

A Socially-Aware Perspective to Understand and Fight Violence against Children and Adolescents

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Abstract. *In challenging design contexts, such as the violence against children and adolescents, considering human values is critical as they influence people's social and cultural lives. Considering values when understanding a social problem is not a trivial activity due to the difficulty of working with abstract concepts, the complexity of people's lives, and the lack of artifacts and recommendations to support designers in this task. Drawing on the Socially Aware Design, this paper describes the use of value-oriented artifacts to understand the problem and to identify requirements for systems design against child violence. As a result, the problem of child violence is characterized in a socially-aware manner, and propositions of value-oriented requirements for a solution are raised.*

1. Introduction

Human values have received attention in the Human-Computer Interaction (HCI) literature as there is a growing need to understand them and use that understanding in more socially responsible computing [Becker et al., 2019]. However, considering values in an interactive system design is not an easy task, as values are often intangible, abstract, and difficult to understand for technology professionals [Pereira et al., 2018]. Understanding values is necessary so that it is possible to consider the values of the interested parties when designing a solution to a problem and raise awareness to the values that solution is expected to promote. Considering values is even more important when it comes to critical contexts, as it involves people's lives and addresses sensitive issues of human existence and dignity.

In social problems, such as child violence, different stakeholders with their values, needs, social and cultural norms bring complexity to the design context. According to the World Health Organization (WHO), one in two children suffers some form of violence each year, which causes immediate harm to individuals, families and communities, and has lifelong harmful effects that undermine the potential of individuals [WHO, 2020]. The problem of child violence is a social one and any intervention to advance solutions to this problem must understand the norms and values of the interested parties.

Knowing how to identify and deal with values is a challenge in HCI [Baranauskas et al., 2014] and is related to the challenge of developing a systemic and

socially aware vision for Information Systems [Boscarioli et al., 2017]. Theories, approaches, methods, techniques and recommendations are needed to work with values, especially for Information Technology professionals, who often have technically-focused training and experiences [Pereira et al., 2018].

As related works, Paim et al. (2020) developed political, cultural, and social requirements for a solution in the context of violence against women using participatory and feminist interaction design. While social and cultural aspects appeared in the discussion, the authors did not focus on bringing and using value-oriented artifacts for children stakeholders. Although value research exists in the field of Interaction Design for Children (see Yarosh et al., 2011, and Van Mechelen et al., 2020), these works do not explicitly tackle the problem of violence. Unlike these papers, our work involves value-oriented discussions in a social context where children and many other related stakeholders live and interact.

Viewing a problem and its solution from the perspective of values makes it possible to reveal social and human aspects that may not be left out in a technically-centered process. Knowing social aspects may inform the development of technological solutions with an understanding of the possible impacts they may have on people's cultures and lives. This development occurs through the explicit and comprehensive gathering of information on what stakeholders value in their situated context and of problems and challenges in the social world that influence or are influenced by this valuation. The design process can then be consciously conducted to communicate the expected values of the solution and inhibit those that the solution should not reinforce. In this process, technological development can be guided by the ethical, moral, and social justice values of the interested parties and reinforce these values through technology.

In this paper, we articulate a set of artifacts from the Socially Aware Design [Baranauskas et al., 2013] to support a value-oriented understanding of the child violence problem. In the problem understanding and characterization, the investigation involved reading and analyzing official documents and papers related to the theme through the lens of socially aware and value-oriented design artifacts. As a result, a case study aimed at characterizing the problem is presented and discussed to allow further investigation of technological solutions for the problem. This characterization includes: i) information gathered about the context of the problem; ii) value-oriented artifacts filled with information regarding stakeholders, their existing problems and solutions; and iii) requirements for potential solutions in the context of the problem.

The paper is organized as follows: Section 2 presents a contextualization of values concepts and theories. Next, Section 3 presents our methodology with artifacts used. Then, Section 4 presents our results, describing our understanding of the problem context through the artifacts. Section 5 presents our discussion and requirements for a prospective solution in the problem context. Finally, Section 6 presents our main conclusions and further work.

2. Contextualization on Human Values

Friedman (2006) points out that a value refers to what a person or group of people considers important in life, and that values substantially depend on the interests and

desires of human beings in a cultural environment. There are many definitions of values and this paper adopts the definition that a value is something that denotes importance to somebody for something in some respect or capacity [Pereira et al., 2018]. This view was adopted because it enables us to understand values as a subjective construction situated in a social context.

Values are learned and determined by culture [Hall, 1959]. According to Pereira and Baranauskas (2015), it is not possible to fully understand values outside their cultural context, so if we want to address values in the design of technologies, we must pay attention to their cultural complexity. There is still recognition that the effective characterization of the meaning of a value depends on the context, since values are socially dependent [Verplanken and Holland, 2002; Flanagan et al., 2005].

The literature on value already has recommendations, artifacts and methods to support identifying values in a design process. Friedman (2006) introduces Value Sensitive Design, an approach to technology design that considers human values throughout the design process. Pereira and Baranauskas (2015) present the Value-oriented and Culturally Informed Approach to the design of interactive systems, which proposes a set of artifacts and methods to support the explicit consideration of values and culture in the design of interactive systems. Despite the existence of value-oriented frameworks for interactive systems design, further investigations in the field are needed. According to Winkler and Spiekermann (2021), as few guides support the work of designers in the field, there is a need for methodological guidance and best practices, reproducible guides and methodological descriptions shared by experienced researchers to facilitate entry into the field and overcome initial barriers.

3. Methodology and Artifacts Used

Our case study is categorized as exploratory [Lazar et al., 2017], and its objective was to understand and characterize in a value-oriented way the challenging problem addressed. We used socially aware and value-oriented artifacts that enabled this objective. Figure 1 presents the artifacts we used, related to the problem understanding adopting a value-oriented approach.

The Socially Aware Design (SAwD) draws on Organizational Semiotics [Stamper, 1993; Liu, 2000] to conceive a semio-participatory design model that offers a systemic view of the way technology shapes human relationships in the world [Baranauskas et al., 2013]. SAwD is represented on the Semiotic Onion, which sees an organization as an information system composed of the technical (technology design), formal (laws, rules and procedures) and informal (beliefs, behavior, values) levels of the domain. Different artifacts have been developed to support design activities, including value-oriented ones [Pereira and Baranauskas, 2015]. Although each artifact in Figure 1 has a specific focus, all the layers of the semiotic onion are transversally considered. For example, when raising the interested parties, stakeholders are considered in different levels of involvement with the problem being discussed.

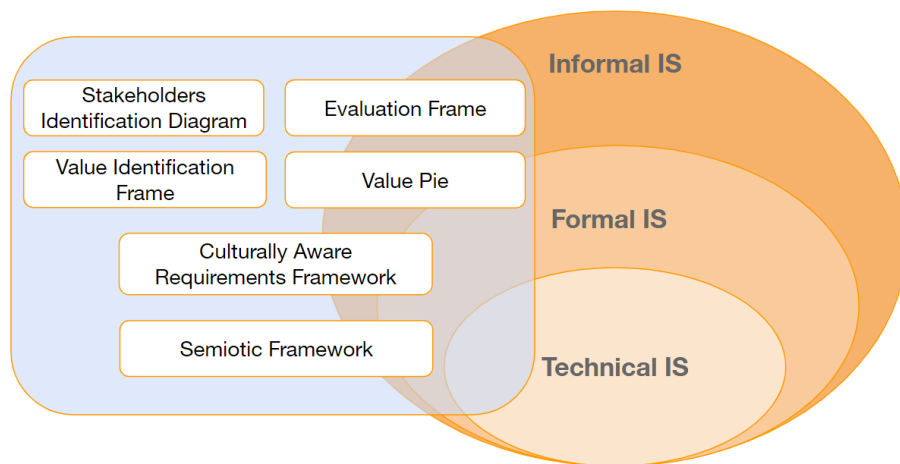


Figure 1. Artifacts used in the study.

All authors together planned and reviewed this case study before its execution. In execution, the first author read the documents about child and adolescent protection and made an initial filling of all artifacts. Once filled, second and third authors (both who have previous experience with SAwD) engaged in synchronous discussions with the first author to refine the artifacts' filling, questioning, changing, removing or adding information in the artifacts. All authors reviewed the mapping and the discussions presented in this paper. As initial input, we searched with keywords '(abuse OR violence) AND (child OR adolescent)' in Google and Google Scholar for documents (booklets, reports, papers) related to violence against children and adolescents, and excluded documents outside the theme. As a result, we identified documents and papers on the context of violence against children and adolescents that enabled us to develop a problem understanding and empathizing with the problem context¹. We used these documents as an input for the artifacts. Table 1 presents an overview of research procedures regarding the artifacts used, their input, actions and results.

Table 1. Summary of artifacts used, input, actions taken and output

Artifact	Input	Actions Taken (method)	Output
Stakeholder Identification Diagram (SID)	Documents and papers on the context of violence against children /adolescents.	Read documents and papers about the problem; Record stakeholder mentions; Consolidate stakeholders in the SID.	List of stakeholders, categorized by their level of influence in relation to the problem.
Evaluation Frame	Documents and papers on the problem context; List of interested parties from SID; Keywords.	Read documents and papers about the problem; Note down problems of a stakeholder; Search for solutions on Google with keywords up to the tenth page. Consolidate a single list of solutions.	List of problems and issues, as well as ideas and solutions related to a particular stakeholder.
Value Identification Frame	List of interested parties from SID; Papers and documents on the problem	Read documents and papers to identify aspects valued by stakeholders; Group values by similarity; Associate values with a stakeholder;	List of values raised from stakeholders' context.

¹ Documents and papers available in: <https://osf.io/dr2eg/>. Last access on 20/05/2022.

	context.	Analyze values-stakeholder relationship.	
Value Pie	Values list of Value Identification Frame.	Consolidate single list of values from Value Identification Frame; Categorize values in the Value Pie culture areas and formality levels	Values associated and categorized into an area of culture and level of formality.
Culturally Aware Requirements Framework (CARF)	Values of Value Identification Frame and Value Pie for each interested party.	Identify requirements for a particular culture area, with associated values and stakeholders	List of value and culture oriented requirements associated with different stakeholders.
Semiotic Framework	Information produced by previously used artifacts.	Ranking CARF requirements on the Semiotics Framework Identify new requirements from the steps of the Semiotic Framework.	Synthesis for a solution in the context of violence; requirements organized by level of formality.

4. Results

This section presents the results of understanding the problem, its interested parties (stakeholders) involved in the problem and their values, as well as results from identifying requirements that a prospective solution should address. The artifacts completed with the raised information are available with open access².

4.1. Interested Parties in the Problem Domain

We used the Stakeholder Identification Diagram [Stamper, 2000] to support the identification and organization of stakeholders relative to five layers of different relations to the problem: i) Operation (problem); ii) Contribution: actors and responsible for the problem; iii) Source: customers and information providers; iv) Market: partners and competitors in the problem or its solution; v) Community: legislators, spectators, community at large. We used the OpenDesign platform [Gonçalves et al., 2020] to fill in the artifact, resulting in 57 stakeholders (see Figure 2 for an excerpt of SID).

This artifact helps to identify or recognize non obvious stakeholders that influence the problem and any prospective solution. Ignoring these non obvious stakeholders compromises an understanding about a problem to be addressed. In the analyzed context, children and adolescents are associated with the role of Victim, while the stakeholders in the role of Abuser, Aggressor or Perpetuator of violence are much more varied. In general, abusers and aggressors are people close to the victim, such as family members, or people who are close to the victim, either indoors or in the surroundings. Technologies to cope with some aspect of the problem must consider the different forces of influence and different foci of violence. If we consider, for example, a technology that takes into account physical environments as part of the interaction, many of these stakeholders are part of and occupy the same space, whether they promote, suffer, are passive or intercede in relation to violence. Identifying the different stakeholders makes evident the diversity of forces influencing the problem, and stakeholders' respective values reflect the complexity of social problems we want to understand.

² Available at: <https://osf.io/dr2eg>. Last access on 20/05/2022.



Figure 2. Fragment of the Stakeholder Identification Diagram

4.3 Evaluation Frame

The Evaluation Frame artifact extends the Stakeholder Identification Diagram, reporting on issues present in the current situation or potential stakeholder issues. Ideas or envisioned solutions that have a potential impact on the design of the solution to the problem are also identified [Baranauskas et al., 2013]. Using as a source the papers and documents relative to the problem domain, we raised 60 challenges, difficulties and problems of the violence impact on children and adolescents, and 31 solution proposals. Final list of problems and solutions are available with open access.³

We identified various types of problems: bullying and cyberbullying, child labor, self-inflicted, community, gender-based and structural violence, among others. This indicates that the problem is complex, composed of different types of violence that a child and adolescent can suffer. As an aggravating factor, the various forms of violence are interrelated, sharing many risk factors, so that children can experience many different types of violence simultaneously and at different stages throughout their lives [WHO, 2020]. Violence is not an isolated phenomenon and demands a greater effort to protect, based on awareness of the different forms of violence that children can be subjected to. Finally, we identified factors that exacerbate the impacts of violence or make violence more difficult to resolve. The main aggravating factor is underreporting, which is the situation in which not all cases of violence are known, reported or taken forward when there is an attempt to report.

³ Available at: https://osf.io/ca7qp/?view_only=9baf868bc5ad4b3ea42c76c9b17f0f81. Last access on 20/05/2022.

We identified a total of 31 proposals of solutions in the context of the problem, such as good practice manuals, infographics, recommendations and educational materials against violence for primary and secondary education, and an online platform for education and training in the area of protection for children and adolescents. The general perception is that the existing initiatives are very much at a formal level, occurring in the form of booklets, manuals, protocols, rules, legislation and textual public policies. In some cases, there are more comprehensive solutions, such as projects and programs that themselves involve several other actions, such as lectures, holding events, publishing videos and texts. Few technological solutions were identified, revealing a gap in the proposition of technical solutions that operationalize into computational systems, the formal aspects already raised in the form of considerations, guidelines, recommendations and good practices.

The Out of the Shadows Index study, prepared by The Economist Intelligence Unit, presents information on how 60 countries tackle the issue of sexual abuse and exploitation of children and adolescents. For Brazil, the Index concludes that the country has clear laws and institutions committed to fighting sexual abuse and exploitation against children and adolescents, however, progress is still needed to get them out of the picture.⁴ According to this survey of solutions, despite the existence of laws, recommendations and norms, there is a lack of technical initiatives that can operationalize formal knowledge into concrete initiatives against violence.

4.4 Value Identification Frame

The Value Identification Frame artifact supports the identification of values related to different stakeholders who may be directly or indirectly interested in or affected by a solution to be designed [Pereira et al., 2012]. Identified values for this project in Value Identification Frame are available in open access⁵. Table 2 presents an excerpt of the Value Identification Frame for Children and Adolescents and Health Professionals.

Table 2. Excerpt of the Value Identification Frame

Contribution	Values from Context Documents	
Children and Adolescents	Freedom from violence Attention and care Well-being Defense and Protection Accountability Trust Conversation	Empathy Reception Safe Environments free of violence Positive, Respectful and Healthy Social Bonds and Support Networks Love and Affection Security
Source	Values from Context Documents	
Health Professionals	Specialized professional service Information confidentiality and Privacy	Prevention Training and Education

The problems we identified in the Evaluation Frame brought mainly the issues (negative aspects) and barriers to the full and healthy development of children and adolescents. The human values identified in the reading of context documents are opposed to the negative aspects and impacts of the problem, indicating an ideal scenario for full human

⁴Available at: https://pge-bidininvest.s3.amazonaws.com/CHILDHOOD_BRASIL_RELATORIO_ATIVIDADES_2020_p1.pdf, in page 10. Last access on 20/05/2022.

⁵ Available at: <https://osf.io/dr2eg/>. Last access on 20/05/2022.

development. Among these, we can point out values such as: Guarantee of fundamental rights for children and adolescents, such as access to health and education [Abranches, 2015]; Justice for victims [WHO, 2020] and Social Justice [Reichenheim et al., 1999]; Complaint (denúncia) [Trajano et al., 2021; Platt et al., 2018]; Positive, Respectful and Healthy Social Bonds and Support Networks [Abranches, 2015; Neves et al., 2010; WHO, 2020; Trajano et al., 2021]; and Awareness about the problem [Platt et al., 2018; WHO, 2020].

The values we identified are associated with the basic rights of children and adolescents and essential aspects for their human development. Values such as safety, protection, trust, justice, care, love and affection, support networks, healthy environments and relationships, are essential for the full development of children and for creating a healthy environment for growth. Some other human values are more related to the context of combating violence, and awareness of the existing problems that keep us away from the ideal situation, where values such as sensitization, awareness, education are essential for combating a culture of violence that impacts children and their families. Values related to the defense of children and adolescents are important as a commitment to change the current situation of the problem.

Health professionals, in turn, value prevention against violence, specialized professional care, training and education, confidentiality of information and privacy. These values indicate that Health Professionals value an education that allows them to receive, care for and deal with victims of violence and to share lessons learned and better ways of working in this context. In the care that Health Professionals can provide to victims of violence, on the one hand, it is important to respect the privacy, reputation and consent of victims of violence to respect people's autonomy and prevent this information from reaching unauthorized people; on the other hand, health professionals themselves value their own privacy, reputation and visibility, as they are often offended and persecuted for receiving and following up on reports of violence.

The artifact allowed us to map and make explicit the interested parties' values, for example the prevalence of the value of Safety, Trust, and Emotion and Affection for Children and Adolescents. For the Family, among other values, the value of norms appears, indicating that formal mechanisms are needed to ensure that the values of the Family are respected, for example the value of financial and economic strengthening, which guarantees an environment with less conflicts and dignified living conditions. The artifact also made it possible to identify general values that are associated with specific and varied values raised from the context. This overview on values can help define an overall feeling of values to bring into the design process. The list of values also helps in the association of values to software requirements.

4.5 Value Pie

The Value Pie organizes values according to their formality, culture and interaction [Pereira et al., 2013]. Once the stakeholders' values have been raised, we use the artifact to develop an understanding of each value from the perspective of the culture, the relationships with other values, and the informal, formal and technical aspects of the problem context. The result of values for Children and Adolescents is shown in Figure 4. Each slice in the Figure represents a culture area. The slices have concentric circles that represent the levels of formality, the outermost part being the informal level and the

innermost part the technical level; among them is the formal level.

The artifact reveals a concentration of values in the areas of Association (4 values) and Subsistence (2 values). These two areas indicate that the child exists and lives in relation to others, mainly to the Family and its members. Relationships, groups, conversation and trust are values that indicate the importance of the existence of a support network and social bonds that help the child to grow in safety (protection culture area) and create safe environments for them to survive.

Value Pie also made it possible for us to identify value formalities and value gaps that could be brought into development. For example, for Children and Adolescents, no values were identified in the Learning dimension. However, if we take into account that there is a problem that children often do not understand what abuse is, learning about their own body and the limits of abusive actions can help this child in informal, formal and technical ways to find help and report it.

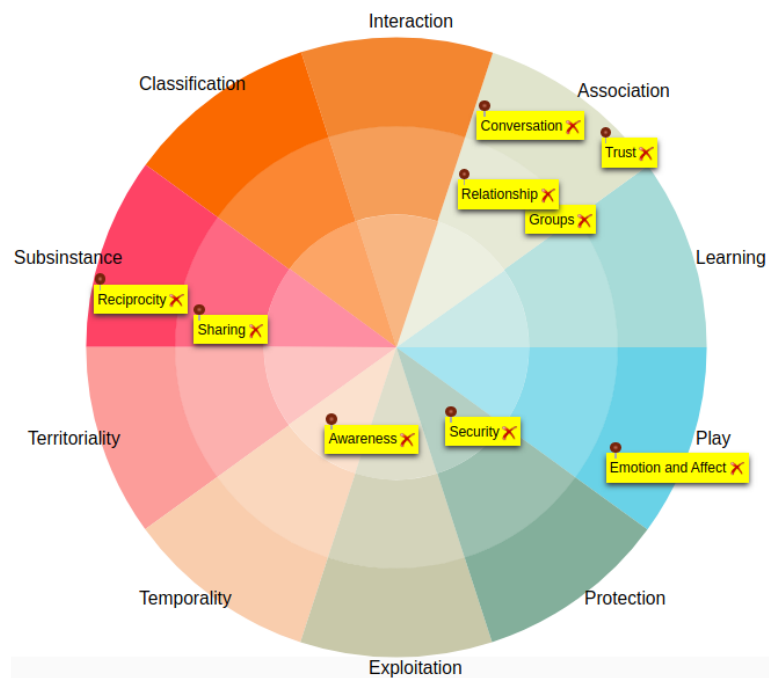


Figure 4. Value Pie with values for Children and Adolescents (Source: DSC⁶)

Through this artifact it is possible to perceive this and other gaps in values that become an opportunity to explore a technical solution. The Value Pie helped us to perceive the values closer to the stakeholders and their contexts and also made it possible to identify gaps in values that could be explored.

4.6 Culturally Aware Requirements Framework

The Culturally Aware Requirements Framework (CARF) supports the identification and organization of requirements that are related to different stakeholders' cultural aspects and their values [Pereira et al., 2012]. We used CARF to identify requirements related to each area of culture in which we raised values associated with stakeholders. The requirements are then value and culture oriented, informing a final solution that respects

⁶ Available at: <http://erytheia.nied.unicamp.br:3000/>. Last access on 20/05/2022.

the identified value issues. We raised a total of 42 requirements, referring to the 10 culture areas and 23 values. Table 2 below presents a fragment of the CARF filled with requirements for the Interaction culture area.

Table 2. CARF fragment filled with value-oriented requirements

Culture Area	Requirements	Values	Stakeholders
Interaction	A solution must presuppose the understanding and respect of the identity of the child and adolescent as a being with their own desires, experiences, opinions and needs, leaving aside the idea that the child is just someone to be controlled or dominated by an adult.	Identity	Children and Adolescents
	A solution must reinforce organizational norms and procedures to be followed that prevent a problem from being underreported, as in cases where health professionals do not report to a system because they think they can solve the problem on their own.	Norms	Health Professionals
	A solution must align with the norms and values associated with an equitable vision of gender and justice, communicating this to users and not condone practices that promote violence through this solution.	Norms	Health Ministry

There are issues and requirements related to values in different areas of culture. Among results, for example, a solution must respect children as subjects with identity and rights, and reinforcing norms and procedures that avoid underreporting and that promote values of justice and equity (Interaction); sensitize users about violent behavior and the importance of reporting (Learning); create mechanisms to prevent users from enjoying violence in the solution environment (Play); adapt content and form according to users, such as the victim, to avoid causing harm or improving understanding, and classify harmful actions that are not seen as violence (Classification).

5. Discussion Towards System Requirements

We mapped the artifacts' results to the Semiotic Framework in order to represent requirements for solutions to face problems related to child violence. The Semiotic Framework represents six layers of meaning that must be considered in the design of a system [Baranauskas et al., 2013]: *social world*: consequence of the use of signs in human activities; *pragmatics*: intentional use of signs and the behavior of their agents; *semantics*: relations between a sign and what it refers to; *syntactic*: combination of signs; *empirics*: static properties of signs; *physical world*: physical aspects of signs. By using this artifact for mapping we can consolidate the knowledge identified in previous artifacts in a systemic way, representing human/social aspects and technical ones.

Social World. The identified issues involve stakeholders from different categories (and the solution will likely not have just one type of end-user). Thus, any solution will have to consider all these stakeholders, their influencing roles in the adoption and success of the solution and how the solution will impact different people during its implementation. When creating a solution, for example, one should not just automate the identification of probable victims based on where they live and other “attributes”, as if it were a pure algorithmic classification task, classifying people into pre-defined

groups, which can promote greater discrimination and social segregation. The intervention strategy must promote humanized solutions, considering a network of actors involved in the cycle of violence, the social context of social inequalities and lack of rights, and respecting the autonomy and dignity that each person has. Technological solutions must reinforce human values of defense, commit to the values related to the human rights of children and their full development, and inhibit negative reverberations of the social challenges of the problem.

Pragmatics. Maximize protection actions from different stakeholders, considering that multiple stakeholders can be part of a safety net. Recognize and mitigate actions with violent intent or that perpetuate violence. Strengthen social responsibility stimulating an intention that can generate a protective action by interested parties. Assess whether the solution is committed to the values related to the human rights of children and their full development, and inhibits negative reverberations of the social challenges of the problem.

Semantics. The solution must communicate a feeling of self-fulfillment, autonomy, and independence in use, without communicating a feeling that “I can’t use”. On the part of the professional, educate about a correct registration process on the violence report and the actions of responsible institutions, so that this professional does not try to solve the problem alone, and to not omit the violence. Communicate a sense of privacy to ensure a feeling of security and protection for both the victim and the person receiving the report. Sensitize children about the meaning of their own bodies and the limits of abusive actions.

Syntactics. Use symbols, images and language that communicate safety, care, reception and protection. Capture and classify violent actions based on structure and prevent the reverberation of violent content. Use accessible language and access resources for illiterate, deaf and blind people. Create a database standard for information storage that respects interoperability standards, with a manual for understanding and implementing the information storage structure, to facilitate information sharing between institutions that work on the problem.

Empirics. Respect formal accessibility recommendations for defining the solution, such as WCAG⁷. Reduce the solution size, if it needs to be downloaded, to speed up a reporting process and avoid using up a person's entire mobile data package. Make the solution available on different platforms and modalities, replicating the same information in different channels to ensure the reach of the solution, regardless of the location and socioeconomic conditions of a person. Create access control and encryption mechanisms to prevent the database with sensitive information from being made available to unauthorized persons.

Physical World. Use open technologies and standards to promote interoperability. Ensuring infrastructure resources so that the solution is available 24/7, because once the system is down, a victim can avoid making a complaint against violence. Explore sensor and actuator capabilities to comprehensively understand the problem, such as pressure, heart rate, body temperature, gestures, facial expressions, and environment, such as location, ambient temperature, speed, humidity.

⁷ Available at: <https://www.w3.org/WAI/standards-guidelines/wcag/>. Last access: 20/05/2022.

6. Conclusion

The violence against children and adolescents is a complex social problem, where many stakeholders have different challenges and conflicting values that impact the problem and its solution. When addressing social problems, we must start in early stages of a design process with a socially aware understanding of the context capable of considering the interested parties and the values they bring. We presented and used a set of artifacts to create this value oriented understanding and define prospective requirements to a potential solution, mapping stakeholders, challenges and values, its cultural nature and formality.

Through these artifacts, we understood that violence is affected by different stakeholders' forces during life and a solution must consider different types of users; these stakeholders bring values related to a desire for social and human development, such as safety, network support and family strengthening; and these values related to the violence prevention against the victim have a cultural nature of Association, revealing that a solution needs to address the violence problem by engaging, exploring and enabling safe and healthy relationships and environments. If we do not consider value in an explicit way, deep desires and needs of stakeholders that affect its life can be disrespected by a technical solution, at best preventing a solution from being adopted, and, at worst, promoting conflicting values, such as values that reinforce violence.

As threats to validity, we conducted an exploratory search for papers and materials, not a systematic one, therefore we may have missed relevant material for analysis. However, the analysis presented in this work does not intend to be exhaustive or to offer any generalization. Rather, the purpose was to illustrate a socially aware and value-oriented process to tackle the problem, presenting artifacts and steps followed to gather information about the problem context and to raise requirements for a solution in the context of violence against children and adolescents. The analysis reveals how violence against children has many challenges of different stakeholders, affecting stakeholders' values and lives. We argue that, in order to deal with a problem of this magnitude, it is necessary to adopt a systemic and situated approach that addresses stakeholders, their problems, values, culture and requirements at different levels of formality. Further work involves expanding the study, and designing a ubiquitous technology system for the context of protection of children and adolescents based on values.

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