Telemedicine and Design: Relationships that Create Opportunities

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Abstract. Every Project that involves Design in its process requires the gathering of information related to the current contexto, the technologies involved and concepts to be approached. In this research, the first step after the delimitation of the scope of the project was to develop a profound analysis of the related areas to Design. In accordance to this procedure, it became possible to start understanding the relationship between different areas. Telemedicine being the central issue of this research, it becomes necessary to limit its connections with the other areas, such as Design. To begin with, it is necessary to explain the topics of interest of the researchers: Design, HCI (Human-Computer interaction) and ergonomics. From this point on, it could be added the interest in areas such as collaborative learning and mobility, that could influence the paths of the research. Moving forward, such concepts can be explored.

Keywords: Human Centered Design, Design, Telemedicine, Collaborative Learning, Mobility.

1 Introduction

Azin Raskin, entrepreneur, renowned interface designer and CEO of Massive Health dedicated the theme of his lecture TEDxSF (local version of San Francisco Event TED - Technology, Education and Design) to the relationship between Design and Medicine. Throughout the lecture, Raskin shares the need of the increasing involvement of Design in projects related to medicine so that methods and tools applied in Design can contribute to the efficiency of the interaction between patients and doctors. According to Raskin:

> *One in every 5 patients in the U.S. who need to take their antibiotics prescribed by your doctor stops ingesting the drugs before the time stipulated by the physician. How can this happen in an age where we have so many technologies to monitor our treatments? Is this a medical problem? Is*

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> *it a technologycal problem? No... it is a Design problem. (...) If you cannot use the remote control of your VCR, the fault is not yours but the designer's who designed the control. If you do not follow the medical treatment that is prescribed to you, the blame should also rely over the designer of the intervention. If we want the success of Medicine in this country, attacking the deeper problems that we face, we need to use the human constraints to our advantage. We need to bring Design to Medicine.* (RASKIN 2012)

The research of Raskin, integrating Design, Medical, Mobility and collaboration brought practical results such as the application The Eatery (https://eatery.massivehealth.com/#/main), for use on mobile devices. This app brings an interesting concept of sharing food habits, based on studies that argue that by sharing your own eating habits with a community, the trend is that these habits become healthier. Today the application already is widespread in the U.S. and used by thousands of users divided into different communities.

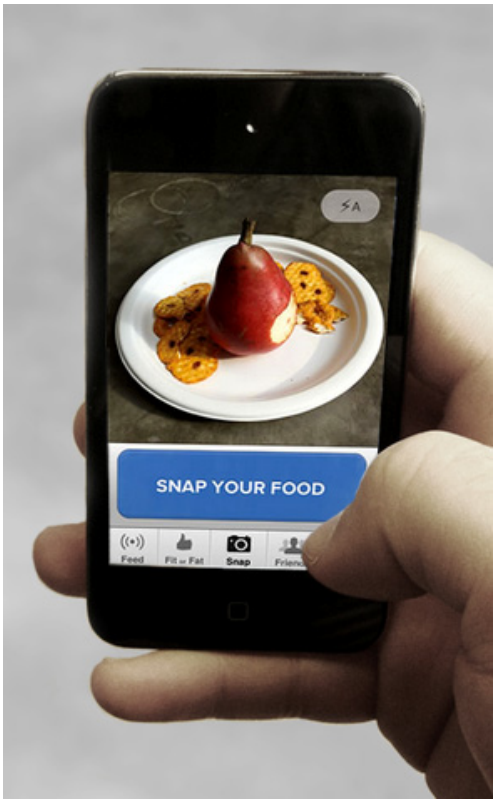

Fig. 1. Application picture of The Eatery company Massive Health

The PhD research of Luiza Novaes that took place in the university PUC-Rio (2007), raises issues related to the relationship between Design and Telemedicine. In accordance to this research, there are innumerous possibilities and opportunities for a

designer to act in projects related to Telemedicine. Nowadays projects related to Telemedicine are planned and executed by interdisciplinary teams that gather professionals from different fields such as Health, Education, Communication and Technology. Therefore, it becomes necessary the intervention of the designer in this context.

Novaes adds that it exists a strong ongoing context of projects related to Telemedicine in Brazil and in the world, many times supported by important organizations such as the World Health Organization (WHO). Such projects have extreme relevance, especially in countries under development, and count with strong structures of research and development. The designer already participates in projects like this, but still in small proportions, in contexts that prioritize the aspects of the interaction between the user and the solutions developed. Novaes suggests a deeper relation:

> *In front of many levels and types of interactions found in the field of Telemedicine, it becomes clear the necessity of prepared Design professionals to face the challenges presented. Designers should participate in the productive chain of health in a more effective way, contributing with creative and original solutions for the field.* (NOVAES, 2007)

The designer has the opportunity to participate in such multidisciplinary teams, with the possibility to contribute in different fases of planning and execution of a project. Each phase involving the gathering of data, common practice in the Design area, should be enriched by the perspective of a designer. From this point on, the possibilities become innumerous once the designer can add in aspects such as the elaboration and evaluation of the solutions proposed. This research tries to demonstrate such possibilities.

Telemedicine, therefore, has the objective of using the channel offered by technology in order to exchange relevant information to the medical field between doctors, professionals connected to Health and patients. In accordance to this analysis, Novaes determines Telemedicine:

> *Telemedicine is the exercise of Medicine through the use of interactive methodologies of audiovisual and data communication, with the objective of assistance, Education and research in Health.* (NOVAES, 2007)

It is possible to identify throughout the world many iniciatives related to Telemedicine. We can observe projects that involve technological resources extremely advanced, in contexts of highly recognized institutions that use advanced laboratories that broadcast surgeries and other interventions. In the US, as an example, the University of Miami's Telemedicine laboratory uses technology to identify cases located in distant locations of the country.

2 Design Presence

High end technology is being developed constantly in order to meet the needs raised by the field of Telemedicine. Companies like American Liberstream (www.librestream.com) dedicates their efforts on designing products that allow specialists to interact in telemedicine projects. An example of a product designed by Liberstream is the camera *Onsight*, that allows the transmission of video and images to equipment located at a distance. The camera allows the user to exchange information in real time with another specialist in possession of a computer so that the product can be presented in operating rooms or in the search field. This solution is focused on mobility concept that includes both the design of interventions product planning and in its communication interface.

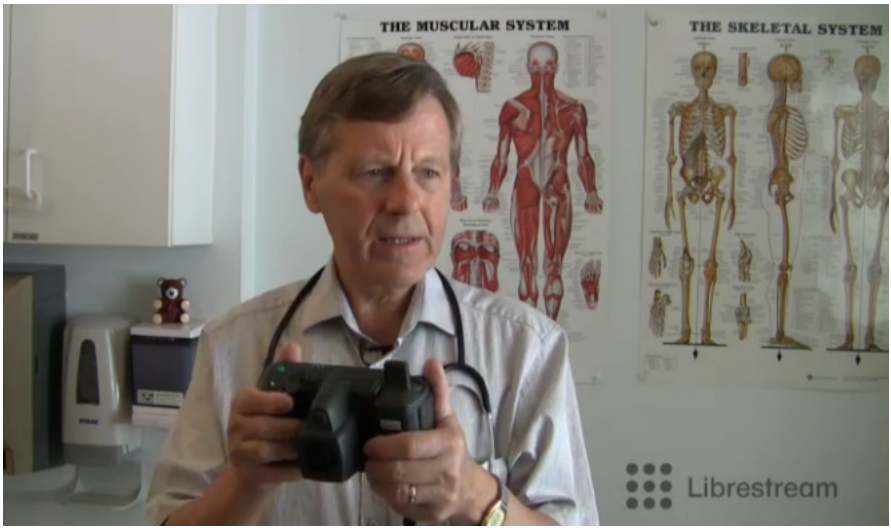

Fig. 2. Illustrative image of a doctor manipulating the Onsight camera

On the other hand, countries that have difficulties in allocating health care professionals in remote locations develop scalable and creative solutions. A group of researchers at the University of California (Berkeley) and the INTEL company, located in Ghana, Africa, use Design methods to gather the required data to develop the solutions needed. In the article entitled "Applying user-centered Design in Telemedicine in Africa" (HO, 2009), the group demonstrates the approach developed for the creation of a system designed for remote consultations, focused on the specific needs of groups located within the country. Acting as Telemedicine solution integrators, the group analyzed the actual contexts of activity of the project, including the locations, resources, technologies, and government support specialists involved. The use of user-centered design methods contributed to the adaptation of the research.

Fig. 3. Images of the sites of the research project

In another initiative, located in India, a country with large population and difficulties with standardization of its health system across the country, we can also identify the need for contextualization of projects related to Telemedicine. The foundation Apollo (http://www.telemedicineindia.com/) has inumerous local projects with the goal of prevention of diseases and medical care for patients across the country. One initiative that calls attention is the "Hospital on Wheels," that enables a bus equipped with medical experts and resources for disadvantaged communities throughout India. With the equipment contained in the bus, the experts can meet local people and communicate directly with teams on duty in hospitals located in large urban centers. Thus diagnosis can be performed instantly, drugs can be ordered quickly and sent to needy regions. According to Professor K. Ganapathy, President and Head of the Foundation in an interview with team communications company Ericsson, the practice of telemedicine can be defined simply as:

> *"The basic goal of telemedicine is to provide physicians where there aren't any."* (GANAPATHY, 2011)

Fig. 4. Illustrative image of buses equipped with technologies dedicated to communications with hospitals in major centers

Another good example is the online community for Physicians: Sermo (www.sermo.com) . This community allows physicians to communicate and to share valuable information about specific topics related to Medicine. The community already counts with over 125 thousand users and can be accessed through computer desktops and mobile devices.

Fig. 5. Illustrative image of the online community Sermo being accessed both by computer desktop and mobile device

3 Conclusion

It is possible to assure that in fact there are many opportunities for design professionals in the field of Telemedicine. Inside and outside Brazil. They are opportunities that go around planning, research, product Design, interface Design, Ergonomics and others.

This research explores such possibilities bringing examples and cases. The main focus of the research is to bring together options for designers to understand the relations of their practice with Telemedicine with the perspective on the use of learning interfaces that can engage learners and teacher during the process of exchanging knowledge.

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