A Scoping Review of Informed Consent Practices in Human-Computer Interaction Research

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Obtaining informed consent is a fundamental ethical requirement in research involving human subjects, designed to ensure autonomy, respect, and the protection of participants. However, new technologies and research methodologies in Human-Computer Interaction (HCI) present unique challenges in maintaining ethical standards and require a deeper understanding of how consent practices are implemented. This scoping review provides a detailed examination of the frameworks, methodologies, and practices for obtaining informed consent in HCI. We present recognized universal principles while also discussing the ethical guidelines, and legal frameworks that underpin consent processes. Furthermore, we analyze the practices of disclosure, screening, consenting, and confirmation to assess how researchers ensure voluntary participation. The review addresses key criticisms and challenges identified in the literature, suggesting improvements and exploring alternative approaches. By offering comprehensive insights into the complexities of informed consent, we underscore the ongoing need for ethical awareness and continuous refinement of ethical conduct in HCI.

CCS Concepts: • **General and reference → Surveys and overviews**; Empirical studies; • **Human-centered computing → Human computer interaction (HCI)**; *HCI design and evaluation methods*.

Additional Key Words and Phrases: Ethical research, informed consent, consent process, consent forms, literature review

1 INTRODUCTION

Informed consent is a cornerstone of ethical research involving human subjects. It refers to the process by which a participant is informed about the aspects of participating in a research study, including its purpose, duration, procedures, potential risks, and benefits. While the principle of informed consent emerged within the context of medical research–particularly clinical trials–its significance is universally acknowledged across the disciplines dealing with human subjects. This encompasses user studies within human-computer interaction (HCI), in which the subjects are involved as participants for testing a wide range of novel technologies, systems, and applications.

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In that interdisciplinary and progressive field, researchers not only apply a wide range of existing methodologies for obtaining informed consent but also establish new practices and methodologies to ensure ethical conduct.

The nature of HCI research creates complex interactions between humans and technology, which require solutions to ensure that participants fully understand the impact of their involvement. Researchers in HCI are not only being confronted with a massive body of implications, such as for data protection, privacy, screening, or blinding the participants ensuring the ecological validity of the research, but also with formal requirements, legal standards, or external ethical approvals. While external research approval typically demands a copy of an informed consent, they often lag behind the reality evident in the rapid emergence of artificial intelligence (AI), ubiquitous computing, or physiological sensing. Researchers encounter bureaucratic hurdles in the approval of their research [55, 263], seek waivers of informed consent in public settings [388, 399, 400], but also help to identify and prevent ways of misusing personal information [266, 270, 349]. As technology becomes more ubiquitous, immersive, and integrated into daily life, the potential for unforeseen consequences in the context of HCI research and obtaining informed consent grows.

The rapid pace of technological advances means that today's innovation could be tomorrow's ethical dilemma. The HCI community emphasizes the high standards of ethical conduct, which is not only evident in a huge body of papers around the informed consent process, but also in public discussion panels [123, 134], workshops [43, 168], and courses [168, 215, 221] at recent CHI conferences. While the ethics of consenting and the process of obtaining (informed) consent are considered to be the cornerstone of ethical research, the practice is also repeatedly questioned, manipulated, or circumvented for multiple reasons [55, 294, 388, 388, 400]. Therefore, it is important to understand the ethical implications of obtaining or assuming consent, to summarize the aspects related, and how the community perceives and applies that process.

To gain an overview of the practices in obtaining informed consent and to better understand its role in ethical HCI research, we conducted a comprehensive scoping literature review. Our work focuses on the research question of what the applied practices, frameworks, and perspectives on informed consent in the field are and what they look like. Through the review of the literature, we look into the intricacies of the process and shed light on the current methodologies, challenges, and potential ways for improvement, emphasizing the critical role of ethical awareness and voluntary participation. Our work ranks among other reviews of ethical issues in HCI and is intended as a reference for the methods and practices currently in use. It also emphasizes the consistent provision and clarification of definitions and terminologies that are to be provided as references for other work. It joins discussions of ethical research and not only provides insights into the practice of HCI researchers but also provides other disciplines to gain an overview of the field and gain new insights.

2 REVIEW METHOD AND ANALYSIS

We utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)-Sc method for scoping reviews [280] and thematic analysis [54] to investigate the current landscape of informed consent practices in the field of HCI. We started by identifying the initial keywords for the literature search, determined the sources of our literature search, and the inclusion as well as the exclusion criteria.

2.1 Database and Search Strategy

We used the ACM Digital Library (ACM-DL) as the initial database for paper retrieval due to its comprehensive article collections and symposiums in the field of HCI research with human subjects. In the beginning, we experimented with different keyword combinations related to our research question and identified a set of keywords that gave us the best matching set of literature for further analysis. The query we used is shown in Figure 1 and was executed in Q2/2024, which yielded 324 entries. The search was not limited to certain paper types, venues, or date ranges. Consequently, we included position papers, panel proposals, workshops, and courses, as

well as other scoping or systematic literature reviews concerned about ethics in HCI in which informed consent procedures are being addressed. An R Script using the bib2df package[1] converted the original Bibtex file from the ACM-DL into a spreadsheet. A total of 284 PDF documents could be retrieved based on their document object identifier (DOI) or Google search and were screened for eligibility.

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"query": Abstract:(("ethics "OR "ethical" OR "consent") AND ("human-computer interaction"
OR HCI)) "filter": ACM Content: DL
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Fig. 1. Search query used for key phrase search in the ACM Full Text Collection.

2.2 Eligibility Criteria and Screening

All retrieved results were screened based on their paper titles, abstracts, and full texts according to the following inclusion criteria: (1) the work is in English, (2) the work is dealing with ethics of informed consent, (3a) challenges, (3b) implications, or (3c) solutions in the process of obtaining (informed) consent. We did not include a body of empirical papers that merely mentioned that they obtained informed consent from the participants (e.g., "After signing an informed consent form,...") without further discussing or presenting more details during the informed consent process.

To ensure the accuracy of the initial screening, we implemented a four-eyes principle. Five of the authors were each responsible for independently verifying a number of approximately 50 articles. All selections were then blindly counter-checked by another author. The inter-rater reliability was found to be good (Cohen's κ = .746). The first author documented and moderated regular discussions to clarify any discrepancies. Out of the 324 articles evaluated, 140 were determined to be relevant to our research.

Moving into the eligibility phase, we thoroughly reviewed the 140 articles and identified 451 additional articles using the back- and forward snowballing method [405]. Thirty records were removed as they were duplicates from the ACM-DL records. The large corpus of additional entries emerged through in-depth research into referenced work in the field of HCI. In cases where no references were given and no snowballing was possible, manual search was used (e.g., for some definitions or detailed process descriptions such as "blinding" or "waiver of consent"). Backward snowballing was applied using the reference list of each paper, forward snowballing with the candidates citing the paper was done based on the information in Google Scholar. The manual literature search was facilitated using Google Scholar and ChatGPT 4 with the ScholarAI Plugin and Scholar GPT respectively. Keywords identified during open coding, such as "E-Consent" and "Dynamic Consent," were used to find additional or original paper records.

ChatGPT 4 and ScholarAI assisted in (1) keyword and synonym identification, (2) brainstorming to cluster themes, and (3) identifying potential papers of interest during snowballing. The ScholarAI Plugin enhanced the search process by leveraging a large dataset of "200M+ papers"[2] (Q2/2024) to efficiently search for and retrieve literature based on existing records, preventing any forms of hallucination by ChatGPT. This combination allowed us to uncover studies and papers that might have been missed in the initial database search, leading to a comprehensive and thorough review of informed consent practices in HCI research. We removed the duplicates, retrieved the papers, and started the open coding process by screening 284 records for the terms "ethics," "informed," as well as "consent" and analyzed them to see if any new or existing codes emerged.

If a paper specifically mentioned combinations of the terms searched, we read through the paper to identify the concrete relation to obtaining consent in HCI research and checked how the information revealed more

[1] https://cran.r-project.org/web/packages/bib2df/index.html
[2] https://scholarai.io/

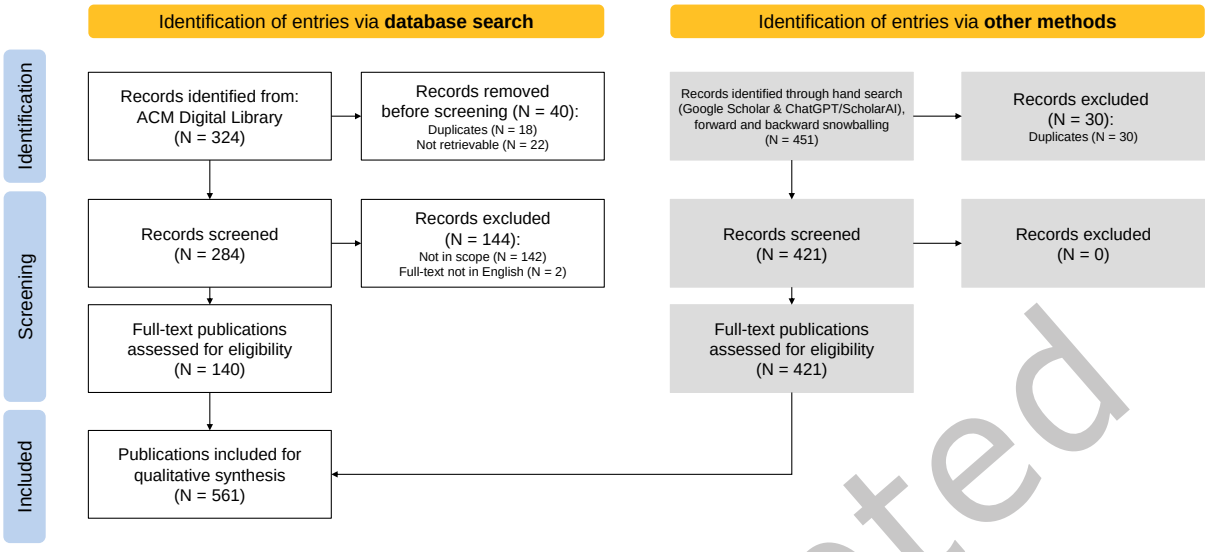

Fig. 2. PRISMA flowchart of the article selection process.

about the practice in the field. The manual search was a complementary component in the thematic analysis to find definitions and deeper explanations used to understand related concepts. Thus, the analysis of the records focused on the practices in HCI, but also delivered important insights and relations into the themes of HCI-related disciplines. The manual search was also accompanied by snowballing until no new topics emerged.

Aligned with our research questions, the authors initially categorized the records into the main themes: "Frameworks," "Methodologies," and "Perspectives," as well as their corresponding sub-themes (e.g., "Improvements" in the category "Perspectives"). The process was followed by an open coding process to screen each record and to understand if new sub-categories emerged and/or if information on existing categories could be extracted. The criteria were subsequently cross-validated and refined by another author to ensure the eligibility of each record. A total of 561 articles (140 from the ACM-DL, 421 found using forward and backward snowballing) were finally considered and analyzed in the thematic analysis of the results. The complete paper selection process is shown in Figure 2, while the list of screened papers can be found in the supplementary material of this work.

2.3 Coding and Thematic Analysis

Based on the content of each paper, we coded the categories of the authors' comments regarding informed consent practices. Five authors contributed to the open coding of the themes, each starting with an average of 28 papers. As already mentioned, we identified new categories using forward and backward snowballing and counter-checked each paper to ensure correct coding. The large number of snowballed records helped us gain a comprehensive overview of the practice, as the works from the original database corpus would have offered only a narrow and limited thematic insight. We used Atlassian XMind to structure the emerging themes and maintain an overview of their relationships. The final map of that process is shown in Figure 3.

For synthesis, we used thematic analysis and started with an inductive search strategy based on the main themes, followed by a deductive open coding process to identify new themes [169]. According to Rahman et

al. [298], large language modelss (LLMs) can effectively generate ideas in academic research. Therefore, all authors used ChatGPT 4 independently in the inductive part of the analysis for concept and synonym identification, structuring of common patterns in the data, and improving the wording of the themes (c.f. [359]), not for the final synthesis or writing. This complies with the ACM guidelines on its use[3]. The qualitative analysis began by examining research-related terms based on ACM-inspired definitions:

(Informed) Consent. The key aspect of our research is to understand and systematize the methodologies used in HCI research to obtain *consent*, where a human subject voluntarily confirms their willingness to participate in a particular research study. An *informed* consent practice is defined by the subject's willingness to participate after the researcher supplies them with the information necessary to make an autonomous decision and ensures that the subject adequately understands the information provided.

Human-Computer Interaction. HCI is a multidisciplinary field of study focusing on the design, evaluation, and implementation of interactive computing systems for human use, and on the study of the major phenomena surrounding them. Due to the multidisciplinary nature of HCI research, a distinction between clinical, medical, biomechanical, and user studies can be difficult. For example, while double-blind randomized medical studies testing drugs are different from typical interventions in user studies in HCI, empirical studies on novel prototypes and artifacts can be very similar. Thus, wherever possible, we took into account similarities and differences between the fields; however, we always included incidences in the records that are important or related to the field of HCI.

3 RESULTS OUTLINE

This scoping review covers the three categories of obtaining informed consent in HCI: the frameworks, methodologies, and perspectives. The presented structure may serve as a narrative guide for practitioners or researchers, offering a comprehensive overview in understanding how these elements work together. This may inform their approach to ethical decision-making and improve the implementation of informed consent in their research and practice. An overview of the themes identified can be found in Figure 3. The final synthesis of the results aligns with the following content of the themes:

- Frameworks
  - Universal Principles
  - Ethics Frameworks
  - Legal Frameworks
- Methodologies
  - Disclosure Practices
  - Screening Practices
  - Consent Practices
  - Confirmation Practices
- Perspectives
  - General Critiques
  - Challenges
  - Improvements
  - Alternatives

[3]https://www.acm.org/publications/policies/new-acm-policy-on-authorship

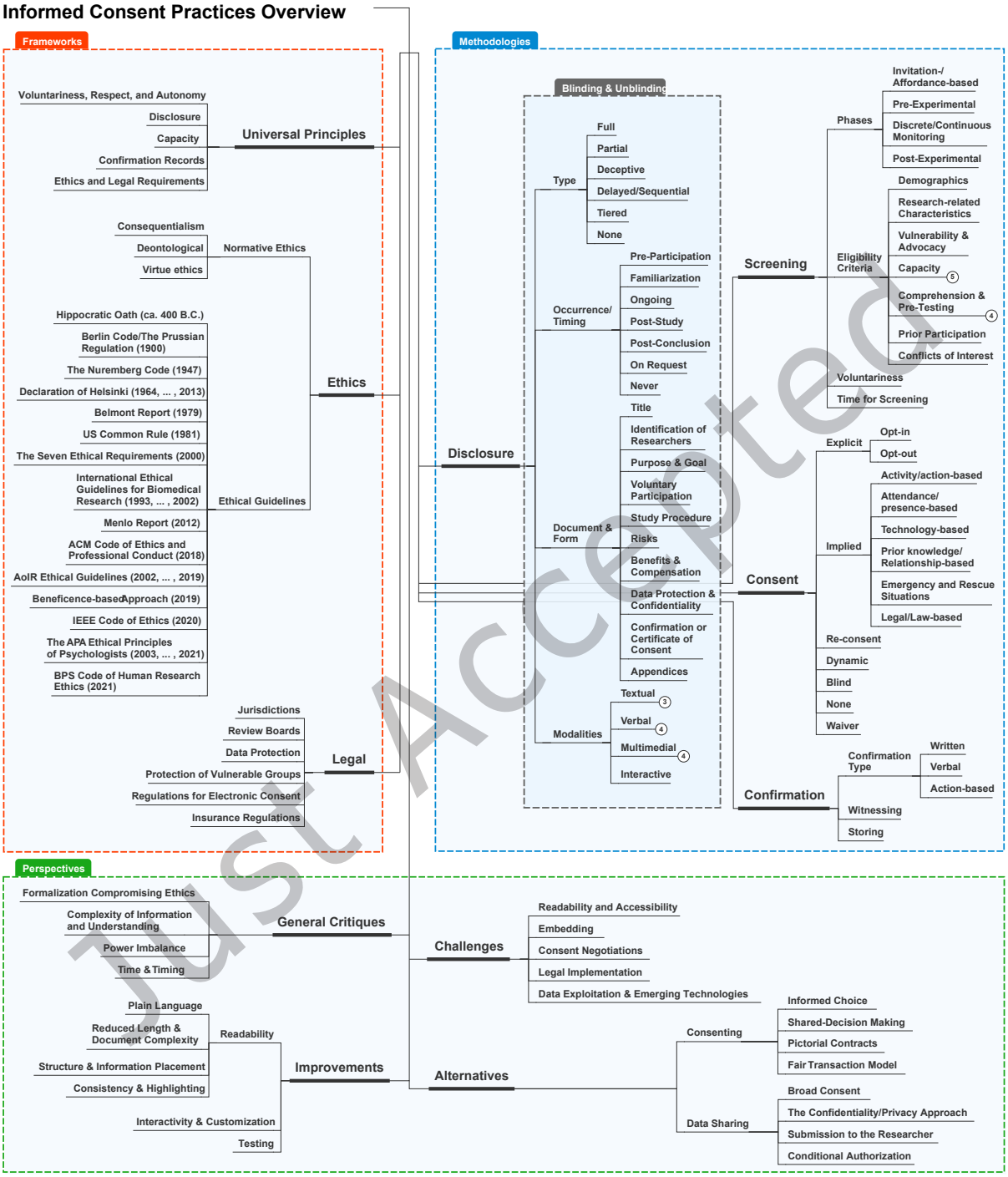

Fig. 3. Content overview map of the themes identified in the scoping review of informed consent practices.

4 FRAMEWORKS

Frameworks provide initial comprehensive guidance for obtaining informed consent on legally necessary or morally correct behaviors and address issues of rights and respect for individuals, which is essential in investigating the complex interactions between humans and technologies. Legal frameworks, established by governmental or regulatory bodies, provide mandatory rules but may lack the flexibility needed to address specific ethical dilemmas found in HCI research. Ethics frameworks often extend beyond the minimum legal requirements in obtaining informed consent, offering nuanced insights necessary for ethical decision-making in HCI research. Thus, researchers frequently navigate both ethical and legal frameworks, which are not always harmonized and lead to criticisms within the community [55, 93, 106, 263, 331, 343]. To provide a consistent starting point for obtaining informed consent and to bridge gaps between different frameworks, we identified a set of universal principles that serve as common ground within the identified ethical and legal frameworks for HCI researchers.

4.1 Universal Principles

The universal principles identified provide a foundational baseline that transcends all frameworks, ensuring a consistent approach to informed consent in studies with human subjects. These principles form the core guidelines that influence and shape informed consent practices in HCI (and other disciplines), helping researchers navigate varying jurisdictional requirements while maintaining ethical integrity. Our review found that the reviewed articles agree upon the following definition of these principles without exception. Individual citations for the components of these principles were omitted. The definition can be considered as the basis of *informed* consent practices and serves as a detailed definition:

4.1.1 Voluntariness, Respect, and Autonomy. The reviewed work acknowledges that informed consent must be obtained voluntarily, revocable, beneficial, and without coercion, manipulation, or undue influence. Individuals should have the freedom to make decisions about their participation in research based on their own values, beliefs, and interests. Individuals must be aware of their rights and the ongoing ability to withdraw their consent at any time and without penalty.

4.1.2 Disclosure. Researchers must provide individuals with relevant and understandable information about the research necessary to make an autonomous decision. The information should be presented in a clear, unambiguous, and comprehensible manner, taking into account the individual's language, culture, education, and physical as well as cognitive abilities. This information must include the research purpose, procedures, risks, benefits, alternative options, and any potential conflicts of interest. Researchers should maintain open and transparent communication of information throughout the research project, providing updates, addressing any changes in procedures or risks, and re-evaluating consent if circumstances change.

4.1.3 Capacity. The participating individual must be capable of making the decision, appreciate the implications of their decision, understand the information provided, and make a rational judgment based on that understanding. Capacity assessments, as well as legal representatives, may be necessary for people who may have impaired decision-making abilities due to age, mental illness, cognitive disabilities, or other factors.

4.1.4 Confirmation Record. The confirmation and its record ensure that the individual received, understood, and consented to the information provided, which can act as legal protection for the researchers. The documentation is implied and required for updates, re-consenting, and clarifying the identities, roles, and responsibilities of the research.

4.1.5 Ethics and Legal Requirements. Informed consent must comply with the *applicable* ethical guidelines and legal requirements. Researchers should be aware of and adhere to the specific laws, regulations, and ethical guidelines relevant to the research setting. Due to local differences, there is no universal legal or ethical guide;

however, it is considered a universal principle to conform to the legal laws and ethical guidelines of the society in which and with which the research is conducted.

4.2 Ethics Frameworks

After internalizing the universal principles, it is important to consider individual ethical frameworks, which provide more precise theoretical and practical foundations for obtaining informed consent. In HCI research, ethical frameworks help distinguish between normative ethics, which set out broad philosophical principles for determining what is morally right or wrong, and ethical guidelines, which provide specific standards and rules for research involving human subjects. We distinguish between *normative ethics* as broad philosophical principles for determining what is morally right or wrong by obtaining informed consent and *ethical guidelines* that offer specific standards of rules governing HCI research involving human subjects.

4.2.1 Normative Ethics. The three main streams in normative ethics are *consequentialism* (including *utilitarianism*), *deontology*, and *virtue ethics* [346]. In HCI, all of them are repeatedly addressed and are the subject of discussions around how technology impacts humans and how to obtain consent in using that technology [165, 198, 418]. While consequentialism focuses on the outcomes of actions to determine their moral value, deontology emphasizes inherent moral duties or obligations associated with specific actions. Virtue ethics prioritizes the development of virtuous character traits for ethical behavior. Each of these ethical theories provides another perspective on using informed consent:

Consequentialism/Utilitarianism Ethics. These approaches emphasize maximizing positive outcomes and minimizing negative consequences for user experience, well-being, and societal implications. For example, if a system enhances user satisfaction, it could be considered ethically good. However, this consequentialist view can be problematic for informed consent, as it may justify bypassing consent to achieve a greater good, such as collective user satisfaction. Critics argue that there is no singular "greater good," and each target group must be considered independently, as seen in gaming where content suitable for informed adults may not be appropriate for children [363]. Utilitarianism, a form of consequentialism proposed by Bentham and Mill [383], posits that the morally correct action is one that produces the greatest happiness for the most people [136]. This theory's relevance to HCI is highlighted by debates surrounding Facebook's Emotional Contagion Experiment [212], which manipulated online user emotions through algorithms. While users provided informed consent by agreeing to Facebook's Data Use Policy, the adequacy of this consent is contested, as many users neither fully read nor understand the policy, which includes consent to experiments potentially manipulating their experience to evoke positive emotions. Critics assess such practices through ethical frameworks like utilitarianism and deontology, raising concerns about the sufficiency of disclosure and the ethical implications of informed consent in these contexts [185, 212, 365].

Deontological Ethics. Deontology, also known as duty-based ethics and associated with Immanuel Kant's categorical imperative [215, 418], emphasizes the inherent moral duties and obligations of specific actions, viewing certain actions as inherently right or wrong regardless of their consequences. This ethical approach prioritizes principles such as honesty, fairness, and respect for autonomy, advocating for adherence to these principles even if it leads to unfavorable outcomes. In the context of informed consent, deontological ethics considers obtaining informed consent a moral duty, essential to respecting participant autonomy, making it unethical to involve participants in research without their full and informed consent [116, 167]. Consequently, informed consent, as well as submitting the research to an ethical committee or Institutional Review Board (IRB), is a deontological commitment [253]. Hooker and Kim [165] argue that actions taken by AI do not violate patient autonomy in deontological ethics if informed consent has been given, underscoring the importance of the consent

process itself as a real-world application of deontological ethics, which contrasts with consequentialist approaches that focus on outcomes over process [418].

Virtue Ethics. Virtue ethics, a category of ethical theories emphasizing moral character over consequences or rules, focuses on *how one should be* rather than *what one should do*. This approach, seen as flexible and nuanced, requires significant moral sensitivity and discernment. Some researchers view virtue ethics as a potential replacement for obtaining informed consent or IRBs approvals, advocating for a participant-centered approach that aligns decisions with participants' values and best interests [100, 175, 312, 331]. In HCI, virtue ethics is considered a solution to challenges like the privacy paradox, where personal values and circumstances significantly impact decision-making [41]. However, its limitations are noted, such as in discussions comparing technology use consent to sexual consent, where lacking consent from robots raises ethical concerns [290, 355]. In online and digital contexts, Rooney and Foley [312] propose a virtue ethics model focusing on empathy, trust, and anticipating moral dilemmas, though they acknowledge its labor-intensive and time-consuming nature may not scale well for larger populations.

4.2.2 Ethical Guidelines. In contrast to theories in normative ethics, ethical guidelines are concrete sets of ethical principles but have no legal power. They are often developed by professional associations, institutions, or jurisdictions to provide a framework for ethical decision-making and behavior. Ethical guidelines can cover a wide range of issues, from conflicts of interest and confidentiality to respect for human rights and social responsibility. Ethical guidelines are often the basis but are not necessarily implemented in legal rights, which is evident in discussions of the updated Declaration of Helsinki, which is currently accepted by the United States (US) Food and Drug Administration (FDA) only to its third revision [407].

Hippocratic Oath (ca. 400 B.C.). The principle of "do no harm," central to the Hippocratic Oath historically taken by physicians, aligns with the ethical considerations in informed consent of autonomy and privacy. Today, databases following these principles are also called *Hippocratic databases* [8, 9, 21], in which researchers must obtain informed consent and be transparent about data usage [21, 385].

Berlin Code (1900). Also known as the Prussian Ordinance, the Berlin Code is a precursor to the Nuremberg Code and marks the first documented mention of informed consent in history [386].

Nuremberg Code (1947). The Nuremberg Code, developed in response to the unethical Nazi medical experiments revealed during the Nuremberg Trials, established ten ethical principles for research involving human subjects, most notably the requirement for voluntary, informed consent [386]. This foundational principle continues to influence HCI practices today [221, 232, 409].

Declaration of Helsinki (1964, latest update: 2013). The Declaration of Helsinki, developed by the World Medical Association (WMA), is a cornerstone in medical ethics, emphasizing the need to respect the rights, safety, and well-being of research participants [366]. Its principles, including the requirement for ethical review and informed consent, are highly relevant to HCI research [64, 82, 409].

Belmont Report (1979). The Belmont Report, a key document in medical ethics, emerged from the ethical breaches of the Tuskegee Syphilis Study. It outlines three core principles—respect for persons, beneficence, and justice—which remain critical to informed consent in research, including HCI [71, 385, 409]. These principles address challenges in areas like anonymization in online studies [385].

US Common Rule (1981). The Common Rule, based on the Belmont Report, sets forth guidelines for biomedical and behavioral research, including the roles of IRBs, informed consent, and compliance [71, 249]. However, its applicability to modern contexts like big data and AI in HCI research is debated [71, 249].

The Seven Ethical Requirements (2000). Emanuel et al. [111] propose seven universal requirements for ethical research, including informed consent and respect for participants. HCI researchers recognize these guidelines but note they may not fully address ethical challenges in novel trial designs or machine learning (ML) applications [71].

International Ethical Guidelines for Biomedical Research Involving Human Subjects (1993, latest update: 2002). Developed by Council for International Organizations of Medical Sciences (CIOMS) and World Health Organization (WHO), these guidelines provide ethical principles for biomedical research, particularly in low-resource settings [71]. Although not directly applied in HCI, they are discussed in the context of "fair" conditions in randomized controlled trials (RCTs) [71].

Menlo Report (2012). The Menlo Report, developed by the US Department of Homeland Security, extends the Belmont Report by adding a principle of respect for law and public interest, particularly relevant for Information and Communication Technology (ICT) research [149, 293, 342]. It addresses gaps in ethical oversight for cybersecurity and other technology-focused research areas.

ACM Code of Ethics and Professional Conduct (2018). The Association for Computing Machinery (ACM) Code provides a comprehensive framework for ethical decision-making in computing, emphasizing informed consent, privacy, and user dignity [15, 59, 64, 211, 241, 406]. However, it has also been criticized for its impracticality in in-the-wild research [400].

AoIR Ethical Guidelines (2002, latest update: 2019). The Association of Internet Researchers (AoIR) guidelines, well-regarded in HCI, advocate for a case-by-case approach to ethics, emphasizing practical decision-making over rigid rules [55, 133, 211, 245, 385]. These guidelines are particularly relevant in online research, addressing power asymmetries and the need for pseudonymization in Big Data projects [133].

Beneficence-based Approach (2019). Kirchhoffer's [200] beneficence-based approach expands on the limitations of the autonomy-based model of informed consent in human research ethics. While autonomy and informed consent are essential, they may not fully capture the complexities of certain situations, especially with vulnerable populations. Kirchhoffer advocates for a more holistic ethical framework that includes principles such as beneficence (doing good), dignity, virtue, solidarity, non-exploitation, vulnerability, and self-ownership, alongside autonomy. He emphasizes human relationality and community, suggesting these should temper the principle of autonomy. This approach aims to ensure that human research not only respects individual autonomy but also serves the broader good of humankind.

IEEE Code of Ethics (1963, latest update: 2020). The IEEE Code of Ethics emphasizes global responsibility and respect for persons but does not explicitly require informed consent [60, 177].

The APA Ethical Principles of Psychologists (2003, last update: 2021). The American Psychology Association (APA) Code of Conduct outlines five ethical principles, including beneficence and respect for dignity [11]. For HCI, the requirement for both pre- and post-experiment feedback (debriefing) is particularly relevant, stemming from concerns raised by the Milgram experiment [186, 235].

BPS Code of Human Research Ethics (2021). The British Psychological Society (BPS) Code outlines ethical principles for research involving human participants, particularly in psychology and related fields like HCI [64, 96]. Critics highlight the growing complexity of ethical regulations in the UK [64].

4.3 Legal Frameworks

The legal framework for applying ethical practices and obtaining informed consent depends on national law and local regulations where the study is conducted. This is important for international research projects and online studies that encounter difficulties due to conflicting regulations or differences in national standards, such

as exploring cultural impacts [229]. In the following, we will not explicitly go into all the national regulations but provide a categorical overview of legal concerns and illustrate national differences and their impact on informed consent practices in HCI research with examples from national regulations. The legal regulations of consenting related to *emergency research* and *biobanks/genetic research* were not further elaborated due to their missing link to HCI.

4.3.1 Jurisdictions. Even though the United Nations (UN) is not a traditional jurisdiction, its authority extends to matters covered by its Charter, including the Universal Declaration of Human Rights (UDHR), which is incorporated into international treaties, regional human rights instruments, and national constitutions. It serves as a baseline for HCI research [221, 367], however, the UDHR is legally non-binding. The concept of "free consent" is instead anchored in the International Covenant on Civil and Political Rights (ICCPR) of the UN Charter (Chapter IV), in force since 1976 and signed by 173 countries[4]. Article 7 prohibits experiments without the "free consent to medical or scientific experimentation" of the subject. Jurisdictions set rules for obtaining informed consent, so researchers and institutions must first understand local laws before obtaining informed consent.

4.3.2 Review Boards. While the structure, function, and requirements of ethical review boards vary globally, ethical review boards typically require reviewing informed consent. In the US, federally supported human subject research must follow regulations under the National Research Act, known as the US Common Rule (1981), with approval by an IRB. An IRB, typically consisting of at least five members, including one non-scientist and one unaffiliated member, reviews research proposals, ensuring compliance with ethical guidelines and federal regulations. Proposals must include an informed consent form detailing research purpose, risks, and voluntary participation. In the United Kingdom (UK), Research Ethics Committees (RECs) or Human Research Ethics Committees (HRECs) review research involving human participants under the oversight of the Health Research Authority (HRA), focusing on participant dignity, safety, and well-being. Researchers must report serious adverse events or protocol changes to RECs, which may suspend or terminate studies, with *ongoing consent* ensuring participants' continued informed consent. Interventional studies generally require full RECs review, while non-interventional studies may undergo proportionate review. In the European Union (EU), the Clinical Trials Regulation (EU No 536/2014) governs clinical trials, while non-clinical research—and obtaining informed consent—varies by country. Some institutions do not necessarily require external approval, which can be crucial for publication, particularly in HCI, where discrepancies in ethical processes complicate fieldwork [12, 123, 264, 391, 399]. Since CHI 2024, the HCI community has addressed these issues by clarifying local ethical standards in the submission process. In interdisciplinary research, procedures can vary even within a single institution. Rooksby [311] highlights the challenge of choosing among multiple ethical committees, illustrating the complexities in HCI ethical review processes.

4.3.3 Data Protection. The legal framework for data protection is highly discussed in obtaining informed consent in HCI research due to the collection of personal data, including biometrics, IP addresses, behavioral data, and other sensitive information. The General Data Protection Regulation (GDPR), enacted by the EU, is one of the most comprehensive and stringent data protection laws worldwide [114]. It received significant attention in HCI as it requires explicit consent for processing any form of personal data and grants individuals extensive rights over their data, adhering to the principles of "privacy by design" and "privacy by default" [7, 195, 217, 320, 321, 388]. Participants must consent to data processing for specific study purposes, and the consent is invalid unless all processing organizations are explicitly named [270]. Researchers must only collect necessary data, use it solely for the stated purpose, and ensure secure storage to prevent unauthorized access or breaches. The informed consent form must clearly state these practices to comply with the GDPR [114]. The GDPR provides participants with

[4]https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-4&chapter=4&clang=_en

substantial rights, such as accessing, rectifying, and erasing their data ("right to be forgotten"). It also regulates the transfer of personal data outside the EU, posing challenges in balancing open science and individual rights.

While the GDPR does not prohibit the publication of personal data per se, it mandates transparency of data use to respect individual rights. Thus, researchers must inform participants if their data will be publicly accessible and the implications thereof within the informed consent. Importantly, the GDPR exempts data that is fully anonymized or publicly available from requiring consent, facilitating certain studies like ethnographies or public observational research [7, 321, 388]. In HCI, the GDPR has been extensively discussed [195, 217, 320], studied [270, 374, 412], criticized [327], and implemented [121, 189, 330]. Critics argue that stringent consent requirements can desensitize individuals to consent requests, potentially weakening the consent mechanism [327], which recently has also been addressed by HCI researchers [79]. Moreover, violations of the GDPR often go unpunished, and it may not fully apply to emerging AI technologies [156, 217, 349]. In response, the EU proposed the AI Act, regulating AI use, banning real-time biometric surveillance, and mandating disclosure of AI-generated content. Conversely, the US adopts a sector-specific approach with varied state laws like the California Consumer Privacy Act (CCPA), complicating international research projects.

4.3.4 Protection of Vulnerable Groups. Legal frameworks are crucial for protecting vulnerable groups in human subject research. These frameworks vary widely across countries and often include specific guidelines for groups such as children, pregnant women, prisoners, incapacitated persons, immigrants, or indigenous communities [143, 239, 311]. For instance, Rooksby et al. [311] report that research involving vulnerable groups at their institution must gain ethics committee approval, while internal committees decide on research not involving such groups. Recognizing the sociocultural context and needs of vulnerable populations is vital for implementing informed consent [52, 92, 292].

Certain countries have specific laws or guidelines to protect vulnerable groups and regulate how to obtain informed consent. For example, the Tri-Council Policy Statement [286] in Canada emphasizes informed and ongoing consent for indigenous groups. The age of consent varies, with the concept of a "mature minor" allowing some individuals below the age of majority to consent to research in places like the US and Canada [46]. HCI researchers advocate for standardized processes for minors [301] such as involving at least one parent or legal representative in consenting [239, 300, 326].

In animal-computer interaction (ACI) research or research of multispecies technology [34, 84], animals are considered a vulnerable group since they cannot provide consent. The European Directive 2010/63/EU mandates the protection of animal welfare in research, requiring researchers to obtain *mediated informed consent* from the animal's owner, breeder, or supplier, ensuring the well-being of animal participants [84]. This directive also covers the protection of wild animals, biodiversity, ecosystems, and non-human primates.

4.3.5 Regulations for Electronic Consent. The regulations for electronic informed consent, or "e-consent," vary globally. The FDA and the Health and Human Services (HHS) provide guidelines for e-consent in clinical investigations in the US. In Australia, the National Statement on Ethical Conduct in Human Research allows for e-consent when appropriate [2]. Similarly, Canada's Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2) permits e-consent if it suits the research context [1]. Thus, researchers should consider the legal situation and ethical guidelines when planning to use e-consent in a study. A comprehensive literature review by Verreydt et al. [381] revealed that there is no consensus on the necessary security and privacy requirements for an e-consent platform. This lack of agreement, coupled with the challenges of gathering requirements for "valid" consent and the limitations of existing solutions like blockchains, hinders the practical application of e-consent systems worldwide [381]. According to Padayachee and Eloff [279], this is particularly evident in software development, where e-consent is often neglected because it is seen as a non-functional requirement and difficult to implement across diverse environments, leading to many systems lacking proper consent mechanisms.

4.3.6 Insurance Regulations. Various institutions require participants and researchers to take out insurance in case of accidents, which should then be clarified in informed consent [336]. Although the legal framework in this regard has not been clearly elaborated in scientific work, anecdotal references can be found in the overview, as in brain-computer interface (BCI) research [201]. For example, if a BCI system is considered an enhancement (i.e., it provides abilities beyond what is considered normal) rather than a therapy (i.e., it restores or maintains normal function), it could impact whether insurance companies are willing to cover the costs of maintaining or replacing components of the system [201].

4.4 Summary

To obtain informed consent in HCI, researchers navigate through diverse and often complex ethical frameworks and regulations, balancing universal principles with the specific challenges posed by human-technology interactions. The informed consent requires alignment with global and institutional guidelines, including approval by IRBs or ethics committees, while addressing varying national and organizational regulations. Particular attention must be paid to the protection of vulnerable groups, including minors and minorities, through compliance with legal and ethical obligations. Legal rights and data protection laws such as the GDPR necessitate explicit, ongoing consent and data handling practices. Thus, HCI researchers often use traditional frameworks with innovative ones, such as using the AoIR guidelines [55, 133, 211, 245, 385] or beneficence-based frameworks [200]. These points highlight that flexibility, cultural sensitivity, and continuous dialogue are essential to ensure that informed consent practices remain ethical, contextually appropriate, and respectful in the evolving landscape with technologies and in HCI research.

5 METHODOLOGIES

The review of informed consent methods emphasizes four general steps in a process, which may vary in order, explicitness, or depth. It typically begins with *disclosure*, in which key study information is provided to participants. It then proceeds to *screening* to assess eligibility, ability, and willingness to participate. Once participants are eligible, *consent* ensures informed agreement, followed by some form of *confirmation* to verify and document participants' understanding and voluntary consent. Unlike traditional fields such as psychology, HCI studies often involve iterative processes, user-centered design, and emerging technologies, which poses some challenges in ensuring participants fully understand the implications of their involvement. In the following, we discuss specifically the practices used or addressed in HCI to obtain informed consent.

5.1 Disclosure Practices

How and to what extent information is revealed to participants, known as disclosure, varies significantly between studies. In reviewing the literature, we found that researchers often use the practice of *blinding* as a counter-concept to disclosure. We further distinguish between *disclosure type* and its *occurrence*, separating disclosure from transparency—a broader concept that includes openness, communication, and accountability in research, beyond just sharing information. Transparency, which involves sharing data, methodologies, results, and failures, is beyond the scope of this review.

Blinding and Unblinding. Blinding is the general methodological practice in which certain information is deliberately withheld from participants to minimize bias and ensure the validity of experimental results [188]. As integral part of the definition of disclosure, blinding represents a strategic withholding of information [188] and is the methodological basis of any RCT in clinical research or Wizard-of-Oz setup in HCI [28, 85, 162] to avoid experimental confounds such as participants' expectations, observer effects, or any confirmation bias [7, 66, 399]. Blinding can be applied to any stakeholder of an experiment, including the subjects, researchers, experimenters, helpers, and data analysts. Typically, participants in HCI research are blind to a specific hypothesis being tested

to prevent their expectations from influencing their behavior [28, 85, 162, 166, 220, 268]. While clinical studies ensure that blinding is as effective as possible in the treatment in RCTs, HCI researchers focus through blinding on the ecological validity of their findings when interacting systems [88, 370, 399].

Researchers across the disciplines also apply and discuss the practice of *unblinding* – revealing the actual purpose of the study. They often argue that unblinding actually requires renegotiation of the informed consent and that participants have the right to be informed as to the purpose of a test [11, 101, 186]. Burmester [59] further points to a case by Mackay [235], where video tapes are being used for purposes other than were originally agreed to with the participant and that the permission was renegotiated. The work by Mackay further discusses "questionable videotaping" in interviews [235] and addresses the ethical consideration of why HCI "cannot simply borrow ethical guidelines from other professions" [235]. The author highlights that the researchers obtaining informed consent must also ensure that the users understand the implications of being video taped before the recording and that changes of correctness or amount of information as shown in their informed consent must users make an informed choice again and "let them change their minds" [235]. The author underscores the governance within the SIGCHI community and emphasizes the role of peers in upholding robust scientific practices, which are grounded in principles of disclosure and consent [235].

5.1.1 Disclosure Type. During or after the course of an experiment, a participant becomes *unblinded* if they deduce or otherwise obtain information that has been masked to them. Our analysis revealed the following practices of disclosing or unblinding the research before consenting: *full*, *partial*, *deceptive*, *delayed/sequential*, *tiered*, and *none*.

Full Disclosure. The practice means that all relevant information about a study or procedure is provided to the participants. This includes the true purpose of the study, all procedures to be followed, all potential risks and benefits, the participant's rights, and any alternatives to participation [55, 57]. The goal of full disclosure is to ensure that participants can make a fully informed decision about whether to participate or not [153, 344, 373].

Partial Disclosure. Refers to the practice when participants receive some but not all information about the study [97]. This is the case when details or other conditions of the study remain unknown to the participants through blinding [69, 155, 337] as well as when it remains unknown whether the participants ever learned the true purpose of the study. A typical example of this practice is A/B testing, where users stay blind to other condition of the study, e.g., while using a website [191, 208, 315].

Deceptive Disclosure. Deception is defined as deliberately misleading participants or not informing them about the true purpose of the investigation, usually to avoid biases [97]. Similar to other disciplines, the practice is utilized in HCI when complete knowledge could alter participants' behavior, for example, in studying computer security issues [108]. In such cases, researchers often use cover stories to hide the true purpose of their research [26, 409]. The use of deception in research is controversial and discussed due to ethical considerations and is generally discouraged unless necessary [409], however, not morally problematic per se [19]. Researchers also suggest that any use of deception implies a debriefing process, in which the true nature of the study is revealed and any misapprehensions are corrected [379] to prevent any mistrust in future research [97]. In HCI-related research, Adar et al. [6] found that the use of deception is widely unexplored and distinguish between *malevolent* (such as dark patterns) and *benevolent deception*, that carefully addresses the motive, means, and opportunity of using deception as proposed by utilitarianism (c.f., in human-robot interaction [20]).

Delayed/Sequential Disclosure. In contrast to partial or deceptive disclosure, delayed or sequential disclosure practice means that the study will be completely disclosed in the course or after finishing the study. It refers to the scenario that researchers first obtain consent without disclosing all details (e.g., hiding the true purpose of the study) to blind participants, to avoid any biases, and subsequently reveal the information required. If this

occurs after the study, this is called *post-study unblinding* [45, 59, 409]. This kind of disclosure is not deceptive and is the only practice in which both blinding and communicating all study details can be brought together and may also include re-/post- [316], or double consenting [59, 204, 234, 409] in which participants are being asked again to give their consent based on all and the additional information of the research. Done explicitly, Klykken calls this a *explicitly (re)negotiated consent* [204]. If a participant refuses and withdraws participation researchers call this an *informed dissent* [49] or *explicitly (re)negotiated dissent* [204] and, for example, requires that the participant's "data should be destroyed" [59].

Tiered Disclosure. This method involves providing participants with varying levels of detail, starting with basic information and offering more in-depth details upon request, allowing participants to choose how much they want to know, including study results [194, 314]. In HCI, researchers use web-based interfaces to digitally annotate and enhance the tiered disclosure [26]. Related to that is the practice of re-consenting based on the additional information. While Cormack [80] proposes to use a tiering framework for the collection of data and the consent for using more data in the further course of the research, Windl et al. [402] suggest using a decision tree-based decision framework for providing different levels of disclosure and consent. Furthermore, Khalil et al. [196] highlighted that the excessive collection of personal data and the limited ability for users to withdraw consent, particularly for sensitive data, necessitate revisiting consent protocols and respecting the user's consent at the moment when data is used—particularly beyond its original intended purpose. In addition, researchers addressed that the disclosure of data based on tiered consent is currently hardly considered in the training of AI models, and researchers repeatedly address the need for legal regulation similar to the GDPR [126, 195, 369].

Nondisclosure. The practice describes research situations where any details on the functionality, data collection practices, or decision-making processes of the research are closed to the user—in some cases also on request. In medical research, this mainly includes studies in or of emergencies [109, 202, 348]. In HCI, this practice is appropriate in cases when "obtaining consent is impractical" [172, 184] such as in online chat settings [30] or in the field of pervasive computing [10]. IRB-approved proposals governed by the US federal regulation can contain a *waiver of consent* (a separate document) for nondisclosure studies when four conditions are met: (1) the research involves no more than minimal risk, (2) the waiver or alteration will not adversely affect the rights and welfare of the subjects, (3) the research could not practicably be carried out without the waiver or alteration, and (4) the subjects will be provided with additional pertinent information after participation when appropriate [275]. Not disclosing the purpose of studies is discussed in the field of online studies [30] or when HCI researchers assume implicit consent based on behavior in public settings [225, 321, 388].

5.1.2 Occurrence and Timing of Disclosure. Most of the reviewed literature agrees that disclosure should precede consent to ensure participants are truly informed. However, some examples illustrate situations where disclosure and consent may occur independently or in a different sequence. Consequently, the occurrence and timing of disclosure are two key factors that can vary. Our analysis revealed that the practice of disclosures can be combined, but each method has its own implications:

Pre-Participation Disclosure. Typically, researchers disclose their study before a participant begins a study. Moreover, an informed consent procedure implies that the consent follows disclosure and precedes the study. This practice is probably the most common timing of disclosure and mostly contains a descriptive study walk-through [37, 171, 271].

Disclosure through Familiarization. Disclosing the study during familiarization refers to the practice of providing participants with information about the study while they are being actively introduced to and directly familiarized with the system, procedures, materials, or environment before data collection—but in a running setup. In this way, researchers can give information about the study, better assess potential risks, and ensure that participants

have a better understanding of what they are consenting to. Typically, the practice also allows participants to ask questions and seek clarification about the study while they are getting a hands-on experience of what participation will involve. Researchers can also obtain re-consent from participants after they have been familiarized with the system, task, or procedure [75, 107, 398].

Ongoing Disclosure. Researchers view disclosure as an ongoing process rather than a one-time event [70, 235, 312]. During the study and data collection, they continuously inform and check in with participants to ensure they understand the study and consent to continue. This ongoing disclosure is crucial when study protocols change or new information emerges that could influence the participant's decision to continue. Researchers also ensure they proceed with specific research aspects or procedures only if participants are comfortable [25, 107, 389].

Post-Study Disclosure. Post-study disclosure involves providing participants with information after their participation has concluded, often through debriefing. This is particularly relevant in studies where full disclosure at the outset could bias the results. Researchers may ask participants to (re-)consent to share study results, use the data in other research, or participate in follow-up surveys or interviews [27, 173]. Debriefing is especially important if the study involved deception or withheld information [271]. The practice of *unblinding* is well-established in psychology and is included in the APA guidelines, notably influenced by the Milgram experiments [251], where subjects were traumatized by believing they had administered electric shocks to others.

Post-Conclusion Disclosure. Post-conclusion disclosure refers to the practice of providing participants with additional information about the study after its end, including the results of the study and explaining any findings *after the conclusion was drawn.* Though relatively uncommon in HCI-related research [278], it is a standard in medical research, where the procedure is also known as *coding in a double-blinded trial* [139]. Violating the rule of post-conclusion is called a *code-break* [250], which describes a set of rules planned for when unblinding should occur in a blinded experiment before there is any conclusion of a trial [36], for example, in case of an emergency during a blinded treatment [56].

Disclosure on Request. On-request disclosure refers to the practice of providing information about a study to participants only when they specifically request it. Typically, this disclosure type is done in online studies and is connected to the possibility of withdrawing consent or having data removed from the study, which is typically the case in online and big data research [32, 80, 138].

Never. See Nondisclosure.

5.1.3 Disclosure Document and Form. In the following, we provide an overview of the typical forms of disclosure and follow its typical structure. Our summary is a conglomerate of typical headings and descriptions identified in the literature records; however, it was also counter-checked using 20 documents and templates found using a regular Google search for "informed consent forms (PDF)[5]" such as from the WHO. Differences among the institutional templates vary, of course.

- Document/Study Title
- Identification of Researchers
- Purpose and Goal of the Research
- Voluntary Participation
- Study Procedure
- Risks
- Benefits & Compensation
- Data Protection & Confidentiality

[5]https://www.google.com/search?q=informed+consent+form+filetype%3Apdf

- Confirmation or Certificate of Consent
- Appendices

Document/Study Title. Contains the heading of the document and should clearly indicate that this is an informed consent form to participate in a research study and the name of the research project. This section can also provide a quick overview of what the study is about [336].

Identification of Researchers. This part of the form provides details about the researchers, data processors, and institutions involved in the study. It typically includes names, affiliations, contact information, and any other relevant credentials to identify the researchers. This ensures transparency and provides participants with a point of contact. Some documents may even include mobile phone numbers of the principal investigators or phone numbers in case of an emergency. This information is mostly included in the disclosure obtaining informed consent and reflects the legal requirements, such as the Federal Regulation of the US [274, 371] or the GDPR [114, 265, 336] (see Legal Frameworks).

Purpose and Goal of the Research. This section outlines why the study is conducted and which research questions the researchers aim to answer (deceptive or not). It explains to the participant what the researchers hope to achieve or discover. As mentioned (see Blinding and Unblinding), researchers often obfuscate the true purpose of the study to avoid any biases. Interestingly, the purpose of the research can even vary between different participants, such as among academic advisors and students in a study by Sun et al. [357], to limit any self-selection bias.

Voluntary Participation. A detailed overview of the general consequences of voluntary participation (and non-participation or withdrawing). In clinical and biomedical research, it is sometimes important to inform the potential participant about the standard health care options that are available, in comparison to those offered by the research study [86, 91, 382]. This section also contains information about who is eligible to participate, any specific criteria that participants must meet, and a summary of the rights of participants (e.g., the right to withdraw at any time). As the practice of obtaining informed consent is based on voluntariness, researchers must acknowledge that participants do not only have the right to give consent but also to dissent, effectively refusing to partake in the study or choose an alternative. Researchers often include further information about the scope of participation such as the *date range*, *sample details*, the *estimated number of participants*, *insurance details*, or *house or hygiene rules* of the institution [336]. Researchers also include information on when or why the researcher may exclude participants or that they cannot derive any publication rights (such as co-authorship) [336].

Study Procedure. This section mostly contains a step-by-step breakdown of what participants will be asked to do during the research. This can include the tasks, duration, frequency of visits or sessions, and any other relevant procedural details. Typically, the explanation of the procedure is textual; however, there are cases where other modalities or even practical demonstrations are used for informing (see Disclosure Modalities).

Risks. The disclosure of any potential risks or discomforts participants might face during the study is an essential aspect of research with human subjects. Such risks can range from physical risks to emotional or mental ones. Typically, the identification of risks is articulated with their probability, consequences, and related risk factors [148]. Disclosing the risks is often associated with special aspects of caution or prevention, particularly when dealing with vulnerable groups [55, 199, 296]. While in medical research, systematic risk assessment or group-specific attribution of risks (such as expert and prior knowledge [287], Failure Mode and Effects Analysis (FMEA) [53], or Surgical Risk Preoperative Assessment System (SURPAS) [396]) is widely established, we were not able to identify a disclosure of systematic risk assessment in HCI. A study by Huh-Yoo and Rader [174] provides valuable insights into the experiences in risk assessment by IRB members. They found that assessing the likelihood of harm in digital research projects remained largely unknown for them and that they seek regulatory enforcement policies to aid the effective protection of individuals from harm [174].

Benefits & Compensation. To motivate people to participate, researchers highlight the benefits. These include direct benefits to the participant or indirect benefits to science and society. Direct benefits vary depending on the nature of the study and may include *modes of compensation* such as cash, gift cards, vouchers, class credits, food/beverages, movie tickets, medical care, donations, or physical devices such as mobile phones [288]. A comprehensive overview of participant compensation in HCI and recommendations on how to report compensation are provided by Pater et al. [288]. Benefits may also include indirect ones such as learning, skill development, access to new technologies or treatments, and the contribution to the stake of knowledge, often addressing the idea of altruism [397].

Data Protection & Confidentiality. This section details how participants' data will be handled, stored, and protected. It assures participants that their information will remain confidential and explains the measures in place to ensure data security.

Confirmation or Certificate of Consent. In a stricter sense, the part of the form in which the agreement of participation is given is not part of the disclosure and belongs to the consent practice (5.3), as this is where participants provide their formal consent to participate in the study, typically using a signature, printed name, time, and location. The part of consent is often written in the first person and often includes a statement of understanding and a place for participants to sign, indicating that they have read, understood, and agree to the disclosure and terms of the study.

Appendices. Some studies have additional information, forms, or details that did not fit into the main body of the consent document. It might contain further reading, detailed methodologies, or extended data protection protocols.

5.1.4 Disclosure Modalities. The modalities of communication of disclosure refer to the way in which information about a research study is communicated to potential participants. This is a crucial part of the informed consent process, as it ensures that participants have at least one channel to receive the necessary information to make a decision. Following were identified:

Textual Disclosure. This is the most traditional form of disclosure and often involves providing participants or advocates with written documents such as physically printed [55, 227, 235], online [26, 144, 409], or braille printout for people with visual impairments [263]. Disclosure is often combined with the consenting form, but sometimes also appears as information sheets [105] or brochures [408]. Whilst the informed consent form is often signed by the participants and delegated back to researchers, there are cases where also the participants receive a physical [377] or digital copy [213], and some researchers even obtain an explicit confirmation that the participant received that copy of written disclosure [297].

Verbal Disclosure. Verbal disclosure in the context of research refers to the process of orally communicating information about the study and explaining to the participants or advocates the purpose, procedure, risks, and benefits in-person [159, 328], via recorded audio or video explanations [117, 145, 216], telephone [282], or live video conferencing [178] such as in online interviews.

Multimedial Disclosure. A multimedia demonstration as a disclosure modality not only involves explaining but also showing participants how a system, procedure, or task works in practice. This may include a live walkthrough using audio and video material [26, 345], a companion in a role-play scenario [104], a 3D print [411], or a tutorial [179, 218, 325].Multimedia tutorials ensure consistent and replicable information delivery, minimizing variability in participants' understanding and even their experimental performance [236]. Although tutorials are important in HCI research and effective for disclosure [189], they are not interactive and can be skipped [22, 354]. This can be one reason why researchers have found inconclusive evidence regarding the effectiveness of

multimedia demonstrations or tutorials. For instance, Flory and Emanuel's systematic review [127] revealed that using multimedia and enhanced consent forms can significantly reduce satisfaction and willingness to participate, with only limited success in improving participants' comprehension, findings that align with Synnot et al. [358]. In contrast, Abujarad et al. [5] found that multimedia informed consent tools enhance participants' comprehension and satisfaction compared to traditional paper-based methods. Fischer et al. [125] found that multimedia support can improve time efficiency, however, with comparable satisfaction, anxiety, and information gain. Based on their findings, Flory and Emanuel [127] proposed that having a research team member or a neutral educator spend time talking one-on-one to participants appears to be the most effective way of improving research participants' understanding.

Interactive Disclosure. An interactive disclosure modality typically refers to the hands-on disclosure of the research by explorative testing the task or apparatus. This can be done through training [170], an interactive tutorial [260], a test in VR [390], a simulation [103], and even by freely engaging through the affordance of a system [164, 388, 398]. The difference to all other disclosure modalities is that each participant has their own and personal experience. The disclosure goes beyond mere presentation of information to foster communication and may also necessitate additional resources and technical expertise. Therefore, interactive disclosure is often connected to screening practices (see Comprehension & Pre-Testing).

5.2 Screening Practices

Informed consent practices necessitate that researchers provide adequate information (see Disclosure Practices) and ensure participants are eligible, capable, and willing to participate after receiving the necessary details. This critical step, known as *screening*, involves a mutual decision-making process where both parties assess whether voluntary participation is feasible and if the benefits outweigh the risks. While eligibility is essential for participation, it does not guarantee voluntariness; a participant may be eligible but unwilling, or willing but ineligible. Additionally, the screening process can be time-consuming and requires mutual respect for each other's time.

5.2.1 Screening Phases. Screening refers to the process of inviting, recruiting, and seeking out potential participants to take part in a study. It also involves the continuous examination of individuals who meet the study's eligibility criteria and including them to participate. Considering that the invitation or the research setting's affordance created by the researcher precedes the first disclosure, this initial step is an important and complex process (c.f. [74, 197, 219, 308]).

Invitation-/Affordance-based Screening. During the recruitment phase, researchers set eligibility criteria aligned with the study's goals. Potential participants express interest based on these criteria, often through various means like invitations or public settings. Researchers note potential biases in this process and recruitment databases [308]. During screening, participants remain anonymous, with researchers having a general idea of the required demographic sample but no specific details. Individuals self-screen, assessing their eligibility and alignment with the study before engaging. The presentation of the study can influence participation and inform consent, so researchers aim to provide sufficient information for an informed, voluntary decision even at this early stage.

Pre-Experimental Screening. In pre-experimental screening, participants become identifiable as researchers gather detailed personal information, assess suitability through background questions, technological familiarity checks, and observations of mental and physical condition before obtaining consent. In HCI, this screening is often necessary to involve healthy subject groups [214]. Ethical considerations must be observed, and participants must be given adequate time to consider without pressure [237]. Challenges may arise from unforeseen factors

or participant withdrawal, resulting in unresolved issues. Research on understanding reasons for withdrawal is vital but often complex, usually stemming from personal fears about potential negative effects on their current condition [391].

Discrete/Continuous Monitoring. Monitoring involves continuous assessment of participants for compliance with eligibility criteria, adverse reactions, adherence to protocols, and engagement in interventions. This is especially important for studies where participation depends on intrinsic motivation or specific criteria [118]. If participants no longer meet requirements or respond as anticipated, they or the researcher may withdraw them. Ongoing monitoring is crucial in multi-session studies with high demands, where repetitive trials may lead to fatigue, exhaustion, or social implications [391].

Post-Experimental Screening. When participants complete a trial and data collection is finished, researchers may review their well-being and adherence to the study protocol. While in clinical trials, it might be important to confirm that participants took their assigned medication as instructed, in HCI this often includes discussing the results, checking data quality, or a general feedback questionnaire around the research [98, 186, 283]. The researcher must monitor any adverse effects or reactions occurring after concluding the study [186]. Sometimes, data from certain participants may be excluded from the final analysis due to system failures or protocol deviations discovered post-study. Post-experimental screening also applies when participants request to have their data deleted due to privacy or confidentiality concerns [17].

Demographics Screening. The demographics of potential participants, such as age, gender, education level, occupation, cultural background, race, or technological proficiency, are crucial for determining study eligibility [223]. In HCI research, demographic data helps assess whether a sample is homogeneous or heterogeneous and is used to answer research questions related to factors like age or gender [335]. It is important for researchers to transparently communicate which demographic data is required and why, as it can be inclusion or exclusion criteria for participation. Researchers acknowledge that demographic data is often based on trust and assumptions, which can be problematic for screening and consenting, particularly when data is inaccurate [161, 304], as seen in online studies with fake profiles [89, 238].

Research-Related Characteristics. Screening for research-related eligibility criteria is important in consenting. It involves determining participants meet the study's specific requirements, often derived from research questions and target groups [223]. Both researchers and participants perform screening [214], but self-assessment can be unreliable for aspects like proficiency, language skills, or familiarity with technologies and tasks [223]. Unlike demographics, eligibility characteristics can be temporal, such as mood or pregnancy [223]. These characteristics help determine sample representativeness [257] and are used in group splits for between-subject designs (e.g., typing proficiency [206]). Participants must understand why this information is essential, especially when it affects their classification in the study, as in tracking eye movements of novices versus experts [170, 375].

Vulnerability & Advocacy. Preventing exploitation or violations of voluntariness with vulnerable groups requires understanding the complexities and tensions involved [226, 236, 384]. Liang et al. [226] highlight four tensions – exploitation, membership, disclosure, and allyship – stressing the importance of an allyship-oriented approach in supporting marginalized groups before consent. Related to HCI, Waycott et al. [392] emphasize the ethical challenges in sensitive settings and advocate extensive negotiation with vulnerable groups or allies to address concerns, especially as new technologies may heighten vulnerabilities [81, 140]. Parents or guardians can consent for minors, articulating needs and preferences to ensure the research is respectful and beneficial [302, 326], while HCI researchers use participatory design to ethically involve marginalized children [326, 350] and caregivers for individuals with dementia [81]. Advocates offer insights into the needs of vulnerable individuals, ensuring that research respects their rights, which means HCI researchers must consider both the specific vulnerabilities of

user groups and the needs of advocates [384]. Gatehouse et al. [142] highlight the risk of vulnerability labels stigmatizing individuals, especially within the LGBT community, advocating for ambiguously designed texts to reflect the fluid and emergent nature of identities. This calls for reflexivity in screening practices and a commitment to ethical research when working with marginalized groups [142].

Capacity. The capacity of potential participants to perform a study is a key factor in screening for eligibility, encompassing *language & literacy*, *study & disclosure accessibility*, *physical & mental health condition*, *compliance & resiliency*, and *availability*. *Language & literacy* ensures participants can understand study instructions and consent documents, considering both language and the complexity of terms [105, 374, 409]. *Study & disclosure accessibility* addresses participants' ability to access study information and engage with the study, with barriers highlighted in vulnerable populations [252]. *Physical & mental well-being* relates to participants' health conditions, with studies often requiring specific states of health, such as dementia or autism [4, 35, 168, 209]. *Pregnancy* can be an inclusion or exclusion criterion, necessitating respectful engagement with pregnant participants [13, 192, 223, 262, 281]. *Compliance & resiliency* are essential for adhering to study protocols and managing study demands, with strategies to enhance these traits including clear instructions and user-friendly designs [132, 378, 387]. *Availability* refers to participants' ability to commit time to the study, crucial for activities like multi-session or longitudinal studies [378]. All these factors underscore the critical link between a participant's capacity for informed consent and the obligations of the researcher. By carefully evaluating them during screening, researchers ensure that participants are genuinely able to provide informed consent, thereby reinforcing their autonomy and maintaining the study's ethical standards.

Comprehension & Pre-Testing. To ensure that participants understand the information provided during the informed consent process, researchers use different strategies to facilitate comprehension, which we summarize as *comprehension and pre-testing* practices while screening participants [205]. Direct in-person interaction, where the researcher thoroughly explains the consent form and addresses any questions the participant may have, is considered the most effective and preferred method for obtaining informed consent [14]. While a study by Geier et al. [144] revealed that interactive components on an informed consent webpage significantly increase the comprehension of the informed consent, Cohn and Larson [76] found that no single intervention consistently improves participants' understanding. Therefore, comprehension testing is often combined with demonstrative or interactive modalities of disclosure (see Disclosure Modalities). In HCI, researchers use cognitive [122, 284] as well as personalized screening questionnaires [261], quizzes [3], pre-study interview questions [415], observations [23], as well as the teach-back method [307, 324] to learn if participants can express and explain their understanding of what the system can do and how to use it. Bickmore et al. [39] and Xiao et al. [409] automate the interaction in this process using informed consent chatbots that explain and answer questions. Due to the lacking success in some attempts to test for comprehension, studies have highlighted the significance of engaging in interactions with researchers, particularly in the context of complex and high-risk studies [68, 144, 409].

Prior Participation. Screening for prior participation is important to avoid biases and often ensures that participants are blind to the research [368]. Particularly in online studies and crowd-sourcing platforms, checking for prior participation is a serious issue as participants can exploit their anonymity using fake profiles to repeat a study and receive compensation [99, 119].

Conflicts of Interest. Conflicts of interest screening occurs when the interests of the researcher or the organization could influence study outcomes or participants' decisions [310]. These conflicts often stem from prior relationships between actors, such as professors and students [372]. While medical research extensively discusses how conflicts of interest arise (e.g., financial) [267, 362], HCI research on this topic is limited. Badampudi [24] suggests that conflict screening should be the participant's responsibility, but other researchers note an inherent conflict due to differing expertise and motivation levels between researchers and participants [55].

5.2.2 Screening for Voluntariness. To guarantee voluntariness, researchers must provide clear information about *risks* and *benefits*, enabling informed decisions while avoiding coercion or excessive incentives [203]. Participants should understand their right to withdraw at any time without repercussions [409]. In HCI, ensuring voluntariness is challenging due to the complex and technical nature of the technology and research [137]. For example, Luger and Rodden [231] highlight issues with voluntariness in pervasive systems, where users depend on them for daily activities, making it difficult to refuse participation [388]. Therefore, researchers must communicate clearly, considering participants' technical proficiency and reliance on these systems to ensure voluntariness.

5.2.3 Time for Screening. Individuals must have enough time for screening and to carefully review if participation is possible [182]. Vice versa, researchers need to take the time to carefully review each potential participant's information to ensure they meet the study's eligibility criteria as mentioned in the informed consent. This can involve reviewing responses to questionnaires, conducting interviews, or even reviewing medical records in some cases. They may also need to take the time to consider whether they are interested in and comfortable with participating in the study. We found no literature indicating how long that time should last. A survey on clinical trials reports on times that "ranged from a few minutes to more than a week" [380]. Munteanu et al. [263] report on a case study in which participants needed "a few minutes to familiarize themselves with the application before signing the consent form" [263].

5.3 Consent Practices

While researchers generally differentiate between *explicit* and *implicit consent* [112, 231, 330, 338, 388, 399], the discrimination "does not quite capture the intricacies and nuances of consent" [322]. Similarly, Luger et al. further advise considering the *context* and the users' *implicit actions* and further discriminating between *contextual* and *social* consent [231]. Factors of consenting to interact with robots were identified by Sarathy et al. [322] as *actual*, *apparent*, *presumed*, *constructive*, and *reluctant* consent. Related to this, Serim and Jacucci [338] separate the concept of *implicit interactions* into being *unintentional*, *attentional in the background*, *unaware*, *unconscious*, and *implicature* (the degree of intention). However, our analysis showed that some consent practices in human subject studies in HCI conceptually do not correspond to existing models of obtaining consent (cf. [230, 289, 330]). Therefore, we restructured and classified the consent practices in HCI research from scratch and first present the main consent types of the theme synthesis:

5.3.1 Explicit Consent. The practice refers to a clear and direct form of consent given by an individual in an informed and voluntary manner. Similar to a contract, this form of consent leaves no room for misunderstanding or misinterpretation. It includes specific information about the action or request, potential risks involved, and system complexity [231] and the unambiguous agreement or authorization of a person to participate in a specific research activity, share personal information, or undergo particular data processing. Regarding the explicitness, researchers differentiate between *opt-in* and *opt-out* consent [63, 152, 189, 374].

Explicit Opt-in. This involves actively taking a specific action, such as signing a form or checking a box on a website, to indicate one's voluntary agreement to participate in a study or provide any personal information for the study. This approach requires individuals to make an affirmative, conscious, and deliberate choice to give their consent to participate in the research study and is in most jurisdictions legally valid. If individuals do not take the specified action to agree or to sign it is understood that they are choosing not to participate. The unambiguous agreement to participate based on specific information about the research is what researchers among the disciplines understand as *informed consent* practice [131, 146, 228].

Explicit Opt-out. This practice operates under the assumption that individuals are already included or enrolled in a research activity. Explicit opt-out refers to a clear and direct method provided to users to withdraw their

consent or discontinue their participation in a study, service, or feature. This is often seen in email marketing, online services, and software applications where users take deliberate actions to revoke and withdraw their consent. Consequently, the explicit choice to opt-out requires an active step by the participants if they did not want to participate. In an HCI study by Miller et al. [255], the researchers couple their opt-out mechanism with a deadline [255]. Other HCI researchers often criticize that opt-out choice can be hidden or require navigating through a complex process making it difficult for users to opt out of certain websites, services, or devices [157, 210]. The systematic implementation of hidden, misleading, confusing, or dysfunctional opt-out practices is often considered as *dark patterns* [156, 243] and can even circumvent legal intents such as the GDPR [266, 270, 349].

5.3.2 Implied Consent. The type of consent that is not explicitly stated or obtained through direct action or verbal confirmation and is being inferred or assumed based on the individual's behavior, actions, or the context of the situation is called [231, 327]. HCI researcher often refers to *implicit consent* when individuals *voluntarily participate* or engage in certain activities (such as public installations [399]) and indicate their willingness to join or to proceed with the intended (inter)action. It is important to note that the interpretation of *implied consent* is made by someone else (the researcher) and HCI researchers assume *implicit consent* consequently when an individual had the opportunity to ignore the intervention [388]. Thus, implicit consent echoes the ethical considerations e.g., by the BPS and other ethical frameworks (see Ethics Frameworks) including that the researcher respects the autonomy of the user [272]. However, as not every interpretation is based on action or the possibility of ignoring the intervention, we further discriminate the interpretative foundation of implying consent by researchers into the following categories and render their contextualization in HCI:

Activity/Action-based Implied Consent. Researchers refer to the consent type that a person's active behavior or action indicates their agreement to participate in a particular situation or condition. In HCI, this practice is often called *implicit consent* and applied in the research of interactions with public installations and exhibits [7, 388, 399], robots [322], social media [95], in mixed reality [277, 309, 321], or using mobile devices [112, 244]. Another example of this practice is to imply consent when participants voluntarily start the study such as by filling out questionnaires [12, 416]. Luger et al. [232] address the question if participants are continuously consenting when they sustained their activities and propose an agency-enhancing framework for obtaining consent using a bidirectional human-device communication. Consequently, the concept of activity-based implied consent is the subject of ongoing debates around ethics, particularly in the context of activity tracking [413], digital privacy [231, 401], and data protection after the research [270].

Attendance/Presence-based Implied Consent. The practice refers to contexts where a person's presence at a certain event or participation in a certain situation implies their consent to the conditions associated with that situation such as in observational and ethnographical examinations [66]. Although one could argue that attendance is an activity per se, the concept is evident in the passive engagement during observations instead of referring to activities initiated by the participants [42, 66, 231, 240]. For example, a student's decision to join a virtual classroom may also mean their agreement to the implied rules and policies of the meeting and, therefore, also include observing, recording, and evaluating their presence during attendance in the virtual classroom [376]. Due to the nature of (virtual) ethnographic studies, Casedei et al. [66] define the role of participation by the presence of (anonymized) users in online forums and consciously discarded an informed consent practice.

Technology-based Implied Consent. This type of consent involves consent that is inferred from merely using a technology or digital system – even when it is not actively used or used for another purpose. Here, the (automatic) processing of user data is not explicitly given but assumed by having or using a device. The key characteristic of technology-based implied consent is that it is assumed based on the anticipated functioning of a system. For example, Enck et al. [112] illustrate the case of selecting the "use my location" option in a weather application, in which the user implicitly consents to disclose geographic coordinates to the server. Technology-based implied

consent practices of mobile devices and online services are often criticized for being intransparent, misleading, inaccessible, or ineffective [63, 189, 320, 349]. Schwartz and Wood [334], for example, highlight the difficulties of obtaining consent while applying technology to monitor and cluster data patterns, indicating that digital communication inherently implies consent [334].

Prior knowledge/Relationship-based Implied Consent. The consent practice refers to past activities, behavior, or pre-existing relationships between participants and the researcher, research-related systems, or their data. In HCI research, this is particularly evident in ethical considerations of reusing data sets [207] for validating or comparing findings [58, 138, 246, 395] or for data mining [149]. Another typical case involves accepting terms of use via cookies [29]. When users first visit a website, they may see a notice about cookie use, and continuing to use the site may imply consent. Once terms are accepted, cookies can imply consent for future use of platform features, related services, or other devices [233].

Implied Consent in Emergency and Rescue Situations. Refers to the legal and ethical concept widely applied in medical and healthcare known as *peril invites rescue* [94]. This principle assumes consent for treatment when a person is in a critical condition requiring immediate intervention to prevent severe harm or death, and they cannot provide explicit consent [94], even extending to research or background checking [329]. Coiera [77] criticizes computing systems for causing errors and clinical risks by overlooking the nuances of human communication in such critical situations. Researchers and institutions are often protected by an approved *waiver of consent* for these scenarios [109, 202, 348] (see Waiver of Consent).

Legal/Law-based Implied Consent. Consent can be implied based on specific local laws or regulations or the legal context. Such cases are rare, however, addressed and mentioned in the field of human-robot interaction [322]. One example is a situation where a car driver consents to stay at the place in the case of an accident after obtaining a driver's license [120, 322].

5.3.3 Re-Consent. Re-consenting is the process of obtaining renewed consent from research participants after initial consent has been given. The difference to dynamic consent is that the researcher is actively prompting for new consent. This is necessary when there are significant changes to the research protocol, when new risks or benefits emerge [312], for long-term studies that require periodic reaffirmation of consent [235, 312], if a participant's capacity to consent changes, or when previously collected data or samples are intended for new research purposes[70]. The practice ensures that participants remain informed and their autonomy is respected throughout the research, especially as situations evolve or new information becomes available.

5.3.4 Dynamic Consent. Dynamic consent, a more interactive and ongoing approach to informed consent, emerged in data-driven biomedical and biobank research [193, 242, 393], recognizing that individuals' circumstances and feelings may change over time, granting them the right to adjust their consent decisions accordingly. Dynamic consent allows fine-grained control, enabling participants to give and withdraw explicit and implicit consent for various study aspects at different times, rather than providing a one-time, all-encompassing consent at the study's outset. Although dynamic consent has gained attention in HCI research [51, 248, 414], and is seen as a "promising design approach" [222] and a flexible solution for interacting with technologies like voice agents [340], its adoption has been slow due to several challenges. These include technological hurdles requiring robust, secure, and user-friendly digital platforms [351], regulatory issues that complicate fitting dynamic consent into existing ethical frameworks, and the resource-intensive nature of maintaining such systems [351]. Furthermore, it demands ongoing participant engagement, which may be hindered by privacy concerns or the participants' ability to make continuous decisions.

5.3.5 Blind Consent. Agreeing to participation terms without reading or understanding them is termed "blind consent" [295]. Systematic reviews in clinical studies reveal that only a small minority of participants accurately

understand all aspects of their consent [115, 294, 360], though the literature does not clearly define when consent becomes "blind." Participants retain and focus on different components of informed consent with varying accuracy and attention. For instance, Tam et al. [360] found that while 75.8% of participants understood their freedom to withdraw, only 54.9% could name a single risk. Researchers agree that information density plays a significant role in comprehension; excessive information often overwhelms participants, discouraging them from reading [273]. Obar and Oeldorf-Hirsch [273] describe the claim that people read and understand these terms as the "biggest lie on the internet," noting that 98% of their study's participants missed fake clauses like sharing data with government agencies or giving up their firstborn child. This suggests that more information increases the likelihood of blind consenting, especially when embedded in dense text like app store terms of use [319].

5.3.6 No Consent. This category applies to situations where a study is conducted without obtaining implicit or explicit approval from the individual involved. It differs from implicit, dynamic, or blind consent as researchers have no basis to assume consent or may even violate explicit refusal. This occurs when the intervention cannot be ignored by participants [388] or when participation proceeds despite explicit refusal [156]. Examples include dark patterns [243] or data misuse [176, 185, 212]. The category also covers cases where consent is ignored or participants are arbitrarily withdrawn from the study without their consent.

5.3.7 Waiver of Consent. A waiver of consent allows researchers to bypass the typical requirement of obtaining informed consent from participants. Unlike No Consent, a waiver is granted by an appropriate review board or authority before the research begins. It is considered when the research poses minimal risk [50, 154], obtaining consent is impractical, threatens the research question [180], or data is recorded anonymously [154]. In other cases, regulations permit exceptions to informed consent, such as in emergencies (see Implied Consent in Emergency and Rescue Situations) where immediate action is necessary, or when the research's potential benefits are significant [109, 202, 348]. Despite a waiver, ethical principles must be maintained, with oversight by bodies like IRBs to ensure participant protection.

5.4 Confirmation Practices

Confirmation of consent in research can be evidenced through different methods, including written and verbal confirmations, with verbal consent being suitable in situations like limited literacy or remote conferencing, but facing criticism in automated platforms due to privacy concerns. Other methods encompass digital solutions, observations, and witnesses. We also address the issue of archiving the confirmation.

5.4.1 Confirmation Type of Consent. Analog and digital *written* and *verbal* confirmations serve as typical evidence that individuals have been adequately informed and have given their informed consent to participate in research [237, 291, 353, 374]. While written consent is dominant, verbal consent is used in situations where literacy is a concern, cultural or political reasons discourage contract-like documents, or when remote video conferencing is involved [31, 78, 318, 410]. Automated verbal consent mechanisms are often criticized for potentially undermining informed consent principles, especially in platforms involving voice agents due to privacy concerns [340, 341]. Some researchers offer both written and verbal confirmation [281]. Digital confirmations include active types like digital signatures [291], checkboxes ("I agree") [374], or indirect methods such as consent hidden in terms of use during app downloads [319]. Utz et al. [374] conducted in-the-wild studies on online consent, finding that the position, choices, and wording of cookie consent notices significantly influenced user engagement. Techniques like highlighting "Accept" buttons and specific wording affected user decisions, indicating that consent mechanisms may not substantially improve user privacy compared to pre-GDPR times [374].

5.4.2 Witnessing the Consent. Witnessed consent involves a third-party witness observing the informed consent process to ensure the participant fully understands and voluntarily agrees to participate [18]. This method

enhances the integrity of consent, particularly in cases where participants may struggle to comprehend the information or require additional protection (see 5.2.1). Some authors suggest that ethical questions about the role of witnesses in consent have not been adequately addressed in regulations [18, 151, 183], calling for more debate to define witness responsibilities and training to maintain consent integrity.

5.4.3 Storing the Consent. The archiving of informed consent documentation involves systematically storing evidence of participants' comprehension and voluntary agreement to partake in research. This is closely tied to ethical concerns regarding data sharing, preservation, and the use of cookie tracking, particularly in online research [83, 347, 374]. Challenges arise in aligning informed consent archiving with open science principles [62] and GDPR regulations for storing consent cookies [374]. Digital solutions like e-consent are sought across various fields, including healthcare and internet of things (IOT) [279, 381], with blockchain proposed to enhance transparency and trust. However, uniform requirements for access control and data protection remain barriers to widespread adoption [381].

5.5 Summary

The reviewed methodologies for obtaining informed consent encompass a broad spectrum of practices, including approaches to blinding and unblinding participants, screening, and securing consent while ensuring participant autonomy, comprehension, and technical proficiency. Blinding methods should be carefully designed to mitigate harm and ethical concerns, incorporating structured unblinding strategies such as sequential or tiered disclosure, along with explicit (re)negotiated consent following deception, to ensure participants can make an informed post-study decision. Implied consent, where participation itself is interpreted as agreement, raises ethical concerns regarding participant autonomy and awareness of data collection, necessitating clear disclosure of its use and, where possible, opportunities for explicit (re)confirmation of consent. Enabling re-consent or dynamic consent processes further supports ongoing data control and decision-making. Blinding practices should be carefully managed, with provisions for post-study unblinding and renegotiation of consent. Digital tools for confirming and archiving consent, particularly in online studies, must comply with legal frameworks such as the GDPR. In summary, HCI researchers adopt flexible, participant-centered consent strategies that balance methodological rigor with ethical transparency, ensuring that participants remain informed and empowered throughout the research.

6 PERSPECTIVES

In this section, we present the results of the diverse perspectives of researchers on the process of obtaining informed consent in HCI. We begin by discussing *general critiques*, followed by an exploration of specific *challenges*, proposed *improvements*, and potential *alternatives* to the traditional informed consent process. By synthesizing these viewpoints, we aim to provide a comprehensive understanding of the current landscape, highlighting both the strengths and areas in need of further development.

6.1 General Critiques

Jay Katz identified multiple points of criticism on obtaining informed consent in a position paper from 1994 in the field of clinical studies [190]. Our review only partially covers these points – not only because conditions in the clinical research are different from those in HCI, but also because many aspects of informed consent practices have changed over time such as the concerns about online privacy and data collection. The central theme of general criticism is related to the formalization of the process and the complexity of the document.

6.1.1 Formalization Compromising Ethics. The primary criticism of obtaining informed consent is that its formalized process may undermine ethical conduct. Cairns and Thimbleby [61] argue that formalization and ethical

reviews primarily serve to limit legal liability, rather than protect research participants. Luger and Rodden [231] warn that formal ethics can reduce what should be a social relationship into a "point of severance" between participants and their data. Other researchers contend that formal research ethics are rooted in a specific, not universal, epistemology and value set [40, 136], suggesting that the legalistic approach may be detached from participants and skewed by particular perspectives. This formalization has often favored legal protection for institutions over genuine ethical engagement. Pointing to related work, researchers argue that consent documents are often optimized for ethical committees and IRBs [33, 93, 106]. Also in HCI, researchers frequently seek external approval of consent forms by such review boards. Designing these forms at the outset wrongly implies that all ethical issues are known beforehand, potentially hindering ongoing ethical engagement. To address this, some advocate for an ethical relationship that emphasizes particularism, collective rights, and active engagement over a strictly legal model [93, 106]. Brown et al. [55] argue that "legalizing of consent obscures the ethical responsibilities in these cases" and stress the need to prioritize participants' well-being over exhaustive academic explanations, a point also made by Schneider [331]. Thus, a more flexible, peer-review-based approach is suggested, allowing for real-time ethical decision-making and a nuanced understanding of harm [55, 263].

6.1.2 Complexity of Information and Understanding. Researchers criticize consent forms for being misleading and difficult to understand due to their complexity and use of technical jargon, which hinders participants' ability to make truly informed decisions [187, 285]. Brown et al. argue that informed consent "does little to protect participants," and Katz labels it a "charade," misleading patients into thinking they are making informed decisions when they are not [55, 190]. Katz advocates for a greater focus on disclosure, highlighting that current practices often fail to develop meaningful consent [190]. A study by Cassileth et al. found that only 60% of patients understood a procedure's purpose, with many associating consent forms more with protecting physicians' rights than with their own understanding [67]. In HCI, online participants, particularly those on platforms like Mechanical Turk, often struggle with consent forms, where the "click-through" nature of online agreements and the complexity of legal language create significant barriers to genuine understanding, posing critical challenges in obtaining true *informed* consent, especially for vulnerable groups [55, 247, 263, 409].

6.1.3 Power Imbalance. Differences in expertise, knowledge, or experiences between researchers and participants cause significant challenges in the informed consent process, where participants might not fully grasp the research implications or feel pressured to agree [55]. In HCI, ethical concerns stem from gender-based inequalities and biases in technology design and data interpretation [160]. Brown et al. criticize the rushed consent process, often influenced by these imbalances [55], while Schneider calls for the abolition of flawed human research regulations [305, 331]. This issue is exacerbated in research involving children and animals, where consent can become a formality, eroding participants' autonomy [331]. IRBs often view subjects as "manipulable victims," leading to over-legalization, harm, and distrust [55, 331]. The inherent knowledge disparity further complicates consent, especially in vulnerable groups, where socioeconomic factors and conflicts of interest can affect informed decisions. Clear guidelines are needed to ensure fairness, with some researchers advocating for greater benefits for vulnerable populations [35, 55, 391].

6.1.4 Time & Timing. Time constraints are a significant challenge in obtaining informed consent, as noted in various studies [181, 403, 404]. Wogalter et al. [403] highlight time pressure as a key reason participants often skip reading consent forms. This issue persists even in situations without explicit time constraints, such as online studies or mobile applications [60]. Similar to other terms and conditions online [259], users frequently bypass consent documents they perceive as unimportant, overly complex, or already explained [403]. Furthermore, ethical concerns arise when participants provide feedback or when data collection begins before consent is fully obtained [263].

6.2 Challenges

In an overview paper about informed consent in clinical trials, Nijhawan et al. [269] identified *language barriers*, *religious influences*, *false expectations*, *patient perceptions*, *dealing with vulnerable groups*, and *different cultural backgrounds* as the main challenges in obtaining informed consent. In the following, we render the challenges identified in the field of screening the literature in HCI.

6.2.1 Readability and Accessibility. The issue with readability as well as accessibility of informed consent documents is the most-addressed challenge in the literature and lies in the complex and technical language, making it difficult for the average person to understand the content [65, 230–232, 269]. In a series of case studies, Munteanu et al. [263] found that even "adult learners struggled to understand the forms, and most signed without reading them" [263]. This can lead to a lack of comprehension among research participants, potentially undermining the voluntary and informed nature of the consent process, especially for vulnerable populations or individuals with limited literacy levels. To address this problem, researchers and ethics committees strive for consistent terminology and nomenclature [65] as well as aim to improve the readability of informed consent by using plain language and presenting information in a clear and accessible formatting and document style [231, 269].

6.2.2 Embedding. Researchers embed the informed consent into other processes, documents, or technical systems, depending on the context and requirements of the research activity. In some studies, informed consent is embedded into the "terms of use," for example, in online applications [319] or in social media research [231]. This poses additional concerns and challenges for researchers [158, 231, 258] and even goes beyond the scope of scientific research and generally questions if accessible web pages must encourage consent or are just designed to hide the complexities of the terms of use [231]. In a case study by Luger et al. [231], the authors illustrate the hidden complexity of informed consent in the terms of use using the Simple Measure of Gobbledygook (SMOG) formula. The authors found that the texts "were far beyond what a functionally literate adult could be expected to understand" [231].

6.2.3 Consent Negotiations. The process of sufficiently informing participants to provide valid consent can also be considered a negotiation or shared decision [113]. In a negotiation-based approach, the level of trust a participant has in the researcher influences how much information they require to decide whether to participate or withdraw. Negotiations may also result in compromises, for example, if participants agree to the processing of certain data, which is rather uncommon practice in HCI studies [235]. Schuck [332], for example, proposes legal regulations enforcing the negotiation of a contract between researcher and participant. However, there are currently no standardized procedures for obtaining informed consent and conducting a negotiation. The approaches of researchers in HCI are mostly related to the use of data and individual cases [235, 391].

6.2.4 Legal Implementation. Schuck highlights a discrepancy in obtaining informed consent between the law as it is written and how it is applied in practice [332]. The author suggests that this gap could be a source of insight for improving the law and compares informed consent in health care to its counterparts in other areas of tort law, such as product liability. He finds that health care imposes more responsibilities on risk creators, a difference that he doesn't find clearly justified by factors like autonomy, relational continuity, conflict of interest, information and power inequalities, or utility. All those discrepancies become evident in the implementation and the difficulties in the realization of e-consent platforms [279, 381]. Garzp and Garay-Vitoria [141] present a flowchart summarizing the ethical and legal decisions for clinical research and the development of medical devices in the EU (Regulation No 536/2014) to overcome a wrong legal implementation of the regulation. It is designed to help researchers navigate the complex ethical and legal processes that should be carried out when humans are involved in the design, development, and evaluation of new technologies, especially those with assistive

or medical purposes. The authors argue that Human-Centered Design (HCD) techniques such as participatory design techniques may be useful when medical devices are developed to ensure compliance with this norm [141].

6.2.5 Data Exploitation & Emerging Technologies. The rapid advancement of emerging technologies presents significant challenges related to informed consent, central to the broader issue of data exploitation. Choissi et al. [72] and Stepanova et al. [352] highlight the complexities of obtaining informed consent for biosignal data, as users and researchers may not fully grasp the implications of what their biodata reveals or control their physiological activity. Moreover, Tanaka et al. [361] even raise significant questions regarding the consequences of sharing brain signals. This raises significant privacy and agency concerns, as users must retain control over their sensitive information to avoid exploitation. Similarly, in the context of extended reality (XR) technologies, informed consent becomes increasingly challenging due to the vast amount of personal data being collected, including physical movements and biometric information, often without users' full awareness [306, 333]. This underscores the potential for exacerbating power imbalances, particularly when sensitive data is used for purposes like neuromarketing [317], emotion detection [323], or any other commercial interests [333]. The risks associated with interpreting and using such data highlight the need for robust policy frameworks and cautious approaches by HCI researchers to protect user privacy and avoid overstating the accuracy or insights derived from any emerging technologies [224].

6.3 Improvements

According to Wolter et al. [403] people give a number of pragmatic recommendations to improve the understandability of informed consent documents: *decrease technical terms*, *shorten the text*, *increase the font and print size*, *outline the text*, *give examples*, *give explanations*, *explain definitions*, and *provide visual aids*. An initiative funded by the EU with the goal to generally standardize and improve the process is the H2020 i-CONSENT[6] project [128–130]. The project particularly takes gender, multiculturalism, and vulnerable populations into consideration, however, only received marginal attention in HCI. Our review revealed three general main categories of how researchers aim to improve the way of obtaining informed consent in HCI: *readability*, *interactivity*, and *testing*.

6.3.1 Readability. Researchers mainly address readability as an obstacle in understanding informed consent documents. by using plain language, concise sentences, and clear headings. We identified three main themes that researchers address to improve the readability of informed consent documents:

Plain Language. According to Jefford [182], researchers should use familiar words, ideas, bullet points breaking up long explanations, short words, easy sentences, and avoid misleading descriptions. Readability checkers can help to formulate and to estimate reading levels. Jefford also suggests training of investigators, decision aids, and prompts while reading [182]. Researchers should align with plain language paradigms[7] such as the Plain Writing Act of 2010 [276], a US law that requires that federal agencies to use communication that the public can understand and use.

Reduced Length & Document Complexity. Formal informed consent documents are often challenging to understand due to their length, complex vocabulary, jargon, legal language, and technical terms [285]. These texts frequently use intricate sentence structures and abstract concepts, making comprehension difficult, especially for those with varying reading skills. Emanuel and Boyle [110] found that reading a 9-page document on COVID-19 vaccine research took an average of 35 minutes, but it was possible to convey the same information in under 3000 words at a lower grade level without sacrificing readability. Studies consistently recommend reducing technical

[6]https://i-consentproject.eu/
[7]https://www.plainlanguage.gov/

wording and document length to improve understandability [404]. Davis et al. [87] found a preference for simpler, shorter documents, while Stunkel et al. [356] noted that comprehension levels remained the same across different document lengths. For vulnerable groups, clarity and accessibility are particularly crucial. Antonacopoulos and Serin [102] showed that combining images and bullet points enhances readability, although Reeder et al. [303] found that a grid-based interface offered no significant advantage over natural language. Researchers must prioritize clarity and simplicity to ensure truly informed consent.

Structure & Information Placement. In an eye-tracking study investigating how people read informed consent documents, Rosa et al. [313] found that information related to voluntary participation and around the signature area at the bottom have captured the attention of the reader. Consequently, the authors suggest that the area around the signature location should provide precise and relevant information about the experiment. The authors also found that people rather tend to read the content at the top of the page implying that this area should provide a summary of the content [313]. The "Model for Informed Consent" is presented [135] and addressed in HCI research [73] as a ethics-focused conceptual design of web browser. The authors propose to change the consent process in web browsers by advocating for design principles that minimize the "nuisance factor" for users, such as by exempting certain safe web interactions from requiring explicit consent, improving default settings to preserve user consent, and offering users more control over consent processes.

Consistency & Highlighting. Using templates to develop informed consent documents improves readability and ensures consistency, helping participants better understand study objectives and risks. Templates provided by institutions [404] or generated through consent tools [336] familiarize participants and researchers with document formats, especially in subsequent studies. While familiarity can enhance comprehension, it may also lead to "click-through" behavior, where participants skip reading due to the document's repetitive nature [55]. To mitigate this, key points should be emphasized, such as through verbal feedback or textual anomalies like bold fonts. Consistent nomenclature and clear terms are crucial for maintaining document clarity [65, 374, 409].

6.3.2 Interactivity & Customization. Interactive applications are being used to improve the usability and understandability of e-consent forms. While Blake et al. [44] highlight the advantages of digital enrollment for participants and researchers, Muravyeva [265] uses e-assessments to overcome the privacy paradox (the contradiction between attitudes towards personal data protection and actual behavior) and present a GDPR-conform blueprint for informed consent documents. Moreover, Balestra et al. [26] use shared social annotations and comments within the form to support the understanding of informed consent documents [26]. In a CSCW workshop by Randazoo et al. [299], the authors propose to use customization as framework for informed designs. Xiao et al. [409] even present the AI chatbot "Rumi" to support users in their understanding of informed consent and to close the power gap between the participant and the researcher with the AI as a neutral instance for negotiations. Their approach not only improved consent form reading and promoted a more equal power relationship between the participant and the researcher, but also improved the study response quality [409].

6.3.3 Testing. Comprehension tests such as questionnaires [48] and teach-back methods [147] significantly enhance participants' understanding of the consent process [404]. Taylor et al. [364] found that targeted education improves consent comprehension, though periodic screening is needed for retention. Pre-testing assesses not only understanding of risks and benefits but also eligibility, such as safety procedures [150], competency levels [170, 206], and medical status [38, 417].

6.4 Alternatives

Alternatives to traditional informed consent are necessary due to the critiques, challenges, and limitations. Key aspects include the complexity of consent forms, which often hinder participants' understanding, and the evolving

nature of data use, where traditional, study-bound data practices are increasingly seen as inadequate. In HCI, we see an increasing need for adopting flexible and accessible consent processes to ensure ethical engagement and participant comprehension.

6.4.1 Alternatives to Consenting.

Informed Choice. Forming alliances with participants to empower them as active partners in, especially in healthcare decisions [394], is seen as a viable alternative to traditional informed consent. Weinstein's model of *informed choice* [394] highlights the significance of both researchers and participants accepting alternative methods of participation and clearly defining their roles in making research-related decisions. This approach is particularly beneficial in situations where decisions are complex, as it enables participants to become more informed about their options and integrates their values into the decision-making process. In HCI, this model is crucial for fostering a more collaborative and user-centered approach, ensuring that participants are actively involved in research processes that directly impact their interactions with technology.

Shared-Decision Making. The methodology of negotiating consent, previously discussed, involves a dialogue between the researcher and the participant. Medical researchers envision the future of informed consent as a transformation towards shared decision-making [113]. This view is shared by Moody [256], who argues that negotiation allows for a more personalized and interactive approach to consent, where participants can ask questions, express concerns, and negotiate the terms of the research. De Sutter et al. [90] also suggest adapting to participants' needs through a co-creation process with research participants to inform the design of e-consent. This approach, akin to informed choice, is particularly useful in complex research scenarios, with vulnerable populations, or in participatory design, as it fosters a nuanced understanding of consent, accommodates necessary changes, and helps build trust between the researcher and participant.

Pictorial Contracts. Andreotta et al. propose using pictorial contracts, or 'comic contracts,' to clarify study explanations and data usage [16]. They offer an alternative to standard legal agreements, employing colored illustrations instead of dense legal text to enhance comprehension, particularly for those with literacy or technical language challenges.

The Fair Transaction Model. Miller and Wertheimer [254] see that the paradigm of informed consent is challenged due to some shortcomings, particularly the neglect of risk-benefit evaluations, the potential to hinder subjects from beneficial research participation, and the lack of clarity for investigators about when consent is valid. As an alternative, they suggest their fair transaction model to address these shortcomings. The model emphasizes a thorough risk-benefit evaluation, and introduces flexibility as a mechanism, allowing participants to consent only with a foundational understanding, especially when participation aligns with their preferences or poses minimal harm. It provides guidelines for researchers, delineating when consent is valid, thereby safeguarding the ethical enrollment of subjects. Lastly, it aims to acknowledge a balanced responsibility, recognizing that while researchers must communicate effectively, they are not burdened with ensuring exhaustive comprehension by participants.

6.4.2 Alternatives to Data Sharing.

Broad Consent. Broad consent is a flexible approach where participants give permission for their data or samples to be used in future, unspecified research [163]. It is particularly relevant to HCI and AI research, where predicting all future uses of large datasets is often unfeasible. Broad consent facilitates the reuse of such datasets for novel AI algorithms or HCI studies without requiring re-consent for each new study.

The Confidentiality/Privacy Approach. This alternative emphasizes the protection of participants' privacy and confidentiality over obtaining specific consent for every research activity [163]. It aligns well with data protection

in AI, Big Data research, and digital phenomenology [47], where anonymization and encryption are crucial. HCI studies can collect and anonymize user interaction data for AI model training, safeguarding privacy.

Submission to the Researcher. This perspective, rooted in a Hobbesian view, suggests that individuals submit to the authority of researchers, trusting them to act in their best interests [163]. It emphasizes trust in research participation, where in HCI, users trust platforms or applications with their data, relying on the developers' and researchers' ethical expertise.

Conditional Authorization. Conditional authorization is a contract-based approach where participants set specific conditions for the use of their data and provide their data not for specific research activities but for purposes [163]. It is particularly relevant in Big Data research, where data may be used for various purposes. For instance, advanced web browsers could have pre-set responses to protect users' privacy preferences [16], allowing interaction data for user experience improvements but not targeted advertising. This approach balances research flexibility with respect for participants' boundaries.

6.5 Summary

Informed consent faces a number of critiques and challenges such as the high level of formalization, document length, power imbalances, and time constraints. Formalization and document length often laden with technical jargon and legal terminology, impedes comprehension, particularly for vulnerable groups and lead to "click-through" behavior of e.g., online users. One might assume that accessibility, interactivity, customization and testing are the strengths of a human-centered science in such a process, but similar to other disciplines with human subjects, many challenges remain in HCI. In addition, emerging technologies and big data or biometric data introduce more complexities, necessitating flexible, interactive, and participant-centered consent models or alternatives. Improvements such as plain language, simplified structures, and consistent formats though enhance accessibility and alternatives such as informed choice, e-consent, interactivity, and shared decision-making promote active engagement. However, to address the evolving nature of technology use and the diversity of participants, researchers require rethinking to address adopt and develop user-centered, transparent, and flexible consent practices that prioritize autonomy, comprehension, and ethical data use.

7 DISCUSSION

In this literature review, we provide a systematic overview of the practices in obtaining informed consent in HCI user studies, shedding light on regulatory frameworks, applied methodologies, and the perspectives of the research in the field. Our exploration underscores the role of ethical awareness in advancing HCI research that incorporates informed consent. Our findings resonate with studies, highlighting the importance of voluntary consenting but also the disparity between all formal requirements of obtaining informed consent and its practical execution in studies in HCI [55, 124, 263, 339]. In our discussion, we emphasize the need for increased awareness of the principle of voluntary participation, the role of HCI in fostering a dialogue between researchers and participants to improve the process, and provide recommendations for disclosure and consenting. We also address the limitations and conclusions of the review.

7.1 Implications for HCI Researchers

The findings in this review offer practical and conceptual implications that span ethical principles, methodological practices, and different perspectives for obtaining informed consent. These not highlight the need for adaptable, human-centered, and ethically sound approaches in HCI but also the responsibilities of the researchers. In the following, we provide actionable recommendations from the synthesis and main implications to address the challenges of obtaining informed consent:

7.1.1 Ethical Implications. We learned that informed consent is fundamentally rooted in ethical conduct with human subjects. However, HCI research must prioritize the design of consent processes that are transparent, accessible, and adaptable to diverse participants interacting with complex technologies while adhering to both ethical principles and legal requirements. The following implications highlight actionable steps HCI researchers can take to align with ethical principles in obtaining informed consent:

Promote autonomy and respecting participant rights. Researchers should establish and promote consent processes that ensure study participants can freely decide whether to take part throughout a study, without experiencing any form of pressure or coercion. This includes the design of fair and equitable compensation structures that avoid undue influence [55, 288] and flexible opportunities to access and delete data. Participants must be explicitly informed of their rights such as to withdraw from the study at any time [116, 167], which may also extends to the usage of ubiquitous devices, processing of data and necessitates the implementation of efficient consent mechanisms that accommodate requests promptly, transparently and correctly [7, 195, 217, 320, 321, 388].

Protect vulnerable populations. Disabled persons, children, marginalized communities, and individuals with impairments require special safeguards mechanisms to ensure ethical participation [92, 200, 239]. Researchers should adapt consent processes and legal requirements to meet the needs of these groups and may also support them by using simplified language, visual aids, multi-modality or involving legal representatives where necessary [301]. Researchers should consider the social and cultural context of their participants, incorporating practices that respect these differences [286, 292]. Experts consultation and review boards are required in cases involving minors and minorities to align with collective decision-making norms in obtaining informed consent [52].

Foster transparency and trust. Researchers should provide participants with clear, understandable information about the study's purpose, methods, risks, benefits, and data usage [114, 388]. To foster trust, researchers should go beyond the legal minimum by incorporating feedback mechanisms [385] or share study results with participants explaining how their contributions have advanced the field. Researchers should also address participant concerns about data privacy by clearly outlining how data will be protected and stored, particularly in compliance with regulations such as the GDPR [270].

Account for cultural and contextual differences. HCI research often takes place in international, diverse or interdisciplinary contexts, where perceptions of autonomy and consent can vary significantly among the institutions. Researchers should adapt consent practices to align with local norms and expectations [286, 292]. For example, in some cultures, collective decision-making may take precedence over individual autonomy, requiring researchers to engage with community leaders or representatives [52]. To address these differences, researchers should involve experts and their review board early in the research process and design informed consent procedures that are both respectful of cultural values and compliant with ethical standards [92].

7.1.2 Methodological Implications. HCI research must develop participant-centered methodologies that prioritize transparency, autonomy, and ongoing consent while addressing the unique ethical challenges posed by emerging technologies and data privacy concerns. The implications of the methodological recommendations were:

Reflecting on the balance between blinding and unblinding. Practices such as partial, delayed, or even deceptive disclosure are often employed to enhance study validity by reducing biases [85, 162, 188]. However, these practices can create ethical tensions, particularly when participants are not fully informed about the study's true purpose or cannot foresee the fully consequences of participation. Researchers must carefully weigh the benefits of maintaining ecological or experimental validity against the potential risks of undermining participant autonomy and trust [59, 235]. To navigate these challenges, researchers should consider the timing and depth of disclosure, adapting it to align with participants' cultural or cognitive needs [311]. Strategies such as tiered, sequential, or post-study disclosure, as well as maintaining ongoing communication throughout the study, can enable

participants to make informed decisions at appropriate stages, even in blinded HCI studies [26, 204, 314]. Review boards and ethics committees can play a critical role in overseeing these processes, ensuring that the blinding and disclosure mechanisms strike an appropriate balance between study validity and ethical obligations.

Ensure comprehension. The literature suggest that a research team member or a neutral educator spending time to talk to participants one-on-one appears to be the most effective way of improving research participants' comprehension of informed consent [127]. In addition to personal enlightenment researchers also do use pre-study comprehension tests, teach-back methods, quizzes, or video tutorials to confirm that participants understand the study procedures and potential implications [3, 144, 307, 324, 409, 415]. These tools are especially useful in HCI studies involving novel technologies, where participants may benefit from experiencing an experimental system before conducting the study. Interactive tools like FAQs, chatbots, or interactive test tutorials further help participants process information and clarify uncertainties [38, 39, 409].

Implement flexible consent mechanisms. Longitudinal studies or research involving evolving data use should integrate mechanisms for dynamic consent, enabling participants to update their consent over time [193, 393]. Researchers can design digital interfaces that notify participants of changes in study protocols or data usage and allow them to re-consent with minimal friction [126, 369]. Researchers can also treat consent as a continuous process rather than a one-time event [235, 312]. This includes providing participants with opportunities to reaffirm their consent during multi-session studies or when protocols change [25]. Digital consent platforms can facilitate this process by enabling notifications and updates. Digital enrollment can also streamline the process, while e-assessments can address the privacy paradox by protecting data and enhancing understanding. Annotations and comments within forms encourage participant engagement [26], which is especially relevant for studies involving novel or complex technologies.

Leverage interactive or personalized approaches. Interactive tools, such as decision trees, interactive tutorials, or personalized digital platforms, should be used to improve participant engagement and comprehension [390, 398, 402]. For example, participants can explore study procedures through simulations or hands-on tutorials, ensuring they understand the tasks and expectations before consenting [26]. Researchers should also adopt and consider digital systems for confirming and archiving consent [381].

7.1.3 Perspective Implications. The evolving nature of technology and participant diversity necessitates the rethinking of traditional consent models in HCI. The following actionable implications highlight additional considerations for designing consent practices:

Simplified and accessible consent documents. Researchers should prioritize clarity and accessibility by using plain language, structured layouts, and visual aids [231]. They should use concise sentences, familiar words, and easily understandable structures, following readability guidelines such as the Plain Writing Act of 2010 [276]. Employing visual aids, such as pictorial contracts [16], bullet points, and interactive elements, can further support comprehension. Reducing document length and complexity has been shown to maintain comprehension without sacrificing necessary information [87, 110, 404]. Additionally, the strategic placement of critical information—such as summaries at the beginning and key details near the signature section can enhance attention and understanding [313]. Researchers can also mitigate "click-through" behavior by emphasizing critical points using consistent formatting, templates, and visual highlights [55, 65, 374].

Foster equity and mitigate power imbalances. Researchers should explicitly recognize and address power dynamics inherent in the participant-researcher relationship to foster trust and avoid coercion [55, 331]. Collaborative consent processes with experts and participants, particularly for vulnerable populations, and providing opportunities for feedback and renegotiation are essential measures to ensure fairness [35, 391]. Researchers should move

beyond a compliance-driven approach to consent by fostering transparent, participant-centric, and ethically grounded practices [33, 93, 263].

Adopt dynamic and participant-centered models. Traditional consent forms often fail to adapt to participants' needs or evolving complex research contexts. Researchers should go beyond static consent forms by employing flexible, iterative models such as tiered or sequential disclosure [204, 402]. Dynamic consent models, which allow participants to adjust their consent as research evolves, are particularly valuable in studies involving extended data use or complex technologies [163, 196]. Involving participants in the co-creation of consent processes ensures that their perspectives, needs, and expectations are integrated into study designs [90]. Participatory approaches such as expert or stakeholder workshops as well as iterative feedback loops can help researchers identify barriers to comprehension and trust while obtaining informed consent. Regular feedback from participants can identify areas where consent practices fall short, such as unclear communication or inadequate follow-up.

Account for data complexity and challenges of emerging technologies. As data-driven research increasingly relies on large and diverse user-generated datasets, researchers should adopt flexible consent models like broad consent or conditional authorization to manage uncertainty about future data uses with technologies that have not been invented [163]. This is particularly relevant for AI and big data studies, where re-consenting for every (future) use case is impractical. With biometric technologies, researchers should also anticipate ethical complexities that may require new frameworks, negotiation, and enhanced awareness to address privacy concerns and participant agency [72, 361]. Thus, in studies involving sensitive (biometric) data, researchers should prioritize flexible consent platforms, robust anonymization techniques, and secure data storage [47]. Notifications with updated information about significant methodological changes enables participants to make informed decisions and ensures that their consent remains valid for the researcher [59].

7.2 Limitations and Future Work

The limitations of our research include not exploring participants' motivation to engage in a study, omitting practices of recruitment, and not integrating complexities from the broader field of bioethics, mechanical engineering, technological treatments in medicine, or robotics into our study. Additionally, we did not extend our work to future considerations, such as (data) consent in AI research, an area ripe for future inquiry given the evolving technological landscape. The development of a readable, understandable and standardized form of informed consent to participate in a study and to (further) process data could be one of the most important tasks for future researchers.

7.3 Conclusion

This scoping review explores the complexities in obtaining informed consent within HCI research. By examining ethical and legal frameworks, methodologies, and perspectives, we illuminate the multifaceted nature of informed consent. This review serves as a comprehensive reference and a foundational work of definitions, offering a structured framework that other researchers can rely upon when addressing informed consent in their own studies. In studies with human subjects, we emphasize to carefully address the steps of disclosure, screening, consent, and confirmation practices to ensure both participant autonomy and voluntary participation through informed consent. We suggest potential improvements and alternative approaches, extending the discourse on ethical compliance. The insights provided here lay a foundation for future HCI research and the process of obtaining informed consent, highlighting the ongoing need for ethical innovation and the continuous refinement of participant-centered research practices.

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