42 Risk and Soft Impacts

Tsjalling Swierstra[1] · *Hedwig te Molder*[2]
[1]University of Maastricht, Maastricht, The Netherlands
[2]University of Twente/Wageningen University, Enschede/Wageningen,
The Netherlands

Abstract: Policy and technology actors seem to focus "naturally" on risk rather than on technology's social and ethical impacts that typically constitute an important focus of concern for philosophers of technology, as well as for the broader public. There is nothing natural about this bias. It is the result of the way discourses on technology and policy are structured in technological, liberal, pluralistic societies. Risks qualify as "hard" (i.e., objective, rational, neutral, factual), other impacts as "soft" (i.e., subjective, emotional, partisan, value-laden) and are therefore dismissable. To help redress this bias, it is necessary to understand how this distinction between hard and soft impacts is construed – in practice and in theory. How are expected (desired, feared) impacts of technology played out in expert-citizen/consumer interactions? We first discuss online patient deliberations on a future pill for celiac disease ("gluten intolerance") promising to replace patients' lifelong diet. By "rejecting" this pill, patients displayed concerns about how the new technology would affect their identity, and the values incorporated in the way they had learned to handle their disease. Secondly, we analyze how experts construct a consumers' concern with "naturalness" of food: as a private – and invalid – preference that requires no further debate. The point of the analysis is to make available for discussion and reflection currently dominant ways to demarcate public and private issues in relation to emerging technologies, including the accompanying distributions of tasks and responsibilities over experts and laypersons. However, the actors themselves cannot simply alter these demarcations and distributions at will. Their manoeuvring room is co-shaped by discursive structures at work in modern, technological, pluralist, liberal societies. In the third section, we therefore identify these structures, as they provide the hegemonic answers to the three key questions with regard to the possible impacts of emerging technologies: how are impacts *evaluated*; how are they *estimated*; and how are they *caused*? We conclude with some suggestions for further research.

Introduction

"Risks" typically concern harms to values like health, environment, and safety. But the larger public sometimes is interested in another type of consequences of existing or emerging technologies as well, positive or negative consequences that we refer to as "soft impacts." Until now, these soft impacts receive relatively little attention in Risk Studies, and go largely ignored by policy makers and technologists. In this chapter we show how concerns with soft impacts often get overlooked. And if they are acknowledged, they typically get subtly removed from the agenda. We offer some explanations for this exclusion of soft impacts (Swierstra et al. 2009; Boenink et al. 2010), and conclude with some suggestions for further research.

History

For a long time scientific and technological progress seemed to equal societal progress. From the 1950s onward, however, the conclusion became inescapable for policy makers and technology actors that technological innovations can and often do have unintended, unforeseen, and/or undesirable impacts. Risk assessment was invented to warn society in advance for such impacts, and thus help to avert them by taking social and/or technical precautions.

It is interesting to observe that the growing awareness of technology's unintended and unwanted impacts during the previous decades was hardly informed by the philosophy of technology. Classic philosophers of technology, e.g., Martin Heidegger and Jacques Ellul, had already devoted ample attention to technology's darker side at the time when "technological risk" became prominent on society's agenda. But they tended to focus less on safety, health, or environmental issues, concentrating instead on the consequences of new and emerging technologies for

- Established meanings, world and life views (cultural)
- Existing values, norms, and conceptions of the good life (moral)
- The (global) distribution of power and control (political)

Some complained about technology because it eroded tradition, replacing it by uniformity and conformism. They feared dehumanization, depersonalization, spiritual shallowness, desensitizing, and mind-numbing as a result of automation, and in the end, the substitution of humans by machines. Others stressed technology's moral consequences: technology would lead to the devaluation of life's fundamental values, cause moral corruption, and result in eternal unhappiness or shallowness, through the creation of artificial needs. A specific variety of the moral corruption thesis is couched in religious terms: technology was accused of creating false gods and of giving the false illusion that man is no longer dependent on God, thus leading man to commit the sin of hubris. Again others warned that technology would help create new tyrannies, that would be all the more secure because of psychological manipulation. These tyrannies would undermine our privacy through observation techniques and data banking, or their anonymous systemic logic would marginalize democratic deliberation.

Of course, these doom prophets invited all kinds of reassuring rebuttals by other philosophers, who argued that this ink-black pessimism was ungrounded. In fact technology had exactly the opposite impacts: enriching culture, strengthening morality and religion, and enhancing democracy (For an overview, see Van der Pot 1985).

Thus far, policy makers and technologists by and large ignore these discussions. In the past that could be justified by the fact that according to many philosophers technology was inseparable from its unwanted consequences. Because of this technophobic bias, their work held little promise for policy makers and technologists who were faced with the practical task to make technology safer, but were not prepared to throw out technology altogether. But this situation has changed drastically since. Most modern philosophers of technology are no longer in the business of dismissing Technology (with a capital T). Since the "empirical turn" (Achterhuis 2001) they tend to study the impacts of specific technologies in specific contexts, without a priori leaning toward pessimism of optimism.

Current Research

Like their predecessors, modern philosophers of technology still tend to focus on a *different* type of impacts than is common in risk studies. In this chapter, we will argue that it is important to broaden the assessment of technology's impacts from risk to the kind of "soft impacts" that are typically in the center of attention of philosophers of technology. We offer two reasons for this broadening of the agenda. The first one is that many laypersons worry about these soft impacts, and therefore democracy requires that at least they are being assessed

and discussed openly. The second reason is that Technology Assessment aims at better technology. To realize this aim, it is important to take a wide array of possible impacts into account, not only risk.

However, getting soft impacts on the agenda of policy makers and technologists is not a simple matter. Broader cultural, moral, and political aspects are regularly voiced in public discussions, but seem to have difficulty gaining access to the agendas of policy and technology actors. These parties "naturally" seem to focus on risk rather than on technology's social and ethical impacts. Or rather, their focus is on risk assessment and everything else is dubbed an "ethical issue." This framing then makes the prevalent "non-risk" issues ready to be recognized as legitimate but solely private concerns (Wynne 2001; Swierstra 2002), which are out of place on the public agenda.

We will argue that there is nothing natural about this bias. It is the result of the way discourses on technology and policy are structured in technological, liberal, pluralistic societies. Impacts of (emerging) technologies that qualify as "hard" (i.e., objective, rational, neutral, factual) attract much more attention than impacts that can be dismissed as "soft" (that is, subjective, emotional, partisan, value-laden). And risks qualify as "hard," social and ethical impacts as "soft." While the relation between soft impacts and the evolution of public controversy is not linear and direct, experience and research (see for example Marris 2001) have shown that the dismissal of latent concerns about soft impacts (soft concerns) may easily engender unexpected – at least for technologist designers – outbursts of public discontent later in time. By then, repeated experiences and cumulated irritations have replaced the early, largely invisible and not necessarily *negative* concerns. Technologists may feel nothing but annoyance about the public's irrational moves – no longer being able to recognize that, for instance, religious critiques ("playing God") might also pose questions about the limits of science (Wynne 2001). The paradigm case here is the Monsanto debacle of the mid-1990s. A lot of public concerns seemed to regard the *hard* impacts of modified crops – environmental risks and health concerns – but these concerns often sprang up from other concerns about *soft* impacts, e.g., that genetic modification exemplified technological hubris, or that it increased the power of big corporations over small farmers (Marris 2001).

To help redress this bias, we need to analyze how this distinction between hard and soft impacts is construed – in practice and in theory. As we are aware of, our concern with the impact of "other than risk issues" on public dialogue is not entirely new. Other studies, mainly in the area of science and technology studies (e.g., Jasanoff 2003; Hobson-West 2007; Wynne 1996, 2001), have pointed to the importance of seeking to evaluate technology's aims rather than its mere consequences in terms of risk (Jasanoff 2003, p. 224), and "the uncritical framing of contemporary controversies as primarily about risk, or even about different understanding of risk" (Hobson-West 2007, p. 211). Brian Wynne's work (e.g., 1996, 2001, 2006) perhaps most prominently refers to the significance of addressing wider social and political questions in public debate on emerging technologies.

While these authors do recognize the importance and dismissal of other than risk issues, little is known about how these demarcations between hard and soft impacts of technology are performed in real-life situations, for what purposes (consciously or not), and with what consequences. Furthermore, the question remains what these impacts, and the difference between them, actually consist of. (How) can they be characterized, and what makes them susceptible for more or less devoted attention? In this chapter, we will make a start with both questions.

First, we will analyze in close detail how expected (desired, feared) impacts of technology are played out in expert-citizen/consumer interactions. We first discuss an illustrative example of how soft impacts surface in online patient deliberations on an emerging technology, namely, a future pill for celiac disease ("gluten intolerance") patients that was promised to replace their lifelong gluten-free diet. We show how these patients, by "rejecting" the proposed technology, displayed concerns about how the new technology would affect their identity, and the values incorporated in the way they had learned to handle their disease. Their rejection was targeted not so much at the pill itself but at the experts' construction of their current life as highly problematic and the pill as a perfect solution for that problem. The example illustrates the indirect way in which soft concerns often manifest themselves.

In our second example, we study closely how subtly – respectfully – these soft concerns often get dismissed. To illustrate this point, we look at an example of expert interaction in which a consumers' concern with the "naturalness" of food is both constructed as a private issue and discounted as nonvalid. We are claiming neither that the expert is wrong nor that the consumer or patient is right. The point of the analysis is to make available for discussion and reflection currently dominant ways to demarcate public and private issues in relation to emerging technologies, including the accompanying distributions of tasks and responsibilities over experts and laypersons.

However, it would be naïve to assume that the actors themselves could simply alter these demarcations and distributions at will. Their manoeuvring room is co-shaped by discursive structures at work in modern, technological, pluralist, and liberal societies. In the third section we therefore will identify these structures, as they provide the hegemonic answers to the three key questions with regard to the possible impacts of emerging technologies: how are impacts *evaluated*; how are they *estimated*; and how are they *caused*? Together these answers help construct some positions as being rational, public, neutral, and serious, and others as being irrational, private, partisan, and not to be respected. We conclude by pointing out why, if one aims for an open and comprehensive public dialogue about science and technology, it is crucial to modify these discursive structures.

It Is Not All About Health: How Soft Concerns Tend to Get Overlooked

The point of medical technology is to help increase (or defend) our health. Therefore, it seems a pretty straightforward matter that discussions about emerging medical technologies would concentrate on these would impact our health. In reality, however, matters are not so simple. We will illustrate this by drawing on examples from a broader study of celiac patients' accounts regarding a future pill (te Molder et al. submitted; Veen et al. 2010).

In our analysis, we applied a discursive psychological approach that starts from the assumption that talk is oriented to *action* rather than merely *reflecting* reality. So instead of determining the truth-value of what people report – by looking at what a person really wants, thinks, or feels, or what the world really looks like – the focus is on what people's utterances *do* in the interaction, such as accusing, complaining, and complimenting (Edwards 1997; Potter 1996; te Molder and Potter 2005). People use the turn-by-turn development of a conversation as a resource to make sense of each other's talk. They may treat displays of anger as a request to

leave the room, claimed losses of memory as reluctance to answer a question, or deal with a description of their behavior as implicating blame. These continuously updated understandings of what is being said and done constitute an important "proof procedure" for the analyst, that is, he or she can use these displays to provide support for the analysis. Whether something is blame or compliment is not decided upon by the analyst in the first place but analyzed as a *participants' concern.*

People also talk rhetorically, in that they routinely resist or deny actual or potential alternative versions of what is being said. Inspecting stretches of discourse for these alternative versions helps the analyst to make sense of the actions performed. Presenting yourself as a woman resists "being a man," and that may provide cues for the action at stake, for example, in the context of alleged or claimed transsexualism. It is the combination of a sequential and a rhetorical analysis which forms the basis of a discursive psychological approach (te Molder 2008).

The discussion on the gluten pill is part of an online forum for celiac disease patients (www. celiac.com). Celiac disease is a genetic disorder that causes an autoimmune reaction to the wheat protein gluten, which results in serious damage to the small intestine. At the moment, a lifelong diet is the only remedy. This requires not only discipline but is also difficult to implement as gluten is found in many daily foods.

Now let us have a look at extract 1, in which a (self-reported) scientific expert introduces the pill. The focus is on what the expert's question is *doing* – in terms of discursive action – by looking at how the participants at the online discussion forum *treat* his or her contribution:

Extract 1

1	*Researcher (Sept 6 2004, 09:38 AM)*
2	*Newbie*
3	
4	I am doing some research on developing potential new therapies for celiac
5	disease and am wondering, how much would you be willing to pay each day if
6	you could take a pill that would let you eat a normal diet? How much would
7	you pay per year?
8	((9 lines omitted))
9	
10	*Sammy (Sept 9 2004, 08:04 PM)*
11	*Member*
12	
13	I wouldn't give one red cent for a pill. I have taken pills all of my life
14	because of this disease. I would just keep on with the diet as is. I feel
15	better than ever and have more energy than most 60 year olds should have.
16	Pills? Thanks any way. Sammy

The topic is initiated by a researcher, obviously not a celiac patient and in this respect an outsider on the forum. Notice how by requiring into the amount of money that patients would be willing to pay each day (lines 5–7), the issue of need or desire to have this pill is already answered for. Second, the pill is presented as an *easy solution* to the disease in comparison to the current treatment ("a pill that would let you eat a normal diet," line 6).

Sammy's contribution challenges the validity of both presuppositions. By saying that she "wouldn't give one red cent for a pill" (line 13), she explicitly brings down the assumption that celiac patients would take the pill anyway. She grounds her rejection in her elaborate experience with pills (lines 13–14). If you have used pills all your life, and the disease has ultimately been treated effectively by a diet, it makes no sense to go back on a pill and give up the diet and its payoff ("better than ever" and "more energy than...," line 15). Sammy's reply thereby questions the assumption in the researcher's post that the pill will radically change her life for the better.

Interestingly, the question including the presupposition that celiac patients will take and need a pill no matter what, evoked much stronger reactions than the careful suggestion that a pill might be developed:

Extract 2 If they came out with an anti-gluten pill thingy (IV, 1–2; 4; 6–7)

132	If they found a pill that would neutralize the effects of gluten on your body (sort of like the pill people		
133	take who are lactose intolerant), would you use it?		
134			
135	Yes, definitely – all the time	[18]	[43.90%]
136	Sometimes, but only when I am eating out	[12]	[29.27%]
137	Sometimes, maybe once or twice a week	[4]	[9.76%]
138	No, I'd be afraid that it wouldn't work	[4]	[9.76%]
139	No, I don't think I could ever look at wheat the same way	[3]	[7.32%]
140	Total Votes: 41		
141			
142			
143	*Ronald (Apr 9 2004, 12:35 PM)*		
144	*Advanced Member*		
145			
146	It could happen, eventually.....		

This then shows that it is not the pill *itself* which is disputable, but the assumption that patients will use it *as a matter of course*. It is at this point that we become aware of the presence of concerns that do not regard health or safety ("risk") issues. Sammy, for example, rejects being characterized as a passive patient. She presents herself as a healthy individual who is able to maintain her vitality in the face of adverse circumstances. By resisting the notion that they would straightforwardly accept the pill patients construct themselves as proactive, thoughtful people with a healthy way of life. Presenting new possibilities as cure-alls makes the gluten-free diet appear as a hardship, and undermines the complexity of the patients' relation to their disease, including the positive values embedded in that relation. This example shows that an apparent straightforward rejection of a new medical technology is drawn upon by patients not so much to show concern about the pill's impact on their health, but about how the presentation of this innovation impacts their identity and sense of achievement (see also Veen et al. 2010; te Molder et al. submitted).

So, "less tangible" concerns often *emerge from* rather than stand out in discussions about new technologies. We find these, in this case, identity- and lifestyle-related concerns (who am

I – a patient, a victim, a naïve believer in cure, a healthy person?) only by looking at the ways in which patients *treat* the expert's contribution, and not so much by focusing on the content of what they say (e.g., I do not want the pill). This shows that these concerns are often only available indirectly for the analyst or debate facilitator. Moreover, participants themselves often do not have direct access to such interactional concerns. More precisely, we should say that this type of concerns regarding emerging technologies typically seem to arise as interactional goals – consciously or not – of what people say, rather than that they can be found directly in the content of the arguments that are put forward.

Now we turn our attention to an example that illustrates how experts operate to allow some concerns about technology's possible impacts access to the public agenda, while denying a similar access to other concerns. Again, this is typically done in a way that is far from straightforward.

How Soft Impacts Tend to Disappear from the Public Agenda: The Case of "Naturalness"

The next fragment is part of a larger study of expert talk on future foods. It illustrates how a relatively classic citizen theme – naturalness, in this case of food – may be removed from the public agenda. In contrast to the previous example, in which an identity concern emerged from the discussion in such a way that it was neither available for experts nor patient participants, here "naturalness" appears as an explicit theme on the agenda. This can partly be explained by the fact that this discussion about the future of food was organized (not spontaneous, as in the first example) and the theme was put forward by the discussion leader. But naturalness is also a classic theme when it comes to citizen concerns about all sorts of new technologies. The argument is both attributed to citizens by experts and drawn upon by citizens themselves (e.g., Marris 2001 for naturalness in relation to food). It is treated as a typical citizen concern that is readily available and needs no further explanation, as we will also clarify with the following example.

The extract is taken from a discussion among twenty Dutch stakeholders about future food technologies, nine of whom were scientific and industrial food experts (Middendorp et al. in prep.). It illustrates how "naturalness" is removed from the public agenda by attributing the theme to the private domain of consumers such that no special account need be given, and no further exploration of its meaning is required:

Extract 3[1]

Facilitator	1	bu- but the picture that emerges now
	2	is of uh as it were
	3	an uhh (0.4) somewhat
	4	powerless industry
	5	that have to dance to the contradictory whims
	6	of the consumer (0.6)
	7	uhh is that the current feeling
	8	or are there also ideas about naturalness
	9	with the industry itself
	10	((expert gets his turn from facilitator))

Expert	11	yes I think the industry
	12	views it a little bit-
	13	a little bit differently (0.4)
	14	uhh there are indeed (0.8) consumers
	15	who indeed want <u>natural</u>
	16	→without probably many consumers
	17	→uhh understanding what that then means
	18	→and what it entails (1.3)
	19	ehh subsequently (0.6) one wants e-number free
	20	well the industry <u>can make</u> it (0.7)
	21	the only problem of course is
	22	if you want to produce it e-number free
	23	that is more <u>diff</u>icult that is more ex<u>pens</u>ive
	24	the quality is generally less
	25	and it ultimately costs a little bit more (0.7)
	26	well if the consu- if the consumer <u>wants</u> that
	27	then I think that the industry simply has to
	28	↑make it (1.1)
	29	as simple as that

We are interested in the kind of *action* that the expert performs by responding in the way he does. First note how the expert's remark about industry and consumers having different views (lines 11–13) avoids answering the facilitator's question whether the industry also has its own ideas about naturalness (8–9). The naturalness issue is reformulated from also, possibly, being an industry problem into a consumer concern only: it is consumers who want natural foods (14–15). In addition, the preparedness of the industry to listen to consumers is underlined. While it may not be the most logical choice to produce natural or e-number free food (more difficult, more expensive, etc. 23–25), we produce what they want. In so doing – turning naturalness into a private consumer concern which is attended to by experts (though somewhat reluctantly) – the need to further explore that concern is taken away. There is no reason for consumers to complain, so why investigate their concerns in a more than superficial manner?

Potential reasons to explore what "naturalness" refers to are further undermined by adding that consumers want natural food "without probably many consumers uhh understanding what that then means and what it entails" (16–18). This formulation defines the food expert as having superior access to what "naturalness" is, by suggesting a yardstick along which (other) definitions can be measured. By merely *implying* epistemic superiority, the actual definition of naturalness is claimed to be in the hands of experts such that there is no need to have it disclosed. Black-boxing the expert definition of naturalness prevents having it available for discussion, and opening it up – and other definitions for that matter – for debate.

Both discursive actions, i.e., framing naturalness as a private consumer-citizen concern that is already met by food experts as best it may, and claiming a superior definition of naturalness without having it explicated, work to establish naturalness as a concern that need not be dealt with in the public sphere. It is presented as already dealt with, without undermining scientific superiority or creating any pressure to ask explorative questions (as in: "What do you mean by natural food?").

While there is only space to discuss two cases here, the fragments shown here seem to represent a broader pattern in which potential soft impacts of future technologies either emerge as difficult-to-pin-down and mediated concerns (as with the celiac pill), or come up in the form of black-boxed, classic arguments (as with naturalness). While in the first case, the soft impact or identity concern is only implicitly available (as an interactional goal of participants' utterances rather than in the literal content of what they say), in the second case it is explicitly there but constructed as private and not in need of further exploration (this is again achieved indirectly, as an interactional consequence of the expert's arguments). Both ways of dealing with soft impacts make them susceptible to denial in the public domain, either because they are not visible, or because they are treated as private, known, and already dealt with (though nonvalid). The question is: how come?

Three Dimensions of the Hard/Soft Distinction: An Explanatory Model

In our analysis we focused on two concrete cases, in which impacts regarding health, identity, lifestyle, taste, and naturalness were at stake. In the first case we showed how a patient raised her concerns about the pill's impacts on identity and lifestyle only in an indirect, roundabout way. In the previous section we saw how technology actors manoeuvered to allocate accountability for impacts. Some of these got accepted as public concerns that deserve the attention of technology actors and policy makers, while others got framed as private concerns and delegated to the citizen-consumer. These two cases seem to exemplify a wider pattern: some topics get taken up by technology actors, such as health, safety, and environment, while others, such as identity, lifestyle, and naturalness, are hardly taken serious. In this section we offer an explanatory model: in liberal, secular societies in which science and legal conceptions of accountability play pivotal roles, some of technology's impacts get qualified as "hard," others get dismissed as "soft." This crucial distinction is made along three dimensions.

Valuation

The first dimension regards the valuation implicit in hopes and fears regarding the impacts of emerging technologies. If we look back at the examples given in the previous sections, the values underlying the concerns would be something like "having a sense of achievement," as exemplified in the diet-centered lifestyle of the celiac patient, or the "naturalness" of food. But the defenders of these values have, as the analysis shows, a hard time making themselves heard. It shows in the way Sammy talks: She *blurts* out that she doesn't need the pill, rather than "rationally" assessing the pros and cons of that particular medical technology, and without explaining how the prospect of the pill somehow affronts her. In the second example, it is clear that some consumers worry about whether modern food technology somehow results in "unnatural" food. It is equally clear, however, that this concern is not really taken seriously by the technologist. He bows for the demand, but only like an adult sometimes bows to the demand of an obstinate child: It may not be wise, but it is easier as it avoids a hassle.

Lifestyle concerns like "sense of achievement" or "naturalness" somehow seem to be taken less seriously. Nominally, there is no reason why these values would not be included in risk

assessments. Risk is simply defined as the probability that something undesirable will happen, so that could refer to any value. However, in actual practice, the values usually implied in Risk Assessment are only two: Safety and Health. True, in recent years, the Environment (Sustainability) was an important addition to the values implied in risk, and yes, more recently Privacy seems to be gaining prominence. Finally, Technology Assessment is usually broader than Risk Assessment and also takes into account values like Economic Growth and Employment. But that is about it, value-wise.

This is strange, as people have worried about a much broader palette of values in relation to technology: about the erosion of tradition, the tendency toward uniformity and conformism, about alienation, dehumanization, depersonalization, spiritual shallowness, enslavement by the machine, devaluation of life's fundamental values, artificial needs, about Faustian hubris, playing God, Frankenstein, about threats to democracy and justice, privacy, and so forth. Or they have hoped for much more important benefits: true self-development, post-humanism, true religion, world peace, cosmopolitan understanding, and so forth.

How then to explain this narrow focus of Technology and Risk Assessment? The answer lies in the dominance of liberalism in our societies. The key value informing liberalism is individual freedom, nowadays most often operationalized as "freedom of choice." The restriction of that freedom by the state is a priori under suspicion and always has to be justified. To this day, the simplest, most powerful, and most wide-spread justification of state intervention circulating in Western societies is J.-S. Mill's no-harm principle: "That the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others" (John Stuart Mill 1859, pp. 21–22). So, in the case that there is no clear, noncontroversial instance of harm done, liberals lose interest. Those issues are left for everyone to decide upon individually, that is, they get relocated from the public to the private domain, where they are treated as matters of subjective preference. In John Rawls' influential terminology: public reason deals with the "Right," not with comprehensive conceptions of the "Good" (Rawls 1993, pp. 173–211).

When a nuclear reactor explodes, that is harmful. No one hesitates to affirm such a statement. Hard impacts are considered to be hard because they refer to such indubitable instances of harm: a technology is good when it helps avoiding it – e.g., by providing a cure against cancer or by helping to feed the hungry – and bad when it causes such harm. In the latter case, the state should move in. Safety, Health, Sustainability, Privacy, Profit, and Employment: When technology touches upon these values, relevant actors (technologists, policy makers, citizens) agree that these impacts qualify as harm, and should therefore be recognized as matters of public concern.

But unfortunately things are not always so clear-cut. When the television pollutes our minds by producing large quantities of inane chatter, is that harmful or innocent fun? And does Internet turn our friendship into a travesty (Turkle 2010) or do our ideas about friendship simply evolve with the new technological reality? Or, to return to the examples discussed in the previous sections: is it harmful when new medication threatens to rob a particular lifestyle of its value, and the ones living it of some of their sources for self-esteem? Or when technological interventions alienate us from our food, is that bad? Some would answer yes, but many would not.

If a technology is detrimental to one's safety or (preferably physical) health, few are going to argue. But it is much more difficult to establish a broad consensus on moral, cultural, or political "harms." In a liberal, pluralist society that prides itself on its tolerance of diverging conceptions of the good life, technologies cannot be forbidden on such a shaky basis. And

because it cannot be forbidden, why talk about it at all? In liberal societies about the only harm that is considered a legitimate topic for public discussion, is physical (or maybe medically certified psychological) harm, because only on this topic citizens can reach consensus. In other words, there is an – admittedly gliding – scale between impacts that are conceived to be "hard" because they involve clear instances of harm, and impacts that are conceived to be "soft" because they do not. Technology and policy actors take the first type seriously, but rarely the latter type (Swierstra 2002).

Quantifiability

Now let us turn to the second dimension of the distinction between hard and soft impacts: quantifiability. Quite apart from the kind of harm we are dealing with when assessing the impacts of a technology, we also want to know how big the chance is that a technology will cause such harm in the future, and how big the harm then will turn out to be. So, how big would be the risk that the gluten pill would indeed affect the diet-centered lifestyle of Sammy, and how harmful would that be exactly? Or: how big is the probability that modern food technologies diminish the "naturalness" of our food, and if so, how bad would this be exactly?

Both technology actors and policy makers tend to prefer answers to these questions in the form of numbers. For them, numbers equal objectivity. The more readily impacts lend themselves to quantification, as the better they fit into the discourses prevailing among technology developers and policy makers and the more readily they are accepted as "rational" and "serious," in other words, the "harder" they are perceived to be (cf. Slovic 2000; Jaeger et al. 2001; Roesser 2010). And indeed, some risks do lend themselves to this language of numbers. An example of high quantifiability is the risk of a nuclear disaster, both in terms of probability and in terms of body count. In general, we can say that impacts on Health and Safety, and on Profit and Employment, can be quantified well using numbers. Environmental risks, on the other hand, already lend themselves less readily to quantification. Their probability may still be calculated but it often proves difficult to attach numbers to the harm/impact itself. Of course, one can estimate how many fish will die, but how to translate this quantity into a magnitude of harm – to us? This is why harms to the environment often get translated into economic terms. Risks to our Privacy are also hard to quantify.

But many of technology's impacts lend themselves even less to quantification. Take for example the risk that a new medication will change my diet-centered life style and undermine my sense of achievement? By what means to assess the probability that that will happen, and how even to begin quantifying such an impact? Or the risk that food technology will alienate us even further from Nature. How to calculate the probability that that will happen? And how to even start measuring different degrees of alienation?

Quantifiable risks count as hard, nonquantifiable risks get dismissed as too soft to merit rational discussion. Why do technology actors and policy makers seem to prefer the language of numbers? The answer to that question is not self-evident. More than a century ago, Wilhelm Dilthey argued that there are two ways of investigating the world: scientific explanation for the natural world and (historical) understanding for the social world of meanings. But still, up to this day scientists and policy makers consider the contributions of history, anthropology, and other qualitative sciences as too soft to take seriously. Similar to the way "harm" is considered

as an objective criterion in liberalism, allowing for a rational discourse capable of generating consensus, in science and policy making "quantifiability" is perceived as a sign of objectivity and rationality.[2] Only on this basis a rational consensus is deemed to be possible.

Causality

However, to be really accepted as "hard" by technology actors and policy makers, an impact has to meet a third and final condition. To be relevant to these actors, they have to somehow feel responsible, or more passively, afraid to be held accountable, for the impact in question. A major precondition for responsibility/accountability is that there exists a clear causal link between technology and impact.[3] When such a link can be established, this considerably adds to the hardness of an impact. And who would try to deny the causal link between a nuclear explosion and the dead bodies around?

But the causal link between technology and impact is not always easy to establish. Philosophy of technology, Actor Network Theory, and (post-)hermeneutics have argued convincingly that the conception of technology as a passive, neutral instrument is naïve. Philosophers of technology point out that technology is far from passive and neutral, because it mediates our (theoretical and practical) relations with the world in specific ways. Technology can change the way we interpret the world (Idhe 1993), and how we act in it (Akrich 1992; Latour 1992; Verbeek 2005; Swierstra and Waelbers 2010; Waelbers 2011). Studies show over and over again how technological artifacts, for instance, can "invite" or "facilitate" certain behavior in the user. These instances of technologically mediated behavior are, however, difficult to assess in terms of accountability. The causal link between technology and impact is not straightforward, but bent, diffused. A philosopher may consider accountability for undesirable impacts distributed over technologists, users, artifacts, and policy makers; in legal practice it is still usually the user who ends being blamed.

As American bumper stickers never tire to explain: Guns don't kill people; People kill people. Of course, even the gun lobby is willing to admit that in some cases guns do kill people, that is, when they malfunction and explode in the face of the shooter. But in all other cases, according to the weapon-lobby, it is solely the user who is to be held accountable, not the innocent (neutral, passive) *instrument* or its designer/manufacturer/seller. Similarly, if a new anti-gluten pill threatens someone's identity, this can never be attributed to this pill. Some people will be able to withstand the pressures of this new medical technology, and stick to their old identity, so ultimately it is a matter of free individual choice.

Now, even if we think this reasoning is a little too comfortable, we have to admit that the attribution of responsibility is difficult when it is clear that effects are co-produced by a plurality of actors. We as yet have very limited means to conceptualize and organize collective responsibility. Our dominant moral models ultimately refer back to individuals making conscious choices. In cases where humans and nonhumans share responsibility, it is easier to conclude that no one is responsible. As a result, impacts of technology that cannot be clearly and unequivocally linked to technology actors are treated as "soft" and removed from the public agenda. Do not blame the makers of the gluten pill for undermining your sense of achievement. Do not blame the food technologists for making you eat unnatural food. It is no one's fault, really, and therefore not a matter of public concern.

Concluding Remarks

We started our chapter by pointing out that the participatory agenda is managed in such a way as to deal with certain topics and not with others. In the previous section, we argued that some concerns were allowed on that agenda because they are perceived to be "hard" enough to allow for rational debate. Hard issues are essentially considered to be hard, because they promise to be the object of a rational, uncoerced, consensus: because the type of harm is noncontroversial, because no one can argue with numbers, and/or because technology or policy actors cannot deny accountability because of the clear causal link between technology and impact. Everything that does not score on (one or more of) these three dimensions, runs the risk of being dismissed as too soft – subjective, unproven, and/or messy with regard to whom is to be held accountable.

The celiac pill example showed how "soft" concerns cannot be recognized so much in what people literally say as in what becomes visible in the interactional concerns that they display, e.g., treating the anti-gluten pill – couched by an expert as a panacea to their problems – as a threat to their identity and a devaluation of their of current lifestyle. This appearance clarifies why soft concerns may surface in a roundabout way rather than become apparent straightaway, and thus may be difficult to identify.

In other cases, soft concerns seem directly available for discussion, as in the food expert discussion on naturalness. However, this soft concern was subsequently constructed as a private consumer issue that does not require any further scrutiny or exploration, as it is already known and can be met (if somewhat reluctantly). While in this case the soft concern seems easier to recognize, the interactional result is the same: it is constructed as not deserving any further attention in the public arena.

The three dimensions of soft impacts as laid out in the previous section (difficult to value; quantify, and explain causally) make their indirect emergence or lack of exploration plausible, for this type of soft concern can expect an unwelcome reception. The patients' talk shows an orientation to such challenge and marginalization by phrasing the rejection of the anti-gluten pill in extreme terms and not spell out the nature of the affront. But the dismissal of these concerns also requires a detour. By couching the dismissal of natural food in the obligatory language of mutual respect and of the sovereignty of the citizen-consumer's wishes, the expert's talk shows anticipation of the "hardness" of democratic norms and rules that demand that everyone's concern counts.

We want to argue that this dismissal of soft impacts by technology actors and policy makers is shortsighted. It is a cause for concern when citizens fail to acquire a fair hearing for their concerns, even if the values concerned are contested, even if the chance that the harm occurs cannot be quantified, and even if there is no one who can be held accountable in a clear and unequivocal manner.

It is worth pointing out that hard impacts are not as hard as they are taken to be. There is always room for conflicts about what constitutes harm, how to quantify it, and who is to be held accountable. But more importantly, taking soft impacts seriously is not only paramount for democratic reasons – if large strata of society hold these concerns, that is in itself enough reason to discuss them carefully – it is also crucially important for substantive ones.

First of all, taking a broader range of values seriously opens a door to a more positive heuristics with regard to emerging technologies, away from the present binary discourse about the question whether a technology should be forbidden or not. Currently the main thrust in Risk or Technology Assessment is negative: How to avoid or minimize harm? If no clearly

harmful impacts are to be expected, policy makers and technology actors lose interest and the success of the technology is now left to the unreflective preferences of individual consumers. But in a technological culture like ours, the issue should rather be: how to establish a practice of public deliberation on what *good* technology is. What technology do citizens want to see developed? The aim should be goal-setting rather than harm-avoidance. Taking soft impacts seriously helps to move away from the binary risk discourse ("Should this technology be forbidden: yes/no"), to a discourse of the (common) good (Swierstra 2002).

Secondly, laying too much stress on quantifiability can be highly counterproductive. Because they only had eyes for the hard impacts of GMOs, decision makers for too long dismissed the public's doubts as irrational, emotional, private, and religious, etc. The resulting break of mutual trust between producers and consumers has frustrated the development of biotechnology (Wynne 2001).

Thirdly, ignoring indirect impacts may thwart the technology's intended aim, as in the case of so-called revenge-effects (Tenner 1996). Technology actors and policy makers often fail to anticipate that the user's behavior changes because of the new technology. The "light" cigarettes that in the end only increased the net intake of tar and nicotine because people assumed these were not so unhealthy, provide a good example. Such technologically mediated behavioral change is currently dismissed as a soft impact, because responsibility cannot be unequivocally located with the technologist. But when such indirect impacts are foreseeable for the marketing department of the tobacco company, why should technology developers and policy makers being excused from taking them into account?

Summarizing: In the case of controversial technologies, like the life sciences for instance, stakeholders point out a large array of possible impacts. However, decision makers, like; technology actors and policy makers, tend to concentrate on "hard" – quantifiable, harmful, direct – impacts. But it is essential that in a technological culture soft impacts of emerging technologies are equally taken into account. This is the only way to make the co-evolution (Rip and Kemp 1998) or co-production (Jasanoff 2004) of technology and society reflective and democratically checked. Technology does far more than simply providing the means to our existing goals. Technology redefines these goals; changes or affirms power relations; affects values, standards, and norms; informs aspirations; installs new needs and preferences; teaches what it is right to hope for.

Further Research

Having said that responsible innovation processes require soft impacts to be taken into account, it is important to point out what we mean by the latter, and whose responsibilities we are and are not referring to. For one thing, "taking into account" soft impacts does not equal accepting these impacts as true or right, and/or following them up immediately. We do not propose that expert-technologists start to grow natural food straight away, or that policy makers acknowledge that genetic modification transgresses ethical boundaries once citizens have pointed those out to them. The validity of soft impacts, and acting according to them, should become part of the negotiation. Furthermore, while technologists and policy makers may be inclined to display little concern for soft impacts, this neither implicates that it is their responsibility alone to solve the matter, nor that it would be the most effective way to go.

As the conversation analysts Heritage and Raymond (2005, p. 2) point out: "the distribution of rights and responsibilities regarding what participants can accountably know, how they know it, whether they have rights to describe it, and in what terms, are directly implicated in organized practices of speaking." Looking at the actual dynamics of accountability attribution and denial, particularly at the level of what expert participants claim to accountably know, i.e., claim to have access to, and for what interactional purposes, is crucial as a first step for revealing the ways in which the hard/soft distinction are made and sustained. Not only as to understand better the concerns that guide, consciously or not, the referral to soft and/or hard impacts, but also because different attributions of accountability may have different implications for how to achieve a more comprehensive public dialogue.

That naturalness is both constructed as a private consumer concern and black-boxed as requiring no further investigation, makes it a different problem than, for example, the issue of good taste (Middendorp et al. in prep.). Food experts tend to attribute complete responsibility to consumers for telling them what good taste is, and only claim epistemic access to the technicalities of how to achieve a certain taste. Since anything can be made – is the suggestion – there is no such thing as a lack of good taste when it comes to future foods. In both cases, soft concerns are pushed off the discussion table but the starting point for a more comprehensive dialogue would be different. Naturalness and good taste are both treated as private preferences that require no debate, but taste is constructed as a legitimate concern, whereas naturalness is dismissed as invalid. For one thing, naturalness would need to be explored, and the conclusion may well be – jointly with consumers – that "natural food" is infeasible, or precisely the reverse, because it stands for something other than expected. Up till then, experts keep the "problem" intact as much as they blame consumers for.

Our analysis shows that these concerns are often not or only indirectly available for the debate facilitator. Likewise, participants themselves tend not to have direct access to interactional concerns although, when confronted with them, they will recognize them immediately. The Discursive Action Method (Lamerichs and te Molder forthcoming 2011) is a reflection method that aims to turn participants into analysts of their own discourse by making these concerns visible and open for discussion. This not only counts for the expert-designer or policy makers but just as well for (potential) users of technologies. Natural food may be reshuffled into a private consumer concern with which a food expert should not be preoccupied, but "naturalness" may just as well be drawn upon by consumers to delineate their territory such that no expert is allowed in.

A close and critical reflection on how soft/hard concerns are drawn upon, and for what interactional business, may be the starting point for a new area of research, and a practice in which a more comprehensive dialogue could make a start. This research should then be complemented by a philosophical critique of the three dimensions that together make up the hard–soft distinction. Such critique will have to draw its inspiration from quite diverse traditions. The primacy of the no-harm principle in liberal political philosophies has to be investigated in the light of the new realities of a technological culture. Does the way this principle is applied allow for fruitful public deliberations about the (un)desirability of technologies? A similar investigation has to focus on the widespread belief that only numbers allow for rational consensus. Part of this investigation will be primarily philosophical in character, but important inputs are also to be expected from more empirical research in Science and Technology studies that explore how these numbers are constructed and contested. Last but not

least, the issue of technological mediation has to be explored further by both philosophers of technology, who investigate the various forms of technological mediation, and moral philosophers, who have to develop convincing conceptions of collective, or shared, responsibility. These types of research in the philosophical foundations of the hard–soft distinction will help to create the necessary discursive space for the technologists, policy makers, and citizens. Because they are the ones who have to make sure that in their mutual dealings the (implicit) distinction between hard and soft impacts no longer serves to remove relevant topics from the agenda for the public dialogue on technology.

Notes

1. Transcripts employ the notational convention used in conversation analysis (Jefferson 2004). The transcription symbols used here are:

   bu-   a cut-off or self-interruption
   ↑   sharp rise in pitch
   (1.0)   numbers denote silence in tenths of seconds
   wants   underlined items were hearably stressed
   (( ))   transcriber's description of events

   The fragment is translated from Dutch to English, remaining as close as possible to the original Dutch text.
2. A separate issue, of course, is whether all the relevant data are available. The precautionary principle is a procedural rule devised to deal with such a (temporary) lack.
3. Although it has to be admitted that in the case of positive impacts, this demand for a direct causal link is usually interpreted less strictly. As Ravetz famously put it: "Science takes credit for penicillin, while Society takes the blame for the Bomb" (Ravetz 1975, p. 46).

References

Achterhuis H (ed) (2001) American philosophy of technology: the empirical turn. Indiana University Press, Bloomington/Minneapolis

Akrich M (1992) The description of technical objects. In: Bijker W, Law J (eds) Shaping technology, building society: studies in sociotechnical change. MIT Press, Cambridge

Boenink M, Swierstra T, Stemerding D (2010) Anticipating the interaction between technology and morality: a scenario study of experimenting with humans in bionanotechnology. Stud Ethics Law Technol 4(2): article 4

Edwards D (1997) Discourse and cognition. Sage, London

Heritage J, Raymond G (2005) The terms of agreement: indexing epistemic authority and subordination in talk-in-interaction. Soc Psychol Q 68(1):15–38

Hobson-West P (2007) 'Trusting blindly can be the biggest risk of all': organized resistance to childhood vaccination in the UK. Sociol Health Illn 29(2):198–215

Idhe D (1993) Postphenomenology. Northwestern University Press, Evanston

Jaeger CJ, Renn O, Rosa EA, Webler T (2001) Risk, uncertainty, and rational action. Earthscan, London

Jasanoff S (2003) Technologies of humility: citizen participation in governing science. Minerva 41:223–244

Jasanoff S (ed) (2004) States of knowledge: the co-production of science and social order. Routledge, New York

Jefferson G (2004) Glossary of transcript symbols with an introduction. In: Lerner GH (ed) Conversation analysis: studies from the first generation. John Benjamins, Amsterdam/Philadelphia, pp 13–31

Lamerichs J, te Molder H (2011, frth) Reflecting on your own talk: the discursive action method at work. In: Antaki C (ed) Applied conversation analysis. Intervention and change in institutional talk. Pallgrave Macmillan, Basingstoke

Latour B (1992) Where are the missing masses? In: Bijker W, Law J (eds) The sociology of the new mundane artefacts. Shaping technology, building society. MIT Press, Cambridge

Marris C (2001) Public views on GMOs: deconstructing the myths. EMBO Rep 21(7):545–548

Middendorp S, te Molder H, van Woerkum C (in prep.) Responsible innovation in the food sector: what impacts of food technology may enter the public debate? Wageningen University, Wageningen

Mill JS (1859) On liberty. Oxford University, Oxford, pp 21–22

Potter J (1996) Representing reality. Discourse, rhetoric and social construction. Sage, London

Ravetz JR (1975) . . .et augebitur scientia. In: Harré R (ed) Problems of scientific revolution. Progress and obstacles to progress in the sciences. Clarendon, Oxford, pp 42–57

Rawls J (1993) Political liberalism. Columbia University Press, New York

Rip A, Kemp R (1998) Technological change. In: Rayner S, Malone EL (eds) Human choice and climate change, vol 2. Battelle, Columbus, pp 327–399

Roesser S (ed) (2010) Emotions and risky technologies. Springer, Dordrecht/London

Slovic P (2000) The perception of risk. Earthscan, London

Swierstra T (2002) Moral vocabularies and public debate: the cases of cloning and new reproductive technologies. In: Keulartz J, Korthals JM, Schermer M, Swierstra T (eds) Pragmatist ethics for atechnological culture. Kluwer Academic, Deventer, pp 223–240

Swierstra T, Waelbers K (2010) Designing a good life: the matrix for the technological mediation of morality. Eng Ethics (Online First, 30 Nov 2010)

Swierstra T, Stemerding D, Boenink M (2009) Exploring techno-moral change. The case of the obesity pill. In: Solllie P, Duwell M (eds) Evaluating new technologies. Springer, Dordrecht, pp 119–138

te Molder H (2008) Discursive psychology. In: Donsbach W (ed) The international encyclopedia of communication, vol IV. Wiley-Blackwell, Oxford, UK/Malden, pp 1370–1372

te Molder H, Potter J (eds) (2005) Conversation and cognition. Cambridge University Press, Cambridge

te Molder H, Bovenhoff M, Gremmen B, van Woerkum C (submitted) Talking future technologies: how celiac disease patients neither accept nor reject a 'simple pill'

Tenner E (1996) Why things bite back. Technology and the revenge of unintended consequences. Knopf, New York

Turkle S (2010) Alone together. Why we expect more from technology and less from another. Basic Books, New York

Van der Pot JHJ (1985) Die Bewertung des technischen Fortschritts. Eine systematische Uebersicht der Theorien. Van Gorcum, Maastricht

Veen M, Gremmen B, te Molder H, van Woerkum C (2010) Emergent technologies against the background of everyday life: discursive psychology as a technology assessment tool. Public Underst Sci. doi:10.1177/0963662510364202. Prepublished 13 Apr 2010

Verbeek PP (2005) What things do. Philosophical reflections on technology, agency, and design. Pennsylvania State U.P, Pennsylvania, PA

Waelbers K (2011) Doing good with things–taking responsibility for the social role of technologies. Springer, Dordrecht

Wynne B (1996) Misunderstood misunderstandings. Social identities and public uptake of science. In: Irwin A, Wynne B (eds) Misunderstanding science? The public reconstruction of science and technology. Cambridge University Press, Cambridge, pp 19–46

Wynne B (2001) Creating public alienation: expert cultures of risk and ethics on GMOs. Sci Cult 10(4):446–481

Wynne B (2006) Public engagement as a means of restoring public trust in science – hitting the notes, but missing the music? Community Genet 9:211–220