Value Sensitive Design

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There is a need for an overarching theoretical and methodological framework with which to handle the value dimensions of design work.

> We have to reject the "worshiping [of] the new gadgets which are our own creation as if they were our masters" (p. 678).
>
> —Norbert Wiener (1953/1985)

cyberneticist Norbert Wiener (1953/1985) argued that technology could help make us better human beings, and create a more just society. But for it to do so, he argued, we have to take control of the technology.

Norbert Wiener (November 26, 1894 – March 18, 1964) was an American mathematician and philosopher. He was a professor of mathematics at the Massachusetts Institute of Technology (MIT). A child prodigy, Wiener later became an early researcher in stochastic and mathematical noise processes, contributing work relevant to electronic engineering, electronic communication, and control systems.
Wiener is considered the originator of cybernetics, a formalization of the notion of feedback, with implications for engineering, systems control, computer science, biology, neuroscience, philosophy, and the organization of society.

> Where a simple man might ask: “Do we need these things?”, technology asks “what electronic wizardry will make them safe?” Where a simple man will ask “is it good?”, technology asks “will it work?” (pp. 611–612).
>
> —Joseph Weizenbaum (1972)

Joseph Weizenbaum (8 January 1923 – 5 March 2008) was a German-American computer scientist and a professor emeritus at MIT. The Weizenbaum Award is named after him. He is considered one of the fathers of modern artificial intelligence.

The Weizenbaum Award was established in 2008 by the International Society for Ethics and Information Technology (INSEIT). It is given every two years by INSEIT's adjudication committee to an individual who has “made a significant contribution to the field of information and computer ethics, through his or her research, service, and vision.”
It is officially named the 'INSEIT/ Joseph Weizenbaum Award in Information and Computer Ethics', "in recognition of Joseph Weizenbaum’s groundbreaking and highly influential work in computer ethics in the 1970s, which helped to shape the field as we know it today”.[1]

Value Sensitive Design is a theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process.

applied successfully for almost 20 years

A value refers to what a person or group of people consider important in life.

In a narrow sense, the word “value” refers simply to the economic worth of an object.

values should not be conflated with facts (the “fact/value distinction”) especially insofar as facts do not logically entail value.

“is” does not imply “ought” (the naturalistic fallacy)

values cannot be motivated only by an empirical account of the external world, but depend substantively on the interests and desires of human beings within a cultural milieu

An iterative methodology that integrates conceptual, empirical, and technical investigations.

Conceptual Investigations

careful working conceptualizations of specific values clarify fundamental issues raised by the project at hand, and provide a basis for comparing results across research teams

- Who are the direct and indirect stakeholders affected by the design at hand?
- How are both classes of stakeholders affected?
- What values are implicated?
- How should we engage in trade-offs among competing values in the design, implementation, and use of information systems (e.g., autonomy vs. security, or anonymity vs. trust)?
- Should moral values (e.g., a right to privacy) have greater weight than, or even trump, non-moral values (e.g., aesthetic preferences)?

Empirical Investigations

Depending on the questions at hand, many analyses will need to be informed by empirical investigations of the human context in which the technical artifact is situated.

Empirical investigations are also often needed to evaluate the success of a particular design.

Empirical investigations can be applied to any human activity that can be observed, measured, or documented.

the entire range of quantitative and qualitative methods used in social science research is potentially applicable here, including observations, interviews, surveys, experimental manipulations, collection of relevant documents, and measurements of user behavior and human physiology.

- How do stakeholders apprehend individual values in the interactive context?
- How do they prioritize competing values in design trade-offs?
- How do they prioritize individual values and usability considerations?
- Are there differences between espoused practice (what people say) compared with actual practice (what people do)?

- What are organizations' motivations, methods of training and dissemination, reward structures, and economic incentives?

Technical Investigations

Value Sensitive Design adopts the position that technologies in general, and information and computer technologies in particular, provide value suitabilities that follow from properties of the technology.

a given technology is more suitable for certain activities and more readily supports certain values while rendering other activities and values more difficult to realize

technical investigations focus on how existing technological properties and underlying mechanisms support or hinder human values

technical investigations involve the proactive design of systems to support values identified in the conceptual investigation.

Technical investigations focus on the technology itself.

Empirical investigations focus on the individuals, groups, or larger social systems that configure, use, or are otherwise affected by the technology.

1. Value Sensitive Design seeks to be **proactive**

2. Value Sensitive Design **enlarges the arena** in which values arise to include not only the work place

3. Value Sensitive Design contributes a **unique methodology** that employs conceptual, empirical, and technical investigations, applied iteratively and integratively

4. Value Sensitive Design **enlarges the scope of human values** beyond those of cooperation (CSCW) and participation and democracy (Participatory Design) to include all values, especially those with moral import.*

5. Value Sensitive Design **distinguishes between usability and human values** with ethical import.*

6. Value Sensitive Design identifies and takes seriously **two classes of stakeholders**: direct and indirect.*

7. Value Sensitive Design is **an interactional theory***

8. Value Sensitive Design builds from the psychological proposition that **certain values are universally held**, although how such values play out in a particular culture at a particular point in time can vary considerably*

[ad 4] By moral, we refer to issues that pertain to fairness, justice, human welfare and virtue, […] Value Sensitive Design also accounts for conventions (e.g., standardization of protocols) and personal values

[ad 5] Usability refers to characteristics of a system that make it work in a functional sense, […] not all highly usable systems support ethical values

[ad 6] Often, indirect stakeholders are ignored in the design process.

[ad 7] values are viewed neither as inscribed into technology (an endogenous theory), nor as simply transmitted by social forces (an exogenous theory). […] the interactional position holds that while the features or properties that people design into technologies more readily support certain values and hinder others, the technology's actual use depends on the goals of the people interacting with it. […] through human interaction, technology itself changes over time.

[ad 8] the more concretely (act-based) one conceptualizes a value, the more one will be led to recognizing cultural variation; conversely, the more abstractly one conceptualizes a value, the more one will be led to recognizing universals

How-To

1. Start with a value, technology, or context of use
2. Identify direct and indirect stakeholders
3. Identify benefits and harms for each stakeholder group
4. Map benefits and harms onto corresponding values
5. Conduct a conceptual investigation of key values
6. Identify potential value conflicts
7. Integrate value considerations into one's organizational structure

[ad 1] We suggest starting with the aspect that is most central to your work and interests.

[ad 2] direct stakeholders are those individuals who interact directly with the technology or with the technology's output. Indirect stakeholders are those individuals who are also impacted by the system, though they never interact directly with it. […] Within each of these two overarching categories of stakeholders, there may be several subgroups. […] A single individual may be a member of more than one stakeholder group or subgroup. […] An organizational power structure is often orthogonal to the distinction between direct and indirect stakeholders.

[ad 3] one rule of thumb in the conceptual investigation is to give priority to indirect stakeholders who are strongly affected, or to large groups that are somewhat affected […] Attend to issues of technical, cognitive, and physical competency. […] personas have a tendency to lead to stereotypes because they require a list of "socially coherent" attributes to be associated with the "imagined individual." […] we have deviated from the typical use of personas that maps a single persona onto a single user group, to allow for a single persona to map onto to multiple stakeholder groups

[ad 4] In some cases, the corresponding values will be obvious, but not always. Table 4.1 in Sect. 4.2.2 provides a table of human values with ethical import often implicated in system design.

[ad 5] the philosophical ontological literature can help provide criteria for what a value is, and thereby how to assess it empirically.

[ad 6] value conflicts should usually not be conceived of as "either/or" situations, but as constraints on the design space.

[ad 7] In the real world, of course, human values (especially those with ethical import) may collide with economic objectives, power, and other factors. However, even in

Table 4.1 Human values (with Ethical Import) often implicated in system design

Human value	Definition	Sample literature
Human welfare	Refers to people's physical, material, and psychological well-being	Leveson (1991), Friedman et al. (2003), Neumann (1995), Turiel (1983, 1998)
Ownership and property	Refers to a right to possess an object (or information), use it, manage it, derive income from it, and bequeath it	Becker (1977), Friedman (1997b), Herskovits (1952), Lipinski and Britz (2000)
Privacy	Refers to a claim, an entitlement, or a right of an individual to determine what information about himself or herself can be communicated to others	Agre and Rotenberg (1998), Bellotti (1998), Boyle et al. (2000), Friedman (1997b), Fuchs (1999), Jancke et al. (2001), Palen and Dourish (2003), Nissenbaum (1998), Phillips (1998), Schoeman (1984), Svensson et al. (2001)
Freedom from bias	Refers to systematic unfairness perpetrated on individuals or groups, including pre-existing social bias, technical bias, and emergent social bias	Friedman and Nissenbaum (1996), cf. Nass and Gong (2000), Reeves and Nass (1996)
Universal usability	Refers to making all people successful users of information technology	Aberg and Shahmehri (2001), Shneiderman (1999, 2000), Cooper and Rejmer (2001), Jacko et al. (1999), Stephanidis (2001)
Trust	Refers to expectations that exist between people who can experience good will, extend good will toward others, feel vulnerable, and experience betrayal	Baier (1986), Camp (2000), Dieberger et al. (2001), Egger (2000), Fogg and Tseng (1999), Friedman et al. (2000a), Kahn and Turiel (1988), Mayer et al. (1995), Olson and Olson (2000), Nissenbaum (2001), Rocco (1998)
Autonomy	Refers to people's ability to decide, plan, and act in ways that they believe will help them to achieve their goals	Friedman and Nissenbaum (1997), Hill (1991), Isaacs et al. (1996), Suchman (1994), Winograd (1994)
Informed consent	Refers to garnering people's agreement, encompassing criteria of disclosure and comprehension (for "informed") and voluntariness, competence, and agreement (for "consent")	Faden and Beauchamp (1986), Friedman et al. (2000b), The Belmont Report (1978)
Accountability	Refers to the properties that ensures that the actions of a person, people, or institution may be traced uniquely to the person, people, or institution	Friedman and Kahn (1992), Friedman and Millet (1995), Reeves and Nass (1996)
Courtesy	Refers to treating people with politeness and consideration	Bennett and Delatree (1978), Wynne and Ryan (1993)

(continued)

Table 4.1 (continued)

Human value	Definition	Sample literature
Identity	Refers to people's understanding of who they are over time, embracing both continuity and discontinuity over time	Bers et al. (2001), Rosenberg (1997), Schiano and White (1998), Turkle (1996)
Calmness	Refers to a peaceful and composed psychological state	Friedman and Kahn (2003), Weiser and Brown (1997)
Environmental sustainability	Refers to sustaining ecosystems such that they meet the needs of the present without compromising future generations	United Nations (1992), World Commission on Environment and Development (1987), Hart (1999), Moldan et al. (1997), Northwest Environment Watch (2002)

More recently, supporting human values through system design has emerged within at least four important approaches. *Computer Ethics* advances our understanding of key values that lie at the intersection of computer technology and human lives, e.g., Bynum (1985), Johnson and Miller (1997), and Nissenbaum (1999). *Social Informatics* has been successful in providing socio-technical analyses of deployed technologies, e.g., Johnson (2000), Kling et al. (1998), Kling and Star (1998), Orlikowski and Iacono (2001) and Sawyer and Rosenbaum (2000). *Computer Supported Cooperative Work* (CSCW) has been successful in the design of new technologies to help people collaborate effectively in the workplace, e.g., Fuchs (1999), Galegher et al. (1990), Olson and Teasley (1996), and Grudin (1988). Finally, *Participatory Design* substantively embeds democratic values into its practice, e.g., Bjerknes and Bratteteig (1995), Bødker (1990), Carroll and Rosson (2006), Ehn (1989), Greenbaum and Kyng (1991), and Kyng and Mathiassen (1997). (See Friedman and Kahn (2003) for a review of each of these approaches.)

4.3 The Tripartite Methodology: Conceptual, Empirical, and Technical Investigations

Think of an oil painting by Monet or Cézanne. From a distance it looks whole; but up close you can see many layers of paint upon paint. Some paints have been applied with careful brushstrokes, others perhaps energetically with a palate knife or fingertips, conveying outlines or regions of color. The diverse techniques are employed one on top of the other, repeatedly, and in response to what has been laid down earlier. Together they create an artifact that could not have been generated by a single technique in isolation of the others. So, too, with Value Sensitive Design. An artifact or design emerges through iterations upon a process that is more than the sum of its parts. Nonetheless, the parts provide us with a good place to start. Value Sensitive Design builds on an iterative methodology that integrates conceptual, empirical, and technical investigations; thus, as a step toward conveying Value Sensitive Design, we describe each investigation separately.

This table is intended as a heuristic for suggesting values that should be considered in the investigation – it is definitely not intended as a complete list of human values that might be implicated.

Our particular list comprises many of the values that hinge on the deontological and consequentialist moral orientations noted above […] In addition, we have chosen several other values related to system design

Interviewing Stakeholders

A semi-structured interview often offers a good balance between addressing the questions of interest and gathering new and unexpected insights.

the simple question “Why?” can go a good distance.

the important point is a priori to conceptualize what the topic entails, if possible demarcating its boundaries through formal criteria, and at a minimum employing issues or tasks that engage people’s reasoning about the topic under investigation.

Technical Investigations

We have found it helpful to make explicit how a design trade-off maps onto a value conflict and differentially affects different groups of stakeholders.

Unanticipated values and value conflicts often emerge after a system is developed and deployed. Thus, when possible, design flexibility into the underlying technical architecture so that it can be responsive to such emergent concerns.

underlying protocols that release information should be able to be turned off

As with the traditional criteria of reliability, efficiency, and correctness, we do not require perfection in value-sensitive design, but a commitment. And progress.

Thank you!

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Bonus Material

Nature of Values

While expressing classifications of ethically principled values was an important step, more scaffolding is needed to guide the value discovery, i.e. to uncover values as they are lived in-situ, through empirical exploration relevant to the design context. After these so-called local values have been discovered, lists can be used as an analytical tool.

lists could also be beneficial from the start, especially for practitioners with limited time at hand, as the lists highlight important values and mitigate the odds that these are overlooked.

an important distinction is to be made among explicitly supported values (i.e., ones that the system is designed to support), stakeholder values (i.e., ones that are important to some but not necessarily all of the stakeholders) and designer values (i.e., ones that the system designers hold)

Role of Stakeholders

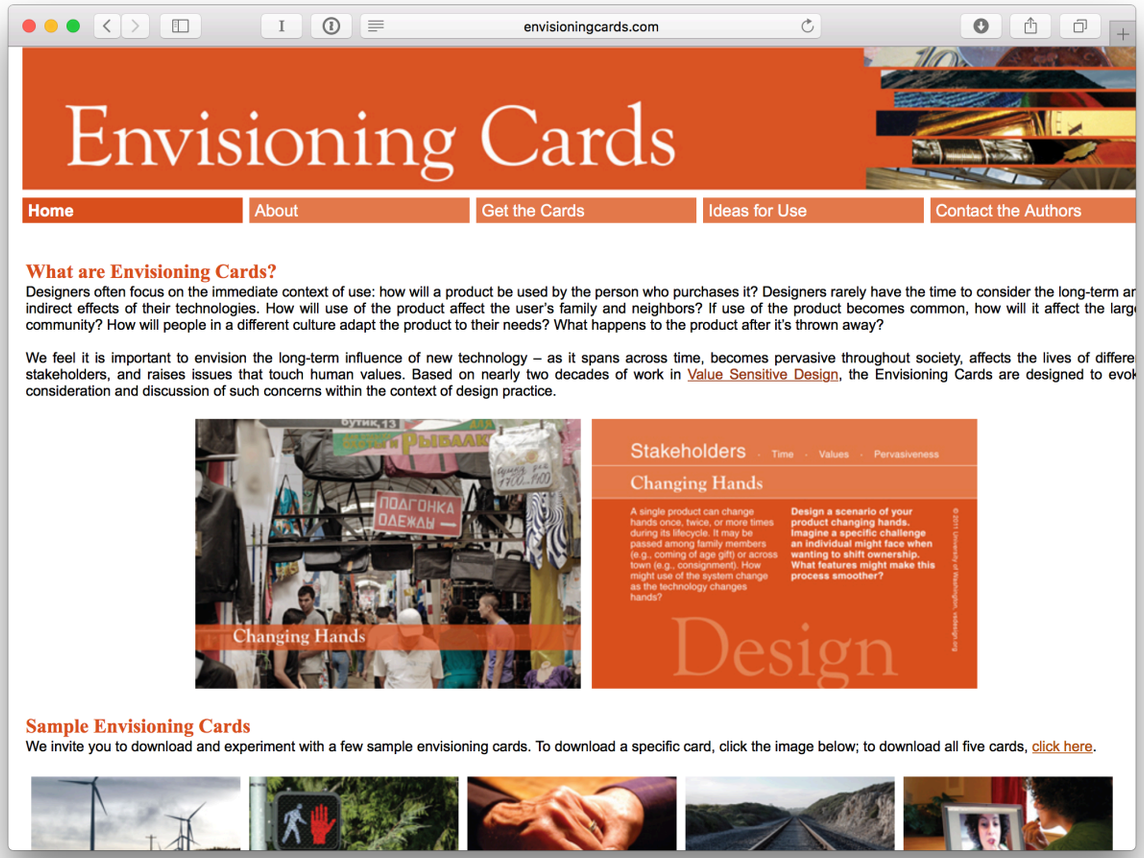
Stakeholders in VSD are not only the clients or end-users, but all people involved directly or indirectly in creating, using or being affected by the new technology.

sharing responsibility and power among stakeholders and designers/researchers is beneficial to investigate value questions

Concrete Methods

the question of concrete methods for VSD is not only closely related to the methods' abilities to facilitate participation, but also to the competences within a design team.

Another way to empower technology developers who are untrained in social science or ethics are specific tools or techniques to deliberately consider and account for values in design.



Envisioning Cards (see Fig. 4.5) incorporate similar elements to the Value Scenarios: stakeholders, time, values and pervasiveness.

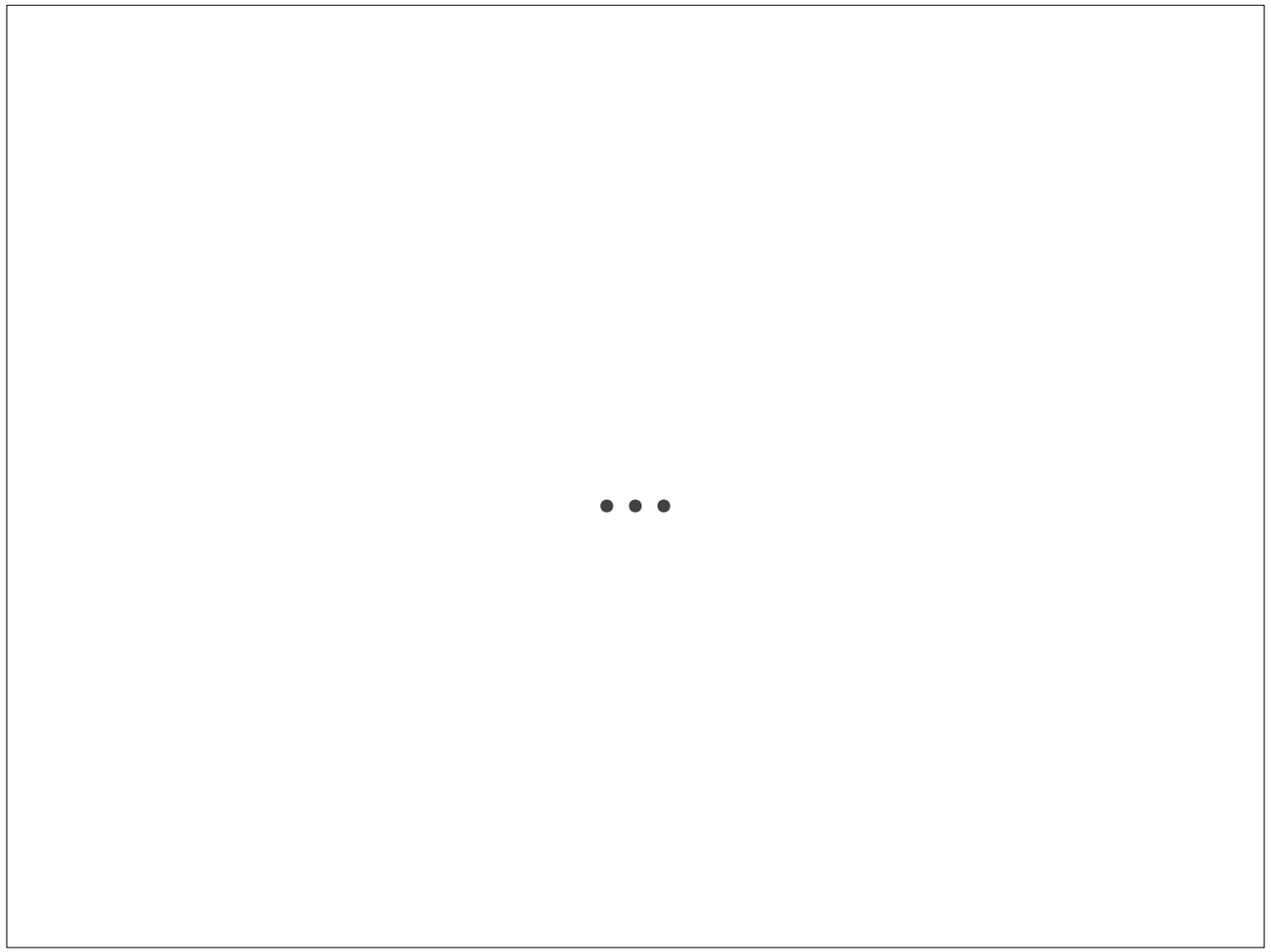
Envisioning Cards are a versatile tool that can be used in many design processes including ideation, co-design, heuristic evaluation, and critique or as educational tools

Drawing from Value Sensitive Design methodology, the Stakeholder criterion emphasizes the range of effects of a technology, both on those who are in direct contact with a technology (direct stakeholders), and on those who might not be direct users, but whose lives are nevertheless affected by various interactions around the technology (indirect stakeholders).

Inspired by the long-term perspective of urban planning, the Time criterion helps guide designers to consider the longer term implications of their work – implications that will only emerge after the technology has moved through initial phases of novelty to later phases of appropriation and integration into society.

The Value criterion emphasizes the impact of technology on human values. Our use of the term values draws from the Value Sensitive Design literature, "what a person or group of people consider important in life." In interaction design, we have found values of interest to include but are not limited to: autonomy, community, cooperation, democratization, environmental sustainability, expression, fairness, human dignity, inclusivity and exclusivity, informed consent, justice, ownership, privacy, self-efficacy, security, trust, and universal access.

The Pervasiveness criterion emphasizes systemic interactions that follow from the widespread adoption of an interactive technology. Technologies can become pervasive with respect to geographic (e.g., city navigation software use within urban areas), cultural (e.g., text messaging within the deaf community), demographic (e.g., online social networking sites among teenagers), and other factors.



Ideally, VSD projects would include professionals trained in ethics, social sciences, computer science/engineering and design.

in industry practice, where it is equally important to design in a value sensitive manner, it cannot be assumed that a design team is sufficiently trained in ethics or social sciences

One way to address a short-coming may be to have consultants or value advocates from outside the projects providing these skills.

Another way would be to develop more specific toolkits to trigger value sensitive deliberation and discussion within the design team, and tools to work out value definitions and tensions with stakeholders. The Envisioning Cards provide one example of such a toolkit.

The methods presented above trigger thinking about ones' (Dunne and Raby 2001) values and I believe that especially value scenarios or related methods, e.g. design noir, can be used to make stakeholders more aware of the (unforeseen, long-term) ethical issues at stake.

Important for methods that allow stakeholders to voice themselves safely is that
they provide means for controlling precision and ambiguity for the data they elicit.

An essential part of supporting widespread VSD practice is the early education
of researchers and practitioners in various fields, which are being addressed in academic courses and workshops at major research venues (e.g., Detweiler et al. 2012).