A TOOL FOR THE IMPACT AND ETHICS OF TECHNOLOGY:
THE CASE OF INTERACTIVE SCREENS IN PUBLIC SPACES

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Introduction

In this chapter I will elaborate on the relationship between the impact and the ethics of technology, and more specifically on the significance of the so-called Product Impact Tool for ethical reflection and discussion about technology. A case study concerning ethical reflection in a research project about the development of interactive screens in public spaces is integrated as an illustration and application of the approach.

The Product Impact Tool issued from research aiming to make the connection between philosophical reflection on technology and the design of technology (Dorrestijn 2012, 2017a). The core of the tool is a framework that offers a practical translation of the notion of technical mediation (that human existence and way of living are fundamentally mediated by technology) by breaking the general idea down into four modes of interaction, and twelve types of impact, illustrated with examples. It is thus a collection of exemplary figures of technical mediation against the background of the general idea.

When applied in design for usability or behavior change, the tool is related to "affordances" in design (Norman 1988), "persuasive technology" (Fogg 2003), and "nudge" (Thaler and Sunstein 2008), three approaches referred to in the tool. However, an important application of the Product Impact Tool is to support and stimulate ethical reflection about technology and behavior-changing design. From the beginning responsible innovation has been a goal of the tool. The tool, however, does not explicitly employ ethical terminology but only speaks of impact. This raises the following questions: How does the Product Impact Tool, in the practice of an impact assessment with the tool, encourage ethical reflection? And how can the conceptual connections between the impact and ethics of technology be understood, in order to explain the passage from impact to ethics, and to structure and enhance the use of the tool for ethical reflection?

The chapter proceeds as follows. The Product Impact Tool is shortly introduced in relation to the philosophy of technical mediation. Then I report on the project about interactive screens in public spaces where the tool was applied in a workshop leading to a concise advice on ethical aspects. Next, I elaborate how a technology impact assessment with the tool and ethical reflection about technology are correlated. To begin, it appears that in practice impact assessment workshops appear to result in ethical reflection and discussion. Then I proceed by further developing the experience that impact assessment leads to ethical reflection also in a conceptual way. By means of examples of impact of interactive screens brought to the fore in the workshop, the different modes of interaction and impact are introduced. From there I explore how every figure of technical mediation in the tool is at the same time a concept for

understanding impact as well as an expression of ethical concern. The impact of technology often alludes to a negative value and engenders critical concern. Any type of impact can, however, also take on positive value and then a design strategy and ethical remedy can be derived.

In terms of this book, this chapter is about how we can or should relate to things (ethical concern about technology), especially also in response to how those things relate to us (impact of technology). With the case of interactive screens and the focus on impacts and ethics, the issue of control comes to the fore as an important aspect of the relation between things and us. Technologies have tendency to control us, and interactive technologies may come to control us in new and more intensive ways. It is a challenge of our time to become aware of the controlling tendencies of technology. And a key ethical question concerns the meaning of this control by technology as well as which kind of control over technology we wish to have.

Product Impact Tool: Figures of Technical Mediation

The Product Impact Tool (Figure 8.1) provides an overview of different effects of technical products on human behavior and existence. It is an interdisciplinary collection of relevant examples and useful concepts from a variety of scholarly disciplines, from design to psychology, history, anthropology, and philosophy. The central model shows a human figure in the middle of a repertoire of types of impact, thus expressing how technology is taking hold of humans from all sides. The twelve types of impact are subdivided into four different modes of contact and interaction. This repartition aims to cover the impact of technology in full scope while remaining sufficiently comprehensible for memorization and application.

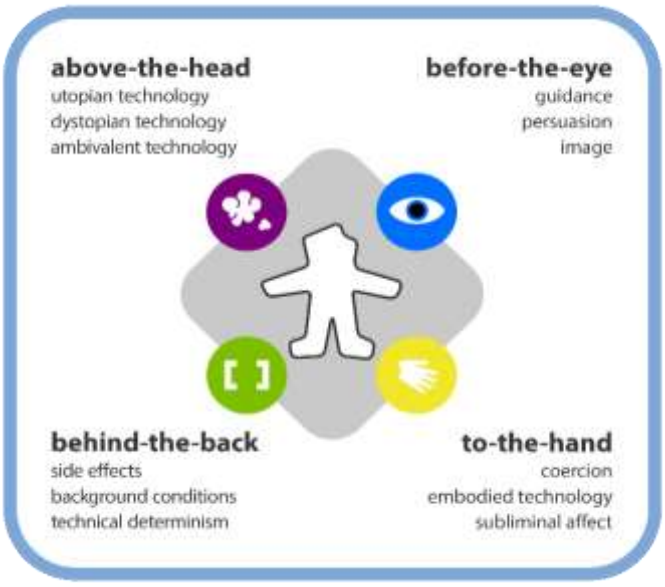

FIGURE 8.1 Product Impact Tool Model.

In the online version of the tool (see www.productimpacttool.org), one can unfold the framework from the diagram in the center, via text boxes with explication (Figure 8.2) of the modes of interaction and types of impact, to the outer circle consisting of sixty examples with a picture and a short explanation.

FIGURE 8.2 One example of product impact from the online Product Impact Tool.

The Product Impact Tool intends to give a practical turn to work in the philosophy of technology (Eggink and Dorrestijn 2018). It refers especially to the current of historical, empirical, and phenomenological research into "technical mediation" (cf. McLuhan 2003 [1964]; Ihde 1990; Latour 1994; Verbeek 2005). The term "mediation" is conveniently broad so that it can serve, in my view, as an overarching concept for how technologies play a role in, intervene in, and give a twist to our existence and way of living. It is an important element of the concept of technical mediation that technology and humans are not approached as fundamentally separated entities, but rather there is a focus on interactions, interdependencies, or interwovenness. The focus in the tool is on the impact of technology, but the *impact of technology on humans* is framed within the *interaction between humans and technology,* and overall, the model reflects the idea of *technical mediation of human existence*.

Within the framework of technical mediation, the Product Impact Tool brings together a variety of answers to the question what technologies do to our existence, as have been discovered, formulated, and conceptualized by people in different times and from different disciplinary angles. It is not the ambition to provide one single answer to the question what technical mediation is and how it works. The relations between humans and technology appear so complex and dynamic that striving for a complete grasp (in the form of some quasi-mechanistic theory of human-technology relations) seems unfeasible. Rather my approach is to explore the multiplicity of effects of technology that may occur and provide some structure by the framework of modes of interaction and types of impact. The Product Impact Tool model thus collects conceptions of specific "figures of technical mediation," appearing against a "background" of technical mediation as a general theme or problematic (cf. Dorrestijn 2012, 62–64).

The resulting repertoire of figures of technical mediation can be applied for several purposes. The tool can be of help in the design process, supporting design for usability and for behavior change. Also the tool can help to analyze problems with the acceptance of technologies. And, as it is the focus in the present text, the tool also contributes to the ethics of technology.

Impact and Ethics of Interactive Screens in Public Spaces

A concrete example which I will use as a case in this chapter is offered by the research project OBSERVE, in which interactive screens for public spaces are developed (Figures 8.3 and 8.4). Big screens are popping up everywhere: alongside highways, on squares, on the facades of shops and schools. OBSERVE is about making the content on those screens interactive: responsive to circumstances such as the weather, or festivities, or also responsive to input from people passing by or to information gathered about them by sensors and from the internet. A business incentive for this project is that responsive content would render the exploitation of screens more economical because of better targeting of people. A simultaneous promise is that content will become more relevant and enjoyable for the public.

FIGURE 8.3 Project name display on a screen on a pilot day.
Source: http://www. actmedialab.nl/tweede-pilot-observe/.

To make the interactivity work, such a system makes use of sensors, as well as the collection of information from data banks and from the internet. The collected information is used real time by the system for selecting relevant content or to produce content through input from the spectators.

FIGURE 8.4 People in view of an interactive screen system.
Source: http://www. actmedialab.nl/tweede-pilot-observe/.

A consideration of the ethical aspects of interactive screens was part of the research project from the offset. Initially the ethical aspects were framed in a rather juridical way: What does data and privacy legislation allow concerning the collecting and use of data about people, and does the project remain within these borders of law? From the perspective of the Ethics and Technology research group it seemed immediately that the ethical issues were broader and different from the question about compliance with privacy legislation. The pilots in the research project would not immediately be so advanced that privacy laws would be an important factor—not yet. Still, the future of interactive screens, especially the possibility of personalization of content by responsiveness of the screens to specific people in front of the screen, may have massive consequences with respect to privacy. Many people are reminded of the scene in the movie *Minority Report* (2002, directed by Steven Spielberg), where one of the main characters (played by Tom Cruise) walks in a site where all the walls are screens which show messages specifically directed at him. In such a fully interactive environment the data collected about people returns to them in the form of interference in their behaviors in very personal and far-reaching ways.

Interactive environments may prove altogether impossible to exist if current privacy principles of informed consent about data collection, storage, and processing would be strictly followed. Moreover, people themselves share data on social media and other online services, while consent is only a formality, but in no way can be actually considered informed consent. And how could this be different? If full data transparency will be impossible in a future smart world, what does this mean? Total data transparency is hardly feasible, but also not what most people seem to want. It is improbable that technical developments will be put on hold, nor that many people would really want full abandonment of interactive technology. Are we therefore seeing the end of privacy? There is another option. It may also be that the meaning given to the value of privacy is transforming. Even if all data streams can no longer be controlled, people will remain or become more and more cautious about the meddling of smart technologies in their lives, the practical interference with their freedom. Following this approach, emphasis in the framing of the problem is thus shifting from data to impact. In dealing with impact, the framing is also shifting from a focus on regulation by law to a focus on responsible research and innovation.

Fitting with this orientation toward responsible research and innovation, an important activity in the project OBSERVE was a workshop with project group members about the impact and ethics of interactive screens (on July 12, 2016, with six research group members, and myself as workshop leader). The approach followed was to start by analyzing the impacts of interactive screens in a structured way with the help of the Product Impact Tool. The model was presented using the online version of the Product Impact Tool. Each time the three types of impact in one of the quadrants were presented, and then the group discussed if these exemplary effects could be recognized or imagined to apply in the case of interactive screens in public spaces.

The details of the discussions in the workshop will be reported on hereafter in the elaboration of relationships between figures of impact and ethical concern. I will end this section with a concise reproduction of the five points of attention which were drafted by way of conclusion in the workshop proceedings.

1. Awareness and Responsibility

The workshop was a lively event. The introduction to the workshop suggested issues for reflection, but participants also brought their own knowledge, intuitions, opinions, and topics to the discussion. The workshop offered occasion for articulation and deliberation of one's thoughts. The workshop did help to raise awareness, and this confirms the assumption that not only legal compliance but also responsibility of participants is important in such a project.

2. Respect Existing Legal Regulation

Compliance with data and privacy legislation is of course important and juridical advisors are needed for this. But there are many gray areas and novel situations where existing law is not adequate so that ethical reflection and responsibility are impelled.

3. Privacy and Interference

Framing the ethical aspects broadly as concerning freedom and interference with behaviors, beyond data and privacy, appeared mostly a fruitful approach. The theoretical introduction about this point was taken for granted without any special approval or disapproval, but the topics discussed during the workshop indeed covered this broader thematic of impact and freedom.

4. Participatory Design

At several occasions during the workshop the project became characterized as *top down*. The desire of the public for interactive and personalized content would be largely an assumption from developers. People in the street have a very different estimation of technical opportunities; most of them are not early adopters. The acceptance readiness of people does not, for the most part, follow from arguments or technical numbers but is based on people's feelings. This calls for communication between developers and users, like in a product impact workshops where opinions and emotions can become articulated and discussed.

5. Participatory Interaction

Participatory design means in a minimal sense that users are heard and informed in the design process but can in a broader sense also mean that the functionality actually is affected by the input from users. The understanding of interactive technology by developers often seems to have the form of a sensor feedback control system, where data about users is gathered (by sensors or by data mining in available databases) and users remain passive. The possibility of active contribution by users (by input via speech, gesturing, pushing a button) remains underexposed. Still this may offer new possibilities in terms of interaction, which are highly interesting because of a real interplay between humans and the technical system. At the same time in the case of such participatory interaction ethical issues with privacy and behavior interference will often be circumvented or prevented. For when people retain an active role *in the loop*, they stay more in control.

Correlating Figures of Impact and Ethics

The aim of this text is to elaborate how the Product Impact Tool can also serve as a tool for ethical reflection and discussion about technology. To begin, a structured impact assessment raises awareness of otherwise unnoticed or neglected effects of technology. In a Product Impact Tool workshop, like the workshop on interactive screens, this usually leads to much discussion and this brings along the articulation of ethical concerns about technology. This can clearly be recognized in what is reported in this text on the workshop about interactive screens. Therefore it appears that the Product Impact Tool already functions as a tool for stimulating ethical questioning, even when the terminology used in the tool is about impact and does not explicitly refer to ethics.

It is still, however, an interesting question how this pattern of ethical discussion raised by assessing impacts can be explained and structured. In this section I will therefore review the correlation between figures of impact and of ethical care, as two sides of the same coin. While the recognition of impact may produce ethical concern, the conceptualization of impact can just as well be seen as an expression of ethical concern. It may well be that often the concern came first and the conceptualization of effects of technology followed in reaction to the concern. This reflects the epistemological issue that knowledge about ourselves, and thus also about technology affecting us, cannot be altogether objective (cf. Dorrestijn 2017b).

In the following, the different types of impact and the associated ethical concerns will be discussed, starting from the discussions in the interactive screens workshop. This means a further presentation and explanation of the types of impact in the Product Impact Tool with illustrations from the case of interactive screens. The same workshop discussions are also the starting point for the elaboration of the correlated figures of ethical care.

The mirroring between the perspectives of analysis of impact and of ethics is most obvious in the above-the-head quadrant of the tool, which comprises overarching philosophical and ethical visions on the impact of technology (utopian, dystopian, and ambivalent technology). But in some of the other exemplary mediation effects, the ethical aspect is also readily recognizable. Side effects and technical determinism are good examples. These notions have a critical connotation, alluding mostly to undesired impact—although they surely also can take on a positive value. Embodiment and guidance, by contrast, are types of impact which may have predominantly a positive ethical connotation. I will start behind-the-back and conclude above-the-head.

Behind-the-Back

Behind the visible and tangible screens themselves, interactive screens assume much technical and organizational infrastructure in the background. Think of sensors, archives with content to be broadcast, a content selection system, an exploitation and business model, etc. The impact of technology behind-the-back affects people indirectly, without direct user-technology contact. The *behind- the-back* mode of interaction appears particularly important in this case, as with regard to intelligent environments in general.

Background Conditions

The functioning of interactive screens is in numerous ways dependent on the wider infrastructure. Considering *background conditions* often helps explaining problems with the implementation and adoption of new technology. During pilots in this project about interactive screens, this appeared an important dimension. Fast internet connection proved to be a bottleneck for the fluent functioning of the system. The geographical site also determines essential environmental factors of the system. Think of the amount and variety of people passing; weather circumstances; and the presence of historical, touristic, or commercial spots. The content selection mechanism is a clear example of a system that functions in the background, which users cannot directly interact with or even see, but which is very important with respect to ethics.

Background conditions tend to be concealed and often mean dependence, making it one of the impact figures with a mostly negative ethical connotation. For, uncontrollability contradicts the ethical ideals of awareness and consent. Still, withdrawal to the background can also assume a positive sense as it also means absence of hindrances, convenience. In this sense background conditions, persuasion, subliminal effect, and embodiment are all comparable. The ethical remedies to the concerns about background conditions are *raising awareness* and a systemic design approach for improving *integration* of different factors. Redesign of a whole system becomes in the strongest form a *regime shift* or *Revolution*, as in Marxism, where political and cultural transformation would be achieved by changing the material and economic basis of society.

Side Effects

Next to considering interdependences of background conditions, a second form of impact behind-the-back concerns *side effects*. One example from a pilot in OBSERVE during spring time was that movie clips appeared on the screen about Saint Nicolas festivities, which one would only expect in the weeks up to December 5. The automatic selection of content led to unintended consequences. Another side effect is that while the screens aim to draw people's attention to the screens, they will distract them from everything else, which can pose serious safety risks in traffic for example. Other unintended consequences are the visual pollution during daytime and undesirable spoiling of darkness at night of all-too-bright screens (so considered by many, although a matter of taste).

Clearly the impact figure of *side effects* is also one with negative ethical qualification. This is true for all the examples discussed in the interactive public screens workshop: visual pollution, distraction of people, and automatically selected content that is not fitting. Other terms related to side effects, such as *unintended consequences*, *collateral damage*, or *risks*, all sound negative. Even when often negative, side effects can also occur in a positive way; think of the notion of a *win-win situation*. In the normal sense where side effects are mostly unintended and unforeseen, the corresponding ethical remedy is anticipation and prevention of the negative impact.

Technical Determinism

The third behind-the-back type of impact that the Product Impact Tool distinguishes is *technical determinism*. This term refers to a philosophical and ethical question: Do humans design and control technology, or is it rather an internal logic and power of technology which determines human culture? But it can also be considered in a descriptive way and on a smaller and more concrete scale: Does technology offer solutions to existing needs and values, or does the availability of technology create or change needs and values? In the case of interactive screens an important aspect is what happens to the value of privacy. Awareness and consent about the use of personal data seem almost impossible with rush of smart and interactive technology. Must privacy be reinforced, redefined, or can only its demise be lamented? Another instance of *technical determinism* which is relevant here is what is called *function creep*. Can it be prevented that personal data, first collected solely for monitoring movements in the city, will later perhaps be used for personalized publicity or for regulating access?

In the explanation of *technical determinism* as technology producing instead of following human needs and values, the ethical significance is already quite explicit. Function creep denotes an ethically undesired form of changing needs. The challenging of values, such as privacy, has also a predominantly negative meaning. However, in the ethics of technology it is an important question if there is a middle way between acknowledgment of the impact of technology on human values and leaping into full determinism (Swierstra, Stemerding, and Boenink 2009; Kudina and Verbeek 2019). The ethical concern and remedy with respect to value change are aptly denoted by the quite popular notion of *disruptive technology*.

The term is often used by technology enthusiasts in a positive way expressing that new technology enforces a break out of a dated regime (like Uber disrupts an overregulated and protected taxi system). Still, in ordinary language disruption rather used to have a negative ethical connotation. Much depends on the values one endorses. In negative disruption the idea of a decline of human values, overruled by technical change, takes prominence. Positive disruption converges with regime change, as in changing the background conditions for a good cause. The change of values may in this case be seen as an awakening (an overcoming of false ideology). The core ethical significance about such a challenging of values is not the empirical description of changing values, nor philosophical acknowledgment that values may change, but critical reflection about the question which values, long standing or revaluated, we want to affirm.

Before-the-Eye

The quadrant *before-the-eye* is about technology as carrier of information and meaning, addressing the user's cognition and influencing people by informing their decisions for actions. In the case of interactive screens this category comprises the content shown on screens but also the appearance (design) of the screens.

Guidance

A first point which was discussed is whether people were at all able to see and understand how the interactive screen reacts on their presence, and how they can influence the interaction. This is an example of the effect of *guidance* in the Product Impact Tool: design

elements which provide guidance or information about the intended use of technology.

Guidance has a mostly positive value, which is easily translated into a design strategy. For example, the usability expert Donald Norman (1988) with his work on affordances has promoted user-guiding design as an important strategy for user-friendly design. His approach is a response to annoyance with the opposite, of technologies which are *misleading* users. User guiding design can therefore be a design strategy and serve as an ethical remedy. Another (positive) ethical significance of guidance is that it complies with the ethical value of being informed.

Image

The design of a screen must also fit the city and the specific place. A workshop participant brought up the example of a new digital time table at the Central Station of the Dutch city of Utrecht. Many people, however, long for the former analog time table (with flipping slats). The style and branding of a technology matter for the acceptation. Do we or do we not want to associate or identify ourselves with certain technologies of a certain style or brand, or a certain kind of technology at all? In the Product Impact Tool this falls under the category of *image*. Regarding the question of image, the research project title, OBSERVE, is quite daring. The reference to observation will remind people of issues with privacy and control (Big Brother), and this is perhaps not a lucky association.

The notion of *image* can just as well be positive as negative (like the title OBSERVE). A negative image that proves persistent becomes a *stigma*. A different kind of ethical concern about image is that it is *only superficial*.

Persuasion

The effect of *persuasion* (cf. Fogg 2003) is a more intentional kind of influencing by technology than just conveying information or meaning (*guidance*). It is definitely relevant with regard to the content displayed on the screens. It is a prerequisite that the screen itself is *persuasive*, in the sense that it must first successfully attract the gaze of people. The consideration of persuasion led one of the workshop participants to remark that up to this point content makers for public screens are very much focused on broadcasting with the goal of persuading and influencing people, and not on true interaction (including a participatory role for the public). The ethical concerns about *persuasive technology* are especially complex and interesting. First, persuasive technology and the comparable concept of *nudging* (Thaler and Sunstein 2008) are typically used for ethically desirable causes, such as saving energy and stimulating healthy eating and lifestyle. The idea is that persuasive technology functions as behavior support to tune behavior toward goals we ourselves affirm but often fail to achieve without the right cues. Second, the theories of persuasive technology and of nudging both include ethical guidelines where the idea of informed consent is important and where the targeted people should always be able to opt out. However, these ideals can easily become challenged in practice. For who decides what are good causes? And cannot the same strategy be used by people with bad intentions?

Moreover, while the theory says explicitly that there should be awareness about persuasive or nudging strategies, the effectiveness might be better when there is less awareness on the user side. Think of hidden messages, a related technique which influences people's decisions

subconsciously. It is impossible to prevent that this technique is used for online marketing or influencing elections via social media, but it is fully against the transparency guideline.

Finally, even when the persuasion is transparent and fully in accord with the ethical guidelines, there remains a fundamental ethical issue. Take as an example a persuasive message on a screen in a public space: receive a coffee for free when you park your car outside the city center, and keep the city clean and pedestrian- friendly. It is an ethical problem (especially in Kantian ethics of good intentions, duty, and autonomy) that people then do good, but only because of something else (a coffee for free) and not because of intrinsic moral motivation.

The downsides of pervasive augmented reality and persuasive technology are impressively explored in the artistic movie *Hyper Reality* (by Keiichi Matsuda; see http://hyper-reality.co/), which is discussed extensively by Galit Wellner (see Chapter 9). The sheer amount of images and messages in this example of *augmented reality* is completely overwhelming for the main character of the movie and for us as spectators. When, on top of this, the system is hacked, the situation gets even worse and really confusing.

To-the-Hand

In the Product Impact Tool *to-the-hand* denotes physical interaction by which products affect people directly by interference with their body and gestures. In the case of interactive screens this is not the most important quadrant, but still there are effects which have to do with the materiality and the positioning of the screens and with the physical sensations of the light of the screens.

Coercion

The screens must be placed so that people do find them. Are they well visible, or too obtrusive? Even if it is not the typical example of *coercion*, it can be said that a screen which cannot be practically circumvented does physically *coerce* people's gaze toward the screen and confront them with the content.

Coercion has an obvious ethical counterpart in the *obtrusion of freedom*. And this means, following the famous analysis by Latour (1994), that morality is taken from humans and delegated to things. Coercive design can bring along usability annoyances but can also go as far as a total control of behavior, which is obviously ethically significant. Interventions such as spikes to ward off the homeless or youths with skateboards are a good example (see Rosenberger in this volume). This also gives insight in yet another aspect, namely that because the constraints are often both unwanted and well visible to the targeted people, they may provoke subversive action. Finally, a positive ethical value of coercive design is that there is a fixed procedure, and users cannot do anything wrong.

Subliminal Affect

Not only the positioning but also the often-extreme brightness of some screens is obtrusive if one passes by in the darkness of the night. The light can be so bright that it hurts your eyes, resulting in a repulsive reaction. This is an example of *subliminal affect*, where the senses (sight in this case) are addressed not with information to be cognitively processed but in a sheer physical way, rendering an effect of attraction or repulsion.

Subliminal affect was found to be somewhat applicable in the case of all- too-bright screens, but it should be noted that such light does reach the level of conscious cognition. The subliminal aspect comes more to the fore when for marketing purposes, for example, people's moods are being influenced with light, color, sound, or smell. This prompts an important ethical challenge, because people remain mostly or altogether unaware about how they are influenced: the opposite of the ethical ideal of informed consent.

Embodiment

Public screens are a simple technology in the sense that little learning efforts are needed to be able to watch them. They are easily *embodied* (although that is on the basis of knowledge and skills to understand the place of screens and images and text in our world, which everybody must acquire through education). But embodiment may acquire extra relevance when the interactivity of such screens is further developed. In a project by artists in the research group, the movements of people on the square in front of the screens were monitored and used to generate a line on the screen. People are thus invited to enter in an interplay with the screen and start to adapt their movements on the screen in order to influence the drawing on the screen. This is an example of the possibility of human-technology interaction by movements and gestures. This is a trend: think of swiping on touch screens or contactless controlling by gesturing of gaming consoles. It means a retrieval of the relevance of the impact figure of *embodiment*, albeit in a new form. This time it is not about literally handling tools but about remote-controlling technical systems by gesturing.

In general, *embodied technology* has a positive ethical connotation. In interaction design it is a mark of successful design when a product is easy to use, without thought, in a natural way. It is undesirable when the learning curve is too steep, because a technical product demands much "use technique" (skills) (Tenner 2003). The aspect of habituation and training of embodiment implies a self-transformation of the user. For this reason embodiment is an important notion in the ethics of technology when the focus is on material culture, ethical practice, and self-development. This practical focus stands in contrast with a more theoretical and cognitive understanding we have about our behavior and ethics where the focus is on conscious behavior and technology use. An ethical concern about embodied technology, as with the other subconscious figures of impact, is that it goes against the ethical ideal of consent. This concern becomes a concrete danger when the attachment and interaction become so easy, natural, or pleasant and people may slip into a form of addiction to technologies. The initial burden of habituation reverses to a burden of rehab or detox. This is at least the terminology that is being used more and more in relation to the pervasive use of the smartphone and social media apps.

Above-the-Head

Finally, the *above-the-head* quadrant comprises overarching ideas about the impact of technology. In the case of interactive screens, the views concern typically expectations about perfect automation and personalization as well as concerns about the values of privacy, freedom, and control in public space. Whereas impacts in the other quadrants refer to concrete examples, here we find generalizing, abstract views on the meaning of technology for humans. The tool contains three conceptions of technology (utopian, dystopian, and ambivalent technology) as a very concise and schematized overview of the philosophy of technology. Even if there is no explicit reference to ethics in these titles of the figures of mediation, they do express an ethical valuation (from altogether positive, to ultimately negative, to mixed). Moreover, the more extended explanations of the views on technology in the online version of the model and in background literature (Dorrestijn 2012, ch. 4; 2016, 2017b) do explicitly combine an analysis of the impact and an evaluative, ethical counterpart.

Besides the ethical concern as counterpart of the impact, it is also possible to make a connection between understanding of impact and ethical theories and principles. The utopian view on technology lines up mainly with utilitarian ethics (after Jeremy Bentham), while the dystopian view rather combines with duty ethics (Immanuel Kant). Both of these moral theories are rationalistic and theoretical. The view of ambivalent technology is more congruent with practical currents in ethics, with a focus on virtues and on care of the self (Michel Foucault). I have elaborated these links between conceptions of technology and moral theories elsewhere (see Dorrestijn 2012, ch. 5) and will include very concise summaries in the following.

Utopian Technology

In the workshop it was remarked that the screens are being imposed upon the public. The screens have come into being more due to technology push than marked pull. This links to the figure of *technical determinism* in the sense of the history and governance of technology. But it was also discussed how this pushing of technology has to do with the meaning given to technology, a positive attitude on the side of developers. The enthusiasm can have traits of a *utopian view of technology* and is often focused too much on technical possibilities and solutions while neglecting actual human preferences and values.

My description of utopian technology, including the ethical concern, is that *technology wonderfully completes human life, while the ethical challenge is only to solve scarcity or unequal distribution of technology*. Technology itself here appears good; only the application and distribution, an economic problem of a good fit to human needs, can be problematic.

The economic perspective is also central in the ethical theory of utilitarianism, of which Jeremy Bentham (1748–1832) is a main proponent. Bentham stressed that utility should be the principle of a radically rational ethics. Good is an action which results in maximum happiness (for oneself and others, for the greatest number). Interestingly, Bentham did explicitly consider technology, as he was also an avid promotor of his Panopticon project, an architectural design for a prison or any building for holding together large numbers of people. The circular shape with a central watchtower allows for continuous inspection. This effectively prevents any incorrect behavior but also, as Bentham believes, removes the will to do evil. In the actual world actions that go against the principle of promoting happiness for the community may go unpunished or

even prove beneficial for the actor in the short term. The Panopticon design shapes an ideal world where everything and everyone is always visible and where one always immediately experiences the right consequences of one's deeds. As a result, people will always act in accordance with the rational moral principle of utility for maximizing happiness.

Dystopian Technology

Such a positive attitude toward technology is not universal. Developers in the workshop remarked that they do see that there are always people who do not actually want so much technical innovation at all. Moreover the utopian idea of perfect convergence of smart technology with the demands of people can turn from a *Utopia* into a *Dystopia* when as a result people never ever would have to leave their house anymore. This was expressed by a workshop participant with reference to the movie *WallE*, where robots do all the work, but this has rendered people fat, immobile couch potatoes. Another *dystopian* danger mentioned was that all sensors and databases might fall in the hands of a totalitarian regime.

Dystopian technology can be explained as *the accumulation of technology into a system that takes control of humanity, with the complementary ethical calling to put limits to this rush of technology*. Following a fully dystopian view, technology in itself is principally dangerous. The totalitarian exploitation of technologies would not be due to wrong use, but it is a pattern residing in technology itself that when utopian ideals become realized, they turn out dystopian.

The dystopian view of technology combines with duty ethics rather than with utilitarianism. In the modernistic search for an ultimate rational moral principle, the theory of duty ethics by Immanuel Kant (1724–1804) is the competitor of utilitarianism. According to Kant the actor's intention and not the effects of an action count for ethical evaluation. Actions are qualified ethically good if they are based on good intentions, meaning that they stem from duty, from respect for the moral law. Kant stresses that this assumes the possibility of a free will to determine one's own actions: autonomy. Unlike Bentham, Kant did not explicitly consider the impact of technology, but the emphasis on human autonomy can be seen as the ethical complement of the dystopian view of technology. The reversal from utopian to dystopian technology can be illustrated with the adventures of Bentham's Panopticon. At the end of the twentieth century, since the famous analysis by Michel Foucault (1977), the Panopticon has rather become an emblem of a *Dystopia* of social control by technology. Foucault does, however, not himself endorse duty ethics, but for example the call for an "imperative of responsibility" by Hans Jonas (1984) is an explicit expansion of Kant's duty ethics to technology.

Ambivalent Technology

The overall atmosphere among the participants in the interactive screens workshop could rather be called *ambivalent*. The focus was on the need to find balance between the positive opportunities of technology and the negative impacts and risks. It was felt that surveillance may be presented too easily as dystopian (with reference to Big Brother or the Panopticon), whereas it is undeniable that surveillance does also help to actually prevent assaults. Somebody recognized that one's evaluation of technology is linked together with one's theoretical understanding of technology, and even referred to Actor-Network Theory (cf. Latour 1994), with its emphasis on the intertwinement of humans and technology. Other remarks that expressed an *ambivalent view* were that it is a matter of finding balance, of finding

or creating possibilities to turn technology off again, or of tweaking technology; education is important; people should have a choice and they need to become proficient to recognize and make choices. Regulation was mentioned as a remedy for making the behind-the-back systems more transparent, for example a certification register for sensors. An idea for design improvement was the notice board as a model for the interaction with the screen, which would give the public a more active role in the interaction compared to the sensing and automatic content collection system, which is top down controlled.

In the Product Impact Tool ambivalent technology is the view that acknowledges that *human existence is unescapably mediated by technology with always both good and bad effects, prompting an equally complex ethical challenge, which is to cope with technology in a balanced way*. This means a middle position between the utopian and dystopian views, which does not mean an easy solution, and it does not diminish the importance of technology. "Technology is neither good nor bad; nor is it neutral" is the nice formulation (by Kranzberg), emphasized in the ethics of technology by Michel Puech (2016, 2).

With the effects of technology ambivalent and the focus on coping in a balanced way, this view of technology combines better with practical approaches in ethics which we see in the postmodern revival of ancient focus on virtues and the care of the self. Balance has since the time of Plato and Aristotle always been a key feature of virtues. Michel Foucault's work to revive the ancient care of the self (Foucault 2000a) allows to rethink human freedom and autonomy as the practice of coping with external influences, instead of the opposite of determination (in line with Kant's ethics). By the way, Kant himself does explicitly acknowledge that the existence of free will is a philosophical enigma and impossible to explain in the scientific framework of physical and social determinations (nor of technical conditions we may add). Foucault thinks that this trait in Kant marks the inauguration of modern philosophy in its true sense. Here Foucault does not so much think of Kant's ethics of free will and duty, but especially of Kant's more pragmatic work on anthropology and his essay on the Enlightenment. Foucault finds in Kant the beginning of a critical awareness of the paradoxes and side effects of progress, whereas classical rationalism before Kant was naïve and too optimistic. In his late work, Foucault was comparing and combining the critical "attitude of modernity" (Foucault 2000b) with the theme of the "care of the self " from ancient ethics (Foucault 2000a). This combination is inspiring for a practical ethics for coping with the impact of technology, and finding a good balance of humans and technology.

Conclusions

The workshop with the Product Impact Tool about interactive screens research within the research project OBSERVE was used to show how an impact assessment with this tool did evoke reflection and discussion about ethical concerns. Many points from the discussion have been reported on here, and this gives an idea of how in the practice of a workshop the movement from impact assessment to ethical concern occurs all the time.

A further question in this chapter was how the connection between impact assessment and ethical concern can be understood in a more conceptual way. After a reflection on the conceptual affinity and reciprocity between figures of impact and figures of ethical concern, I have reviewed all twelve types of impact and discussed which ethical concerns typically are

raised in connection with any of them. It appeared that some types of impact have predominantly a negative ethical value (a critical concern) and others a positive (an ethical remedy). In the positive form an impact figure can be used as a strategy for responsible design that remedies some ethical concern. Along this structure the following table summarizes the output of the workshop and further elaboration.

Type of impact	**Ethical concern / negative value**	**Ethical remedy / positive value / design strategy**
Utopian technology	Only scarcity and unfair distribution	Utilitarian ethical principle; Human completion, optimization
Dystopian technology	Technology takes command	Deontological ethical principle; Limits to technology, precautionary principle
Ambivalent technology	Technology neither good nor bad nor neutral; Ethics of virtues and arts of living	Practical ethics of virtues and arts of living; Hybridization, balance, re- humanization
Guidance	Misguidance, non-guidance	User-friendly; manuals, instruction
Persuasion	Who controls?; unawareness, wrong reasons/deception	Behavior support
Image	Stigmatization; superficiality	Positive association, growth, self- esteem
Coercion	Interference with freedom and responsibility	Can't go wrong, one way of using
Embodiment	Slippery slope, bad habits, addiction	Natural self-extension, user-friendly
Subliminal affect	Subconscious drives, temptation, unawareness	Positive sensory stimuli; a comfortable, welcoming, healing ambiance
Side effects	Unintended consequences, collateral damage, risks	Anticipation, impact assessment; win- win situation
Background conditions	Dependence; withdrawal and unawareness	Raising awareness; Integration, system design, regime change, revolution
Technical determinism	Negative disruption, shifting values and preferences, decay	Positive disruption; resistance, subversive use of technology

A few points of discussion may be added to these results. This exploration of impacts and ethics is based in practice and connected to the case of interactive screens. Still, the results have wider application in the case of other interactive technologies and technology in general. In the same way as the twelve types of impact in the tool, the overview provides a framework, scheme, vocabulary, which is helpful and necessary for interpreting and articulating the adventures of the interactions between humans and technology. It remains also provisional and is only one possible framework. The repertoire of impacts and concerns helps to dive into an exploration of the details of the interwovenness of humans and technologies, of our own technically mediated existence.

The Product Impact Tool does contribute to the ethics of technology in a certain way. It does not provide a clear answer or a method to decide in case of an ethical dilemma. The last step of making a decision for action is left to the wisdom and responsibility of those engaged with the issue. What this tool does do, in case of a given dilemma, but just as well if there are no known issues yet, is that it contributes to awareness and insight about the impact of technology, and it does evoke reflection and discussion about ethical concerns. The Product Impact Tool therefore does stimulate a responsible attitude of engineers, designers, and other stakeholders in innovation.

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