

Internet of Everything? A matter of innovating as a texture of practices

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In recent years, the possibility to connect smart devices as computers, smartphones and tablet has been growing. The emergent literature labels these connections as “Internet of Things” (IoT), the networked connections between objects that can receive and send data (Ashton 1999; Wigmore 2014).

Although less of the one per cent of things in the world is connected, this percentage is increasing and will increase in the future. As the

number of connected humans and non-humans grows, IoT is evolving into a new realm labelled Internet of Everything (IoE), which can connect the entire unconnected (Cisco 2012). IoE is becoming a new social reality in which it is possible to connect people, process, data and things. The IoE allows widening the Internet of Things towards The Internet of Peoples through Internet of Services.

“The Internet of Everything is changing how people and things connect, how we collect and harness data, and how they all work together to enable intelligent processes” (Cisco 2013).

In this context the real innovation is not the new device but the new service provision for people. Main fields of application for the IoE regard several industries from retailing to manufacturing, from private to public industry. In particular, in the healthcare sector, wearable devices allow to offer an increased service provision for users as sensors which monitor blood pressure or vital parameters.

Recent studies on this topic come mainly from information systems, medical and engineering fields in which the main focus is on the

technologies development that enables the connections between various actors. There is a need instead to consider the impact that new technologies, networked connected devices and connections have on the social dimension and how ways of doing are changing.

This paper aims to understand how the practices are changing and new connections in actions are emerging thanks to the Internet of Everything. We carry out an empirical research on multiple actors (i.e. users, doctors, community, companies, etc.) in the healthcare market.

Literature review

Internet of Thing and of Everything

Studies on Internet of Everything are in its infancy, while there is a growing literature on the Internet of Things; however it is mainly on technical aspects (Yan *et al.*, 2008).

The Oxford Dictionary (2012) offers a definition of IoT, as “a proposed development of the Internet in which everyday objects have network connectivity, allowing them to send and receive data”. These connections regard not only de-

vices as computers, smart phones and tablet but a wide variety of devices such as optical lens with microchips able to test and monitor glucose level through tears and send information about it to specialists, chips on animals to study their habitat or migration behaviors, sensors that monitor and send information about climate or pollution conditions, automobiles with sensors able to capture malfunctioning or sensors connected to traffic sensors and parking sensors (Abdelwahab *et al.*, 2014; Kopetz, 2011). These devices collect, monitor and share useful data thanks to technologies able to connect themselves to Internet and each other.

The societal impacts of such application are rarely recognized (Vermesan and Fries 2011; Greengard, 2015) and not yet investigated in terms of new social practices.

A Practice-based approach to Innovation

A 'practice-based approach' is a broad term that encompasses many different research fields (Gherardi, 2006), unified by the common premise that social reality is fundamentally composed of practices (Schatzki, 2001). Rather than viewing

the social world as external to human agents, this approach views it as being produced and reproduced through everyday actions. 'Practices' are understood to be constitutive of the socio-material world (Orlikowsky, 2002), in which human agency is not only shaped by but also produces, reinforces and changes structural conditions in a recursive process of reproduction and transformation. Moving innovation into the realm of practice means going from the outcome to the process (Mele *et al.*, 2014; Mele and Russo Spina, 2015): from innovation as a new artefact to innovating as a set of co-creation practices performed by people who merge knowledge, actions, tools, languages and artefacts to create something new and better. Innovating is not only an economic process but a social process of construction by a group of actors. In this view, innovation occurs at the interplay of different practices or connections in actions (Gherardi, 2012).

Methodology

Close to the relativist epistemology, our study is the outcome of a contextual knowledge. We carried out an empirical research in the

Healthcare. We investigated a multiple actors context with users, doctors, hospitals, communities and other partners.

We followed Gherardi and Nicolini (2006: xviii), who suggest that “the methodological principle of ‘follows the practices’ acquires concrete meaning when the researcher observes a situated practice and moves up from it to the institutional order or moves down from it to the individual-in-situation or in other words, when she/he explores ‘a connective web’” (see also Nicolini, Gherardi and Yanow, 2003). Consistent with Carlile (2002), we studied how the Internet of Everything impacts on practices in Healthcare through an analysis of who actors are, activities they perform, how they interact with other market actors, what resources they use and how they integrate resources to reach their aims.

Case studies

The analyzed new practices concerned the new use of wearable products allowing new service innovation for users, doctors and hospitals.

The wearable products are built on new technology for healthcare professionals to be

able to keep tabs on the vital information of their patients. They can help to keeping track of heart rate, breathing, temperature, steps, and even detects body position in case if a person has fallen. These devices give the possibility to doctors not only to have a snapshot of the patient health but, through biosensors, receive data that continuously track comprehensive vital signs and biometrics. Moreover, all the data could be saved in customizable and scalable cloud and may also be used for storage of historical data or to perform analytics, or the platform can be integrated to transmit data directly.

Other wearables are examples how technologies are changing practices in medical clinics. One of these is Augmedix based on the smart glass (Google Glass) connectable with every kind of devices have an internet connection. The Glass is embedded with software able to enter patient information into an electronic chart and understands nonverbal communication since Glass includes video. Moreover, the Glass can be used during the surgeon because it is able to transmit to the doctor images from scans plus live images simultaneously. Through

Augmedix it is possible to send the audio-video feed from Google Glass during each patient visit; the doctors could enter patient notes directly while he/she visits him/her; the doctors at the end of the day, can review and make any necessary edits before clicking submit and save notes in the HER. In addition, Augmedix could offer personalized service for doctors, in fact it stores specialty, practice style, and clinical cadence, to merge seamlessly with personal workflow.

Conclusion

In the investigated cases innovation emerges as constantly co-constructed by the activities of all participating in social & technological interactions to support relationships in respective alignment of aims meanings and practices. New devices are not a technological improvement but they spur changing in the practices. The Internet of Everything impacts on the social side of community allowing also the evolution of social arrangements and institutional structures.

We address the Internet of Everything as a strong enabler of innovating-in-practices. The

term ‘innovating’, rather than ‘innovation’, reflects the dynamic aspect of the phenomenon. In this view innovating not simply as an outcome but as something actors do: a practice in terms of a collective doing that connects knowledgeable actors. We emphasize the social connections occurring among a group of actors—individuals, collectivity and organizations—that integrate an array of resources (e.g., tools, knowledge, images, material objects), as well as the contexts in which knowledge creation and sharing take specific forms for innovation to occur. The practices are viewed as connections, sustained by an ongoing series of relationships in actions—that is, connections in actions, involving both humans and non-humans elements. Innovating is thus conceptualized as a texture of socio-material practices that seamlessly interweaves relationships and actions. It is a social emergent process in which a collective doing activates and connects distributed knowledge in and between social actors (Nicolini 2011; Gherardi 2012).

Keyword

Internet of Everything, Practice, Innovation

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