Co-Design as a Process of Joint Inquiry and Imagination

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Introduction

Many innovation projects are currently organized as co-design processes (i.e., as processes of creative cooperation). The term co-design can refer, for example, to the organizing of open innovation processes, in which people from different organizations share and combine ideas and knowledge, or to involving users or customers as participants in the design process.[1] One might even argue that design is always co-design because it is inherently a social process.[2] Co-design comprises diverse approaches, ranging from research-oriented ones (e.g., applied ethnography) to design-oriented ones (e.g., using generative tools), and with a focus on user involvement, ranging from approaches in which researchers and designers move toward users (e.g., usability testing) to approaches in which users move toward researchers and designers (e.g., participatory design).[3] Co-design often builds on the tradition of (Scandinavian) participatory design.[4]

In this paper, I follow Sanders and Stappers's use of the term co-design to indicate "collective creativity as it is applied across the whole span of a design process."[5] Another useful definition is provided by Kleinsmann and Valkenburg, who describe co-design as "the process in which actors from different disciplines share their knowledge about both the design process and the design content… in order to create shared understanding on both aspects… and to achieve the larger common objective: the new product to be designed."[6] This definition draws attention to the sharing and combining of knowledge and to developing shared understanding—issues that are discussed here.

Diverse benefits are associated with co-design: from improving processes of idea generation and service or product development, to improving decision-making and promoting cooperation and creativity, to improving users' and customers' satisfaction and loyalty over the long-term.[7] Despite the prominence of co-design as a strategy, it receives little scholarly attention, and the ideas behind it are rarely discussed critically.[8] This situation might be caused by the popularity of labelling projects as *co-design* and the conceptual dilution or confusion that results.

1 Henry W. Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from New Technology* (Boston: Harvard Business School Press, 2003); and Henry W. Chesbrough, Wim Vanhaverbeke, and Joel West, eds., *Open Innovation: Researching a New Paradigm* (Oxford: Oxford University Press, 2006). Sari Kujala, "User Involvement: A Review of the Benefits and Challenges," *Behaviour and Information Technology* 22, no. 1 (2003): 1-17; Harald Rohracher (ed.), *User Involvement in Innovation Processes: Strategies and Limitations from a Socio-Technical Perspective* (Munich: Profil Verlag, 2005); and Bo Edvardsson, Anders Gustafsson, Per Kristensson, Peter Magnusson, and Jonas Matthing, eds., *Involving Customers in New Service Development* (London: Imperial College Press, 2006).

2 Louis Bucciarelli, *Designing Engineers* (Cambridge, MA: MIT Press, 1994).

3 Elisabeth B. N. Sanders and Pieter Jan Stappers, "Co-Creation and the New Landscapes of Design," *CoDesign* 4, no. 1 (2008): 5-18; and Marc Steen, Tensions in Human-Centred Design," *CoDesign* 7, no. 1 (2011): 45-60.

4 Douglas Schuler and Aki Namioka, eds., *Participatory Design: Principles and Practices* (Hillsdale, NJ: Lawrence Erlbaum, 1993).

5 Sanders and Stappers, "Co-Creation and the New Landscapes of Design."

6 Maaike Kleinsmann and Rianne Valkenburg, Barriers and Enablers for Creating Shared Understanding in Co-Design Projects, *Design Studies,* vol. 29, no. 4 (2008): 369-86.

7 Marc Steen, Menno Manschot and Nicole De Koning, Benefits of Co-Design in Service Design Projects,

In this essay, I explore how philosophical pragmatism can help to better understand and to effectively organize co-design processes.

Abduction or Design Thinking

A first move in this exploration is to note that (co-)design proceeds via a particular form of logic and that it cannot be adequately understood as a form of science or of engineering. Science is typically concerned with describing and understanding past or current situations and with discovering "facts," whereas design is concerned with envisioning and realizing alternative situations, and with both facts and values. Furthermore, engineering is typically concerned with solving a problem that is given beforehand and finding one "best" solution, whereas design is concerned also with exploring alternative problem definitions and with exploring alternative solutions. I add "typically" to acknowledge the fact that scientists' or engineers' actual practices can be rather different from how these practices are "typically" described or prescribed in textbooks or in management discourse. Numerous studies have shown that, in science and engineering practices, facts and values are often intertwined and are dealt with simultaneously, and that problem-setting and solution-finding proceed via explorative and iterative processes.[9]

What happens in (co-)design can be understood more adequately as a process of *abduction*—a term coined by pragmatist philosopher C. S. Peirce, which refers to a type of reasoning that is different from deduction or induction: "deduction proves that something must be; induction shows that something actually is operative; abduction merely suggests that something may be."[10]

These three types of reasoning can be illustrated with the following examples: In *deduction,* one starts with two or more premises and then draws a conclusion. For example, one starts with the premises, "All humans are mortal" (p→q) and "Socrates is a human" (p), and then deduces that "Socrates is mortal" (q); this type of reasoning is typical for mathematics and logic. In *induction,* one starts with a series of observations and then speculates about a pattern. For example, one observes that "if copper is heated, it expands" (p1→q1); "if steel is heated, it expands" (p2→q2), etc.; and then induces that "if metal is heated, it expands" (p→q). This type of reasoning is typical for natural science and social science. In *abduction,* one can start with experiencing a specific current situation as problematic (p), and then simultaneously and iteratively imagine both ways to approach and frame the situation (p→q) and possible solutions for the problem (q); this type of reasoning is typical for design.[11]

Likewise, Dorst recently argued that abduction is at the "core" of design thinking.[12] Dorst understands *deduction* as the process of moving from knowing "what" and "how" to the

International Journal of Design, vol. 5, no. 2 (2011): 53-60.

8 Nevertheless, work has been done by Sanders, Stappers, Kleinsmann, Valkenburg, and Van der Lugt, as identified, as well as in the Scandinavian participatory design tradition by E. Beck, G. Bjerknes, T. Bratteteig, S. Bødker, P. Ehn, J. Greenbaum, M. Kyng, R. Markussen, and more recently by K. Battarbee, J. Buur, J. Fulton Suri, J. Gulliksen, I. Koskinen, S. Kujala, T. Mattelmäki, E. Stolterman and others.

9 Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (2nd ed.) (Princeton, NJ: Princeton University Press, 1986); Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Milton Keynes, UK: Open University Press, 1987); Steve Woolgar, ed., *Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge* (London, UK: Sage, 1988); Malcolm Ashmore, *The Reflexive Thesis: Wrighting Sociology of Scientific Knowledge* (Chicago: The University of Chicago Press, 1989); Karin Knorr Cetina, Laboratory Studies: The Cultural Approach to the Study of Science, in Sheila Jasanoff et al., eds., *Handbook of Science and Technology Studies* (London, UK: Sage, 1995),140-66; and Bruno Latour, *Aramis, or the Love of Technology* (Translated by Catherine Porter) (Cambridge, MA: Harvard University Press, 1996).

10 C. S. Peirce, quoted in: Nigel Cross, "Discovering Design Ability" *Discovering Design: Explorations in Design Studies,* Richard Buchanan and Victor Margolin, eds., (Chicago: The University of Chicago Press, 1995), 110.

11 See also: Norbert F. M. Roozenburg and Johannes Eekels, *Product Design: Fundamentals and Methods* (Chichester: John Wiley & Sons, 1995).

12 Kees Dorst, The Core of "Design Thinking" and its Application, *Design Studies,* vol. 32, no. 6 (2011): 521-32.

"result" (e.g., if one knows about stars and about their movements, one can deduce their locations) and *induction* as the process of moving from knowing "what" and "result" to possible options for "how" (e.g., if one knows about stars and their locations, one can induce possible working principles), and he proposes two forms of abduction. In *abduction-1* (closed problem solving), one develops an object ("what"), based on a given desired outcome ("result") and a given working principle ("how"); in *abduction-2* (open problem solving), one starts with a desired outcome ("result") and develops both an object ("what") and a working principle ("how"). The latter is associated with design thinking and with the notion of *framing.* Framing is an approach of iteratively developing frames (i.e., combinations of a result and a working principle) and developing possible solutions, and thus creatively moving between "result," "how," and "what" during the design process.

Thus, in design thinking, problems and possible solutions are explored and developed and evaluated simultaneously in an iterative process: A "design process involves finding as well as solving problems" so that "problem and solution co-evolve."[13] Design thinking is needed to cope with "wicked problems"—problems that cannot be clearly defined using "facts" at the start of a project and that cannot be solved by selecting a "best" solution.[14] Many real problems in the real world are, in fact, "wicked problems."

In the case of *co*-design, diverse people participate in this process of design thinking. In the following section, I argue that co-design can be understood and organized as a process of *collaborative design thinking,* or—drawing from the ideas of pragmatist philosopher John Dewey—as a process of *joint inquiry and imagination.*

Dewey's Pragmatism

This exploration's second move is to turn to philosophical pragmatism. Philosophical pragmatism emerged in the United States in the late nineteenth and early twentieth centuries, with William James, C. S. Peirce, and John Dewey as key figures. A key theme in pragmatism is its focus on people's practices and experiences, rather than on abstract theories. Here, I focus on texts by Dewey (1859–1952) because his ideas are especially relevant to technology, engineering, and design, and have been used productively in these fields.[15]

Many people in the field of design are familiar with Dewey's ideas on experience and aesthetics.[16] Dewey's ideas also appear in Schön's notion of *reflective practice,* which Schön uses to discuss the ways in which professionals combine practice and reflection.[17] Moreover, the use of Dewey's ideas to discuss

13 Bryan Lawson, *How Designers Think: The Design Process Demystified* (4th ed.) (Amsterdam: Elsevier, 2006),125; and Nigel Cross, *Designerly Ways of Knowing,* (London: Springer-Verlag, 2006), 80. See also: Kees Dorst and Nigel Cross, Creativity in the Design Process: Co-Evolution of Problem-Solution, *Design Studies,* vol. 22, no. 5 (2001): 425-37; Nigel Cross, *Design Thinking* (Oxford: Berg Publishing, 2011); and Jon Kolko, Abductive Thinking and Sensemaking: The Drivers of Design Synthesis, *Design Issues,* vol. 26, no. 1 (2010): 15-28.

14 H. W. J. Rittel and M. M. Webber, Planning Problems are Wicked Problems, in *Developments in Design Methodology,* Nigel Cross, ed. (Chichester: Wiley, 1984); Richard Buchanan, Wicked Problems in Design thinking, *Design Issues,* vol. 8, no. 2 (1992): 5-22; Richard Coyne, Wicked Problems Revisited, *Design Studies,* vol. 26, no. 1 (2004): 5-17; and K. Dorst, Design Problems and Design Paradoxes, *Design Issues:,* vol. 22, no. 3 (2006): 4-17.

15 Larry A. Hickman, *John Dewey's Pragmatic Technology* (Bloomington, IN: Indiana University Press, 1990); Larry A. Hickman, *Philosophical Tools for Technological Culture: Putting Pragmatism to Work* (Bloomington, IN: Indiana University Press, 2001); Jozef Keulartz, Maartje Schermer, Michiel Korthals, and Tsjalling Swierstra, Ethics in Technological Culture: A Programmatic Proposal for a Pragmatist Approach, *Science, Technology, & Human Values,* vol. 29, no. 1 (2004): 3-29; Gerald A. Emison, The Complex Challenges of Ethical Choices by Engineers in Public Service, *Science and Engineering Ethics,* vol. 12, no. 2 (2006): 233-44; Peter Dalsgaard, *Designing Engaging Interactive Environments: A Pragmatist Perspective* (PhD dissertation) (Aarhus University, 2009); Steven A. Moore, ed., *Pragmatic Sustainability: Theoretical and Practical Tools* (London: Routledge, 2010);

co-design is in line with Dewey's ambition to make his "scholarly work" relevant and applicable to "practical affairs."[18] Dewey saw philosophy as a way to develop tools that people can use to cope with real problems in the real world, and he aimed for a "recovery of philosophy," so that philosophy "ceases to be a device for dealing with the problems of philosophers and becomes a method, cultivated by philosophers, for dealing with the problems of man."[19]

Dewey's pragmatism has two key themes: It focuses on people's concrete practices, their personal experiences, and the role of practical knowledge; it aims at promoting cooperation and at empowering people so that they can improve their situations.[20] These two themes are briefly discussed in the following sections.

Practices, Experiences, and Knowledge

Dewey distinguished between primary experiences of "gross, macroscopic, crude subject-matters" (i.e., experiences that come "as the result of a minimum of incidental reflection") and *secondary* experiences of "refined, derived objects of reflection" (i.e., experiences "in consequence of continued and regulated reflective inquiry."[21] Furthermore, Dewey promoted an "empirical method" of moving back and forth between practices (primary experiences) and reflections (secondary experiences) to develop practical knowledge—knowledge that is based on practices and that is practically applicable.[22] In addition, Dewey held that knowledge needs to be "particular" or "contingent," which is rather different from traditional philosophy or mainstream science, where knowledge is typically viewed as "universal" or "necessary."[23]

Dewey held that "thinking and acting are just two names for a single process—the process of making our way as best we can in a universe shot through with contingency," and that "knowledge is a by-product of activity: people do things in the world, and the doing results in learning something that, if deemed useful, gets carried along into the next activity."[24] Similar ideas—on the generation of knowledge in relation to design practices—have been expressed by, for example, Stappers and Van der Lugt.[25]

Communication, Cooperation, and Change

Dewey believed that "the specific conditions which exist at one moment, be they comparatively bad or comparatively good, in any event may be bettered."[26] He emphasized people's abilities to communicate and to cooperate as ways to jointly bring about positive change: "The heart of language is not 'expression' of something antecedent, much less expression of antecedent thought. It is communication; the establishment of cooperation in an activity in which there are partners, and in which the activity of each is modified and regulated by partnership."[27] This engagement with communication, cooperation, and change is rather different from a

and Richard Sennett, *The Craftsman* (London: Penguin Books, 2008). See also: Gavin Melles, New Pragmatism and the Vocabulary and Metaphors of Scholarly Design Research, *Design Issues,* vol. 24, no. 4 (2008): 88-101; and Carl DiSalvo, Design and the Construction of Publics, *Design Issues,* vol. 25, no. 1 (2009): 48-63.

16 John Dewey, *Art as Experience* (1934; New York: The Berkley Publishing Group, 2005).

17 Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983); and D. A. Schön, "Design: A Process of Enquiry, Experimentation and Research, *Design Studies* 5, no. 3 (1984): 130-31. Schön wrote his dissertation on Dewey's theory of inquiry.

18 David Hildebrand, *Dewey: A Beginner's Guide* (Oxford: Oneworld, 2008), 3.

19 John Dewey, The Need for a Recovery of Philosophy, in *Creative intelligence: Essays in the Pragmatic Attitude,* J. Dewey, ed. (New York: Henry Holt and Co., 1917), 65.

20 D. Hildebrand, *Dewey* (2008), 4-6.

21 John Dewey, *Experience and Nature* (La Salle: Open Court Publishing, 1965), 3-4.

22 Dewey, *Experience and Nature,* 5-9.

23 John Dewey, *Reconstruction in Philosophy* (New York: Henry Holt and Co., 1920), 78.

24 Louis Menand, *The Metaphysical Club: A Story of Ideas in America* (New York: Farrar, Straus and Giroux, 2001), 360, 322.

25 Remko Van der Lugt and Pieter Jan Stappers, *Design and the Growth of Knowledge* (Delft University of Technology, 2006); and Pieter Jan Stappers, Doing Design as a Part of Doing Research, in *Design Research Now: Essays and Selected Projects,* R. Michel, ed., (Basel: Birkhäuser Verlag, 2007), 81-91.

26 Dewey, *Reconstruction in Philosophy,* 178.

27 Dewey, *Experience and Nature,* 179.

"spectator conception of knowledge,"[28] which is typical for traditional philosophy or mainstream science and refers to describing an external reality and a stable state of affairs.

Dewey promoted processes in which people are empowered to jointly reflect on their practices and experiences, to communicate and cooperate, and to improve their own or other people's situations. This "melioristic motive"[29] can also be found in the works of Papanek and Margolin and, more recently and in this journal, in the works of Bonsiepe, Dong, Nieusma, and Oosterlaken.[30]

Dewey viewed knowledge as instrumental, in that he proposed that knowledge should be concerned with exploring alternative futures, with promoting communication and cooperation, and with organizing positive change. These key themes are also found in co-design, which makes Dewey relevant, indeed, to a discussion of co-design.

These topics—practices, experiences, and knowledge, and communication, cooperation, and change—are intimately intertwined through Dewey's concept of inquiry.[31] Dewey advocated organizing processes of joint inquiry, in which people jointly explore, discuss, and define a problem and jointly explore, develop, and evaluate possible solutions. In very general terms, he envisioned inquiry as a process that starts from a problematic situation, and that moves—by productively combining doing and thinking—to a resolution: "Inquiry is the controlled or directed transformation of an indeterminate situation into … a unified whole."[32] In such a process of inquiry, the aim is *not* to develop universal knowledge that represents some external reality, but to bring people together so that they can jointly explore, try out, learn, and bring about change in a desired direction.

Exploring Ethics

A third move in this exploration is a turn toward ethics. Based on Dewey's pragmatist philosophy, I argue that co-design has inherent ethical qualities.

For Dewey, *moral* experiences were his starting point and the empowerment of people to cope with *moral* questions was his primary goal: "For Dewey, social and political philosophy—and not metaphysics or epistemology—is First Philosophy."[33] Dewey held that people, throughout their daily lives, continuously engage in ethics, especially when they interact with each other. People have moral experiences and need to cope with moral questions whenever they think and feel, whenever they deliberate and act, whenever they communicate and cooperate, whenever they make plans and decisions.[34] For Dewey, "moral concerns permeate much of experience and require nearly constant deliberation and choice of action, whether issues are minute or momentous."[35] Dewey saw daily life, with both its minor issues and its major questions, as inherently ethical. Moreover, Dewey saw deliberation as a social

28 Dewey, *Reconstruction in Philosophy,* 156.

29 Hildebrand, Dewey (2008), 5.

30 Victor Papanek, *Design for the Real World: Human Ecology and Social Change* (2nd ed.), (London: Thames & Hudson, 1991) and Victor Margolin, *The Politics of the Artificial: Essays on Design and Design Studies* (Chicago: University of Chicago Press, 2002); Gui Bonsiepe, Design and Democracy, *Design Issues,* vol. 22, no. 2 (2006): 27-34; Andy Dong, The Policy of Design: A Capabilities Approach, *Design Issues,* vol. 24, no. 4 (2008): 76-87; Dean Nieusma, Alternative Design Scholarship: Working Towards Appropriate Design, *Design Issues,* vol. 20, no. 3 (2004): 13-24; and Ilse Oosterlaken, Design for Development: A Capability Approach, *Design Issues,* vol. 25, no. 4 (2009): 91-102.

31 Larry A. Hickman, Dewey's Theory of Inquiry, in *Reading Dewey,* Larry A. Hickman, ed., (1998),166-86; and Hildebrand, Dewey (2008), 40-62.

32 John Dewey, *Logic: The Theory of Inquiry* (New York: Henry Holt and Co., 1938), 104-05.

33 John J. Stuhr, Dewey's Social and Political Philosophy, in *Reading Dewey,* 85.

34 Hildebrand, Dewey (2008), 63-93; and Gregory F. Pappas, Dewey's Ethics: Morality as Experience, in *Reading Dewey,* Hickman, ed., (1998), 100-23.

35 Hildebrand, *Dewey* (2008), 63.

process, "not only in the sense that we must take consequences for others into consideration, but also in the sense that conversation with others provides the means for reflection."[36]

Likewise, when people engage in a co-design process, they also engage in ethics—in a process with ethical qualities. These ethics become manifest, for example, when co-design participants express and share their personal experiences, when they empathize with others, when they discuss current or problematic situations, when they envision possible or desirable situations, when they develop and evaluate possible solutions, and when they make decisions and bring about change. Co-design can be understood as an instance of "moral inquiry:" "a reflective response—intervening with analysis and imaginative deliberation—when action is frustrated," where deliberation may "proceed by dialogue, visualization, imagining of motor responses, and imagining how others might react to a deed done."[37]

Similarly, Devon and Van de Poel argued that design is inherently a social activity and quintessentially an ethical process—"Ethics is not an appendage to design but an integral part of it"—and advocated using moral imagination to bring the ethical qualities in design processes to the fore.[38] Lloyd meanwhile contended that design and ethics are similar because they are both concerned with envisioning and developing possibilities and with evaluating and choosing between possibilities.[39]

Pragmatist ethics provides an alternative to two dominant schools in ethics: consequentialist ethics, which tends to search for general rules to maximize the positive consequences of one's actions, and deontological ethics, which tends to search for general rules based on one's duties and obligations. "Pragmatist ethics turn away from such rigid abstractions [like the 'general rules' just mentioned] and return to the ordinary life-experiences of inherently social, embodied, and historically situated beings."[40]

If some readers find that using the term *ethics* in the context of co-design is somewhat awkward, we can instead use the term *ethos* and discuss the *ethos* of co-design, which refers to the moral ideas and attitudes of participants in a co-design process.

Joint Inquiry and Imagination

In the following section, I discuss Dewey's ideas on organizing processes of joint inquiry and imagination.[41] Such processes, he argued, consist of five phases that are intimately related and that ideally are addressed in an iterative process:

Exploring and Defining the Problem (Phases 1 and 2)

1. *"The indeterminate situation."* A specific and concrete situation is experienced as problematic, but what precisely is problematic about it is not yet known. Dewey stressed that personal and subjective experiences are critical for the

36 Steven Fesmire, *John Dewey and Moral Imagination: Pragmatism in Ethics* (Bloomington, IN: Indiana University Press, 2003), 82.

37 Hildebrand, *Dewey* (2008), 77.

38 Richard Devon and Ibo Van de Poel, Design Ethics: The Social Ethics Paradigm, *International Journal of Engineering Education*, vol. 20, no. 3 (2004): 461-69. See also: Richard Devon, Towards a Social Ethics of Technology: A Research Prospect, *Techne: Research in Philosophy and Technology*, vol. 8, no. 1 (2004): 99-115.

39 Peter Lloyd, *Design, Ethics and Imagination (or: Why we don't need to teach ethics to designers, but why we should teach philosophers to design)*, presented at an Ethics Seminar at the Open University, November 16, 2006.

40 Fesmire, *John Dewey and Moral Imagination*, 58.

41 This section is based on: J. Dewey, *Logic: The Theory of Inquiry*, 101-19. The citations in this section are from that book chapter, unless indicated otherwise.

start of an inquiry process—to make the situation "questionable—and that expressing and sharing these experiences are critical: "Inquiry is not a purely logical process—feeling is a useful and orienting presence throughout each phase."[42]

2. *"Institution of a problem."* A provisional problem definition is formulated, which can later be restated and refined in an iterative process. Please be aware that the wording or articulation of the problem is important: "The way in which the problem is conceived decides what specific suggestions are entertained and which are dismissed." This intimate relationship between problem-setting and solution-finding is also found in design thinking.

The ethics of co-design occur in the ways in which and in the extent to which participants are able to express and share their experiences and to empathize with others (e.g., by engaging in storytelling), and in the ways in which they are able to draw from their own and other people's experiences when they explore and define the problem. Ideally, these processes of interaction are carefully organized so that participants can jointly engage with questions such as, "What do I find problematic about this situation?" "What are other people's experiences?" or "In what direction should we look for possible solutions?"—questions that Dewey would have understood as ethical.

Perceiving the Problem and Conceiving Possible Solutions (Phase 3)

3. *"The determination of a problem-solution:"* In an iterative process, the problem and possible solutions are simultaneously explored and further defined—similar, again, to design thinking: "Observations of facts and suggested meanings or ideas arise and develop in correspondence with each other."[43] Dewey proposed that problems are best explored and defined using *perception*—one's capacities to see, hear, touch, smell, and taste current situations *(what is)*—and that solutions are best explored and developed using *conception*—one's capacities to imagine and envision alternative situations *(what could be)*. Ideally, perceiving the problem and conceiving possible solutions are productively combined.[44] Different or more precise ways to perceive the problem help to conceive different or more concrete solutions, just like the conceiving of different or more detailed solutions helps in perceiving the situation differently or more precisely.

42 Hildebrand, *Dewey,* 57.

43 Dewey, *Logic: The Theory of Inquiry,* 109.

44 Perceiving a problem involves a looking backward, and conceiving solutions involves a looking forward. This looking backward and looking forward can be recognized in Dewey's phrase, warranted assertibility, which he used to describe the role of knowledge in inquiry: *Warranted* "points backward in time toward something that has been accomplished" and *assertibility* "points forward in time towards something yet to be done" (Hickman, Dewey's theory of inquiry, 166-67).

As suggested concerning expression, sharing, and empathy, the ethics of co-design also occur in the ways in which and in the extent to which participants can use their capacities for perception and conception. For example, for the former, they can engage with visuals that are related to the problem and empathize with the people involved, and for the latter, they can use tools that foster joint creativity and innovation.[45] Such perception and conception ideally involve "moral imagination" or "dramatic rehearsal," in which co-design participants imagine or rehearse current and problematic situations or alternative and desirable situations, using both their thoughts and their feelings.[46] In such deliberation, "we singly or collectively hunt for ways to settle difficulties and ambiguities by scoping out alternatives and picturing ourselves taking part in them. Imagination continues until we are stimulated to act by a course that appears to harmonize pressing interests, needs, and other factors of the situation."[47]

This combination of perception and conception and the ways in which co-design participants cooperate productively would enable them to address questions such as, "How does this problematic situation feel?" "How can we generate solutions for this problem?" or "How is this solution better than the current situation?"—questions that we can consider, again, as ethical.

Trying Out and Evaluating Solutions (Phases 4 and 5)

4. *"Reasoning:"* One should not jump to conclusions or accept a solution too quickly. The relationships between the tentatively defined problem and different suggestions for solutions need to be evaluated to assess how different solutions can help to solve the problem. Ideally, participants can explore and define the scope and boundaries of a project and critically discuss means and ends, and the relationships between means and ends. This systemic approach can promote systems thinking because participants become more aware of the scope and boundaries of their project, and a systems perspective can help them to generate innovative ideas and solutions.
5. *"The operational character of facts-meanings:"* This phase is concerned with actually trying out solutions (e.g., by organizing experiments or tests with users or customers). The project becomes more real and the stakes get higher, and ensuring that the people involved continue to cooperate constructively is critical. They might need to express and discuss their respective roles and interests, which

45 Froukje Sleeswijk Visser, *Bringing the Everyday Life of People into Design* (PhD dissertation) (Delft University of Technology, 2009); and Elisabeth B. N. Sanders, Generative Tools for Co-Designing, in *Collaborative Design: Proceedings of CoDesigning* 2000, Stephen A. R. Scrivener, Linden J. Ball, and Andrew Woodcock, eds. (London: Springer-Verlag, 2000), 3-12.

46 Fesmire, *John Dewey and Moral Imagination,* 55-91.

47 Ibid., 70.

might generate conflicts between them. However, recognizing and coping with these different perspectives and motivations is necessary for developing a shared understanding of what needs to be done and how they need to cooperate.[48] They need to jointly generate solutions that will work practically. If their roles and interests remain unexamined, the risk is that one role or one interest dominates the project, which can lead to solutions that are less viable or less feasible. Ideally, co-design participants can deal creatively and productively with even "deep-seated and fundamental value conflicts" and develop solutions that work for all of them.[49]

Thus, the ethics of co-design also occur in the ways in which and in the extent to which the people involved are able to try out different solutions, to critically discuss the project's scope and boundaries, and to negotiate their different roles and interests. Such an approach would help them to explore ethical questions such as, "What should be our project's scope?" "What solution will work for me?" or "What would work for the other participants or stakeholders?"

Imagination is key throughout the process outlined. Fesmire discussed two roles of imagination: 1) imagination as "empathic projection," as a way to respond directly and empathically to others and their feelings and thoughts; and 2) imagination as a way to escape current patterns and imagine alternatives.[50] Imagination is, then, "a capacity to engage the present with an eye to what is not immediately at hand."[51]

In sum, we can understand co-design as a process of *joint inquiry and imagination*—as "a reflective activity in which existing tools and materials (both of which may be either tangible or conceptual) are brought together in novel and creative arrangements in order to produce something new."[52] In such a process, people use "the power of intelligence to imagine a future which is the projection of the desirable in the present, and to invent the instrumentalities of its realization."[53]

A Practical Example

To illustrate this argument, I discuss the TA2 project.[54] In this research and innovation project, about 40 researchers, designers, and developers from 14 organizations (ranging from international corporations and small enterprises to universities and research institutes) cooperated for four years (2008–12) to develop and evaluate a series of innovative telecommunication, multimedia, and gaming applications. The project's goal was to better understand how such technologies can help groups of people to engage in social communication when they are separated in space and

48 Kleinsmann and Valkenburg, Barriers and Enablers for Creating Shared Understanding in Co-Design Projects.

49 Keulartz, Schermer, Korthals, and Swierstra, Ethics in Technological Culture.

50 Fesmire, *John Dewey and Moral Imagination,* 65.

51 Ibid., 67.

52 Hickman, *Dewey's Theory of Inquiry,* 169.

53 Dewey, The Need for a Recovery of Philosophy, 69.

54 See also: www.ta2-project.eu.

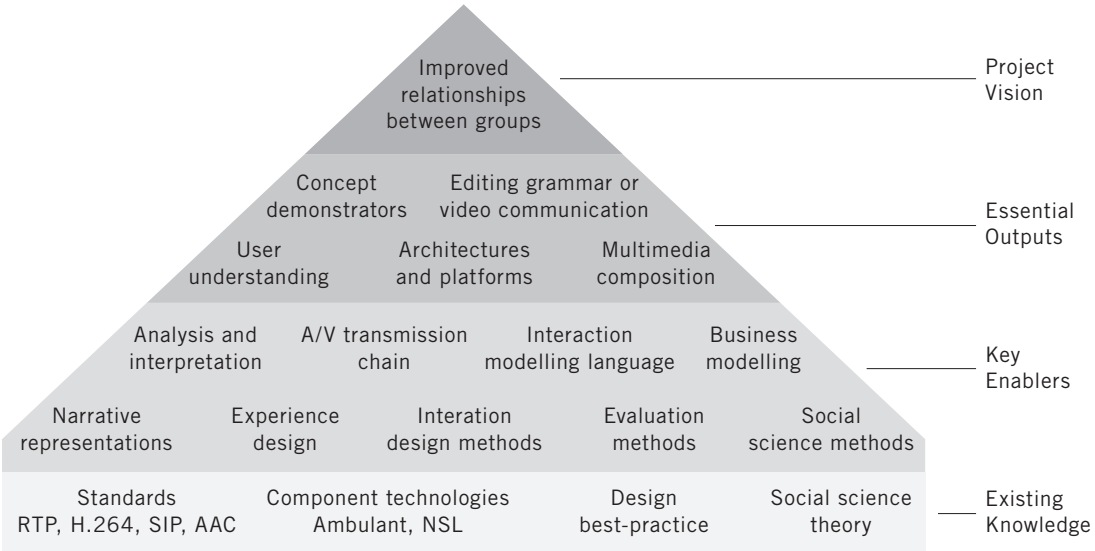

Figure 1
Overview of TA2 goals and enablers.

in time—TA2 stands for *Together Anywhere, Together Anytime*. TA2 focused on group-to-group communication, as an alternative to many projects and products that facilitate one-to-one communication. The project followed a co-design approach and promoted multidisciplinary teamwork; early user involvement; and an iterative approach involving research, design, and evaluation.

The following sections discuss some of the co-design activities in TA2 and focus on the ways in which project team members engaged in joint inquiry and imagination.[55]

Exploring and Defining the Problem (Workshops)

The original project plan contained a drawing of a pyramid (see Figure 1) that represents the project's goal in its top (making "communications and engagement easier among groups of people separated in space and time" to "help in the nurturing of social relationships") and in its bottom what needs to be done to realize that goal (the development of technologies, components, and applications, and the gathering and development of knowledge on, for example, user experience and business modelling).

The project implicitly recognizes that the current focus on one-to-one communication in many products and services is problematic somehow, and that products and services for group-to-group communication need to be developed. To make the process of problem exploration and definition more explicit and more of a collective effort, several co-design workshops were organized.

Three months into the project, key project team members participated in a Scenario Workshop. They were invited to empathize with different groups of (imaginary) people and to take them as a starting point for developing *scenarios*. They wrote five short narratives in which people use the TA2 applications in specific situations. Writing these scenarios helped

55 Marc Steen, Jan Buijs and Doug Williams, The Role of Scenarios and Demonstrators in Promoting Shared Understanding in Innovation Projects, *International Journal of Innovation and Technology Management.*

Figure 2
Drawings of a storyboard for *MyVideos*.

them to empathize with (imaginary) users and their experiences, and to more vividly imagine the sort of problems that TA2 aims to solve.

In the tenth month of the project, people's ideas on the project's overall goal seemed to have diverged. To improve shared understanding, a Togetherness Workshop was organized. All project team members were invited to express their personal experiences in relation to togetherness and to engage more personally with this key theme. This workshop further helped project team members to empathize with people's experiences by expressing and sharing their experiences in relation to the theme of togetherness.

These workshops brought to the fore the ethics of co-design in that they helped project team members to express and share their own experiences and to empathize with other people and their experiences—both of which helped to ground the project's problem definition in people's concrete experiences.

Perceiving the Problem and Conceiving Possible Solutions (Storyboards)
After the Scenario Workshop, the five scenarios were developed into five storyboards, in an iterative process between key project team members and a professional illustrator, over a period of several months. Each storyboard consisted of five to ten drawings with accompanying narratives. For example, Figure 2 shows a storyboard for *MyVideos*, a software application that helps people to use video recordings of a social event, for example, a school concert (top), to create a video compilation using one's own and other people's footage (middle), and to share these video compilations with, for example, family members abroad (bottom). *MyVideos* is intended to facilitate togetherness by enabling people to share the experiences of a shared activity.

Jointly developing the storyboards helped the project team members to be more specific and precise, and to productively discuss how the project's overall goal and ideas for specific solutions relate to each other. Moreover, the five storyboards were used to organize focus groups consisting of people from five corresponding target groups, to talk with them about the applications as early as possible—before any prototypes were built. These focus groups helped project team members to better understand people's daily lives, their needs, expectations, and preferences in relation to the TA2 applications.

Creating these storyboards and discussing them with potential users helped the project team members to combine technology perspectives (the ambition to create technology) and users' perspectives (the ambition to help people). It promoted a multidisciplinary and iterative process in which project team members were able to discuss different solutions in the context of the overall project goal.

Creating and discussing the storyboards brought to the fore the ethics of co-design in that both project team members and users were able to perceive the problem (the project's goal); they were able to conceive possible solutions (specific applications); and they moved between perception and conception in an iterative process (e.g., when project team members listened to users talking about their problems and when they jointly tried to find solutions for these problems).

Trying Out and Evaluating Solutions (Prototypes)

In the second and third years of the project, project team members worked together to develop several prototypes, and they discussed the viability and feasibility of the various technologies and applications. Moreover, these prototypes were tried out and evaluated in realistic situations in close cooperation with potential users, in field trials in people's homes, or in laboratory experiments.

For example, for *MyVideos,* project team members cooperated with two groups of parents with children in two high schools. First, a group of parents with children in a high school in The Netherlands participated in focus groups in which they discussed their current practices of recording, editing, and viewing video material vis-à-vis the ideas for *MyVideos*. Some months later, they made video recordings of a concert in which their children performed, and they participated in user tests, in which they evaluated a first prototype of *MyVideos* to view and edit the video material recorded at that concert. Next, they participated in focus groups to discuss different options for further development, which directly affected the development of a second prototype of *MyVideos*. Parents with children at a high school in the United Kingdom then participated in further evaluation. At a concert in their school, they made video recordings of their children performing, and some of them participated in user tests to evaluate the second prototype of *MyVideos* (Figure 3). In these experiments, project team members studied people's experiences with using the application by conducting interviews. In addition, the parents filled out questionnaires before, during, and after the experiments.

The ethics of co-design happen insofar as the participants are able to jointly achieve concrete results and, at the same time, to critically discuss these results—as well as to learn from this confrontation (e.g., when solutions do not work as planned or when problems arise unexpectedly).

Conclusion

My argument has been that co-design can be understood as a process of collaborative design thinking: a process of *joint inquiry and imagination* in which diverse people jointly explore and define a problem and jointly develop and evaluate solutions. It is a process in which participants are able to express and share their

Figure 3
Prototype and user test of *MyVideos*.

experiences, to discuss and negotiate their roles and interests, and to jointly bring about positive change. Co-design participants combine *inquiry*—a move from the outside world and others to the inside world, so that they can be curious and jointly learn—and *imagination*—a move from the inside world to the outside world and others, so that they can be creative and jointly bring about change.

Moreover, I have argued that the process of co-design has inherent ethical qualities. These ethics come to the fore in the ways in which and in the extent to which participants are actually able to express and share their experiences, to discuss and negotiate their roles and interests, and to jointly bring about positive change. For example, the ethics come to the fore in the process of framing,[56] in which participants creatively and iteratively move between problem-setting and solution-finding. Ideally, co-design participants are able to jointly and carefully engage with ethical questions, such as "How do I perceive this problem?" "How do others perceive it?" "How would I go about solving it?" or "How can we jointly develop solutions?"

This view is supplementary to other views on co-design, which typically emphasize the generation and combining of knowledge, because it brings to the fore the importance of combining thinking *and* feeling, facts *and* values; it combines both doing and reflecting, divergence and convergence.

In the spirit of pragmatism, I advocate organizing co-design according to these ethics—to its *ethos,* which often remains implicit. We can do so by making these ethics more explicit and promoting reflexivity: by helping co-design participants to be more aware of their thoughts and feelings, and of their own roles and interests. By becoming more aware of their involvement, participants can organize their co-design more effectively, so that they can jointly learn and jointly create, address problems in the real world, and develop solutions that work.

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56 Dorst, The Core of "Design Thinking" and its Application.