# Design and Innovation as Co-creating and Co-becoming with the Future

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Our world has changed radically over the last several decades. Almost every domain of our lives is affected by disruptions in technology—our economy, culture, and education, as well as social lives. We are living in an environment that is characterized by high levels of volatility, uncertainty, complexity, and ambiguity ("VUCA world"). These changes bring about completely new challenges on an individual, an organizational, and a global level. Whereas classical approaches to design and innovation are based on the assumption that we can "solve" these challenges by applying techniques and methods of "problem solving," of (social) collaboration, co-creation, or co-design, this paper challenges this "classical" understanding of "together" and "co-."
We will develop and take a closer look at three forms of "together" and "co-," investigating the relationship between the designer/innovator, his or her material and environment, and the involved stakeholders and their being embedded in ecosystems, as well as the future he or she is designing for: (a) being/working together and collaborating with others (socio-epistemic dimension); (b) being together, interacting and corresponding with the material/world (co-becoming dimension); and (c) being together and co-developing with the future as "learning from the future as it emerges."
It will be shown how these forms of together are related to design and innovation, and we will develop implications concerning new skills and mind-sets.

*Key words: design, innovation, co-becoming, learning from the future as it emerges, future skills and mind-sets*

## Introduction

Innovation and creating novel knowledge have become two of the most important driving forces in our economy and society over the last several decades. This is because our world has changed dramatically in the last 20 years in almost every domain: our technologies, economy, society, culture, political systems, educational systems, and so forth have become hypercomplex, digital,

dematerialized, highly specialized, and high speed, and they follow an exponential dynamics (cf. discussions on "VUCA world"; Bennett and Lemoine, 2014). Unpredictability and disruption are the new normal. These radical changes require completely new approaches in tackling the resulting challenges and problems. We have to deal with the dynamics emerging out of these new technologies and their implications for society and the markets by creating new niches. These are problems and challenges that go far beyond bounded rationality (Felin et al., 2014; Simon, 1996), ill-structured, or wicked problems (Dorst, 2006), as they are dealing with uncertainties about a future that is not only unknown, but also unknowable and unpredictable in principle (Sarasvathy et al., 2003).

In this context, design and innovation have received new attention over the last few decades (e.g., Binder et al., 2011; European Commission, 2015; Fagerberg and Verspagen, 2009)—however, not primarily in the sense of making things aesthetically more appealing, making devices smarter or more innovative, or enhancing the usability of user interfaces, and so forth, but rather as a means and as a tool for creating sustainable futures by bringing forth innovations for these grand challenges. It has become clear that these challenges can only be tackled by sophisticated design and innovation processes in a *collaborative* and *interdisciplinary* manner.

In the context of these challenges, *innovation* plays a key role, not only as an economic driver or as a knowledge creation process, but also primarily as a *mind-set*. Similarly to design, it is—ideally—about shaping the future in a sustainable, thriving, and future-oriented manner. As has been shown by Peschl and Fundneider (2016), there is a close relationship between design, innovation, and anticipating (and shaping) the future. This paper will develop an argument that this convergence becomes even stronger if the aspect of the *future* becomes one of the key drivers for these processes.

Classic approaches suggest focusing on processes of (social) collaboration for tackling these abovementioned challenges. The claim of this conceptual paper is that they cannot be solved only in the "classical" manner and understanding of "together" and "co-," namely, in the sense of (social) collaboration, co-creation, or co-design. Rather, this paper suggests going beyond this understanding and investigating alternative, more profound, and wider concepts of "together." We will develop and take a closer look at three forms of "together" and "co-." investigating the relationship between the designer/innovator, his or her material and environment, and the involved stakeholders, as well as the future he or she is designing for. It will be shown how these forms of together are closely related to design and innovation. In the final section, we will take a closer look at the implications of these approaches and discuss necessary future skills and mind-sets.

## Interaction and collaboration in design and innovation processes

### *Innovation as shaping the future*

Before going into the details, let us take a quick look at some basic concepts and assumptions of innovation. Of course, as is the case in design, innovation is far from being a clear and unified concept, and there exists a vivid discussion on various approaches and concepts of innovation (e.g., Dodgson and Gann, 2010; Fagerberg et al., 2006; Tidd and Bessant, 2009). Baregheh et al. (2009)and Garcia and Calatone (2002) give an extensive literature overview and show the whole diversity of the field. Despite this diversity, there are some characteristics that can be found in almost all approaches to innovation that are summarized nicely and in a comprehensive manner in the following:

> *Innovation is conceived as a process that includes the generation, development, and implementation of new ideas or behaviors. Further, innovation is conceived as a means of changing an organization, either as a response to changes in the external environment or as a preemptive action to influence the environment. Hence innovation is here broadly defined to encompass a range of types, including new products or services, new process technologies, new organizational structures or administrative systems, or new plans or programs pertaining to organizational members.*
>
> *(Damanpour, 1996, p. 694)*

Innovation is primarily a socio-epistemological *process* and not (only) its final product or service (Baregheh et al., 2009; Fagerberg et al., 2006; Peschl and Fundneider, 2008; Peschl et al., 2015). It integrates knowledge processes and social practices. Innovation is about future states of the environment and about changing it in a future-oriented manner. Hence, it is not only about reacting to changes in the environment, but also about *proactively* influencing and shaping the environment in such a way that novelty may arise in the future. From a design perspective, this second case is even more interesting, as design is concerned with generating new meaning by changing the environment or creating new niches (e.g., Dorst, 2015; Krippendorff, 2006,2011). For innovation processes to be successful, innovation has to start on an *individual* and *organizational* level: it is about individual and organizational transformation (i.e., the participating cognitive system[s] are changing their mind-set, attitudes, culture, etc.). Only after having transformed our perception and individual and organizational (cognitive) capabilities will we be able to bring forth novelty and thriving innovations.

### *The role of collaboration in design and innovation*

In the fields of both design (studies) (e.g., Cross, 2001) and innovation (e.g., Paulus et al., 2012), various forms of *collaboration* are brought into focus. The first and most obvious version of "together" in design and innovation processes focuses on the social aspect: it is about the collaboration between designer(s), innovators, users, and various stakeholders. The underlying assumption of this aspect of collaboration and cooperation is to introduce diversity of perspectives. As a consequence, such approaches try to achieve interdisciplinarity, multiperspectivity, and emergent effects that cannot be brought about by a single designer only. User-centered design or co-design approaches are examples for such collaborative processes.

Whereas in classic user-centered design (e.g., Sanders and Stappers, 2008) the user is a more or less passive object of study, in a co-design setting "the roles get mixed up: the person who will eventually be served through the design process is given the position of 'expert of his/her experience', and plays a large role in knowledge development, idea generation and concept development" (Sanders and Stappers, 2008, p. 12). By including various stakeholders in the design process, design becomes a *socio-epistemic* technology and practice (e.g., Peschl, 2006).

On the one hand, we are dealing with knowledge and cognitive processes that are the foundation of these designerly activities. On the other hand, these epistemic activities are embedded in social processes of jointly negotiating and creating meaning that is transformed into (the production of) artifacts (Glanville, 2007; Krippendorff, 2006,2011). The underlying assumption of the collaborative approach is that this social diversity leads to diversity in the domain of knowledge and, by that, opens up new (and more adequate) spaces and opportunities for solutions.

However, social interaction is not the only form of collaboration taking place in design and innovation processes. We have to bring another form of collaboration into focus as well: the second form of collaboration and "together" concerns the relationship between the designer and his or her material and/or environment.

### *Reframing collaboration with the world and the material*

Every design and innovation process results in some form of artifact (be it physical, a process, a change in a social/organizational system, etc.). In the classic understanding of design and innovation, the process of creating an artifact is based on the following assumption: an agent (e.g., the creative agent, designer, or innovator) has an idea, a form, or a concept in his or her head/mind and externalizes it via his or her behavior (and by making use of tools); by that, he or she shapes the environment or material according to this form (i.e., production or "making" of an artifact). In other words, the material more or less passively "receives" its form by the activity of the agent. Ideally, this artifact mirrors, "represents," or, more accurately, *embodies* the intended idea or knowledge: a piece of wood has become a table, a lump of clay has become a pot, electronic and physical components have become a cellular phone, and so

forth. One of the roots of this perspective can be found in Aristotle's concept of *hylomorphism* (Aristotle, 1991, 2007).

If one takes a closer look, however, one can see that things are not as simple as they seem. For instance, Ingold (2013, 2014 and Roth et al. (2016) suggest rethinking this relationship between the agent or designer and the designed material or environmental structures in the following manner: one can think of both the designer's and the material's dynamics as two streams of becoming or as a flux of activities that are joining in the process of designing or innovating. It is an interaction, a process of *joint growth*, and of co-shaping rather than that one (i.e., the designer) shapes and impacts the other (i.e., the material, environment) only. Both designer and material are *active and passive*, they are shaping and being shaped, and they are giving form and receiving it. It is about both our engagement with materials as well as materials or the environment engaging in our lives in a kind of coupling, mutual modulation, and "dance" leading to an *emergent unity* that might develop and/or reveal novel qualities on both sides and/or in the interaction patterns. In such a process, we not only shape the environment, but also the emerging object or artifact is "designing back" on us—we are shaped by it by gaining intimate knowledge and insights about the designed object or the environment, by "knowing it from within" (e.g., Bortoft, 1996; Depraz et al., 2003; Ingold, 2013). In this sense, design can be understood as a *conversation* with the material/environment (Glanville, 2007; Schön, 1992). The activity of design is embedded in a feedback loop of forming a bidirectional movement between acting and reflecting about the implications of these actions (and back). Taking this idea one step further, we are arriving at what is referred to as "ontological design" (e.g., Willis, 2006).

As can be seen in Figure 1, we are dealing here with two streams of becoming that are interacting with each other: the flow of the agent's cognitive processes is interacting with and co-shaping the flow of the material.

One of the implications from our considerations so far is that we have to seriously question the classic assumptions of design (and innovation), namely, the hylomorphic approach. It is not only our mind and cognitive processes that are "in control" and the source of novelty, but also the *environment* that plays an important role as well in this process of creating novelty or innovations. This does not mean that the agent is completely passive; rather, he or she closely engages with the environment, and he or she both changes it and is changed by it (and by the results of his or her actions). Nevertheless, in such a perspective, the creative agent still has the lead over the material.

Exploring this relationship between the agent (designer, innovator, maker) and his or her environment in depth reveals, however, that both are *deeply intertwined* rather than just "interacting" with each other. We will see that such a perspective has crucial implications for our understanding of innovation and design, and it calls for new sets of skills as well as for alternative epistemic and organizational mind-sets and attitudes.

Hence, pushing this second form of "co-"(elaboration) or "together" one step further, we propose the following: instead of seeing the streams of becoming of the agent and the material/environment as separated and "only interacting" at specific points in time—following Ingold (2013), Ingold (2014), Pallasmaa (2009), or Roth et al. (2016)—we have to question the concept of interaction and develop an alternative by understanding these processes rather as *correspondence* and *co-becoming* between these two domains: design becomes a "modality of the never-ending flux of life. When a number of such lines of becoming come together in a particular way to make a bundle, a new form is created —like a thread formed when fibers of wool are spun . . . lines of becoming are corresponding with each other and, in this, come to correspond to each other" (Roth et al., 2016, p. 11). Both the agent and the environment/material are changing, and *together* a new form *emerges* as a result of mutually modulating each other (see Figure 2). That is, co-becoming is not only about an agent changing the environment (or shaping an artifact) and this artifact changing (back) the agent, but also about both parties forming a new and emerging unity, a

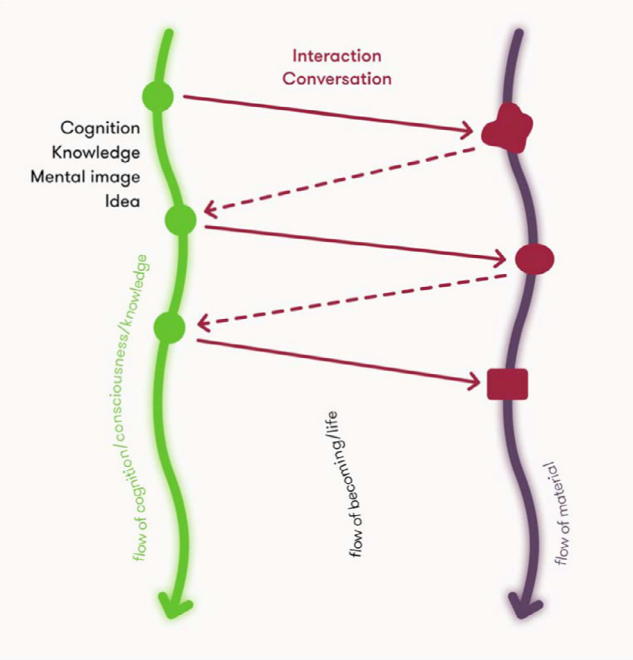


Figure 1. Designing and innovating as interaction and conversation with the material (adapted from Ingold, 2013; Roth et al., 2016; Schön, 1992). [Color figure can be viewed at wileyonlinelibrary.com]

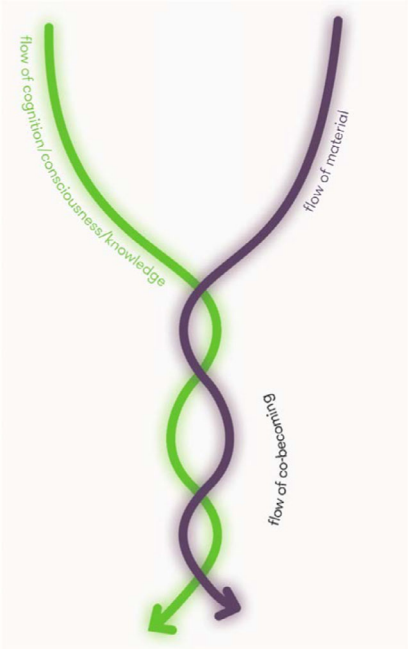


Figure 2. Designing and innovating as an emergent activity of co-becoming and correspondence between the designer/innovator and his or her material. [Color figure can be viewed at wileyonlinelibrary.com]

new entity, a new pattern of interactions that is more than the sum of (the changes in) the participating systems. It is characterized by a mutual engagement and modulation of the participating systems, leading to a new (joint) system that is defined by and has emerged from their mutual history of interactions.

One of the consequences is that the agent is not only involved in changing or shaping his or her environment any longer in a more or less detached manner; rather, he or she is also immersed in a process of *personal transformation and growth*, of an emergent joint growth. As an implication, this leads to a more humble attitude in design and innovation: designing or innovating is not primarily about creating and testing preconceived hypotheses or ideas by confronting reality with these hypotheses; rather, it is about *openness*, *listening*, and *being receptive* to what reality "wants to teach" us and following where it might lead us.

> *The environment "thinks in us, as we think through it. . . [It] is not to describe the world, or to represent it, but to open up our perception to what is going on there so that we, in turn, can respond to it. That is to say, it is to set up a relation with the world . . . correspondence."*
>
> *(Ingold, 2013, p. 6f)*

Thinking with and through the world means that we have to give up the attitude of control and replace it with a more humble mind-set and epistemic attitude of openness and radical receptiveness. The interesting point and difference between the interaction and correspondence approach lies in the prefix *inter-*: it points to the fact that in interaction, we are looking at the process of design as an interaction of two separated "parties" or streams of becoming that are interacting via the bridge of actions or behaviors. In the correspondence perspective, these two streams of becoming are joining and become one; they engage in a process of "co-becoming."

This understanding is in line with recent developments and findings in cognitive science, such as the *extended* or *enactive* approach to cognition (e.g., Clark, 2008; Clark

and Chalmers, 1998; Froese and Paolo, 2011; Grisold and Peschl, 2017b; Menary, 2010). Here, the claim is not only that our brain/mind is thinking, but also that we as cognitive systems are embedded in a closed feedback loop coupling us with the environment via our sensory systems and our motor systems. Our cognition is engaged in bringing forth and enacting our world, leading to behaviors that are changing environmental structures and dynamics. In turn, these environmental changes have a direct impact on our sensory system that is modulating our cognitive processes. Thus, it is not only our cognition that shapes the environment according to our ideas and knowledge; rather, we are thinking with and through our environment, and the designed environment is shaping us as cognitive systems in the process of designing and innovating toward a joint emergent ecosystem (of interaction patterns).

This intimate cooperation, co-becoming, and correspondence with one's own work have several interesting consequences:

- The final form of the resulting (innovation) artifact is not known in every detail from the outset of the design/innovation process. Of course, the designer will have some basic idea in his or her mind; however, in the course of the interaction with the material/environment, this idea might be changed dramatically.
- The form as well as the final cause or *purpose* (in an Aristotelian sense; Aristotle, 1991, 2007; Falcon, 2015; Mitleton-Kelly, 2007)(of the innovation artifact) emerges in the process of interaction and co-becoming. It is co-created in a process of mutual modulation and is fully revealed only when the work is finished (or, as pointed out by Glanville, 2007, p. 1194ff), when the work "is good enough" in the sense of having found its eigenform).
- Designers (co-)become their work: "as producers generally and designers specifically are '[g]rowing into the world, the world grows in them' (Ingold). They become the design so that the development of the designer is one of becoming-design. This unfolding becoming-design can be reduced neither to the human designer nor to the thing-designed" (Roth et al., 2016, p. 11f). Design and innovation are no longer about novel artifacts only, but about personal transformation.

## Why it is a necessity to include the future for profound design and innovation processes

If we have to give up the idea of having a clearly defined goal for an (innovation) artifact in mind before we start interacting with the environment, and that this goal or purpose will emerge and co-become in the process of engaging with the environment, then we are facing the question of how to identify this purpose and the "adequate" goals worth pursuing so that a successful and thriving innovation might emerge. In other words, the challenge is to develop strategies avoiding that the resulting novelty or innovation is *not* completely arbitrary, but rather fulfills a *deeper purpose* that is coherent with emergent environmental potentials, dynamics, and (real human) needs.

Glanville (2007) compares such an understanding of innovation and design with the activity of wandering around: we follow some direction, but we do not know exactly where we will end up. However, there is something that attracts us, and when we arrive, we will know that we have arrived and we will know that we have reached the goal. However, this goal or this final cause/purpose lies in an *uncertain future*. As shown in the introduction, today we are confronted with an uncertainty that is not only unknown but also—due to the high level of complexity—unknowable in principle (Sarasvathy et al., 2003). So how could we design and innovate for such an uncertain environment in a sustainable and thriving manner?

### *The third form of "together"/"co-": potentials and co-becoming with an unfolding future*

Continuing our considerations from the previous sections, one can see that this third form of "together" or "co-" is based on the previous point. However, it is not only about co-becoming and correspondence of the designer and his or her material/

environment (in the present moment), but also about *co-becoming with an unfolding future*. It is a process of co-creating a future by "learning from the future, as it emerges" (cf. Scharmer 2007, p. 52). Whereas the correspondence approach suggests a process of co-becoming between the designer and his or her material, this third understanding of "together" focuses on the aspect of the *future as attracting* us in a process of bringing forth novelty and innovation. However, it is meant to be neither a process of problem solving nor a kind of "out-of-the-box thinking" or creative brainstorming.

Based on the intimate knowledge ("knowing from within" and correspondence; see above) and relationship between the designer and the designed, one tries to identify *hidden future potentials*, make sense out of them, and bring them into the present to develop and incubate them into concrete innovations. Hence, novelty is not so much a projection of our own ("out-of-the-box") ideas into the future, but rather the future potentials themselves are "teaching" and attracting us (in the sense of final cause/future purpose), and, by that, the future is co-created in a process of joining, making use of the dynamics, and shaping the process of an unfolding reality. In that sense, we are (co-)developing together with the future.

From an ontological perspective, this "unknown future" can be seen as follows: any phenomenon, entity, system, or object is unfolding its own behavioral dynamics/becoming according to its inner workings and its interactions with the environment over time. This means that this phenomenon or object is not completely determined in its dynamics (in the sense of not being completely predictable). This perspective has its roots in, for instance, Aristotle's metaphysics (Aristotle, 2007) and draws on the concepts of potentia/potency/possibles (in the sense of "what is not yet") and actus/actuality/actuality. Contrary to actuals, possibles or potentials are open to develop in various ways and directions that are partially intrinsic to this phenomenon/object and partially dependent on environmental stimuli, influences, or changes; they are latent (Poli, 2006).

In this context, it is important to distinguish between a *potential* and a *trend*: both deal with the future. Whereas a trend is recognized as a change or movement that is already taking place, for example, in fashion or technology, a potential is more blurred, fuzzier, and usually further in the future; it is *not yet fully recognized* and understood. A potential cannot be identified by, for example, observing users (e.g., by means of a trend-scouting process) who live a certain trend because it is still ahead of a trend. Rather, a potential is something that is *emerging* (e.g., unclassifiable behaviors, alternative lifestyles, almost indistinguishable shifts in value systems) and does not (yet) manifest itself in a concrete existing object, thing, or phenomenon; a potential is still hidden or latent (Poli, 2006), it is "not yet" (Bloch, 1986), and it cannot be recognized or perceived directly (i.e., through our sense organs). It "lies in the air," it is subtle and "beneath the surface," and one must immerse deeply in the field, "feel" it empathically, and know it from within (Bortoft, 1996). In many cases, a potential has its origin in almost imperceptible changes, such as minor shifts in mind-sets, social values, and cultures. Since these changes are far from "obvious" and cannot be identified in a concrete event or phenomenon, a process of sense making (i.e., a deep understanding of the object and its context) is necessary to identify what these potentials are actually about: What possible purpose, value, or need lies behind them? What could be a yet unknown niche? Which implications does this have for the next steps of bringing these future potentials into the present?

The interesting and at the same time challenging point about potentials is that we have to (a) identify these latent possibilities and (b) cultivate them in a nonimposing manner so that they can develop into "interesting" and sensible innovations. This can be achieved by following a dynamics having its foundation in the concept of adjacent possibles: "New Actuals create adjacent possible opportunities in which new Actuals arise in a continuous unprestatable co-creation" (Kauffman, 2014, p. 6).

This involves highly sophisticated skills, mind-sets, and capacities on an individual/cognitive, designerly, and organizational level: for instance, being able to identify latent

or hidden potentials (Poli, 2011), being able to redirect and reframe one's patterns of perception and cognition (Bohm, 1996; Depraz et al., 2003; Scharmer, 2001, 2007), or dealing with self-transcending knowledge (Kaiser and Fordinal, 2010; Scharmer, 2001). In other words, we must be able to bring forth sustainable radical innovations that are not based on the projections from the past into the future (Grisold and Peschl, 2017a, 2017b; Peschl and Fundneider, 2017b), but that are grounded in a process of "co-becoming with and learning from the future as it emerges" (Scharmer, 2007, p. 52). We refer to this process as *emergent innovation* (Peschl & Fundneider, 2008, 2013).

In this sense, our creativity answers and corresponds to as well as engages with an ever-ongoing creative becoming of the world. This is different from our classical understanding of design and innovation, where the creative agent plays a central active role; in this process of emergent innovation, future potentials take the lead and the role of the designer/innovator is to make use of them in a sensible and thriving manner.

## Conclusions

Today's challenges and the high levels of uncertainty and complexity in our VUCA world call for completely new ways of thinking, skills, mind-sets, organizational behaviors, and capacities; they have to go beyond classical approaches of problem solving, analytical tools, prediction models, creativity techniques, design (thinking), or innovation. As we are confronted with problems that are lying in an uncertain future, it is inappropriate to employ strategies that are for—the most part—driven by projections from the past (Peschl and Fundneider, 2014, 2017a). In the course of this paper, we have developed three forms of "together" as possible strategies that could overcome these limitations and challenges: (a) being/working together and collaborating with others (socio-epistemic dimension); (b) being together, interacting and corresponding with the material/world (co-becoming dimension); and (c) being together with the future as "learning from the future as it emerges" (co-creating a joint future dimension). What are some of the consequences of these three forms of "together" (especially for the latter two)?

### *Personal transformation as a prerequisite for future-driven design and innovation*

Any process of design or innovation is based on *personal involvement* and *engagement*. However, as we have seen in the co-becoming and correspondence approach, it is not sufficient to just apply a preconceived concept or idea to the environment and react to what does not work in the process of realizing one's own plan or concept. Rather, it has become clear that the designer (and his or her idea or concept) has to fully engage and co-develop with his or her material or artifact in a process of co-becoming, leading to a personal transformation.

### *The designer becomes his or her work/artifact*

As a consequence of the previous point, we not only have to acknowledge that the border between the agent and his or her environment/material gets blurred, but also that the agent (partly) becomes what he or she creates. In other words, the whole process of designing and innovating is transformative on both sides, and both have to undergo a process of mutual profound change (toward an emerging future purpose and joint pattern of interaction). This applies on both an individual and organizational level.

### *Importance of being out of control and letting go for creating novelty*

> *Being out of control . . . can be seen as offering more options than we could, ourselves, imagine. Thus, it is a way of increasing our creativity because we have access to (for instance) ideas which would otherwise not have come to our minds.*
> *(Glanville, 2007, p. 1195)*

As our cognition is heavily determined by our past experiences (e.g., see the predictive mind approach in cognitive science; Clark, 2016; Hohwy, 2013), it is hard for us to open up to an uncertain future. Only if we let go of our past experiences will we be able to "see" potentials that are going beyond our projections from the past.

***The goal is not clear from the outset: going with the flow***

As has been shown in Glanville's (2007) wandering metaphor and as has become evident from the last form of "together," complex and uncertain futures do not allow for defining a clear goal and trying to achieve it. Rather, it has turned out that we have to be receptive to what wants to emerge and go with the flow in a process of co-creation and co-becoming with the unfolding future.

***Necessity of acquiring new sets of skills and mind-sets***

We need to cultivate future-oriented (epistemic) skills, practices, and mind-sets to enter into a process of co-creating a thriving future by learning from this future as it emerges:

- Openness
- Receptivity
- Being able to embrace the unexpected
- Being able to wait/patience
- Engaging with and immersing fully into one's environment
- Developing a sense for potentials and what is "not yet"
- Being able to listen to what wants to emerge and what "wants" to come into being
- Love for details and "weak signals"
- Being oriented toward an emerging purpose rather than having a mind-set of optimizing existing functionalities

In conclusion, it is important to keep in mind that the resulting purpose or possible value of this future-driven approach to design and innovation can neither be planned nor given in advance, but emerges and unfolds in the process of co-becoming as the final cause. Thus, focusing on future potentials not only changes the quality of the outcome of this design/innovation process, but also large parts of the process itself. It is not completely open-ended, but a process of "designing and innovating as learning from the future as it emerges (rephrased from Scharmer 2007)."

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