A similar argument could be made with regard to other features and values of technology. Thus, a definite social context is an aspect of technical designs; however, in most instances, it is taken for granted and therefore often overlooked. Only amidst changes in circumstances or in the face of opposition, as in the case of the Ford Pinto, does this social or political nature become evident as a rule; thereafter, the design would be modified and re-embedded within a new context. It is important to note that such transformations of design are not made from a functionalistic perspective. Transformations of design occur within the public sphere and not within a narrow economic sphere, in which functions are considered to be efficiently adapted on the basis of the needs of the market or customers. Barrier-free design is another noteworthy example for this discussion. The former designs that chiefly took non-handicapped people into account come to be realized, for example, through the civil rights movement, as barriers that prevented the handicapped from social participation. From a reflective viewpoint, we can clearly observe the discriminative structure included implicitly in the former designs, and accordingly, the value of justice has been incorporated into the new designs. This transformation clearly reveals the political nature of technical designs. Design is also a historical entity that is developed by many people including engineers, managers, and laypersons.

6 Unintended Results and Public Nature

As mentioned in the previous section, design can be considered as a process of stipulating target functions. Considering the facts that technological design embodies social needs and relationships and that it creates a new social order (see the examples given above),[3] it would be possible to state that designing artifacts means simultaneously designing and defining the order of our world. In a sense, it is similar to a "legislative act" (Winner, 1986, 29). However, the power of this "legislation" is limited since one cannot presuppose the perfect predictability or analytical separability of means and ends. We must also note that the identification of objectives with "the intent of the designer" and of designing processes with the implementation of that design is problematic. As evident from the discussion above, this is because the dimension of what items will be established as objectives as well as what is emphasized in the process of design and what is viewed as secondary are dictated on the basis of culture, or routine knowledge that is often taken for granted. This is strongly associated with the assessment of the uncertainty and incompleteness of technology.

[3] The problem of technical mediation demands a separate study and is beyond the scope of this chapter. For an example from classical literature, see E. Cassirer (1985). "Tool carries out the same function in the sphere of object that can be found in the sphere of logics: it is as it were 'termimus medicus' which is grasped in the objective conception (gegenständliche Anschauung), not in mere thinking" (ibid., 61).

First, besides directly intended objectives, there could be latent secondary intentions that can cause unexpected results. For example, when a designer unintentionally designs an artifact that is primarily meant for non-handicapped people, it might be dangerous for the disabled and therefore result in them feeling discriminated against.

Second, the results of technology are not primary; instead, they accompany numerous effects and side effects. Technology exceeds the intent of the designer, resulting in unintended and unpredictable by-products. In the words of Tenner, technology "bites back" (1996). Results of technology cannot be controlled completely. In the context of risk analysis, with respect to the problem of side effects, a "risk trade-off" is often insisted, i.e., comparing the possibility and weight of a target risk with those of a potential risk that will take its place and determining whether an action should be performed. However, the effects of technology that should be valued can only be determined within the cultural and social context.

Third, changes in the context incorporated in the design and the significance of that technology as a result of the transformations in lifestyle due to technology and other factors are also important. As Don Ihde states, all technologies are double-edged because they have "ambiguous, multistable possibilities" (1999, 44) that exceed the intent of the designer. He terms this phenomenon "designer fallacy" that is modeled on the phenomenon of intentional fallacy in literature. Such instances result in changes in the assessment criteria with regard to risk and the features of technology.

Therefore, the question that arises is: Who should be responsible for this decision? Since no one can manage the technological uncertainties, the question of what overall benefits does a particular technology produce should not be assessed paternalistically and decided solely by engineers. Rather, this question should be determined in public by analyzing it from a larger number of perspectives without being limited to a narrow technical perspective. In this case, the engineers cannot possess all the rights and responsibilities, and the perspectives of non-engineers must be incorporated. This is the reason (Shrader-Frechette, 1994, 94) for advocating the principle of "giving priority to third-party or public responsibilities in situations of uncertainty."

At the beginning of this chapter, I mentioned "culture in technology"; however, the existence of such a system of experiential knowledge implies that it will serve as a barrier that prevents the participation of people who do not share that system. Thus, it should be accepted that in our present society, experts have a monopoly on technological matters. There appears to be an asymmetrical relationship of dominance versus subordination between experts and laypersons. However, such a culture cannot be closed to both matters of fact and normative demands.

On the one hand, as claimed in risk theory, experts have noted the "risk-perception bias" of laypersons. In this case, experts often point to "literacy" in the sense of the capacity to understand science and technology. The thought is that acceptance without bias is only possible by redistributing knowledge, i.e., educating the public and enabling them to acquire the ability to understand modern science and technology "correctly". On the other hand, if one disregards this barrier,