultural promotion, coaching, education, philanthropy, etc.). For further details on ONLUS in healthcare visit the official website of the Italian Ministry of Health: <http://www.salute.gov.it/>.

**Figure 4.1 – Yunus’ Social Business Model**



Source: Yunus, et al. 2010

In the context of healthcare and health nutrition two social business initiatives can be taken as best practices: Grameen-Danone, Grameen-Veolia Water Ltd (Yunus, et al. 2010). The first joint venture, Grameen-Danone, was founded in 2006 to fight the malnutrition of Bangladeshi children under the age of 5. Grameen-Danone is still alive (a viable system) and takes all the micronutrients which are missing in the children and put them in the yogurt, selling a cup of yogurt at a price of 6 BDT (= 0.06 EUR) which even the poorest can afford. The second joint venture is Grameen-Veolia Water Ltd that have joined forces and combined their complementary skills to make clean and safe water accessible to villagers in the poorest parts of Bangladesh where groundwater is contaminated with arsenic, very often at levels that make it a health hazard. The principal task is to build and operate several water production and treatment plants in some of the poorest villages in the center and south of Bangladesh.

Another emergent category is the Benefit Corporation. According to the founders of B Lab<sup>10</sup>, Coen Gilbert, Bart Houlahan, and Andrew Kassoy, a benefit corporation is a new form of organization that should meet and satisfy simultaneously the needs of shareholders and other stakeholders (consumers, employees, investors, policymakers, etc), in order to produce a more socially and environmentally beneficial economy (Marquis, et al. 2010). Saying it with the Viable Systems Approach terms, the benefit corporation should be consonant with the context, aiming a dyadic consonance with each stakeholder and a contextual consonance with the overall context (Golinelli 2010), having necessarily a social or an environmental purpose. The role of B Lab is to certify these B Corps from the socio-environmental standpoint. In other words, a benefit corporation cannot exist without meeting rigorous standards of social and environmental performance. To guarantee the meeting of standards, B Lab has created and developed the GIIRS Rating System<sup>11</sup> in order to canalize capitals toward the emergent class of “impact investments”. In USA, 12 States have recognized the legal status of Benefit Corporation and other 20 are working on it. There are many benefit corporations listed within the healthcare context, such as Preciva Incorporated, Maxwell Health, Episencial, Dimagi, Inc, Home Care Associates, PainBeGone Village, etc.

Now let’s take a look on what “The Big Four” professional services firms think about the healthcare market trends.

► **PricewaterhouseCoopers’s (PwC) vision**

Dr. David Levy, PwC’s Global Healthcare Industries Leader, sustain that are three major forces driving change in the market:

- i. there is a rebalance of the public and private sectors in the financing and delivery of care;
- ii. the healthcare sector is industrializing;

<sup>10</sup> B Lab is a non-profit organization that certifies Benefit Corporations. For more information visit the [www.bcorporation.net](http://www.bcorporation.net).

<sup>11</sup> GIIRS stands for Global Impact Investing Rating System. [www.giirs.org](http://www.giirs.org).

iii. healthcare is becoming a precision-based industry.

The first point addresses the necessity of sustainable healthcare, based in a partnership between public and private sector (Troisi, 2010). The major force that drives these necessities is the changes in demographics (aging, chronic illness, etc).

The second point refers to the power of connectivity. This many-to-many approach (Gummesson, 2009) opens the door to different viable service systems (Barile, Polese, 2010) part of diverse industries, from retail, telecommunications, tourism, etc.

The third and last point considers three pillars of the future medicine: personal, predictive, preventive. This is possible because of the scientific progress in genetics and biotechnology. In this context, health solutions will become more and more customized.

#### ▶ Deloitte's vision

The Deloitte Center for Health Solutions provides a six minutes video, where the Executive Director of the Center, Paul Keckley describes the seven mega-trends that will influence healthcare industry in the near future. The megatrends defined by Keckley are:

- **Demanding demographics:** the increasing diversity rate of population, the large income disparities within the population, the ability to access insurance and the desire to have a healthy life, are demanding more than previously from the healthcare industry.
- **Strategic globalization:** many U.S. companies involved in healthcare are looking to expand overseas. One reason is the demand coming from the local population and the other is the medical tourism.
- **Unconstrained connectivity:** individuals are becoming more exigent, because with their Smart-phones and the different apps can access personal health records and electronic medical records online. Even more, they can diagnose and treat diseases online. So, the healthcare industry should respond with the same technological progress rate.
- **Constrained resources:** there are constrained human resources and financial resources. Like other industries, healthcare industry suffers from a shortage in talent and faces difficulty in accessing capital.
- **Accelerated consolidation:** this is a focus to recoup the fragmented healthcare industry in order to achieve sustainability and scalability.
- **Big data:** the healthcare industry possess a big amount of data necessary for the consumers, but winner industries will be those with the most effective technological tools that transforms data into information and make that information available and accessible for consumers, possibly just in time.
- **Consumer discontent:** as in many other industries, also in the healthcare sector the consumers' confidence is low. Hence, the healthcare will not connect simply with patients, but above all with consumers to be satisfied.

#### ▶ Ernst & Young's vision

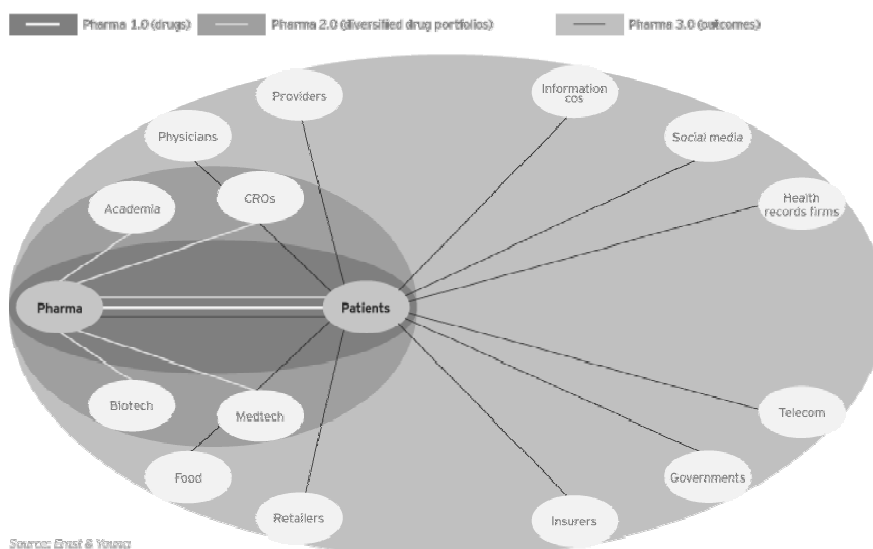
Ernst & Young's Global Life Sciences Center provides information, consulting and forecasting mainly in three areas of healthcare: Biotechnology, Pharmaceutical, and Medical Technology.

According to "The Italian Biotechnology Report" of 2011 for Ernst & Young, Italian biotech shows continuous growth and competitiveness on a European level. To maintain the competitiveness base in a sustainable innovation, companies must operate in a network perspective to share risks and costs. In agreement with Umberto Vattani's opinion (for this report), president of ICE (*national institute for foreign commerce*), Italian biotech field has extended the competitive strength toward nutraceuticals, biomass, biomaterials, nanobiotechnology and regenerative medicine, including also the innovative therapies and diagnostics. Other strengths of development in the biotech field of Italy are the diversification, the science parks and incubators for pure biotech, the high quality of Italian research, and the suitable climate (very important in the green biotech). For the near future experts are optimistic for a further growth in this sector, as long as Italian firms will intensify their strategic alliances in order to afford the necessary investments. Hence financial resources are crucial and the 27% of the companies included in the report sampling will try to strengthen their corporate structure through Private Equity or Venture Capital investments in the next two years.



In Pharmaceutical context, the most interesting trend, which has seen a growth of initiatives by 78% since 2010, is the Pharma 3.0 business model.

**Figure 4.2 – Pharma 3.0 and the healthy outcomes**  
The healthy outcomes ecosystem



Source: Ernst & Young

Source: Ernst & Young, 2010

According to the Global Pharmaceutical Industry Report 2010 – Progressions Pharma 3.0 of Ernst & Young, with Pharma 3.0 the focus shifts from drugs to healthy outcomes (figure 4.2). Saying it with S-D logic terms, the focus goes from a logic of goods to a logic of service(s). As a consequence a patient centric network arises, where patients relate to physicians, providers, IT, information companies, social media, health records, medical technology, insurers, governments, etc.

Now, considering the medical technology phenomenon, the PI technologies (patient-empowering and information leveraging) are using health information technology and medical devices for tracing progress in diagnosis and illness management. Referring to the Medical Technology Report 2012 – Pulse of the industry of Ernst & Young, some of the key innovations that will take place soon are:

- An ingestible sensor that, when incorporated into a pill, allows users to track data on drug adherence and other health indicators over time;
- An iPhone app that uses the phone’s front-facing camera to calculate a user’s heart rate;
- A wearable device that researchers hope can track a person’s movement patterns and look for significant changes in their gait and posture so as to be able to predict when they may be at risk of a fall.

► **KPMG’s vision**

KPMG provides a huge research database for healthcare. To be selective, the most key terms used in different publications (survey reports, white papers, business and industry issues, press releases and publication series) of KPMG’s healthcare research database are: technology, cost and people. For instance, the UK’s Department of Health launched in May 2008 the Whole System Demonstrator program to build a body of evidence for the integration of health and social care provision through telehealth and telecare (KPMG, 2012a). In reference to human resources, KPMG has replaced the old slogan “cost walk on two legs” into a new one: “value walks on two legs” (KPMG, 2012b). In other terms, improving job satisfaction and technological infrastructure, reduces costs and increases service quality in medium-long run.

As we previously seen, the most developed and influencing area in healthcare is technology, particularly ICT. Nowadays information technology is transforming the life of individuals, groups and organizations. We live in the society of information, or saying it with Habermas’ words: the “*technological society*” (Habermas, 1974). According to Stern and Deimler (2006, p.101) every business is an information business:

*“In many industries not widely considered information businesses, information actually represents a large percentage of the cost structure. About one-third of the cost of health care in the*



*United States— some \$300 billion—is the cost of capturing, storing, and processing information relating to, for example, patient records, physicians’ notes, test results, and insurance claims... [And] what will happen to health care providers and insurers if a uniform electronic format for patient records eliminates a major barrier that today discourages patients from switching hospitals or doctors?”*

It is clearly a *paradigm shift* (Kuhn, 1962) from classical (health) economics to the (health) information economics, from “*homo economicus*” to “*homo interneticus*” (Milton, 2010). So another great trend (by *modus operandi*) in healthcare is the health information technology (HIT) with all its components or subsystems. This last trend gives the opportunity to create healthcare social businesses. Anyway, this category of social business, based on the usage of IT tools and social networks for the business purpose, should not be confused with Yunus’ social business. The second category refers to the *aim*, the first to the *modus operandi*. This type of social business is different from Yunus’ social business because not referred to the *purpose* but to a new *scheme* of doing business, even though a meeting point can be found due to a common denominator: value proposition and value co-creation (constellation) required by both logics.

As the role of trained managers who manage healthcare organizations increases because of the people’s needs for doctors, nurses, X-ray technologists, IT professionals, etc. (Horowitz 2010, p.23), the role of people who “self-manage” their healthcare increases in parallel. This last trend has been possible due to the global technological developments and implementations in healthcare. Now it is possible to “have your health in your pocket” through the mobile health (*mHealth*, Vital Wave Consulting, 2009). A synergic combination of smart mobile devices and applications, cloud computing, social networking and big data analytics, allows people to diagnose and treat their health without being necessarily surrounded by the physical boundaries of the hospital (except particular cases and clinical interventions). In particular, mHealth advances patient monitoring (managing patient’s health condition), health awareness (being the doctor of yourself), and chronic disease management (e.g. diabetes). An interesting initiative in this context (but more sophisticated and effective) is the IBM’s “connected home health” ([www.ibm.com](http://www.ibm.com)). This endeavor, under the umbrella of the IBM’s “smarter healthcare”, is an instrumented solution, using sensor-enabled medical devices to collect vital sign data from patients in the comfort of their own homes. Sensors gather data such as blood pressure, weight, glucose level, temperature and other vital signs and automatically transmit the results to a personal health system in the patient’s home. The results are also sent on to a monitoring service where all of the data is interconnected so the patient and their care team can keep track of their condition.

### ***5. The Italian National Health Care System (NHS) between strengths and weakness***

The whole world has faced, and it is facing yet, a global economic crisis with economic and social impacts. The unemployment rate has increased (World Bank, 2013), creating financial constraints which hinder the individual to afford even the basic expenses. Therefore a national healthcare system which is less business-oriented and more social-oriented is probably more adequate for these times. The Italian NHS has the advantage of the social orientation; in order to avoid market failures, there is the public intervention of the state (Citoni, Garofalo 2005). As reflected in the “White Book of the Fundamental Principles of NHS” (2008), some pillars of the Italian NHS that manifest the social character are:

- the public responsibility for the protection of the right to health of individual and local communities;
- the centrality of the individual;
- the universality, equality and fairness of access to benefits and services;
- the globality of health cover: essential levels of assistance (LEA) and appropriateness of the services.

One of the main characteristics of the Italian NHS is the reform of corporatization process of health unities (USL) that transformed the so called USL in ASL (*azienda sanitaria locale* – local health company). ASLs are companies governed by the public law, but having financial, organizational, administrative, and technical autonomy (Mele, Calabrese, Troisi, 2012). Thus, the

principle of autonomy increases the organizational flexibility becoming a strength for the healthcare system.

Another advantage of Italian NHS is the developing network perspective of healthcare districts, aiming a public health governance of the healthcare services, and achieving the satisfaction of territorial needs (Da Col, Bellentani, 2011). The general purpose is to ensure the primary healthcare through a social-health optic.

On the other hand, the Italian NHS has also a lot of problems connected with the healthcare resource allocation efficiency and technical efficiency. The regionalization of the healthcare system, and the socio-economical discrepancies between various Italian regions, has produced health service imbalances among regions (Lo Scalzo et al., 2009). The doctors, seen from the perspective of human resources allocation, are not equally distributed among regions. According to France, Taroni and Donatini (2005) the southern regions suffer in terms of public healthcare and service quality, which has been reflected in the greater use of private specialists by patients.

Considering the technical efficiency, one of the greatest concerns of Italians has to do with the waiting times for specialized outpatient care, which has implications in the level of patient satisfaction. This is another barrier for taking advantage by healthcare services; it creates a focus shift to the private sector.

Hence, as it seems clear there is a competition between public and private sector in the healthcare, but the competitiveness is related with some challenges in terms of effectiveness (Levaggi, Capri 2008):

- the competition is not governed by the mechanisms of price, but by those of perceived quality from patients;
- there is an asymmetry in terms of objectives of public and private sector. If the public sector of health services is obligated by law to offer the “globality of health cover”, the private sector isn't. So, private health structures can concentrate their attention in a niche market, which can guarantee them a competitive advantage;
- there is still a managerial asymmetry between public and private healthcare. When the corporatization process occurred, many public structures were not technically prepared to afford the managerial challenges. Although the accounting system of ASLs (*local health companies*) is developed, initially the financial management was poor and with many problems reflected in the government expenditure.

### 5.1. A Systems View of IT Service Logic at the Lombardy Region

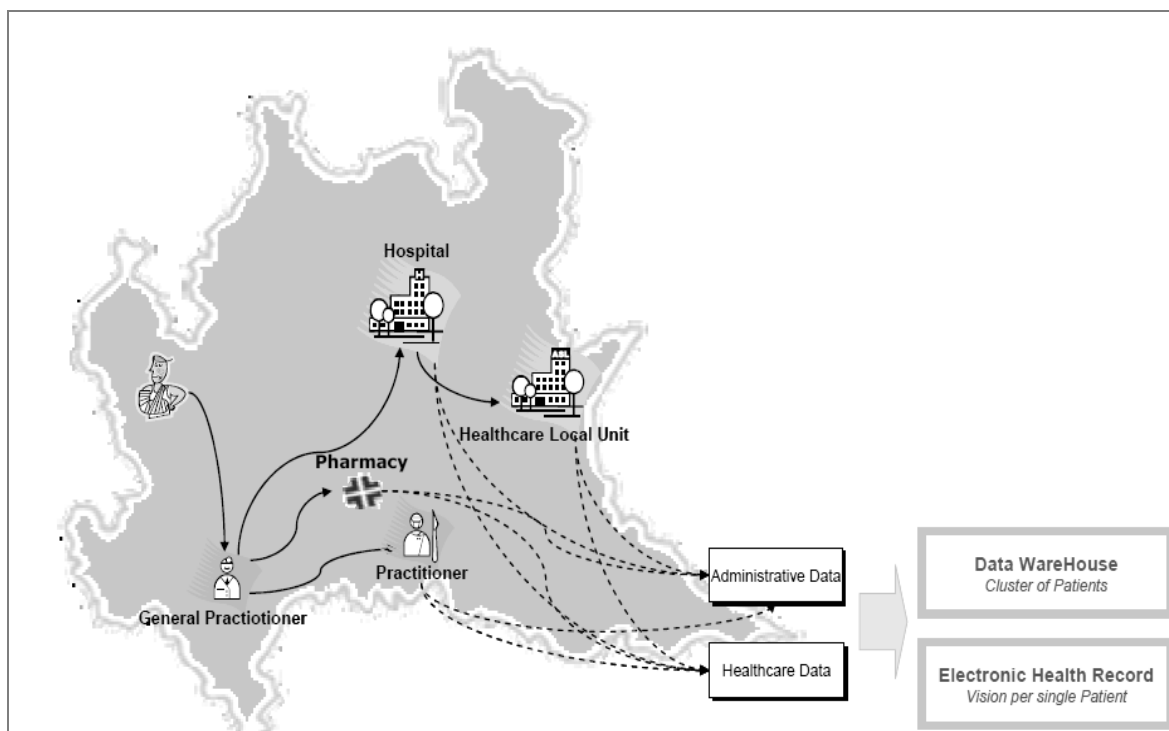
The dematerialization process in the actual world is not a coincidence with the “service” and the “system”, but a necessity, where the system become viable through the service that proposes; thus, the era of viable service systems is present (Barile, Polese, 2010). The high speed flows of information and the dynamics of markets and societies (as a consequence), bring out the necessity of viable service system networks to cope with the strong demand for service(s). Since the conception of Service Science and Service Dominant Logic, their terminology looked powerful. Concepts such as service(s), operant resources, conversation/dialogue, value proposition, resourcing, value-creation network, etc (Lusch, Vargo, 2008; Lusch, Vargo, Wessels, 2008) are becoming more and more an ordinary language.

Service systems are present everywhere. They can be distinguished from the type of service that propose and the operational field. Focusing the attention on the Italian NHS, a great progress has been made in the last years from the healthcare service standpoint. According to Dr. Rossana Ugenti (2010) – *IT General Director at Ministry of Health* – since 2002 Italian NHS has successfully implemented health information systems for monitoring health service.

An interesting case study is the Italian Lombardy region. In the region of Lombardy there are present 9.900.000 Citizens, 150.000 Health & Social Care Operators, 7.800 General Practitioners, 2.600 Pharmacies, 35 Public Hospitals, 15 Local Healthcare Units (ASLs), over 2500 Private Healthcare Service Suppliers (Contardi, 2010). The question is how to integrate these operators in an effective network. For this purpose *Lombardia Informatica S.P.A.*, has developed the SISS (“*sistema informativo socio sanitario*” – social and health information system) for behalf of Lombardy region, in order to cover and satisfy health citizens’ needs ([www.lispa.it](http://www.lispa.it)). Referring to Pellegrini (2010), the strategic objective is to create a regional network of healthcare providers with the scope to guarantee

to the citizen a high quality and equally distributed health service. Hence a value co-creating network is created by various health service systems enhancing the accessibility to administrative data and health data, as illustrated in figure 5.1. It can be described as citizen centric network; all the data are gathered, organized and reported on the basis of the citizen's clinical treatment within the Regional Healthcare Network. Even though this network is a composition of service systems, in a superior level it is a service system itself, or according to Spohrer et al., (2007) a “value-coproduction configuration of people, technology, other internal and external service systems and shared information (such as language, processes, metrics, prices, policies, and laws)”.

**Figure 5.1** – Health value co-creation network between service systems in Lombardy region



Source: Contardi, 2010

Saying it with the terms of the Viable Systems Approach, the primary purpose of each viable system present in this network is to find the dyadic consonance with the citizen/patient. However, although the citizen is the value proposition's target, all the viable service systems must resonate with each other in a contextual consonance, in order to co-create value (Golinelli 2010, Barile et al. 2011; Vargo, Maglio, Akaka, 2008). In specific, digital documents are available to handle pathological problems for patients. The healthcare local units provide digital documents containing prescriptions, patients' summary, vaccination records, etc. Health suppliers provide test results, discharge letters, first-aid reports, pathology cards, therapy plans, etc.

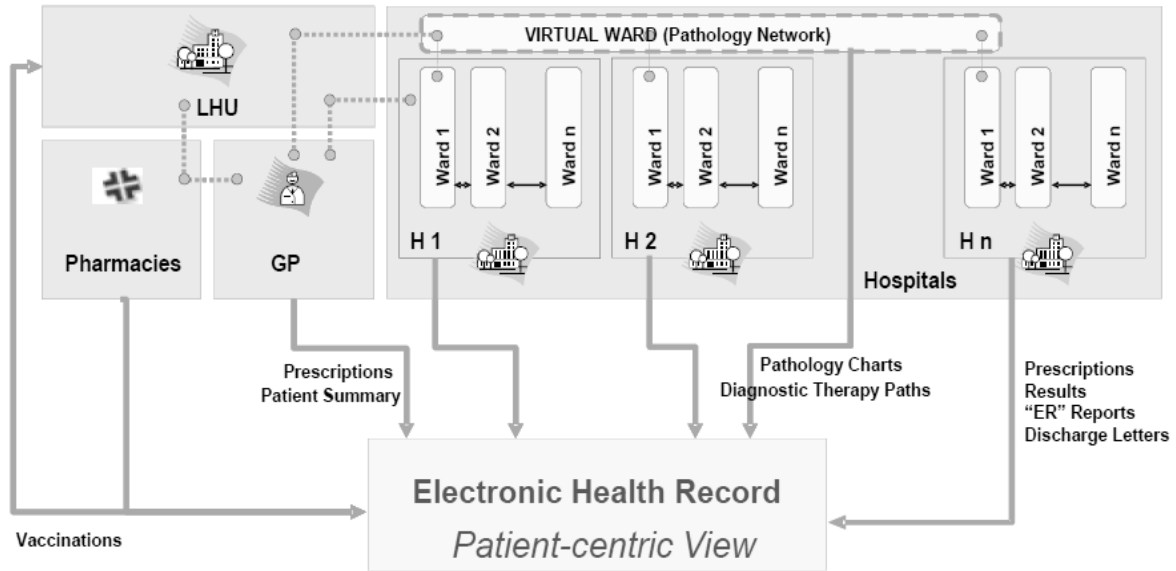
The primary purpose of SISS program is the electronic health record (EHR). Through the EHR system the information is directly available for citizens and health providers which can undertake clinical actions. As it can be seen from figure 5.2, there are pathology networks between hospital specialist, diagnostic and therapeutic paths between general practitioners and hospital specialist, and patient summaries send from general practitioners to hospital specialist. Each document is classified according to its typology (Radiology, Lab, etc), and is qualified by context attributes (date, ward, problem, etc). The EHR manages documents both in textual and structured (HL7-CDA2) formats. When a clinical document is generated, the system archives the document along with consultation authorization. Then the hospital repository publishes the document to the SISS.

According to Contardi (2010), pathology networks can be described as “technical and organizational networks consisting of hospitals and operators active in the cure and assistance of patients in the various phases of illness, with the primary objective of optimizing the assistance of the

patient by activating homogeneous care policies throughout the region.” Thus, pathology archives and registers help the service systems and citizens to gather data with epidemiological ends, to obtain an in-depth study of the pathology, to define better care paths and a better appropriateness of cure.

At the other hand, the scope of the diagnostic and therapeutic paths is the continuous assistance of health citizens’ situation. This is very important for chronic illness (e.g. vascular disease, diabetes, etc).

**Figure 5.2 – EHR system in Lombardy region**



Source: Contardi, 2010

As defined commonly by the community of general practitioners (GP), a patient summary is “*an electronic clinical document, digitally signed and published in the EHR, containing the summary of the clinical history and current state of the patient. It is created and updated by the GP each time there are significant variations in the clinical history of the citizen. It contains a predefined set of clinical data in case of emergency*”. It is important to put into evidence that information units such as clinical documents are simply operand resources, which should be acted upon and be transformed through/in operant resources. So, clinical documents will be the stimulus of clinical actions. Traducing the scenario in VSA’s terms, clinical documents refer to resources, planned clinical actions refer to capabilities, and clinical interventions refer to competencies (Siano, Basile and Confetto 2008).

## 6 – Conclusions and future research

As it can be deduced by the evidence the success key of the healthcare is the service. Even though the material infrastructure or the prosthesis of healthcare is really necessary, it remains an operand resource to be acted upon. Thus without service operations and the system vision there are no health benefits for the citizens (as patient or not). All the actors operating and collaborating with each other in the healthcare are service systems do to a service exchange and to a value co-creation with and for patients. Considering the dynamic characteristic of complex service systems it means that they are always in movement; there are no goods to be warehoused. We can say that boundaries are absent and service is full immersed in the global arena. Nowadays, due to the IT solutions the healthcare service can be exploited also outside the hospital or other sanitary structures. Especially for chronic illness patients can use technology (e.g. mobile health – *mhealth*) to handle their organism dysfunctions. Considering the nowadays trends and the galloping developments in the smart technology of healthcare, we can repeat the words of Ray Kurzweil: “the singularity is near”. The exponential growth of computational capacity will shape for better our lives creating more and

more relationship networks between healthcare service systems and citizens. Technology will make possible to avoid also the so called medical tourism, because people will have the healthcare everywhere without constraining them to go elsewhere for a better health service.

We have to follow this way in order to deepen some empirical evidences affecting the healthcare service eco-system in terms of new smart solution for the efficiency of the interconnected performances. We'll try to do it!

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