

# LIBERATING VOICES

A Pattern Language for Communication Revolution

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The MIT Press  
Cambridge, Massachusetts  
London, England

## 87 Value-Sensitive Design

**Problem** Human values and ethical considerations no longer stand apart from the design and development of information and communication systems. This shift reflects, at least in part, the increasing impact and visibility that information and communication technologies have had on human lives. Computer viruses have destroyed data on millions of machines. Large linked medical databases can, and often do, infringe on individuals' privacy. The fair outcome of the national elections may hinge in part on the design and management of computerized election ballots. On and on, the media portray such problems. In turn, software engineers, designers, and developers must engage not only the technical aspects of their designs but the value and ethical dimensions as well. Yet how should they do so? What theories, methods, tools, and techniques might they bring to this challenge?

**Context** Values are at play in all phases of envisioning, designing, developing, implementing, deploying, appropriating, and ongoing reappropriation and reinvention of computer and information technology. In all these activities, there exists the need for explicit consideration of values, value tensions, and value trade-offs. The Value-Sensitive Design pattern can be used throughout all of these phases. Moreover, it is expected that value-sensitive design will be used in conjunction with other successful methodologies (such as participatory design, systematic debugging and testing practices, and rapid prototyping) and with a variety of practitioners, including software engineers, usability engineers, interaction designers, information solution professionals, and concerned direct and indirect stakeholders.

### Discussion

That technology itself determines what is to be done by a process of extrapolation and that individuals are powerless to intervene in that determination is precisely the kind of self-fulfilling dream from which we must awaken. . . . I do not say that systems such as I have mentioned [gigantic computer systems, computer networks, and speech recognition systems] are necessarily evil—only that they may be and, what is most important, that their inevitability cannot be accepted by individuals claiming autonomy, freedom, and dignity. The individual computer scientist can and must decide. The determination of what the impact of computers on society is to be is, at least in part, in his hands. . . . It is possible, given courage and insight, for man to deny technology the prerogative to formulate man's questions. It is possible to ask human questions and to find humane answers. (Weizenbaum 1972, 614)

Heeding the call of computer scientists like Joseph Weizenbaum and cyberneticist Norbert Wiener before him, the emerging field of value-sensitive design seeks to design technology that accounts for human values in a principled and comprehensive manner throughout the design process (Friedman 1997; Friedman and Kahn 2003; Friedman, Kahn, and Borning 2006). Value-sensitive design is primarily concerned with values that center on human well-being, human dignity, justice, welfare, and human rights. This approach is principled in that it maintains that such values have moral standing independent of whether a parti-

cular person or group upholds such values (e.g., the belief in and practice of slavery by a certain group does not a priori mean that slavery is a morally acceptable practice). At the same time, value-sensitive design maintains that how such values play out in a particular culture at a particular point in time can vary, sometimes considerably.

Value-sensitive design articulates an interactional position for how values become implicated in technological designs. An 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. A screwdriver, after all, is well suited for turning screws, and yet amenable as a poker, pry bar, nail set, cutting device, and tool to dig up weeds. Moreover, through human interaction, technology itself changes over time. On occasion, such changes can mean the societal rejection of a technology or that its acceptance is delayed. But more often, it entails an iterative process whereby technologies are invented and then redesigned based on user interactions, which then are reintroduced to users, further interactions occur, and further redesigns implemented.

To date, value-sensitive design has been used in a wide range of research and design contexts, including an investigation of bias in computer systems (Friedman and Nissenbaum, in Friedman 1997), universal access within a communications company (Thomas, in Friedman 1997), Internet privacy (Ackerman and Cranor 1999), informed consent for online interactions (Friedman, Howe, and Felten 2002), ubiquitous sensing of the environment and individual rights (Abowd and Jacobs 2001), computer simulation in support of democratization of the urban planning process (Borning, Friedman, Davis, and Lin 2005), social and moral aspects of human-robotic interaction (Kahn, Freier, Friedman, Severson, and Feldman 2004), privacy in public (Friedman, Kahn, Hagman, Severson, and Gill 2006), value analyses in reflective design (Senger, Boehner, David, and Kaye 2005), and the place of designer values in the design process (Flanagan, Howe, and Nissenbaum 2005).

Methodologically, at the core of value-sensitive design lies an iterative process that integrates conceptual, empirical, and technical investigations. Conceptual investigations involve philosophically informed analyses of the central constructs and issues under investigation. Questions include: How are values supported or diminished by particular technological designs? Who is affected? How should we engage in trade-offs among competing values in the design, implementation, and use of information systems? Empirical investigations involve both social-scientific research on the understandings, contexts, and experiences of the people affected by the technological designs, as well as the development of relevant laws, policies, and regulations. Technical investigations involve analyzing current technical mechanisms and designs to assess how well they support particular values, and, conversely, identifying values, and then identifying or developing technical mechanisms and designs that can support those values.

How then to practice value-sensitive design? Some suggestions follow (see also Friedman, Kahn, and Borning 2006):

- Start with a value, technology, or context of use. Any of these three core aspects easily motivates value-sensitive design. Begin with the aspect that is most central to your work and interests.
- Identify direct and indirect stakeholders. Direct stakeholders are those who interact directly with the technology or with the technology's output; indirect stakeholders are those who are also affected by the system, though they never interact directly with it.
- Identify harms and benefits for each stakeholder group. Systematically identify how each category of direct and indirect stakeholder would be positively or negatively affected by the technology under consideration.
- Map harms and benefits onto corresponding values. At times the mapping between harms and benefits and corresponding values will be one of identity; at other times the mapping will be multifaceted (that is, a single harm might implicate multiple values, such as both security and autonomy).
- Conduct a conceptual investigation of key values. Develop careful working definitions for each of the key values. Drawing on the philosophical literature can be helpful here.
- Identify potential value conflicts. For the purposes of design, value conflicts should usually not be conceived of as either-or situations but as constraints on the design space. Typical value conflicts include accountability versus privacy, trust versus security, environmental sustainability versus economic development, privacy versus security, and hierarchical control versus democratization.
- Technical investigation heuristic: value conflicts. Technical mechanisms will often adjudicate multiple, if not conflicting, values, often in the form of design trade-offs. It may be helpful to make explicit how a design trade-off maps onto a value conflict and differentially affects different groups of stakeholders.
- Technical investigation heuristic: unanticipated consequences and value conflicts. In order to be positioned to respond with agility to unanticipated consequences and value conflicts, when possible, design flexibility into the underlying technical architecture to support post-deployment modifications.

**Solution** Human values and ethical considerations are fundamentally part of design practice. Value-sensitive design offers one viable principled approach to systematically considering human values throughout the design and deployment of information and other technologies. Through its theory and methods, value-sensitive design asks that we extend the traditional criteria (e.g., reliability, correctness) by which we judge the quality of systems to include those of human values.

**Linked patterns** Ethics of Community Informatics (67), Equal Access to Justice (69), Positive Health Information (74), Wholesome Design for Wicked Problems (82), Voices of the Unheard (83), Future Design (88).

## 88 Future Design



**Problem** By acting as though the future will never arrive and things never change, we are subconsciously creating the future with the seeds that we are unwittingly sowing today. Whether by actively embracing the conventional wisdom that has created these socially and environmentally precarious times or by succumbing to the dictates of habit, instinct, or necessity, humankind seems to sleepwalking into the future. Indeed it is quite plausible that we are creating the ideal conditions today for unspeakable disasters tomorrow.

**Context** This pattern can be used in unlimited situations, especially when people feel strongly that the directions they are following are not the ones that they think they should. Employing this pattern often takes the form of a collaborative envisioning exercise with a variety of stakeholders.

**Discussion** Looking at the future with open, imaginative, and critical eyes can open up the possibility of, if not the demand for, fundamental social change. After all, why would anybody bother to contemplate the future if there were no possibility of change, if every step taken was an echo of some past step?