

# Empowerment in HCI - A Survey and Framework

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## ABSTRACT

Empowering people through technology is of increasing concern in the HCI community. However, there are different interpretations of empowerment, which diverge substantially. The same term thus describes an entire spectrum of research endeavours and goals. This conceptual unclarity hinders the development of a meaningful discourse and exchange. To better understand what empowerment means in our community, we reviewed 54 CHI full papers using the terms *empower* and *empowerment*. Based on our analysis and informed by prior writings on power and empowerment, we construct a framework that serves as a lens to analyze notions of empowerment in current HCI research. Finally, we discuss the implications of these notions of empowerment on approaches to technology design and offer recommendations for future work. With this analysis, we hope to add structure and terminological clarity to this growing and important facet of HCI research.

## ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

## Author Keywords

Empowerment; power; literature survey; framework.

## INTRODUCTION

With the emergence of third wave HCI [10, 37, 38], more abstract aspects of interaction move into the focus of the HCI community, such as agency, fulfillment, and social justice. One of these aspects is *empowerment*, a concept which seems to be multifaceted in itself: it can be a process, a method, an end goal; it can be a world view, an ideology, a new paradigm, an approach to action, a symbol or a metaphor; one can empower oneself or someone else [16]. According to Rappaport (who has been associated with coining the term empowerment), “empowerment is a little bit like obscenity; you have trouble defining it but you know it when you see it” [74]. Moreover, empowerment (almost) always appears as an unconditionally positive mission no one would argue against.

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No wonder that many tech companies are currently priding their businesses with a mission to empower people through technology:

**Microsoft** “Our mission is to *empower every person and every organization on the planet* to achieve more.”[62]

**Facebook** “*Give people the power* to build community and bring the world closer together.”[29]

**Twitter** “*To give everyone the power* to create and share ideas and information instantly, without barriers.”[91]

**Tumblr** “*To empower creators* to make their best work and get it in front of the audience they deserve.”[85]

At the same time, researchers in different disciplines, e.g., management [16], healthcare [94], entrepreneurship [9], and technology design [53], have drawn attention to the fact that interventions that aim or claim to empower can ultimately turn out to be disempowering, for example if they mark disadvantaged people as different or offer more help than needed [53].

In light of the various passionate calls for technology that empowers people in HCI [10, 25, 51, 58, 77, 83], we argue that a deeper investigation of empowerment, its theoretical foundations and the conditions under which empowerment prospers (or not) are essential to develop a more nuanced understanding of the concept, and to advance it within the HCI community.

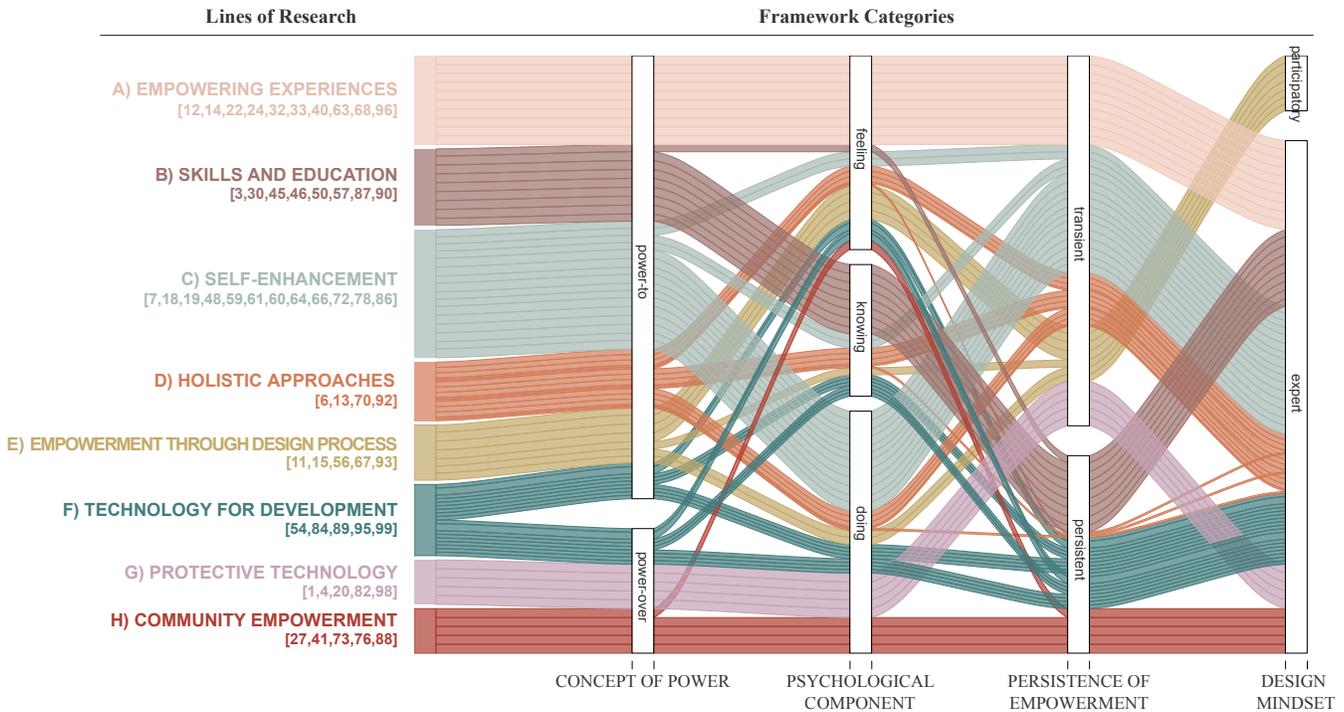
The aim of this paper is to help future research on empowerment in HCI to navigate some of the conceptual unclarity currently prevalent in this field. However, we do not aim at deriving a new, general definition of empowerment from our analysis, but rather at presenting different characteristics along which existing and future research can be classified. Our work is guided by the following research questions:

**RQ1** “How can different *notions*<sup>1</sup> of *empowerment* be characterized?”

**RQ2** “Which lines of research on empowerment in HCI emerge from this characterization?”

Our contribution therefore is twofold: We first present a framework derived from an analysis of 54 CHI publications using the terms *empower* and *empowerment*. The framework inte-

<sup>1</sup>with notion we refer to researchers’ interpretation of the term



**Figure 1.** Alluvial diagram of lines of research characterized by our framework: The vertical pillars represent the four categories of our framework and their manifestations. Each reviewed paper is represented by a horizontal line which splits when a paper was coded as multiple manifestations of a category. Papers in one line of research share the same color. Most papers in one line of research have a very similar coding - some differ in one or two categories. For example, papers in A) *Empowering Experiences* all share an understanding of *power-to* as CONCEPT OF POWER, they focus on *feeling* as PSYCHOLOGICAL COMPONENT, the PERSISTENCE OF EMPOWERMENT is *transient*, and they use an *expert* DESIGN MINDSET. On the other hand, papers in, for example, D) *Hollistic Approaches* share the same CONCEPT OF POWER, PERSISTENCE OF EMPOWERMENT and DESIGN MINDSET and address all three manifestations of PSYCHOLOGICAL COMPONENT.

grates four categories (CONCEPT OF POWER, PSYCHOLOGICAL COMPONENT, PERSISTENCE OF EMPOWERMENT, and DESIGN MINDSET) which have been informed by prior work on the concepts of power and empowerment in social and political sciences as well as by design research in HCI. We then cluster our paper set through the lens of our framework to unravel prevailing lines of research on empowerment in HCI (see figure 1).

This represents – to the best of our knowledge – the first attempt to bring structure and clarity to the emerging body of work on empowerment in HCI.

## BACKGROUND

Before starting our analysis, we need to cover some theoretical ground on the notions of the terms *power* and *empowerment* in social and political sciences.

### Power

*Power* is the concept underlying empowerment. In social and political theory, definitions of the term have been heavily discussed and contested [36]. As a basis for this paper, we distinguish between two fundamentally different notions of power, both prevalent in the literature: *power-to* and *power-over*. With this, we adopt a common distinction (see, for example, Allen [2]).

### *Power-To: An Ability to Act*

The notion of *power-to* articulates power as an *ability to do something*. Writings that reflect this notion of power have for example been presented by Hobbes [39] and Arendt [8]. Hobbes defines power as a person’s “present means [...] to obtain some future apparent Good” [39]. Similarly, for Arendt “power is a something - anything - which makes or renders somebody able to do, capable of doing something. Power is capacity, potential, ability, or wherewithal.” [8]. Arendt explicitly distinguishes power from authority, strength, force, and violence. When we use *power-to* in the rest of this paper, we refer to Arendt’s definition.

### *Power-Over: Relations Between Actors*

When power is understood as *power-over* it refers to the *relation between multiple actors*. Most prominently, Weber defines power as “the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance” [97]. Similarly, Dahl offers what he calls an “intuitive idea of power” according to which “A has power over B to the extent that he can get B to do something that B would not otherwise do” [23]. The actors A and B can be “individuals, groups, roles, offices, governments, nation-states, or other human aggregates” [23]. Dahl omits the notion of force, which makes his definition more suited for the purpose of this paper. With *power-over*, we therefore refer to Dahl’s definition.

## Empowerment

Agreement on a definition of empowerment has not yet been reached, despite the considerable body of research on empowerment and empowerment theory.

Zimmerman introduced the concept of psychological empowerment and defines empowerment as “a process in which people gain understanding and control over personal, social, economic, or political forces in order to take action to better their lives” [100]. Similarly, Rappaport defines empowerment as “a process by which people, organizations, and communities gain mastery over issues of concern to them” [74]. Within the scope of this paper, we adopt Rappaport’s definition of empowerment, which remains deliberately open to both notions of power - as *power-to* and *power-over*. To denote the instance (person, institution, etc.) who is being empowered we use the term “empoweree” in this paper.

## METHOD

To investigate our research questions, we conducted a structured literature review on 54 CHI publications.

Using the search functionality of the ACM Digital Library, we collected all CHI publications that used one of the terms “empowerment” (N=37) and “empower” (N=115) at least once – an approach that was similarly employed by Kannabiran et al. [47] and Schlesinger et al. [81]. We removed non-paper artifacts (such as posters, keynotes, and workshops), resulting in 62 manuscripts.

### 1) Deriving of framework categories, manifestations and exclusion criteria (all authors):

After reviewing the paper set, we discussed commonalities and differences between the underlying notions of empowerment. In several meetings, we defined four categories and their manifestations with the goal to capture these conceptual differences. While we decided to integrate four categories in our framework, we considered several others in our discussions (we elaborate on this decision in the limitation section of this paper). We decided to exclude papers in which empowerment was either used only marginally or did not directly refer to the presented system or research project, but rather to related work. We removed another eight papers [9, 10, 21, 26, 34, 35, 55, 71].

### 2) Coding (first and second author):

Once the four framework categories were defined, we coded the remaining 54 papers according to the coding scheme defined by the framework. Papers that substantially addressed multiple manifestations within a category were coded as such. In cases of disagreement, coding was discussed in the team until consensus was reached.

### 3) Clustering (first and second author):

We then clustered papers according to the final coding, which resulted in eight clusters (in the following called *lines of research*) that share a similar notion of empowerment. Table 2 provides an overview of these lines of research and their characterization through the lens of our framework. In this paper, we describe both, the framework categories and the lines of research that emerged in our analysis.

## FRAMEWORK

During the analysis, we identified four categories that helped us to describe differences between notions of empowerment and thus answer

### RQ1 “How can different *notions of empowerment* be characterized?”

We combined these categories in an initial framework that we later use to discuss the scope of empowerment research in HCI. The four categories that are part of our framework – namely CONCEPT OF POWER, PSYCHOLOGICAL COMPONENT, PERSISTENCE OF EMPOWERMENT, and DESIGN MINDSET – strongly resonate with psychological [100] and philosophical [8, 23] literature on empowerment, as well as with design theory [80]. Below, we briefly introduce the four categories and discuss their relation to related work. Table 1 provides an overview of the categories in our framework.

#### CONCEPT OF POWER

The distinction between *power-to* and *power-over* emerged as a central aspect to differentiate between the different notions of empowerment. For example, a system that aims to help a community to confront the ones in power is reminiscent of *power-over*, while a system that aims to enable people to build their own technology is reminiscent of *power-to*. We therefore include this distinction in our framework.

#### PSYCHOLOGICAL COMPONENT

The effect of empowerment in the papers we reviewed differed greatly and ranged from the feeling of power to skill development or taking action. We therefore integrated the category PSYCHOLOGICAL COMPONENT in our framework and define its manifestations as *feeling*, *knowing* and *doing*. This distinction has been derived from Zimmerman’s theory on psychological empowerment [100], which has been successfully applied to HCI research on empowerment by Ammari et al. [6]. While these components are, by definition, somewhat interdependent, we categorized the papers we reviewed according to the effect of empowerment in their main focus. A system focusing on *feeling* might for example aim at improving users self-esteem by providing positive feedback, a system focusing on *knowing* might teach users a new skill that improves their chances to find a new job, and a system focusing on *doing* might help users to get more work done in less time by automating certain processes.

#### PERSISTENCE OF EMPOWERMENT

The third category, PERSISTENCE OF EMPOWERMENT, can be *transient* or *persistent*. For example, while a prosthesis empowers its wearer immediately and only during use (*transient*), a voting system can help its users to gain political power which unfolds and persists after usage (*persistent*). Similarly, an educational technology may expand users’ skills and job opportunities after and beyond system use (*persistent*).

#### DESIGN MINDSET

In the fourth category, we adopt a distinction that Sanders [80] used to describe the design research landscape, namely the distinction between *expert* mindset and *participatory* mindset.

Categories	Manifestation	Definition	Examples
CONCEPT OF POWER	power-to	Power is understood as “something - anything - which makes or renders somebody able to do, capable of doing something” (as in [8]).	Multi-sensory, interactive maps for visually impaired children[17].
	power-over	Power is understood as a relation between two actors where “A has power over B to the extent that he can get B to do something that B would not otherwise do” [23].	A system that helps people to confront policy makers [41].
PSYCHOLOGICAL COMPONENT	feeling	Empowerment as perceived control, self-efficacy, competence and motivation to exert power.	A system that increases users’ self-esteem by balancing scores according to physical ability [33].
	knowing	Empowerment results in understanding and learning the awareness of action opportunities and the development of skills related to problem-solving and exerting power.	Educational games [45, 46, 90] or a system that allows women to gain self-knowledge by looking at their vaginas [3].
	doing	Empowerment results in the exertion of power and taking action.	Systems that enable people to achieve their goals in the first place, or in quicker or more efficient ways [7, 64].
PERSISTENCE OF EMPOWERMENT	transient	Empowerment happens immediately, and only, during system use.	Mobile phones [61] or systems assisting or supporting handicapped persons [7, 18, 72].
	persistent	Empowerment happens beyond and persists after system use.	A public voting system [88] or an educational videogame [45].
DESIGN MINDSET	participatory	Technology can only be empowering when designed from the empoweree’s perspective.	Multimodal games for fall rehabilitation co-designed with seniors [93].
	expert	Researchers analyze the need for empowerment from a third person perspective.	Researchers analyzing crowdsourcing platforms, which encourage the exploitation of crowdworkers [1].

**Table 1. The categories and their manifestations of our framework, illustrated by examples from the literature we reviewed.**

When an *expert* mindset is adopted, design researchers see and refer to people as “subjects”, “users”, and “consumers”. When a *participatory* mindset is adopted, design researchers “value people as co-creators in the design process” [80]. The DESIGN MINDSET is especially relevant when designing empowering technologies. Several researchers have questioned the validity of empowerment being given or granted by those having power and stressed the importance of empowerees taking initiative as well [28, 42]. If this argument is followed, it would likely be necessary to employ a *participatory* mindset to empower people. However, as experts’ knowledge and competences can be equally beneficial in the design of empowering technologies [42], obtaining balance between the two seems ideal.

#### ANALYSIS OF EMPOWERMENT RESEARCH AT CHI

After deriving this framework from our literature analysis, we then used it to cluster the papers we reviewed and thus answer

**RQ2** “Which lines of research on empowerment in HCI emerge from this characterization?”

The eight different lines of research that emerged from our analysis each share a different notion of empowerment. The black squares in table 2 mark the unique combination of characteristics of the notion of empowerment in a line of research, and therefore how it differs from the other lines of research. Gray squares mark characteristics that were true for only some of the papers in a line of research. The alluvial diagram in

figure 1 provides more details on how papers within a line of research were coded differently: Again the vertical pillars represent the four categories of our framework and their manifestations, while horizontal lines represent papers color-coded by the line of research. The diagram then shows the coding of each paper in every category (where a paper is coded as multiple manifestations of a category, the line splits).

Below we briefly describe each line of research by summarizing the *notion of empowerment* and providing an *example* for illustration purposes, a *synopsis* of other facets prevalent in this line of research, as well as a *takeaway*. Within these descriptions, we refer to the coding according to our framework categories where appropriate and necessary (for the complete coding of all four categories for all groups, see table 2)

#### A) Empowering Experiences

*Notion of Empowerment:* Empowerment refers to users’ autonomy or self-esteem. *Feeling* empowered is the researchers’ main focus. It may, in turn, affect empowerees’ behaviors as well, but concrete action opportunities are not regarded as a prerequisite for empowerment.

*Example:* In one project, Gerling et al. [33] used hidden balancing to enable people with mobility disabilities to compete with able-bodied peers in exergames. Hidden balancing was achieved through input, time, or score balancing, the latter meaning that individual score multipliers are set for each player. As the hidden balancing was often not recognized by players (but increased their self-esteem), it is evident that

Line of Research		Framework Categories								
		CONCEPT OF POWER		PSYCHOLOGICAL COMPONENT			PERSISTENCE OF EMPOWERMENT		DESIGN MINDSET	
		power-to	power-over	feeling	knowing	doing	transient	persistent	participat.	expert
A) Empowering Experiences	[12, 14, 22, 24, 32, 33, 40, 63, 68, 96]	■		■			■			■
B) Skills and Education	[3, 30, 45, 46, 50, 57, 87, 90]	■			■			■		■
C) Self-Enhancement	[7, 18, 19, 48, 59, 61, 60, 64, 66, 72, 78, 86]	■				■	■			■
D) Holistic Approaches	[6, 13, 70, 92]	■		■	■	■	■	■		■
E) Empowerment through Design Process	[11, 15, 56, 67, 93]	■		■	■	■	■		■	
F) Technology for Development	[54, 84, 89, 95, 99]	■	■	■	■	■		■		■
G) Protective Technology	[4, 1, 20, 82, 98]		■			■	■			■
H) Community Empowerment	[27, 41, 73, 76, 88]		■			■		■		■

**Table 2. Lines of research coded with the presented framework categories. Each row presents a line of research, each column a manifestation of the four framework categories. A black square indicates that all papers in a line of research were coded as the respective manifestation; a gray square indicates that *some* of the papers in a line of research were coded as the respective manifestation.**

this project is clearly focusing on the *feeling* aspect of PSYCHOLOGICAL COMPONENT: Players’ behaviors stay the same but the likelihood of them winning the game increases.

*Synopsis:* The *feeling* of empowerment can take on different forms. In the papers we reviewed its descriptions varied from “feeling powerful” [68], over a “sense of agency” [22], autonomy [24, 40, 63], or feeling safe to enjoying in-game experiences in public spaces [12]. Two papers in this line of research focused on fostering learners’ autonomy [24, 63] and three projects focused on people with specific impairments [32, 33, 96].

It was also observed that technology can (unintentionally) undermine users’ autonomy. Höök et al. [40], for example, argue that this is the case in many affective computing technologies, which “isolate, measure, interact with and influence our emotions”. Similarly, Bopp et al. [14] report that “monitoring and evaluation practices” led to disempowerment and the “erosion of autonomy” of mission-driven organizations.

*Takeaway:* Technology allows users to experience feelings that are associated with power and powerfulness, such as sense of agency, control, and privacy.

## B) Skills and Education

*Notion of Empowerment:* Empowerment is an attempt to help users acquire skills or knowledge that is expected to benefit them because it will translate to better development or job opportunities, better ability to achieve a task, or general wellbeing. In contrast to (A), research in this line of research focuses

on *knowing*. As knowledge or skills are expected to last beyond system use, empowerment is *persistent* (PERSISTENCE OF EMPOWERMENT).

*Example:* Almeida et al. [3] presented Labella, a system that allows women to construct “knowledge about ones own body” by looking at the vagina. Women’s understanding of their intimate anatomy is regarded as both crucial for their reproductive health and sexual wellbeing – and eroded by the social-cultural construction of the vagina “as something private, shameful and not to be talked about”. According to the authors, their prototype Labella empowers women through an improved understanding of their own bodies (*knowing*), which can be expected to last beyond system use (*persistent*).

*Synopsis:* Other papers presented systems to improve career development skills [87], language skills [46, 90], or scientific understanding [50]. Three of these focused on children in underdeveloped regions [45, 46, 90]. Two papers focused on task-specific knowledge and skills, namely on “critiquing” computer users to support their problem-solving and learning activities [30] and on informing design practices through data, and therefore on *empowering designers* [57].

*Takeaway:* Technology allows users to extend their skills or knowledge, which is expected to benefit them beyond system use.

## C) Self-Enhancement

*Notion of Empowerment:* Technology empowers its users by “allowing them to do things that [they] would otherwise be incapable of doing” [61] while using the system. Users are

given action opportunities they would not have without technology, thus fostering productivity, efficiency, independence and engagement. Hence, research in this line of research focuses on *doing*. The new abilities or opportunities last only during system use, and thus empowerment is *transient*.

*Example:* O’Connell and Choong call for interactive visualizations that “empower [...] information analysts to manage diverse, ever-increasing data; search information and visual spaces to better understand information; develop hypotheses; and collaborate.” [66]. Such a system would primarily help users to achieve more, to be more productive and efficient (*doing*). However, *feeling* empowered and *knowing* might more arise as a side effect.

*Synopsis:* Besides systems that increase users’ productivity or efficiency [60, 64, 66, 86], work in this line of research includes two other ways technology may empower: (1) It may give its users *new* abilities, for example by assisting or supporting handicapped persons [7, 18, 72], or through mobile phone usage in general [61]. (2) It may give its users *new* abilities, but users may determine the nature of these abilities *themselves* by building technology that fits their needs (*Do-It-Yourself*). Thus, users may develop the “ability and confidence to control the technology in their life” [59] and actively engage in shaping future technologies [78].

*Takeaway:* *Technology allows users to do things they would otherwise not be capable of.*

#### D) Holistic Approaches

*Notion of Empowerment:* Zimmerman [100] described the interpersonal, the interactional, and the behavioral components as fundamental parts of personal empowerment. Similarly, several papers took a holistic approach that suggests that *feeling*, *knowing*, and *doing* need to play into each other in a successful empowerment process. Two of these presented the design of a *system* [13, 92] and two of them presented *frameworks* for empowerment in technology design.

*Systems:* The first system is the vocal chorder by Unander-Scharin et al. [92]. According to the authors, empowerment was indicated by the changing self-image of opera singers (*feeling*), but this change in self-image happened because opera singers were able to “take control over the rhythmic pace and overall artistic and aesthetic outcome of their performances” (*knowing* and *doing*). Similarly, *feeling*, *knowing*, and *doing* were entangled in Bickmore et al.’s [13] virtual nurse agent. The agent helps people when they are in “one of the most disempowering situations one can experience in modern society”, being a hospital patient. The agent is described as an “animated, empathic virtual nurse interface for educating and counseling hospital patients”. It is designed to mitigate patients’ feelings of helplessness (*feeling*) and provides patients with more knowledge about their condition (*knowing*), which will potentially result in them taking action or making better decisions (*doing*).

*Frameworks:* Oulasvirta’s humanistic research strategy presents equality, autonomy, and control as the goal of empowering design. The paper includes a holistic view of steps towards designing empowering technology and the examples

that illustrate how to apply the framework arguably address *feeling*, *knowing* and *doing* [70]. Lastly, Ammari et al.’s [6] model of networked empowerment is derived from Zimmerman’s theory on psychological empowerment and therefore by nature addresses *feeling*, *knowing*, and *doing* explicitly and extensively.

*Takeaway:* *Holistic approaches to empowerment pay deliberate attention to the interconnectedness of feeling, knowing, and doing.*

#### E) Empowerment through Design Process

*Notion of Empowerment:* Users are empowered by having their voice heard and being put into the center of the design process (DESIGN MINDSET: *participatory*). In this view, putting users in the center of the design process itself leads to empowerment, as put by Baumer [11]: “practices of user-centered design have empowered technology users, making them the focus both of HCI design and scholarship.” This view is reflected in all papers in this line of research.

*Example:* Bossavit et al. “empowered [high functioning autistic teens] by assigning them specific roles across several [design] sessions” [15]. As “users”, “informants”, “designers” and “testers”, they developed digital educational games together with their teachers to improve Geography skills.

*Synopsis:* Other work in this group, applied participatory design techniques with older adults [56, 93]. On a different note, O’Leary et al. [67] suggest a new method of structured data collection – called Q methodology – which empowered participants because it allowed them to discuss “their health beliefs and attitudes with the interviewer.”

*Takeaway:* *Participatory design methods themselves can be regarded as empowering.*

#### F) Technology for Development

*Notion of Empowerment:* As power imbalances (e.g., between societies, genders, or socioeconomic groups) are of main concern, equality and empowerment are regarded as long-term goals. Effects of empowerment would entail social advancement, self-determination, or more fulfilled lives. Work in this line of research is characterized by the aim to gain a deep understanding for the communities in focus, which often involved long-term engagement with NGOs, social services, or collective organisations (e.g. [84, 89, 95]). The CONCEPT OF POWER of work in this group cannot easily be categorized as either *power-to* or *power-over*: On the one hand, a recognition of groups or communities as being oppressed (*power-over*) is the main motivation in these projects; on the other hand the approach taken is not directed towards confronting the ones in power (*power-over*) but towards extending the abilities of the powerless (*power-to*). To reflect this in our coding, we coded this line of research as *power-to* and *power-over*.

*Example:* Shroff and Kam [84] conducted 15 weeks of field research with NGOs that aim to empower women in the developing world. Their goal was to translate leanings into recommendations for technology design. The initial motivation of their project was the power imbalance between women and men in the developing world (*power-over*): “women in the

developing world face violence in varying degrees: forced marriage, spousal abuse, forced prostitution, and infanticide” [84]. Their design recommendations focus on giving women the power to achieve more (*power-to*) and not to confront or exert power over men: “promote an instructional sequence that leverages cultural elements to overcome fear of technology, use entertaining elements to interest women in professional development, and gradually incorporate numeric symbols to reinforce emerging numeracy skills”.

*Synopsis:* Several research projects were motivated by helping those in powerless situations to better their situations, e.g., women in the developing world [84], the homeless population [54], people living in rural areas [89], local communities disempowered by the consequences of the financial crisis [95], or Palestinian refugees [99].

*Takeaway:* *Technology design can aim at balancing social and global power by creating opportunities for the disadvantaged.*

### G) Protective Technology

*Notion of Empowerment:* Empowerment is mainly understood as countering the loss of control evoked by interacting with existing technologies. Technology aims at balancing power between an existing technology (and thus developers or providers) on one side and its users on the other. Hence, the main motivation of work in this line of research, is addressing the power imbalance between technology users (who are left with no option but to use the technology the way providers present it) and providers. Moreover, we coded empowerment in this line of research as primarily *transient* as empowerment is intended to happen within the context of technology use. However, it might lead to more reflected and proactive consumer behavior in general and therefore facilitate *persistent* empowerment. *Example:* In Almuhmedi et al.’s [4] work, empowerment is seen as giving users’ control over their private data. In particular, they use nudges as a privacy-enhancing technology to make users aware of and thus capable of reacting to data collection during smartphone usage.

*Synopsis:* Research employed nudging [4, 98] to increase users’ risk awareness, or monitoring [20, 82] to allow users to better control their broadband use.

*Takeaway:* *Technology itself can be the source of disempowerment.*

### H) Community Empowerment

*Notion of Empowerment:* Papers in this line of research describe a power imbalance between specific groups (*power-over*) and aim at helping the disempowered to confront the ones “in power”. It explores how technology can be used to help one group or community to acquire power over another, which is expected to last beyond system use (*persistent*).

*Example:* Hsu et al. [41], investigate the potential of a community-empowered air quality monitoring tool to address the “unbalanced power structure between citizens, governments, and businesses”. Their “design principle is to stimulate critical discussions and confront the current unbalanced power relation between stakeholders.” [41].

*Synopsis:* In four of six cases in this line of research the ones “in power” are represented by governmental institutions and agencies [27, 41, 76, 88]. On a different note, Rajanen et al. [73] investigate the power dynamics that take place in Open Source Software (OSS) development.

However, such an approach – to empower one group at the cost of another – has also been criticized as onesided. According to Harding et al. [35], the fact that system designers “focus almost exclusively on empowering citizens rather than adopting an informed, inclusive approach that addresses the needs of both citizens and civic authorities [...] sustained use and perceived value of civic engagement technologies remains low”. In their research, Harding et al. therefore focus on fostering mutual trust.

*Takeaway:* *Technology can facilitate the negotiation of political power.*

### LIMITATIONS

We are confident that our framework can help to classify a broad range of research on empowerment in HCI, although it is certainly not the only way of doing so. Several decisions we made when conducting this literature review and constructing our framework present possible limitations of this work:

First, we selected the boundaries of our literature review to include only CHI full papers that use either the terms “empower” or “empowerment”. With this we excluded work that strongly relates to the concept of empowerment without using the term explicitly, such as work on enabling technology [79], or on choice architecture [43]. This decision was based on what we perceive as an increasing trend towards using the term “empowerment” itself as a keyword both in industry and HCI research without further explanation. Discovering what is behind this mere labeling and resolving the current terminological fuzziness initiated our work on the paper. A parallel example can be seen in the increasingly unclear use of “user experience” for describing a variety of usability-related concepts. Future work will need to test whether our framework is applicable without changes to related concepts.

Second, we decided to integrate four main categories in our framework despite the emergence of several alternatives during our discussions. For example, papers differed in the way the need for empowerment was diagnosed (by researchers, empowerees, or a third party) and in their evaluation of empowerment outcomes (evaluation with users, reflection by researchers, or no assessment at all). It would also have been possible to distinguish between papers focusing on individual or community empowerment. Even though papers differed widely in these aspects, integrating them in the framework did not help to identify patterns and cluster in our data set. Hence, we left them out for the benefit of simplicity and clarity. However, we welcome other research to extend, amend and validate our framework.

Third, we decided to base our framework on existing discourses on power and empowerment in social and political sciences. Hence, our classification of research on empowerment inherits the contestability that is pervasive in these discourses. For example, some papers addressed more than

one PSYCHOLOGICAL COMPONENT and have been coded according to the primary focus of the paper (as understood by us). But, even though some papers could possibly be coded differently, we strongly believe that our framework and analysis can bring an added value by structuring research on empowerment in HCI.

## DISCUSSION

With the presented survey and framework, we hope to increase awareness of the different facets of empowerment and to help other researchers to obtain an overview of the field of empowerment research in HCI, to understand commonalities and differences between their own work and the work of others, to locate their research in related work, and to plan future research. In short, we intended the paper to be a reference point for terminology and structure for everybody who is using the term “empowerment”, be that in their research framing or in publications.

### Recommendations for HCI Research on Empowerment

To facilitate a more structured discussion on empowerment, we propose several specific recommendations for HCI researchers in the field:

#### *Reflect on the underlying ethical maxims of empowerment*

Power is the foundation of empowerment, yet the majority of publications reviewed refrained from defining the term power explicitly - an observation that has for example been discussed in the literature on employee empowerment before [36]. Similarly, the ideal state to be reached through empowerment, i.e., the underlying ethical maxim, is rarely made explicit, even though most papers seem to implicitly raise some sort of ethical claims.

We argue that it is necessary to discuss the notion of power as well as the research project’s aims and goals and underlying ethical maxims before making any judgement about the effectiveness of empowerment. Different ethical maxims have been well discussed in philosophical literature. For example, do we aim for equality (every individual/group should get the same), as suggested by Rawls’ theory of justice [75], for equality of chances (every individual/group has the same chances regardless if they take them or not) or for a minimum threshold of each capability for everyone (as suggested by Nussbaum [65])? Other maxims are thinkable and each of them can lead to different recommendations and have their specific side-effects (e.g., preferring a lower power level as long as it is equal between groups).

Defining one’s ethical maxim is certainly a challenging task. Nonetheless, researchers should reflect and make transparent the implicit ethical maxim they use when talking about or requesting empowerment. We hope that our research highlights this need for reflection and gives food for thought in this direction.

#### *Consider the design implications of different notions of power*

Our analysis further revealed that reflecting on the notion of power (as *power-to* and *power-over*) is of importance when

designing for empowerment. Both notions require a differentiated view to understand the consequences and possible pitfalls of design.

*Power-over* investigates social or political power imbalances between multiple actors. Investigating and designing for *power-over* situations holistically is challenging: Designers and researchers might have well-intended goals – e.g., to empower the unemployed population to earn a salary by conducting micro-tasks on crowd-sourcing platforms. However, the same technology can turn out to be disempowering, as it might allow employers to circumvent workers’ rights, which are in the real world protected and relentlessly defended by unions [1].

Since *power-over* deals with power comparisons between different groups, the difference of power between those groups appears as an obvious metric by which empowerment is judged. Following this implication, different cases of change in power could lead to empowerment. For example, an increase of power in the targeted group is possible (without taking away power from the counterpart) just by transferring power from one group to another (while the sum of power is held constant). Alternatively, a decrease of power in the superior group would also lead to a smaller power difference and therefore to empowerment of the targeted group despite not changing their own power. Here, the sum of power is decreased, but all have the same (low) power. Moreover, there might be situations in which power imbalances are preferable, e.g., if more experienced or competent actors hold more decision power. To address these challenges holistically, we propose to adopt an “informed, inclusive approach that addresses the needs of both [actors]” [35] as pursued by Harding et al.

*Power-to* is predominant on an individual level and aims at increasing power for a single person (no power is taken away from a third party if the individual gains power). Designing technology based on this understanding seems more straightforward as it only requires a proper analysis and understanding of one actor’s situation. Designing for empowerment is, however, not without pitfalls: Technology based on an notion of *power-to* was, for example, perceived as disempowering because it framed people as worse off [77] or offered more help than needed [31, 52]. Health management tools have been described as disempowering because they come with specific expectations on how patients have to behave and therefore interfere with their autonomy [94]. To avoid such unwanted side-effects, we recommend to adopt a holistic perspective, that considers all three psychological components (*feeling*, *knowing*, and *doing*).

#### *Draw from existing work in social and political sciences*

Research on empowering technologies should be based on related work on power and empowerment in social and political sciences. In the context of our framework, introducing the distinction between different concepts of power [2] and Zimmerman’s work on empowerment [100] turned out to be a fruitful basis for analysis. Other work, such as Sen and Nussbaum’s *capabilities approach* (CA) [65] might similarly aid to theoretically ground the concept of empowerment in HCI. The CA has become influential in other fields such as welfare economics,

international development and human rights and, recently, several authors in computer ethics, philosophy and technology for development (ICDT4D) advocated the CA as framework for designing empowering technology (e.g., by Johnston [44], Oosterlaken [69]). However, none of the reviewed papers mentioned this approach. For HCI research projects, adopting the CA would likely entail starting from people's wished-for outcomes and measuring the degree to which they have been attained [69]. While the capability approach does not propose specific methods to design and evaluate interventions, several operationalizations provided operationalizations that attempt to do so, e.g., Kleine et al. [49] or Alsop and Heinsohn [5]. Such operationalizations could provide methodological grounding of empowerment evaluations in HCI, which is an important area for future work as few research projects in our review attempted or addressed the evaluation of empowerment (for notable exceptions employing quantitative measures see [41, 66] and qualitative methods see [40, 41, 70, 92]). We hence encourage other researchers to make use of existing work to enhance conceptual clarity.

#### *Contribute to a structured analysis of empowerment*

For a differentiated analysis of the concept of empowerment and to adequately frame any research claims, we recommend to clearly articulate the decisions researchers make when investigating empowerment. We suggest the four categories of our framework as a possible guideline in this matter:

(1) The first decision is the CONCEPT OF POWER that research is based on: Researchers can think of power as extending abilities (*power-to*) or as a limited resource that has to be redistributed (*power-over*).

(2) The second decision is the PSYCHOLOGICAL COMPONENT in focus: Does empowerment mean for researchers that empowerees *feel* empowered? That they are more aware of their situation, acquire new skills or a better understanding of issues that matter to them in their lives (*knowing*)? Or does empowerment only take place when empowerees (have the opportunity to) behave differently (*doing*)?

(3) The third decision concerns the PERSISTENCE OF EMPOWERMENT: Should empowerment happen immediately and only during system use (*transient*)? Or should empowerment last beyond system use (*persistent*)?

(4) Finally, the fourth decision is whether to adopt a *participatory* or *expert* DESIGN MINDSET: What do we gain from taking on an expert's perspective when designing empowering technologies? What do we gain from incorporating the empoweree's perspective as much as possible and which methods are best suited to accomplish this?

#### **Concluding Remarks**

In this work, we reviewed papers on empowerment in HCI, constructed a framework grounded in work on power and empowerment, and described different lines of research prevalent in our community. Our analysis revealed that notions on power and empowerment differ greatly between eight lines of research. To inspire a more structured discussion about the concept of empowerment, we provided several recommendations which we hope may guide this dialogue. We strongly

believe that the turn towards empowerment in HCI has the potential to influence technology design for the better. However, to utilize this potential in a responsible way, in each individual case, it 1) requires a definition of the underlying maxim and goal of empowerment and 2) an evaluation to what extent the envisioned goal has been reached. Unchallenged calls can entail the risk of becoming a mantra and lead to ineffective (and potentially detrimental) design choices. Appropriate metrics are required to prevent such negative effects and ensure the effectiveness of the chosen form of empowerment. They are also needed as a foundation for design guides and best practices and to differentiate between effective and ineffective approaches of empowerment. In order to develop such metrics, a clear understanding of empowerment is needed: Who is the target group, which are the targeted psychological components, do we aim for an increase in power or a decrease in power difference? In Zimmerman's words, "the development of a universal and global measure of empowerment is not an appropriate goal because it may not mean the same thing for every person, organization, or community everywhere." [100]. Our framework provides starting points for finding these metrics. But more than that, we hope to have highlighted the need to consciously reflect on the notions of power and empowerment researchers want to adopt for their project.

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