The Turn to Practice in HCI: Towards a Research Agenda

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ABSTRACT

This paper argues that a new paradigm for HCI research, which we label the 'practice' perspective, has been emerging in recent years. This stands in contrast to the prevailing mainstream HCI paradigm, which we term the 'interaction' perspective. The 'practice turn', as it has been dubbed in the social sciences, provides a conceptual frame to organize a variety of issues emerging in more recent HCI research. While this approach has been present in certain strands of HCI research for some time, it has not been articulated fully to date. In this paper, we provide a short account of the main tenets of this perspective, and then show how it can illuminate some of the recent debates within HCI. Our argument is one which does not seek to replace extant HCI theories, but rather to provide an alternative, complementary theoretical lens which may illuminate the present confusion among both researchers and practitioners as to the direction of HCI. The paper articulates a set of issues which can help direct HCI research programs, as well as highlighting the potential contribution of the HCI field to this practice approach itself, in terms of a more nuanced understanding of emerging practices.

Author Keywords
Research; interaction; practice; theory; methodology

ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces — Theory and methods;

General Terms
Design, Human factors, Theory.

INTRODUCTION

While HCI has always been an arena where different disciplines mix, and where a variety of theoretical approaches and research methods have been used, it would

appear that more recently this eclecticism has become even more pronounced. Indeed, in a recent review of theory in HCI, Rogers states: "…there is no longer a coherent set of aims or goals, or accepted classification of contributing disciplines. It seems anything goes and anyone can join in" [32, p. xii]. We have always had debates in the community about the definition of the HCI field, and where exactly are its borders. Indeed, some have raised the question as to whether the term itself should be retired, as it seems so problematic and limiting in terms of the issues being addressed in HCI research today [1]. This might indicate that the HCI field is in crisis, but in this paper we rather argue that at least some of the apparent confusion in the field can be understood as tensions between competing, dare we say it, 'paradigms' of enquiry in HCI [18]. We are aware of the over-use or misuse of this term in much recent academic debate, but hope to show, in this paper, that the term may indeed be warranted. Our argument is not that one paradigm is necessarily superior to the other, but rather that each paradigm orients to a particular kind of research program, and admits different objects and activities into its mode of enquiry. We label these two distinct paradigms in HCI as the Interaction paradigm and the Practice paradigm.

Briefly, HCI studies within the Interaction paradigm have tended to focus on momentary and ahistorical HCI situations, that are not crucially connected to a particular time and space; the focus is on the snapshot of the interaction at the moment, usually focused on an individual, centered on the human-machine dyadic relationship itself. Methods have traditionally come from the psychological sciences, involving controlled short-term, lab-oriented studies with individuals engaged in pre-determined experimental tasks. The Practice paradigm, on the other hand, examines historical processes and performances, longer-term actions which persist over time, and which must be studied along the full length of their temporal trajectory; they are situated in time and space, and are dependent on many features of the surrounding material and cultural environment, which cannot be simply seen as a surrounding "context", but must be interwoven within the practice. This necessarily involves coordination with others (implicitly or explicitly). Research methods have often been qualitative, *in situ*, observational studies, extended over time, studying an overall activity, involving people,

artifacts, organizational routines and daily practices. The methods of enquiry adopted by the 2 paradigms thus differ, with one being more experimental, the other more developmental and phenomenological in orientation.

We posit that the Interaction paradigm has held sway for many years, indeed defining mainstream HCI. Our argument is that the current turbulence in the field is brought about by an increasing realization that this paradigm, while effective in handling certain problems and issues, is, like any perspective, blind to other issues. Further, these areas of blindness have become more pertinent in recent years as a result of changes in the nature of technology, and in the ways that technological infrastructures are being developed and appropriated into a variety of societal forms. Whilst the notion of interaction between human and machine has not gone away, the need to consider how the technology fits into our everyday practices has grown. As a result, there has been a relative loosening of the mainstream experimentalist hold on what counts as quality HCI research, allowing into the community a variety of alternative perspectives with their own conceptual frames, epistemologies, and methods. Our purpose is not to attempt a history of these changes in the field, but to argue that certain of these competing frames have some elements in common, and it is these elements we wish to explore in this paper, under the banner of the Practice paradigm. Note that this does not mean that the Interaction paradigm is somehow wrong, or must disappear. Rather, we state why there is a need to explicate a novel paradigm to handle the raft of new challenges posed by this emerging situation. We hope to provide a conceptual frame within which these emerging issues can be debated and explored. We believe that the practice and interaction perspectives are complementary in certain respects, framing the field in particular ways.

 'Practice' as a potential research focus has been identified in the social sciences for some time, and there has been a decades-long process, 'a turn to practice', where practice has slowly gained a legitimate position as a fundamental unit of analysis [34, 26, 27]. We believe that themes are emerging in HCI that echo those seen as central in the practice discussion in the social sciences – without to date acknowledging this existing discussion. Our interpretation is that a new research focus is emerging within the HCI field, a focus that can be tentatively labeled as "computer-supported practice". The difference between the discussions in HCI and those in the social sciences is that while the practice turn in the social sciences has been an openly partisan, programmatic and reflective movement to create a new research focus, in HCI it has been and remains tacit, spontaneous, and unsystematic, without any articulated program or indeed a clear recognition of this practice orientation. The mere fact of naming this perspective and articulating some of its features in this paper may in itself be helpful for the HCI field. Given that practice-oriented research in the social sciences has reached a more mature

stage, there is also the likelihood that investigating this social science field may help our understanding of current HCI.

 As we will see, one can discern a practice orientation in certain studies within HCI at least since the 1980s, so it is not a complete novelty to the community. Thus far it has, however, been more of an undercurrent, existing on the fringes, rather than being mainstream. In the last few years this 'fringe' has become more mainstream, and has been challenging aspects of the Interaction paradigm. The Interaction paradigm is hardly going to disappear (for the good reason that it is still brimming with unresolved problems), so what we expect is that the two perspectives need to be understood as different ways of 'carving Nature at its joints", to use Plato's famous phrase.

For example, while discussion about the "context" of interaction has long been a part of the Interaction paradigm, the interaction between human and computer is always at the center, in a privileged position, while everything else is considered as a "context" to this primary interaction, that impacts on, but can be treated independently from the basic interaction. The Practice paradigm requires us to "decenter" this privileged position of interaction, as noted in [30], and to consider this human- machine interaction as only one factor among several that are interesting and important. The Interaction paradigm usually takes the situation it studies as static: except for the change brought by the novel technology itself, the general situational context is considered as given, and often immutable. The Practice paradigm, on the other hand, views the current situation as the momentary result of a historical evolution, which is constantly under the influence of a variety of forces; over a period of time it may, and probably will, change, and it is important to anticipate the potential for such evolution. The paradigms differ also with respect to the scope of the changes intended. For the Interaction paradigm, the scope of the intervention is viewed as changing human actions by means of novel technology. For the Practice paradigm, a whole practice is the unit of intervention; not only technology, but everything related and interwoven in the performance is under scrutiny and potentially changeable, depending on the goals of the intervention. Thus the changing technology is but one of the options.

Some implications of this shift away from a focus on interaction between person and artifact, and towards a more encompassing view of human activity and practices in a setting, can be found in recent work e.g. [16]. This broadening of the scope of intervention has implications for the 2 paradigms in terms of their stance towards the values and politics of their actors. The Interaction paradigm eschews any need for politics in its analysis, or for cultural specificity, focusing on the modalities of interaction in the here and now, isolated from other activities and from most features of the setting. The Practice paradigm necessarily

includes aspects of values and thus the cultural and political, in the origins and development of the practice.

The structure of the paper is as follows: we first give a general outline of the practice approach, list the major schools of thought within it and identify the main issues identified within practice research. Then the paper analyzes two IT sub-disciplines – IS and CSCW – where practice theories have surfaced more explicitly than in HCI to date. The result is that this focus on practice differs across these areas: while the practice approach has gained some acceptance in mainstream IS and HCI, it has been much more prominent (even though not labeled explicitly) in CSCW – especially European CSCW, as well as in the participatory design (PD) sub-community of IS. We then proceed to show how this practice approach might help organize and frame certain HCI concerns. Practice as a research focus is quite different to interaction, and requires different approaches for its study, and different measures for evaluation. Practice research in the social sciences can serve as an example and reference point for how this might be done. A simple replication will not be sufficient however, as much of the social science practice research has tended to focus on organizational settings, and not to focus on the ways artifacts can also change practices. Because of their experience with these matters, we might expect CSCW and PD researchers to lead this practice turn. We note that the weaknesses of social science practice research to date allow for the possibility that HCI research might eventually contribute back to the general practice discussion, especially concerning the role of *artifacts* and the *emergence of new practices*.

THE 'PRACTICE TURN' IN THE SOCIAL SCIENCES

One of the most significant developments in the social sciences in recent years has been a re-orientation in how the object of research is conceived, often referred to as the 'turn to practice' [34, 26]. Reckwitz [31] provides one conceptual frame for orienting to different kinds of social science practice theories. He distinguishes between 'traditional' and 'cultural' theories. Traditional explanations are based on either individual needs (*homo economicus*) or on social norms (*homo sociologicus*). The critiques of the rational choice model underlying *homo economicus* are legion [24, 25]. Likewise, *homo sociologicus* has also come underfire, especially from the ethnomethodologists. For Reckwitz, cultural theories challenge the traditional two extremes as being too narrow and limiting, and maintain that human actions take place in a cultural context that allows humans to interpret the world and thus make their actions meaningful. All practice theories are cultural in this respect, but according to Reckwitz there is a second division between cultural theories, based on what is the base of the social, and thus not all cultural theories are practice-oriented.

Practice theories do not locate the origin of the social in the mind, discourse, or interaction, but in 'practices' - routines consisting of a number of interconnected and inseparable elements: physical and mental activities of human bodies, the material environment, artifacts and their use, contexts, human capabilities, affinities and motivation. Practices are wholes, whose existence is dependent on the temporal interconnection of all these elements, and cannot be reduced to, or explained by, any one single element. Practices are relatively stable performances, ways how things get done, continuously produced and reproduced. Practices are also the substrate for the shared understanding and perception of the world, for common language games and the formation of shared identities. For social scientists, practices are the minimal units of analysis where essential and interesting social issues all come together in a natural and authentic way and become accessible for study. From a practice perspective the world is a network of performances that are durable, because the ways of doing things are coded in minds, bodies, artifacts, objects and texts, and connected together so that the result of performing one activity serves as a resource for another.

The practice perspective creates a radical shift in perspective, as noted by an organizational researcher:

> "…A focus on practice challenges us to bridge different levels of analysis, and to do so in different ways. The orthodox language of social science, including organizational studies, carves up phenomena into three levels: from the very micro (what people say and do); to the meso (routines); to the macro (institutions). (…) 'practice studies' as a field forces us to reground our study of organizational activities in terms of phenomena that are actually done, as they become evident in the here-and-now. And this in turn requires us, arguably, to reconceptualize the idea of levels." [26, p. 1309].

There are a number of approaches to how practices are conceptualized and studied, commonly called practice theories – a family of different approaches connected together by a network of historical and conceptual similarities. The overview here follows Nicolini's recent account [27]. Note that the use of the term 'theory' by Nicolini and others in describing the variety of practice approaches can lead to some confusion, as these perspectives are not what many would term theories *per se*, but we use the term here for convenience, following Nicolini's usage.

What is meant by the concept of practice is a debated topic since the time of Aristotle, and tracing its provenance is a worthwhile endeavor. According to Nicolini the historical and philosophical roots of practice theories can be directly traced to the groundwork done by Marx, Heidegger and Wittgenstein, who each in their critiques of contemporary philosophy gave practices a pivotal role in the development of their own systems. Marx legitimized 'practice' both as an object of study and as an analytical category, and also connected it with both sociality and historicity. Heidegger's

project was to renew philosophy by focusing on ontology and being, and he took embodied practical interaction with the environment, 'being-in-the-world', as the starting point. Wittgenstein studied meaning in language and found that shared practices are both the origins of, and are made possible by, language, and they serve as the measure for the correctness and usefulness of a language used. Both Heidegger and Wittgenstein, independent of the different origins of the projects, ended up seeing practices as the central foundation for their critical projects. The influences of Marx, Heidegger and Wittgenstein have in various ways and combinations led to a number of different lines of thought on notions of practice in the social sciences.

In an insightful forthcoming paper entitled "The Concept of Practice" [35], Kjeld Schmidt shows how the term moved centre-stage at the time of the Enlightenment, through an examination of the work of the French Academy of Sciences from the late 17th to the late 18th century, which undertook an exceptionally comprehensive and detailed study of the work practices and techniques of hundreds of trades. This was conducted because they had an understanding of the importance of the practical reasoning conducted by these people in their daily work, and wished to have it documented in great detail in order to explicate it. However, this body of knowledge, as Schmidt points out, was then forgotten with the rise of the Industrial Revolution in the late 18th century, as the focus switched to the machine. Indeed, Schmidt states: "..two centuries after the onslaught of the Industrial Revolution actual work practice remained managerially and academically uninteresting." [35, p. 6]

Nicolini has identified six main schools of practice theories: the 'praxeology' of Giddens and Bourdieu, practice as tradition and community, practice as activity, practice as accomplishment, practice as 'the house of social' – direct followers of Heidegger and Wittgenstein, and practice as discourse. Very briefly, a word or two on each of these:-

Praxeology: The 'praxeology' of both Giddens and Bourdieu holds that social life is a series of contingent and continuously evolving practices, and that institutions, power, and social norms can be understood through structures and connections between practices.

Practice as tradition and community: The work of Jean Lave and Etienne Wenger would be an example. Their theory of legitimate peripheral participation sees learning both related to, and a specific form of, a particular practice, - a social process whereby a novice obtains a legitimate role that grows along with their skills and capabilities, and which is characterized by participation, commitment, belonging and identity.

Practice as activity: The cultural historical "activity theory" approach, which emerged from the Soviet Union through the early work of Vygotsky and developed more fully by A. Leont'ev, is the practice approach that has most pushed the

earlier ideas of Marx on practice. In this approach, the notion of human activities fuelled by motives is the fundamental unit of analysis. Nicolini sees this as one of the most radical approaches to practice, emphasizing many issues not discussed by other theories, and one having an interventionist program of changing practices 'from the inside'. Activity Theory has also developed one of the more detailed conceptual apparatuses for articulating practice.

Practice as accomplishment: Although it is not fully correct to call ethnomethodology a theory because of its opposition to the very notion of 'theory', Nicolini characterizes it as an approach that sees practice as an accomplishment. For ethnomethodology practices are locally produced by using a selection of certain 'ethno-methods' of interaction that make practices, and thus all social activity, possible. These ethno-methods are the central object of ethnomethodological studies.

Practice as the 'house of the social': Nicolini uses Theodore Schatzki as an example of those researchers developing further Heidegger's and Wittgenstein's thoughts. For Schatzki the meaningfulness of human actions has a central role. This is historically formed and different from abstract rationality. Practices form the natural horizons for meaningfulness.

Practice as discourse: Nicolini classifies both the conversation analysis tradition and Foucault's work as practice theories focusing on discourse. Conversation analysis tries to understand the social organization of linguistic conduct, and its origins are in ethnomethodology. Foucault's approach is different; he is interested in material and discursive practices that regulate social life.

Although these approaches differ in many ways, there are also a number of common features; Nicolini lists them as follows:-

1. A *process and performative view on social life*: structures and institutions are realized through practices; practices are local and timely and they have histories.

2. The *critical role of materiality* of human bodies and artifacts; there are no practices without them.

3. A *different role of agency and actor* than in traditional theories: 'homo practicus' is both the bearer of practices in his or her mind and body, and the one who produces the practices in action.

4. Seeing *knowledge as a capability to act* in practices in meaningful and productive way.

5. The *centrality of interests and* motivation in all human action and a corresponding focus on power, conflicts and politics.

Nicolini's account of practice theories is important, not in proposing any form of meta-theory, but because it shows that despite the diversity of practice theory perspectives (which he uses the bulk of his book to elaborate), they all –

perhaps surprisingly – share a number of ontological and epistemological commitments about practices as objects of study. Given that some of the practice theories listed among Nicolini's schools (Heideggerian phenomenology, ethnomethodology, Activity Theory) serve as the major foundations of current HCI research, this may lead one to question the commonly held perception that HCI theory is in a somewhat chaotic state, e.g. [32]. So, instead of fragmentation there is actually an underlying common ground. The underlying commonalities noted do not make the theories directly commensurable, but they surely open up the possibility for some dialogue, and for exploring the use of different theoretical frames in complementary ways, as Nicolini explicitly notes.

Seeing social life as consisting of practices that have to be studied as wholes is a radical ontological commitment, leading to a complication and restructuring of the whole research process. As characterized by Miettinen et al:

> "In sum, 'practice' has not only a theoretical agenda but a methods one, as well. Studying a living practice 'here and now' and relating it to the history of practice and to larger institutional contexts is an extraordinary challenge." [26, p. 1314].

The practice approach has opened up a potential for better explanations of phenomena than heretofore, and a possibility to alleviate many of the dichotomies that have been plaguing social sciences, such as *social vs. material, mind vs. body*, and *knowledge vs. action*.

Because practices are contingent, mediated and cannot be understood without reference to the particular place, time and concrete historical context where they occur, they can only be studied 'close-up'. This is in a sharp contrast with many social science approaches that take isolated features of human behavior and study them at a distance, through modeling and generalization.

Further, if one is interested in real-life practices, they must be studied where they occur, in their natural setting, as bringing them into the laboratory is impossible. There may be practices to be studied in the laboratory as well, but they are not the same ones as in everyday life. In studying practice, many other widely used data collection methods also have their problems:

> "… for studying practices, one needs to employ an internally coherent approach where ontological assumptions (the basic assumption about how the world is) and methodological choices (how to study things so that a particular ontology materializes) work together. For example, studying practices through surveys or interviews alone is unacceptable. These methods are, in fact, as unsuitable for studying work practices as they are unfaithful to the processual ontology that underpins the ethnography of the practice approach." [27, pp. 217-218].

After this very brief description of social science practice theories, let us turn to how such approaches have informed HCI and related fields.

THE INFLUENCE OF PRACTICE THEORIES IN IS, PD & CSCW

While explicit concern with practice theories is a relatively novel phenomenon in HCI, that is not to say that many of the issues have not surfaced in HCI and allied fields over the years. We briefly examine what has happened within the related fields of information systems (IS) – incorporating the field of Participatory Design (PD), and computer-supported cooperative work (CSCW), with respect to practice and practice theories, before turning to practice concerns in the HCI field itself.

Information systems

IS has a long connection with practice-oriented theorizing, and the first attempts to use Giddens' structuration theory in IS appeared in the early 1990s [23, 28]. This can be related to the shifting focus in the closely related organizational studies (OS) field, which according to Nicolini [27] in the 1990s moved from studying organizations as things towards studying them as discourses and processes, which generated a fertile ground for practice theories. Over the years practice-oriented research has penetrated most of the subfields in OS and become a well-established genre of research. Because of the significant overlap between IS and OS research communities and publication channels, research drawing from practice theories has also become rather popular within IS. The interest in materiality, embodiment and artifacts has, however, remained rather weak in IS research, as noted in a well-cited framework paper [29]. Indeed, we would critique much recent IS research for its over-elaborate articulation of theoretical frames and consequent neglect of the details of practical work activities and settings.

One of the sub-areas of IS has been, however, radically different in this respect. It is the Scandinavian Participatory Design (PD) tradition, which emerged at the end of the 1970s as an opposition movement against both the then dominant systems-theoretical, and alternative socio-technical, traditions in IS design [5]. Scandinavian PD was (and still is) very much practice-oriented: the starting point is the recognition of worker knowledge and skills enmeshed in their everyday work practices. Scandinavian PD has also emphasized agency, emancipation and empowerment. It has also brought forward a distinct new set of methods for studying practices. Small wonder that one of the most substantive theoretical accounts in Scandinavian PD – Pelle Ehn's 1988 book [11] – draws heavily from the three foundations of practice theories: Marx, Heidegger and Wittgenstein. Although PD has lost some of its emancipatory and empowering flavor since the pioneering days of the 1970's, being viewed by some as a mere technique for improving the quality of IT products, the PD community has maintained a core concern with workplace practices.

CSCW research

The practice approach has been embraced within the field of computer supported cooperative work (CSCW), and especially within the distinct European CSCW community (ECSCW). While the interests of the US CSCW community were more diverse (including social psychology-oriented 'groupwork'), the research agenda in Europe was strongly influenced in the early 90s' by sociologists from Lancaster, whose work practice studies had begun to intersect with work done by the systems engineering development group there [e.g., 3]. It so happened that the sociological approach adopted by the majority of the social scientists was ethnomethodological in character. Thus ethnomethodology had a strong role in defining the CSCW research agenda in Europe, and correspondingly it became practice-oriented and has remained so, while the US CSCW community has always been more heterogeneous in this respect.

Other sociologists have also been involved, e.g. the studies on cooperative work conducted by Schmidt and colleagues [36]. What Schmidt so elegantly argues is that practice is not mere 'doing', or simple execution of pre-defined rules, but crucially involves reasoning in the 'doing'. The work that people perform is not simply the following of pre-ordained rules, but necessarily involves the local interpretation of these rules in the light of the evolving situation. Thus, work is not the execution of pre-ordained rules, but neither is it completely *ad hoc*. There is a notion, shared among other workers, of what it means to perform the work competently. This is the 'practice' which is common to the workers. Or, as Schmidt puts it, " *the concept of 'practice' focuses on normatively governed contingent action* " [35, p. 9]. This conceptual approach has provided a solid basis on which to develop a research program for CSCW, where practice has been a central concern [36].

There has also been a long-standing interest among ECSCW researchers in the application of Soviet-inspired Activity Theory, another approach with a strong practice base [20]. Within the CSCW community the practice approach to IT design has had the possibility to grow and mature, and by the end of the 1990s, it had started to influence the mainstream HCI research field. A unique feature of European CSCW is the serious interest in, and theorizing about artifacts, in the form of both studies on coordination mechanisms [37] and mediation [8]. Not all aspects of the practice approach in CSCW are equally developed, however: interest in both agency and power has been rather muted. Thus CSCW and PD complement each other in this respect.

STEPS TOWARDS A PRACTICE ORIENTATION IN HCI

The practice orientation in HCI has a more complicated history. In the early days of HCI, the dominant paradigm in cognitive psychology, the human information-processing (HIP) approach, was the conceptual framework used. The focus was on the relationship between the human and the computer, via the interface, with the goal of engineering a better fit between the physical and mental state of the 'user' and the interface of the machine. While much useful work was done, and indeed, continues to be done within this framework, by the end of the 80's this 'first wave' of traditional theoretical frames began to be questioned as to their relevance to the design of user interfaces [2]. A scan of the book chapters in [9] provides an indication of the feeling of unease within the community as to its ongoing purpose and relevance. Laboratory studies as a method of acquiring knowledge about how interfaces were used, or for the design of new systems, were shown to have limited applicability [38, 21].

There began an opening out to new ideas and theoretical frames – activity theory, action theory, linguistic theories, the language–action perspective, phenomenology, etc. It was also at this time that HCI began to open up to PD ideas, albeit often in a 'watered-down" form. None of these approaches became mainstream during the 90's in HCI, although they all had adherents. For others, the lessons to be learned from the perceived failure of the HIP research program for HCI was to eschew "theory" altogether, and concentrate on more mundane practical matters of usability, seeking to develop measures and methods that would help in designing more usable systems – developing guidelines for "user-centred" design (UCD). The resulting research was practical and utility-oriented: designing interfaces that enable us to do something at all; designing interfaces that enable us to do something 'better' than previously; and devising methods that enable us to design and manage designing.

While some of the UCD approaches engaged with users in the design process, influenced by PD approaches, others did not. Most of the UCD approaches stayed away from 'theory'. The focus on practical observations, at times in actual work situations, did mean that UCD practitioners observed human work practices, but this rarely became a central feature of the work. Research was still centred on the Interaction, not the Practice, paradigm. The opening up of HCI to the field of design helped to move some aspects of the HCI research program out of the formal lab experimentation tradition into a more open, "design thinking" arena, allowing for design explorations into such topics as ambiguity and playfulness in design [13]. However, this design turn in HCI, worth further investigation in its own right, did relatively little to contribute to the understanding of ongoing work practices – other than those involving the designer's own creative activities, such as sketching, for example.

HCI as a field had become very eclectic, consisting of a mix of theoretical positions, personal reflections, and simple observational studies, combined with technology explorations. From the outside, this led to the view that the field was conceptually weak, or perhaps chaotic. But the seeds of the practice turn were present from quite an early

stage. Certain practice-oriented elements appear from the outset of the '2nd wave' of HCI research in the 1980s [7]. Lucy Suchman's book *Plans and Situated Actions* in 1987 and the studies of the Work, Practice and Technology (WPT) group she led at Xerox PARC, and some practice theories like Activity Theory came along during the 1980s and 1990s [6, 19], but the focus in mainstream HCI remained at the level of interaction and usability of systems. During the 1990s interest in what surrounds interaction (i.e. the 'context' of the interaction) grew stronger, also affecting more practical UCD approaches - e.g., the Contextual Design method pays some level of attention to aspects of work practices [4]. The broadening of the areas of IT application outside the workplace, and the widespread use of mobile technology launched what has been termed the '3rd wave' of HCI at the turn of the millennium [7], bringing in even more practice elements, in particular the interest in embodiment and personal experience. In recent years we have entered another phase, where the scope of HCI applications has expanded rapidly and questions of agency, engagement, materiality and even social responsibility have become fashionable. It is interesting to note, however, that despite the parallel between the new 'paradigms', 'waves' or 'turns' in HCI and the 'practice turn' discussion in the social sciences, the connection between the two fields has hardly been recognized at all.

In this short paper we cannot provide a detailed review of this emergence of interest in practice, but we can point to a number of topics that have begun to be explored by HCI researchers, all of which we believe link to this turn to practice. Briefly, we note:-

Understanding the "context" of interaction: One of the central issues in HCI has been the notion of 'context' in interaction. For some time it has been supposed that context influences what happens in interaction and how it is experienced, resulting in attempts to define richer and richer contexts. But 'practice' can be interpreted as the ultimate context: *practices are where interactions take place in real life*. But there is also a gestalt shift involved: while formerly interaction is the foreground and context the background, with practices, interaction is no longer at the center, but is one aspect among many, serving its specific part in the performance. It can be studied and understood only through this whole performance, not separately.

An interest in "appropriation"[33, 39]: The recent interest in how people take ownership of artifacts and shape them to their own purposes and practices clearly relates to this practice turn, as it examines the ways in which designed "things" become assimilated into an ongoing set of routines.

The push towards research 'in the wild': With respect to research methods, the suggested program for in-the-wild studies carries a clear mark of a practice orientation:

> The shift towards conducting in-the-wild studies has largely come about from a growing interest in how pervasive technologies can be designed to enhance and become part of the everydayness of life. In-the-wild studies show how people come to understand and appropriate technologies in their own terms and for their own situated purposes. [32, p 73]

Interest in solving complex real-world problems: In recent years a cluster of research topics has emerged in HCI which is historically grounded, shaped around complex real world problem spaces, and conceived as a response to these problem. Kaptelinin and Nardi analyse this emergence in their book [17], and as examples they give topics such as sustainable HCI, interactive and collaborative technologies for development (ICTD), crisis informatics, comparative informatics, and collapse computing. These are often explicitly studied from a practice point of view, as in the TOCHI September 2013 special issue.

Materiality: Practice approaches see materiality of the world as one of the central resources for the realization of practices. Therefore the recent interest in both material aspects of interaction, and digital artifacts as a form of materiality is a very interesting parallel, e.g. [41, 14].

Embodiment: In recent years, HCI has finally engaged in a substantial way with the role of the body in human activities and performances. Much of this work has taken its inspiration from the phenomenological approach of Merleau-Ponty. The book by Dourish [10] helped turn many researchers in HCI towards aspects of this topic.

Performance: One of the central insights of the practice approach is their processual and performative nature. Again, there has been increasing interest in various forms of process and performance in HCI and design, e.g. [22, 40].

Digital ecologies: The extension of analysis from individual artifacts towards a family of artifacts is a step in broadening our viewpoint on the world about us e.g. [12, 15]. However, it needs to be extended to include the practices that surround these artifacts, the ways that humans appropriate and shape these artifacts, as the focus needs to be not on artifacts *per se* but on *artifacts-in-use*. The change and evolution of digital ecologies only becomes meaningful when linked to corresponding practices, as artifacts and practices co-evolve. Every practice has a particular set of artifacts that make it possible.

The explicit mention of practices in research: The September 2013 issue of TOCHI was devoted to "practice-lens" approaches to sustainable HCI. The Editorial for the issue discusses the decentering of the human-computer interaction element, the dynamics of practices and practices as the unit of intervention. [30].

While this list of emerging HCI topics may at first appear to be rather disparate and have little in common, we believe that, at a deeper level, there can be uncovered themes which resonate with a practice-based approach, as distinct from the earlier mainstream Interaction approach. A practice lens approach should help us to perceive these underlying relationships.

TOWARDS A PRACTICE-BASED RESEARCH AGENDA IN HCI

We have shown that an increasing number of practice-oriented research programs have emerged in HCI in recent years. We believe that it is time to seek a common conceptual foundation for these programs, through reflecting on some of their common origins and concerns. The practice frame we have articulated here allows us, through the notion of practice, to align a number of currently disparate research threads into a relatively coherent research program. The movement towards practice research has thus far however been rather unsystematic, partial, and tacit. We suggest that much can be gained by making it more systematic, comprehensive, and reflexively conscious. A characteristic of recent HCI research has been to take one isolated aspect of practice – be it embodiment or empowerment, for instance – and make it the focus. But studying isolated aspects of practices will not lead to the benefits that a holistic practice approach is capable of offering.

The different nature of the units of analysis leads to different research settings and methodological selections. There are various approaches to practice research, but in HCI there is a common unifying goal to understand practices that are changing, where the change is often due to the introduction of information technology. This gives a better common ground to seek common foundations and construct values and norms with respect to validity and quality of research. In any case, the recognition of commonalities can give a boost to the internal discussions and the search for more coherence within the field.

One central issue is the question concerning *emergent practices*. The goal of the proposed research program is to develop our capability to transform practices through technology. Practices cannot be fully preplanned; it is only possible to provide a set of arrangements and resources, put in the hands of participating humans, who then try to use whatever is available to accomplish their goals. The end result is eventually a transformed new practice that may be close to the initial vision or not. During the transformation new practices emerge, a process whereby the change happens. The ultimate goal of the research program is to understand the dynamics of this transformation and emergence: why and how it happens, and what are the ways to facilitate and support it. This is taking place in real situations and places, between real stakeholders, under real conditions of politics and power.

An essential ingredient in understanding these dynamics is to understand the role of computer artifacts in the emergence and transformation of practices; what are artifacts for practices, and what are our possibilities in influencing what happens through changing the artifacts? In this respect we have not progressed very far, but there are a number of promising openings – for instance with respect to materiality and the complexity of artifacts, and to mediation of practices by artifacts. The notion of practice gives us a possibility to connect and align these separate efforts.

Approaches privileging individualistic ”user needs” or macro-level ”organizational systems” are no longer sufficient, as we grapple with the complexities of digital ecologies and usage practices. The individual user cannot be the unit of analysis -- user needs are not a homogenous mass, but consist of sets of needs, differentiated and separated from each other depending on the practice. Practices are a shared resource among a community of people. Neither is the ”organizational system” a monolithic structure; it is composed of a number of smaller systems, each serving the needs of a particular practice. And wherever these systems have connecting points and commonalities, it is important to maintain the relative independence of each of them. Practices and artifacts co-evolve, different practices are in different phases of maturity, they evolve at a different pace. If the connections and links between systems are made fixed and permanent, it may paralyze the evolution of those practices that are changing faster than others. How do we handle such issues in systems design, and what technical infrastructures are required?

There is the potential to open up a theoretical discussion between approaches as to what it means to do practice-oriented HCI research and further expand that into a general practice-oriented research program, giving order and direction to the whole HCI field. The participatory design and European CSCW communities, due to their experience and dedication to practice research issues, may serve an important role as catalysts for this development.

CONCLUDING REMARKS

The paper has posited that we are witnessing the emergence of a major new paradigm within the HCI field, concerned with the concept of computer-supported practices. The earlier interaction paradigm still has value for answering certain HCI questions, but from a practical point of view, in terms of our understanding of how ICT supported practices emerge and develop, the practice paradigm encompassing bodies, artifacts, performances, and routines provides a more encompassing frame, giving us a variety of conceptual resources to understand important issues of appropriation and assimilation of technology into everyday life. Developing a set of methodological tools and guidelines as to how they should be utilized is the next step.

This Practice program being advocated is clearly not without risks, although this has not been a major focus in this paper. Recently, researchers at Siegen, who have been influential in developing one version of a practice-based approach to HCI-related research, articulated some of these difficulties:

"Practice-orientation is a labor-intense, risky, and long-term research approach. To be able to conduct in depth field studies in real world settings and to roll out innovative IT artifacts, one needs to build trustful cooperation with practitioners and their management. A considerable part of the research efforts are dedicated to satisfy the practitioners' problems which are not always academically interesting. In addition, the technical artifacts, which we build and roll out, need to be technologically well performing, stable, and usable. Hence, an open challenge is to develop design approaches to observe appropriation phenomena in a timely and cost efficient way, not deformed by technical issues in a disturbing sense. Finally, practice-orientation is a risky research framework. Design case studies can break for a variety of different reason of which many are not under the control of the researcher". [42, p. 510].

We are aware that recent efforts in articulating this Practice paradigm, including ours, have only scratched the surface. More work is needed both analytically and empirically to elucidate this perspective, and to develop its research agenda. We look forward to being a part of this emerging research program.

ACKNOWLEDGMENTS

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