Chapter 7
Can Technology Embody Values?

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Abstract Under the banner of Value Sensitive Design (VSD) various proposals have been put forward in recent times to integrate moral values in technology through design. These proposals suppose that technology, more in particular technical artifacts, can embody values. In this contribution, we investigate whether this idea holds water. To do so, we examine the neutrality thesis about technology, that is, the thesis that technology is neutral with regard to moral values. This thesis may be interpreted in various ways depending on the kind of values involved. We introduce two distinctions with regard to values: (1) final value (value for its own sake) versus instrumental value, and (2) intrinsic value (value on its own) versus relational or extrinsic value. This leads to four different kinds of values to which the neutrality thesis may refer. We argue that the most interesting version of the neutrality thesis refers to extrinsic final values. We provide a number of counterexamples to this version of the neutrality thesis, and, on the basis of these examples, we suggest a general account of when a technology may be said to embody values. Applying our results to VSD, we introduce three different values involved in a design process, namely, intended value (the value intended by the designers) embodied value (the value designed into the artifact) and realized value (the value that is realized in actual use) and we discuss how we can verify what values are embodied in a designed technical artifact.

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7.1 Introduction

In recent times various authors have argued for taking into account considerations about moral values in the engineering design process by what they call Value Sensitive Design (VSD). This is an approach that aims at integrating values of ethical importance in a systematic way into the designs of technical artifacts (Friedman 1996; Friedman and Kahn 2003; Friedman et al. 2006). The approach has been applied to a number of design projects especially in information and communication technologies (ICT) but the basic idea of the approach is more generally applicable.

A central tenet of VSD is that we can somehow design moral values or values in general into technical artifacts, so that they can embody values (cf. Flanagan et al. 2008). This assumption is, however, not uncontroversial. Our main aim in this contribution is to critically assess the idea that technical artifacts may embody values, in particular moral values. We will do so by contrasting this assumption with the neutrality thesis of technology. One of the most powerful expressions of the neutrality thesis is contained in the slogan of the American National Rifle Association: "Guns don't kill people, people kill people". This statement is not intended to deny that guns can be used for morally good or bad purposes; they can. Rather it holds that it is this use, and not the technology itself, that is morally good or bad and thus has moral value. In its most general form this neutrality thesis with respect to technology can be expressed as follows:

(N) Technology is morally neutral.

The meaning of N depends, of course, on the meaning of the notion of technology and what it means to be morally neutral. There are various ways in which we may interpret the notion of technology (see for example Mitcham 1994). Here we will take technology to be a collection of technical artifacts – we will have more to say on the notion of technical artifact below. Furthermore we will assume that something is morally neutral if and only if it does not embody moral values. With regard to VSD, the interesting question is not whether *all* technical artifacts are morally value-laden (or *all* are morally value-free) but rather whether it is possible to make some technical artifacts morally value-laden by consciously designing them that way. We therefore propose to reformulate the neutrality thesis N as follows:

(N1) Technical artifacts cannot embody moral values.

If N1 is true, it is not possible to design values into technical artifacts and therefore the basic assumption underlying VSD is ill-founded. The most obvious defense of N1, it seems, starts from the assumption that technical artifacts are mere instruments.[1] As mere instruments, they can be used for morally good or bad ends, but technical artifacts themselves, independent of these ends, are value neutral; they do

[1] It is hard to find explicit defenses of the neutrality thesis in the literature, but see Pitt (2000) and Pitt's contribution to this volume.

not by themselves embody moral values. So, technical artifacts may have instrumental value and this instrumental value may be exploited in realizing ends that may be assessed as morally good or bad. In terms of the use plan interpretation of technical artifacts developed by Houkes and Vermaas (2010) this may be expressed by saying that only because of the goal of the use plan in which a technical artifact is embedded, technical artifacts may have moral significance. So, it is their (social) context of use that determines whether technical artifacts have moral values.

In this defense there are two issues at stake. One issue is whether technical artifacts can only embody instrumental value or also what we will call below final value, i.e. value for its own sake. The other issue is whether technical artifacts by themselves can have certain values (intrinsic value), or whether they can have values only in relation to something else (relational value). To understand the neutrality thesis, and to affirm or rebut it, we need to disentangle both aspects. We therefore start this article with a rather long philosophical detour aimed at better understanding the notion of value. This detour will enable us to formulate the neutrality thesis more precisely. We will then provide a number of examples that rebut the neutrality thesis. Having argued that technical artifacts may embody a particular kind of values, we return in the final part briefly to VSD and analyze how values may be embodied in technical artifacts by relating them to their designed features.

7.2 Moore on Intrinsic Value

We start our philosophical detour about values with G.E. Moore's characterization of intrinsic value. The reason is not that we subscribe to Moore's characterization of intrinsic value. Rather, we believe, like various other contemporary philosophers, that Moore's conception of intrinsic value is somewhat confusing, for reasons we will explain below. Nevertheless, Moore's characterization is interesting because it has been quite influential in philosophy and because it appears to touch upon both aspects in the debate about the neutrality thesis we alluded to above, i.e. instrumental versus final value and intrinsic versus relational or extrinsic value.

In the beginning of the twentieth century, G.E. Moore has offered the following account of intrinsic value (Moore 1903, 1912, 1922).[2] Moore believed that 'goodness' (the term he used for what we call value) is an unanalyzable property; in particular it cannot be defined or analyzed in terms of natural or descriptive properties. At the same time, Moore believed that goodness was objective and did not depend on people's desires or appreciations. This brought him to the notion of intrinsic value, as value that is intrinsic to the valuable object.[3] For Moore intrinsic

[2] For a discussion of different notions of intrinsic value that have been distinguished by philosophers, see Feldman (2005).

[3] There is a debate in the philosophical literature about what kind of entities can bear value; some believe that only states-of-affairs can be bearers of values, others, like Moore, also include, for example, objects. We will not enter into this debate here, but we will assume that objects can be

value was not a property of an object, at least not a descriptive or natural property because he is a non-naturalist about goodness. He nevertheless seems to believe that intrinsic value depends on the intrinsic (natural) properties of an object. One possible way of expressing this idea is by saying that intrinsic value supervenes on intrinsic natural properties but cannot be analyzed in or reduced to these natural properties. According to Moore, then, a value that is intrinsic to an object remains the same whatever its relation to other things: "A kind of value is intrinsic if and only if, when anything possesses it, that same thing or anything exactly like it would necessarily or must always, under all circumstances, possess it in exactly the same degree" (Moore 1922: 265). For Moore, intrinsic value is thus by definition not extrinsic or relational.

Although the emphasis in Moore's account lies on what it means for an object to have intrinsic value, he also assumed that only so-called final values can be intrinsic values. The reason for this assumption seems rather straightforward: things with instrumental values derive their value from them being instruments for attaining something else that is valuable (be it for its own sake or not). So instrumentally valuable objects by definition derive their value from something outside the object, and therefore the value of these objects is not intrinsic to those objects, but relational.

7.3 Various Forms of Value

For Moore then the notion of intrinsic value combines two aspects: (1) value that is intrinsic to an object, i.e. value that only depends on an object's intrinsic properties and (2) final value, i.e. value for its own sake. Especially Christine Korsgaard's 1983 article "Two Distinctions in Goodness" has drawn attention to the distinction between these two aspects (see also Kagan 2005; Rabinowicz and Rønnow-Rasmussen 2005). Korsgaard follows Moore in saying that objects that are valuable due to their intrinsic properties are unconditionally good (Korsgaard 1983). Their goodness does not depend on their relation to other objects or to people; otherwise their value would not be intrinsic to the object. However, according to Korsgaard, some things may be good for their own sake, even if they are not unconditionally good. An example is human happiness understood in a Kantian way. According to Kant, human happiness is good for its own sake; happiness is not an instrumental value but a final value. Nevertheless, according to Kant, happiness is only conditionally good; it is only good insofar as brought about by the good will, i.e. out of respect for the moral law.

Taking into account the distinction that Korsgaard refers to, we propose to classify the values of objects in two independent ways. The first relates to whether values are

bearers of value (otherwise the neutrality thesis seems obviously true). In the text we will refer to objects as bearers of value but we do not want to imply that only objects, and not, for example, states-of-affairs or persons, can be bearers of value.

Table 7.1 Types of value

	Intrinsic value (Non-relational)	Extrinsic value (Relational)
Final value (For its own sake)	Intrinsic final value	Extrinsic final value
Instrumental value (Not for its own sake)	Intrinsic instrumental value	Extrinsic instrumental value

relational or not. Values that are not relational will be called 'intrinsic values' because these values depend only on intrinsic properties. Otherwise, values are called 'extrinsic'. The second way relates to whether the values of objects are values for their own sake or not. Values for their own sake will be referred to as 'final values'; otherwise values will be called 'instrumental values'. Doing so, we end up with the following four possible combinations of values (see Table 7.1).

Whether or not it is possible to make sense of all four combinations of values is an issue that falls largely outside the scope of this paper. With regard to the neutrality thesis N1 and VSD the interesting question now is what notion of value might be at stake in these claims. We will argue that N1 can best be understood in terms of final values, and that technical artifacts may embody (moral) extrinsic final values, which means that N1 does not hold. But rather than getting ahead of our argument, we will first argue why we believe that N1 should not be interpreted as referring to instrumental values. One rather straightforward reason would be to note that many defenders of N1 do not want to deny that technical artifacts have instrumental value. We think that we should, however, dig a bit deeper, for there appears to be a more fundamental reason to assume that N1 is not about instrumental values: instrumental values may well be not values at all.

7.4 Are Instrumental Values Real Values?

Several philosophers have suggested that instrumental value is not a value at all. Some of them seem to assume that it is obvious that instrumental values are not real values (Moore 1903; Ross 1930; Dancy 2005b). Others suggest that the idea of instrumental value being a value is based on a linguistic or terminological confusion. Instrumental value refers not to being a value but rather means something like "being a means to" (Rønnow-Rasmussen 2002). Below we will try to provide an argument why instrumental values are not 'real' values. At the bottom of this argument lies an assumption about a relation between values and reasons to which many modern philosophers seem to ascribe. We start with setting out this relation and then apply it to instrumental values.

Both values and reasons belong to the normative domain; they belong, however, to different parts of the normative domain. Values come in different kinds, such as epistemic value (truth), aesthetic value (beauty), pragmatic value (efficacy/efficiency) or moral value (moral goodness). What these values have in common is that

they are varieties of goodness (von Wright 1963). It is on the basis of values that we evaluate certain objects or state-of-affairs as good or bad and beautiful or ugly. Values, therefore, have their home in the evaluative part of the normative domain. Reasons, however, belong to the deontic part. Reasons relate to what to do, believe or aim for. Reasons are considerations that count in favor of or against doing, believing or aiming for something. Reasons are to be distinguished from 'oughts' or obligations, which also belong to the deontic domain. If one has reason to do something one is usually not obliged to do it (although different authors sometimes use somewhat different terminology here). Often there are both reasons for and reasons against doing something and an 'ought' is then believed to result from the totality of relevant reasons, although the totality of reasons can also be inconclusive or can merely allow to do something without there being an obligation to do it.

There is no agreement in the philosophical literature on how values and reasons are related. One category of theories, often called 'consequentialism', holds that we have reason to do what has or brings about value, that we should increase the amount of value in the world or even should maximize it. Such theories thus believe that values precede reasons: they are what give us reasons. One need, however, not be a consequentialist in the above sense, to maintain that values are metaphysically prior to reasons. Jospeh Raz, for example, holds that values give us reasons to engage with those values in appropriate ways (Raz 1999). What appropriate is may, however, depend on the value and the situation: some values are to be promoted or maximized (as consequentialists hold), other are to be admired, cherished or enjoyed.

Other theories hold that reasons are metaphysically prior to values. Elisabeth Anderson, for example, defends what she calls an expressive theory of rational choice (Anderson 1993). According to her statements like 'x is good' or 'x is valuable' can be reduced to 'it is rational to adopt a certain favorable attitude towards x.'[4] The reasons we have to adopt certain attitudes to things or state-of-affairs ground the value of those state-of-affairs or things. A somewhat different account is offered by Scanlon, who argues that "being good, or valuable, is not a property that itself provides a reason to respond to a thing in a certain way. Rather, to be good or valuable is to have other properties that constitute a reason" (Scanlon 1998: 97).

We will not take a position in the theoretical debate about the relation between reasons and values here. It is, however, worth noting that all positions we briefly mentioned seem to suppose a certain correspondence between values and reasons of the following kind:

(V) If x is valuable (in a certain respect) then one has reasons (of a certain kind) for a positive response (a pro-attitude or a pro-behavior) towards x.

This statement is intended to be neutral with respect to the question whether values ground reasons or reasons ground values or that neither can be reduced to the other. As Dancy (Dancy 2005b) notes, whatever position one takes in this debate something like V seems to be true. The notion of positive response in V is meant to

[4]We might also have a reason for a negative rather than a positive response. This would then be associated with disvalue rather than value.

capture a range of pro-attitudes and pro-behaviors like desiring, promoting, caring for, admiring, enjoying, loving et cetera. As suggested above what positive response is adequate depends on the kind of reasons or values (and the situation).

What makes V interesting for our current purpose is that it may have a certain pragmatic or epistemological relevance for tracking or recognizing values. If we want to know whether a certain x is valuable (bears or embodies a value), we need to check whether there are reasons for a positive response towards x. If such reasons are absent, x has no value. Of course, if there are such reasons then V does not imply that x is valuable. The so-called 'wrong kind of reasons' problem (cf. Schroeder 2009) illustrates that one should be careful not to reverse the implication in V. For example, if I promise someone to give him an object x tomorrow this gives me a reason to protect x now (for example against theft) and protecting expresses a positive response to the object x. This reason, however, is based on my promise and in no way related to the object x itself (apart from it being the object of my promise). It is therefore the wrong kind of reason to track the value of x. Therefore not all reasons for positive responses towards x track or indicate that x is valuable, at least we need to make sure that the reasons relate to x itself and not to something else.

With respect to instrumental value, the crucial question is whether the instrumental value of an object provides reasons for a certain positive response to that object. For example, is the instrumental value of a knife for cutting a reason to use it for cutting?[5] Not as such, but it may be if I desire to cut something; then the instrumental value of the knife may be a reason to use it for cutting. However, as several philosophers have pointed out, the fact that I desire to do something is as such not a reason to do it (Raz 1986; Scanlon 1998; Dancy 2002). This is not to deny that I might have a reason to do what I desire but this reason is not grounded in the desire but in something else; the fact that I have the desire as such does not add anything to my reason. So desiring to cut cannot provide the right reasons for cutting nor for using the knife for cutting. From this it follows that instrumental value cannot be associated, at least not always, with reasons. This may be taken as a strong argument why instrumental value is not a real value. In the appendix we discuss in more detail why the instrumental value of technical artifacts cannot be associated with reasons, or at least not with the right kind of reasons.

7.5 A Reformulation of the Neutrality Thesis in Terms of Extrinsic Final Value

We have identified four possible forms of value (Table 7.1) and we have argued that there are good reasons to doubt that the instrumental forms of values are real values. This leaves us with two forms of values, intrinsic final values and extrinsic final

[5] We take 'using' here to be a positive response. For further discussion, see the Appendix.

values, to which the neutrality thesis might refer. Let us first look at the interpretation of the neutrality thesis in terms of intrinsic final values:

(N2′) Technical artifacts cannot embody moral intrinsic final values.

The problem with N2′ is that it appears hard if not impossible to deny. The idea that a technical artifact has a form of value that remains the same independent of its relation to anything else, in particular of its design context or its context of use is very implausible. A serious problem with regard to N2′ is that it is not clear at all what kind of value could undermine N2′. If no conceivable value can be intrinsic to technology, then N2′ runs the risk of being true by definition. This means that N2′ as our construal of the idea that technology is value-neutral is more or less a truism.

The foregoing is related to a conceptual point about technical artifacts. In a nutshell this point is the following. Roughly, technical artifacts may be characterized as physical objects with a practical function. Typically, the physical object is a human made physical construction. But not any physical construction made by humans is a technical artifact; for that it is necessary that that physical construction is to be used for doing something, that is, that it has a technical function. Neither is a function without a physical construction that realizes that function a technical artifact. Both the physical structure and function are constitutive for being a technical artifact. This means that a technical artifact has a dual nature: it is a hybrid object with physical and functional features (see Kroes and Meijers 2006; Kroes 2010). Now, the physical features are intrinsic features of a technical artifact, but that is not true for its functional features. On the one hand, its functional features are related to its intrinsic physical features, because the physical structure has to realize the function. But, on the other hand, the functional features are related to human intentions or practices of intentional human action. It is only in relation to human intentions that technical artifacts have functions. More in particular we assume in the following that the intentions of designers, and not those of users, are constitutive for an object to be an instance of a particular technical artifact kind (for more details, see Kroes 2012). However, irrespective of whether the intentions of designers or users play this role, being a technical artifact involves intrinsic as well as relational properties.

According to the dual nature account, technical artifacts cannot be conceptualized or characterized fully in terms of their intrinsic physical properties alone. What distinguishes a technical artifact from a mere physical object are some of its relational or extrinsic properties. Such extrinsic properties, however, cannot be the ground for any intrinsic final value of a technical artifact. This means that, in so far a technical artifact has intrinsic final value it must have this value in virtue of its physical properties, that is, in virtue of being a physical object. So N2′ is not so much a statement about technical artifacts as well a statement about physical objects. Since it is generally assumed that physical objects, qua physical objects, have no intrinsic value, N2′ may be true, but it is not a very interesting thesis about technology or technical artifacts because it disregards those (extrinsic) features of physical objects that make them technical artifacts. A similar conclusion may be drawn on the basis of the use plan approach to technical artifacts. According to

Houkes and Vermaas (2010) what makes a physical object into a technical artifact is the fact that it is embedded in a use plan; without a use plan, no technical artifact. This feature of a technical artifact, of being a physical object embedded in a use plan, however, is a relational or extrinsic feature, not an intrinsic one; it relates technical artifacts to human beings. So, again, since any intrinsic final value of a technical artifact will have to be grounded in its intrinsic features, it follows that in so far a technical artifact would have any intrinsic final value, it would have so in virtue of being a physical object.

Let us shift our attention from intrinsic final values to extrinsic final ones. Then we end up with the following version of the neutrality thesis

(N2″) Technical artifacts cannot embody moral extrinsic final values.

A first thing to note is that the notion of extrinsic final value is not uncontroversial. Nevertheless, various philosophers have argued for the existence of extrinsic final values (Korsgaard 1983; Kagan 2005; Rabinowicz and Rønnow-Rasmussen 2005). We will not consider their arguments in detail, but cite two kinds of examples that make their argument plausible. One kind of example concerns cases in which something has final value, or at least more final value, than it would otherwise have because it is rare.[6] A rare stamp has more value than a regular stamp. The last remaining vase from a certain time period has final value not so much because of its intrinsic properties but because it is the only exemplar left. Given that rarity is a relational property rather than an intrinsic property these examples suggest that something like extrinsic final value is possible. Another kind of example concerns objects that have value because they belonged to a particular person, for instance, my mother's wedding ring, which again is a relational rather than an intrinsic property.

These examples can easily be extended to technical artifacts. A rare car from the 1920s may have final value because of its rarity. Similarly, the guillotine which with Louis XVI was killed may have historical final value. These kinds of examples raise, however, another worry. They are not the right kind of examples to reject the neutrality thesis because they do not refer to the specific technical or designed features of the technical artifacts involved. It appears that we somehow must restrict the extrinsic or relational properties on which the final value of a technical artifact may supervene to get an interesting version of N2″. We propose to do so by adopting, and slightly (but significantly) revising, a proposal that Dancy has done to distinguish between what he calls the resultance base and the supervenience base of a value. Dancy introduces this distinction because he wants to allow for the fact that a feature "may have one value in one context and a different or [even] opposite value in another" (Dancy 2005a: 333). At the same time Dancy wants to retain something of Moore's original idea that value supervenes on intrinsic properties. He therefore distinguishes "between those features from which some value results (the good-making features, as we might put it), and other features whose presence or absence would

[6] Keep in mind that according to Moore two similar objects should not just have both intrinsic value but also exactly the same amount of intrinsic value.

have made a difference." The first features or properties form the resultance base: they generate the value. The second type of features are the supervenience base and "can make a difference to the ability of the intrinsic properties to generate the value that they do" (Dancy 2005a: 334).

Dancy appears to equate the resultance base with intrinsic properties. This proposal will not do for our purpose because, as we have seen above, some of the defining properties of technical artifacts are extrinsic in nature. Nevertheless the notion of resultance base can be used if we adapt it to refer to those properties that define the technical artifact, excluding from the resultance base those relational properties that a technical artifact has by virtue of its specific context of use. These specific contextual properties still might be considered part of the supervenience base and they may influence the ability of the properties in the resultance base to actually generate the value they potentially do. In this way, we can allow for the context to make a difference for the value that is actually realized while at the same time we can maintain the claim that a technical artifact has a value that is generated by the technical artifact itself rather than its context of use. The latter value may be a value that a technical artifact has for its own sake, that is, may be a final value. Nevertheless, such a final value will be relational or extrinsic because it is grounded in a resultance base that is partly relational.

Our conception of the resultance base may leave open the possibility of a technical artifact having extrinsic final value in general, but we still have to define the restrictions to be put on the resultance base in order to arrive at an interesting version of N2″. One possibility would be to focus on those properties that are (minimally) necessary to call something a technical artifact. That may be the right choice if one wants to know what values may be embodied by technology in general or by technology as the class of all technical artifacts. Our purpose here is somewhat different: we are interested in whether it is possible to embody specific values in technical artifacts through design (VSD). We will therefore interpret the resultance base of a particular technical artifact as those properties that are designed into that object. If these designed properties can indeed generate value, we have reason to suppose that we can embody value in technical artifacts by design and that VSD is possible. This brings us to the following reformulation of the neutrality thesis:

(N3) The designed properties of technical artifacts cannot form the resultance base of moral extrinsic final values.

Below, we will argue against N3. Before we do so, it is worthwhile to consider what denying N3 would and would not imply. First, the denial of N3 does not entail that all technical artifacts embody extrinsic final value. Rather it implies that technical artifacts can embody such values and that this embodiment can be achieved through design. Second, the denial of N3 does not imply that technical artifacts embodying extrinsic final values will always realize these values in actual practice. According to the adapted version of Dancy's distinction this is dependent on the entire supervenience base that includes the extrinsic properties related to the context of use as well. So, denying N3 implies that the potential to generate certain specific values can be embodied in certain technical artifacts.

7.6 Rebutting the Neutrality Thesis: Some Examples

We will now rebut the neutrality thesis N3 through a number of examples. Before we do so, some clarifications are in order. First, as noted above, N3 and its denial are claims about the resultance base and not about what values are realized in practice. To deal with this, we propose to make the following terminological distinction. We will use the notion *realized value* as the value that is realized by a technical artifact in a practical context; the realized value is dependent on the entire supervenience base as argued above. We will use the notion of *embodied value* as the value that results from the resultance base; an embodied value is not necessarily realized in an actual context. Embodied value may be understood as the potential to realize a value in an appropriate context. We have more to say on the distinction between embodied value and realized value in the final section, but for the moment this basic distinction suffices.

Second, we will take the designed features of a technical artifact to be intentionally designed features (unless stated otherwise). This might seem obvious because design is an intentional activity. However, even if design is intentionally directed at creating technical artifacts with certain features, it does not follow that all the designed properties are necessarily intended properties. Cars, for example, pollute the environment and this may be considered a feature that results from the design of cars, but this feature is not intended, at least not in the common sense notion of intending. We do not want to enter into a philosophical discussion on the notion of intention here, but simply postulate that below we will be focusing on the intentionally designed properties of technical artifacts. Even if there are also unintentionally designed properties, this does not pose a problem for our undertaking. We are looking for examples that rebut N3. Since the intentionally designed properties of a technical artifact are obviously a subset of its designed properties, examples of intentionally designed features are ipso facto examples of designed features and, therefore, they are relevant for rebutting N3.

Third, we will make reference to functional features or functions of technical artifacts. We are aware that various function theories interpret functions in different ways, ranging from intended physical capacities through intended behavior to intended effects and purposes (see Houkes and Vermaas 2010 and Van Eck 2011). For our purposes it will not be necessary to commit ourselves to any particular function theory.[7] Note moreover that functions are usually associated with instrumental values, since they are interpreted in terms of means-ends relations. Below, however, we will associate functions also with final values.

With these clarifications in place, we can now turn to our task of presenting a number of examples that rebut N3. The first category of examples we will provide are examples in which the embodied extrinsic final value of a technical artifact

[7] We do, however, exclude function theories that identify functions with physical capacities, for those theories would make functions intrinsic properties of technical artifacts. Function theories that identify functions with intended capacities are, however, not excluded, since intended capacities are not intrinsic properties.

coincides with, or is hardly distinguishable from, its function. These examples are based on the assumption that it is uncontroversial that the function of a technical artifact results from its designed features. Now, if we can show that in some cases the extrinsic final value of a technical artifact is indistinguishable from its function, we have shown, contrary to N3, that a technical artifact's designed features may form the resultance base for extrinsic final value, which means that a technical artifact can embody such values.

The first example concerns sea dikes. The technical function of a sea dike is to prevent the hinterland from flooding (e.g. Herbich 1999: 3.4). Protecting the hinterland from flooding is instrumental to a moral value like the safety of the inhabitants of the hinterland, which we consider to be a final value. The point is not that sea dikes can be used to achieve safety but that achieving safety is part of their *function*. This is witnessed by the fact that design requirements, and in fact legal norms, and design approaches for dikes are based on the value of safety (Snippen et al. 2005). Dikes are thus *designed for safety*. This is different from, for example, a knife. The function of a knife is cutting; cutting of, for example, bread may be instrumental to a final value like health or survival or human-well-being. However, the attainment of such final values neither is part of the function of knifes nor have normal knifes been designed to achieve such final values. Whereas in the case of the knife, the function of the artifact and the final values that can be achieved by realizing the function are clearly separated this is not the case in the sea dike example. The instrumental function of sea dikes (protection from flooding) can hardly be distinguished from the final value for which they are designed (safety with regard to flooding). After all, the technical function of a dike may be described as providing safety with regard to flooding. If such expressions make sense, then it follows immediately that technical artifacts, as objects with a function, may embody extrinsic final values, since functions are extrinsic features of technical artifacts.

A second example is the speed bump. The function of speed bumps is to slow down cars in, for example, living areas and this is conducive to traffic safety, which again we assume to be a final value.[8] Similar to the dike case, being conducive to traffic safety is not just an instrumental feature that speed bumps happen to have but it is a purposively designed feature, it is what speed bumps are designed and used for. Moreover, like the sea dike example, the function of the speed bump (slowing down cars) is hard to distinguish from the final value to which it is instrumental (traffic safety). So, also speed bumps may be said to embody an extrinsic final value, namely that of traffic safety. That they indeed embody this value is also confirmed by the fact that we appear to have certain reasons to positively respond to speed bumps given the fact that they are designed for traffic safety. Suppose that someone feels inclined to speed over speed bumps because he likes a bumpy ride or he likes the kick of dangerous driving. Such a person does not seem to respond properly to speed bumps because they are designed (intended) to let people slow down and to

[8] See e.g. http://www.portlandonline.com/Transportation/index.cfm?a=83939&c=38764#function. Accessed December, 14 2009.

increase traffic safety. In other words, speeds bumps give us reasons to slow down not just because it is inconvenient to drive fast over a speed bump but primarily because they have the function of traffic safety.

Someone might object that we have a reason to slow down in living areas anyway, whether there are speed bumps or not. This is true, but our point is that the speed bump and its intimate connection to traffic safety give an *additional* reason to *respond* to the speed bump in a specific way, i.e. by slowing down. This response is the expression of a pro-attitude because it respects the function/value of the speed bump and it therefore fits thesis V. Another objection might be that whether this is indeed the proper response will also depend on the use context. Suppose that a speed bump is part of a racing track to add an element of skillful driving to a racing competition. In that case, slowing down does not seem the proper response, but it is rather something like skillfully driving as fast as possible over the speed bump. We agree that in those circumstances, the value of, and the proper response to the speed bump are different from the normal circumstances. This difference, however, can be understood in terms of the difference between resultance base versus supervenience base introduced earlier. The claim is, then, that the value of traffic safety results from the resultance base, i.e. the designed features, of the speed bump while the supervenience base, that determines whether this value is indeed realized in practice, also depends on the context of use.[9]

What is crucial to these examples is that the final values involved are part of the function of a technical artifact. It does make sense to say that the function of dikes is the safety of the hinterland and of the people living there or that the function of speeds bumps is traffic safety. There are, however, also cases in which the function of an artifact may be instrumental to a final value but in which the final value is itself not part of the function. Take for example a hygrometer. The function of a hygrometer is to measure humidity. Measurements of humidity can be used, for example, to protect valuable paintings in museums. Protecting valuable painting is a final value (we suppose). It would, however, not make sense to claim that the function of a hygrometer is to protect valuable paintings. (Maybe the function of 'museum hygrometers', if such technical artifacts would exist, may be said to protect valuable paintings). Moreover, the use of a hygrometer for another purpose than protecting paintings seems in general not improper while using speed bumps for reckless driving seems an improper response in normal circumstances.[10] So unlike sea dikes and speed bumps, hygrometers do not embody final values.

[9] In the final section, we will discuss in more detail how one can determine whether a certain value indeed results from the resultance base even if it is not always realized in practice.

[10] It might be inappropriate not to use a hygrometer for protecting valuable paintings in certain circumstances, but in such cases it is an inappropriate response to the value of paintings rather than to the value of the hygrometer.

7.7 Side-Effects

We now turn to a second category of examples. In these examples the final value is not part of an artifact's function, but it nevertheless results from its designed features. A first example in this category are the low overpasses at the Long Island parkways designed by city builder Robert Moses, as discussed by Langdon Winner (1980). According to Winner, Moses intentionally designed these overpasses extraordinary low for racist motives. The low overpasses would make it impossible to reach the beaches by public transport because buses could not pass below them. So, only people who could afford a car – and in Moses' days these were generally not Afro-American people – could easily access the beaches.

Winner's interpretation of this case is contested (e.g. Joerges 1999). It has been questioned whether Moses really made the bridges low for racist motives or that he maybe did so on the basis of other considerations. It is also not clear whether it was really impossible to reach the beaches by public transport as a result of the low overpasses. For the sake of the argument, we will nevertheless accept Winner's version of the story; after all it seems conceivable that some city builder designs low overpasses for the reason and to the effect that Winner ascribes to Robert Moses.

Now, the question is whether it makes sense to say that the low overpasses at Long Island embody the value, or rather disvalue, of racism.[11] Obviously, it is not the technical function of the low overpasses to prevent Afro-Americans to reach the beaches, or even to make impossible public transport over the Long Island parkways. These are rather side-effects.[12] In general the occurrence of side-effects seems not enough to ascribe the associated value or disvalue, in this case racism, to the technological artifact that causes the side-effects. One reason why such ascriptions seem dubious is that the side-effects may arise from the specific way an artifact is used or from its employment in an unusual context. This case is, however, not just an example of side effects but it is an example of intended side-effects (on Winner's reading at least).

We believe that it makes sense to say that the overpasses embody the disvalue of racism. One reason to think so is that the overpasses are intentionally *designed for* racism. This intentional history gives the overpasses a certain meaning or symbolic value, which corresponds with reasons to disapprove of them. Similarly, the fact that the gas chambers in German concentration camps during the Second World War were designed to contribute to the extinction of the Jews gives us reason to abhor those gas chambers. It might be objected that our disapproval in such cases concerns the intentions of the designers rather than the technical artifact itself. Surely, we also have reasons to disapprove the intentions of the designers,

[11] The reason why we analyze this case in terms of disvalue and not of value is that V is formulated in terms of pro-attitudes and racism does not correspond with pro-attitudes but rather with contra-attitudes (at least for most people we hope) which may be associated with disvalue (or negative value).

[12] The function of an overpass is something like the crossing of one road over another. Making overpasses extraordinary low does not change this (basic) function.

but we also believe that there might be independent and additional reasons to disapprove the technical artifact itself, at least in those cases that the artifact has the potential to realize the intended disvalue as a result of its designed properties. If the overpasses in Winner's example lacked the capacity to prevent buses (and so Afro-Americans) to go to the beach or if the German gas chambers lacked the capacity to kill Jews, we might still disapprove the intentions of the designers but not the artifact itself. The importance of this condition is even clearer in cases of a positive value. We may admire or cherish pace makers because they are designed to save human lives, but we would not have any reason for such pro-attitudes if they had been poorly designed, so that they were likely to kill rather than to save people. (Nevertheless, we might still admire the intentions of the designers, even if we disapprove of their technical skills).

It is not difficult to find other examples that fit in this second category. Such examples include, for example, a safe chemical plant, a sustainable light bulb or a gender equitable computer game. If we call a chemical plant safe we do not merely mean that it is used in a safe way but rather that it is – if properly used – safe, for example in the sense of making accidents unlikely. We thus mean that the plant is designed for safety (although it will also be designed for other goals and values) and that it is actually likely to be safe in practice. Similarly a sustainable light bulb is not one that is used in a sustainable way, but rather one that – if used properly – does not consume a lot of energy and that has been intentionally designed for this feature. A gender equal computer game is a computer game that is intended to be interesting for and to meet the interests of boys and girls, men and women, and has designed features that make it possible to realize this. In these examples, safety, sustainability and gender equity are values that the artifact embodies on the basis of certain designed features, even if they do not refer to the function of the artifact. Safety is not the function of a safe chemical plant, nor is its function – producing certain chemical substances – conducive to safety. Similarly, it would be strange to say that the function of the computer game is gender equity. Nevertheless it may well be the case that the game is so designed that its designed features are conducive to gender equity. Examples like these show that it is possible to design for a (positive) extrinsic final value in other ways than incorporating this value in the artifact's function. This may also be achieved by designing a technical artifact for a value and by seeing to it that it has the appropriate designed features to realize this value.

7.8 The Importance of Design

The concluding observation of the previous section suggests the following general claim:[13]

[13] Our analysis shows that the following conditions are sufficient for embodying extrinsic final value; whether they are necessary conditions remains to be seen.

The designed properties of a technical artifact x form the resultance base of an extrinsic final value G if the following two conditions are met:

1. *The designed properties of x have the potential to achieve or contribute to G (under appropriate circumstances)*
2. *x has been designed for G*

We discussed both conditions for the class of examples in which the embodied value of an artifact does not coincide with its function. It is easy to see that the conditions also apply if G is part of the function of a technical artifact. On the dual nature account of technical artifacts, for F to be the function of a technical artifact x, it is minimally required that (1) F was intended by the designers to be the function of x, i.e. that the designers purposively designed x for F and (2) x has the capacity to realize F in the appropriate circumstances. These conditions entail the above mentioned conditions if G is part of, or identical to, F. Somewhat analogous to the dual nature account, the embodiment of extrinsic final values in technical artifacts thus depends on both an intentional condition ('x has been designed for G') and on a condition that primarily refers to physical properties ('The designed properties of x have the potential to achieve or contribute to G (under the appropriate conditions)').[14]

The phrase 'x has been designed for G' can mean a number of things here. Minimally it means that efforts have been made to design x so that it has the capacity to be conducive to G in the appropriate circumstances. In addition, it can also mean that x is optimized for G, or that efforts have been made in the design process to prevent uses of x that would destroy (or otherwise express a negative attitude towards) G, or it can mean that efforts have been made to make x fit for the circumstances in which it is (usually) appropriate to express a pro-attitude towards G. It should be noted that 'x has been designed for G' does not necessarily mean that x has been designed according to the approach of Value Sensitive Design (VSD) as this approach has recently been advocated by a number of authors. In our opinion, design for values is much older than the recent attention for VSD suggests. It is what many designers have been doing all the time. Design for values is thus probably as old as designing itself (although the emphasis on designing for moral values may be a recent phenomenon).

Back to our central issue: Is the above result a rebuttal of N3? Only in so far as it can be shown that indeed artifacts can be designed such that they fulfill the above two conditions. In the previous section we have discussed a variety of examples satisfying both conditions and it is not difficult to provide many other ones. In the light of our original question, whether VSD is possible, the second condition ('x has been designed for G') may seem a bit paradoxical or even question-begging because it sounds like VSD is possible just by trying. This is, however, not true because the first condition requires that not just an attempt is made but that the designed

[14] "Primarily" because the formulation leaves open that some of the designed properties are textual or symbolic. We take it, however, as characteristic for technical artifacts that their designed properties are by and large physical properties and that their symbolic/textual features are somehow related to the physical properties that are conducive to realizing their technical function.

properties have the potential to achieve or contribute to G (under appropriate circumstances). In the next section, we will say a bit more how this potential may be assessed in practical cases and how the phrase 'appropriate circumstances' may be understood. For the moment, we note that one might not just want to require that x is conducive to G under appropriate circumstances but that it is so because x has been designed for G, i.e. that 'x has been designed for G' is part of the explanation why 'the designed properties of x are conducive to a final value G.' Our final proposal therefore reads[15]:

The designed properties of a technical artifact x form the resultance base of an extrinsic final value G, so that x embodies G, if the designed properties of x have the potential to achieve or contribute to G (under appropriate circumstances) due to the fact that x has been designed for G.

7.9 Realized Versus Embodied Value

We have argued that it is possible to embody a specific kind of value, namely extrinsic final value, in technical artifacts through design. We want to stress, however, that an embodied value is not necessarily realized in practice. To see why, we have to recall the distinction between resultance base and supervenience base. Figure 7.1 clarifies the relation between what may be called *intended value* (the value which designers aim to embody in their design and which they hope to be realized in practice), *embodied value* and *realized value*. As this diagram suggests, use and the context of use are crucial for whether embodied value is indeed realized in practice.

Figure 7.1 raises the question whether we can somehow verify what value is embodied in a designed artifact. Is there any way of telling what value G, if any, is embodied in a designed technical artifact x? We can, at least to some extent, observe and experience values that are realized in user practices, but can we observe or experience embodied value? *Prima facie* the answer appears to be negative because embodied value is more like a capacity (a potential value), the actual realization of which depends on a broader supervenience base, including the context of use.

It may, however, be possible to infer the embodied value of a technical artifact from its realized value in various use contexts. In addition to such inferences, it might be possible to make embodied value more directly traceable by specifying it in a specific way, namely as that value that is realized if an artifact is properly used. The underlying idea is that designers often not just design an artifact but in doing so also design, or at least presuppose, a proper way to use the artifact. Proper use may,

[15] Our final proposal comes close to a suggestion made (but not further elaborated) by Franssen (2009: 947–948): "technical artefacts can be called bad in a moral sense if its functional requirements, the characteristics that in a sense define it, explicitly refer to specifically morally bad states of affairs as goals states to be realized by using the artifact, such that it will be optimized, through the accepted methods of engineering design, to realize precisely these outcomes."

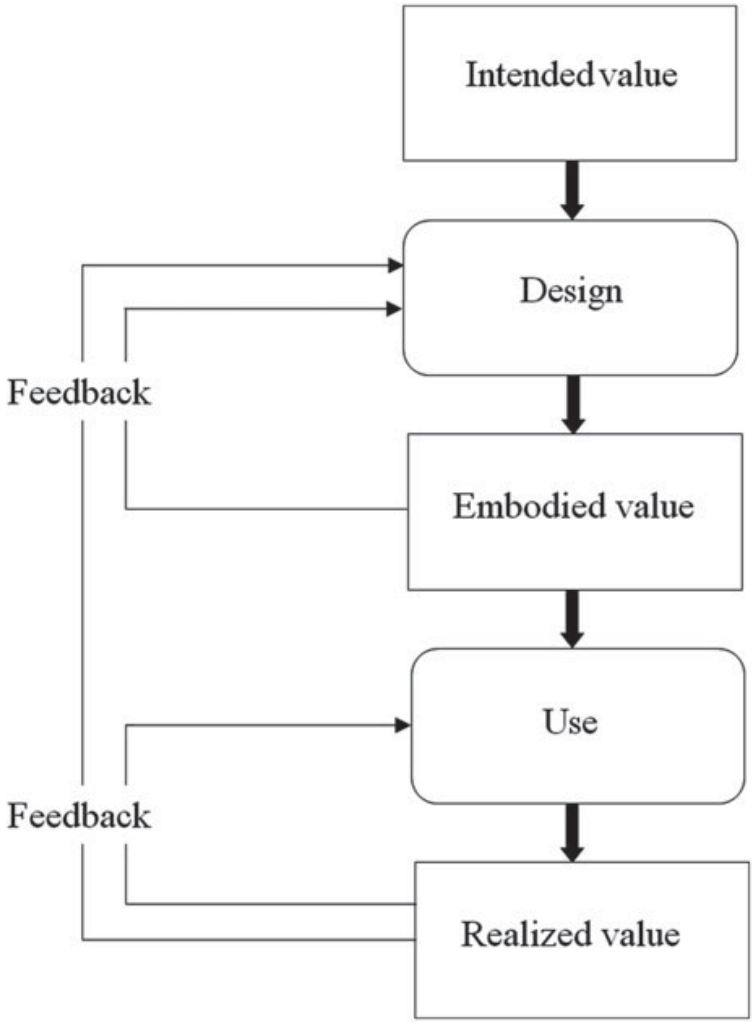

Fig. 7.1 The relation between intended, embodied and realized value

for example, be defined by what Houkes and Vermaas call the use plan of a technical artifact (Houkes and Vermaas 2004, 2010). According to them, the design of technical artifacts is always also the design of a use plan.

The advantage of defining embodied value as the value that is realized if an artifact is properly used is that embodied value becomes more directly traceable and that engineers are better able to verify whether their designs embody the intended values. Two remarks are, however, to be kept in mind. First, proper use may underdetermine what value is realized. It is very well conceivable that proper use in different use contexts leads to the realization of (somewhat) different values. In other words, the supervenience base that determines what value is realized may be broader than the designed features and the features defined by proper use together. So the notion of proper use is not an error-free method for ascertaining the embodied value of a technical artifact, although it may be helpful. Second, the ultimate aim of approaches like VSD is to contribute to the realization of values in actual practices. From the view point of VSD, embodying values in artifacts, in the sense we have defined the term here, is only a first step. It is, for example, conceivable that designers are successful

in embodying a value in a technical artifact by articulating a rather eccentric or unrealistic form of proper use for that artifact. In such cases their 'success' seems hardly relevant for the ultimate goal of VSD, i.e. realizing values in practice.

This brings us to a final point. In our opinion it is part of the responsibility of designers to try to anticipate the circumstances and ways in which artifacts will be used and to try to anticipate how this will affect the realization of values. This is not to say that designers should always accept current user practices. They may sometimes have good reasons to ask users to 'properly use' an artifact in a way that deviates from what they are used to. In other cases, however, it might be that the designers have to adapt their notion of 'proper use' to actual practices or to what can be realistically expected from users. We also do not want to suggest that designers can precisely predict or control how artifacts will be used and what values will be realized in practice (cf. Albrechtslund 2007). We nevertheless think that fruitful design for values requires that designers try to anticipate actual use and the actual realization of values. Moreover, they ought to monitor whether values are realized in practice and feed such insights back into the design process.

In summary, the central outcome of our analysis is that the neutrality thesis does not hold and that it is possible for technical artifacts to embody values. However, the values that may be embodied in technical artifacts are of a specific kind, namely extrinsic final values. Values may be designed into technical artifacts and therefore VSD is possible. We have also briefly argued that the main difficulty that VSD faces is not embodying values in technical artifacts through design, but that the real challenge for VSD lies in realizing such embodied values in actual use practices.

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Appendix: The Instrumental Value of Technical Artifacts

Phrases like 'x is a good knife' refer to goodness of x as an instance of a kind, in this case goodness as a knife. Usually this goodness is understood as a kind of instrumental goodness. The underlying idea is that kinds of technical artifacts can be associated with certain purposes or certain functions for which they have been designed. So if we say that 'x is a good knife' that can be analyzed as saying that 'x is a knife' and that, assuming that the function of knives is cutting, 'x is good for cutting.' The latter statement refers to instrumental value. Now if we want to know whether this instrumental value is really a value at all, we can employ thesis V (see main text): if instrumental value is real value it should correspond with reasons for a positive attitude towards the instrumentally valuable object and these reasons should originate from the same resultance base as the instrumental value itself. But does it? In answering this question we start with the account Maarten Franssen has developed to characterize the normativity of

evaluative statements such as 'this is a good knife', i.e., evaluative statements about the goodness of technical artifacts as instruments. He proposes the following characterization of such evaluative statements:

(1) 'x is a good K' expresses the normative fact that x has certain features f that make x a K and that make it the case that a person p's wish to K recommends that p uses x for K-ing. (Franssen 2009: 933)

Here K refers to a certain type of technical artifact (like a knife), and x refers to a token of this artifact type; K-ing is the use or performance of the function of a K (cutting in the case of knifes). f is what we have called in the main text the resultance base for the instrumental value and the reasons or recommendations are associated with this value. The term recommendation refers to what Broome (1999) has called a normative recommendation: 'x recommends y for p' means that 'p has reason to see to it that (if x is the case then y is the case)'.

Franssen also addresses the question whether the instrumental value of x is really a value. His suggestion is that while the instrumental value of x may give us reasons to use x, using is really not the expression of a pro-attitude. Since to have value corresponds with reasons for a positive response (a pro-attitude or a pro-behavior) as expressed in V, it follows that x does not have value because it gives reason for using, since using is not a positive response according to Franssen.

The argument that using is not a positive response, however, appears not very convincing. After all using an artifact costs efforts and doing so therefore may be taken to imply somehow a positive response. Moreover 'x is a good K' seems not only to recommend that 'p uses x for K-ing if p wishes to K', but also that 'p keeps (instead of throwing away), maintains or even buys x for K-ing if p wishes to K' because all these activities enable or ensure that p can use p for K-ing. Keeping, maintaining and buying seem all pro-behaviors expressing a positive attitude. However, even if using is considered to be a pro-attitude, there may be another way to understand why the instrumental value of an artifact is not a value at all, namely that it does not correspond with reasons, or at least not with reasons of the right kind (i.e. reasons originating from the artifact itself).

The normative recommendation that is expressed in (1) is equivalent to a reason 'to see to it that (if p wishes to K, then p uses x for K-ing)'. This reason, however, is not grounded in the (instrumental) value of x, but rather in the rationality requirement or recommendation that if one wishes something one should (or is recommended to) adopt appropriate means to achieve it. In as far as (1) expresses certain reasons these reasons are grounded in (the value of) rationality, rather than in the specific value of x. Another way of seeing this is to recognize that if p has no reason for wishing to K, p also has no reason to use x for K-ing. The mere fact that 'p wishes to K' cannot give p any reason to K (at least according to such authors as Raz 1986; Scanlon 1998; Dancy 2002). So, in as far as (1) gives reasons to use x it are the wrong kind of reasons for V because it are reasons not grounded in the valuable object (they have another resultance base than f) and hence the value of the object cannot be associated with those reasons. Therefore the instrumental value that is expressed in (1) does not give a reason for a positive response to x.

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