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Technology and Values

1.1 Introduction

We live in a century where pretty much everything around us is designed and engineered. Cities, infrastructures, and eco-systems; our houses, workplaces, and everything inside; our genomes, organs on a chip, life itself, and intelligent machines. Aspects of our social lives and experiences are regimented by algorithms, and our feelings get shaped by micro-targeted messages. Parts of the planet that are untouched by technology and design are hard to find, and the few places of true wilderness that are left may soon see the amount of rain or sunlight that they receive adjusted by geo-engineers.

Design is everywhere and represents a good part of what the human condition in the 21st century amounts to. Designs may close off certain routes and keep us from doing certain things, or they may create new options. This book argues that creating the society that we want in the 21st century requires us to address the fact that our world is designed. We need to face up to the fact that the situation we find ourselves in is more often than not the outcome of design. Designing, planning, and engineering set the stage for our actions, thoughts, and experiences. It is upon us, therefore, to make explicit what the ethical starting points and implications are of our designing, planning, and engineering.

Three ideas are central in this book. The first is that moral values are often expressed in our technologies, technical systems, and artifacts. The second idea is that we can systematically design technologies, technical systems, and artifacts in order to express our values. The third idea is that commitment to moral values gives rise to obligations to design and shape the world in accordance with these values.

These ideas hang together and in a sense follow from each other through methodological and ethical argument. In this book, we make the first idea plausible and expand on the second idea by giving tools and methods for design for values. The third idea is, however, the most important, and we return to it in Chapter 9 at the end of the book: Doing ethics in the 21st century in a meaningful manner requires designing our technologies to express our values.

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1.2 Our Designs Are Value-Laden

The first idea that is central to this book is what we call "the value-design nexus." This is the idea that moral values are expressed in designs and technologies, systems, and artifacts. We are familiar with the idea that our values and moral views can be expressed in words and text, in our dismissive gestures, raised eyebrows, and works of art. But we have only fairly recently come to appreciate that they can also be incorporated or embedded in what we invent and design.

Founders of states and communities have always tried to shape envisaged societies in accordance with their values and views. Over the course of history, we have seen values such as dignity, respect, equality, justice, and fairness expressed not only in charters, constitutions, and basic institutions, but also in sewage systems and water management systems. Ideas about living space and decent housing, well-being of citizens, found their way to the designs of garden cities around the turn of the 1900s. Broad boulevards in Paris became an expression of military strategy, and hierarchical societies in the ancient world were effective means to manage large waterworks and to build hydraulic empire. The philosopher Jeremy Bentham already observed 200 years ago that his design of a dome-shaped prison was very efficient and effective since one only needed a small number of guards in the tower in the middle of the dome to oversee all the prison cells. He claimed to have solved a number of societal problems "by one simple principle in architecture."[1]

The history of humankind is, as the Spanish philosopher José Ortega y Gasset argued, a history of technology that reflects human ideals, values, and senses of self.[2] In his history of technology, George Basalla makes a similar point with reference to Ortega's observation. This – according to Basalla – provides us with an explanation of the incredible wealth and variety of artifacts that humanity has produced over hundreds of thousands of years.[3] The variety in material culture we see is a mirror image of the many different values and conceptions of the good life that humanity is heir to.

The idea that our values are expressed in design and engineering with moral consequences was very convincingly formulated in an article from the 1980s by the philosopher of technology Langdon Winner, titled *Do Artefacts Have Politics?*[4] Winner described the work of the architect and town planner Robert Moses, who oversaw big urban planning projects for the city of New York in the 1920s. He was also responsible for the design of overpasses near Brooklyn. A later study of Moses's life and work suggested that he had made these overpasses for motorways intentionally low in order to prevent buses from the poor Black neighborhoods

1 Bentham, J. (1995). The Panopticon Writings (ed. M. Bozovic). London: Verso.
2 Ortega y Gasset, J. (1997 [1939]). Meditación de la técnica, Filosofía hoy. Madrid: Santillana.
3 Basalla, G. (1989). The Evolution of Technology. Cambridge University Press.
4 Winner, L. (1980). Do artifacts have politics? *Daedalus* 109 (1): 121–136.

from accessing White middle-class beaches near New York City. In the literature, they are often referred to as "low hanging overpasses." Winner concluded that a racist value or a racist idea had been expressed in a piece of civil engineering. Winner meant his analysis as a criticism and warning, which should be taken to heart. Not all historians agree with Winner's interpretation.[5] But since its publication, this article has served as a sensitizing concept and many examples of "artefacts with politics" have been identified and described.

1.3 Design for Values

When you start looking at our technological environment, examples of moral values expressed by their design in technologies, technical systems, and artifacts will present themselves. Take, for instance, the "hostile" park bench, depicted in Figure 1.1. It is designed in such a way as to make it impossible to lie down on it because it has iron rods built in to separate seats. The local government does not want homeless people to sleep there, and it does not want to employ people to



Figure 1.1 Bench south of Old State Capitol in Springfield, Illinois, designed to deny homeless residents of the city a place to sleep (credit: Visviva / Wikimedia Commons / CC0 1.0 / https://commons.wikimedia.org/wiki/File:Hostile_bench_Springfield_Old_State_Capitol.jpg / last accessed on April 30, 2026

5 For example, Joerges, B. (1999). Do politics have artefacts? *Social Studies of Science* 29: 411–431.

chase them away. So they arrived at this design solution. Similarly, we see cobbled stone under overpasses and metal spikes under bridges, and this simple idea of "hostile architecture" seems to have caught on. The values that underpin it are public safety, hygiene, security, and some aesthetic considerations. The hostile park bench may be a solution to the problem of homeless people sleeping on benches in the park, but it is of course no solution to the deeper problem of homeless people, the unavailability of affordable housing, or inequality in society.

In a similar fashion, town planners create concrete benches for pedestrians that also function as physical barriers for terrorist car bomb attacks. The expression of values and ideals in design is not limited to the built environment, but extends to all domains and technologies, including information and communication technology. Dark patterns on the Internet such as a "roach motel" or "fly bottle" make it easy to create a Facebook account but make it very hard to delete it again. It ropes Internet users in and keeps them in.

This idea that technologies can embody values was core to the idea that Lawrence Lessig defended in Code as Law, namely that computer code could serve as law and that software is a new way to govern society or discipline people.[6] This can be problematic, as the cases of the low hanging overpasses, park benches, and dark patterns show. But they can also be helpful to safeguard values that we hold dear. For example, in the field of data protection "privacy by design" and "privacy enhancing technology" have become prominent approaches to protect the personal sphere of life. The European Commission has now even written these design approaches into the law.[7] By doing so, it has turned the design approach to data protection into a de facto golden standard. An idea that is increasingly being discussed, but still far from being turned into a standard practice, is that of "fairness by design" in the development of algorithms.

The nudging revolution provides another good, albeit controversial, example. The idea of nudging is based on the idea that by designing the environment of people in certain ways some actions and behavioral patterns will become more likely than others, and people will be gently guided toward certain morally desirable outcomes, without taking options away.[8] Putting the healthy options within reach in a cafeteria and the less healthy options further away from the customer

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6 Lessig, L. (1999). Code and Other Laws of Cyberspace. New York: Basic Books.

7 European Union 2016. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data (General Data Protection Regulation). *Official Journal of the European Union L* 119: 1–88. Article 25. https://gdpr-info.eu/issues/privacy-by-design/.

8 Thaler, R.H., and Sunstein, C.R. (2009). Nudge: Improving Decisions About Health, Wealth, and Happiness. Rev. and Expanded Ed. New York: Penguin Books.

increases the likelihood that the healthy options are chosen. This is a widely adopted approach to improve the health of employees. It is still possible to reach for the deep-fried and sugar-coated food. Thus, the individual's freedom is unaffected. The nudging idea has encountered resistance and critique because it could be used as a subtle form of manipulation that is often unaccounted for and circumvents people's moral reasoning and conscious decision-making.

Two recent examples that illustrate how the idea of expressing values in design can be used to our advantage. In 2019, the Dutch city of Utrecht introduced 300 new sustainable bus stops with plants-and-grass-covered rooftops.[9] The green bus stops not only support biodiversity by attracting bees and other insects, but also capture fine dust particles, store rainwater, and reduce heat stress in the city during the summer. They are made of eco-friendly materials, and their transparent design increases citizens' sense of security. What strikes us as so smart and admirable about this innovation is that a number of our values, namely, sustainability, well-being, and security, are all realized here in one coherent and attractive design. The design generated considerable international interest.

Another example of an inspiring innovation is a coastal protection device developed by ReShore, a start-up at Wageningen University & Research, the Netherlands.[10] ReShore develops various innovative coastal protection concepts that simultaneously support different central values. This protection consists of breakwater structures floating before coasts, including cages with aquacultures of seaweeds, mussels, and oysters. By their design, a number of values are serviced without a need to decide on unattractive trade-offs: Incoming waves are broken, leading to coastal safety and a reduction in erosion, while excess nutrients in the seawater are filtered out off the water, restoring marine ecosystems and supporting fish stocks relevant for the economic resilience of local communities.

The bus stops mentioned earlier admirably manage to accommodate a number of things we value: They capture dust, retain rainwater, reduce heat stress, accommodate insects, etc. And so does the ReShore coastal protection device. These examples exemplify another possibility of design for values, namely, to accommodate by smart design more than one moral value at the same time. When we are dealing with multiple values, with different stakeholders advancing different points of view, it may often seem that we are ethically stuck because we are

9 Euronews (2019). Getting from A to bee: Utrecht installs environmentally friendly bus stops. *Euronews*. https://www.euronews.com/2019/07/12/getting-from-a-to-bee-utrecht-installs-environmentally-friendly-bus-stops (accessed 12 July 2019).

10 van der Zanden, J. and Gustafsson, F. (2022). Successful tests of ReShore's 'living breakwater' design. MARIN Report 133. https://www.marin.nl/en/publications/successful-tests-of-reshores-living-breakwater-design (accessed 8 April 2022).

overburdened or "morally overloaded."[11] There is so much that we value that we are bound to fail to serve all of them in one fell swoop. The moral dilemma is a classic case. Here we have more obligations than the world allows us to honor. We cannot simply put human dignity on the back burner until we are done with safety and security. We cannot delay action on sustainability and climate change in order to deal with privacy first. It may seem then that there is no obvious way to satisfy or honor all of our values and obligations at the same time. It may seem impossible to unify our values, reduce them to each other, or resolve the conflicts of incommensurable values such as intimacy, friendship, and efficiency. What we are seemingly left with is hard dilemmas, tragic choices, political compromises, prolonged disagreement, and recurrent moral conflict.

These conflicts and disagreements may have different sources and they may be perfectly reasonable, but the examples we provided earlier and the other examples we will discuss throughout the book show that persistence and creativity may sometimes lead to morally admirable novel solutions that manage to reconcile a number of values in one design. Designers, engineers, and architects are often not interested in trade-offs, second-best solutions, and compromises, but instead make efforts to move beyond the status quo and expand the set of options open to them, to enlarge the design solutions space, with a view to expanding the set of societal and moral obligations they can thus satisfy by design. They aim for prosperity *and* clean energy and aim for both privacy *and* transparency, instead of settling for just one of them. Their refusal to surrender to apparently irreconcilable value requirements drives them to moral innovations. In this way, they pursue solutions that allow them to have their cake and eat it.

We suggest that the approach we advocate may help us to achieve more of our values and enlarge the set of moral possibilities. The values that we experience as constraints can thus also be morally "productive." This, of course, may make them vulnerable to the lure of a relentless search for technical fixes, but as we will see, a democratic and inclusive approach to problem solving with technology may prevent what has been called technical "solutionism," or a technocratic attitude.

1.4 Ethics in the 21st Century

Designs are everywhere and are in part constitutive of our human environments. They empower us and constrain us in particular ways. Designs can thus be characterized as sets of both affordances and constraints. When implemented, they

11 Van den Hoven, J., Lokhorst. G.-J, and Van de Poel, J. (2012). "Engineering and the problem of moral overload." *Science and Engineering Ethics* 18 (1): 143–155. https://doi.org/10.1007/s11948-011-9277-z.

make certain things possible and others impossible. Sometimes one person's constraint is someone else's affordance. Indeed, quite frequently institutions and technologies have dual uses, ethically speaking: They can be used for both good and evil purposes. Countries, for example, maintain dual-use goods lists. Chloride can not only help to keep water in swimming pools free of bacteria, but also be used to manufacture chemical weapons.

Values are thus not just things we argue and disagree about in philosophy or in public and private debates. Our moral values are incorporated and exemplified in technology, either intentionally or inadvertently. If we do not want racist ideas, addictive features, unsustainable properties, and surveillance philosophies to end up in what we design (often without democratic decision-making) – be it algorithms, websites, data sets, overpasses, or prisons – we will have to pay close attention to how we design them and to the way our values implicitly or explicitly shape our technological world. It is important to realize in all of this that there is hardly anything around us that is not designed. We therefore need to bring the world of ethics – our values, principles, norms, duties, obligations, virtues, rights, standards, ideals, and laws – to bear upon a world of engineering, technology and innovation. And we should do so routinely, transparently, and systematically, not haphazardly, surreptitiously, and coincidentally. Our smart cities are designed from beginning to end. If we want them to be safe, sustainable, fair, and just environments, we will have to make them so. In short, we need to be fully cognizant of these design processes in light of our moral values, and we need to be able to reproduce them, explain them and justify them. We should be able to criticize what others have made and be ready to assess which values are supported or realized by means of their designs. Ethics need to take design seriously and design needs to take ethics seriously.

We are at an interesting junction at the beginning of the 21st century. Values and worldviews, ideas about how people should live, will be imparted to what we design, make, and produce. No matter what we say or do, this happens as a matter of fact. Sometimes these values are admirable, and sometimes they are detestable. We can make cigarettes, smart phones, and games addictive on purpose. We can optimize for addictiveness. We may design for a limited lifespan of a product. This is what is referred to as "contrived durability" or "planned obsolescence." The opposite is also possible.

This brings us to the other side of the value–design nexus: the idea that our values are not gratuitous and inconsequential but demand to be expressed. What seems reasonable to expect of anyone who subscribes to a moral value is that they invoke this value when this is relevant in deliberations about what to do. If someone always talks about privacy or states that he thinks it is important, then we expect that person to bring privacy up in deliberations and debates as an argument or an important moral consideration. Our moral values seem "deliberative

consequential," as Samuel Scheffler has put it.[12] Similarly, we could say that our moral values are "design consequential." If we are seriously committed to our values – whatever they are – we will seek to realize them in our material and technological world, where they will shape our choices, practices, lives, and identities. Suppose a person for whom sustainability is important is responsible, in some role or capacity, for work flows in a hospital. Then it is reasonable to expect that this person is willing to think about what sustainability would concretely mean in terms of the design of the hospital's waste and energy management. Taking sustainability seriously in a real world of high-tech implies making efforts to design for sustainability, to be on the outlook and actively explore how it can be best expressed. Similarly, now that we are actively discussing and adopting diversity, equity, and inclusion as values central to our societies, it is time to start (re)designing our societal structures to make them support diversity, equity and inclusion. To put our hands where our hearts are.

1.5 Overview of the Book

In this book, we put the design perspective on ethics and technology central. Technology is not value neutral but imbued with our values, that we can and ought to systematically design technology for our values, and that our moral values are design consequential, that is, we ought to design our technology for our values.

We provide many concrete examples, and we present a conception of doing ethics that we believe is what is needed in the 21st century. We refer to this approach as *Design for Values*. It provides a semi-structured way of incorporating our moral values in technologies, systems, and artifacts by explicitly, systematically, and demonstrably designing for them. We suggest that it can help to make our innovations more ethical and at the same time make our attempts at working responsibly with technology and innovation more tractable and productive. We do not claim a level of precision and certainty that – as Aristotle already knew – morality does not always allow for, but we do claim that the methods and framework we present provides a perspicuous representation of making ethics part of the practices in a world of technology.

We start the next chapter by describing our academic context: the design turn in ethics. In the center part of this book, we introduce methods for design for values and tools for dealing with moral overload, value conflict, and disagreement. In Chapter 3 we sketch contemporary design approaches, and in Chapter 4 we

12 Scheffler, S. (2010). Equality and Tradition: Questions of Value in Moral and Political Theory. Oxford: Oxford University Press.

expand on understanding moral values. Chapters 5–7 make up the center of the book by combining both topics, describing the three phases of design for values and dealing with moral overload. Chapter 8 describes a design for values case in great detail. In Chapter 9, we consider the third idea in this book that our values are design consequential. In it, we survey what is needed to support effective design for values for technology ethics in the 21st century. Chapter 10 is for reviewing a number of frequently encountered criticisms of the design for values approach. And we end with a few final thoughts.