

An Essay on Human Values in HCI

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Abstract— Academic literature has indicated a new moment for the HCI field that requires it to revisit methods and practices to consider aspects that are difficult to deal with, such as human values and culture. Although recognized as important and a challenge for HCI, human values is still a topic that demands investigation, discussion, and practical results (theoretical, methodological, technical) so that it may become somewhat useful for HCI as both a discipline and a community. This paper presents an informed discussion in which we explore possible understandings for values in HCI, the importance of the topic, and existing approaches. We draw on the literature and on our own research experiences in the topic to develop critical discussions and suggest possible directions for advancing the research and practice in the context of this challenge.

Keywords— *Design, Culture, Grand Challenges, Ideal rules, Norms, HCI third moment.*

I. INTRODUCTION

Technology triggers changes, affecting the environment in which it is inserted and the people who live in this environment — even the ones who do not use it. Ubiquitous Computing, Wearable Computing, Social Software, Ambient Assisted Living, Intelligent Building, Smart Cities, and the Internet of Things are some examples of how interactive computing technology has permeated all aspects of personal and collective life.

These aforementioned examples represent research and development areas that both challenge and have the potential to extend, significantly enrich, and even shift the relationship between people and the world around them, including technology itself. Therefore, the task of designing interactive systems has assumed new dimensions in terms of complexity and has required a wider and deeper understanding of the ethical and social responsibilities of those who create them. In recent years, impact of computer systems on economic, ethical, political and social life have become more evident, drawing attention to the need for moving from a human-computer interaction (HCI)-oriented discussion to a perspective of life mediated by interactive computing technologies.

The Association for Computing Machinery (ACM) defines HCI as “a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them” [1].

According to this definition, HCI is the area of Computer Science that must deal with issues that cross other areas (e.g., Algorithms and Data Structure, Graphics and Visualization, Networks and Communication, Software Engineering), and that must consider specific aspects of the environment in which its application occurs (e.g., economic, geographic, social, cultural).

In its 2013 Curricula for Computer Science [2], ACM highlights that “because it deals with people as well as computational systems, as a knowledge area HCI demands the consideration of cultural, social, organizational, cognitive and perceptual issues”. Winograd [3] had already argued that the designer’s role goes beyond the construction of an interface to encompass all the interspace in which people live, requiring a shift from seeing the machinery to seeing the lives of people using it. The author suggests the existence of a complex interplay between technology, individual psychology, and social communication, which demands attention to relevant factors that become hard to quantify and even identify. Such interplay has become increasingly visible as interactive systems become a reality in peoples’ lives, being worldwide available and used for different purposes, through different devices, and in quite different and complex contexts.

Some authors have pointed out to strong transformations in HCI’s focus, goals, and roles: Harrison et al. [4] discuss the emergence of a third paradigm in HCI — while the first and second ones focus on issues of ergonomics and cognitive factors, respectively, the third paradigm must deal with the establishment and multiplicity of meaning in situated interactions. Bødker [5], in turn, speaks in terms of a third wave where new elements of human life are included, such as culture, emotion, and experience; the focus of the third wave is on culture and on an expansion of the cognitive to the emotional.

Speaking in terms of either a new paradigm or wave in HCI, we are experiencing a new moment where the very basic concepts of “computer” and “interaction” have already been redefined, and where the concept or idea of “user” became increasingly limited. In fact, the human being is not a “user” of the world he or she inhabits, but part of it, affecting as well as being affected by it. In this HCI new moment, discussions of different nature (philosophical, methodological, practical), such as the neutrality of technology, the techno-dependency, the possible approaches and understanding for context, etc., are emphasized. The myth of the average user is confronted with plurality and diversity; the focus on the “use” is challenged by the effects and concerns of the “non-use”; social, cultural, and

emotional elements, that were usually left on the margin of design approaches, require a central attention.

Although the debate around the aforementioned issues is not new, the raising of an ICT-mediated society has required both academy and industry to revisit their practices and views. Bannon [6], for instance, claims for a reformulation (reimagination) of the HCI discipline, exploring new forms of living with/through technologies that give primacy to human actors, their values, and their activities. Sellen et al. [7], in turn, assert that HCI experts must broaden the field's scope and search for new methods to be used in the 21st-century sociotechnical environments.

The challenges and problems of an ICT-mediated society can neither be solved from a technically-centered perspective — ignoring the social world in which solutions are used and people live — nor be addressed with specific approaches in an isolated and fragmented way. In this sense, different initiatives have been conducted to identify and inspire directions in HCI for the near future. In 2007, researchers from academy and industry, from several countries and with different backgrounds, joined efforts to understand and idealize HCI in 2020 [7]. In 2012, the Brazilian HCI research community prospected grand research challenges for HCI in Brazil for the next 10 years [8]. Both the initiatives suggested that placing human values in the core of HCI is a challenge for the area itself and for all those involved with the design, evaluation and use of interactive computing technology.

Hornung et al. [9] highlight that Human Values is not a new concern in HCI. As an Ethics-related concept, it has been a research topic in HCI for about two decades, and as a concern and important issue, it has been involved in approaches such as Design for All and Participatory Design, which can be traced back at least to the 1990s. Similarly, efforts, such as Values in Design [10], have contributed to a rich body of work in scientific literature. However, Hornung et al. [9] argue that human values still seem to play a secondary role in systems design, even of systems with great social impact, and suggest the existence of a gap between research and practice in academic as well as industrial settings.

A gap between research and practice on values in HCI is reinforced by other authors who have explored the topic [7, 11, 12]. These authors point out to a lack of guidance regarding how to focus on human values, how to identify those that are critical and that must be considered in a design context, and how to actually conduct value-oriented design, highlighting the need for solutions, explanations, and examples of how to deal with values issues in an explicit manner. Such claims indicate not only theoretical and methodological limitations for values in HCI, but also practical and cultural ones. It is still necessary to promote the discussion on the subject, clarifying how we may understand, approach and deal with it.

This paper presents an informed discussion, situated in the context of Human Values as a Grand Challenge [8, 9], focusing on possible understandings for values in HCI, the importance of the topic, and existing approaches. We intend to shed light on the topic by both presenting an overview and suggesting the

extension of a theoretical and methodological approach. We draw on Organizational Semiotics [13, 14] and the Socially Aware approach to the Design of interactive systems [15, 16, 17], which understands design from a socially responsible perspective: participatory and universal as process and product. Naturally, this frame of reference both informs and models our positions, claims and directions.

This paper is organized as follows: first, we revisit ideas and definitions for the concept of values, elaborating on them. Second, we bring up real examples and discuss on the importance of the topic for the realm of HCI. Third, we explore existing works in the literature addressing values in HCI, pointing out some challenges and directions. Fourth, we draw on our discussions in the previous sections to propose an extension to an existing approach for values in HCI. Finally, we present our remarks and conclude the paper.

II. DEFINITIONS FOR VALUES IN HCI

The notion of values permeates human life. People prefer one thing to another, praise one behavior and condemn another, like something and dislike something else: whenever people do it, they assign values. Axiology is the philosophical study of value, mainly from the perspective of ethics — the concepts of “right-wrong” and “good-bad”, and aesthetics — concepts of “beauty-ugly” and “harmony-conflict”. Studies in axiology are often concerned with problems related to the nature and status of values, their evolution, normative aspects, scientific methods to explain values and judgements, etc.

In the scientific domain, axiological issues are related to whether research can be truly free of value (e.g., of researchers' values), and whether its ends should be designed to expand knowledge or to change society [18]. In his reflections on science and technoscience, Lacey [19] has developed an idea of interaction between values and scientific practices, rejecting both the positivist objectivism that challenges the influence of values in scientific activity, and the postmodern relativism that denies the distinction between cognitive values and ethical and social values. Lacey considers epistemological and practical implications of science in contemporary society, arguing that scientific institutions and scientists themselves should consider the social, ecological and human contexts when designing their research projects and instruments.

Williams [20] defines values as core conceptions of the desirable within individuals and society that serve as standards or criteria to guide not only action, but also judgment, argument, evaluation, and choice. Schwartz [21], in turn, defines values as desirable, trans-situational goals that vary in importance and function as principles that guide people's lives. For the author, values may be understood as “beliefs tinged with emotions”, and as motivational constructs that transcend specific situations and actions, serving as standards or criteria to guide the selection of actions, policies, people, and events.

In his General Theory of Value, Perry [22] argues that values cannot be treated either as a mere quality of an object or as a mere mental quality of a subject: it is a relation between an object and an interest-taking subject. While it is obvious that

people do not only value objects, but also other people, behaviors, situations, ideas, etc., this observation is useful because it suggests a subjective and relative nature of values. For instance, a disabled person will value ramps and lifts very differently from a non-disabled one; a foreign individual will value a bilingual dictionary differently from a native; an occasional pedestrian will value signs and directions differently from a frequent one; elderly may value specific behaviors, places and things very differently from the young, and so on — see Figure 1. Therefore, we can say that a value is not an aspect of the person who nurtures it (a first), and it is not an aspect of

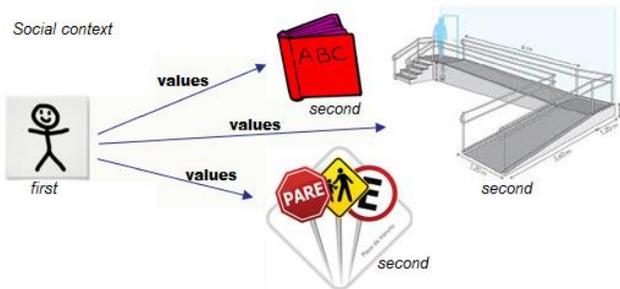


Figure 1. Values as an aspect of the relation between a first and a second in a social context.

an object, environment, situation, idea, person, organization, etc. (a second), but an aspect of the relation between a first and a second in a social context.

In HCI, the most adopted definition for values is the one from Friedman et al. [23], who understand values as something that is important to a person individually or to a group of people. On the one hand, this definition makes space for considering (and inquiring) not only what theories and other definitions determine as values, but also what people understand as a value. On the other hand, it gives no support for further elaboration on values that may be useful when designing ICT solutions. Drawing on Peirce’s [24] definition of signs¹, we can ally Friedman with Perry’s ideas saying that: *a value is something that denotes importance to somebody for something in some respect or capacity*. This notion of values may be especially interesting in the scope of HCI and Semiotics when inquiring, revisiting or applying semiotic-based methods for HCI design and evaluation.

The word “value” has been used in many senses and has been the main concern of researchers from different disciplines, being approached and investigated for and from quite different perspectives. Therefore, we should not look for an ultimate definition able to unify the different interests and understanding around it, but revisit notions that may be useful for HCI. In fact, Williams [20] highlights that assuming a definition for values is useful as well as challenging: while a comprehensive initial view for the idea of valuing must identify generic aspects and characteristics, for specific purposes, conceptions that are more restrictive should be formulated as needed.

In this sense, a broad definition like the one we suggested may be used as a starting point from which more elaborated understanding and directions can be developed. A shallow approach to values leads to naive assumptions and positions where the term values becomes just a kind of buzzword. At the same time, deep conceptual discussions and inquiries on values may lead to philosophical, psychological and logical issues that may be impractical and beyond the direct focus of HCI. Both the extremes would not offer substantial contribution to HCI investigation and practices, indicating the need for reaching a balance. Such a balance may require moving from an abstract notion of values to a more specific one that facilitates the consideration and involvement of values in design process and products. For instance, how to identify values and decide which ones to consider, how to deal with them in different design stages (e.g., prototyping, evaluation), and what means to design for values are common questions in HCI literature (e.g., [25] and [26]) that are directly influenced by the definition adopted for values. These questions are especially challenging for those who have a technical-centered background — the common case of Computer Science and ICT professionals. Therefore, what concept or idea could offer/promote such a balance for HCI?

A. Ideal Rules, ideal scenarios, ideal solutions

Considering different disciplines, Williams [20] indicates that the term “values” has been used to refer to interests, pleasures, preferences, moral obligations, desires, wants, goals, needs, attractions, and other kinds of selective orientations in which the core phenomenon is the presence of criteria or standard of preference — a preference that indicates (or reveals) an ideal something.

Hart [18] asserts that the normative aspect of values has been eschewed in the scientific investigation. One of the few works in this field is von Wright’s book about norms [27], in which the author distinguishes between three main groups of norms: rules, prescriptions, and directives (technical norms). Rules are regulations or principles governing conduct within a particular activity, such as the rules of a game and grammar. Prescriptions are commands, permissions and prohibitions, such as the laws of the state. Directives are concerned with the means for reaching an ending, such as the instructions that will take the person who follows them to a specific result. The author also proposes the notion of “ideal rules”: a special kind of norms that shows affinities to the main groups of norms and has direct relationship with the notions of values. The core difference is that while the main groups of norms are concerned with doing/not doing (actions), ideal rules are concerned with being/not being (characteristics).

As von Wright explains, ideal rules are closely connected with the concept of goodness. They refer to ideal behaviors, people, emotions, professions, organizations, events, policies, objects and other things that serve various human purposes, where we say they ought to have certain properties and should not have others [27]. The properties we say someone, or something ought to possess (e.g., a teacher, job, organization, object) are characteristic not of every someone or something, but

¹ Peirce [24] defines sign as “something which stands to somebody for something in some respect or capacity”.

of the good ones. The someone or something that has the properties of a good so-and-so in a supreme degree are the ones we call an ideal so-and-so. The same holds true of interactive systems and all design products in the HCI domain. An ideal social network system must have a broad set of good properties, such as: communicability, privacy, security, usability, portability, performance, accessibility, aesthetics, freedom of speech, motivational features, no offensive contents and behaviors, etc. These properties can be refined and specified in a way we can inspect and conclude whether they are good enough. Some are easily understood as functional or non-functional requirements while others may be related to project constraints, design decisions, or even to the behavior of users in this social network. In a broad sense, we can talk about an ideal design solution, an ideal approach to a specific problem, an ideal design context, ideal tools and methods, ideal designers, and so on.

Values and ideal rules are intrinsic to HCI. When Carroll [53] states that *“the special value and contribution of HCI is that it will investigate, develop, and harness those new areas of possibility not merely as technologies or designs, but as means for enhancing human activity and experience”*, and when de Souza [28] states that the designers’ intent is ultimately to satisfy the users, these statements communicate ideal rules for the designers, for the design process, for the design product, and for HCI as a discipline. Although such a view may sound obvious for HCI researches and practitioners, the same does not hold for Computer Science and ICT professionals who very often have a technically-centered background and experiences.

Ideal rules can be understood as a special kind of norms that communicate values, specifying characteristics related to values and helping to translate these characteristics into a more formal structure. They may also be understood as requirements that specify not an ordinary solution, but an ideal one. Thinking in terms of ideal rules may be useful for HCI in the sense they may act as a bridge between aspects of the complex social context (e.g., stakeholders’ values and culture, project’s goals) and the technical solutions to be designed to represent/operationalize them. Furthermore, ideal rules may also be a less vague notion for ICT and Computer Science students and professionals than values — i.e., thinking of ideal solutions and ideal scenarios for different stakeholders, identifying and specifying ideal rules for them etc., may be less abstract than talking in terms of values. If so, ideal rules can make it easier to bring the notion of values into HCI practices and, consequently, into Computer Science and ICT practices.

III. THE ROLE OF VALUES IN HCI

“It is not enough to teach a man a specialty. Through it he may become a kind of useful machine but not a harmoniously developed personality. It is essential that the student acquire an understanding of and a lively feeling for values. He must acquire a vivid sense of the beautiful and of the morally good. Otherwise he—with his specialized knowledge—more closely resembles a well-trained dog than a harmoniously developed person.” (Albert Einstein, the New York Times, October 5th, 1952).

In the Design field, the concern with peoples’ values and real needs has been somewhat present in discourses and practices. Latour [29], for instance, claims that a decisive advantage of the

concept of design *“is that it necessarily involves an ethical dimension which is tied into the obvious question of good versus bad design”*, and where issues of materiality and morality cannot be disassociated. Papanek [30] brought these issues into practice, challenging the way industrial design was understood and practiced. He observed how often design products cause negative impact on the world (from promoting bad behaviors to killing people), attributing this problem partially to the deficiency, or established culture, of design literature and design courses, which are usually economy-oriented and technically centered and omit the social context of design, as well as the target public and people in general.

Papanek [30] claims for a socially and ecologically responsible design of products, tools and infrastructures, advocating that design has shaped tools, environments, society, and even the humankind, demanding high social and moral responsibility from the designer. Consequently, it demands both the ones who practice design to develop a great understanding of people, and people to get more insight into the design process. For the author, design must be more research-oriented, becoming *“an innovative, highly creative, cross-disciplinary tool responsive to the true needs of men”*.

From the perspective of HCI, the aforementioned claims and concerns sound genuine. However, the literature (and practice) has shown that there is a long way to go until a socially responsible perspective becomes the reality in HCI. For instance, when talking about Ambient Assisted Living, Bannon [6] mentions how often designers and even researchers conduct their researches and develop their products hoping they will support elderly people living independently, having a better quality of life at home instead of in an institution, and not becoming a burden on other people (or the state) as they grow older. However, as he highlights, although much of this work is justified by the need of *“empowering older people through independent living”*, on looking more closely they are providing fulltime remote monitoring of these people instead of adding to their dignity or empowering themselves to remain autonomous.

The design of educational ICT, especially for disabled students, usually suffers from the same *“good will but narrow view”* problem: designers, researchers and teachers are often interested in promoting students learning, developing their abilities, capacitating them to use technology, etc. However, although these studies usually strive for user-centered design and defend the idea of universal access and social inclusion, on looking more closely, their outcomes end up automating activities and procedures already conducted in the classroom. They expect students to achieve a *“normal performance”*, and evaluate students based on pre-defined parameters instead of it naturally making sense to them, favoring significative learning, adding to their quality of life and promoting their welfare.

In the aforementioned situations, the concern with the key people (elderly, students), their real needs, concerns and values is not actually primary, but secondary. As Bannon [6] argues, thinking of technology development and medical assistance before understanding the stakeholders, knowing their values and actual needs, may prevent the understanding of more basic issues such as elderly’s desire to be in contact with their family,

friends and neighbors in a natural way; and the need for remaining autonomous, managing their privacy and keeping control over themselves. Similarly, thinking on technology development, pedagogical goals and engagement strategies before understanding the students and their values prevent the development of technologies that naturally make sense to them, add to their quality of life, and promote their welfare. Moreover, this may even prevent the design of new solutions and strategies that consider students and their particularities to develop the abilities necessary for the students' context of life, promoting their own progress.

Evidence of the lack of consideration of stakeholders and the implications of values (or their lack) in the design of computer systems are present everywhere. However, as Friedman [11] highlights, although the neglect of human values in any organization is disturbing, it is particularly damaging in the design of computer technology because, unlike people with whom we can disagree and negotiate values and their meanings, we can hardly do so with technology. Therefore, working in situations where values, culture and emotional issues are key aspects is not only a methodological and technical concern, but also a matter of mindset, requiring a different perspective from the professionals involved. What should be such a new perspective? The following examples show real situations and talk by themselves.

A. Different Dimensions of a New Moment in HCI

In 2015, the Brazilian government launched the eSocial platform², intended to manage and facilitate employers' tax payments related to domestic workers. Imposed by the federal government as a substitute to the existing methods (i.e., manual payments, automatic debit), the system was launched in November 2015 and, due to technical problems, poor user interface, lack of understanding of the formal and informal aspects of the problem domain etc., about 1/3 of its registered employers were not able to make their tax payments – late payments are subject to fines. The system, intended to make tax payers' life easier and to favor the formality of the domestic work class, became an example of how an interactive computing system can be imposed to create barriers and make more difficult a task people were already used to perform.

In 2010, several countries adopted full body scanners at airports, which produce livid naked pictures of people and raised the concern with possible ethical problems and negative social consequences. In the United States, the first scanners being experienced were producing detailed and high definition pictures of people's body and allowing displaying some pictures in full living colors through a basic image editing software [31]. The produced pictures would not be blurred because it would limit the detection capabilities of the scanners. In the United Kingdom, these scanners conflicted with child protection laws that ban the creation of indecent images (or pseudo-images) of children [32], what was considered a legal and operational issue. While the possible negative consequences of producing and storing images of naked people, including children, is a clear concern, prioritizing people's security and well-being for the

common good (e.g., against terrorism) was often used as a justification for using such scanners.

Problems regarding privacy and reputation in social software, such as *Facebook*[®] and *Twitter*[®] are also broadly reported. These problems are originated by different factors that range from system's failures and absence of (or misleading) interface features to intentional design decisions and users' behaviors. One of the greatest challenges (and dangers) with problems related to values is that they tend to be identified only after design and adoption, when the system is already operating and negative side effects are already being produced, sometimes in an irreversible way. FoxNews [33] reported how pedophiles were using *Wikipedia*[®] as a medium to disseminate their ideas, expose their view that it is not a crime, and enter in schools easily reaching students. The investigation identified an evident effort by pedophiles to use *Wikipedia* to further their agenda, editing articles about the topic intending to reduce the rejection to their behavior and recruit more members into their community.

In March 2016, *Microsoft*[®] had to deactivate Tay (acronym of "thinking about you"), its chatbot, as it became racist, cited Hitler and started supporting Donald Trump's immigration plans a few hours after it had been launched online. The chatbot was targeted at 18 to 24-year-old people in the US as part of research on conversational understanding, designed to engage in conversations via twitter and to learn from these interactions. According to *Microsoft*, it planned and implemented several filtering features and conducted extensive user studies with diverse user groups when designing Tay. However, *Twitter* users were able to explore vulnerabilities in Tay, "teaching" the chatbot in ways designers were not able to anticipate. *Microsoft* took "full responsibility for not seeing this possibility ahead of time", claiming that Artificial Intelligent systems feed off of both positive and negative interactions with people, making the challenges as much social as technical. *Microsoft* admitted: "*Tay is now offline and we'll look to bring Tay back only when we are confident we can better anticipate malicious intent that conflicts with our principles and values*". However, *Microsoft* alerts: "*we will do everything possible to limit technical exploits but also know we cannot fully predict all possible human interactive misuses without learning from mistakes*".

In a paper from Science, Caliskan et al. [54] show that applying machine learning to ordinary human language results in human-like semantic biases. Their results indicate that text corpora reflect historic biases: from morally neutral bias, such as preferences and reactions toward insects or flowers, to morally problematic bias, such as race and gender.

The debate on ethics and values in algorithms has gained attention as controversial and potential harmful studies/solutions arise. A recent study from the Stanford University applied deep neural networks to detect sexual orientation from facial images [55]. Even more alarming than the scientific criticism about the method and data, were the ethical concerns regarding the possible uses for this study — e.g., homosexuality is a crime in several countries. Earlier, another study investigated automated inference on criminality from facial images in China [59],

² <http://www.esocial.gov.br/>

generating a strong debate on the ethical implications of the research. The authors published an addendum showing themselves surprised with some misunderstanding about their work, “*in particular the motive and objective of our research*”.

The cited cases are not isolated or sporadic. The Start-ups and high-tech companies have continuously offered examples of how organizations may affect society not only with their technical solutions, but also with their processes, rules, and business strategies. In 2014, The *New York Times* published a review about situations in which high-tech companies had acted poorly or even unethically during the year [34]. For instance, *Facebook*[®] manipulated people’s news feeds to change the number of positive and negative posts as part of a psychological study without any kind of subjects’ informed consent or awareness. *Google*[®] updated its privacy policy in order to scan people’s emails and improve their recommending features. *Snapchat*[®] took no action to fix a previously warned security vulnerability that compromised the privacy of users, exposing the phone numbers and user names of million accounts. Last, *Uber*[®] exposed the intention to track consumers’ geo-localization, and conducted an aggressive dispute with *Lyft*[®] by booking fake rides and sabotaging its fund-raising initiatives.

The aforementioned examples show situations in which value-related issues have produced negative impact, and one could develop an extensive analysis and discussion on each example, its causes and consequences, etc., which is outside the scope of this paper. However, we can highlight some important points that indicate how values and ethics are related to ideal rules for different aspects of a technical product, its adoption and usage, its design process, and organization. For instance, the very aim of a technical artifact and its functions both communicate values and affect them. Having a body scanner at airports communicates a higher concern with security than with users’ privacy, and not blurring the produced images communicates a higher concern with technical performance and accuracy than with the possible impact on users. Therefore, institutional or organization’s values are being prioritized when they conflict with personal values. In this case, ideal rules for alternative solutions were not presented — maybe not even considered.

Depending on the form and functions of a technical solution, it will afford some behaviors and inhibit others. Users naturally explore and use technical solutions in different ways than the ones designers had in mind when projected them. While it is useful to design solutions that allow a creative and flexible use, it may be an ideal decision to design solutions that inhibits or constraints undesired behaviors. This is why in one way or another designing communicates values. In Wikipedia’s case, the organization has strived for a better control about the intentional manipulation of its contents, but it still seems to have lots to advance. In Snapchat’s case, the company took some action only when the security problem affected millions of users, refusing to take responsibility about it.

The cases of Tay and the biased AI solutions, in turn, expose gaps between the design, operation and effects of algorithms and our understanding of their ethical implications. Operations and choices previously left to humans are being increasingly

delegated to algorithms. As Mittelstadt et al. [57] suggest, algorithms must be known to the user, designed for transparency, informing people about their information processing and outcomes to reduce the risk of severe consequences for individuals and whole societies

Papanek [30] argues that designers are not free of responsibility regarding the products they create and deliver in the world, as well as the impact triggered by them. In this sense, Lacey [19] draws the attention to everyone’s responsibility regarding what the future will be, emphasizing the need for finding ways to act and collaborate with each other in order to incorporate specific values, such as social justice, sustainability, well-being of all and participatory democracy.

The examples in this section show that the concern with values must not be limited to direct users but to comprise a wide range of stakeholders. While in the *Facebook*’s case the direct user was the first to be affected, it should not be ignored that *Facebook* is used everywhere, and changing the humor of people affects the environment as well, including users’ productivity, relationships, decision-making, etc. Similarly, in *Uber*’s case, cheating a competitor also affects the taxi drivers and their subsistence work, the taxi passengers and their personal and professional needs, also challenging the formal and legal norms of an entire business system. In all the examples, ethical issues, emotional effects, normative and formal aspects, and technical issues are clearly present.

These examples also indicate that it is not possible to talk about values detached from a society in which people live, the technical solution is inserted, and the organization exists. Values cannot be fully understood outside their cultural context and cannot be treated as isolated factors or components. The concern with values in HCI must be present throughout any design process, starting when a problem is to be clarified, continuing when a solution is designed, delivered, used, modified and disposed. In the same sense Sommerville [36] has suggested that the quality of a product is strongly related to the quality of the process that originated it, the concern with values and ethics in a designed product tends to be as effective as the concern with values and ethics in its design process. Likewise, a design process is able to account for values and ethical issues as far as the organization itself does it through its informal and formal practices.

Walsham [58] questions whether we, ICT researchers, “*are making a better world with ICT*”. The author highlights that dramatic changes have occurred over the last decades, with ICTs being spread over almost all countries and becoming pervasive in many areas of human activity. Such changes raised concerns that the research contribution of the field could have got lost and that the field itself could be in decline, and the author suggested that an agenda focused on ethical goals should be mandatory for the field to remain relevant and offer a unique contribution.

Ethics, human values, and culture are intertwined with each other. Areas, such as architecture, medicine, engineering and law are concerned to investigate how to build better physical spaces, provide better quality of life, developing more efficient technologies, and ensure better organization and conditions of

human life. Computer Science, as both a powerful tool for other areas and an area for itself, must take such issues seriously. As Lee [60] states, “*neither a computer nor the teaching of computer science has any value or meaning outside of its impact on people*”. Therefore, it is mandatory to sensitize Computer Science and ICT professionals — in their different roles — to be aware and concerned on how to use their knowledge and skills to improve the lives of people in their own environments, favoring their autonomy, in a way that makes sense to them and do not trigger adverse effects on individual and communities’ lives. HCI is key for “reimagining Computer Science” and ICT research and development, and this is what we call “a new moment for HCI”.

IV. EXISTING APPROACHES FOR VALUES IN HCI

The HCI literature has a relevant amount of works and initiatives either that recognizes values as a central aspect or that favors the focus and attention to values and related issues. Universal Design and Participatory Design are perspectives that commit to specific values (e.g., equality, democracy) [9], favor the consideration and involvement of a high diversity of stakeholders and, therefore, the emergence or identification of different values. Other initiatives have explicitly focused on values in technology design, proposing methods and artifacts, as well as analyzing existing works and solutions.

Cockton [37] proposes a framework to support what he named a Value-Centered Design, suggesting some activities and artifacts to support designers in understanding technology design as a process of delivering something valuable, of creating value. Sun et al. [38] propose a method to analyze business functions and ICT roles, and to evaluate business-aligned ICT from social and technical perspectives. The authors introduce a set of techniques to support the evaluation of existing ICT applications regarding their technical capabilities for maximizing business value. Steen and van de Poel [39] analyze the importance of considering values in information system design, arguing that design is beset with values from the start, and drawing attention to the need for making values explicit during the design process.

Friedman [11] argues that values emerge from the tools we build and how we choose to use them. She has been working for about two decades on an approach she named Value-Sensitive Design, which is intended to support the concern with values in the design of computer systems, especially ethical values [40]. According to Friedman et al. [23], such approach involves an integrative and iterative tripartite methodology that consists of conceptual, empirical, and technical investigations, encouraging moral discussions in relation to the development of products and services. The authors suggest a practical guide to the approach:

1. Start with a value, technology, or context of use in mind.
2. Identify direct and indirect stakeholders related to the design problem.
3. Identify benefits and harms for each stakeholder group.
4. Map benefits and harms onto corresponding values.
5. Conduct a conceptual investigation of key values.

6. Identify potential value conflicts.

Other authors have reported experiences with design activities where the concern with values is made explicit. Isomursu et al. [12] propose a method based on Schwartz’s circular model [21] for modeling the subjective value perceived by users of a new technology. Their method was used to analyze the adoption of a technology-supported attendance control system in a primary school from the perspective of values. Schikhof et al. [25], in turn, explored the role of monitoring systems in small-scale housing for elderly people with dementia, incorporating principles of Value Sensitive Design in a human-centered design process.

If on the one hand the existing initiatives represent the way values are currently approached in HCI, on the other hand, they give us insight on how values should be approached — i.e., they communicate ideal rules for approaching values in HCI. Several authors argue that understanding the design context is considered the most critical activity in a design process [3, 6, 14]. In this sense, design approaches must help designers to clarify the problem as wide and deep as possible and viable, seeing the people prior to the problem to be solved, the problem context prior to the technology to be designed, and the actual needs of stakeholders prior to the tasks to be automated.

The identification of stakeholders is pointed out as one of the most important steps when conducting a value sensitive design [23]. However, common practices in HCI usually focus on user studies and on the analysis of stakeholders that are clearly linked to the design problem and solution. As Satchell and Dourish [41] suggest, designers tend to think about users and use only (and not always), ignoring issues related to the “non use” of a design solution. This focus assumes that non-users would cause and suffer no impact and influence at all — something that the examples presented in this paper are enough to contradict.

Other authors argue that existing models and approaches in HCI usually restrict the analysis to a set of preconceived values, rather than encourage professionals to inquire about other values and aspects that may appear and that are relevant to a particular usage context [12, 26, 42]. Isomursu et al. [12] reinforces the cultural nature of values, and argue that models, which consider global values but do not account for their cultural nature, may prevent the identification and understanding of specific values that are important/relevant to the design context. The case study presented in [12] suggested that the designed product could have met the target users’ values if values had been explicitly considered when it was designed. Schikhof et al. [25], in turn, stress a lack of guidance in HCI to support the process of understanding how to actually conduct value-oriented design.

Even considering some influential references, recent literature indicates that research in values, ethics and culture in HCI has been guided by practical and specific problems and contexts, therefore, building a fragmented view [56]. They are approached in theoretical isolation, in specific design stages or activities, and by specific individuals using pre-defined assumptions about interested parties and their cultural context. On the one hand, fragmented approaches ignore that before an ICT solution is launched, lots of design decisions and coding activities take place; before writing code, requirements are

specified and solutions are modelled; before modelling, there is a problem to be understood and a solution to be proposed; before the problem, there is a context that justifies its existence and importance. In this context, there is a society, there are people, and everything that makes part of their life. On the other hand, ethics denote set of values, and while values denote importance for a person or group of people, it is the cultural context that explains such importance. Therefore, isolating ethics, values and culture prevents us from understanding them in the situated context in which they make sense, i.e., prevents us from identifying, specifying, modelling, coding and evaluating ideal ICTs according to ethical values in different cultural contexts.

Therefore, from the previously exposed we can point some high-level ideal rules for approaching values in HCI, which we believe must be at the core of any ideal approach for ICT design:

- It must facilitate to understand the design context as wide and deep as possible, involving different stakeholders, and to pay attention to people's way of life.
- It must consider values, including ethical issues, in their situated context, inseparable from culture.
- It gives importance not only to the direct and indirect users and effects of use, but also to other stakeholders — interested parties.
- It considers not only different dimensions of use and adoption, but challenges, reasons, impact and results from non-using a designed solution.
- It must pay attention to aspects of values from the very start of a design process, recognizing the uniqueness of design contexts, the creative nature of the design activity, and the complexity of dealing with social issues.
- It must sensitize people involved in technology design to the importance of keeping issues related to values, ethics and culture in mind when designing computer systems, looking beyond technical issues.
- Finally, it must look for a balance between offering designers guidance while providing them with the liberty to inquire and understand the design context, i.e., supporting designers without limiting or narrowing their actions.

Following, we explore an approach that has been developed to account for values in HCI in line with these high-level ideal rules.

A. *An Approach for Values and Culture in HCI*

Baranauskas articulates ideas inspired by Organizational Semiotics [13] and Participatory Design [43] to propose a framework that considers a dialogue with design materials and, mainly, among individuals in their different roles, which guides the participatory work in computing technology design. In her

view, the technical aspects of a design solution depend and impact on the formal and informal aspects of organizations and society, so that a technically centered perspective would prevent those involved in a design context from a wider sense-making of the problem being handled and the solution to be proposed. Therefore, Baranauskas claims that any design process must be understood as a movement from the informal to the technical, crossing the informal and formal layers of signs towards the construction of a technical solution (see the dashed ellipse in Figure 2)³. Because this movement favors the identification, articulation, and formalization of relevant aspects of the social world, such as values and culture, it returns from the technical system affecting the formal and informal layers and the society in an informed way, possibly making sense to users, as it tends to reflect an understanding of their social world. This perspective for the design is in line with the new moment of HCI we remarked in the previous sections.

In [42], VCIA was introduced as a Value-oriented and Culturally Informed Approach to the design of interactive systems. This approach instantiates Baranauskas' framework and proposes a set of artifacts and methods to support the explicit consideration of values (including the ethical ones) and culture in the design of interactive systems — see Figure 2. VCIA seeks to address some of the aforementioned characteristics of an ideal approach, recognizing that: i) values and culture are intertwined and inseparable; ii) designers need practical artifacts and methods to support their activities; and iii) designers need a well-defined design process.

VCIA was created on the grounds of Hall's building blocks of culture [35] for understanding and representing culture and its connection to values; on the Organizational Semiotics [13, 14] theory to create and adapt artifacts and methods for considering values and cultural aspects at different design stages and activities; and on Baranauskas' Socially Aware Computing [14, 16] to integrate the artifacts and methods into a design process: from the identification of stakeholders to the organization of requirements and the evaluation of a prototype or designed solution. Although VCIA was conceived to be used by ICT professionals, better results can be obtained if the artifacts are used in a participatory style with different stakeholders.

Following, we present a brief explanation for the main artifacts that compose VCIA.

- Stakeholder Identification Diagram [44]: is an artifact from the Organizational Semiotics that supports the identification of stakeholders according to different levels of involvement in a problem and/or its solution. It leads designers to think beyond obvious classes of stakeholders (e.g., direct users, funding organization), paying attention to different levels of involvement, interests and expectations. This artefact is key to make designers aware of stakeholders that may even not use or get to know the designed solution, but may be affected by it and the changes it may trigger.

³ Da Silva et al. [50] has developed a CASE tool to support early design activities in Baranauskas' approach: www.nied.unicamp.br/dsc

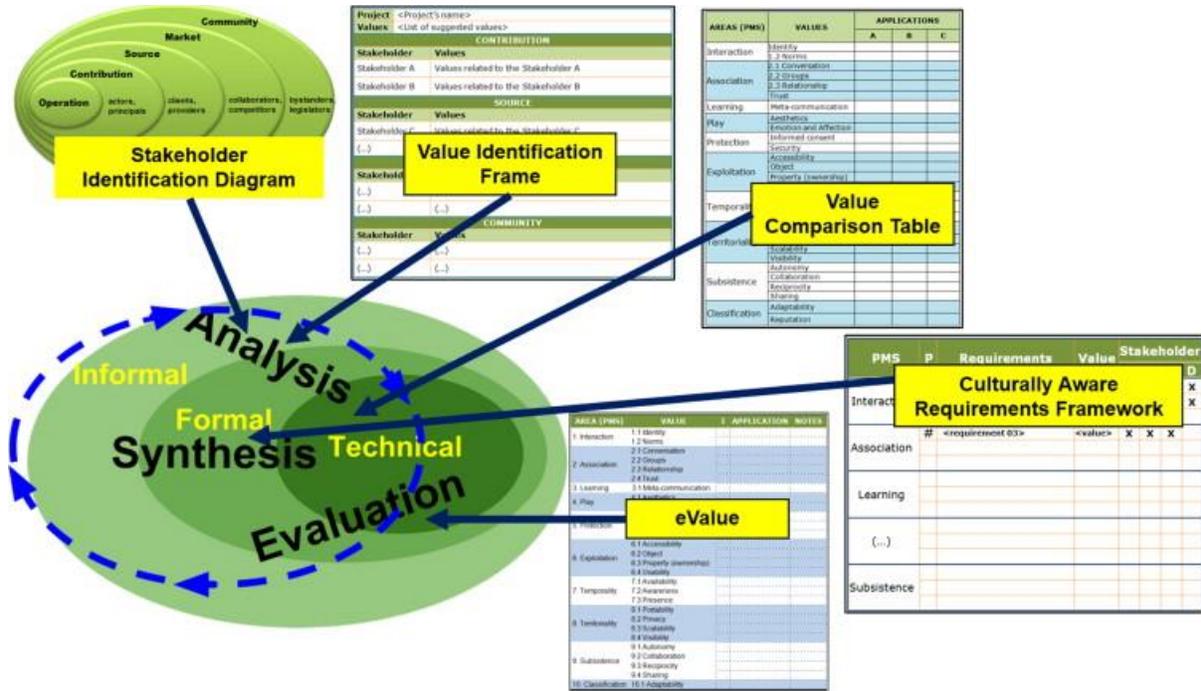


Figure 2. Design model for VCIA approach [42].

- Value Identification Frame [45]: supports the identification of the values related to the different stakeholders associated to the design context, inviting designers to think about values and make them explicit. It is especially useful during design activities where designers must look at the world through the lenses of other stakeholders, identify anticipate conflicts, and identify compatibilities.
- Value Comparison Table [46]: helps designers to identify and compare different design alternatives related to values when investigating existing solutions. It favors the evaluation of existing systems or prototypes regarding the way they communicate values to different stakeholders.
- Culturally Aware Requirements Framework [45]: supports the identification and organization of requirements related to cultural aspects of the different stakeholders and their values. Furthermore, this artifact invites designers to assign priority to requirements and anticipate possible conflict between different values and stakeholders.
- eValue [47]: helps designers when evaluating an interactive system or its prototype whether design decisions are reflecting the understanding about the values and the culture of the different stakeholders.

VCIA considers three main design stages proposed by Baranauskas and Bonacin [17] — Analysis, Synthesis, and Evaluation, in a non-linear order, indicating that understanding and describing a problem, finding a solution, and implementing it, does not occur in fixed, predefined sequences, but in an interactive, iterative and incremental process. These stages are intentionally abstract in order to make VCIA a perspective that may be adopted and incorporated into existing practices and processes.

On the one hand, results from VCIA’s application in different design contexts (e.g., in a participatory way [42] and in graduate classes [45]) have shown its contribution for bringing the concern with values and culture into designers’ awareness, promoting their consideration in design practices and supporting a better understanding of the design context. On the other hand, the results reinforce the literature claim that values and culture are not common (or easy) topics for Computer Science and Information Technology professionals. Therefore, there is an urgent need for further investigations on how to support designers to elaborate on the information they elucidate, so that it can be mapped into design decisions and solutions. It means supporting designers from understanding a problem and proposing a solution, to modelling, coding, testing, delivering it and analyzing its usage results.

In the next section, we propose to extend VCIA with the notion of ideal rules and norms in order to advance in this direction.

V. FROM VALUES TO IDEAL RULES

Hall [35] uses the term culture to refer to the way of life of people, their learned behavioral patterns, attitudes, values, material things, explaining that culture is related to the very different ways of organizing life, of thinking, and of conceiving underlying assumptions about the family, the state, the economic system, and even of the mankind. For Hall, the natural act of thinking is strongly modified by culture, as well as the things people pay attention to and what they ignore, the way they behave and the way they interpret other’s behavior, what they value and what they do not, etc. In this sense, it is impossible to fully understand values in technology design if we ignore their

cultural nature. In fact, the very act of designing influences and is influenced by culture — be we aware of that or not.

Accounting for values directly communicates the need for clarifying ideal rules related not only to the technical product to be designed, but also to its design process, delivery and adoption strategies, the involved organizations, and the people involved in its development and use, i.e., to the complex cultural context of design. For instance, assuming that a body scanner is the ideal solution for security in airports, what would be the ideal rules for a body scanner device to follow? What would be the ideal way of installing and starting using it at airports? What ideal rules an organization should satisfy to produce a body scanner? What would be the ideal rules for its use and different users? Refining this kind of high-level questions may support organizations and people to take actions towards an ideal solution for different stakeholders.

One of VCIA's main goals is to sensitize people involved in technology design to the importance of keeping values and culture in mind when designing computer systems, looking beyond technical issues. From VCIA's artifacts and methods [42], we can list some general activities that underlie it:

1. Identify the stakeholders directly and indirectly related to the design problem and its solution.
2. Identify and list the values different stakeholders bring to the design context;
3. Analyze how existing solutions support (or neglect) the listed values and get insights;
4. Clarify, identify and organize requirements related to stakeholders' values and culture. Identify possible conflicts and assign priorities;
5. Prototype/build design solutions;
6. Evaluate the solutions and document the design rationale.

While the comparison between VCIA and Value-Sensitive Design [23] is out of the scope of this paper, we can highlight that, on the one hand, VCIA adds to Value-Sensitive Design by proposing artifacts and methods that may support different activities they have in common (e.g., identification of stakeholders and their values, the analysis of existing technical solutions). On the other hand, VCIA advances by addressing the cultural nature of values and integrating the proposed artifacts and methods into a well-defined design process. However, both approaches heavily depend on designers' expertise and sensibility to take advantage of the value-enriched knowledge produced about the design problem when they are specifying, modelling and building a solution. In VCIA, some of its artifacts may be adapted to invite designers to think about ideal rules related to values and culture, producing outcomes that can offer better support to modelling, prototyping and evaluation activities.

Briefly, when analyzing existing solutions in VCIA (see item 3), the Value Comparison Table could explicitly incite designers to inspect examples of ideal design decisions related

to stakeholders' values, explaining why such decisions seem to be ideal. The negative examples are also useful because they are usually going against some ideal rule and can reveal important information. The direct participation of stakeholders, interviews, and analysis of empirical data are examples of activities that can help designers to enrich and justify their rationale.

In the VCIA case study presented in [42], the authors identified Autonomy, Accessibility, Privacy, Collaboration, and Reputation as values for the stakeholders involved in the design problem, presenting requirements related to these values. For instance, clarifying the way users understood collaboration and valued a personal contact led to the requirement: i) "*the system must allow a user to invite other users to contribute to his or her discussions*". In the same way, understanding autonomy and accessibility as values for the users led to ii) "*The system must favor users' autonomy*" and iii) "*The system must be accessible*", respectively.

Although some requirements are specific enough to support designers in prototyping, building and evaluation activities, other are too abstract to offer a concrete guidance. While it is possible to discuss the first requirement in functional terms, the second and third ones are stated as quality attributes and would require further refinement to be translated into practical or concrete actions. Otherwise, essential information about values and the cultural context that give them meaning will be missed when translating them into requirements. For instance, what is autonomy and its importance in the design context are not being communicated by the stated requirement. Similarly, the meaning and value of accessibility for stakeholders and their cultural contexts, as well as its ethical implications, are not expressed in its general requirement. Specifying the ideal rules related to these values could both express (preserve) the cultural richness of the clarified requirements and support designers in more concrete steps towards a solution.

When identifying and organizing requirements (item 4), participatory techniques for understanding "ideal scenarios" may be conducted. Brainstorming workshops may be conducted to favor to identification of ideal rules related to ethical, informal, formal and technical aspects of the solution being designed. The Culturally Aware Requirements Framework artifact may be adapted to incite designers to specify ideal rules for a prospective solution. Such ideal rules would specify how the prospective solution should be in order to account for the stakeholders' values and cultural aspects clarified in the previous steps, i.e., an ideal solution. A portfolio of existing examples (item 3) can help this activity.

After general ideal rules have been clarified, we suggest applying the Norm Analysis Method (NAM) [13] from Organizational Semiotics to refine these ideal rules into norms. Norms is a key concept in Organizational Semiotics, being understood as collective constructions of agents at the social level, providing guidance for their actions. Norms are a kind of force that makes "*the members of a community tend to behave or think in a certain way*" [48], defining a culture, or a sub-culture. The NAM supports the study of a design context, making it possible to specify the problem and its solution by specifying norms. These norms will represent distinct aspects of

a design problem and its solution and will represent aspects related to values and culture if they were considered during problem understanding and articulation. Some norms can be automated or supported by a technical solution — i.e., we can code them as a computing system’s functionality or interface feature/characteristic, while others will shape its design, deliver, use, as well as influence the social environment surrounding it.

For instance, the mentioned requirement for accessibility (“*The system must be accessible*”) represent an ideal rule for the solution to be designed. The NAM can support designers to identify and specify norms related to this ideal rule, such as: 1. “*Whenever a new feature is designed, if it will be made available to users, then designers must evaluate its accessibility and usability*” — norm for the design process. 2. “*Whenever a new content is shared, if it is a picture or a video, then the author may inform a textual description for it*” — a norm for favoring the production of accessible content. 3. “*Whenever a user is logged in the system, the sessions must not expire after the elapsed time*” — a norm for preventing beginners from losing their data when they took long time to complete a web form.

In step 5, the norms and their high-level ideal rules can be used to support prototyping activities, such as the Brain Drawing participatory technique [43] — e.g., Norm 2 requires additional interaction and interface elements to be considered. These norms can be useful in the step 6 as well, serving as a guide and even criteria when evaluating the designed solution. Existing artifacts and methods, such as the eValue [47] and the Communicability Evaluation Method [49], can take advantage of the specified norms to support designers to ensure the designed solution communicate an adequate understanding about the design problem, its stakeholders, their values and cultural aspects.

Because VCIA offers a set of artifacts and methods articulated in a socially aware design process, extending it with the notion of ideal rules and norms may contribute to demystify the topics of culture and values in HCI, favoring their effective consideration in the design of interactive solutions. Naturally, these suggestions must be put into practice, explored and analyzed, opening the way for further discussions and improvements.

Finally, it is clearly important and necessary to investigate artifacts, tools, practices and approaches that promote the concern with values and ethics in design, favor the understanding of culture, and support the consideration of affective and emotional aspects as well as other concepts relevant to this HCI new moment. However, treating topics like values, culture and ethics in isolation through specific approaches and methods may lead to fragmentary advances that will not work together. These topics must be discussed and treated in an articulated way, being reflected by the approaches, methods, artifacts and tools we use. Revisiting our HCI curricula, theories and practices is key to advance in this direction.

VI. CONCLUSION

A technology cannot be detached from its cultural context. Computational artifacts are produced through intentional and rational processes influenced by the cultural background of

different stakeholders. Computer artifacts permeate all the aspects of individual and social life, not only solving problems and automating tasks, but also connecting people, mediating complex social interactions, allowing the expression of creativity, play, learning, etc. Therefore, the concern with such artifacts cannot be restricted to their designed functions and quality attributes but must include the concern with the environment in which they are inserted, the people that live on that environment, the possible uses they can serve, and effects they may trigger.

Recognizing values as a concept directly related to ethics and culture, we argue that considering these concepts in an explicit and related way is a new moment for the HCI field, requiring the academic community itself (and HCI practitioners) to change its teaching and researching culture. Such change means putting concepts related to ethics, values and culture in the core of HCI approaches and methods, and adopting as a value in HCI the idea that the design of computing systems must be responsive to the true needs of society, being practiced from a systemic and socially responsible perspective, in a participatory and universal manner.

In order to advance in this new moment, we may start by: 1. Revisiting the theories, methods, tools and current practices in HCI so that they contemplate, or at least favor, a systemic and socially responsible understanding of design and its possible effects. The Actor-Network Theory [51] and Organizational Semiotics [13] are two examples of theories that have been proposed to go beyond technical and formal issues. 2. Opening to multidisciplinary, recognizing that computing technology is part of a more complex system composed by people, materials, rules, organizations, other living organisms, etc., and is currently being investigated in other areas such as Design, Management, Philosophy, Sociology, Anthropology, and Economics, just to name a few. These areas have much to contribute to HCI and with its natural role as the interface of computing and the human world. 3. Taking an ethical commitment, translated into our research and practices, of designing, delivering and using socially aware computing technology, so that they contribute to advance in the solution of existing chronic problems in our society.

As a discipline concerned with the design and evaluation of computational technologies for human use and with the major phenomena surrounding them, HCI has recognized its responsibility regarding the consideration of values, so that “human use” and “phenomena surrounding them” are more than a complement in its definition. In this paper, we presented a discussion informed by the literature on values in HCI and influenced by our own research experiences on the topic, pointing out to some directions for approaching them.

Our main goal in this paper is to promote the discussion on the role and importance of values for HCI, pointing out to different questions, aspects and dimensions involved in such topic, starting by clarifying what we mean and have in mind when we talk about human values in HCI. Therefore, we revisit different understandings for values, discuss about the importance of the topic, its relation to other important topics, and explore existing works and approaches. Additional to our discussions, we bring the notion of “ideal rules” as a possible

bridge between cultural values and design decisions, suggesting incorporating it into an existing approach to the design of computing systems. We claim that values must be understood from a situated perspective and as an omnipresent concept in HCI, and we hope this paper can promote the discussion and critical thinking on the topic.

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