Internet Use and Healthcare

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The medical use of computing and information and communication technologies (ICTs) has a history of several decades, but the emergence of the internet, and especially the web and social media, created a new situation. As a result, currently the term eHealth is widely used – and the usage of the internet (and mobile) "technologies" in healthcare (among the patients and professionals, too) tends to be usual practice. There are more and more signs of the institutionalization of this new sub-disciplinary field of medicine, such as social organizations, healthcare institutes, scientific journals, regular conferences, etc. In this paper, collecting the most relevant developments we will try to characterize this state of affairs in the field. Moreover, as it is well-known, the use of the internet has an enormous impact on society, social systems and subsystems, and even on the everyday life of people. This extended practice also influences medicine and healthcare as social subsystems, and fundamentally transforms some of their characteristics. In this paper, we try to show several important dimensions of these changes.

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Today more than 50% of the world's population has internet access and the use of the internet has an enormous impact on society, social systems and subsystems, culture, and even on the everyday life of people. About 30 % of internet use is associated with some kind of health-content – in this way, this is the second most popular topic on the web. This extended internet use has a double influence on medicine and healthcare. First, internet (and mobile) technologies have successfully been directly applied in medical practice and healthcare systems – and from all of these applications a specific new area of healthcare, the so-called *eHealth* has already emerged and has been formed. Secondly, internet use has changed the whole culture and the modes and spheres of human beings – and in this way, creating a radically new context for the human existence, the whole medical practice

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and healthcare systems have also sustained a reinterpretation as *Medicine 2.0* or health 2.0. Both the direct and the indirect impacts of internet use on healthcare, i.e., both eHealth and Medicine 2.0 have relatively uncertain contours, plural interpretations and intensively varying nature – but the fundamental significance of their formation is unquestionable. The following brief accounts of these developments can hopefully serve as a possible starting point for more sophisticated further studies.

Emerging eHealth

The emergence of eHealth (electronic health, e-health, iHealth, etc.) can be observed from the 90s as the intensive application of computing and information and communication technologies (ICTs) in healthcare. However, the medical use of computing and informatics had a history of several decades, by this time medicine and healthcare had sustained a moderate lag in applying ICT-intensive procedures in their everyday praxis compared to areas like commerce or banking. Nevertheless, the general use of digitalization of all kinds of data, and the ubiquitous use of the internet, and especially the web and social media, created a beneficial situation in this field. As a result, the usage of the internet (and mobile) "technologies" in healthcare (both among the patients and professionals) tends to be the usual practice. There are more and more signs of the institutionalization of this new multidisciplinary field of medicine. In this paper, we will try to show the state of affairs in the field.

Regarding the history of science, technology and medicine, John Pickstone's works (Pickstone, 2001, 2007) demonstrate excellently how medical praxis includes – during the whole history of medicine – the "ways of knowing and ways of working" as well. In other words, medicine necessarily has a technological character and technological sensibility, in this way, the appearance of ICTs within medical praxis in the late 20th century is not an extraordinary experience. However, both medicine and computing, information and communication technologies have a very complex structure with many different constituents, in this way, it is not so trivial to identify the interacting medical and ICT components and the identity of the emerging new entity. There are no well identified circles of experiences and broadly accepted definitions of the emerging new medical practices.

As a strange consequence, a wide terminological diversity can be identified in the *naming* of the new field of medical praxis. The most frequently used names include: telemedicine, digital medicine, cybermedicine, electronic health, e-health, eHealth, mHealth, uHealth, iHealth, Health2.0, Medicine2.0, eCare, etc. The meanings of these names, of course, are not absolutely the same, there are historical, disciplinary, practical, technical, etc. differences in the meanings. In what follows we will disregard the differences and will normally use the term "eHealth" alone.

In fact, to find an acceptable *definition* of the new medical practice is a more fundamental difficulty than to find a name for it. As a consequence of the interactions of the two highly complex entities (medicine as a discipline and ICTs as technology), a proliferation of definitions can be considered. The most cited definition came from Gunther Eysenbach, who is the editor of the leading journal of this new field of experiences called "Journal of Medical Internet Research" (JMIR) (Eysenbach, 2001):

> *"e-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology."*

However, scholars working on different medical fields and/or with different ICT technologies proposed and applied slightly (and sometimes radically) different definitions. A significant collection of these definitions – based on the analysis of several hundreds of relevant publications – can be found in the (Oh, Rizo, Enkin & Jadad, 2005) paper, which includes 51 different definitions such as the following: "The use of emerging information and communication technology, especially the internet, to improve or enable health and healthcare thereby enabling stronger and more effective connections among patients, doctors, hospitals, payors, laboratories, pharmacies, and suppliers", or "The use of internet technology by the public, health workers, and others to access health and lifestyle information, services and support; it encompasses telemedicine, telecare, etc.".

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A much more systematic consideration of the different definitions can be found in (Cunningham, Wake, Waller & Morris, 2014). They present definitions associated with the aims aspired to by eHealth systems, patient involvement, devices and hardware, data management and presentation, usability and accessibility, clinical application of eHealth, patient centered care, and so on. The most extended and most meaningful classification of definitions was published recently by Giuseppe Aceto, Valerio Persico and Antonio Pescapé (Aceto, Persico & Pescapé, 2018). Considering many hundreds of relevant eHealth-related publications they were able to indentify different kinds of ICTs-based healthcare paradigms. These are the following: e-health, mobile health, personalized health, smart health, ubiquitous health, and pervasive health. The paper provides a comparative analysis of these paradigms, identifying their similarities and dissimilarities as well. Additionally, they consider and present the taxonomy of the technological conditions, tools, equipments, i.e. the ICT paradigms using in eHealth situations – and propose valid links between healthcare and ICT paradigms. Taking into account this development, it is now possible to define eHealth-related medical practices as a medical field, a subdiscipline with well-identifiable and critically considerable characteristics.

eHealth as subdiscipline

At this time, actually, we can probably declare much more: besides the formation of the well-identifiable medical subdiscipline of eHealth, different important signs of the institutionalization of this new field of healthcare can also be observed.

There are many conscious reflections on the *historical formation* of the field. Notwithstanding the lack of a proper name and well-identifiable charac-teristics of the new medical praxis numerous studies had been published from the beginning of the formation of the eHealth considering the possibilities of a dimly visible field (Lindberg & Humphreys, 1998), (Russell, 2000), (Kapur, 2001), (Paris & Ferranti, 2001), (Rice & Katz, 2001), (McKenzie, 2002), (Tyrrell, 2002), (Powell, Darvell & Gray, 2003), (Murero & Rice, 2006). Cut a long and complicated story short and simple: shaping the identity of the new (sub)discipline in a certain sense was a result of a continuous conscious reflective construction. Relatively com-prehensive treatments of the story can be found in the (Gibbons, 2008a),

(Meier, Fitzgerald & Smith, 2013) and (van Rooij & Marsh, 2016), (Whitehouse, Wilson & Rosenmöller, 2014) papers and in the books (Miah & Rich, 2008), (West & Miller, 2009).

A significant step in the process of institutionalization of a scientific discipline is to form specific *research communities*, public forums, organizations, etc. for studying the topic. Perhaps the most important thing is to have an infrastructure of publication, to create specific journals, series of books, etc. for the topic. Besides the regular publications on eHealth topics in the different medical and ICT journals and series of books such own forums have fundamental roles to form and improve the self-identity of the discipline. In case of eHealth, the *Journal of Medical Internet Research* (JMIR) was launched in 1999 (Eysenbach, 1999) as a peer-reviewed open access journal for digital medicine, and health & healthcare in the internet age.

This initiative has shown an extraordinary development. Now it is called JMIR Publications (https://www.jmirpublications.com/) which is the leading open access digital eHealth research publisher and its collection includes about 30 (!) specific journals in the field. (Eysenbach, 2019). The Journal of Medical Internet Research and its "sister" journals has already published more than 7000 publications, all of them included into a searchable thematic collection: https://www.jmir.org/themes. The following can be found among the most important journals: *Journal of Participatory Medicine*, JoPM (http://jopm.jmir.org), its mission is to advance the understanding and practice of participatory medicine among health care professionals and patients. It is the official Journal of the Society for Participatory Medicine. The *JMIR mHealth & uHealth* (mobile and ubiquitous health), JMU, (http://mhealth.jmir.org) is devoted to the studies of mobile and tablet apps, ubiquitous and pervasive computing, wearable computing and domotics (smart home) for health. *Medicine 2.0*, (http://www.medicine20.com) is the official proceedings publication of the Medicine 2.0 Congresses. The *JMIR Data* (JD), (http://data.jmir.org/) is focusing on the publication and curation of datasets, small and large, in the field of medicine and health. The *Interactive Journal of Medical Research* (i-JMR), (http://www.i-jmr.org) is a general medical journal with a focus on innovation in health, health care, and medicine. Perhaps even this ad hoc list of the JMIR Publications demonstrates clearly the enormous significance of the organization in the formation of eHealth.

Of course, besides this extended publication activity of the JMIR Publications, numerous other publishers also have more or less eHealth relevant journals. Such as the following:

➢ *JAMIA Journal of the American Medical Informatics Association* (https://academic.oup.com/jamia) is a peer-reviewed journal for biomedical and health informatics,
➢ *Informatics for Health and Social Care* (formerly known as Medical Informatics and the Internet in Medicine) (https://www.tandfonline.com/action/journalInformation?journalCode=imif20),
➢ *PLoS Medicine*, (http://journals.plos.org/plosmedicine/),
➢ *Telemedicine and e-Health* (https://home.liebertpub.com/publications/telemedicine-and-e-health/54),
➢ *Journal of Health & Medical Informatics* (https://www.hilarispublisher.com/health-medical-informatics.html),
➢ *Journal of Mobile Technology in Medicine* (jMTM) (http://www.journalmtm.com/).

It is also an interesting new development that in the last year the high prestige medical journal, The Lancet launched its new open access journal (The Lancet Digital Health. Editorial 2019) *The Lancet Digital Health* (https://www.thelancet.com/journals/landig/home).

Another important component of the formation of a new discipline is to organize regular *conferences* and to publish their outcomes in book series. In case of eHealth, we can observe such activities, as it is documented e.g. in the publications (Weerasinghe, 2008), (Kostkova, 2010), (Kostkova, Szomszor & Fowler, 2012), (Giokas, Bokor & Hopfgartner, 2016).

In the case of an established discipline there are several widely used *monographs*. It is interesting that there are only a few and relatively old monographs on the problems of eHealth (Gibbons, 2008b), (West & Miller, 2009). The lack of numerous newer monographs probably is a consequence of the extremely fast development of the field.

Last but not least, the formation of well functioning *cultural institutions* associated with the discipline (research and educational institutes, social initiatives, economic and political organizations and their programs, etc.) represent important signs of the existence of a discipline.

There are several research institutes all around the world, e.g. the *NHMRC Centre of Research Excellence (CRE) in Digital Health* is a significant academic e-health research organization in Australia (https://digitalhealth.edu.au/), the *HIMSS Institute for e-Health Policy* in the USA (https://www.e-healthpolicy.org/), the *eHealth Research Institute (eHRI)* in Hong Kong (http://www.ehealth-ri.com/en/index.html), *The Norwegian Centre for E-health Research* (https://ehealthresearch.no/en), etc.

Numerous universities provide *degrees* in the field of eHealth, e.g. an international Consortium of Educational Institutions in Digital Health overlapping many countries, the McMaster University in Canada, the Harbin Institute of Technology in China, the Flensburg University of Applied Sciences in Germany, the Linnaeus University in Sweden, or even the FH JOHANNEUM, University of Applied Sciences in Graz.

There are a huge number of state, commercial, non-profit, etc. *initiatives* to improve eHealth policies and the necessary infrastructure. Even the WHO has an "eHealth Unit", the European Commission under the title "Research and Innovation in eHealth" manages around 100 eHealth and ICT for ageing projects. There are German, Czech, Norwegian, and many more national projects on eHealth.

In this way, based on the disciplinary components listed and characterized above, it seems to be clear that currently eHealth can be considered as an existing medical (sub)discipline.

Social and cultural consequences of internet use

Until now, we have focused on the direct consequences of ICTs and internet use on healthcare. However, it is known from the philosophical description of nature and the use of the internet that extended internet use has many important social and cultural implications. It can be shown that internet use strongly impacts on the whole culture and even on the modes and spheres of human beings – in this way, creating a radically new context

for human existence. It is almost evident that these fundamental changes of the human conditions have an influence on the traditional context of medical practices and the whole healthcare system and involve a necessary reinterpretation of them. In the rest of the paper, we try to identify the most important social and cultural changes and some of their impacts on medicine and healthcare producing a new version (Medicine 2.0 or health 2.0) of them.

The appearance and the extended use of the internet can probably be considered as the most significant development of the twentieth century. However, this becomes evident if and only if the internet is not simply conceived as a network of interconnected computers or a new communication tool, but as a new, highly complex artificial being with a mostly unknown nature. An unavoidable task of our age is to use, shape, and, in general, discover it – and to interpret our praxis, to study and understand the internet, including all the things, relations, and processes contributing to its nature and use.

Studying the question what the internet is and its history – apparently – provides a praxis-oriented answer. Based on the social and cultural demands of the 1960s, networks of interconnected computers were built up, and in the 1980s a worldwide network of computers, the *net*, emerged and became widely used. From the 1990s the network of web pages, the world wide *web*, has been built on the net. Using the possibilities provided by the coexisting net and web, *social networks* (such as Facebook) have been created since the 2000s. Nowadays, networking of connected physical vehicles, the emergence of the internet of things, the *IoT*, seems to be an essential new development. Besides these networks there is a regularly renewed activity to form *sharing networks* to share "contents" (files, material and intellectual property, products, knowledge, services, events, human abilities, etc.) using, e.g., streaming or peer-to-peer technologies. In this way, currently, from a practical point of view, the internet can essentially be identified as a complex being formed from *five kinds* of intertwined coexisting networks: the net, the web, the social networks, the IoT, and the sharing networks. (Ropolyi, 2018).

As it is easy to see, the internet cannot be identified, and its development cannot be understood independently from the historical-societal and cultural environment in which it is launched and used. In this way, we have

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to understand the emergence and formation of a complex of the five intertwined coexisting and interacting networks shaped by experts and active users in the changing social and cultural environments of the late modern (or postmodern) age.

However, such a social/cultural contextualization of the intertwined, highly complex networks does not provide an understanding deep enough, therefore, we need a complex philosophical analysis. In our philosophical understanding, we conceive of the internet in four – easily distinguishable, but obviously connected – contexts: we regard it as a system of technology, as an element of communication, as a cultural medium, and as an independent organism (Ropolyi, 2013). From a *technological* point of view, the internet is an artificially created and maintained virtual sphere, for the operation of which the functioning of the computers connected into the network and the concrete practices of people's interpretations are equally indispensable. From the point of view of *communication*, the internet is the network of consciously created and maintained extended plural communities, for the functioning of which the harmonized functioning of computers connected to the network as well as the individual's control over his own communicative situations are needed.

In its *cultural* context, the internet accommodates the values of the late modern age, or the "end" of modernity. That is, it houses late modern worlds. Late modern culture contains modern values as well, but it refuses their exclusivity and it favors a plural, postmodern system of values. The way of producing culture is essentially transformed: the dichotomy of experts creating traditional culture and the laymen consuming it is replaced by the "democratic nature" of cyber culture: each individual produces and consumes at the same time. Thus, from a cultural point of view the internet is a network of virtual human communities, artificially created by man unsatisfied by the world of modernity; it is a network in which a postmodern system of values, based on the individual freedom and independence of cyberculture prevails.

The worldwide *organism* of the internet is imbued with values: its existence and functioning constantly creates and sustains a particular system of values: the network of postmodern values. The non-hierarchically organized value sphere of virtuality, plurality, fragmentation, included modernity, individuality and opposition to power interconnected through

weak bonds, it penetrates all activity on the internet – moreover, it does so independently of our intentions, through mechanisms built into the functioning of the organism. Thus, from the organizational point of view, the internet is a superorganism made of systems, networks and cultural universes. Its development is shaped by the desire of late modern man to "create a home", entering into the network of virtual connections impregnated with the postmodern values of cyber culture. For human beings, the internet is a new – more homely – sphere of existence; it is the exclusive vehicle of web-life. Web-life is created through the trans-formation of "traditional" communities of society and the cultures pre-vailing in the communities.

To sum up: *the internet is the medium of a new mode of human existence* created by late modern man; a mode that is built on earlier (i.e. natural and social) modes of existence and yet it is markedly different from them. We call this newly formed existence web-life. This means, that human existence is being transformed. Its structure, many thousand years old, seems to be changing: built on the natural and the social, there is a third form of existence: web-life. Man is now the citizen of three worlds, and its nature is being formed by the relations of natural, social and web-life. It is necessary the study of web-life, which has developed as the result of internet use (Ropolyi, 2013, 2014, 2018).

Web-life and healthcare

Although the summary presented above on the highly complex nature of the internet and the very fundamental social and cultural consequences of its use was a really brief outline, perhaps some relevant conclusions can be seen from this position. Considering the formation of eHealth – accepting the usual procedures applied in the literatue – in fact, we conceived the internet in a limited, particular sense. While speaking of the internet, only its technological (and sometimes communicative) characteristics were taken into account. However, as we presented in the part of our paper above, this *description* and understanding of the internet *is not complex enough*. In this way, based on the regularly accepted and applied considerations regarding the impacts of internet use on healthcare, only a part of the consequences can be discovered, namely the part which is directly related to the internet as a technological system and as an agent of communication. This means that

we can find several additional consequences that are normally not included into the usual understanding of the eHealth.

Other types of simplified conclusions can be reached if we understand the internet as a *less complex* network, i.e. just as the net, the web, a social network, the IoT, or a sharing network. Many studies are prepared in this "particular" style, e.g. studies on telehealth, telemedicine and tele-monitoring are taking into account only the characteristics of the net, and there are a lot of web-based practices (Kreps & Neuhauser, 2010), (Shah, 2018). The so-called participatory or collaborative medicine focuses on social networks or sharing networks (Flores, Glusman, Brogaard, Price & Hood, 2013), (Hesse & Shneiderman, 2007), (Hernandez, 2009), (Hood & Auffray, 2013). The most intensively studied particular network is the internet of things (Yin, Zeng, Chen & Fan, 2016), (Dimitrov, 2016), (Bhatt, Dey & Ashour, 2017), (Armentano, Bhadoria, Chatterjee & Deka, 2018), (Kumar & Vimal, 2018), (Krishna, Gurumoorthy & Obaidat, 2019).

The particularity of these considerations comes from two (an epistemological and an ontological) kinds of simplification of the complex nature of the internet. Actually, it is presupposed in both cases that the social/cultural/human environment of medical practices is given. In other words: it is the healthcare system that is subject to change because of internet use – and not the social/cultural/human one.

However, a group of studies is sensible enough to realize the changes of social/cultural/human spheres parallel to the changes of medical practices under the influence of internet use (Gibbons, 2008b), (Hill & Powell, 2009), (Hawkins, Han, Pingree, Shaw, Baker & Roberts, 2010), (Greenhalgh, Russell, Ashcroft & Parsons, 2011), (Black, Pagliari, Cresswell, McKinstry, Procter, Majeed & Sheikh, 2011), (Hardiker & Grant, 2011), (Weber-Jahnke, Peyton & Topaloglou, 2012), (Ho, Jarvis-Selinger, Novak Lauscher, Cordeiro & Scott, 2012), (Noar & Harrington, 2012), (Schweitzer & Synowiec, 2012), (Tamburis, Mangia, Contenti, Mercurio & Rossi Mori, 2012), (Flores, Glusman, Brogaard, Price & Hood, 2013), (Gaddi, & Capello, 2014), (Yom-Tov, 2016), (Meskó, Drobni, Bényei, Gergely & Győrffy, 2017), (Le, Le, Tromp & Nguyen, 2018), (Morley, Cowls, Taddeo & Floridi, 2020), (Morley, Machado, Burr, Cowls, Joshi, Taddeo & Floridi, 2020).

However, the philosophical analysis proposed above emphasizes that internet use does not simply cause changes in the social/cultural/human spheres, but fundamentally transforms their structure. Internet use has a universal impact on human existence – not only a particular one.

The internet is the artificial medium of a new, virtual mode of human existence – the web-life – which is basically independent from, but built on, and coexisting with the former (natural and societal) spheres of existence and created by the late-modern humans. As a result of internet use, there can be three worlds: natural, social, and web-life, and now we are experiencing the transition from two worlds to three worlds of human beings. A more complex world is emerging in which the natural, the social and the web-life spheres are simultaneously present. "Human essence" has been moving from the social to the web-life. Personality is being reshaped and a new period of human history has started.

This means that human nature is in radical transition. As it is obvious from the new structure of human existence, the new human overcomes the "traditional" one. The "new human" can be called "Human 2.0". The Human 2.0 is a product of the fundamental transformation which was described by Nietzsche and which is the observation of several recent social scientists (Fuller, 2011, 2013, 2019), (Fuller & Lipińska, 2014), (Csepeli, 2020). However, these views can be familiar from popular anthropological studies on transhumanism, posthumanism, and their broader contexts (Hayles, 1999), (Tegmark, 2017), (Kopnina, 2020) as well. The culture of the internet user (cyberculture) is imbued with postmodern values. In fact, postmodern values are realized and distributed in the world in the course of internet use without conscious decisions. These are: the virtuality/openness, plurality, individuality, fragmentality, included modernity, and an agency against power.

The knowledge presented and conveyed through the internet valorizes the forms of knowledge which are characteristically situation-dependent, technological and postmodern. The whole modern system of knowledge becomes reevaluated and to a large extent, virtualized; the relationship to knowledge, reality, and truth takes a personal, concrete, open and plural shape. The significance of the institutional system of science is diminished.

Instead of scientific knowledge, technological or technoscientific knowledge and the technologies of interpreting knowledge are in the forefront.

Besides culture created by the communities of society, individual cyber culture plays a more and more important role. The traditional separation of the producers and consumers of culture becomes more and more limited in this process. Supported effectively by information technologies, billions of the worlds of the citizens of web-life join the products of the professional creators of culture. Cyber space is populated by the infinite number of simultaneous variations of our individual virtual worlds. Aesthetic culture gains ground at the expense of scientific culture and imagination becomes the human capacity that determines cultural activities.

Personality becomes postmodern, that is, it becomes fully realized as an individual, virtually extremely extended and acquires a playful character with ethereal features. A more vulnerable post-selfish web citizen is developed, compelled by chaotic dynamics. Web citizens are mostly engaged in network tasks; that is, in building and maintaining their personalities and communities.

Besides the natural and the social spheres, a sphere of web-life is built up. Now humans become citizens of three worlds. Human essence moves towards web-life. The freedom of access to the separate spheres and the relationship of the spheres of existence are gradually transformed, in a yet unforeseeable manner. The characteristics of web-life are shaped by continuous and necessarily hard ideological, cultural, political, legal, ethical and economical conflicts with those of the traditional social sphere.

Web-life as a mode of existence is the realm of concrete existence. Stepping into web-life, the "real history" of mankind begins yet again; the transition from social existence to web-life existence leads from a realm of life based on abstract human capacities to a realm of life built on concrete capacities.

Medical practices and healthcare are being radically transformed as well. The medicine of the Human 2.0 can be naturally called Medicine 2.0 and its characteristics fit partly the transhumanist, but mainly the posthumanist networks of values (Kopnina, 2020), (Friese & Nuyts, 2017). Cyborg identity or postmodern e-personality can represent handy illustrations.

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Several important dimensions of these changes are clear, but most of them are still unseen. However, it is evident that the eHealth subdiscipline is included into the Medicine 2.0 of the Human 2.0, as its necessary component. In this way, the direct and indirect impacts of internet use on healthcare form a compact whole.

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