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Co-design and Pragmatism

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Abstract

The paper consists of four sections. In the first part it is argued that industrial design practice is changing in two significant ways. It is moving towards organizing *processes* in which designers cooperate with other experts and with (potential) users and stakeholders and engage in processes of co-design, rather than doing the design work alone and in isolation. It is also moving towards facilitating change *processes* rather creating finished products; designers engage in joint processes of organizational change, in which new products or services or processes are developed. The focus of industrial design shifts from designing a finished-product to engaging in co-design-as-a-process and facilitating diverse people to jointly work in an innovation process.

In the second section it is argued that both practising designers and design theorists need new foundations to understand and organize such co-design-as-a-process because the foundations from science and from engineering have become inappropriate. Science is (assumedly, typically) concerned with understanding current situations and search for universal truth, whereas (co-) design is concerned with envisioning and realizing specific responses for specific situations. Likewise, engineering (assumedly, typically) focuses on finding one optimal solution for a given problem, via linear process, whereas (co-)design is about exploring and developing the problem and possible solutions in parallel and in an iterative process. 'Design thinking' is about two questions: 'where do we want to be?' and 'how do we get there?' (Thackara 2006, p. 2).

The third section introduces *philosophical pragmatism* as a way to explore and develop new foundations for co-design. Especially pragmatists' focus on practices and processes, on people's experiences, on cooperation and negotiation, on, and their orientation towards future action are relevant here. Pragmatist John Dewey explains that the process of reflective thinking (1910, pp. 68-78), or the process of inquiry (1938, pp. 101-119), consists of five closely related processes, which run partly in sequence, partly in parallel: 1) Perceiving a situation as 'questionable'; 2) Exploring and formulating the problem provisionally; 3) Simultaneously exploring and further developing the problem ('perceptual') and possible solutions ('conceptual'); 4) Exploring the relations between problems (ends) and solutions (means); and 5) Trying-out solutions in practice to find out whether or how they can help to solve the problem. This pragmatic perspective on co-design introduces a focus on people's experiences and on cooperation between people. Following this perspective, one would encourage diverse participants to express and discuss their personal, concrete experiences (ethics), e.g., their experiences with the problem or with possible solutions (rather than only discussing 'scientific facts'), and one would encourage participants to express their respective roles, positions and interests and negotiate these with each other (politics), e.g., their personal stakes in the project (rather than trying to find one 'optimal solution' via a linear reasoning)

The fourth section provides one example from practice: a design project in which the author works. The goal of this project is to design a 'mixed reality' system—an ICT system that combines *tangible interfaces*, *augmented reality*, *augmented virtuality* and *virtual reality*—to support people to engage in a specific kind of co-design, namely: joint urban planning. In line with Dewey's ideas, this system will include tools with which people can express their experiences, e.g. via story-telling (*user generated content*) and tools to express their diverse interests and negotiate with one another (*serious gaming*). The system supports people to jointly develop a shared understanding of the problem and of possible solutions in an iterative process. The design of this system illustrates how co-design can be organized differently, drawing from pragmatism.

Philosophy recovers itself when it 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 [designers].
(Dewey 1917, p. 65)

1. Shifts in the design of ICT products or services

In a traditional view on industrial design, we can imagine a woman or man who makes drawings, e.g., of a piece of furniture, that these drawings are then used to produce products, and that these products are later on used by people in ways that were anticipated by the designer. This would concur with how the verb 'design' is defined in a dictionary: 'decide how something will look, work, etc. especially by drawing plans or making models' (Oxford Dictionary, 7th ed.).

However, industrial design has changed considerably in the last decades. In current design practices one can very well observe diverse groups of people, rather than individuals, who are cooperating in an innovation project that is about bringing about organizational change, rather than about creating a tangible product, e.g., a group of designers, researchers, nurses and patients who cooperate in a project that aims to improve a health service by organizing it differently.

Design—and I will focus on design of ICT products, services, applications and systems—is undergoing two fundamental changes. Stated in very crude terms and neglecting many nuances, the *design process* is changing, via user-centred design and human-centred design, into co-design, and the *design content* is changing, via interaction design and service design, into transformation design. I will discuss these two shifts in the sections below (with apologies for the simplifications for the sake of argument).

User-centred design, human-centred design and co-design

Traditionally, an industrial designer would create a design based on her or his informal or intuitive understanding of people's needs and preferences. Needless to say that such an approach can result in very successful products or very unsuccessful products and everything in-between. The shift towards *user-centred design* (Nielsen 1993; Norman 1988) introduced a focus on users, on usability and on making products and services user-friendly. Designers began to make explicit efforts to understand how people will use the products that they are working on. E.g., in usability engineering, designers would model the task that people are supposed to perform with the product and then build a prototype and evaluate that by inviting people to use it, and, in an iterative process of design and evaluation, they create a product that people can use efficiently, effectively and with satisfaction (the three benchmarks for usability).

Human-centred design (ISO 1999) can be seen as a next step, in which designers attempt to involve (potential) users during the entire process of research, design and evaluation. There is a wide range of human-centred design approaches, which can be put into two categories (Steen 2008, Chapter 2): approaches in which designers attempt to move towards users and to understand and take into account users' experiences, such as *applied ethnography* (Button 2000; Crabtree 2003), *contextual design* (Beyer and Holzblatt 1998) or *empathic design* (Koskinen *et al.* 2003), and approaches in which (potential) users are invited to participate in the project and to contribute their knowledge and

ideas, such as *participatory design* (Schuler and Namioka 1993), the *lead user* approach (Von Hippel 2005) or *co-design* (Sanders and Stappers 2008).

The overall idea is that users can participate and contribute to the design process because they are 'experts of their experiences' (Sleeswijk Visser *et al.* 2005). The notion of *co-design-as-a-process*, of a diverse group of people who cooperate during a design process, is not entirely new to practitioners of user-centred design or human-centred design. The idea is to create a multi-disciplinary team of people with diverse backgrounds and functions and to encourage them to cooperate[1]. The design process is opened-up and a diverse range of actors and stakeholders participates and contributes. The goal of this paper is to better understand how to organize processes of cooperation within such teams.

Interaction design, service design and transformation design

Whereas traditional industrial design would be concerned with designing a physical product, the emergence of *interaction design*[2] drew attention to the interactions between people and an ICT system, and to facilitating or designing these interactions (also known as the field of *Human-Computer Interaction*). Another shift occurred in the field of CSCW (*Computer Supported Cooperative Work*, currently known as *Computer Mediated Communication*, *Social Software* or *Social Media*) which looks at how ICT systems are used by groups of people to communicate and cooperate with each other. In that sense, interaction design is not only about interactions between people and things, but also about interactions between people. This shift can also be understood as a shift from the technical or functional aspects of a product or a service to the way people experience of a product or a service (Pine and Gilmore 1999)[3].

The focus on user experience (or customer experience) is related to the shift towards *service design*. In service design (Cottam and Leadbeater 2004; Parker and Heapy 2006) one is concerned with *service encounters*, with how a person experiences the various encounters with a specific service, e.g., a banking service or a health care service. Imagine, for example, a person who receives a letter from the service provider, makes a phone call to their call centre or looks up something on their website, and goes to the service provider's shop or counter for a face-to-face conversation. All such *service touch points* need to be designed in such a way that the customer or client is served appropriately. One can imagine that service design can lead to ideas for organizational change. In order to change *service encounters* and *service touch points*, one may need to change processes within the organization or how the organization works.

One approach to cope with such organizational changes is transformation design[4]. *Transformation design* (Burns *et al.* 2006) is appropriate for situations that are problematic for various stakeholders experience, and for which it is not easy to identify one problem within one organization that can easily be solved. Many

[1] The ISO 13407 standard for human-centred design proposes to include the following roles in such a team: 'end-user; purchaser, manager of user; application domain specialist, business analyst; systems analyst, systems engineer, programmer; marketer, salesperson; user interface designer, visual designer; human factors and ergonomics expert, human-computer interaction specialist; technical author, trainer and support personnel'.

[2] The term *interaction design* is used to refer to 'interaction design as a design discipline', rather than to 'interaction design as an extension of human-computer interaction' (Löwgren 2008).

[3] Some write about *experience design*, but I think that is inappropriate; one can attempt to influence a person's experience, e.g. via the design a product, but one cannot design a person's experience

[4] This does not refer to *transformation* as put forward by Pine and Gilmore (1999) as a next step in economic offerings, from commodities and products via services and experience to transformation.

examples are, not surprisingly, from the domain of public health, where problems and solutions are often distributed across diverse organizations, and where actors and stakeholders have diverse interests. Transformation design is based on various related notions (*op cit.*, pp. 20-22): at the start of a project you need to explore and redefine the brief as a part of the process; multi-disciplinary team work is needed to understand the problem and to develop solutions; participatory design techniques can be used for that; enabling and empowering the participants to participate in the project and increasing their capacities for innovation; going beyond traditional solutions in order realize innovations; and creating fundamental changes, e.g., by applying a systems perspective.

The focus of transformation design is on carefully nurturing processes of communication and cooperation between people and facilitating processes of organizational change, rather than about rushing to create a tangible product. This process is ongoing; transformation design 'is never done' (*op cit.*, p. 21). Again, this is not entirely new to practitioners of interaction design or service design; the designs that they work on are always related to what happens or needs to happen within the client's organization, and they need to be concerned with actors and stakeholders within and around the client's organization. The goal of this paper is to better understand how to take into account the—often conflicting—interests of these various actors and stakeholders, and to organize cooperation between them.

An example: How health care services can be improved

The shifts sketched above are greatly simplified and somewhat arbitrary. One could very well create very different stories about what is happening to the design of ICT products or services. Especially the distinction between the shift in the *process* of design, via user-centred design and human-centred design towards co-design, and the shift in *content* of design, via interaction design and service design towards transformation design, are too schematic. Both in theory and in practice, one cannot, and does not need to, separate between design process and design content in such crude terms.

For example, the notions of co-design, service design and transformation design were developed in relation to one another, and by co-operating authors, based on similar cases from public health (Cottam and Leadbeater 2004; Burns *et al.* 2006; Parker and Heapy 2006). A traditional view on public health would focus on the *cure* processes within an institute, for example on the practices of doctors and nurses, whereas an innovative view on public health would focus on prevention and *care*. In an innovative view on health, it is acknowledged that citizens are essential to the process of 'co-creating' public health, i.e., a population of healthy citizens, through their decisions and attempts to live healthily, and that services for self care, peer support or informal care by family members, can play key roles in that. Such services should be designed from a service design and/or co-design perspective and transformation design is needed to facilitate continual innovation and organizational change in order to change the way such services are provided.

This example also draws attention to the roles of various 'users'—in this case: patients, family members, citizens, nurses, etc. Users are no longer passive users of finished products—if they ever were. They do not simply adopt and use products that are offered to them. Rather, they play active and creative roles in the design, usage, domestication and modification of products and services. The relationships between people and technology are reciprocal and complex and innovation can best be understood as processes of *co-construction* (Oudshoorn

and Pinch 2003; see also Rohracher 2005), in which people influence the product and the product influences people, and in which the design and usage are blurred. Obvious examples of this blurring are Web 2.0 applications where people create and modify parts of the application. Designers cannot—and often choose not to—predict what people will do with the products or services they are working on; rather, they involve people in the design process.

2. Co-design-as-a-process needs new fundamentals

Although the shifts within the design of ICT products and services, via user-centred design and human-centred design towards co-design, and via interaction design, service design towards transformation design may sound as a progression in quality, it would be clear that the process-of-co-design introduced above, just like any effort of people, can go well or can fare less fortunately[5]. As mentioned above, my goals are to improve our understanding of how multi-disciplinary teams can cooperate (better) and of how to (better) take into account the conflicting interests of actors and stakeholders.

In practice—and I speak from my own practice of working as a consultant and project manager in innovation projects in which we work on ICT products, services, applications or systems—one improvises a lot in co-design processes. One would typically attempt to involve users, actors, stakeholders and people with various disciplinary backgrounds, and organize a range of interactions, such as interviews, round-table conversations, workshops and project meetings, in order to enable and facilitate communication and cooperation. A group of motivated and skilled people—an experienced project manager, capable project team members and committed stakeholders—would typically be able to conduct co-design-as-a-process successfully via all sorts of improvisation and the application of intuition, people skills and tacit knowledge. Although I do not believe there is anything wrong about such an approach, I also believe that an improved understanding of co-design can help to explore better ways to organize co-design[6].

Science and engineering are insufficient

The point that I wish to make, is that co-design-as-a-process seems to be based on foundations from science and from engineering and that these foundations are insufficient for realizing the potential of co-design-as-a-process, for facilitating communication and cooperation that are so crucial. My speculation is that both design theorists and practitioners could benefit from exploring new foundations.

Science, in very general terms, and also as part of a design process, is (supposedly, typically) concerned with describing a current state of affairs in terms of objective facts and with providing explanations in terms of general knowledge claims. This kind of science would be inadequate for understanding or organizing (co-)design, because (co-)design is concerned with envisioning alternative or future situations (*'what ought to be'*, rather than *'what is'*) and because (co-)design is about generating specific, contextual responses to specific, contextual problems. Although I acknowledge that science can be very useful for (co-)design, I would suggest that science is not enough, and that one also needs ways to take into account personal experiences (not-objective facts) and ways to

[5] Please note that I write about the quality of the *process*, not the quality of the *results* of the process; this is in line with my argument and with my focus on co-design-*as-a-process*.

[6] One may note that I seem to have an implicit agenda to *improve* co-design, to explore ways to organize co-design processes *better*; this is probably an effect of my day-to-day role as practitioner.

make a jump of imagination in order to envision and creating innovations. (To people in *Science and Technology Studies*, or anyone who wants to pay attention to how science is 'actually' done, rather than how science is written up afterwards or taught in text books, this would be obvious.)

Likewise, engineering, in very general terms, and also as part of a design process, is (supposedly, typically) concerned with finding one best solution for a previously defined problem or specified brief, and ideally proceeds via a linear and logical process from problem to solution. This kind of engineering would be inadequate for understanding or organizing (co-)design, because (co-)design is concerned with participants' diverse, and often conflicting, roles and values and would proceed via conversations, negotiations and in iterative cycles, in which the problem or brief can be discussed and reformulated, and with simultaneously exploring and defining the problem and possible solutions (see below: 'wicked problems'). Although I acknowledge that engineering can be useful for (co-)design, I would suggest that engineering is not enough, and that one also needs ways to deal with conflicts between participants' roles or interests and ways to facilitate discussions and negotiations about the problem-to-be-addressed and about possible solutions.

Imagine that you work in a multi-disciplinary co-design project team. Imagine that your current task is to gain a better understanding of a supposedly problematic situation and to formulate a problem statement, and that project team member A conducts a survey into users' needs and produces quantitative data, person B conducts informal observations and produces qualitative data, and person C has personal experiences with relevant situations and produces a personal account of the situation. Imagine also that a next task is to develop solutions for the problematic situation, and that project team member D sketches solutions based on his or her intuitive understanding of the problem, that person E makes a drawing of an overall architecture from a technology perspective, and that person F makes a list of all the sub-problems that the problem can be divided into and lists associated sub-solutions.

How can the project team members communicate with each other? How can they reach a shared understanding about the situation at hand? And how can they develop and realize solutions that indeed solve the problem? They cannot rely on science because their approaches to understand the current situation are too different and they cannot rely on engineering because their approaches to envision solutions are too different. They will typically have a hard time to communicate and cooperate and will need 'people skills' and improvisation.

About design thinking: 'The problem and solution co-evolve'

I would propose that an understanding of 'design thinking' can help to explore new fundamentals for co-design. Design thinking (Roozenburg and Eekels 1995; Cross 2006; Lawson 2006), the way people think while they engage in design, is what makes (co-)design different from science and from engineering. It is argued that design deals with 'wicked problems' (Rittel and Webber 1984; Buchanan 1995), i.e., problems that one cannot define clearly beforehand, and for which very diverse solutions are possible, that are often hard to compare with each other. Dealing with such situations requires 'design thinking', which proceeds (also) in a non-logical and non-linear fashion. In 'design thinking' one simultaneously explores and—step by step—defines the problem and explores and—step by step—defines solutions for that problem: 'The problem and solution co-evolve' (Cross 2006, p. 80). Exploring and articulating problems and exploring and envisioning solutions are intertwined, and requires creativity and

some degree of chaos (Buijs 2003; Buijs 2007). This view on design is similar to the view on innovation as a interpretive process—as an alternative to the dominant view on innovation as an analytical process—which can proceed via conversations between people; you can improve innovation by enabling and facilitating conversations between divers people, so that they can jointly generate innovative understandings of the problem and of possible solutions (Lester and Piore 2004).

If co-design-as-a-process is about facilitating a diverse group of people to participate, contribute and influence an innovation/design project in a variety of ways—on a content level, on a process level and on an organizational level—then the (false) idea may emerge that 'anything goes': it is okay if whatever people exercise whatever influence on the project. Clearly, co-design-as-a-process introduces contingency, but I would argue that different ways of doing co-design do more or less justice to the potential of co-design. Ideally, participants who are verbally weak should have a voice as well, and participants with little power should also have a say. I would like to see contingency as a chance to rethink the *ethics*—in terms of participants' experiences and how they discuss these with each other, and in how they deal with freedom, responsibility and choice—and the *politics*—in terms of participants' roles and interests and how they discuss these with each other, and in how they deal with power, influence and agency—of co-design. I see co-design as a process that happens between people and a process with political and ethical qualities (Steen 2008).

3. How pragmatism can provide a novel perspective on co-design

I propose that philosophical pragmatism can offer a perspective to think differently about co-design. One of the reasons for choosing pragmatism, is that I see some key similarities between design thinking and pragmatism[7].

The realizations that there are no stable, certain truths and that there are no universal, best solutions—similar to my argument above about science and engineering as insufficient—were key bases for philosophical pragmatism. This school of philosophy was developed in the USA in the end of the 19th century and has three 'founding fathers': C.S. Peirce, William James and John Dewey.

Pragmatism focuses on practices, on what people's experiences, on what they think and feel, on processes of communication and cooperation between people, and on the future[8]. It poses an alternative to a dominant tradition in philosophy to focus on theoretical concepts and to build laborious, but abstract, constructions out of these concepts. Instead, pragmatism focuses on practice. If person A talks about idea X and person B talks about idea Y, they do not have to discuss X and Y in order to find out what they are or whether X or Y is true or not. Instead, they try out their ideas in practice and observe the practical consequences of their ideas to determine how their ideas 'work' in practice.

Another key concept in pragmatism is experience. Pragmatists hold that experience is personal and contextual, and reject the idea that there are universal truths and they try to steer clear from essentialism, from foundationalism and from dualism (Keulartz *et al.* 2004). In order to understand reality or organize things in reality—both natural reality and social reality—one cannot start with essences or build upon foundations. All knowledge is provisional and the 'quest

[7] Another, more frivolous, reason for turning to pragmatism is that the term *pragmatism* is relatively easy to 'sell' within the organization in which I work. In previous research (Steen 2008), I drew from *deconstruction* to reflect on our projects; it was sometimes harder to 'sell' this term.

[8] This section is based on my reading of: Logister 2005, Hildebrand 2008 and Menand 2001.

for certainty' is a fallacy. Likewise, pragmatists steer clear from a dichotomies like theory/practice, consciousness/reality or fact/value. Instead, they focus on how people experience reality and how they use their experiences to gain an understanding about what is happening or to envision what ought to be happening.

Furthermore, a key goal of pragmatists is to encourage 'peaceful cohabitation and fruitful cooperation' (Keulartz *et al.* 2004) between people. Therefore, they focus on processes of communication and cooperation between people, and on how to enable or facilitate people to communicate and cooperate.

Moreover, pragmatism is future oriented. In pragmatism one poses questions, envisions desirable goals and possible future situations and attempts to realize these in practice. Pragmatism is empirical and experimental; one tries-out things in practice and tries to learn from that.

Traditional philosophy can be seen as a quest for universal, stable and certain facts, whereas pragmatism can be seen as a process of inquiry into contextual, changing and contingent phenomena. This makes pragmatism similar to design thinking and co-design-as-a-process, which are also concerned with facilitating communication and cooperation, with changing things and with generating specific, contextual responses to specific, contextual problems, and with trying-out to see what 'works' in practice.

Co-design as a process of inquiry

I will focus on two texts by John Dewey (1859-1952) in order to look at co-design-as-a-process as a process of reflective thinking or inquiry. Dewey's texts can be used to understand our current technological culture and to think about how we relate technology (Hickman 2001). Although Dewey is famous for his texts on education, on democracy and on aesthetics, his work can also be understood as a philosophy of technology, provided that technology is understood as 'active productive inquiry' (Hickman 1990, p. 23), as an activity that involves tools and artefacts, where these tools can be concrete or abstract.

I will be drawing from two parts of two texts by Dewey: from *How we think* (1910, pp. 68-78) and from *Logic: The theory of inquiry* (1938, pp. 101-119). In these texts, Dewey outlined his ideas about the process of reflective thinking or inquiry. He defined inquiry as follows:

> 'Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole.' (1938, 104-5)

Dewey saw inquiry as a process in which we start with an 'indeterminate situation', a situation that we experience as problematic, which we try to turn into 'a unified whole'; we try to solve (some of) the problems of the original situation and turn it into a situation that we experience as less problematic. Furthermore, he argued that the process of perceiving and defining a problem and of exploring, defining and trying-out solutions consists of five closely related activities or phases, which are often intertwined—often one will go back and forth between these activities. The five activities or phases are:

1. *'The antecedent conditions of inquiry: The indeterminate situation'* (1938), or 'a felt difficulty' (1910).

A specific, concrete situation is experienced as problematic, without yet knowing what is precisely problematic about this situation or how to solve it. This phase is like posing a question, making the situation '*questionable*': 'it is the very nature of the indeterminate situation which evokes inquiry to be *questionable*'.

Please notice that perception and experience, which are always personal and subjective, are key elements of this activity; to the start of an inquiry process. Looking at co-design from a pragmatic perspective, we will acknowledge that personal and subjective perception and experience can be starting points. This means that we will have to organize co-design in such ways that there is room for participants to express and discuss their personal and subjective perceptions and experiences, so that they can indeed be taken into account.

2. *'Institution of a problem'* (1938), or '[the problem's] location and definition' (1910).

A provisional definition of the problem is formulated. This is an important phase: 'The way in which the problem is conceived decides what specific suggestions are entertained and which are dismissed; what data are selected and which rejected'. The problem definition is provisional and will be revisited, reformulated and refined in an iterative process.

The way in which—and even the words with which—the problem is defined influences the kind of solutions that will be searched for. Please notice that this intimate relation between problem-setting and solution-finding is also found in design thinking, e.g., in the way 'wicked problems' can be approached, and in how, in transformation design, participants are encouraged to explore and redefine the brief as a part of the process.

3. *The determination of a problem-solution'* (1938), or the 'suggestion of possible solutions' (1910).

In a process of inquiry, a problem and its possible solutions are simultaneously explored and developed:

> 'Observations of facts and suggested meanings or ideas arise and develop in correspondence with each other. The more the facts of the case come to light in consequence of being subjected to observation, the clearer and more pertinent become the conceptions of the way the problem constituted by these facts is to be dealt with. On the other side, the clearer the idea, the more definite, as a truism, become the operations of observation and of execution that must be performed in order to resolve the situation.' (1938, p. 109)

This process is similar to how a co-design process is organized in iterative cycles of research, design and evaluation: research is done in order to better understand the situation, e.g., of what users do and of their needs and preferences; new or improved products or services are created, based on a growing understanding of the problems at hand, possibly together with users and stakeholders; and these solutions are then evaluated in practice, possibly together with users and stakeholders.

Dewey suggests that *problems* are best explored and defined using your *perception*, your capacities to see, hear, touch, smell and taste what is there, and that *solutions* are best explored and developed using your *imagination*, your capacities to imagine new things and new situations; what could be there or what ought to be there. When we organize co-design, we will have to create room for perception and for imagination. E.g., in a co-design session, one can confront the

participants with photographs or video or audio recordings of the problem that they are addressing about, in order to help them to actually perceive the problem, or one can provide the participants with methods, tools and materials that will help them to use their imagination and creativity. Such approaches would be similar to the 'generative tools' that Sanders is proposing to use during co-design (Sanders 2000).

4. *'Reasoning'* (1938), or the 'development by reasoning of the bearings of the suggestion' (1910).

One should not jump to conclusions; one should not accept too quickly a suggestion for a solution, because that will 'cut short' the process of inquiry. In this phase the relations between the problem-as-it-is-currently-defined and the current-suggestions-for-solutions are studied. This can be done by reasoning about how the envisioned solutions (means), will help to solve the problem (end).

This activity would be similar to how participants in a co-design process discuss the means and ends and the relations between means and ends. Imagine that they are discussing at length about how to reach a specific goal, and one of them asks 'Why do we want to achieve that goal, anyway? Or is there another, further goal that we want to reach?' Questions like that can be of great help to stretch or define the boundaries of a project. Being explicit about the size and the boundaries of the system that will be discussed is critical to encourage the kind of systems thinking in transformation design.

Dewey explained this phase in terms of meanings within a system:

> 'This examination consists in noting what the meaning in question implies in relation to other meanings in the system of which it is a member, the formulated relation constituting a proposition.' (1938, p. 111)

Discussions about problems and solutions, and about means and ends, are meant to enable participants to adopt a systems perspective and to encourage systems thinking, so that they can generate radically new ideas for new services or processes and for organizational change. For such discussions it is critical that the participants are invited and facilitated to express their different—and sometimes conflicting—backgrounds, roles and interests, so that they can discuss these, so that they can work as a multi-disciplinary team. If these different backgrounds, roles and interests are not taken into account, the solution will very likely be less innovative, e.g., because it was confined to one, dominating role or interest.

5. *'The operational character of facts-meanings'* (1938), or 'further observation and experiment leading to its acceptance or rejection' (1910).

In this phase one evaluates how the suggested solutions help to solve the chosen problem, by trying-out things in practice and observing what happens. As described above, 'the observed facts of the case and the ideational contents expressed in ideas are related to each other, as, respectively, a clarification of the problem involved and the proposal of some possible solution', and in this phase these ideas are made operational. This phase is about formulating hypotheses, of designing and doing experiments, of trying-out things and observing what happens.

In terms of co-design, this phase is about creating and evaluating prototypes in practical settings and about organizing and evaluating trials and pilots in which people use (early versions of) the products or services that are being developed.

In the next two sections, I will further explore a Deweyan perspective on co-design—seeing co-design as a process of inquiry. My goal is to understand and organize co-design more in line with what is already is: a social process, a process between people, and a process with ethical and political qualities.

I organize my remarks and ideas along to two lines. These lines are based upon two key questions that John Thackara formulated (2006, p. 2); he explained that design and design thinking are about exploring and finding answers to two key questions: 'where do we want to be?' and 'how do we get there?'

Where do we want to be?

Addressing the first question—where do we want to be?—can be seen as an effort to understand a current situation, to explore and define what is problematic about that situation, and to suggest possible solutions and to imagine alternative, future situations. Addressing this question would roughly correspond with Dewey's phases 1, 2 and 3 in the process of inquiry. In terms of co-design, this is a process of idea-forming ('beeldvorming' in Dutch): a group of people aim to develop a shared understanding of where they are and where they want to go to.

Applying Dewey's argument to co-design, I would argue that throughout a co-design project—and especially during the start of a project—the participants should attempt to get in contact with their own (personal, subjective) experiences with that concrete situation, or with similar, concrete situations, and attempt to express and discuss these with each other—and listen to others when they express their experiences.

Furthermore, they should be encouraged to explore and define and—later on, while the project progresses and possible solutions are explored and developed—to reformulate and refine the problem very carefully, and, e.g., pay attention to the terms that they use to describe the problem.

Moreover, they should be encouraged and facilitated to use their perception—what they see, hear, touch, smell or taste—to (further) explore and define the problem and to (further) explore and develop possible solutions. Throughout the co-design project, there should be room for, and an emphasis on, expressing and discussing personal and subjective experiences—next to the usual practice of expressing and discussing 'facts'. This is in line with Hildebrand's (2008, p. 57) remark that 'inquiry is not a purely logical process—feeling is a useful and orienting presence throughout each phase'

Such a co-design process, via introspection, reflection, dialogue and empathy, is rather different from a 'scientific' approach, in which people (supposedly, typically) try to produce 'facts' and convince each other. During the co-design process, participants can engage in 'dramatic rehearsal' (cf. Keulartz *et al.* 2004): they can imagine, express and 'rehearse' what the current, problematic situation feels like and what various alternative situations would feel like. Such an approach would bring to the fore and take into account the 'ethics' of co-design.

How do we get there?

Addressing the second question—where do we want to be?—can be seen as an attempt to create and try-out possible solutions and to materialize an alternative situation. Addressing this question would roughly correspond with Dewey's phases 3, 4 and 5. In terms of co-design, this is a process of decision making

('besluitvorming' in Dutch): the making of decisions is critical to making progress within the project.

Applying Dewey's argument to co-design, I would argue that, while the co-design project proceeds, and the ideas about the problem and about possible solutions become more concrete and detailed, they should be encouraged to express their respective backgrounds, roles and interests, so that they can discuss these and negotiate with each other. A key reason for bringing different backgrounds, roles and interests together is to enable the participants to generate a balanced solution: a solution which balances their, sometimes conflicting, backgrounds, roles and interests. This will facilitate multi-disciplinary team work and enable them to discuss and reformulate means and ends, and the relations between means and ends, and to discuss and reformulate the problem and possible solutions.

Furthermore, it is critical that the project leader, or facilitator or client, encourages the making of decisions. There is always a tension between the attempt to be *open* towards other people and new ideas (diverging) and the need to move towards *closure*, towards drawing conclusions and delivering results (converging) ({Steen, 2008 447 /id}). A (co-)design starts with a relatively large 'space', when many questions are not yet posed and many decisions are not yet made, and must result in a smaller 'space', when questions have been posed and answered, and some kind of closure is reached. Making choices makes a project move forward. Obviously, there are advantages to an iterative process, but, just as obviously, there are also disadvantages to too iterations. The project must proceed, not only by making decisions on a content level, but also by making decisions on a process level: about when to allow for a discussion or iteration and when to not allow for that and to move forward.

Moreover, a Deweyan perspective on co-design, as a process of inquiry, draws attention to the importance of building prototypes early-on in a project, of trying-out solutions in practice, e.g. by conducting trials, pilots, and of learning from such evaluations.

Such a co-design process, of facilitating participants to express and discuss and negotiate their interests and to discuss and reformulate problems and solutions in iterative cycles, is rather different from an 'engineering' approach, in which people (supposedly, typically) try to follow a linear process and look for one 'best' solution for a brief that is given in advance. During the co-design process, participants are encouraged to deal constructively with 'deep-seated and fundamental value conflicts' (Keulartz *et al.* 2004, p. 22) that may exist between them. When participants' perspectives or values are conflicting and in a deadlock, they can try 'conflict management', e.g., by introducing an innovative reading of the situation, tangential or perpendicular to the current perspectives or values. Such an approach would bring to the fore and take into account the 'politics' of co-design.

4. An example from practice: a *MiReCol* application for co-design

In this section I will introduce one example from practice, i.e., a design project in which I work. The name of the project is *MiReCol*, which stands for Mixed Reality Collaboration. The goal of this project is to design a *mixed reality* system that will help people to collaborate. 'Mixed reality' refers to an ICT system that mixes the real and the virtual and uses *augmented reality* (virtual additions to the real world), *augmented virtuality* (additions from the real world in a virtual world), *tangible interfaces* (real objects that can do things in a virtual world) and *virtual reality* (virtual environments). The project is partly driven by

the availability of new technologies, and partly driven by the need for an actual application, namely the need for a system which people can use in urban planning, to facilitate and encourage experts and citizens to collaborate during idea-forming and decision-making in the process of urban planning.

The project is currently (July 2009) in-progress. We have a first version of the system requirements, we have a 3-minutes promotional video-animation-clip that shows our ideas—see Figure 1. We are starting to build and evaluate parts of the system and the plan is to build and evaluate a prototype in 2010.

Figure 1. Screenshot of a video-animation-clip of MiReCol.

Some key elements of the system were inspired by the application of Dewey's ideas on inquiry for rethinking co-design, as described above. They were also informed and inspired by discussions with people from the The Hague Urban Planning department. They follow a 'conversation' ('samenspraak' in Dutch) approach and organize conversations with citizens early-on in an urban planning process, in order to invite and encourage them to contribute actively and creatively, instead of treating citizens as passive and reactive and only confronting them with the plans after they are almost finalized, as is commonly done in 'consultation' ('inspraak' in Dutch).

A prototype of the *MiReCol* system will be build in a room and will include a multi-touch, multi-user table and several large wall-mounted screens[9]. The design of this system illustrates how co-design can be organized differently, drawing from pragmatism.

The *MiReCol* system can be understood as set of tools that enable people to engage in co-design. Three kinds of such tools are relevant here:

- Tools that people—especially citizens—can use to express their personal experiences, e.g. by 'story telling', so that other participants can get to know these people's experiences. This is intended to help participants during the process of problem definition and to take into account citizens' perspective and experiences. Examples of these tools are: applications—e.gj. web-based so

[9] Possibly there will also be a kind of 'look through' display that people 'in the field' can use to experience *augmented reality*.

that they are available via the Internet, or via kiosks in public spaces—via which citizens can record and upload video clips of themselves, or comment upon other citizens' video clips. During a co-design session, in the *MiReCol*-space, participants can browse through and view these video clips, to bring citizens' perspectives and experiences into the process. In that sense, these tools function as the memory of the project. Similar tools will help participants to express and discuss their own experiences, or their reactions to citizens' stories. The memory function can also be used to record and store episodes of the project, e.g., a video clip that documents a joint project team decision, so that it can be retrieved later on, e.g., by people who join the project later on.

- Tools that people can use to visualize and modify elements of the problem or of possible solutions, such as traffic congestion, street noise, citizens' safety and other variables that change depending on participants' choices. Participants can use the multi-touch, multi-user table for this. During the iterative processes of idea-forming and decision-making, participants can display, manipulate and edit maps, and objects on it, on this table. There are several models running 'under' the table, which can model and simulate these variables. This allows participants to manipulate these variables in intuitive and iterative ways, so that they can immediately and directly see the results of their ideas for possible solutions. They can, e.g., use 'tangibles' (small objects that they can put on the table and which are recognized by the table) to start and modify these models and simulations. This allows the participants to jump between 'perceiving the problem' en 'conceptualizing solutions', and to make quick iterations.

- Tools that people—especially different experts during a co-design session—can use to discuss the problem and possible solutions. Combined with the tools to express and share experience and with the tools to visualize and modify these variables, there are tools that the participants can use to negotiate with each in constructive ways. These have more to do with the process than with the content, and the session facilitator or project manager play key roles in this. He or she can influence the process, in order to help the participants to jointly develop a shared understanding of the problem and of possible solutions in an iterative process. There is, e.g. the risk that people who are relatively less skilled in communication or influencing are not allowed to speak up or are not listened to; the role of the facilitator or manager is to invite and encourage such people to speak up and invite and encourage others to listen. The facilitator or manager will also facilitate processes of negotiation while participants modify and discuss different possible solutions, e.g., from different perspectives, from their different roles and interests, so that they can generate solutions that are acceptable to most of them.

- Tools that monitor and feedback aspects of the group dynamics, with the goal of helping the participants to reach a shared understanding and to enable them to generate solutions that are satisfying to all of them. The system can, e.g. monitor which person is speaking a lot or which is not speaking a lot, and adjust lights within the room, so that the participants can become aware of their group dynamics, and can change their behaviour. Other, more subtle ways are to have lights that can emit different colours and smell dispensers that can emit different scents; these are intended to enable the facilitator to influence the group dynamics.

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