The New Good: Exploring the Potential of Philosophy of Technology to Contribute to Human-Computer Interaction

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ABSTRACT
As a result of the increased interest in issues such as engagement, affection, and meaning, contemporary human-computer interaction (HCI) has increasingly come to examine the nature of interactions between artifacts, humans, and environments through concepts such as user experience and meaning. In the transition from usability metrics to user experience, what appears lacking is a more explicit characterization of what it is HCI now strives for as a discipline—i.e. what constitutes a 'good' user experience? Through a detailed look at two contemporary philosophies of technology—Albert Borgmann's notion of the device paradigm and Don Ihde's non-neutrality of technology-mediated experience—this paper seeks to explore the potential of the philosophy of technology to contribute new insights and provide well-grounded conceptual tools for coming to terms with what may become HCI's 'new good'.

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Philosophy of Technology, Philosophy, Theory, Device paradigm, Non-neutral technology, Design.

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Design, Theory

INTRODUCTION
It is becoming increasingly difficult to ignore the impact that various digital interactive products, services, and systems have on the lives we live—our mobile phones keep ringing, our in-car navigation systems tell us to turn, our e-mail inboxes stack up and Twitter feeds roll by, and that we rather meet friends over Facebook than over a pint at the pub.

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Traditionally, analogue and mechanical technologies are also rapidly becoming enhanced with digital capacity, such as networking capabilities, 'smart' behavior, and interactive features. At the same time, a range of new pervasive technologies, such as Bluetooth, Wireless LAN, ANT, 3G, 4G, ZigBee, and RFID, are enabling this rich array of digital artifacts to communicate with each other, to create ad-hoc networks, negotiating handshakes, and exchanging information, while leaving us—formerly known as *users*—outside the loop altogether. Consequently, our world is rapidly becoming increasingly experienced only through these digital artifacts.

From the perspective of human-computer interaction (HCI), these trends, and their associated questions and uncertainties, pose a number of imperative questions whose reach we are currently struggling hard to grasp. For instance, first, while the concept of designing for user experience is rapidly catching on in HCI as an alternative to traditional usability metrics, few well-developed notions exist with regard to what would constitute a 'good' user experience. Second, the current pervasiveness of digital technology in our everyday life, including the Web and the mobile phone, further complicates this matter, as it is becoming increasingly difficult to distinguish a 'user experience' from any other kind of experience. Third, the trend towards networked digital artifacts primarily interacting with each other, and with computational power embedded in the environment rather than with human users, blurs and thus challenges the concept of 'user', which has been a crucial element of most methodological and theoretical approaches in HCI.

These three examples also illustrate that the kinds of problems with which HCI is concerned—in designing technology and in understanding the interactions that occur between technologies, humans, and environments—have become considerably more complex. This has shifted the kinds of investigation with which we are involved from reasonably well-defined, controlled problems, to what has been termed 'ill-structured' or 'wicked' problems in design research [49]. Such problems typically bring with them a range of concerns that seem to persist on a level beyond design, use, and evaluation—thus challenging not only our

theoretical and methodological approaches, but also old truths in the field regarding its scope, purpose, and aim.

Ultimately, we argue, dealing in a structured way with these concerns—which are unavoidably ethical in nature—comes to threaten HCI's so far largely implicit notion of good and bad. It will make visible what we see as a current lack of a coherent and articulated vision of what HCI seeks to achieve as a field.

FROM USABILITY TO USER EXPERIENCE

Through the term usability, traditional HCI taught that interactive systems should be designed to be *effective, efficient, engaging, error-tolerant,* and *easy to learn*. By maximizing metrics constructed from these terms, usability sought to improve all interactive artifacts by enhancing their usability, i.e., making them more 'useful'. A shared technical terminology, a set of techniques, methods, and tools, and a common goal have been successfully constructed around these guiding notions. *Usability* is hence a collective term for a particular set of ideas developed primarily in HCI about the relationships between users, analysts, designers, artifacts, and the context in which design takes place.

To understand why usability developed this particular focus, it is necessary to briefly go back to the dawn of modern HCI —the early 1980s. At this time, there was substantial confidence in how cognitive psychology would come to contribute to the field of HCI [50]. Computers were difficult to learn and use, as users often had to strictly follow the computer's model of how to approach tasks. To improve the user's position, the accumulated corpus of knowledge and the credible, structured approach of cognitive science came to be seen as HCI's 'knight in shining armor'. Various information processing theories were adopted and adapted to advance new design principles and guidelines, methods, and analytic tools for the field. For instance, Norman's [44] theory of action focused on modeling people's goals and how they were met, while Card et al.'s [10] model enabled quantitative predictions about user performance that could be used to evaluate different kinds of interfaces and assess their suitability for a given task. Such predictive models became a keystone of the usability movement, allowing usability-driven HCI to "assess our designs and test our systems to ensure that they actually behave as we expect and meet the requirements of the user" [13]. Information processing can thus be seen as the theoretical foundation of HCI's 'first wave'.

HCI's Second Wave

Towards the end of the 1980s, however, questions were raised as to why the theories and approaches imported from cognitive psychology were found neither conceptually influential nor useful in the, at the time, rapidly expanding commercial practice of designing computers and interfaces [37]. Seminal books by Suchman [55] and Winograd & Flores [58] further revealed the limitations of information processing as the key theoretical approach to HCI.

Following what has been described as a theoretical crisis in the field [50], more encompassing theories and associated methodological approaches were proposed during the early 1990s, including participatory design [17], ethnography and ethnomethodology [31], phenomenology [15, 58], ecological psychology [26], distributed and external cognition [59], and activity theory [42].

The primary focus of these 'second wave' approaches was to move the center of attention away from the first wave's rather disembodied emphasis on a single user operating a single application; the focus was shifted to particular work settings, to well-defined communities of practice such as teams collaborating using a variety of applications, and to issues of context. Predicative models, rigid guidelines, and systematic testing were largely abandoned in favor of actively working together with users in participatory workshops, various forms of prototyping endeavors, and though contextual inquiry [5].

HCI's Third Wave

As computing and digital technologies started to become ubiquitous in our daily lives during the end of the 1990s however, the boundaries between public and private, as well as work and leisure, started to blur. Technology changed from being a tool for work to something through which the world could be experienced. In the early to mid-2000s, it became increasingly obvious and accepted that HCI could no longer just be concerned with Western people using technology at work. To remain relevant, HCI needed to broaden its scope substantially: it needed to study and design for technology use in a wide variety of contexts. However, how one would actually study and design for people that were not at work, who did not appear in distinguishable groups or other well-defined circumstances, who did not have well-defined tasks at hand, and who may have a completely different culture, was not entirely clear.

In the early 2000s, to find ways of tackling these new challenges (as well as to break with the theories and methodologies of the second wave), HCI became rapidly interested in issues such as meaning, complexity, culture, emotion, lived experiences, engagement, motivation, and experience—HCI's 'third wave' [5]. Theoretically, third wave HCI tends to relate and integrate technology design and incorporate more cultural analysis, critical theory, philosophy, values, and history than either sociological or psychological theories [1, 5, 23, 40, 52]. Through approaches such as Critical Design, Ludic Design, Reflective Design, Value-sensitive Design (VSD), and Value-Centered Design, third wave HCI has reacted against the second wave's strong commitment to users (and the consequential lack of emphasis on the designer) in favor of a more design-oriented, exploratory, interpretative, playful, ambiguous, and at times taken on an activist attitude [16, 25, 27, 28, 19, 20, 30, 4, 51, 11, 60].

IS THERE A NEED FOR A 'NEW GOOD'?

For the purposes of this paper, the underlying vision of early-day HCI is worth considering: what is a 'good design'? For what do we strive? When it comes to first wave usability, the answer is to construct a machinery to improve interactive artifacts by making them more useful. This can be regarded, admittedly somewhat simplified, as usability's concept of 'good', i.e., 'good' can be reduced to signify those designs that show high levels of usability.

When it comes to second wave HCI, the concept of a 'good design' becomes a little hazier. Participatory design, for instance, brings to the table the challenge of also incorporating political issues, as well as issues of labor and power, while other second wave approaches bring their own particular challenges and highlight other factors. Still, with its focus on well-defined professional teams with specific tasks at hand, on their particular work context, and on groupware as a typical solution, the concept of 'good' seems not that different from that of first wave approaches. The main difference is rather that second wave HCI tends to stress the human side, rather than the technological side. Here, 'good' is whatever enhances the group work process.

When it comes to third wave HCI, however, things get much less transparent. There are no easily distinguishable user groups and, because of the blending of public and private (as well as work and leisure), any clear-cut tasks to support are hard to find. For instance, people that are surfing the web can do so in order to find specific information, but they can just as well do it simply to pass the time.

Third wave approaches, however, tend to share an interest in meaning and in human experiences, momentary or long-term, of using or living with a digital product or service, often termed the 'user experience'. Despite the current boom of interest in the term, it has many different meanings. For instance, Colbert defines it as users' perceptions of interaction that constitute qualities of use [12], while Forlizzi & Battarbee characterize user experience as fluent, cognitive, and expressive [22]. Battarbee, on the other hand, emphasizes the social nature of user experience [2] and McCarthy & Wright discuss experience in terms of culture [40]. Picard [47] and Norman [43], however, highlight affective and emotional aspects. What currently appears lacking, especially in the light of recent third wave approaches, is a more explicit notion about what it is HCI now strives for as a field—what is the 'new good' that replaces the maximizing of usability metrics and improving group work processes? Put bluntly, what constitutes *a good user experience?*

While, for instance, Weiser's [56] vision of the disappearing computer provides an ideal for ubiquitous computing [3], comparable coherent and articulated visions are yet to be established for the whole of HCI. The concept of direct manipulation [53] has come to play such a role, often as a de-emphasized background theme. While direct manipulation continues to be a strong ideal for much work in HCI to this day, it is questionable whether it can continue to function as a unifying, agreed-upon 'good', especially when taking into account the current broadening of HCI's scope, the new areas where HCI thinking is applied, and the multifaceted notion of the user in third wave HCI. Patel et al's [46] work with farmers in rural India is an excellent example of how third wave HCI may find it necessary to break with some of the ideals of direct manipulation.

It could of course be the case that the answer is entirely relativistic, i.e., that HCI has developed to a point where shared visions are neither possible nor required. It could also be that 'good'—given the broad scope of current HCI—has to come in many forms, depending on the particularities of the design situation. The argument of this paper is not necessarily that we will ever arrive at a single distinguishable 'good' for third wave HCI, but rather that there might be a danger in not paying any attention to the underlying vision of what we do, as we might then implicitly or explicitly come to inherit earlier visions of 'good'. If interactive artifacts are knowingly designed to provide users with the opportunity of having specific types of user experience, it is also necessary to develop guiding visions that provide the means—the ideas, concepts, models, and tools—for revealing, analyzing, and discussing the obvious implications (human, social, cultural, ethical, moral, ecological, and political) of these experiences, and how they foster particular relationships and dependencies. As argued by Cockton [11, p. 151], "HCI will not become a true discipline until it develops, expresses, discusses, agrees and integrates a set of core values".

This paper puts forward the proposition that, despite explicit attempts in other directions, the vision of usability still permeates HCI thinking. The second wave's interest in supporting groups and work did not cause problems (as usable artifacts are likely to also enhance, or at least not discourage, group work), but with the third wave's more radical interest in issues such as leisure, ambiguity, multiple interpretations, and activism, usability becomes problematic as an underlying 'good'. For instance, if one knowingly designs for ambiguity with the intent of creating room for experiences that should last or even grow for many years while remaining mysterious or partly unknown, usability may be counterproductive on many levels as an underlying theme: when the work is planned and carried out, when it is later evaluated, reviewed by peers, discussed at workshops and conferences, and eventually used in teaching.

TWO PHILOSOPHIES OF TECHNOLOGY

Given the perplexing challenges that questions of 'good' seem to raise in third wave HCI, we are in need of coherent intellectual frameworks that can help us address these challenges. Below, we propose the possibility of drawing on *the philosophy of technology* as a way to help us better articulate, understand, and illuminate the concept of 'good' in relation to technology. We will introduce two

contemporary philosophies of technology that suggest a number of conceptual tools that operate on a level above design and evaluation, yet are often applicable to the technologies and technology relations that HCI suggests.

Ihde suggests that to qualify as a philosophy of technology, "the philosopher must make technology a foreground phenomenon and be able to reflectively analyze it in such a way as to illuminate features of the phenomenon of technology itself" [33, p. 38]. It was not until the 20th century, with John Dewey and Martin Heidegger, that such philosophies became distinguishable. The two accounts of philosophy of technology introduced below are both related to the pragmatism of Dewey and the existential phenomenology of Heidegger, and both were primarily developed during the late 1980s and 1990s. First, Albert Borgmann's [6,7,8,9] theory of the *device paradigm* will be introduced, followed by Don Ihde's [32, 33, 34, 35] notion of the *non-neutrality of technology-mediated experience*.

Albert Borgmann's Device Paradigm

In *Technology and the Character of Contemporary Life* [9], Albert Borgmann argues that technological development is generally focused on issues surrounding the usefulness of different kinds of technology, suggesting that while particular technologies may be both useful and good, some technologies that are useful for some purposes might be harmful in a broader context. Borgmann's work can thus be seen as a call to reconsider the often-assumed correspondence between 'useful' and 'good' in terms of technology. Rather than to mindlessly strive towards making all technologies more useful (as is the case with usability for instance), Borgmann argues that we must concentrate on those specific goods that are irreplaceably good, termed *focal things* and *practices*. In particular, he argues, we need to carefully nurture the focal things and practices that are currently threatened by the thoughtless employment of technology.

With the technological advancement of the world, comes a promise that liberation and enrichment will result from dominating nature, where technology "promises to bring the forces of nature and culture under control, to liberate us from misery and toil, and to enrich our lives" [9, p. 41]. This promise has led society to believe that a good life must be built on technological mediation and support. Borgmann questions this common belief that technology frees us to attend to other, more stimulating pursuits [54]. His argument is that rather that the technologies that surround us tend to turn us into passive consumers, increasingly disengaged from the world and from each other. According to Borgmann, a particularly dangerous aspect of technology in this respect is its strong seductive power, which seduces people to focus on material goods, quantitative thinking, commoditization, and disposability.

At the heart of Borgmann philosophy of technology is a separation between *devices* and *things*. *Things*, first, tend to engage mind and body, center our lives, and connect us with the world. Borgmann's most famous illustration of a focal thing is the role of the fireplace in a traditional country house, which he compares to a heart. The fireplace has strong centering powers, as it was the natural gathering point in the house and most activities either took place in its direct vicinity, including food preparation. The fireplace commanded presence, as the fire had to be built and maintained, and it preserved continuity with the world. To keep the house warm, trees had to be cut, split into wood, and dried. Taken together, the fireplace was inseparable from what inhabiting that country house meant: "Thus a stove used to furnish more than mere warmth. It was a focus, a hearth, a place that gathered the work and leisure of a family and gave the house a center. […] It provided for the entire family a regular and bodily engagement with the rhythm of the seasons that was woven together with the threat of cold and the solace of warmth, the smell of wood smoke, the exertion of sawing and carrying, the teaching of skills, and the fidelity to daily tasks" [9, p. 42].

A typical attribute of focal things is that they put a number of demands on us. These demands generally require our presence, patience, endurance, skill, and some amount of resoluteness. Focal things are typically also continuous activities, things you *have* to do rather than things you can *opt* to do. To keep one's house warm during the winter, the fire must be maintained, even on days one would rather do something else. In this way, "a focal thing is not an isolated entity; it exists as a material center in a complicated network of human relationships and relationships to its natural and cultural setting" [54, p. 23]. A key characteristic is thus that focal things tend to unify means and ends, where achievement and enjoyment, individual and community, mind and body, and body and world are brought together.

Devices, on the other hand, are appealingly glamorous technologies, designed to be useful for a limited purpose. A characteristic of a device is that it only provides a commodity, only one aspect of the original thing it replaces. Borgmann illustrates how devices operate by describing the shift from wood-burning fireplaces to central heating systems. The central heating system (the device) provides a single commodity, namely warmth, which only represents a fraction of the fireplace (the thing) it replaces in terms of centering powers, the way in which it commands presence, and how it establishes continuity with the world. For this reason, Borgmann argues that most often, such devices turn out to be disengaging in their attempt to do this one thing for us. Because of their detachment from any larger context, devices are disposable, often mass-produced, and receptive to trends and fashion.

In switching from things to devices, Borgmann argues that human involvement simultaneously disappears and only disengaging commodities remain. Borgmann calls this the irony of technology. In this, humanity has become captive to the promises of modern technology, whose devices keep demanding less and less human input. The shift from being

involved and engaged with focal things to disengaging consumption of devices, then, frustrates the deeper aspirations of life.

The term *the device paradigm* is used to give prominence to these ongoing transformations that Borgmann thinks contribute to modern life missing a natural center, a hearth, and thus also lacking a larger social and ecological context: "In this rising tide of technological devices, disposability supersedes commanding presence, discontinuity wins over continuity, and glamorous thrills trump centering experiences" [54, p. 24]. To explain why devices are disengaging, and our consumption of them ultimately disappointing, Borgmann notes that a device typically hides the mechanisms by which its commodity is produced. A device tends to split means and ends, whereas a thing tends to connect its means and ends. The user of a central heating system only experiences warmth as a technological foreground, while the commodity's background machinery, i.e., how that warmth is generated, brought into the house, and distributed, remains hidden and unknown; this means that users experience ends without knowing, caring for, or in any way getting involved with the means. Borgmann argues that such a separation between means and ends leads to disengagement, passive consumption, and disappointment. At the heart of Borgmann's philosophy of technology is thus the notion that modern technology tends to operate to deconstruct things and reconstitute them into devices, and that this transformation is accelerating with recent advances in information technology.

Borgmann has also focused specifically on aspects of information and communication technologies, and the way that they help shape people's experiences with reality [7]. According to Borgmann, there are three main types of information, each constituting a different connection between humans and reality: *natural* information, *cultural* information, and *technological* information. Natural information is information about reality. These are signs that directly inform us about the world we inhabit, making reality understandable for human beings. For instance, smoke tells us that there is a fire. Information can also be for reality, Borgmann argues, i.e., cultural information. Cultural signs cannot be found in nature, but acquire meaning by convention, such as written texts and musical scores. A quality of cultural information is that it realizes and shapes reality. A musical score, according to Borgmann, demands realization, it has to be played. Thirdly, technological information is fairly specific to recent advances in information technology—it is information as reality. The music we find on CDs, for instance, is a kind of information that is hyperreal, i.e., more real than reality itself, as the music on the CD is qualitatively superior to any actual reality. As opposed to both natural and cultural information, technological information does not provide access to reality but rather replaces reality.

Providing what could perhaps best be described as a neo-classical dystopian argument, Borgmann sees that technological information is increasingly being used as a substitute for reality and, through the mechanics of the device paradigm, "information is about to overflow and suffocate reality" [7, p. 213]. According to Borgmann, the virtual 'worlds' where people have started to live their lives, e.g. Second Life, World of Warcraft, and Facebook, are not sufficient alternatives to the first world as they lack the eloquence and engaging power of actual reality. In these hyperreal worlds, both reality and life become reduced to commodities: "Postmodern technology uses the hyper-reality of simulations to get rid of the limitations imposed by reality. The limit of postmodern reality is not the total objectification of nature, but the replacement of reality by virtual reality totally under our control. The objects of reality disappear to the extent that we as subjects gain control over them, but we are similarly reduced to 'a point of arbitrary desires'." [6, p. 108].

Through these examples, Borgmann tries to illustrate how information technology, rather than deepening our engagement with reality and with each other, often seeks to create new realities—hyperrealities—that are easier to control and experience, but which is parasitical to reality itself, and ultimately fails to engage us because of its lack of eloquence and engaging powers.

Don Ihde's Non-neutrality of Technology-mediated Experiences

Don Ihde was one of the very first philosophers in the US to make technology the subject of philosophical reflection, publishing his first of many books on the subject, *Technics and Praxis*, in 1979 [34]. In this work, Ihde focuses on optical technologies and shows how the early use of telescopes and microscopes helped reveal previously inaccessible worlds. But optical magnification did not only provide scientists with access to unknown worlds, it also irreversibly oriented scientific inquiry towards the worlds that these technologies exposed. This transformed not only what was seen, but also how it was seen in relation to technologically unaided vision, which Ihde proposes to be a structural component of all kinds of technologies, not only optical: "For every enhancement of some feature, perhaps never before seen, there is also a reduction of other features. To magnify some observed object, optically, is to bring it forth from a background into a foreground and make it present to the observer, but it is also to reduce the former field in which it fit, and—due to foreshortening—to reduce visual depth and background." [34, p. 111].

In his arguably most important book, *Technology and the Lifeworld: From Garden to Earth,* Ihde suggests that even seemingly ubiquitous technology, such as eyeglasses, have the same non-neutral mediating character [36]. Even though the transformation that comes from wearing eyeglasses (to turn blurry objects into sharp, distinct ones) is typically appreciated by the user, one must never forget that the transformation does not come without a price. The user

needs to care for the mediating technology, which might come to affect both how people behave in certain situations as well as how others perceive them. Ihde also argues that when using glasses, the world inevitably comes to the user as 'enframed'. Subtle back glares, dust and water spots appearing on the glasses give eyeglass users a fringe awareness that the world as it appears to them through the eyeglasses is intruded upon by a technological intermediary: "for every revealing transformation there is a simultaneously concealing transformation of the world, which is given through a technological mediation. Technologies transform experience, however subtly, and that is one root of their non-neutrality" [36, p. 49].

From the point of view of HCI, the non-neutrality of technology reveals a number of issues currently neglected, implicit, or overlooked in the field. It points to elements that are typically outside of current understandings of user experience in HCI, but which congregate to make up a more complete experience. First, Ihde shows that just having a technology present imposes a number of behaviors, even without actually using it. Users may become more careful in terms of bodily engagement with the world, or by not risking ruining their expensive camera or scratching their new mobile phone. Also, carrying a large camera can be strenuous and may thus, often implicitly, come to influence what you do and where you actually go in the first place. Being surrounded by, or carrying, more or less expensive equipment also creates caution with regard to the possibility of theft and risk of bodily harm, thus influencing what one does, where one goes, and how one acts in the world. Finally, technology is also non-neutral when it comes to fashion; it is, for instance, not uncommon that people flash their new mobile phones in front of others as a sign of self-expression.

Optical technologies such as eyeglasses, telescopes, cameras, and microscopes, belong to a group of technologies that seek to enhance (and transform) our perceptual, experiential, and bodily experiences. Other kinds of technology, such as speedometers, clocks, and thermometers, seem not to have this enhancing or amplifying character; they seem to have a different mode of reference to observed objects, reliant on interpretation rather than mediation. While a pair of glasses amplifies seeing, using a speedometer in one's car is more of an interpretative act. There is still a world object being referred to—the speed of the vehicle—but this object is not perceptually represented but rather hermeneutically referenced. The speedometer must therefore be 'read'.

While the broader implications of this argument are clearly far beyond the scope of this paper (and indeed relevant to almost all computational contexts, as hermeneutical referencing of world objects is a key notion in computer systems and user interfaces in general), some of Ihde's insights in this area seem especially pertinent to current HCI. As all kinds of technology are non-neutral, so are hermeneutical representations. The translation that must occur between the signifier and the signified always comes to abstract, and hence significantly reduce, the referred-to phenomenon. What may be a rich, vivid, and heart-beating experiential experience (speed) becomes reduced to figure (miles per hour). This figure also requires that the user has previously acquired the skill to interpret, i.e., to read the instrument in order for it to have any meaning whatsoever. Technologies that provide hermeneutical relationships are hence highly dependent on the context in which they are designed and used; they must accordingly be understood as fully culturally embedded, and whose meaning is entirely constructed.

Ihde distinguishes between three types of human-technology relations: *embodiment*, *hermeneutical*, and *alterity* relations [36]. First, eyeglasses allow users to embody their praxis through the technology, in the sense that they get in between the wearer and the world, a relationship that Ihde thinks of as fundamentally existential. One experiences the world through the technology, and the technology inevitably becomes part of the way one relates to the world. While many technologies appear in between the user and the world, not all are embodied. For a technology to hold an embodiment relation it must be technically transparent, it must allow its user to 'see through' it. But the embodying of technology is also acquired or constituted; for users new to eyeglasses, there is typically a short period of time in which one notices their weight, experiences eyestrain, is annoyed by back glares, and has to compensate for and make adjustments in spatial motility. Once the skill of wearing and seeing through the eyeglasses has been acquired, however, they are more or less "taken into my own perceptual-bodily self experience" [36, p. 73], and withdraw into an embodied relation. The term *transparency* is used to refer to the degree to which an embodied technology recedes into the background of experience. The embodiment relation is not limited to optical technology, it may occur for any sensory dimension, including tactile motility through walking canes, hearing aids, etc.

Second, even though they also appear in between users and the world, speedometers and clocks are two examples of technologies that must be interpreted. When reading a speedometer, one's perceptual focus is not on the world but on the technological instrument, where one perceives the instrument itself rather than the object being referred to in the world. Hermeneutical instruments do generally neither enhance any of their users' innate capabilities or senses, nor are they meant to become invisible; quite the opposite, they are often designed to be objects of focus and, as a result, the world tends to withdraw from their users.

The hermeneutical relationship is thus referential in that it places users' immediate perceptual focus on the technology in between the user and the world. Typically, users of this kind of technology are not able to experience the object of reference experientially, for instance when checking the temperature in Tokyo on the Web, or when monitoring the

core's temperature in a nuclear power plant. Rather, they are dependent on their own reading of the instrument, and it is therefore essential that they know how to properly read the instrument, and about its proper functioning. Thus, the instrument is only transparent, in a hermeneutical sense, if the user has acquired the skills necessary to read it. It can also be very difficult, and sometimes impossible, to know whether or not the instrument is operating properly, which means that users are accordingly forced to trust and depend on the instrument.

Ihde finds a third human-technology relation, termed *alterity*. It is not a mediated relation either with the world or with a referenced object in the world. Rather, it is primarily a relation to or with technology. The term alterity is used to describe a relationship between a human being and some otherness, albeit an otherness generally weaker than in the case of other people and animals, but stronger than our typical relation to objects. The spinning top, for instance, takes on a life of its own when put to use, seemingly defying gravity and moving unpredictably. Ihde sees traces of alterity in people's relations to computers. While many of the relations involved in, for instance, playing a computer game may be understood along an embodiment-hermeneutical continuum, some kind of otherness is often involved: "there is the sense of interacting with something other than me, the technological competitor … I must beat the machine or it will beat me" [36, p. 100-101]. When working with a word processor, the whole computer system functions as an almost transparent tool for manipulating the document. However, in the case of a serious breakdown, if a particular function cannot be activated or the application crashes, the transparency of the tool—"the quasi-love relationship" [36, p. 106]—is lost, the tool itself becomes conspicuous, and the relationship transforms into frustration and "quasi-hate" [36, p. 106], a kind of alterity human-technology relation. A comparable analysis of the differences between the state of flow (where attention is directed on the work being carried out) versus breakdowns (where attention focuses on the tool itself) has already been developed within the field of HCI by Winograd & Flores [58], drawing on Heidegger's description of tool use and breakdown.

To summarize, technologies mediate our experience of the world. They appear in between humans and the world and change our experiences, amplifying some aspects while reducing others. While a technology may enable one to act on the world, it simultaneously limits other ways of acting, enabling new experiences while closing down the potential for others. It is however important to realize that "no technology is 'one thing,' nor is it incapable of belonging to multiple contexts" [35, p. 47]. Technologies are thus *multistable*, as they can be embodied in various ways for various purposes.

DISCUSSION

The above outline of Borgmann's and Ihde's thinking is not intended to completely cover the rich field of philosophy of technology, which is clearly beyond the scope of this paper. A more detailed overview would also have covered work by Feenberg, Winner, Haraway, Hickman, Latour, Ellul, Mitcham, Verbeek, and many others, and even then the list would only account for contemporaries. The introduction has rather attempted to provide two instances of this kind of thinking in relation to technology and technological development in as unbiased a way as possible and, in doing so, try to keep some of the richness and context of their respective thinking. As noted by Bardzell [1], when HCI imports theory, it often borrows a single concept or idea and then directly attempts to apply that idea in design; this is not always an ideal process, as "the piecemeal appropriation of a single concept often strips much of its original analytic force, because concepts … are sensible inasmuch as they participate or are deployed in networks of other concepts, issues, and historical events" [1, p 2358]. Hence, the success or failure of such a borrowed new term, stripped from its original context, often somewhat paradoxically comes to depend on how well it resonates with the old paradigm (from which it may explicitly try to break free), and in the area of HCI its success then rather rapidly tends to become a matter of how well it provides implications for design [14].

Philosophy of Technology in HCI

Having described Borgmann and Ihde without much analysis, it is now time to discuss the potential of their work to contribute to contemporary HCI. First, compared with many other philosophers, they appear attractive to HCI in that they deal directly with today's technologies. At the same time, they sustain strong links to earlier philosophy, for instance in Borgmann's case with the dystopian undertones of Heidegger and Ihde's somewhat instrumental approach and the pragmatism of Dewey. This roots their thinking firmly within a larger philosophical setting. In different ways, Borgmann and Ihde can also be seen to attempt to reconcile the traditional dichotomy between utopian and dystopian accounts of the role of technology in our lives [41]. Both authors have also chosen to communicate their philosophical ideas in a legible form, rendering them fairly easy to understand without extensive philosophical training.

Rather than primarily discussing philosophically the existential effects of 'technology' as a whole, which was Heidegger's main concern, both Borgmann and Ihde address and deal with the same kind of technologies with which HCI is directly concerned. The distance between any particular HCI-related technology or circumstance and Borgmann or Ihde, is thus generally far shorter than the distance to Heidegger—yet the latter nevertheless tends be cited in passing far more often in the HCI literature. While the bulk of Borgmann's and Ihde's work is contemporary, with the shift from first to second wave HCI—i.e., late

1980s to mid-1990s—there has actually been very little interaction between them and HCI. This is rather surprising given HCI's willingness to adopt and adapt new theories and ideas from other fields.

Only in recent years a very modest body of literature in HCI has started to discuss their ideas. For example, Leshed et al. [39] use Borgmann to discuss issues such as commodification and de-skilling in and around use of in-vehicle GPS navigation systems. Odom et al. [45] use Borgmann in passing to discuss why people seem to preserve some things rather passionately while discarding others without much thought. Fallman [18] discusses how Borgmann's theory of the device paradigm raises some important social, cultural, ethical, and moral issues, with a bearing on new themes in HCI, such as sustainable interaction. Pierce [48] is inspired by Ihde's three human-technology relations as a framework when rethinking how to approach the design of everyday objects such as clocks.

The Non-Neutrality of Technology

With different approaches and with different goals in mind, Ihde and Borgmann demonstrate the *non-neutrality of technology*, i.e., that technologies are not simply neutral means for realizing human ends, but actively help to shape our experiences of the world. They are by no means the only philosophers that have arrived at such a conclusion (see e.g. [57]) and it has been explored in HCI-related literature before, e.g. [24, 23, 21], but the notion is still to be to be accepted by mainstream HCI—in part because of the rather persistent 'tool' perspective. Taking the non-neutrality of technology seriously has solemn implications for HCI however. In light of third wave HCI approaches, it needs to form a cornerstone.

Borgmann helps us see that technology should not simply be dismissed as a tool but could rather be seen as an inducement, often so strong that people find themselves unable to refuse it. Twitter feeds, Facebook, Web pages, GPS navigation systems, etc., are not only technologies that can individually be understood as good or bad. We also need to realize that human use of these artifacts coalesce into culture—into a way of life. This raises two concerns for HCI: first, it points to *the moral and ethical capacity of the technologies we design and evaluate*, which has remained largely deemphasized in HCI. Moreover, if our artifacts coalesce into culture and shape our lives, that also suggests that *this capacity goes beyond individual efforts of design and evaluation.*

These concerns can be partly explained through the strong historical association to cognitive psychology, whose goal at the time was to produce predicative models of human behavior. Ethical issues were not within the scope of such inquiry. If we believe that HCI's goal is to make all artifacts more usable, then it is only logical that ethical issues seem to be outside of our area of study. The absence of ethical concerns can also be explained by the rather strong commitment in HCI to the idea of technology as a 'tool', a thriving perspective to this day, which tends to make ethical concerns irrelevant as ethical agency is then solely placed in the hands of the user. In revealing the different relations humans have with technology and the world (Ihde) and the logic and machinery of the device paradigm (Borgmann), both authors illustrate the problems involved with assuming neutrality of technology, reducing it to inactive, dead matter; that technology is not 'just a tool'. While a gun, for instance, does nothing on its own, one's understanding of the situation changes radically when one approaches it from a perspective in which Ihde's human-technology relations are the primitive units of analysis. Using this theory, it can be seen that a human with a gun is very different from the human without a gun, i.e., the human-gun relation transforms the situation and comes to define it by offering specific possibilities for action [36].

The non-neutrality of technology also *challenges the assumed correspondence between 'useful' and 'good'* that through usability permeates HCI. Borgmann shows that such a focus is not enough, as some particular technologies may be both useful and good, while some technologies that are useful for a particular purpose might be harmful for another. As HCI is involved in designing artifacts that will come to play mediating roles in the actions and experiences of future users of these artifacts, we as designers are helping to shape ethical and moral decisions and practices.

The Role of Values and Ethics in HCI

In practice, values and ethical concerns came into view in HCI primarily through the adoption of user-centered design approaches, growing out of the Scandinavian design tradition and Participatory Design [5,17]. These approaches pointed to the importance of involving end users and paying attention to their thoughts, values, issues of labor, power hierarchies, and workplace politics, already from the very earliest stages of interactive artifact design. Since the late 1990s, Value-Sensitive Design (VSD) has been one of the few methodologies in HCI that has actively emphasized the role of values, ethics, and moral concerns in the design process [23]. What is more, VSD stipulates a set of core values with 'moral epistemic standing' [23] within a value-sensitive design, including human welfare, privacy, universal usability, and informed consent.

While Le Dantec et al. [38] note that these values largely echo 1960s US counterculture which was already an integrated part of information technology design, it is nevertheless interesting that VSD comes to illuminate the ethical and moral responsibility on the part of the *designer* rather than the *user*. The alternative suggested by Le Dantec et al. [38], i.e., to seek values locally within the confines of each particular design case, would again deemphasize the designer's role. In third wave HCI, the continued focus on the designer is needed as we wrestle with the problem of not always having easily distinguishable user groups to work with and that the groups we end up distinguishing are likely to have strong heterogeneous characters.

To the discussion on the role of values, ethics, and moral issues in HCI, philosophy of technology could contribute in numerous ways:

- **Offer new perspectives.** Theories such as Borgmann's device paradigm offer new perspectives on the role of values in technology design that tend to operate on a different level than those suggested by first, second, and third wave HCI approaches.
- **Connect specific values with a larger philosophical discourse.** As today's philosophers of technology deal with the same technologies as we do in HCI, we have through them access to a vast history of thinking around ethics and technology and to the different philosophical strands particular ideas belong.
- **Stimulate continued critical reflection on values.** Mainstream HCI tends to rather thoughtlessly connect technological development with societal progress and 'the good life'. Theories from philosophy of technology are often inherently reformist in nature and thus tend to stimulate reflection on values and ethics.
- **Provide guidance concerning how to incorporate specific values in design.** Theories from philosophy of technology may provide guidance as to how specific values might be incorporated into design even if they are not explicitly design-oriented. For instance, as in the case of Borgmann, how a number of specific values seem to foster engagement with reality [18].

CONCLUSIONS

A defining characteristic of third-wave HCI is the shift from a rather narrow task-orientation to the broader concern of trying to increase the quality of everyday experiences. This paper has recognized a need to establish a more explicit, shared notion of what it is HCI now strives for as a field. Further, it has been argued that if interactive artifacts are knowingly designed to provide users with specific user experiences, then guiding visions must be developed, which provide the means for revealing, analyzing, and discussing the obvious implications (human, social, cultural, ethical, moral, ecological, and political) of these experiences and how they foster particular relationships between users, designers, artifacts, and contexts. An extended discussion of these concepts would facilitate a sharpening, enrichment, and substantial deepening of the current discussion of the role of user experiences, engagement, motivation, and meaning in HCI design; it would also help to deal with and better understand *if*, *how*, and *why* some of the experiences we design for may be considered 'good' while others might perhaps be thought of as less so.

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