Shaping sustainable practices: the structural impact of social media in Sustainable Ambient Computing (SAC)

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I. WHAT IS THE RESEARCH FIELD OF SUSTAINABLE AMBIENT COMPUTING?

Sustainable Ambient Computing (SAC) refers to an environment filled with invisible computing devices in smart homes, buildings management systems as well as autonomous cars, but also to the programmable washing machine or the numerous smart phones and tablets [1]. It integrates the same assumptions that are a topic in Green IT, in LCA and in HCI. Bringing both perspectives of software and hardware engineering together, sustainable development in the field of SAC aims to be more than a matter of manufacturing, recycling and resource sufficiency. Therefore, a postulated human or so-called user centered development has to be implemented on each level. In the field of SAC, which unites ambient intelligence and ubiquitous computing, there is a profound awareness of communication processes between humans. They are regarded as developer, worker, user, thus as part of the concept. It means anticipating a human-computer-interaction where the computing device (as a visible device, as an instrumental tool) disappears. Devices become a surrounding that acts supportive to our actions. As a part of SAC, ICT4sustainability integrates material thus ecological, economical thus societal aspects [2] and fosters sustainable development through communication processes and cultural change.

II. SOCIAL MEDIA AS NEW COMMUNICATION PARADIGM

For a sustainable development approach in SAC we implement the human being as a creator and user of artifacts and ideas. Humans are user of languages, starting from Saussure's faculté de langage (faculty of speaking) [3] to coding (e.g. programming languages). Interpretation processes of communications situations occur in languages, thus humans produce signs, being semeiotic animals [4]. They ask questions develop and change meanings – humans produce symbols. Social media platforms like Facebook, Twitter or Instagram changed the concept of ICT through more and direct information, as communication finds place solely for its purpose. Communication as implicitly infinite ongoing process has formed new cultural symbols like # hashtags or Facebook's "Like" thumb. These new paradigms in ICT should be integrated in SAC. However, assuming the sustainable development goal of SAC can be reached within the material sphere, what is the ROI of a sustainable communication process? Sustainable Ambient Computing means faster integration of systems (e.g. for IoT), less error rates, faster workflows especially at asynchronous intercepts (e.g. engineer and designer). It closes e.g. the loop on circular economy, not engaging only in manufacturing and innovation on economical and technical scale, but also using established communication paradigms and enhancing them. The customer engages successfully in recycling and upcycling of products, serving sustainability issues in her evolving context of her communication sphere.

III. SEMEIOTIC ENGINEERING AS SUSTAINABILITY APPROACH IN SAC

However, sustainability issues deal with abstract concepts like communication and culture. The semeiotic methodology termed by Charles. S. Peirce suggests a model-based description of SAC, which is able to provide generalized models of languages as a sphere of signs, the semiosphere [5]. Sign processes are called semeiosis. The sign itself is a determinate triadic structure of object, representamen and interpretant. At the same time the sign is a process of representation of the object that results in an interpretant. Signs form different categories (icon, index, symbol) depending on the level of abstraction [6]. Considering social media as a text [7] or language, this methodology allows to create a model for the realm of the lifeworld where quantification is not possible

[8]. Using signs supports a re-production of inherent processes in text thus communication on different levels. Social media built paradigms of use in the sphere of SAC. The use of gestures for smartphones and tablets are based on the cultural concept of book reading (turning pages), of parchment reading (scrolling), of a hand gesture symbolizing small or big (enlarging or minimizing the user interface). These widely known symbols have been transferred into new contexts, which can be analyzed with the method of semeiotic. Semeiotic engineering analyses the non-determined, non-quantified part of technical semiospheres, which are related to the human in his role as a developer, producer and consumer.

SAC is based on material issues and solutions. Using semeiotic engineering complementary integrates the user within her lifeworld, building new symbols, anticipating rebound effects and changing social and cultural patterns.

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