

# Ethics in Software Engineering: a Systematic Literature Review

Razieh Alidoosti<sup>1,2</sup>, Patricia Lago<sup>1</sup>, Maryam Razavian<sup>3</sup>, and Antony Tang<sup>1,4</sup>

<sup>1</sup>Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

<sup>2</sup>Gran Sasso Science Institute, L'Aquila, Italy

<sup>3</sup>Eindhoven University of Technology, Eindhoven, The Netherlands

<sup>4</sup>Swinburne University of Technology, Melbourne, Australia

## Foreword

This document comprises four appendices, namely Appendix A-D, each containing table(s) that offer additional information for interested readers.

## Appendix A. Codification of the extracted values from the primary studies.

Table 1: Codification of the extracted values.

Schwartz's value categories	Schwartz's values	Extracted values from the studies that were mapped to the Schwartz's values	Extracted values from the studies that were not mapped to the Schwartz's values
<b>Self-Direction (SD)</b>	Choosing own goals	-	-
	Privacy	-	-
	Self-respect	-	-
	Creativity	-	-
	Freedom	Freedom (freedom, liberty)	-
	Curious	Curious	-
	Independent	Autonomy (autonomy, independent)	-
	-	-	Dignity (human dignity, humanness, humanitarianism, work ethic, morality, non-maleficence, beneficence)
	-	-	Identity (identity, being normal, identity control, knowledgeable, individuality, neutrality, self-perception)
	-	-	Solitude
	-	-	Attentiveness
<b>Hedonism (HE)</b>	Pleasure	Pleasure (pleasure, happiness, satisfaction)	-
	Enjoying life	-	-
	Self-indulgent	-	-
	-	-	Calmness (calmness, comfort, peace, convenience, relief, social comfort, sensory comfort, spatial comfort)
	-	-	Hope
<b>Achievement (AC)</b>	Ambitious	-	-
	Influential	-	-
	Intelligent	-	-
	Capable	Capable	-
	Successful	Successful	-
	-	-	Competence
	-	-	Efficiency (efficacy, utility, effectiveness, usefulness, productivity, efficiency, optimality)
<b>Power (PO)</b>	Authority	-	-
	Social recognition	Social recognition (awareness, social recognition)	-
	Social power	Social power (social influence, social power, legitimation)	-
	Wealth	Wealth	-
	Preserving individuals' public image	Preserving individuals' public image	-
	-	-	Ownership and property
	-	-	Knowledge
<b>Security (SE)</b>	National security	-	-
	Family security	-	-
	Reciprocation of favors	-	-
	Sense of belonging	-	-
	Clean	-	-
	Healthy	Healthy	-
	Social order	Social order	-
	-	-	Control (control for safety, surveillance, monitoring, control)
	-	-	Safety
	-	-	Privacy (privacy, data privacy)
	-	-	Support and protection (support and protection, support, caring, support & service quality)
	-	-	Anonymity (confidentiality, anonymity)

Table 1 – Codification of the extracted values.

Schwartz's value categories	Schwartz's values	Extracted values from the studies that mapped to the Schwartz's values	Extracted values from the studies that did not map to the Schwartz's values
	-	-	Certainty (assurance, certainty, verifiability, precision)
	-	-	Availability (accessibility, availability, traceability)
	-	-	Informed consent
<b>Tradition (TR)</b>	Respect for tradition	-	-
	Accepting my portion in life	-	-
	Moderate	-	-
	Humble	-	-
	Devout	-	-
	Detachment	-	-
	-	-	Cultural and spiritual values
	-	-	Lifestyle values
<b>Conformity (CO)</b>	Politeness	-	-
	Obedient	-	-
	Honoring of elders	-	-
	Self-discipline	-	-
	-	-	Flexibility (mobility, flexibility, adaptability, compliance)
<b>Benevolence (BE)</b>	Forgiving	-	-
	A spiritual life	-	-
	Loyal	-	-
	True friendship	-	-
	Mature love	-	-
	Honest	-	-
	Meaning in life	-	-
	Responsibility	Responsibility (accountability, responsibility, responsiveness)	-
	Helpful	Helpful (helping others, helpfulness, assistance, emergency help)	-
	-	-	Togetherness (togetherness, intimacy, solidarity, empathy)
	-	-	Continuity
	-	-	Involvement (involvement, family-centricity, social inclusion, inclusion, participation, communication, collaboration, management, connection, community, cooperation)
	-	-	Usability (universal usability, design for all, ease of use)
	-	-	Accuracy
	-	-	Transparency (transparency, explicability, explainability)
	-	-	Trust (reliability, trust, comprehensibility, articulateness, transparency, openness, authenticity, confidence)
	-	-	Integrity (integrity, completeness)
<b>Universalism (UN)</b>	A world of beauty	-	-
	Broad-minded	-	-
	Unity with nature	-	-
	Inner harmony	-	-
	Wisdom	-	-
	World at peace	-	-
	Equality	Equality (equality of opportunity, equality, equity)	-
	Protecting the environment	Protecting the environment (protecting the environment, sustainability, environmental sustainability)	-
	Social justice	Social justice (procedural justice, environmental justice, distributive justice)	-

Table 1 – Codification of the extracted values.

Schwartz's value categories	Schwartz's values	Extracted values from the studies that mapped to the Schwartz's values	Extracted values from the studies that did not map to the Schwartz's values
	-	-	Welfare (human physical welfare, human psychological welfare, human material welfare, economic-cost, cost-effectiveness, cost reduction, emotional well-being, psychological well-being, physical health, general interest)
	-	-	Fairness
	-	-	Freedom from bias
	-	-	Altruism

## Appendix B: List of primary studies over publication venues and venue types.

Table 2: Number of the selected studies over publication venues and venue types.

Publication venue (PV)	Venue type (VT)	Studies	No.
Science and Engineering Ethics	J	[74, 56, 49, 72, 18, 73, 15]	7
Ethics and Information Technology	J	[34, 81, 43]	3
Informatik	J	[6, 3]	2
ACM Transactions on Computer-Human Interaction (TOCHI)	J	[10, 40]	2
Sustainability	J	[39, 60]	2
Technology Innovation Management Review (TIM Review)	J	[2]	1
International Journal of Decision Support Systems (IJDSS)	J	[82]	1
Designing of Augmented Reality Environments (DARE)	J	[28]	1
Artificial Intelligence Safety and Security	J	[68]	1
Journal of Design Research (JDR)	J	[61]	1
Big Data and Cognitive Computing (BDCC)	J	[65]	1
Journal of Adolescent Research (JAR)	J	[4]	1
Knowledge, Technology and Policy (KTP)	J	[75]	1
Technical Communication Quarterly (TCQ)	J	[58]	1
International Journal of Child-Computer Interaction (IJCCI)	J	[53]	1
IEEE Technology and Society Magazine	J	[57]	1
IEEE Transactions on Professional Communication (TPC)	J	[79]	1
Cognition, Technology and Work (CTW)	J	[36]	1
PLoS One	J	[71]	1
Studies in Logic, Grammar and Rhetoric	J	[55]	1
Mind and Machines	J	[67]	1
JMIR cardio	J	[17]	1
Assistive Technology	J	[44]	1
Humana.Mente	J	[66]	1
AI and Ethics	J	[69]	1
Health and technology	J	[62]	1
Geo-spatial Information Science	J	[42]	1
International Journal of Social Robotics	J	[70]	1
Human Computer Interaction and Emerging Technologies	J	[54]	1
Journal of decision systems (JDS)	J	[48]	1
Procedia Computer Science	J	[76]	1
Conference on Human Factors in Computing Systems (CHI)	C	[84, 46, 59, 47]	4
Decennial Aarhus Conference on Critical Alternatives	C	[77, 85, 37]	3
Hawaii International Conference on System Sciences (HICSS)	C	[20, 27, 30]	3
International Conference on Human-Computer Interaction (HCI)	C	[25, 64]	2
IEEE International Symposium on Technology and Society (ISTAS)	C	[41, 14]	2
International Conference on Information Systems (ICIS)	C	[83]	1
ACM Conference On Computer Supported Cooperative Work (CSCW)	C	[1]	1
ACM International Conference on Supporting Group Work (GROUP)	C	[50]	1
Decennial Conference on Critical Computing: Between Sense and Sensibility	C	[78]	1
International Conference on Interaction Design and Children (IDC)	C	[52]	1
Annual Computer Security Applications Conference (ACSAC)	C	[21]	1
Participatory Design Conference (PDC)	C	[8]	1
International Conference on Ubiquitous Computing (UbiComp)	C	[29]	1
International Conference on Mobile Business (ICMB)	C	[19]	1
International Conference on Advanced Information Systems Engineering (CAISE)	C	[5]	1
European Conference on Computer-Supported Cooperative Work (ECSCW)	C	[7]	1
ACM/IEEE International Conference on Human-Robot Interaction (HRI)	C	[16]	1
IEEE Conference on Open Systems (ICOS)	C	[51]	1
International Conference on Collaboration Technologies and Systems (CTS)	C	[32]	1
International Conference on Unmanned Aircraft Systems (ICUAS)	C	[13]	1
International Conference on Engineering Psychology and Cognitive Ergonomics (ICEPCE)	C	[35]	1
Directions and Implications of Advanced Computing Symposium (DIAC)	C	[26]	1
IEEE Intelligent Vehicles Symposium (IV)	C	[63]	1
ACM Conference on Fairness, Accountability, and Transparency (FAccT)	C	[9]	1
STS Conference Graz	C	[45]	1
International Conference on Wirtschaftsinformatik (Wi)	C	[80]	1

Table 2 – Number of the selected studies over publication venues and venue types.

<b>Publication venue (PV)</b>	<b>Venue type (VT)</b>	<b>Studies</b>	<b>No.</b>
International Conference on the Ethical and Social Impacts of ICT	C	[11]	1
Societal Challenges in the Smart Society	C	[31]	1
International Design Conference	C	[33]	1
International Workshop on Agent-Oriented Software Engineering (AOSE)	W	[24, 23]	2
Workshop on Fostering Smart Energy Applications (FSEA)	W	[12]	1
Pervasive Computing and Communications Workshops (PerCom)	W	[22]	1
Ethik und Moral in der Wirtschaftsinformatik (EMoWI)	W	[38]	1

## Appendix C: List of ethical values according to the primary studies.

Table 3: Extracted values from the primary studies based on Schwartz's conservation dimension.

Schwartz's value categories	Extracted values from the studies	Explanation	Example
<b>Security (SE)</b>	<b>Social order</b>	Refers to the stable state of society, which is necessary for individuals to communicate, e.g., communication through technology.	By hard-coding of some procedures in the platform or through running bots, e.g., using bots that pre-screen edits to detect vandalism, or reverting changes and sending a short message to the editor, Wikipedia cares for the value of social order [57].
	<b>Healthy</b>	Refers to individuals' well-being, both physical and mental, which should be protected by the systems and not cause harm, like injury or death.	By reducing waiting time for blood sample transportation and improving the physical welfare of patients, humanitarian cargo drones care for the value of health [14].
	<b>Privacy</b>	Refers to individuals' claim or right to determine what information about themselves can be communicated to others.	By keeping the users' information privately and securely, e.g., when they logged into the system, what they searched, and how they query the system, the groupware system cares for the value of privacy [50].
	<b>Availability</b>	Refers to the access of authorized users to the information in systems when needed, regardless of their location.	By giving users access to the information relevant to their tasks, regardless of their location or organization of employment, the health information system (HIS) cares for the value of availability [79].
	<b>Safety</b>	Refers to the system avoiding unintended hazards towards individuals and society, detecting and mitigating physical risks, and protecting individuals, property, and the environment against the threats associated with the systems.	By protecting homeless young people and keeping them safe, e.g., by accessing aid via their cell phone, Mobile phone technology cares for the value of safety [84].
	<b>Certainty</b>	Refers to the system making users free from doubts and ensuring they meet their requirements and needs.	By assuring parents about effectively carrying out the treatment steps at home, the sensor-based physiotherapeutic assistance system (for home therapy) cares for the value of certainty [38].
	<b>Control</b>	Refers to the ability of individuals (like designers) to keep the information and its flow safe through technologies.	By embedding some functionalities in the online entertainment platforms that enable parents to define time, content and activity restrictions, and monitor children online, these platforms care for the value of control (in this case, control for safety) [53].
	<b>Informed consent</b>	Refers to permission and agreement of individuals before conducting actions towards them in the context of the systems to protect the safety of data and individuals. It encompasses criteria of disclosure and comprehension (for <i>informed</i> ) and voluntariness, competence, and agreement (for <i>consent</i> ) of people.	By allowing users to become aware of when cookies occur or for what purposes they would be used, the Mozilla Browser cares for the value of informed consent [26].
	<b>Anonymity</b>	Refers to keeping stakeholders' identities private in a system.	By concealing the identity of the reviewers to make judgments based on quality (not academic positions), conference management systems care for the value of anonymity [23].
<b>Conformity (CO)</b>	<b>Support and protection</b>	Refers to the preservation of individuals from threats or harms caused by the systems.	By allowing women to use missed calls to signal the men that they wish to communicate with them (but without financial burden), the media technology cares for the value of support and protection in the context of long-distance romantic relationships in Arabic culture [1].
	<b>Flexibility</b>	Refers to the adaptation of systems to changes wrt the existence of uncertainty, e.g., adaptation to changes in customer needs and new technological developments.	By modifying generation or consumption patterns in reaction to an external signal like a price change to meet the consumers' needs, the smart grid system cares for the value of flexibility [72].
<b>Tradition (TR)</b>	<b>Cultural and spiritual values</b>	Refers to behaviors of individuals in the social and public environments wrt other individuals' expectations.	By embedding different components in the robots (like mind and emotions) according to cultural or religious differences existed among countries, the humanoid robots care for cultural and spiritual values [16].

Table 3 – Extracted values from the primary studies based on Schwartz’s conservation dimension.

Schwartz’s value categories	Extracted values from the studies	Explanation	Example
	Lifestyle values	Refers to the habits, attitudes, tastes, economic level, etc., that constitute the mode of living of an individual or group.	By considering the users’ energy-saving strategies and sustainable behaviour changes in the design of structure and content of the website, e.g., searching and creating user-generated content, the websites care for the value of lifestyle [12].



Table 4: Extracted values from the primary studies based on Schwartz’s openness to change dimension.

Schwartz’s value categories	Extracted values from the studies	Explanation	Example
<b>Self-direction (SD)</b>	<b>Autonomy</b>	Refers to individuals’ ability to decide, plan, and act in ways they believe will help them achieve their goals, with or without the help of others (individuals or systems).	By allowing others to check on elders remotely, elders can live independently longer without their families’ help, the CareNet Display (as a pervasive health care technology) cares for the value of autonomy [22].
	<b>Freedom</b>	Refers to the ability of individuals to have control over their activities or be free in their choice in the context of systems.	By embedding the implantable chip of Radio Frequency Identification (RFID) technology in the body of humans for unobtrusive sending and receiving of data for medical purposes or using in passports, this technology could undermine the value of freedom [47].
	<b>Curious</b>	Refers to individuals’ interest to explore everything to become aware of different aspects about the systems.	By monitoring and measuring the cognitive load and the emotional state of train traffic controllers, the CLES monitor can satisfy the curiosity of team members in each other’s functioning that can affect the value of curiosity [35].
	<b>Solitude</b>	Refers to the right of individuals to be left alone.	By providing a specific warning for vulnerable populations, the privacy addendum for an open source software can affect the value of solitude [29].
	<b>Attentiveness</b>	Refers to individuals for paying close attention and recognizing important things.	By perceiving the minute cues of the care-receivers (i.e., patients) and being attentive to patients’ frailty when lifting, the robots in the hospitals care for the value of attentiveness [74].
	<b>Dignity</b>	Refers to the rights of individuals to be respected and treated ethically in interaction with systems.	By enabling caregivers to interact with the elder in a more relaxed way and to treat them with more respect, the CareNet Display (as a pervasive health care technology) cares for the value of dignity [22].
	<b>Identity</b>	Refers to individuals’ understanding of who they are over time (both continuity and discontinuity over time).	By developing the humanitarian cargo drones to transport blood samples, the vulnerable local communities (e.g., with low-income) are able to develop their identity. So, drones can affect the value of identity [13].
<b>Hedonism (HE)</b>	<b>Pleasure</b>	Refers to a feeling of satisfaction and enjoyment in interaction with systems.	By assessing the overall quality of individuals’ life favorably, the smart city cares for the value of pleasure [39].
	<b>Calmness</b>	Refers to a peaceful psychological state in individuals.	By replacing loud and disruptive medical helicopters, the humanitarian cargo drones care for the value of calmness [13].
	<b>Hope</b>	Refers to a future-oriented expectation of attaining personal goals which are dependent on personal activities, characteristics, and external factors.	By considering the reminder feature that alerts patients to take the insulin, the diabetes apps care for the value of hope [19].

Table 5: Extracted values from the primary studies based on Schwartz’s self-enhancement dimension.

Schwartz’s value categories	Extracted values from the studies	Explanation	Example
<b>Achievement (AC)</b>	Capable	Refers to being able to achieve and under human control.	By being capable of providing a high standard of care (e.g., by possessing strength and intelligence) to cater to the needs of patients, care robots consider the value of capability [68].
	Successful	Refers to accomplishing a desired aim for receiving benefits from the systems.	Design team by implementing functionalities (like a timer for parental involvement) in child platforms and parental controls to improve the quality of their platform cares for the value of success (in this case, commercial success) [53].
	Efficiency	Refers to individuals’ ability to utilize the system in an optimal way.	By using mobile health (mHealth) technologies, Quality of Life (QoL) assessments might become more enjoyable, less time-consuming, and more efficient for people with severe mental health problems. So, mHealth technologies can affect the value of efficiency [49].
	Competence	Refers to individuals’ abilities that help them properly carry out their tasks and be responsible for the results.	By lifting the care-receivers (i.e., patients) at the appropriate speed and angle without hurting or dropping them, the robots in the hospitals care for the value of competence [74].
<b>Power (PO)</b>	Preserving individuals’ public image	Refers to beliefs and public attention about stakeholders based on their actions in relation to the systems.	By answering a question well or contributing to writing good code in the groupware system (through users), this system can affect the value of the reputation at a software engineering organization [50].
	Social power	Refers to attaining a dominant position or control over others in the context of the systems.	By emphasizing within-community achievements of editors within the Wikipedia community (e.g., gaining high regard, or completing an immaculate history of interactions), this platform can affect the value of social power [57].
	Recognition	Refers to recognizing something or individuals based on previous knowledge in the context of the systems.	By monitoring train traffic controllers through the CLES monitor, the hardworking controllers can feel recognized when the monitor shows others how hard they work. So, the monitor can affect the value of recognition [35].
	Wealth	Refers to material possessions and financial benefits in the context of the systems.	By supporting the peer review process and publishing high-quality research through the conference management system, the publication’s and the publisher’s reputation potentially increase. So, the system can support the value of profit [23].
	Ownership and property	Refers to the right to a property including the right to possess it, use it, manage it, derive income from it, etc.	By giving patients online access to their health information in the context of Electronic Health Records (EHR) system, they may regard themselves as the owner. So, the system can affect the value of ownership and property [34].
	Knowledge	Refers to technical knowledge that individuals have in relation to the systems.	By publishing high-quality research and barring substandard level publications, the conference management system can support the value of knowledge [23].
<b>Hedonism (HE)</b>	Pleasure	Refers to a feeling of satisfaction and enjoyment in interaction with systems.	By assessing the overall quality of individuals’ life favorably, the smart city cares for the value of pleasure [39].
	Calmness	Refers to a peaceful psychological state in individuals.	By replacing loud and disruptive medical helicopters, the humanitarian cargo drones care for the value of calmness [13].
	Hope	Refers to a future-oriented expectation of attaining personal goals which are dependent on personal activities, characteristics, and external factors.	By considering the reminder feature that alerts patients to take the insulin, the diabetes apps care for the value of hope [19].

Table 6: Extracted values from the primary studies based on Schwartz’s self-transcendence dimension.

Schwartz’s value categories	Extracted values from the studies	Explanation	Example
<b>Benevolence (BE)</b>	<b>Responsibility</b>	Refers to the properties that ensure actions of individuals or organizations may be traced uniquely to the individuals or organizations.	By ensuring the care-receivers (i.e., patients) about the right direction for care or maintaining an accurate assessment of their needs through the care-givers (i.e., robots), the robots in the hospitals care for the value of responsibility [74].
	<b>Helpful</b>	Refers to the ability of individuals to provide help or direction to others through the system.	By sharing workload information to support operators to help each other when needed, the virtual assistant in the context of train traffic control cares for the value of helpful [36].
	<b>Togetherness</b>	Refers to being close to other individuals for different reasons such as (financial) support, conveying emotion, having communication through technology.	By creating individual work out of group work and displacing some of the built-in social outlets in domestic work (e.g., changing the way of doing laundry or washing dishes because of using electric clothes dryers and dishwashers), domestic technologies could affect the value of togetherness [46].
	<b>Transparency</b>	Refers to the openness, clarity, and understandability of the system, its functions, and data, which help reduce user misunderstandings.	By occupying multiple roles within conference management systems, reviewers who are also authors may see the ranking of their own papers. So, these systems need to pay attention to the value of transparency [23].
	<b>Involvement</b>	Refers to the cooperation of different individuals and organizations as equal partners at every decision-making level of developing systems, from assessment and planning to implementation and evaluation.	By involving parents in the child’s activities, knowing what their children do, and showing the children that they care, the parental application cares for the value of involvement [52].
	<b>Trust</b>	Refers to expectations between people who can experience goodwill, extend goodwill toward others, feel vulnerable, and experience betrayal. Trust in software systems refers to having faith in systems to demonstrate honesty and predictable behavior and keep loyalty and trueness.	By supporting interactions among persons (especially interactions that may leave some persons vulnerable to the actions of other persons), augmented reality considers the value of trust [28].
	<b>Accuracy</b>	Refers to data that should be free of errors, and the proper and precise function of a system, e.g., accurate operation, measurement, and feedback provided by the system.	By providing highly accurate measurement and feedback of the therapy, the sensor-based physiotherapeutic assistance system for home therapy cares for the value of accuracy [38].
	<b>Integrity</b>	Refers to moral and ethical principles for doing the right things by individuals. Integrity in software systems refers to complete and uncorrupted data.	By protecting reviewers’ anonymity, conference management systems care for the value of scientific integrity [23].
	<b>Usability</b>	Refers to level of comfort in the use of systems to make all people (non-technical users or everyone from all demographic groups) successful users.	In [19], the diabetes apps care for the value of usability through supporting some acts. For example, by supporting adjusting lifestyle and mitigating conflict with cultural norms; providing instructions, resources, and commands in non-English languages; supporting the needs of gender and age differences; providing culturally appropriate and adaptable self-management methods.
	<b>Continuity</b>	Refers to the maintenance of continuous operations in a system.	By providing functions for parents to be able to treat their children continuously at home, the sensor-based physiotherapeutic assistance system for home therapy affects the value of continuity [38].
<b>Universalism (UN)</b>	<b>Justice</b>	Refers to the capability of doing what is just and also being just in action.	By ensuring transparency, completeness, and unbiased information in decision-making, the smart grid system cares for the value of procedural justice [72].
	<b>Equality</b>	Refers to behaving equally with users and the contribution of all of them in the system without considering hierarchical considerations and judgments.	By allowing the contribution of all users in the context of peer production systems (like Wikipedia), these systems care for the value of equality [57].

Table 6 – Extracted values from the primary studies based on Schwartz’s self-transcendence dimension.

Schwartz’s value categories	Extracted values from the studies	Explanation	Example
	Protecting the environment	Refers to sustaining environments to meet the needs of the present without compromising the future.	By using electric power instead of fossil fuels (62% of electricity in Denmark comes from renewable sources), cargo drones care for the value of environmental sustainability [14].
	Fairness	Refers to the system that should not discriminate unfairly against specific individuals or groups of individuals in favor of others, or should not bias in order to make reasonable judgments.	By not taking biased or discriminatory actions based on information about the stakeholders and treating all individuals involved equally, autonomous vehicle technologies care for the value of fairness [63].
	Freedom from bias	Refers to overcoming systematic unfairness perpetrated on individuals and groups.	By not discriminating unfairly against any group of stakeholders or privileging one policy over another, the large-scale simulation system (UrbanSim) cares for the value of freedom from bias [8].
	Altruism	Refers to helping others through the systems without personal gain or benefit (for example, providing individuals with some services).	By helping others without personal gain through pervasive brain-computer interfaces, e.g., answering a question about local doctors, these interfaces could affect the value of altruism [59].
	Welfare	In the context of software systems, welfare refers to the protection of the well-being of all people, which consists of (i) physical welfare that deals with bodily well-being, such as physical and mental health, (ii) material welfare that refers to physical circumstances, economics and employment, and (iii) psychological welfare that refers to psychological and emotional states of users like comfort, peace, and mental health.	In [19], the diabetes apps care for the value of welfare through supporting some acts. For example, by improving mental and physical health conditions, facilitating self-monitoring of disease symptoms, supporting and educating patients in overcoming depression.

## Appendix D. List of stakeholder roles' concerns.

Table 7: Concerns of stakeholder roles (system users and system development organisation).

Related value category	Value	Example of system users' concerns	Example of system development organisation' concerns	Studies
Security	Security	-	Security risks in relation to an insulin pump system, like (i) maintaining the integrity and confidentiality of data and (ii) ensuring remote control that should only be accessed by pre-approved individuals [2].	[2]
	Availability	Concerns about data access in relation to identity technologies [10].	The data needs to be usable and available to all in the context of OpenStreetMap [42].	[10, 42, 17, 21, 29]
	Safety	Concerns about safety risks toward teens in the context of parental control applications [4, 52, 53, 83, 85, 32].	The need of control for safety in the context of online entertainment platforms [52, 53, 83, 85].	[4, 52, 53, 83, 85, 32, 10, 33, 60, 16, 18]
	Anonymity	Concern about protecting authors/reviewers' identity in relation to the conference management system [23].	-	[23, 48]
	Privacy	Concern about transmitting personal data to clinics in the context of diabetes self-management using mobile apps [19].	Disclosure to unauthorized parties, unauthorized use of individual data, unauthorized use of aggregated data, unauthorized inference with unexpected external information in the context of a privacy addendum for an open source software license [29].	[29, 19, 71, 21, 23, 35, 82, 61, 50, 48, 49, 39, 42, 76, 11, 38]
	Support and protection	Concerns about receiving social support in relation to eHealth technologies [17].	-	[17, 48]
	Healthy	Concerns about the physical harm that can be caused by a good home-based nocturnal seizure detector [71].	Concern about people's health in relation to a supervisory command and control system for a U.S. Navy cruise missile [18].	[71, 18]
	Informed consent	Informed consent concerns in relation to the Mozilla Browser [27].	-	[27]
Benevolence	Usability	Usability concerns (e.g., ease-of-use) in the context of the Mozilla Browser [27].	-	[27, 9, 19, 60, 49, 71]
	Involvement	Parents expressed issues related to involvement (e.g., knowing what their children do, and showing the children that they care) in relation to parental software for young children [52, 53, 83, 85].	-	[52, 53, 83, 85, 5]
	Trust	To have reliable information and advice in relation to eHealth technologies [17].	Concerns about making humanoid robots reliable [16].	[17, 16, 1, 19, 33, 35, 60, 50, 48, 42, 71]
	Transparency	Concern about clarity of the conference management system [23].	Concerns about transparency in the context of humanoid robots [16].	[23, 16, 60]
	Responsibility	Users need and use software-based risk-assessment instruments (SBRAIs) to support their accountability in respect of third parties [48].	Concern about the unclear division of responsibility or potential burden of responsibility in relation to a good home-based nocturnal seizure detector [71].	[48, 71, 23, 60]
Conformity	Flexibility	Users need software-based risk-assessment instruments (SBRAIs) to remain compliant with regulatory or organizational requirements [48].	-	[48, 9]
Universalism	Protecting the environment	Concern about sustainability and environmental protection in relation to urban simulation system [8].	-	[8, 13]
	Equality	The rights of equality and non-discrimination in relation to smart cities [39].	-	[39, 8]
	Freedom from bias	Users want to be free of bias and any other form of distortion in relation to software-based risk-assessment instruments (SBRAIs) [48].	Concerns regarding the perception of bias in the indicator information, including what information is provided about the indicators and how they are organized and presented to the user in the context of large-scale urban simulation [7].	[48, 7]

Table 7 – Concerns of stakeholder roles.

Related value category	Value	Example of system users' concerns	Example of system development organisation' concerns	Studies
	Fairness	Being fair in the context of the conference management system [23].	Concern about balancing the value of fairness in the context of large-scale urban simulation [7].	[23, 7, 60, 67, 69]
	Welfare	Concerns about physical welfare, psychological welfare, and material welfare in the context of humanitarian cargo drones [13].	Concerns about people's well-being in the context of OpenStreetMap [42].	[13, 42, 1, 19, 60, 18]
Power	Ownership and property	Concern about property rights in relation to urban simulation system [8].	-	[8]
	Preserving individuals' public image	Compromising their reputation (e.g., by answering a question poorly) in relation to a corporation's groupware system [50].	-	[50]
Self-Direction	Dignity	-	Concerns about respecting human dignity in relation to humanoid robots [16].	[16]
	Autonomy	Loss of autonomy in diagnosing in the context of healthcare ICT [61].	Respecting human autonomy regarding sensor-based physiotherapeutic assistance system for home therapy [38].	[61, 38, 17, 19, 60, 48, 67, 69]
	Identity	To be seen as a person rather than a patient in relation to eHealth technologies [17].	-	[17, 48]
	Freedom	Restriction of freedom in relation to a good home-based nocturnal seizure detector [71].	Providing users with greater liberty, while freeing them from being dependent on a commercial or government source in relation to OpenStreetMap [42].	[71, 42, 39]
Tradition	Cultural and spiritual values	Maintaining a healthy lifestyle in relation to eHealth technologies [17].	Concerns about respecting cultural and spiritual values (e.g., mind, emotions) in the design of humanoid robots [16].	[17, 16]
Achievement	Competence	-	Ethical issues related to competency in the context of sensor-based physiotherapeutic assistance system for home therapy [38].	[38]
Hedonism	Calmness	Feeling fear, anxiousness, or insecurity about their health in relation to eHealth technologies [17].	-	[17]
	Hope	Being supported in coping with negative emotions imposed by the disease in the context of mobile apps for diabetes self-management [19].	-	[19]

## References

- [1] Tamara Alsheikh, Jennifer A Rode, and Siân E Lindley. Whose value-sensitive design: a study of long-distance relationships in an arabic cultural context. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work*, pages 75–84, 2011.
- [2] Aida Alvarenga and George Tanev. A cybersecurity risk assessment framework that integrates value-sensitive design. *Technology Innovation Management Review*, 7(4), 2017.
- [3] Markus Ast and Martin Gaedke. Value-sensitive design in hyper-connected societies. *Informatik 2016*, 2016.
- [4] Karla Badillo-Urquiola, Chhaya Chouhan, Stevie Chancellor, Munmun De Choudhary, and Pamela Wisniewski. Beyond parental control: designing adolescent online safety apps using value sensitive design. *Journal of adolescent research*, 35(1):147–175, 2020.
- [5] Balbir S Barn and Ravinder Barn. Human and value sensitive aspects of mobile app design: a foucauldian perspective. In *International Conference on Advanced Information Systems Engineering*, pages 103–118. Springer, 2018.
- [6] Stefanie Betz and Andreas Fritsch. A comparison of value sensitive design and sustainability design. *Informatik 2016*, 2016.
- [7] Alan Borning, Batya Friedman, Janet Davis, and Peyina Lin. Informing public deliberation: Value sensitive design of indicators for a large-scale urban simulation. In *ECSCW 2005*, pages 449–468. Springer, 2005.
- [8] Alan Borning, Batya Friedman, and P Kahn. Designing for human values in an urban simulation system: Value sensitive design and participatory design. In *Proceedings From the Eighth Biennial Participatory Design Conference*. Citeseer, 2004.
- [9] Karen Boyd. Designing up with value-sensitive design: Building a field guide for ethical ML development. In *2022 ACM Conference on Fairness, Accountability, and Transparency*, pages 2069–2082, 2022.

- [10] Pam Briggs and Lisa Thomas. An inclusive, value sensitive design perspective on future identity technologies. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 22(5):1–28, 2015.
- [11] Oliver Burmeister, Paul d’Aoust, Anisha Fernando, Anwaar Ulhaq, and Kirsten Wahlstrom. Exploring co-design considerations for embedding privacy in holochain apps: a value sensitive design perspective. In *[New] Normal Technology Ethics: Proceedings of the ETHICOMP 2021*, pages 96–99. Universidad de La Rioja, 2021.
- [12] Rachel Burrows, Johnson Peter, and Johnson Hilary. Value sensitive design approach to influence energy-use behaviour. pages 657–658, 2015.
- [13] Dylan Cawthorne and Alessandra Cenci. Value sensitive design of a humanitarian cargo drone. In *2019 International conference on unmanned aircraft systems (ICUAS)*, pages 1117–1125. IEEE, 2019.
- [14] Dylan Cawthorne and Aimee Robbins-van Wynsberghe. From healthdrone to frugaldrone: Value-sensitive design of a blood sample transportation drone. In *2019 IEEE International Symposium on Technology and Society (ISTAS)*, pages 1–7. IEEE, 2019.
- [15] Alessandra Cenci and Dylan Cawthorne. Refining value sensitive design: A (capability-based) procedural ethics approach to technological design for well-being. *Science and Engineering Ethics*, 26(5):2629–2662, 2020.
- [16] EunJeong Cheon and Norman Makoto Su. Integrating roboticist values into a value sensitive design framework for humanoid robots. In *2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, pages 375–382. IEEE, 2016.
- [17] Roberto Rafael Cruz-Martínez, Jobke Wentzel, Britt Elise Bente, Robbert Sanderman, and Julia EWC van Gemert-Pijnen. Toward the value sensitive design of ehealth technologies to support self-management of cardiovascular diseases: Content analysis. *JMIR cardio*, 5(2):e31985, 2021.
- [18] Mary L Cummings. Integrating ethics in design through the value-sensitive design approach. *Science and Engineering Ethics*, 12(4):701–715, 2006.
- [19] Majid Dadgar and KD Joshi. Diabetes self-management using mobile apps: An empirical investigation based on app reviews and through value sensitive design perspective. In *2015 International Conference on Mobile Business. Paper*, volume 3, 2015.
- [20] Majid Dadgar and KD Joshi. ICT-enabled self-management of chronic diseases: Literature review and analysis using value-sensitive design. In *2015 48th Hawaii International Conference on System Sciences*, pages 3217–3226. IEEE, 2015.
- [21] Tamara Denning, Daniel B Kramer, Batya Friedman, Matthew R Reynolds, Brian Gill, and Tadayoshi Kohno. CPS: Beyond usability: Applying value sensitive design based methods to investigate domain characteristics for security for implantable cardiac devices. In *Proceedings of the 30th Annual Computer Security Applications Conference*, pages 426–435, 2014.
- [22] Christian Detweiler and Koen Hindriks. Value-sensitive design patterns for pervasive health care. In *2012 IEEE International Conference on Pervasive Computing and Communications Workshops*, pages 908–913. IEEE, 2012.
- [23] Christian Detweiler, Koen Hindriks, and Catholijn Jonker. Principles for value-sensitive agent-oriented software engineering. In *International Workshop on Agent-Oriented Software Engineering*, pages 1–16. Springer, 2010.
- [24] Christian Detweiler, Koen Hindriks, and Catholijn Jonker. A value-sensitive approach to agent-oriented software engineering. In *Workshop 8 The Eleventh International Workshop on Agent Oriented Software Engineering AOSE 2010*, page 1, 2010.
- [25] Jacob Dexe, Ulrik Franke, Anneli Avatare Nöu, and Alexander Rad. Towards increased transparency with value sensitive design. In *International Conference on Human-Computer Interaction*, pages 3–15. Springer, 2020.
- [26] Batya Friedman and Alan Borning. Value sensitive design as a pattern: Examples from informed consent in web browsers and from urban simulation. In *Proceedings of the DIAC 2002 Directions and Implications of Advanced Computing Symposium, Palo Alto, CA*, pages 109–113. Citeseer, 2002.
- [27] Batya Friedman, Daniel C Howe, and Edward Felten. Informed consent in the mozilla browser: Implementing value-sensitive design. In *Proceedings of the 35th annual hawaii international conference on system sciences*, pages 10–pp. IEEE, 2002.
- [28] Batya Friedman and Peter H Kahn Jr. A value-sensitive design approach to augmented reality. *Design of Augmented Reality Environments*, The MIT Press, Cambridge, MA, in press-a, 2000.
- [29] Batya Friedman, Ian Smith, Peter H Kahn, Sunny Consolvo, and Jaina Selawski. Development of a privacy addendum for open source licenses: Value sensitive design in industry. In *International Conference on Ubiquitous Computing*, pages 194–211. Springer, 2006.
- [30] Isabel Gan and Sara Moussawi. A value sensitive design perspective on AI biases. In *HICSS*, pages 1–10, 2022.
- [31] Roberto García and Rosa Gil. Exploring value sensitive design for blockchain development. In *Societal Challenges in the Smart Society*, pages 249–256. Universidad de La Rioja, 2020.
- [32] Arup Kumar Ghosh. Using a value sensitive design approach to promote adolescent online safety on mobile platforms. In *2016 International Conference on Collaboration Technologies and Systems (CTS)*, pages 593–596. IEEE, 2016.

- [33] R Graubohm, T Schröder, and M Maurer. Value sensitive design in the development of driverless vehicles: A case study on an autonomous family vehicle. In *Proceedings of the Design Society: DESIGN Conference*, volume 1, pages 907–916. Cambridge University Press, 2020.
- [34] Christiane Grünloh. Using technological frames as an analytic tool in value sensitive design. *Ethics and Information Technology*, pages 1–5, 2018.
- [35] Maaïke Harbers and Mark A Neerincx. Value sensitive design of automated workload distribution support for traffic control teams. In *International Conference on Engineering Psychology and Cognitive Ergonomics*, pages 12–21. Springer, 2014.
- [36] Maaïke Harbers and Mark A Neerincx. Value sensitive design of a virtual assistant for workload harmonization in teams. *Cognition, Technology & Work*, 19(2):329–343, 2017.
- [37] Maaïke Harbers, Peter Van Waart, and Eva Visser. Value sensitive design of smart cities. In *Charting the Next Decade for Value Sensitive Design Workshop. Denmark: Aarhus*, 2010.
- [38] Oliver Heger. Value sensitive design in design science research projects: The cases of affective technology and healthcare technology. In *EMoWI@ Wirtschaftsinformatik*, pages 17–26, 2019.
- [39] Dirk Helbing, Farzam Fanitabasi, Fosca Giannotti, Regula Häggli, Carina I Hausladen, Jeroen van den Hoven, Sachit Mahajan, Dino Pedreschi, and Evangelos Pournaras. Ethics of smart cities: Towards value-sensitive design and co-evolving city life. *Sustainability*, 13(20):11162, 2021.
- [40] Modassir Iqbal, Katie Shilton, Mahmoud F Sayed, Douglas Oard, Jonah Lynn Rivera, and William Cox. Search with discretion: value sensitive design of training data for information retrieval. *Proceedings of the ACM on Human-Computer Interaction*, 5(CSCW1):1–20, 2021.
- [41] Nicolai Iversen, Morten Birkved, and Dylan Cawthorne. Value sensitive design and environmental impact potential assessment for enhanced sustainability in unmanned aerial systems. In *2020 IEEE International Symposium on Technology and Society (ISTAS)*, pages 192–200. IEEE, 2020.
- [42] Ruba Jaljolie, Talia Dror, David N Siriba, and Sagi Dalyot. Evaluating current ethical values of OpenStreetMap using value sensitive design. *Geo-spatial Information Science*, pages 1–17, 2022.
- [43] Stefanie Köhler, Doreen Görß, Antonia Kowe, and Stefan J Teipel. Matching values to technology: a value sensitive design approach to identify values and use cases of an assistive system for people with dementia in institutional care. *Ethics and Information Technology*, 24(3):1–17, 2022.
- [44] Antonia Kowe, Stefanie Köhler, Doreen Görß, and Stefan Teipel. The patients’ and caregivers’ perspective: In-hospital navigation aids for people with dementia-a qualitative study with a value sensitive design approach. *Assistive Technology*, pages 1–10, 2022.
- [45] S Kumari, R Singh, and M Kumari. Ensure value sensitive design responsibly for social sustainability: A case of e-vehicle design in delhi, india. 2021.
- [46] Christopher A Le Dantec, Erika Shehan Poole, and Susan P Wyche. Values as lived experience: evolving value sensitive design in support of value discovery. In *Proceedings of the SIGCHI conference on human factors in computing systems*, pages 1141–1150, 2009.
- [47] Christopher A Le Dantec and ES Poole. The value of pictures: Photo elicitation techniques for value sensitive design. *CHI, April*, 10, 2008.
- [48] Nick Lüthi, Christian Matt, and Thomas Myrach. A value-sensitive design approach to minimize value tensions in software-based risk-assessment instruments. *Journal of decision systems*, 30(2-3):194–214, 2021.
- [49] Ivo Maathuis, Maartje Niezen, David Buitenweg, Ilja L Bongers, and Chijs van Nieuwenhuizen. Exploring human values in the design of a web-based QoL-instrument for people with mental health problems: A value sensitive design approach. *Science and engineering ethics*, pages 1–28, 2019.
- [50] Jessica K Miller, Batya Friedman, Gavin Jancke, and Brian Gill. Value tensions in design: the value sensitive design, development, and appropriation of a corporation’s groupware system. In *Proceedings of the 2007 international ACM conference on Supporting group work*, pages 281–290, 2007.
- [51] Ahamed M Mithun, Z Abu Bakar, and Wael MS Yafooz. The realism of value sensitive design on user interface development. In *2018 IEEE Conference on Open Systems (ICOS)*, pages 86–91. IEEE, 2018.
- [52] Marije Nouwen, Maarten Van Mechelen, and Bieke Zaman. A value sensitive design approach to parental software for young children. In *Proceedings of the 14th International Conference on Interaction Design and Children*, pages 363–366, 2015.
- [53] Marije Nouwen and Bieke Zaman. Redefining the role of parents in young children’s online interactions. A value-sensitive design case study. *Int. J. Child Comput. Interact.*, 18:22–26, 2018.
- [54] Mert Oktay and Hanna-Liisa Pender. A value-sensitive toolkit: Bringing values into the design process when designing for the elderly. *Human Computer Interaction and Emerging Technologies: Adjunct Proceedings from*, page 23, 2020.



- [55] Giuseppe Primiero, Balbir Barn, and Ravinder Barn. Value-sensitive co-design for resilient information systems. *Studies in Logic, Grammar and Rhetoric*, 63(1):141–164, 2020.
- [56] Lambèr Royakkers and Marc Steen. Developing tools to counteract and prevent suicide bomber incidents: A case study in value sensitive design. *Science and engineering ethics*, 23(4):1041–1058, 2017.
- [57] Agnieszka Rychwalska and Magdalena Roszczynska-Kurasinska. Value sensitive design for peer production systems: mediating social interactions. *IEEE Technology and Society Magazine*, 36(3):48–55, 2017.
- [58] Donnie Johnson Sackey. One-size-fits-none: A heuristic for proactive value sensitive environmental design. *Technical Communication Quarterly*, 29(1):33–48, 2020.
- [59] Nithya Sambasivan and Melody Moore Jackson. Applying value sensitive design in pervasive brain-computer interfaces. In *CHI: ACM Conference on Human Factors in Computing Systems. Extended Abstracts*, Florence, Italy, 2008.
- [60] Mohamed Sapraz and Shengnan Han. Implicating human values for designing a digital government collaborative platform for environmental issues: A value sensitive design approach. *Sustainability*, 13(11):6240, 2021.
- [61] Luuk PA Simons and W Pieter Verhagen. Applying value-sensitive design and quality function deployment to healthcare ICT: the case of dutch primary care unit dossiers. *Journal of Design Research*, 7(2):155–176, 2008.
- [62] Merlijn Smits, Harry van Goor, Jan-Willem Kallewaard, Peter-Paul Verbeek, and Geke DS Ludden. Evaluating value mediation in patients with chronic low-back pain using virtual reality: contributions for empirical research in value sensitive design. *Health and technology*, pages 1–14, 2022.
- [63] Sarah M Thornton, Francis E Lewis, Vivian Zhang, Mykel J Kochenderfer, and J Christian Gerdes. Value sensitive design for autonomous vehicle motion planning. In *2018 IEEE Intelligent Vehicles Symposium (IV)*, pages 1157–1162. IEEE, 2018.
- [64] Darja Tokranova. Tackling ethical implications of mobile banking product development through the value sensitive design approach. In *Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society*, pages 1–3, 2020.
- [65] Steven Umbrello. Beneficial artificial intelligence coordination by means of a value sensitive design approach. *Big Data and Cognitive Computing*, 3(1):5, 2019.
- [66] Steven Umbrello. Meaningful human control over smart home systems: a value sensitive design approach. 2020.
- [67] Steven Umbrello, Marianna Capasso, Maurizio Balistreri, Alberto Pirni, and Federica Merenda. Value sensitive design to achieve the UN SDGs with AI: A case of elderly care robots. *Minds and Machines*, 31(3):395–419, 2021.
- [68] Steven Umbrello and Angelo Frank De Bellis. A value-sensitive design approach to intelligent agents. *Artificial Intelligence Safety and Security (2018) CRC Press (. ed) Roman Yampolskiy*, 2018.
- [69] Steven Umbrello and Ibo Van de Poel. Mapping value sensitive design onto AI for social good principles. *AI and Ethics*, 1(3):283–296, 2021.
- [70] Steven Umbrello and Roman V Yampolskiy. Designing AI for explainability and verifiability: a value sensitive design approach to avoid artificial stupidity in autonomous vehicles. *International Journal of Social Robotics*, 14(2):313–322, 2022.
- [71] Judith Van Andel, Frans Leijten, Hans Van Delden, and Ghislaine van Thiel. What makes a good home-based nocturnal seizure detector? a value sensitive design. *PloS one*, 10(4):e0121446, 2015.
- [72] Geerten van de Kaa, Jafar Rezaei, Behnam Taebi, Ibo van de Poel, and Abhilash Kizhakenath. How to weigh values in value sensitive design: A best worst method approach for the case of smart metering. *Science and engineering ethics*, 26(1):475–494, 2020.
- [73] A Van Wynsberghe. Designing care robots for care: Care centered value-sensitive design. *Science and engineering ethics*, 2012.
- [74] Aimee Van Wynsberghe. Designing robots for care: Care centered value-sensitive design. *Science and engineering ethics*, 19(2):407–433, 2013.
- [75] Pieter E Vermaas, Yao-Hua Tan, Jeroen van den Hoven, Brigitte Burgemeestre, and Joris Hulstijn. Designing for trust: A case of value-sensitive design. *Knowledge, Technology & Policy*, 23(3-4):491–505, 2010.
- [76] Susanne Vernim, Harald Bauer, Erwin Rauch, Marianne Thejls Ziegler, and Steven Umbrello. A value sensitive design approach for designing AI-based worker assistance systems in manufacturing. *Procedia Computer Science*, 200:505–516, 2022.
- [77] Åke Walldius, Jan Gulliksen, and Yngve Sundblad. Revisiting the usersaward programme from a value sensitive design perspective. In *Proceedings of The Fifth Decennial Aarhus Conference on Critical Alternatives*, pages 1–4, 2015.
- [78] Åke Walldius, Yngve Sundblad, and Alan Borning. A first analysis of the usersaward programme from a value sensitive design perspective. In *Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility*, pages 199–202, 2005.

- [79] Rebecca Walton and Brian DeRenzi. Value-sensitive design and health care in africa. *IEEE Transactions on Professional Communication*, 52(4):346–358, 2009.
- [80] Thiemo Wambsganss, Anne Höch, Naim Zierau, and Matthias Söllner. Ethical design of conversational agents: towards principles for a value-sensitive design. In *International Conference on Wirtschaftsinformatik*, pages 539–557. Springer, 2021.
- [81] Kari Edison Watkins. Using value sensitive design to understand transportation choices and envision a future transportation system. *Ethics and Information Technology*, pages 1–4, 2018.
- [82] Heng Xu, Robert E Crossler, and France Bélanger. A value sensitive design investigation of privacy enhancing tools in web browsers. *Decision support systems*, 54(1):424–433, 2012.
- [83] Heng Xu, Nazneen Irani, Sencun Zhu, and Wei Xu. Alleviating parental concerns for children’s online privacy: a value sensitive design investigation. 2008.
- [84] Daisy Yoo, Alina Hultgren, Jill Palzkill Woelfer, David G Hendry, and Batya Friedman. A value sensitive action-reflection model: evolving a co-design space with stakeholder and designer prompts. In *Proceedings of the SIGCHI conference on human factors in computing systems*, pages 419–428, 2013.
- [85] Bieke Zaman and Nassim JafariNaimi. A value sensitive design case study: Why values do (not) design. In *Workshop Charting the Next Decade for Value Sensitive Design, Critical Alternatives Conference*, 2015.