An examination of three ethical perspectives on IT practitioners' intentions to implement accessibility in IT artifact design

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Abstract

Accessibility is a goal that information technology (IT) practitioners strive to achieve when creating IT artifacts for universal use. Designing accessible IT artifacts involves paradigms that encompass typical actions IT practitioners are expected to take. However, meeting user requirements within limited time and budget constraints is challenging and may raise ethical conflicts. In this paper secondary data from seven sample studies was analyzed and reasons why practitioners consider accessibility were collected. These collected views were then compared against three ethical theories: consequentialist ethics, deontological ethics, and virtue ethics to understand the ethical phenomena surrounding the accessibility design of IT artifacts. Preliminary findings suggest the three ethical perspectives seem connected to reasons influencing practitioners' intentions to implement accessibility. It seems that ethical conflict may occur in the relationship between intrinsic and extrinsic reasons. This paper encourages deeper discussion on the question of how to improve ethicality, guidance, and facilitation towards the right decisions in ethical dilemmas in IT artifact development.

Keywords

Digital accessibility, ethics, IT artifact design

1. Introduction

Information technology (IT) practitioners involved in the development of information systems (IS) — including e.g. web developers, user experience (UX) practitioners, web designers, webmasters, and their superiors — make numerous decisions and assumptions, both implicit and explicit, when creating IT artifacts [1]. They acquire the knowledge needed to design the system (epistemological assumptions), and those that relate to their view of the social and technical world (ontological assumptions) [1]. Accessibility is one goal that IT practitioners, hereafter practitioners, strive to achieve when creating IT artifacts for universal use. Designing accessible IT artifacts involves paradigms that encompass typical actions practitioners are expected to take. Practitioners, for instance, should collaborate with users and employ appropriate methods (e.g., participatory design) to understand and address users' needs [2-5].

The 10th International Conference on Socio-Technical Perspectives in IS (STPIS'24) August 16-17 2024 Jönköping, Sweden.

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Practitioners should comply with laws and regulations related to accessibility and follow guidelines that extend beyond these regulations [6,7]. Design outputs should be evaluated against these guidelines [8,9]. Additionally, practitioners should design and assess the compatibility of IT artifacts with assistive technologies [10–12]. Finally, practitioners should consider company policy, time constraints, budget, and their own capabilities, including their knowledge and expertise, when implementing accessibility measures.

From the practitioners' perspective, the design process involves pragmatic, ethical, and moral questions [13]. Pragmatic questions relate to efficacy and effectiveness: Does the system work and perform its intended functions? Does the system meet the owners' long-term aspirations? Are all other requirements considered in the same way as legal requirements? Ethical questions involve compatibility with stakeholders' values, and moral questions address whether the system is fair and just for all affected [13]. Ultimately, practitioners have an obligation to inscribe desirable values in IT artifacts [14]. Users, however, vary widely in their abilities, and their needs are diverse. Meeting user requirements within limited time and budget constraints is challenging and may raise ethical conflicts— "Ethical conflict occurs when people perceive that their duties toward one group are inconsistent" [15 p.215]. Nevertheless, ethical values have been described as a fundamental part of IS practice, indicating that "human ethical values are inherently embedded in the design of IS artifacts" [14].

Examining ethical viewpoints in accessibility design is crucial in the field of IS, because ethical conflicts may influence the actions that practitioners take when creating systems or technologies. McKay et al. [16] emphasized the importance of a socio-technical perspective, integrating both human-centered and construction-centered design knowledge for creating artifacts that fit their context of use. They suggest that understanding the context of an IS artifact is crucial. Similarly, Lyytinen and Newman [17] identified possible imbalances among components like actors, technology, tasks, and structure, which can lead to user issues such as misunderstanding, operational difficulties, or lack of acceptance. Additionally, factors like individual characteristics, task nature, external environment, and support systems influence these user conditions [18]. Notably, the codes of ethics of both, the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS) state: "Technologies and practices should be as inclusive and as accessible as possible, and [computing professionals / AIS members] should take action to avoid creating systems or technologies that disenfranchise or oppress people." [19,20]. Additionally, it is confirmed that there is a serious lack of research being undertaken regarding the ethical dimension of the IS field [13,21] However, in practice, web accessibility represents a promising strategy to improve usability and UX for all user groups [5,22].

This paper was inspired by the work of Mäkipää & Vartiainen [23]. Mäkipää & Vartiainen [23] investigated what motivates web practitioners to promote accessibility and their challenges during accessibility development. They examined these aspects from intrinsic and extrinsic viewpoints but ignored ethical viewpoints. For this paper, we used the same

seven sample studies that Mäkipää & Vartiainen [23] inspected. Then, we compared the reasons why practitioners consider accessibility against three ethical theories: consequentialist ethics, deontological ethics, and virtue ethics to understand the ethical phenomena surrounding the accessibility design of IT artifacts. As a preliminary result, the three ethical perspectives seem to be connected to reasons that influence practitioners' intentions to implement accessibility. Analysis indicates that ethical conflict may occur in the relationship between intrinsic and extrinsic reasons. This paper raise questions on how to improve ethicality, guidance, and facilitation on the right decisions in ethical dilemmas in web development.

The remainder of this paper is organized as follows. In the next section, theoretical foundations of ethics and accessibility are elaborated. This is followed by the method and a review of selected sample studies. The paper concludes with a discussion and concluding remarks.

2. Three philosophical perspectives of ethics and web accessibility development

There are three major general and philosophical perspectives of ethical theories which can be considered consequentialist ethics, deontological ethics, and virtue ethics [13,14]. Consequentialist ethics aims to make decisions that will benefit and provide the greatest good for the widest number of people. The rightness or wrongness of an action is determined by how much hedonistic consequential benefit is derived from the action. The aim is to maximize pleasure and minimize pain [13,14]. In accessibility research and practice, the widely used standard 'Ergonomics of Human-System Interaction' (ISO 9241-11:2018) by the International Organization for Standardization (ISO) defines accessibility as:

> "The extent to which products, systems, services, environments, and facilities can be used by people from a population with the widest range of user needs, characteristics, and capabilities to achieve identified goals in identified contexts of use" [24].

In reference to this definition, the overarching aim of accessibility can be viewed as a consequentialist approach to ethics.

Deontological ethics underscore the principle that all individuals should be treated with dignity and respect. Within deontological ethics, it is believed that we have a duty to act in a certain way. The morality of an action is determined by existing rules. These rules, which represent duties in terms of respecting another individual's rights, must be adhered to, and an act is considered ethical if it aligns with these rules [13,14]. Rights are established by society and are deemed ethically correct and valid, as they are endorsed by a large population. For instance, the Convention on the Rights of Persons with Disabilities (CRPD) defines accessibility in Article 9:

> "... appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and

systems, and to other facilities and services open or provided to the public, both in urban and in rural areas" [25].

The convention also agrees that state parties should promote the design, development, production, and distribution of accessible information at the early stages of information and communication technology processes [25]. To foster the promotion of accessibility, legislation (e.g. European Union (EU) directive) forces public services to develop their online services including websites and mobile applications. Accessibility requirements for web and mobile in the directive are based on EN standard "Accessibility requirements suitable for public procurement of ICT products and services in Europe" [26]. The total foundation of accessibility requirements composition comes from the World Wide Web Consortium, Web Accessibility Initiative as a Web Content Accessibility Guidelines (WCAG). WCAG requirements are set to three levels: A (lowest), AA, and AAA (highest) levels. EN standard and EU directive both recommend the following level AA in their regulations. These requirements are meant for all documents and software that are web pages or documents and software that are embedded, rendering, or intended to be rendered with the web pages [26].

Virtue ethics judge not the ethicality of actions, but rather the ethicality of individuals [14]. While consequentialism and deontology are ethical theories that focus on actions themselves, virtue ethics centers on how one can become a good person. In virtue ethics, decisions are made considering the virtues that are favored [27]. Virtue ethics emphasizes the idea that we should strive to be good people and do just good acts [13,14]. However, there has always been an inherent tension among these three broad schools of ethical approaches. Despite some philosophers' attempts to unite certain aspects of these theories, the field of philosophical ethics considers them to be radically different from each other [14]. Rogerson et al. [21] discussed what it is to be an ethical IS professional. They proposed principles that describe an ethos of professionalism within IS: (1) "develop a socially responsible culture within work which nurtures moral individual action"; (2) "consider and support the well-being of all stakeholders"; (3) "account for global common values and local cultural differences"; (4) "recognize social responsibility is beyond legal compliance and effective fiscal management"; (5) "ensure all business processes are considered from a social responsibility perspective"; and (6) "be proactive rather than reactive". [16 p.89]

Previous research on accessibility has primarily emphasized its inclusion in the design or testing phases of software development [28,29]. Most of these studies focus on user groups with visual impairments, with limited literature available discussing other disabilities such as hearing and cognitive disabilities [28,29]. When it comes to design practices, WCAG [30] appears to be the primary reference for accessibility guidelines and design issues [29]. WCAG is also widely used as a reference model in the development of accessibility assessment tools [29]. However, a practical conflict exists between WCAG and the full inclusion of accessibility. Despite WCAG being considered the standard in practice, it has been criticized in research for only addressing approximately half of the needs of users with visual [31]. Therefore, compliance with WCAG alone does not guarantee a satisfying UX [32], indicating that making an IT artifact accessible requires more than just adherence to existing laws and

and standards. Nevertheless, a study by Inal et al. [33], suggests that the primary motivator for adopting accessibility practices remains government laws and policies.

3. Methodology

As a preliminary examination, seven sample studies (See Table 1.) identified by [23] were reviewed from the literature to examine ethical viewpoints. The sample studies included 1925 respondents.

Table 1.
Description of the Sample Studies

Paper ref.	N	Description of the Participants
Bi et al. [34]	380	Web app developers, mobile app developers, and accessibility designers.
Inal et al. [27]	167	UX professionals.
Joyner et al. [35]	144	Visualization designers, data scientists, academics/teachers, students, data journalists, and hobbyists.
Lazar et al. [36]	175	Webmasters.
Nahon et al. [37]	417	Non-professional practitioners of online content.
Vollenwyder et al. [5]	342	Web practitioners in functional testing, management, project management, development, product owner, and visual design.
Yesilada et al. [38]	300	Consultants, practitioners, researchers, and managers specialized in Web accessibility, Human Computer Interaction, Software engineering, Design, Computer science, Business, and UX.

Considering a qualitative content analysis [39], in vivo coding was utilized to derive sample studies participants' viewpoints of what influence their actions to implement accessibility. The reasons were then collected and analyzed against three ethical theories using abductive reasoning [40], where the aim was to find the most likely conclusion. The following three parameters were used for the interpretation:

(1) Reasons as consequentialist ethics, which intentionally aim for actions that yield hedonistic consequentialist benefits, maximizing pleasure and minimizing pain for the greatest number of people [13,14].
(2) Reasons as deontological ethics, which are influenced by certain rules such as laws, policies, etc., or other factors that instill a sense of duty in practitioners, guiding them to act accordingly [13,14].
(3) Reasons as virtue ethics, which are not about actions per se, but rather about the thought processes behind the actions that make individuals feel like they are being good people [13,14,27].

4. Preliminary findings

After reviewing sample studies, reasons beyond practitioners' intention to implement accessibility are identified and illustrated in Table 2. These are followed by the interpretation of what type of ethical approach these reasons represent.

Table 2.
Reasons by sample studies that influences practitioner's acts to implement accessibility and interpreted ethical approaches

Reason	Evidence	Interpreted ethical approach
Personal motivation	Producing accessible online content is a great idea. - Providing accessible online content is a good thing to do. - I like the idea of producing accessible online content - It is worthwhile to produce accessible online content [37]	Virtue
	It is human responsibility to support equality through equal access in any domain of life [35]	Virtue
	Some personal association towards providing widespread access that made them value visualization accessibility. [35]	Virtue
	Project team members' personal motivation [33]	Virtue
	Ethical aspects [33]	Virtue
Perceived benefits for all, improved product quality and company reputation	Product quality ('If benefits for all user groups are highlighted, Web Accessibility is much more likely to be considered') [5]	Consequentialist
	'Accessibility benefits all types of people regardless their abilities and situations are very strongly supported by all' [38]	Consequentialist
	Organization gains good reputation by following ethical and social responsibility principles [33]	Virtue
	The project focused on reaching more people [33]	Consequentialist
	'Accessibility now needs to be shifted targeting the general end-users and is important for every project' [34]	Consequentialist
	'Accessibility could be integrated into current projects as a competitive functionality' [34]	Consequentialist
		Deontological
Knowing that the target users included people with disabilities	Users actively promote their needs (perceived as subjective norm) [5]	Deontological
	The target users included people with disabilities and special needs [33]	Deontological
	Knowing that users with visual impairment are using their site would influence [36]	Virtue
	Many empathized with visually impaired users as they or someone they knew needed special assistance in other situations. [35]	Virtue
Requirements by the legislation	It was enforced by the law [33]	Deontological
	Government requirements would influence the most [36]	Deontological
	'When it comes to whether legislation is the main motivator to adopt accessibility, responses are evenly divided although no strong positions are held' [38]	Deontological
Requirements by company or client	Company policies [33]	Deontological
	It was required by the customer [33]	Deontological
	Organization required to follow web development standards which help build accessible products [33]	Deontological

	Organization required to take into account web accessibility in that project [33]	Deontological
	Outside pressure from management or clients would influence [36]	Deontological
Influence of external community	Community context: People who are important to me believe that I should produce accessible online content. - People who are important to me encourage me to produce accessible online content - People who are important to me don't care if I produce accessible online content [37]	Deontological
Business pressure	Business pressures motivate to achieve short-term goals rather than the longer-term or indirectly profitable work of accessibility [34]	Deontological
Part of role	Web Accessibility is a part of professional role [5]	Deontological / Virtue
	Providing accessibility features is a standard step in the design process [35]	Deontological / Virtue
	'Accessibility design should not be an independent activity but intertwined with many software artefacts and activities' [34]	Virtue

Summing up the findings, the main reasons can be identified from the sample studies. First, the reasons that practitioners encounter can be divided into intrinsically and extrinsically influencing reasons (See Figure 1.). Intrinsic reasons are those thoughts and values that practitioners personally have, and which vary depending on the individual. Extrinsic reasons are those which influence practitioners' thoughts and work expectations, and vary depending on the context (e.g. company policies).

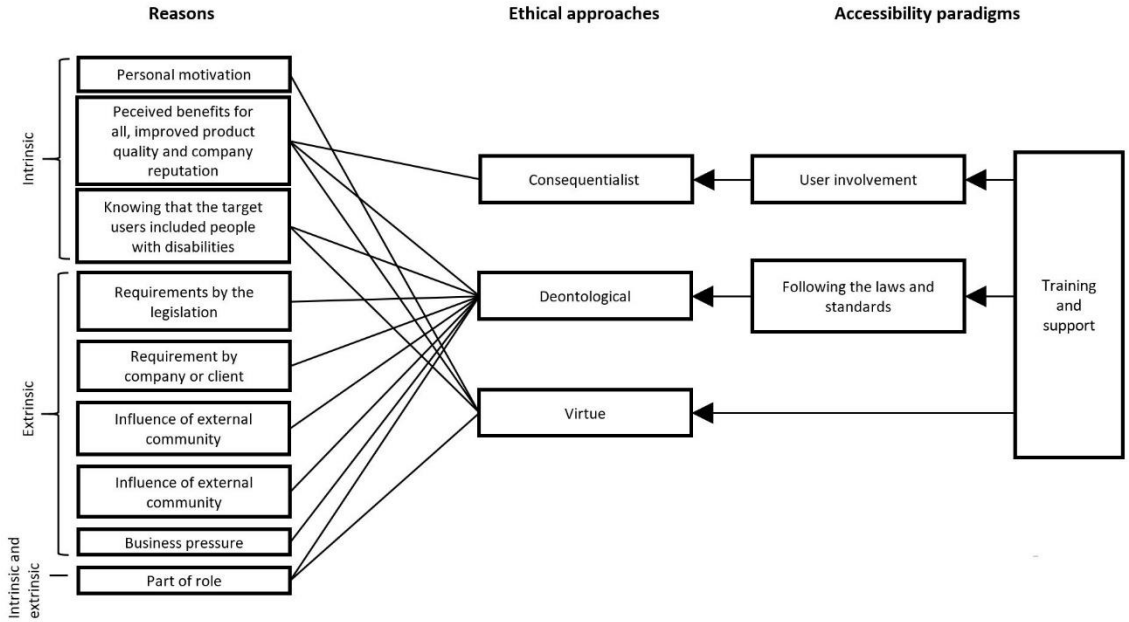

Figure 1. Interconnection between the reasons that influence practitioners' intentions to implement accessibility, ethical approaches, and accessibility paradigms (An arrow represents an effect).

Intrinsic reasons include *personal motivation*, *perceived benefits for all, improved product quality and company reputation*, and *knowing that the target users included people with disabilities. Personal motivation* contains the interest and attitude that accessibility is a good thing, and it is something that a person wants to do [33,37]. Accessibility can be seen ethically as a human responsibility to support equality [33,35]. Personal motivation is interpreted as virtue ethics because it reveals individuals thinking and intentions according to accessibility. *Perceived benefits for all, improved product quality, and company reputation* include consequentialist thinking to improve product quality by applying accessibility which will have benefits for all users, and which will reach more people [5,33,34,38]. These reasons are aiming intentionally for the actions that have a hedonistic consequentialist benefit to the widest number of people regardless of their abilities. There were also ideas that accessibility could be used as a competitive functionality [34] which reveals also deontological thinking that there is a competition that gives the input that makes practitioners feel that they have a duty, and they should apply accessibility. Practitioners also believe that following ethical and social responsibilities by applying accessibility will improve the company's reputation [33], which can be seen as a virtue. *Knowing that the target users included people with disabilities* is the reason that can be perceived from two ethical perspectives. First, it can be perceived as deontological ethics, which refers to the perception that practitioners feel social pressure from others and therefore considers the inclusion of users as a duty they must do [5,33]. Second, this reason can be perceived as virtue ethics. This refers to the extent to which practitioners emphasize users with disabilities [35,36].

Extrinsic reasons include *requirements by the legislation, requirements by company or client, influence of external community*, and *business pressure*. All these reasons are interpreted as deontological ethics because these are caused by certain rules that make practitioners feel that they have a duty, and they should act accordingly. Requirements by the legislation such as complying with WCAG guidelines is many times the reason that influences practitioners most [33,36,38]. A similar perception is felt when company management or clients have accessibility requirements and place pressure [33,36]. The external community's influence refers to the extent to which a developer is a member of the community on a related topic and perceives expectations by the community members to promote accessibility. This is interpreted as extrinsic input that causes the feeling of duty. This is, however, caused by an individual's own choice and therefore cannot be generalized. Like the influence by company policy, practitioners perceive business pressure that can influence practitioners to target short-term goals rather than the long-term work of accessibility [34].

Reasons that can be interpreted as well as intrinsic and extrinsic refer to the role practitioners feel they have. For example, the sense that accessibility is a part of practitioners' role can be personally perceived by practitioners themselves [5,34,35] which refers to virtue. On the other hand, they may believe that the role and position that they represent include an expectation and responsibility to act toward accessibility which refers to duty and deontological ethics.

5. Discussion

Based on the three ethical theories approaches, this paper collates and illustrates the interconnection between the reasons that influence practitioners' intentions to implement accessibility and accessibility paradigms. The main contribution of this paper is the illustration (Figure 1.) of the ethicality of accessibility paradigms and their interconnection to practitioners' intentions to implement accessibility. The illustration shows the relevance and a concern in the ethical management of accessibility in IS development. The question is how to derive the ethics of accessibility paradigms to ensure a holistic view of the development of accessibility of information systems in IT development context.

As a second contribution, this work collated the main reasons that influence practitioners' intentions to implement accessibility which can be divided into intrinsically and extrinsically influencing reasons. Intrinsic and extrinsic reasons are important to understand because ethical conflict may occur in the relationship between them. If deontological reasons and causes, such as requirements of law and management, etc., are perceived as inconsistent or inadequate towards one group that is prioritized by the intrinsic reasons of the practitioners, it may cause an ethical conflict.

5.1. Implications to research

All three ethical perspectives open research streams for future research in accessibility. For example, consequentialist perspective that aims for hedonistic consequentialist benefit to the widest number of people, raises an important question on how designing accessibility for certain group of users affect perception of accessibility, moreover, usability for the other groups. This refers also to other ethical questions on how to define majority and minority among different users.

Rights and duties are important in deontological ethics and must be followed [14]. Requirements by law oblige deontological reasons on practitioners, who must then apply those in their work – but in practice they are not adequate to cover the needs of the people [31]. Therefore, collaboration with users is necessary. It is evident that people, either users or practitioners in this context may perceive tasks, behavior of technology, or organizational structures differently which may lead to misunderstanding, operational difficulties, or lack of acceptance [17].

Chatterjee et al. [14] developed an artifact that enabled practitioner groups to conduct ethical collaboration. Similarly, ethical collaboration with users should be investigated and guided to enable practitioners to conduct user-sensitive design systematically covering the rights. Virtue is a sense of good person. This paper argues that training could influence practitioners' virtues. However, this should be investigated empirically to understand the real impact of training and how the knowledge gained through it is eventually applied.

5.2. Implications to practice

To improve the realization of accessibility, it is necessary to take actions (accessibility paradigms) that are and have a consequentialist and deontological effect, and the actions that influence practitioners' attitude toward accessibility, thus their virtue.

In practice, consequentialist actions can be achieved by supporting practitioners to collaborate and involve users (including users with disabilities and non-disabled users) with appropriate methods (e.g. participatory design) in the design and evaluation processes. Within this collaboration, practitioners can extract and understand users' actual needs [2–5] which are not necessarily covered by guidelines or standards. Moreover, if collaborative users represent various user groups (including assistive technology users) the outcome is more likely to be efficient considering the widest range of user needs and the compatibility of assistive technology [2,10–12].

To support the deontological approach, management should provide training and manuals that cover laws and the knowledge of the practices on how to comply with guidelines. Management should encourage and support practitioners' skills to comply with laws and regulations related to accessibility and guidelines beyond these regulations. [6,7]. Design outputs should be evaluated against the guidelines [8,9]. It is important that management understand that practitioners have to consider company policy, time constraints, budget, and their own capability to perform acts for accessibility (practitioners' knowledge and expertise) as well. Therefore, cooperation with practitioners to find a consensus on these issues is helpful. Engaging a diverse range of stakeholders besides practitioners, such as line managers, copywriters, and policymakers, to make accessibility a reality has an effect on attitude and commitment to promoting accessibility [41,42], thus it can affect practitioners' virtues benefiting accessibility.

6. Conclusions

Better understanding of consequentialist, deontological, and virtue ethics of accessibility paradigms could improve ethics of accessibility of information systems. Practitioners have intrinsic and extrinsic reasons that influence their intention to implement accessibility. Intrinsic reasons include personal motivation, perceived benefits for all, improved product quality and company reputation, and knowing that the target users included people with disabilities. Extrinsic reasons include requirements by the legislation, requirements by company or client, influence of external community, and business pressure. Reasons that can be as intrinsic, as well as extrinsic, refer to the role that practitioners feel they have. Ethical conflict may occur in the relationship between intrinsic and extrinsic reasons.

This paper proposes a model intended for managers to derive the ethics of accessibility paradigms to ensure a holistic view of the development of accessibility of information systems in IT development context. The model illustrates ethical approaches of paradigms of accessibility and interconnection to practitioners' intention to implement accessibility. This paper argues that there is relevance and a need for consideration to encompass each ethical approach in the management of accessibility, so that the main accessibility milestones become implemented in the design.

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