Chapter 2
Who Designs?

Technological Mediation in Participatory Design

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Abstract This chapter engages with the idea that instead of trying to satisfy the users' elusive particularities, designers should offer them tools to create their own designs. From the 1970s speculations on computational techniques for user participation in design, to current design for design empowerment endeavors, technological renderings of this idea do not escape controversy around the delivery of their empowering claims. The question remains: Who designs? The "empowered" users? The tools and/or techniques that facilitate the process? The designer of the tools and/or techniques? I propose that technological mediation, construed here as the mode of agency distribution among users, technologies, and their designers, provides a productive viewpoint from which to analyze and critique techno-centric proposals of design for user empowerment. With this hypothesis as point of departure, I offer a parallel reading of proposals for technologically mediated user participation in design, presented in the 1971 "Design Participation" conference of the Design Research Society, and recent theorizations of technological mediation in science and technology studies (STS) and the philosophy of technology.

2.1 Here Comes Everybody (Again)

In September 1971 a group of designers, architects and planners assembled at the University of Manchester Owens Park halls of residence to discuss opportunities for their own annihilation. Convening with internationally acclaimed architectural critics, artists, information technologists, and engineers, who also took part at the event, they presented ideas for new computational tools, design methods, and technologically enhanced environments that would enable "*wider sections of society to actively participate in the processes of planning and design.*" (Cross 1972c)

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"Design Participation," as the event was entitled, was the first international conference of the Design Research Society, a still-active international association founded in the United Kingdom in 1966 with the objective to promote research into design processes across disciplines. It was also among the first manifestations of a techno-optimistic vision that would come to fuel the imaginary of designers and technologists and that will be the main focus of this chapter: *technologically mediated user empowerment in design*.

In the decade preceding the conference, design participation had become a matter of mounting social and political concern with growing impact on the design disciplines (Cross 1972c). Revolts against technocracy and demands for citizen participation in design and planning decision-making had been challenging the legitimacy of professional experts, giving rise to user-centered perspectives. Parallel to sociocultural fermentations, developments in computer-aided design and information technologies had been cultivating prospects of directly engaging users in the shaping of their living environments. In opening the "Design Participation" proceedings, architect, industrial designer, and conference co-organizer, Nigel Cross welcomed the imminent blurring of the lines between "designer" and "user" as a potential pathway toward urban sustainability and a more democratic social order (Cross 1972c). Partly asserting what seemed to be an unavoidable development and partly aspiring to an optimistic future delivered through the aid of new technologies, Cross titled his conference address "Here Comes Everyman" (Cross 1972b).

Four decades later, media scholar Clay Shirky would come to adopt a similar slogan to promote an analogous vision. In his recent book *Here Comes Everybody*: *The Power of Organizing Without Organizations*, Shirky declares the internet a space of empowerment and social emancipation, and celebrates the growing participation of individuals in the formation of their political, social, informational, and material environments (Shirky 2008). Shirky's analysis exemplifies a widespread optimism about the empowering potential of online connectivity and growing technological literacy. As Nicholas Carr writes, personal empowerment is currently the central theme of an almost universally accepted liberation mythology associated with information technologies (Carr 2008). The central hero of this mythology is the figure of the "empowered user," portrayed as a "prosumer" (Toffler 1989), "designer-user" (Mackay et al. 2000), "innovation user" (von Hippel and Katz 2002), "produser" (Bruns 2008), or "maker" (Anderson 2012), to name a few of the variations. These neologisms allude to a technologically mediated transfiguration of the user from a passive consumer of technologies, products, information, and environments, to an empowered individual with active participation in their shaping.

Apart from its associations with cyber-utopian narratives, market considerations also support the idea of user empowerment in design. In his book *Democratizing Innovation*, economist Eric Von Hippel challenges the preconceived notion that innovations stem from manufacturers and prescribes a turn from manufacturer-centered to user-centered design processes (von Hippel 2005). Epitomizing one of the main arguments in support of user empowerment in design, he casts designers as distortive intermediaries between the users' needs or desires and their embodiment in a product or technology. Empowering users to create their own designs, Von Hippel claims, can remedy this problem. "*Users that innovate*," he writes, "*can develop exactly what they want, rather than relying on manufacturers to act as their* (*often very imperfect*) *agents*." (von Hippel 2005) Further research in open source[1] and mass customization[2] practices links user participation in design with better product development (von Hippel 2005; Schacchi 2003) and higher consumer satisfaction (Franke et al. 2010; Anwar et al. 2011). As business research and innovation studies acclaim the benefits of user-centered design, the question of *how* to engage users in the design process becomes central.

The most common commercial application of mass customization software is the so-called "configurator." In broad-brush strokes, configurators are digital interfaces that prompt users to choose from menus of predesigned components, which they then combine to define the final form of the product. Recent developments in the area of mass-customization employ machine-learning algorithms that profile the user and issue design recommendations so as to alleviate the tedium of menu-picking (Sabin and Weigel 1998). In "Shifting Innovation to Users via Toolkits" Eric Von Hippel and Ralph Katz critique the configurators for leaving the users little room for design (von Hippel and Katz 2002). "Products are not designed by the users themselves," they contend, and move on to outline a set of principles that can be designed into an artifact in order to "transfer design capability to the users" (von Hippel and Katz 2002). These include pedagogical ideas such as learning-by-doing and debugging, as well as information theoretical concerns about the size of the design "solution space" and the "translatability" between design and production "language" (von Hippel and Katz 2002). In outlining such principles, Von Hippel and Katz sketch a provisional theory of design for design empowerment.

Broadly construed, design for design empowerment reflects a shift in the designer's focus from designing products or environments for future users, to offering them the tools to create their own designs. Present since the late 1960s, this approach has recently been regaining prevalence under the support of market considerations, decision-making legitimacy debates, and cyber-cultural utopias of creative individualism. However, technological renderings of this idea do not escape controversy around the delivery of their empowering proclamations. From early speculations on computational tools enabling design do-it-yourselfism

[1] The term "open source" originated from the field of software development. It denotes software where the source code is made freely available to the public domain for use, modification, and redistribution. The Open Source Definition, developed by the Open Source Initiative, a California based public domain corporation, identifies a set of distribution terms that must be met in order for a piece of software to qualify as "open source." Over the past few years, open source ideas and practices have been translated to the domains of knowledge (e.g. Open Knowledge) and artifacts (e.g. Open Source Hardware, Open Design).

[2] As defined by Joseph Pine, mass customization is marketing and manufacturing technique for offering customized products and services to individual customers at near mass production efficiency (Pine 1993).

(Negroponte 1975) to current techno-centric expressions of design for empowerment,[3] one question persists: *Who designs?* The "empowered" user? The tools and techniques that mediate the process? The designer of the tools and techniques?

In this chapter I propose an interdisciplinary approach to this question, drawing from design studies, Science and Technology Studies (STS), and the philosophy of technology. I argue that questions of how to design for user empowerment in design and how to evaluate technological propositions that issue empowering claims are primarily questions of *technological mediation*.[4] Famously described by Bruno Latour as a middle zone between "the myth of the Natural tool under complete human control and the myth of the Autonomous Destiny that no human can master" (Latour 1994), technological mediation captures co-constitutive associations between humans and things, without assuming the one a determinant of the other.

I suggest that the concept of technological mediation, construed as the mode of agency distribution among designers, users, and technologies, offers a productive viewpoint from which to analyze and critique techno-centric proposals of design for empowerment. I further propose that design for empowerment proposals developed in the design disciplines are moral and political articulations that can contribute to recent inquiry in STS and the philosophy of technology. Although technological mediation has not been explicitly discussed among of design theorists, the idea has been implicit in debates around participatory design since the early computational era (1970s). These debates offer different ways of thinking about the potential role of the designer, the user, and mediating technologies. In order to activate the critical potential of these early proposals, one needs to move beyond the intention-declaring rhetoric to examine the kinds of user-technology associations inscribed in their technics. With this spirit I inquire into the proceedings of the 1971 "Design Participation" conference of the Design Research Society (Cross 1972a) where the conference participants discussed the necessities of direct user involvement in the design process and speculated on technological settings fulfilling this demand. In doing so, I maintain, these early proposals implicitly articulated questions of design ethics, human agency, and technological mediation that have recently come center stage in STS and the philosophy of technology.

I begin the chapter by synopsizing ideas from STS and the philosophy of technology that offer useful categories for theorizing user-technology associations and rethinking artifacts from a moral and political perspective. The purpose of this section is to divest the reader of traditional notions that deem technology either neutral or determining and to offer theoretical scaffolding from which to examine

[3] For reasons of simplicity I henceforth use "design for empowerment" instead of "design for design empowerment." In the context of this chapter design for empowerment refers to empowering users in design decision-making and giving them the tools to create their own designs.

[4] The concept of "technological mediation" was systematized by philosopher of technology Verbeek (2011). Verbeek synthesized earlier approaches from STS and the philosophy of technology that grappled with the reciprocities and cross-configurations among users, technologies, and their designers. Bruno Latour had earlier conceptualized such relations in terms of "technical mediation" (Latour 1994).

the “Design Participation” conference propositions. In Sect. 2.2 I describe and contextualize the goals of the “Design Participation” conference, focusing on self-reflective debates on the role and moral responsibility of designers. In Sect. 2.3 I discuss three conference presentations that aspired to remove the human intermediary from the design process, and give the user direct control over design, through the aid of technological mediator.[5] I then diagram different approaches to the question “who designs?” by analyzing the role of the user, the tool, and the designer in each project, and discussing the different conceptions of freedom and technological intentionality that underpin each of the proposals. By shedding light on goals, questions, and problems that surrounded early manifestations of participatory rhetoric, I aim to offer historical and theoretical depth to current design for empowerment debates. By reading the history of design research with and through ideas from STS and the philosophy of technology, I further aspire to bring forth common matters of concern among these disparate fields, thus creating the ground for a productive exchange of critical and analytical frameworks.

2.2 Theorizing Technological Mediation

“Users move center stage,” announce Nelly Oudshoorn and Trevor Pinch in their article “User-Technology Relationships: Some Recent Developments” (Oudshoorn and Pinch 2008). The article offers an extensive overview[6] of recent developments in STS that challenge linear models of technological development, which generally assumed users to be passive receivers of technological artifacts. Oudshoorn and Pinch observe that empirical and theoretical studies in the processes of technology “appropriation” or “resistance” (e.g. Silverstone and Hirsch 1992; Wyatt 2003), the role of social groups in influencing processes of design and stabilization of technologies (e.g. Mackenzie and Wajcman 1985; Pinch and Bijker 1984), and the relationship between designer-inscribed scenarios and actual use of technological artifacts (e.g. Woolgar 1991; Akrich 1992), recast users as active participants in the shaping of technology. In examining “the blurring of the boundaries between production and consumption” (Oudshoorn and Pinch 2008) the authors also present many of the neologisms that frequently appear in user empowerment rhetoric.

[5] The “Design Participation” conference presentations discussed in this chapter are “Adaptive-Conditional Architecture” by Charles Eastman, associate professor at the School of Urban and Public Affairs, at the Carnegie-Mellon University, “Information Processes for Participatory Design” by Hungarian-born French architect Yona Friedman, and “Aspects of Living in an Architecture Machine” by Nicholas Negroponte, assistant professor in the School of Architecture and Planning, at the Massachusetts Institute of Technology.

[6] Oudshoorn and Pinch’s review includes literature from innovation studies, the sociology of technology, feminist studies of technology, semiotic approaches, and media and cultural studies approaches (Oudshoorn and Pinch 2008). Through this review the authors collect analytical tools that capture the previously neglected role of the users in the shaping of technologies.

Recent user-centered perspectives in STS are epigones of a broader change of attitude toward the relationship of technology and society that took place in the 1980s. This shift was epitomized by the so-called Social Construction of Technology (SCOT). According to SCOT, the development and stabilization of technological artifacts is contingent on the meanings ascribed to them by "relevant social groups," including users, designers, producers, distributors, organizations, etc. (Pinch and Bijker 1984). This theory challenged the idea of technology as an autonomous force driving society, and proposed an empirical program for studying technological development in its social contexts (Pinch and Bijker 1984). A similar "empirical turn" took place in the philosophy of technology during the 1980s and 1990s (Kroes and Meijers 2000; Achterhuis 2001). From the external view of technology "as some kind of autonomous, deterministic, and homogenizing force acting on society" (Veak 2006), often referred to as "essentialism" or "determinism," philosophers turned their eyes toward specific technologies in their social and cultural contexts (Verbeek 2011).

Although empirical approaches proved fruitful in exposing the nuanced relationships between technology and society, their descriptive neutrality and methodological relativism were criticized for "descriptivism" (Light and Roberts 2000), "depoliticized scholasticism" (Winner 1993), and the loss of the "activist orientation" that characterized earlier approaches (Verbeek 2011). Their dedication to "symmetry"[7] some charged, often neglected morally and politically contested relations of power and control that operated in the relationships among designers, users, and technologies (Klein and Kleinman 2002). As political scientist and STS scholar Langdon Winner famously argued, artifacts do have politics; they are "ways of building order in our world" (Winner 1986). How artifacts order our world, and who controls, or should control, this ordering, are moral and political questions.

The incorporation of moral and political concerns in the study of design and technological development is especially important in analyzing and critiquing design for empowerment propositions, both the rhetoric supporting and the technics delivering them. Descriptive concepts that announce the intentions to empower users, such as the ones collected by Oudshoorn and Pinch, do not suffice. Critical supplements are called for in order to access forms of control and delegated power inherent in technologically mediated processes.

In his 2011 book *Moralizing Technology: Understanding and Designing the Morality of Things*, philosopher of technology Peter-Paul Verbeek sets out to

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[7] The principle of symmetry was one of the main tenets of SCOT (Pinch and Bijker 1984). According to this principle the analyst maintains an impartial, agnostic position as to any "true" properties of a technological artifact in the explanations of its development (Brey 1997). The positions of all "relevant social groups" should therefore be handled by using the same explanatory criteria. First articulated by David Bloor in the Sociology of Scientific Knowledge (SSK), this principle initially referred to the use of the same type of sociological explanation for "successful" and "unsuccessful" scientific theories (Bloor 1976). The application of symmetry in SCOT has been criticized for implicitly assuming the equality and presence of all relevant social groups in the design process, thus neglecting power asymmetries between groups (Klein and Kleinman 2002).

develop a theory of "material morality" by looking at the mutually constituting relations among the designer, the artifact, and the user, both from a descriptive and normative perspective. In the descriptive part of his book Verbeek draws from STS and the philosophy of technology to tackle questions of mediated freedom, non-human intentionality, and the constitution of the moral subject. Through this inquiry, he offers productive ways of framing the morality of matter, without regressing to animism or technological determinism (Verbeek 2011). Challenging the conception of humans as intentional, moral agents, and of artifacts as passive, instrumental objects, Verbeek locates ethics in human-technology associations (Verbeek 2011). The locus of material morality, he argues, is *technological mediation*.

In his post-phenomenological[8] work philosopher of science and technology Don Ihde classifies different kinds of technological mediations, which he construes as co-constitutive associations between humans and technologies (Selinger 2006). Verbeek's study presents a regrouping of Ihde's taxonomy in two categories: mediations transforming human perception and mediations transforming human action. The "hermeneutic" or "experience-oriented" type of mediation encompasses the ways that technologies transform human interpretation and perception of the world (Verbeek 2011). The "pragmatic" or "praxis-oriented" kind of mediation relates with ways in which humans act in the world[9] (Verbeek 2011). After all, Verbeek reminds us, actions are not the result of socially embedded human intentions, but are shaped and transformed through the material world (Verbeek 2011)—a world populated in part by human made artifacts, tools, and technologies.

Since the 1970s, observational work in anthropology and sociology has offered various frameworks for analyzing reciprocities and cross-configurations among human actions, mediating technologies, and the designers of these technologists. Sociologist Steven Woolgar, for example, conceptualized technological artifacts as texts "written" by designers and "read" by users and described the development of technological artifacts as an ambivalent process of "configuring:" defining, enabling, and constraining the user (Woolgar 1991). Sociologist of technology Madeleine Akrich proposed the concept of the "script" to denote visions of the world, which the designer inscribes in the technological artifact in the form of action and control frameworks (Akrich 1992). In collaboration with Bruno Latour, Akrich conceptualized design activity as a process of laying out scenarios of action

8 Don Ihde developed a post-phenomenological approach as a corrective to phenomenology, construed as "the study of structures of consciousness as experienced from the first-person point of view" (Smith 2012). For Ihde all human experience is mediated by technologies, which constitute an inextricable part of the life-world (Verbeek 2011). Post-phenomenology therefore moves away from traditional anthropocentric accounts to a classification of technologically mediated experiences. These mediations, reminds Verbeek, constitute both subjects and objects (Verbeek 2011), or rather structure their co-constitution.

9 In his book *Technics and Praxis: A Philosophy of Technology* Don Ihde proposed to think about "hermeneutic" mediations in terms of "amplification" and "reduction" and of "pragmatic mediations" in terms of "invitation" and "inhibition" (Ihde 1979).

through material configurations ("inscribing"), with artifact usage either following these scenarios ("subscribing") or resisting and subverting them ("de-inscribing," "anti-programming") (Akrich 1992).

Extending the idea of the "script," a scenario of action designed into an artifact, Bruno Latour proposed a classification of the meanings of "technical," as he called it, mediation. Using categories such as "translation," "composition," "reversible black-boxing," and "displacement," Latour described different combination possibilities between the user's intention and a "program of action" inscribed in the artifact by its designer (Latour 1994). Although Latour's approach has been criticized for its compositional and cognitivist approach to materially embedded action,[10] it asserts the concurrent and active presence of the designer, the user, and the tool in technologically mediated processes.

Insofar as technologies mediate the ways in which humans perceive and act on the world and ethics is generally concerned with the question of how to act, then technologies are morally relevant, posits Verbeek (2011). From this perspective, design can be viewed as "a material form of doing ethics" (Verbeek 2011). After establishing the vocabulary for discussing the ethical implications of human-technology associations, Verbeek moves on to address the second question of his book's subtitle: how to design the morality of things.

"Materializing morality," Verbeek observes, is not a straightforward process of designing specific intentions into the artifact, as artifacts are hardly ever used as intended by their designers (Verbeek 2011). As a response to this problem Verbeek examines three increasingly user-centered methods for merging the "context of design" with the "context of use" (Verbeek 2011). These methods are "moral imagination" i.e. use of theoretical and empirical clues to imagine how a technology will be used; involvement of all stakeholders in Constructive Technology Assessment (CTA), an evolutionary development process, augmented with explicit moral considerations[11]; and use of scenarios and simulations to enable stakeholder participation in the design of a technology.

In the tradition of normative theories that position pluralistic participation as the pathway toward a more democratic technology (Feenberg 1991), Verbeek prescribes the engagement of the users of a technology in its design. However, when it comes to the implementation of his instructions, Verbeek falls under the fallacy he

[10] In his 2009 article entitled "The Textility of Making" social anthropologist Tim Ingold criticizes the effort to remedy the asymmetries between subjects and objects by attributing agency to non-human actors. Ingold argues that this approach casts subjects and objects before any action has taken place, and therefore loses sight of the flows of forces and matter that happen in-the-action. Ingold calls for the replacement of relational descriptions of subjects and objects in networks of agency with dynamic, processual, action-based descriptions.

[11] Verbeek's second method for bridging the "context of design" with the "context of use" is a form of Constructive Technology Assessment (CTA). CTA brings all stakeholders in an evolutionary design process. This process resembles a deliberate actualization of the evolutionary technological development under the influence of relevant user groups that Pinch and Bijker had theorized in SCOT (1984). Verbeek proposes an augmentation of the CTA process through an explicit exposition of stakeholder-technology associations (Verbeek 2011).

has repeatedly warned the readers against: he ignores that the desirable merging between the "context of design" and the "context of use" is also mediated by the very analysis techniques and simulation tools that he claims enable the designer's "moral imagination." [12] If "moral" design is linked to user engagement, then how does one design for user engagement in design? This is the question that motivated the 1971 "Design Participation" conference of the Design Research Society.

2.3 The "Design Participation" Conference 1971

The Design Research Society was an offspring of the so-called design methods movement, a collection of symposia, conferences, and publications that aspired to elucidate the process of design across disciplines and propose scientific design methods as a replacement to traditional empirical practices (Upitis 2008). Originated in England in the early 1960s,[13] the movement was both a symptom and an active participant of a changing design. In the postwar period, technological acceleration, social mobility, and growing environmental concerns turned the future into a central matter of concern for the design disciplines.[14]

As design began to be perceived as future-centric activity, empirical traditions and inherited methods were illegitimated as arbitrary "tricks of the trade" (Friedman 1971), insufficient to address the complexities of the built environment (Alexander 1964). Questions of risk and uncertainty instigated broad debates about the legitimacy of the designers' decisions and their responsibilities in "colonizing" the future (Beck 1992). In the early years of the design methods movement the question of design legitimacy was addressed through a rationalization of the design process that aimed to transform the designer from an artistic genius to a trained expert, operating according to scientifically grounded methods.

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[12] In Verbeek's proposal constructive technology assessment takes the form of what one could call a "moral usability trial." Verbeek here appears to ignore the moral implications of cross-configurations at play between designers, users, artifacts and institutions (Woolgar 1991; Mackay et al. 2000) during such trials. In the case of scenarios and simulations he does not take into account the discontents associated with such mediated representations of a reality in the making (Turkle 2009).

[13] One of the first and formative events for design methods was "The Conference on Systematic and Intuitive Methods in Engineering, Industrial Design, Architecture and Communications" (Jones and Thornley 1963), at the Imperial College London.

[14] An indicative example of future-centric rhetoric in design is the work of American architect, designer, author, and inventor Buckminster Fuller. Fuller was amongst the first to pose issues of sustainability and human survival as integral aspects of design and to articulate principles for what he called "comprehensive anticipatory design science:" a systematic articulation of human-made interventions in the environment. His paraphrase of Abraham Lincoln in the famous motto "the best way to predict the future is to design it," is revealing of a future-oriented attitude with growing prevalence among designers during the 1960s and 1970s.

Findings from operations research, systems engineering, behaviorism, and information technology were applied for the development of rational methods that would help designers manage the growing complexity of design problems (Jones and Thornley 1963; Gregory 1966). Soon after the beginning of design methods, voices from within the criticized the reductive and scientistic character of the early approaches (Broadbent and Ward 1969). Such criticisms did not revert the scientific aspirations of the movement, but rather reoriented it to the systematic understanding of the elusive particularities of the human subject (Vardouli 2014). This shift coincided with social and political events that challenged scientific expertise as the source of decision-making legitimacy and brought user participation in architecture and planning at the epicenter of design debates (Davidoff 1965). The "Design Participation" conference reflected this change of attitude.

"Design Participation" was an "experiment in conference design" (Talbot 1972). Through the aid of information technologies, such as the HOST system (standing for "Helping Organize Selective Togetherness"), on demand lecture access, and CCTV relay of the lectures into the lounge the conference participants were relieved from the burden to "endure long and uninteresting discussions" (Talbot 1972) and enabled to collaborate in workshops, or have impromptu discussions with outside parties. Designed to promote a collaborative climate and administered by amateurs in order to "eliminate bureaucracy" (Talbot 1972) "Design Participation" aspired to be *participatory* both in content and in format.

In opening the conference proceedings, event co-organizer Nigel Cross declared design a "mixed blessing," an ambivalent mixture of "harmful side effects" and "promises for the enhancement of society" (Cross 1972b). He continued to argue that the design specialists, who have the exclusive privilege of shaping the relationship between humans and their environments, have proven incapable to predict and eliminate the undesired consequences[15] of their projects (Cross 1972b). "*These harmful side effects," he announced, "can no longer be tolerated and regarded as inevitable, if we are to survive the future*." (Cross 1972b) User participation in design appeared as a potential remedy to the pathologies of design professionalism.

[15] The ideas of "undesired consequences" or "harmful side effects of technology" invoked by Nigel Cross at the "Design Participation" conference, bring to mind the concept of "unintended consequences" popularized by sociologist Robert Merton. In his 1936 article entitled "The Unanticipated Consequences of Purposive Social Action," Merton engaged in a systematic analysis of the possible causes for unintended consequences, ranging from human error and ignorance to the values that guide decision-making. The idea of intended and unintended consequences was also central in the work of philosopher, sociologist, and political economist Max Weber. In theorizing "risk society" Ulrich Beck argued that the traditional category of unintended consequences does not capture the complexities of risk society: when it comes to risk, intentionality doesn't really matter. If traditional industrial modernity tried to master nature and render the unpredictable predictable (determinant judgment), Beck's new modernity is conscious of the new uncertainties that are manufactured in this process (reflexive judgment). These manufactured uncertainties, the consciousness that technologies will bring risks that cannot be predicted, challenge the role of the experts and pose questions of decision making legitimacy, similar to the ones operative in the "Design Participation" conference.

"*Involving in the design process those who will be affected by its outcome,*" Cross suggested, "*may provide a means for eliminating many potential problems at their source*." (Cross 1972c)

The "self-selected" (Talbot 1972) conference participants were motivated by similar agendas. Recurrent themes in the conference were a suspicion against technocracy and professionalism (e.g. Banham 1972; Nuttall 1972), questions of risk, expertise, decision-making legitimacy (e.g. Cross 1972a; Roy 1972; Stringer 1972; Page 1972; Levin 1972), and explorations of social and alternative technologies (e.g. Banham 1972; Nuttall 1972). The conference participants also discussed techniques and methods of participatory design, which attempted to bridge the *why* with the *how* of participation. These proposals range from informing citizens about design decisions (e.g. Feo 1972; Mitchell 1972), to engaging them in the decision making process (e.g. Armillas 1972; Maver 1972; Siddall 1972), and to enabling them to shape their own environments (e.g. Friedman 1972; Eastman 1972; Negroponte 1972).

The diversity of these approaches illustrates the loose and polysemous interpretations of "design participation." Even at a programmatic level, the term was understood to mean very different levels of user involvement in design decision-making. "*One begins to have the feeling,*" architecture critic Reyner Banham complained in the conference, "*that this* (*participatory design*) *is, in Donald Schon's terms, one of those 'ideas in good currency' and therefore dead; one of those ideas that everyone has heard of, everybody can discuss, everyone knows what it means*" (Banham 1972).

Social worker Sherry Arnstein had famously voiced a similar skepticism of "participation" rhetoric in her 1969 article "A Ladder of Citizen Participation." "*The idea of citizen participation,*" Arnstein wrote, "*is a little like eating spinach: no one is against it in principle because it is good for you*." (Arnstein 1969) In her article she argued that although there has been extensive discussion about who should be given a voice, and why they don't have it already, there has been little talk about what the slogan "citizen participation" really means and how it relates to the social imperatives of the time (Arnstein 1969). Arnstein proposed a typology of citizen participation, presented in the form of a ladder, as a remedy to the "euphemisms" or "exacerbated rhetoric" associated with the term (Arnstein 1969). The ladder was meant as a heuristic to differentiate between "empty rituals of participation" and "real power to affect the outcome of the process" (Arnstein 1969).

Arnstein's ladder included three categories, each subdivided in "rungs" that corresponded to different levels of citizen control (Fig. 2.1). At the bottom of the ladder Arnstein placed "manipulation" and "therapy" as forms of "nonparticipation" (Arnstein 1969). Nonparticipation describes a paternalistic form of decision-making, where experts or authorities decide in the name of "the people" and appeal to benevolent intents in order to legitimize their choices. Next, the ladder featured "informing," "consultation," and "placation" as forms of "tokenism" (Arnstein 1969). In cases of tokenism the citizens' voices are heard, yet the final decisions are still made by experts or authorities. At the top of the ladder Arnstein placed "partnership," "delegated power," and "citizen control" as forms of "citizen power," which she declared the true form of citizen participation (Arnstein 1969).

Arnstein's taxonomy was operative in the "Design Participation" conference. The tools and methods presented by the participants promoted different levels of participation, ranging from tokenism to citizen power. In the following paragraphs I will describe presentations that aspired to realize Arnstein's prescription for citizen control. These projects employed computation and information technology so as to remove professional intermediaries from the design process and give users control over the shaping of their living settings. By replacing the human intermediary with a technological mediator, however, the project authors found themselves confronted with the question of technological intentionality. As discussed earlier, to claim that artifacts have intentions is not to animate them or cast them determinant, but to view them as active participants in mediating human perception and action. By delving into the technics of these early proposals of design for empowerment, I aim to tease out different models of technological mediation put to work in the design disciplines and place them in dialogue with recent conceptualizations of human-technology associations in the context of STS. Through a cross-fertilizing encounter between these two seemingly disparate fields, I argue on the one hand that early design research proposals implicitly prefigure recent STS debates, and on the other hand that recent STS discussions of technological mediation can offer valuable analytical tools for inquiry into early design research proposals.

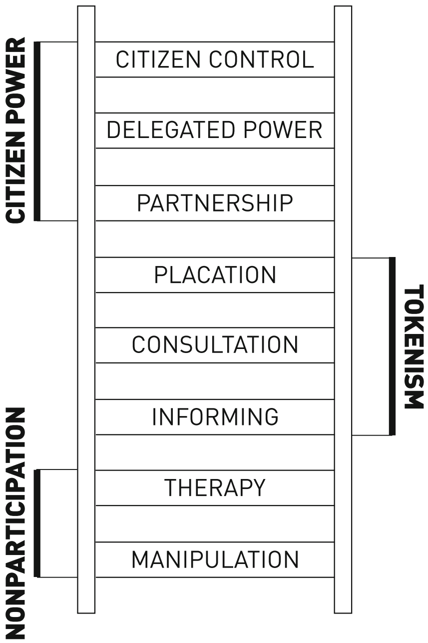

Fig. 2.1 Sherry Arnstein's "ladder of citizen participation" (Arnstein 1969). The "ladder" includes eight rungs that correspond to degrees of nonparticipation, tokenism, and citizen power. Arnstein declared citizen control the true form of participation

2.4 Models of Technological Mediation in Design Participation

2.4.1 *The Thermostat Model*

In his influential work *Notes on the Synthesis of Form*, architect Christopher Alexander conceptualized the relationship between a form and its environment in terms of "fit" (Alexander 1964). "Fit" measured the "well-adaptedness" between the design proposal and its physical and social context. Two years after publishing the *Notes* Alexander developed in collaboration with Barry Poyner a methodology for incorporating user-related parameters in the design process. Entitled *The Atoms of Environmental Structure*,[16] this study proposed "user tendencies," external, observable, and quantifiable behaviors, as a basic unit for structuring people's environments (Alexander 1967). The necessity to consider the evolution of human "tendencies" (Studer 1969) or the question of whether "tendencies" are a good measure of human needs in the first place (Daley 1969; Ward 1969) had raised debates in the design methods cycles (Vardouli 2014). The question of "good fit" between humans and their environments was a growing, yet unresolved, matter of concern.

In the "Design Participation" conference Charles Eastman[17] set out to address this question. In his presentation entitled "Adaptive-Conditional Architecture" (Eastman 1972) Eastman equated "good fit" between a user and an environment with the elimination of external constraints impeding free action. The least the "effort in physical, psychological, social, or economic terms" to carry out an activity in a particular environment the highest the fit, he prescribed (Eastman 1972). Eastman went on to observe that although many quantitative and qualitative measures of fit were at hand at the time,[18] they were only taken into account during the design process and did not respond to future changes of context or evolutions in the users' activities. "Architecture," he declared, "is tuned prior to occupancy" (Eastman 1972). Eastman saw this problem acquiring political and moral dimensions in designing for large numbers of anonymous users. Having no measure of these users' particular interactions with the environment, he argued, designers impose their own values over those of the social groups for which they design.

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[16] The *Atoms of Environmental Structure* had been developed during Alexander's two-year visiting researcher appointment at the Offices Development Group (ODG) of the UK Ministry of Public and Building Works.

[17] Charles Eastman is currently director of the Digital Building Laboratory at Georgia Tech and renowned for his pioneering work in Building Information Modeling. At the time of the "Design Participation" conference Eastman was associate professor and director of Institute of Physical Planning at the School of Urban and Public Affairs, Carnegie-Mellon University.

[18] As part of the qualitative and quantitative toolkit for measuring "fit" between users and their environment Eastman listed methods such as human factors, ergonomic studies, time and motion analysis, proxemics influences and social interactions, as well as influences from sensory processing, cognition, and symbolic references (Eastman 1972).

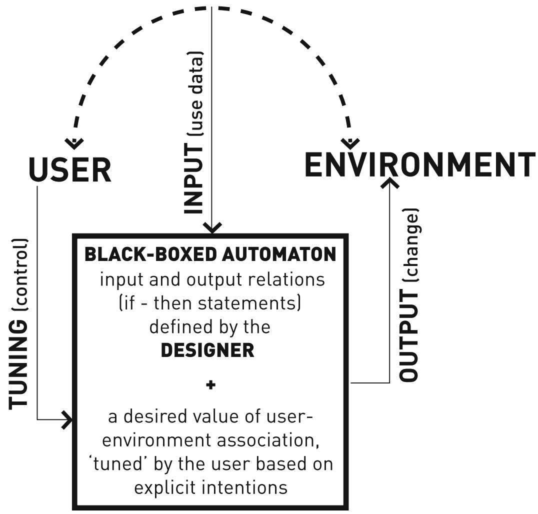

Fig. 2.2 Diagram of the "thermostat model," drawn by the author, based on Charles Eastman's descriptions of "Adaptive-Conditional Architecture" (Eastman 1972)

In order to fine-tune the relationship between users and their environment Eastman speculated on a new model of adaptable architecture, which he metaphorized as a *thermostat* (Eastman 1972). The thermostat is an automatic feedback system that senses the temperature of the environment and modifies its behavior so as to maintain this temperature near a desirable "set point." This encapsulated the four main components of Eastman's theoretical model of "adaptive-conditional" architecture: a "sensing device," a "decision algorithm" running on conditionals ("if—then" statements), a "change mechanism," and a "control setting feature" (Eastman 1972). The "sensing device" elicited future activities or occupancy data through quantitative or qualitative methods, such as sensing, interviews, surveys, and observations. The "if-then" statements prescribed the ways in which the environment responded to these data. The "change mechanism" outputted the response to the input by modifying an environmental parameter. Finally, the "control setting feature" enabled users to control the system's "set point," to assign a desirable value to the user-environment relations (Fig. 2.2).

In the "thermostat model" the designer structures human-environment associations. The key idea in Eastman's proposition was that physical environments embody specific possibilities for action that can support or constrain their users' activities. Insofar as designers define these possibilities, environments embody what Latour would later describe as "delegated power"[19] (Latour 1994). From this

[19] The feeling that designers imposed order in the world through the environments that they designed, was widely shared among designers since the rise and decline of International Modernism. The modernist redefinition of architecture as making "machines for living" (Le Corbusier 1923) did not only epitomize the turn toward functionality and efficiency but also formed the ground for a broader rethinking of "architecture as technology." Technology means here as "*anything made,*

perspective, the concept of "fit" (Alexander 1964) can be interpreted as an effort to systematize a particular kind of human-technology association: one between human and a technology for living. The designer's responsibility is then to create "good fit" between humans and their environment. This approach to the designer's role presents parallels with Verbeek's figuration of the designer as the orchestrator of desirable human-technology associations. Opposite to Verbeek who aims to anticipate and prescribe these associations, Eastman rejects "tuning" a design prior to use (Eastman 1972). Such pre-tuning, he argues, is both inefficient, because people change, and morally contested, because it does not allow users to define the desirable associations with their environment according to their own values. Opposite to giving the environment a concrete form based on a pre-calculation of fit, the designer designs abstract possibilities for a form, rendered as qualitative relations (if-then statements) between user action and environmental parameters.

The adaptive-conditional environment black boxes human-environment associations. Adaptive-conditional architecture is a proposition for an evolutionary approach to human-environment associations, which differs from anticipatory methods that attempt to define such associations prior to occupancy. When Eastman proposed this model, the idea of a "soft" environment supporting the user's changing activities as a replacement to "hard," constraining architectures was already present in the designers' imaginary, fueled by ideas from cybernetics and control theory. In his 1967 article "The Design of Intelligent Environments: Soft Architecture" Warren Brodey had proposed the idea of an "intelligent environment" as an adaptive, self-organizing system both influenced by and influencing its users behavior. Drawing from Rosenblueth, Weiner, and Bigelow's hierarchy of behaviors (Rosenblueth et al. 1943), Brodey had envisioned an environment that goes beyond automation, and moves toward self-organizing and evolutionary behaviors (Brodey 1967).[20] For Brodey, this was the pathway to a kind of responsiveness that could account for the particularities and evolving purposes of the users, instead of considering them "passive unintelligent abstractions who do not create or evolve" (Brodey 1967). Eastman's proposal can therefore be seen as a form of human-modulated evolutionary environment.

In the "thermostat model" the user tunes human-environment associations. In Eastman's proposal the role of the user is twofold: the user both provides the input to adaptive-conditional system and controls the desirable output of this system. The user is an ambivalent figure oscillating between a behavioral subject, whose actions and intentions are formed in relation to a material environment, and a free intentional agent, who "tunes" the material world so to act free of material constraints. This positions the thermostat model in the middle between two likeminded

(Footnote 19 continued)
managed, configured, or transformed in the process of modifying the environment for human habitation" (Hale 2012).

[20] In the context of Warren Brodey's article, "self-organizing" denotes a system that maintains its organization besides partial failures and "evolutionary" designates a system that can form new "purposes."

proposals, which however prove anti-diametrical when examined from the perspective of technological mediation: Yona Friedman's proposal for a behavior-less, transparent, and "objective" machine that supports all human intentions, and Nicholas Negroponte's proposal for a hybrid intentionality emerging through congenial human-machine "conversation."

2.4.2 The Menu Model

Before joining the Design Participation conference, Hungarian-born architect Yona Friedman had been experimenting with ideas about participatory planning and architecture for over a decade. In France, which was his country of residence, Friedman was a central figure in movements that engaged with ideas of participation, urban mobility, and prospective design (Rouillard 2004; Busbea 2007). His utopian proposal for a "Spatial City" (Friedman 1958), a systematic mega-grid hovering over the built environment and offering an infrastructure for ephemeral dwelling and constant mobility had a great impact in the European and Japanese so-called radical architectural scene (Rouillard 2004). Friedman was also renowned for his explorations of a simple visual language, the so-called pictograms, enabling non-experts to "read" architecture and express their design intentions in a way understandable by builders.

In "Design Participation" Friedman presented a summary of his book *Pour Une Architecture Scientifique,*[21] published in French at the year of the conference. In his conference presentation entitled "Information Processes for Participatory Design," Friedman defined design as the informational process of translating the needs of a future user into an artifact (Friedman 1972). The replacement of the single user by masses of people, Friedman argued, had posed a severe informational problem: unable to process the particularities of each user, designers invented a statistical medium (Friedman 1972) and used it as a surrogate of the future user. This fictive mathematical entity not only failed to represent the true needs of the users, but also offered designers a trojan horse through which to justify their preconceived notions and arbitrary preferences (Friedman 1958, 1972). Friedman's guiding aspiration was to ensure an undistorted translation between the user's preference, and the final piece of "hardware" (Friedman 1972). For Friedman, this required a mathematical device that remained immutable as it moved between different subjects (the user, the designer, the builder) and places (paper, machine, built form). The graph, as an

[21] Yona Friedman had originally used *Pour Une Architecture Scientifique* as a textbook for a class on participatory design, which he taught as a visiting professor in the University of Ann Arbor at Michigan (Vardouli 2012). During his travels to the United States, the Hungarian-born French architect, had developed an intense curiosity for the epistemological transformations that information theoretical ideas effected to numerous disciplines. During his stay at Ann Arbor and under the influence of the renowned graph theorist Frank Harary (Vardouli 2012), he applied information and graph theory to justify the intuitions that had led him to propose the "Spatial City," and to elucidate his ideas in a comprehensive scientific theory of architecture (Friedman 1971).

isomorphic representation of a spatial structure, appeared to be the right kind of tool for this task.

Friedman used graphs as a means to represent the spatial structure of a plan. The points of the graph represented spatial enclosures, the links corresponded to accesses, and the labels to forms or functions (Friedman 1972). Using this representation, Friedman observed, one could easily enumerate all the possible ways that a number of spaces can be arranged, thus making the user aware of the full spectrum of realizable choices. Apart from knowing what is possible, however, the user also needed a way to evaluate these possibilities. For this purpose, Friedman developed a method of "weighing" each choice, according to the user's lifestyle. This method involved a form of self-tracking of one's living habits, by counting the number of times that one enters a room. Using these data one could calculate the "effort" that each choice would mean for a given lifestyle. In the final step of the process the user was presented with the full weighed list of spatial organizations. Friedman metaphorized this new model of architecture as choosing from a restaurant menu (Friedman 1971, 1972). The difference was that his *menu* allegedly contained every plan choice physically realizable, and that the prices were calculated not based on external values but based on the intrinsic properties of the plan and the habits of the user (Friedman 1972) (Fig. 2.3).

In "Design Participation" Friedman also presented a speculative computational rendering of this method that he had previously exhibited in the 1970 Osaka World Expo: the FLATWRITER machine. This machine automated the menu-making process by presenting the user with two keyboards, a personalized keyboard of "labels" (formal and functional preferences) and a keyboard of "weights" (importance of a space in one's daily life), and then producing the full "menu." "*Decision making is the result of* cooperation between man and machine (emphasis mine)," Friedman wrote (Friedman 1972). However, "*The adjustment process* (*choice of preferences*)," he remarked, "*is the* client's reserved domain (emphasis mine)" (Friedman 1972).

In the "menu model" the designer/machine "transparently" constructs a personalized "menu." Freedom of choice was the main tenet of Friedman's technologically mediated architectural democracy. Since his early work, Friedman had criticized architects for using pseudo-theories to enforce their own values and ideas about design, thus defining and oppressing the lives of their future users. Friedman attended to the ideal of unmediated user control through a "remodeled architectural process" (Friedman 1971). This process suggested a refashioned designer, who does not make decisions for the user in a "paternalistic" manner, but presents the user with options along with an "objective" personalized evaluation of these options.

In *Pour une Architecture Scientifique,* Friedman described in full length the epistemic advantages of the graph for enabling an "objective" axiomatic of architecture that could form the substructure of all idioms and personal meanings (Friedman 1971). The elements of the graph, he argued, had a "one-to-one" correspondence with a real spatial structure thus enabling immutable translations between reality and its representation, regardless of context and cultural convention.

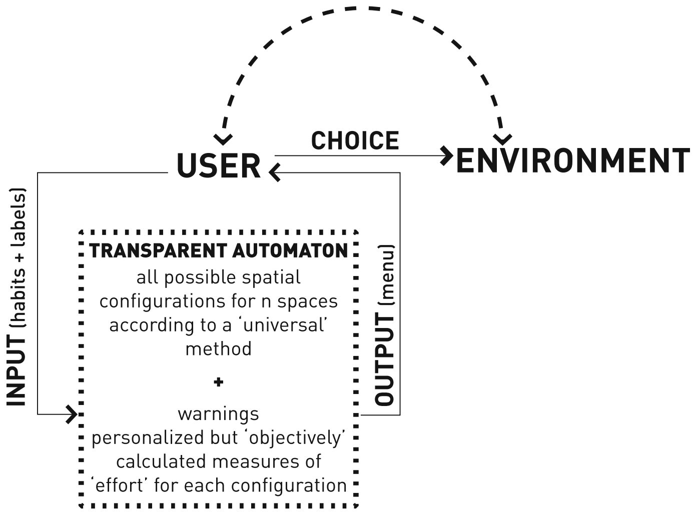

Fig. 2.3 Diagram of the "menu model," drawn by the author, based on Yona Friedman's description of "Information Processes for Participatory Design" (Friedman 1972)

Apart from universal representations, the graph also enabled disinterested evaluations. The "warnings" for each design option, were not a product of the designer's external values, but were derived from the structure of a design itself, and the preferences of the user. In this work, Friedman also appraised the explicitness of his method that rendered it "teachable" to all users (Friedman 1971), sidestepping the elusive and tacit processes of empirical apprenticeship. Universalism, disinterestedness, and democracy, that sociologist Robert Merton had famously declared tenets of the scientific ethos (Merton 1946), were also the main principles of Friedman's refashioned designer.

The FLATWRITER metaphorized the ideal persona of the designer: a transparent, mechanical operator divested from any subjective intentions. It also expressed Friedman's attitude toward technology. With his proposal, Friedman framed a clear-cut distinction between a willful human agent, and an inert unintentional tool. Opposite to a priori assuming the neutrality and non-intentionality of technology, he explicitly attempted to design it. From the non-defining infrastructures supporting unpredictable action he envisioned in the "Spatial City," to the "non-paternalistic," unintentional, and transparent workings of the FLATWRITER, Friedman saw technology as a neutral support to human action and intention. He separated the realm of the human, the "intuitive system," from the realm of the technological, the "objective system," and placed technology, literally, *under* the human.

In Friedman's model the user allegedly made a "free" and "informed" choice from the "menu." This figuration of technology as neutral and disinterested support does not negate technological mediation. It exhibited full awareness of the mediating role of technologies in human perception and action and aspired to create a protocol that will preserve the human as prime mover of a growing technological universe. Scholars have argued that technological mediation disturbs the inherited view of the human as a free agent (Latour 1994; Pickering 1995; Verbeek 2011). They view the modern enlightened subject replaced by hybrid forms of intentionality produced through interactions between humans and technology. Friedman protocoled the "cooperation between the user and the machine" (Friedman 1972) in a way that preserved the threatened modernist ideal of the subject as a rational willful agent. A first exhibit of Friedman's modernist attitude was the portrayal of the subject as a disembodied information processor. In the "menu model," the user calculated the personal and collective consequences of each choice and rationally made a decision. Any form of "steering" in this process was dismissed as "paternalistic." Through his cognitivist and human-driven proposal of user empowerment Friedman aspired to a decision-making democracy constituted of moral calculating actors, planning their personal and collective living environments through universal and transparent methods. This model found a direct counterpoint in Nicholas Negroponte's explorations of "architecture machines" as sentient "partners" in the design process.

2.4.3 The Surrogate Self Model

The question of the "cooperation between human and machine," that Friedman alluded to when describing the FLATWRITER, had been one of the main concerns of the Architecture Machine Group since its foundation in 1967. Started by architect Nicholas Negroponte as a research group in the MIT Department of Mechanical Engineering, the Architecture Machine Group had challenged the conception of computers as glorified calculators at the service of human designers (Alexander 1965). Inspired by the ideas of J.C.R. Licklider (Vardouli 2012), who envisioned a "symbiosis" between the dissimilar entities of humans and machines (1960), and incorporating ideas from conversation theory and artificial intelligence, the Architecture Machine Group aspired to recast computational machines as active "partners" in the design process (Negroponte 1970). In contemplating human-machine partnerships, the Group directly engaged with questions of interaction and mediation (Bolt and the Architecture Machine Group 1976).[22]

At the time of "Design Participation," the Architecture Machine Group had moved from research into computer aids that empowered designers to tackle the

[22] With slogans such as a "new humanism through machines" the Group's leader, Nicholas Negroponte, actively promoted a shift to the understanding of computers from tools of the technocracy to media of personal empowerment and social emancipation (Negroponte 1970; Groisser and Negroponte 1971; Negroponte 1975).

complex needs of their users,[23] to computer aids for direct user participation in design (Groisser and Negroponte 1971). Influenced by Yona Friedman's ideas of "architecture by yourself" (Weinzapfel and Negroponte 1976; Negroponte 1975), the Architecture Machine Group was at the time of the conference working on a proposal for a computational machine enabling users to create their own designs.[24] The program was built on the basis of Friedman's graph theoretical design method, but differed significantly in the way it interacted with the users.

Opposite to Friedman, who proposed a rational, symbolic dialogue between the user and the machine, the Architecture Machine Group proposed a fluid, perceptual interaction: The process began with the user making a sketch of a desired plan. Through sketch recognition algorithms the machine abstracted the sketch to a spatial structure, and then uses parameters inputted by the user and general constraints hardcoded by the designer to feed back a design proposal. The user then responded to this proposal and the dialogue moved forward. Borrowing ideas from British cybernetician Gordon Pask, the Group aspired to orchestrate a congenial "conversation" between human and machine.[25] Through this conversation, the Architecture Machine Group was arguing, the machine would be transformed into a an expert *surrogate* of the user (Groisser and Negroponte 1971), learning to recognize idioms and idiosyncrasies, while the user's design capacities would gradually be "amplified," through intuitive interactions with the machine. Negroponte would later name this speculative machine a "design amplifier" (Negroponte 1975). In "Design Participation," however, Negroponte did not talk about this project. Instead he used a similar model of human-machine association to speculate on environments that were not just adaptive or responsive like thermostats, but "intelligent." "*What will it really be like to inhabit a physical environment that might be described with such adjectives as: alert, friendly, playful, grumpy, or simply 'intelligent'*?" Negroponte asked (Negroponte 1972)

[23] The Architecture Machine Group's first major work in the area of Computer Aided Design (CAD) was URBAN 5, a research project for computer-aided architecture initiated in 1966 under the joint sponsorship of the IBM Cambridge Scientific Center and the Massachusetts Institute of Technology. The Architecture Machine Group later wrote about URBAN 5: "*This effort was the first and largest comprehensive computer system ever developed to assist architects with those activities they call "design"* (*as against specification writing, preparation of working drawings, accounting* etc.)" (Groisser and Negroponte 1971).

[24] Around the time of the Design Participation conference, the Architecture Machine Group submitted to the National Science Foundation (NSF) a proposal for Computer Aids to Participatory Architecture, which however did not get funded. Nicholas Negroponte had taken inspiration from Friedman's argument that the user—as the risk bearer in design- is the legitimate decision maker (Friedman 1975). In 1973, Negroponte invited Yona Friedman as a visiting researcher in the Architecture Machine Group, in an effort to implement his ideas about the FLATWRITER, in a new program called YONA (Your Own Native Architect). In 1975 Nicholas Negroponte published the results of these explorations in his book *Soft Architecture Machines*, with a foreword on the chapter about participatory design by Yona Friedman.

[25] Gordon Pask famously argued mutual understanding derived from three levels of modeling: "(1) *its* (*the machine's*) *model of you,* (2) *its model of your model of it, and* (3) *its model of your model of its model of you*." (Negroponte 1975).

Negroponte's published paper in the "Design Participation" proceedings begins with a photocopy of a letter to the conference organizers, declaring the text "*a very first draft of new and controversial ideas*," "*a first stab at disclosing a train of thought*," "*the very first inklings of what the subject is all about*." (Negroponte 1972) Titled "Aspects of Living in an Architecture Machine," Negroponte's direction-setting presentation, compared and contrasted different approaches to the way in which an environment should recognize, respond, and learn from its users (Negroponte 1972). Through this comparative inquiry Negroponte portrayed a physical environment imbued with human-like intelligence. This environment recognized its users through informed guesses and mental shortcuts (heuristics), employed evolutionary learning to cope with the erraticism of its users, and responded in environmental, physical, and informational ways (Negroponte 1972).[26] "*Absolute adaptivity,*" wrote Negroponte, "*would lead to terrible complacency.*" (Negroponte 1972) Opposite to Eastman who imagined the environment as following the subject's evolution, Negroponte put forth a vision of an environment that resembled a "good friend or surrogate self" (Negroponte 1972).

In the "surrogate self" model the designer/machine models and converses with the user. Both in designing computer aids for architecture-by-yourself and in laying out the principles of an "intelligent" environment, Negroponte envisioned a technological mediator that can learn, react, and converse with the user like a sentient being. Both Eastman and, more saliently, Friedman, dismissed the human designer's subjectivity as distortive of the user's intentions and model their technological systems as "supports" for their unconstrained expression. The mechanical operation of Eastman's thermostat or Friedman's menu-making typewriter, boisterously prescribed an "objective," "unintentional" mediation. Negroponte's proposal presented a different attitude. Opposite to Friedman who mechanized the human intermediary, Negroponte aspired to humanize the machine; opposite to Eastman who imagined the environment as a responsive servant of human activity, he

[26] In his presentation "Aspects of Living in an Architecture Machine," presented at the "Design Participation" conference, Negroponte explored different methods for recognizing, responding, and learning from the user. As far as user recognition was concerned Negroponte proposed heuristics, i.e. informed guesses based on previous experience and mental shortcuts as an intuitive way of identifying the user of an environment. He counterpoised this idea to artificial means, such as a barcode, or statistics, that do not really provide any meaningful information about the user. He then proceeded to envision three kinds of responsiveness, pertaining to atmospheric changes (environmental), practical gadgetry (operational), and linguistic interactions with the user (informational). Finally, when it came to learning the user, Negroponte examine three types of models: the "determinate", the "probabilistic", and the "evolutionary." The determinate model corresponded to a compositional kind of modeling, based on building up a model through smaller ones. "*Such a model,*" Negroponte wrote, "*is always at the mercy of its human designers, because when it fails it is simply repaired by the addition or subtraction of the parameters deemed necessary.*" (Negroponte 1972) The probabilistic model was based on the examination of statistical probability, gauging future behavior based on past ones. Negroponte dismissed this anticipatory kind of learning as unsatisfactory, because it told the machine nothing about the phenomenon in question. Negroponte proposed evolutionary learning as the main principle of an "intelligent" environment.

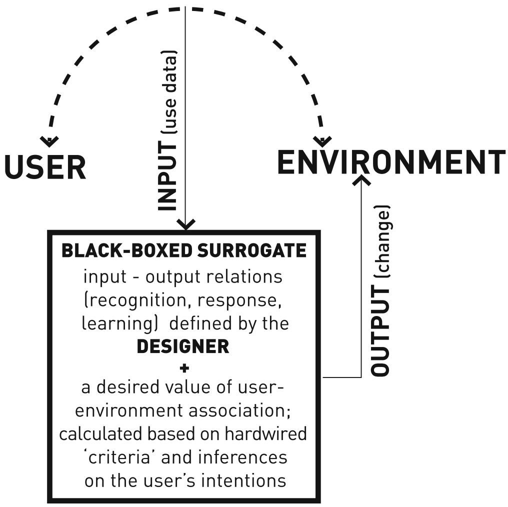

Fig. 2.4 Diagram of the "surrogate self model," drawn by the author, based on Nicholas Negroponte's description of "Aspects of Living in an Architecture Machine" (Negroponte 1972)

envisioned a co-evolving partner. However, his proposal still held a privileged position for the human agent (Fig. 2.4).

Negroponte construed user control as the ability to design personalized mediations with one's technological environment- be it the tools that one uses, or the environment that one inhabits. In Eastman's model, the user "tuned" the machine's behaviors, i.e. the desirable outputs of the black box. However, a human designer had decided in advance the kinds of behaviors that could be adjusted. Negroponte's proposal and broader work as part of the Architecture Machine Group was based on the aspiration to create a form of personalized responsiveness by inferring categories and criteria through conversation with the user. In a reflective process, the user designed the environment that designed the user. Negroponte's proposal portrayed a subject whose intentions are shaped through active, embodied engagement with the technological environment. From the prime mover of technology, Negroponte reframed the empowered user as a perceptual, fluid subject, "infected" by interactions with the world.

2.5 A Laboratory of Mediations

In her recent New York Times opinion piece entitled "Zombie Nouns," Helen Sword issued a polemic against nominalizations. "*They cannibalize active verbs,*" she said, "*suck the lifeblood from adjectives and substitute abstract entities for human beings*." (Sword 2012) According to Sword, the replacement of different parts of speech with nouns "fails to tell us who is doing what" (Sword 2012). When you see nominalizations look for hidden actors, Sword seemed to prescribe. In this chapter I applied this heuristic to "user empowerment," an increasingly invoked keyword associated with a heterogeneous assemblage of market opportunities, emancipatory visions, and new technologically enabled design paradigms. I suggested that insofar as design for empowerment implicates a designer, a user, and a tool, then the question "who designs" is a productive lens from which to analyze and critique techno-centric proposals issuing empowering claims.

The goal of my inquiry was not to develop a normative theory for how to answer this question, but to offer theoretical scaffolding from which to ask it and to map different styles of responses. After all, as mathematician and philosopher Henri Poincare is quoted to have declared, "*The question is not*, '*What is the answer*?' *The question is* '*What is the question*?'" (Licklider 1960) The question, I argued, is one of technological mediation. The way that one asks it and responds to it reveals different attitudes toward the association between users and technologies and toward the role of the designer in laying out these associations. With this hypothesis as a point of departure, I synthesized theorizations of technological mediation in the context of STS and the philosophy of technology alongside embodiments of the same question in speculative techno-centric proposals for user empowerment as developed in the context of the design disciplines.

I first synopsized recent concepts and ideas developed in STS so as to conceptualize the relationships between designers, users, and artifacts. I argued that pertinent scholarship addresses the "blurring of the boundaries between production and consumption" (Oudshoorn and Pinch 2008) in a primarily descriptive fashion. In search for critical supplements to this descriptive vocabulary, I moved to scholarship that brings moral and political concerns to the design and use of technological artifacts. Drawing from Don Ihde's post-phenomenological perspectives into human-technology associations (Ihde 1990), semiotic approaches to user configuration and technological mediation (Woolgar 1991; Akrich 1992; Latour 1994) and Peter-Paul Verbeek's theorization of material morality (Verbeek 2011), I identified ways of thinking about intentionality and freedom in technologically mediated human experience that nuance the extremities of social constructionism and technological determinism. Instead of declaring the user as constructor of technology or technology as determinant of the user, discussions of technological mediation cast the associations between users and technology as the locus of ethical and political concerns. In doing so they lay the ground for normative theories of design ethics, such as the one articulated by Verbeek or the ones presented as speculative projects in the "Design Participation" conference. Departing from this observation, I critically analyzed Verbeek's ways of "*anticipating*, *designing*, *and assessing the mediating roles of technologies*" (Verbeek 2011), which he casted as "*methods that also open the possibility of making technology design a more democratic activity.*" I used Verbeek's normative claims as segue into analogous debates that took place in the design disciplines four decades earlier.

Transitioning to design debates, I provided a brief history of the designers' ethical self-reflections, as they were manifested in the so-called design methods movement. I suggested reading the early effort to scientize design as an attempt to anticipate and assess the mediating roles of technology, as Verbeek would later come to prescribe. Through an abridged narrative of design methods activity during the 1960s, I illustrated a change of attitude in the designers' moral self-portraiture. From deontological[27] anticipation, designers moved toward self-abnegation to give full authority to the legitimate decision-makers, the future users. Sherry Arnstein's "Ladder of citizen participation" was an example of the rise of such preference utilitarianist attitudes in the design cycles.

I then moved on to examine three proposals for direct user control of the processes of architecture and planning, all self-positioned at the top rung of Arnstein's ladder. These proposals aspired to remove professional intermediaries from the design process and intended to offer direct control to the users through a technological facilitator. After describing their main principles I analyzed them from a perspective of technological mediation examining the roles and responsibilities that they ascribe to the human designer, the user, and the mediating machine. This analysis brought forth three different models of technological mediation, with different conceptions of intentionality and freedom. The table below synopsizes this analysis (Table 2.1).

It is a frequent tendency to approach past technological imaginary with retro-futuristic nostalgia or instrumentalism. My motivation for revisiting the past was neither to remark the prophetic insight of the past visions of the future, nor to uncover workable user empowerment ideas that fell short due to the lack of required technologies. I proposed to view design debates as a fertile testing ground of ideas about how users should relate to their human-made environment and argued that such debates can contribute to ongoing inquiries into technological mediation (Ihde 1979; Latour 1994; Verbeek 2011) and the ethics of design (Achterhuis 1998; Verbeek 2011).

Design for empowerment is a laboratory for contemplating the responsibilities of the designer in creating associations between users and technologies. It is also a laboratory for constructing the persona of the empowered user: at times a free intentional agent; other times a rational calculating actor; and some times an non-modern subject, entangled with the environment that it inhabits and in which it creates. Ultimately, design for empowerment is a laboratory for tackling questions of intentionality and freedom, either as transcendental ideals with the human as the prime mover or as the "*possibilities that are opened up for human beings so that they might have a relationship with the environment in which they live and to which they are bound*" (Verbeek 2011). Understanding the nuances of the question "who designs?" and the multifarious assumptions made when asking it, is crucial for escaping the loop of optimism and discontent associated with design for empowerment and actualizing the productive potentials of this persistent and elusive vision.

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[27] Deontology is a normative theory of ethics that evaluates an action based on a set of rules (Alexander and Moore 2012). Preference utilitarianism is a form of consequentialism, a normative theory that judges the rightness or wrongness of conduct based on the consequences of one's actions. This form of utilitarianism seeks to satisfy the preferences of as many stakeholders as possible (Sinnott-Armstrong 2012).

Table 2.1 Summary of the designer's, machine's, and user's role in the "thermostat," the "menu," and the "surrogate self" models

	Designer	Mediating technology	User
Thermostat model	A steersperson: structures human-environment associations ("fit" relations) by linking user input with environment output	A black-boxed automaton: Outputs a change based on "fit" relations, defined by the designer, so as to achieve a desirable "fit" value, defined by the user	A rational and behavioral agent: Defines a desirable "fit" value and provides use input to the "machine"
Menu model	A transparent automaton (scientific ethos): applies a "universal" and "objective" method to calculate all possible spatial configurations for a number of spaces and provide personalized "effort" warnings to the user	A transparent automaton: applies a "universal" and "objective" method to calculate all possible spatial configurations for a number of spaces and provide personalized "effort" warnings to the user	A rational agent: Rationally evaluates all possibilities and makes a decision
Surrogate self model	A steersperson: defines "criteria," maximum and minimum acceptable values, for human-environment associations and designs the recognition, response, and learning "behaviors"	A black-boxed surrogate: Outputs a change, based on hardwired "criteria" and user intentions inferred through "conversation" with the user	A behavioral agent: Forms intentions by conversing with the "machine" and provides use input

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