Carefully I test
My plan; it is
Big enough; it is
Unrealizable.
Bertolt Brecht [1]

Georg Trogemann

Introduction to the Unknown in Design, Art, and Technology **Contributions to a philosophy of making**

In 2021, the White Book on the future of design education presented an international overview of the situation and challenges of design in the 21st century.[2] Over a five-year period, a series of workshops and group discussions were held, and a total of 250 teachers, students and representatives of professional practice on four continents were surveyed in interviews and hearings. The result is a valuable overview of the current situation in design, which above all also highlights the heterogeneity and contradictory nature of the field. This is aptly summarized by one of the numerous bon mots highlighted by the layout: "Not even designers can agree among themselves on what design is."[3] Alternatively, as Ekkehart Baumgartner puts it in his essay: "Rarely has the use of a word exploded to such an extent: from strategy designer of all colors to the business designer, from influence designer to hair designer and nail designer. They are all designers – digital citizens are by dint of how they see themselves per se also creative citizens. The concept of design and that of the designer are, to resort to a human comparison, burnout patients in an A&E unit."[4] Design has long since ceased limiting itself to creating

1 Bertolt Brecht, "Sorgfältig prüf ich Meinen Plan; er ist Groß genug; er ist Unverwirklichbar.", (Translated by the author).
2 IF Design Foundation, Christoph Böninger, Fritz Frenkler, Susanne Schmidhuber, eds., Designing Design Education: Weißbuch zur Zukunft der Designlehre / Whitebook on the Future of Design Education (Stuttgart: avedition Verlag, 2021). The white book is also available for online download, accessed September 16, 2024, https://www.if-designfoundation.org/en/weissbuch-zur-zukunft-der-designlehre-als-pdf-zum-download/
3 Ibid. 80.
4 Ibid. 136.

meaning and style for tangible and visible products. Today, not only is everyone a designer, but professionals also deal extensively with abstract concepts such as processes, services and systems.

Moreover, major local differences also make it difficult to clearly define the field and draw uniform consequences for design teaching. At the African hearing in Johannesburg, the participants noted that design is often seen as an elitist, Western concept characterized by colonial influence. The aim must therefore be to break free from Western individualism and create an independent community-based design system rooted in traditional local contexts and oriented towards local and regional markets instead of having one's own resources and labor exploited in global markets. However, this requires developing a specific language for independent ideas and establishing a completely autonomous discourse. At the Asian hearing in Kyoto, discussions focused on the relationship between modern design and cultural heritage, such as the Kōgei practice. Although both modern design and Kōgei are holistic concepts reflecting political, economic, social, cultural and environmental concerns, Kōgei – like the arts and crafts movement – gains appeal by emphasizing the enduring value of everyday objects, countering the economics of short-lived trends. "Kōgei is appealing to designers because it serves as a projection area for the vision of social counterculture to anonymous mass production."[5] The role of beauty in design – which seems outdated from a Western perspective – was also discussed. Although beauty is fleeting and subjective, it is nevertheless associated with truth and economic success. Nonetheless, even speaking of a uniform Western or European perspective in this context seems problematic. For example, at the North American hearing in Pasadena, it was strongly emphasized that in the course of digitalization, design is increasingly determined by automated processes. Therefore, skills in algorithmic programming, artificial intelligence and machine learning seem to be "the literacy of the 21st century."[6] On the other hand, at the European hearing in Gmund, reservations were expressed about digitalization, primarily directed against the dynamism and social impact of these technologies. It was lamented that new facts are constantly being created and there is no time to

5 Ibid. 181.
6 Ibid. 256.

culturally come to terms with them and reflect more deeply on their consequences. Indeed, we know even less about what would have emerged if the Chinese, southwestern Asia, etc., perspectives on the current issues in the design had also been taken into account.

A general consensus and starting point for the White Book project on the future of design education was "that the status quo in design education does not suffice to overcome the challenges that result from the dynamic changes in technology, business and society."[7] Due to the changing economic conditions and other external factors – such as digitalization and globalization – under which designers work today, an urgent need for action in design education is unanimously identified. However, the need for change in design education is also due in no small part to the expanded importance that the design community ascribes to itself. Not only are the changing demands of design practice pulling the field in certain directions, but designers themselves – at least those who participated in the White Book project – are at the same time trying to push their profession into a central position in society, or rather trying to reposition it there. Throughout the history of design, designers have repeatedly struggled for a prominent position as political actors who attempt to intervene in social conditions. For many years, we have been observing a situation in which the term design is booming but has simultaneously become completely meaningless, because everything has become design. Design's current struggle for significance and interpretative sovereignty over its own profession is perhaps best illustrated by the following two quotes: "… design will in coming decades be the leading discipline when it comes to the comprehensive renewal of coexistence on Earth."[8] "The designer is the CEO of the future."[9] In any case, the authors of the White Book are firmly convinced that the influence of design will continue to increase over the 21st century, not least due to social ambitions and the preoccupation with ecological issues. In general, we are observing an increasing positioning of design as a solution-generating method for complex social problems, which comes surprisingly close to the current "solutionism" as the ideal of technological problem-solving approaches. With their business ideas, the New Tech Elite also claims to disrupt the economy and solve humanity's problems.

7 Ibid. 20.
8 Ibid. 141.
9 Ibid. 159.

The postulated central social role of design goes hand in hand with its future-oriented nature and a dedicated value-oriented approach. "The future is a constant theme in design. Design is geared to designing the future."[10] Design – like technology – has always aimed to improve the status quo. Its starting point is a self-critical reflection on the present and speculating about what responsible action for a promising future might look like. In this context, design is understood as a value-based practice through which cultural values are materialized, which is associated with a strong degree of social responsibility. "Since, over the last 150 years, design has been part of the developments in modern industrial societies that have brought us to our present-day situation (environment, digitization, politics, business, society), it should be considered an important social responsibility when it comes to managing the resulting tasks. In order to do justice to the discipline, the execution of design practice requires a framework of ethical-moral values that are bound by the common good. Design is a human-oriented and politically impacting practice."[11] Alternatively, as it was put in the African hearing: "The highest ethical aspirations are applied to one's own work. The question »What do you do?« should be answered with an entirely clear conscience: »I am a designer and I'm saving the planet.« The fact that there is no simple formula for saving the planet goes without saying."[12] The demand for an ethics of design culminates in a comparison with the Hippocratic oath. "Those who swear it commit to preserving life. Designers should take on a similar responsibility."[13] Of course, there are also other positions in design demanding that design must be amoral to fulfill its function. "The claim for ethics as a major criterion in design seems to be off the point, a symptom of immaturity. Ethics should be kept implicit in the process by using the appropriate methodical tools and communicative styles. We need a moral disarmament of design in order to become acceptable to other disciplines."[14] Wolfgang Jonas replaces the moral claim in design with the concept of responsibility. "Design is responsible for what it is doing. Responsibility is only possible if we do not retreat to

10 Ibid. 17.
11 Ibid. 254.
12 Ibid. 224.
13 Ibid.
14 Cf. Wolfgang Jonas, On the Foundations of a 'Science of the Artificial,' Useful and Critical – the Position of Research in Design, International Conference, University of Art and Design Helsinki, 1999, accessed September 18, 2024, http://8149.website.snafu.de/wordpress/wp-content/uploads/2011/07/1999_HEL.pdf

moral positions."[15] However, the assumption of responsibility presupposes that one is as clear as possible about the impact and side effects of one's actions. The fact that foresight is only possible to a limited extent in most cases restricts the scope for control. Moreover, the question of responsibility becomes all the more difficult as we transfer increasingly more decisions to automated technical systems.

The current situation in the field of design as summarized in the White Book is reminiscent of Bertolt Brecht's poem: "Carefully I test my plan; it is big enough; it is unrealizable." This overburdening of design is an unavoidable consequence of its self-positioning in the center of society, i.e. its commitment to responsibility for all forms of creation – not to say for the whole world – and the ethical and normative principles accompanying it. Put bluntly, without having any problem-specific knowledge itself, design aims to solve the major problems of our time. In this image, design sees itself as a cross-sectional or even anti-disciplinary competence that permeates and enriches other areas but has no autonomous substance. That is why much of what is formulated as requirements for a contemporary design education reads like the specifications for meeting the challenges that modern life presents to all of us. Everyone – not only designers – must acquire the skills required to a certain degree if they want to cope with today's life.

The broad consensus in the study on several statements considered essential to design is largely due to this postulated broader scope of the role of design in society. Thus, many shared convictions and the resulting demands on teaching have not emerged despite all of the different visions in design but they are precisely a natural consequence of the expanded scope. Some loose core statements and demands for contemporary design education from the White Book are summarized below into four main topics that hold particular importance for our approach:[16]

The thinking hand: In his article, Ekkehart Baumgartner places the thinking hand at the center of design practice, as a term that he borrows from Horst Bredekamp and his studies on Galileo.[17] He is convinced that the interplay of manual and intellectual considerations is the fundamental mechanism, and the concept of thinking with

15 Ibid.
16 IF Design Foundation, Christoph Böninger, Fritz Frenkler, Susanne Schmidhuber, 253-257.
17 Ibid. 133-143.

one's hands is also regarded as the central form of design research. Visual drafting was already used as an analytical and creative cognitive instrument since the Renaissance. However, the development of a holistic approach that combines intellectual thinking and manual action primarily requires a basic mental attitude that regards both areas as inseparable, as a kind of interlinked, joint movement. Moreover, not only professional designers but even children learn by acting and thinking about what they do. This underlines that design as a unity of thought and action is a fundamental human way of engaging with the world. If you ask about its foundations, you inevitably come to poiesis, which is already theorized in the philosophical concepts of Aristotle. The poietic roots of design are also visible in the following quote: "If we connect the conceptual duo of the Thinking Hand with the activity of the designer then the radical intellectual effort innate in the creative process essentially consists of generating actions or results that were not previously conceivable and that liberate humans from their determinacy and help improve the conditions of human life, but also have an enlightening impact."[18] However, the thinking hand needs an update to be effective in today's circumstances. The drawing pen – still a powerful tool – has been accompanied by other, often more abstract but sometimes also more powerful tools.

Digitalization and tools: The digitalization of recent decades has led to significant changes in all areas of life and had a major impact on design. Designers are claiming the role of developing the products and solutions of tomorrow in an increasingly technological and digital world. This raises the question of the level to which designers need to understand the digital technology they use. Where is the skillful use of the tool sufficient and where is a deep understanding of the underlying digital structures and algorithms necessary? The extent to which the underlying digital structures and algorithms must be penetrated depends not least on the task to be solved. The new software tools and especially artificial intelligence (AI) – which has become increasingly important in recent years – require designers to constantly adapt their processes to the new possibilities of the tools to achieve better or at least faster results. In terms of purpose, tools are neither good nor evil, and naturally

18 Ibid. 139f.

they can be used for constructive as well as destructive objectives. At the same time, tools are never neutral: they have an enormous influence on the direction in which the design process – whether material or social – develops and what result is ultimately achieved, or which phenomenon ultimately manifests itself. In this context, it is insufficient to know the rough horizon of a new technology, as designers must become active participants in the experimental space of AI and digital technologies. Design can only retain its claimed autonomous position if it is also actively involved in the development and experimental exploration of new digital tools. Design has not yet taken a convincing position on this issue, which is particularly important as the aesthetic possibilities are also a consequence of the tools used. At the moment, it seems that aesthetic decisions come at the end of the design process, after many different and sometimes conflicting interests of different interest groups have been taken into account. This practice is based on an oversimplified understanding of aesthetics.

Teamwork and interdisciplinarity: Design within the framework of the thinking hand is also understood as a cultural experimental space in which different interests and players can come together. Design must constantly respond to changing circumstances and contemporary challenges. Successful methods from the past might prove inadequate in future projects. In order to do sufficient justice to most of the tasks facing us today, the skills of designers must be combined with those of engineers and stakeholders from many other fields, whereby the boundaries are inevitably blurred. This diversity of participants is seen as an enriching success factor. Design is regarded as a post-heroic practice that is not dominated by individual geniuses but primarily thrives based on the cooperation of mixed teams. Interdisciplinarity is considered important but at the same time contemporary design claims a special role within the network of diverse competencies. Within organizations, design is not seen as limited to one area but rather fulfills an overarching function that connects all areas. Designers are playing the role of moderating the controversies of different stakeholders and integrating different expert views into holistic perspectives, such as in value sensitive design (VSD). To fulfill this function, the ability to communicate in international, intercultural, interdisciplinary and cross-hierarchical constellations is considered indispensable. Therefore, sensitivity to

cultural contexts and traditions is considered an important qualification in design practice.

Uncertainties and ignorance: Dealing with uncertainty is typical for design. Solving problems and achieving goals under uncertainty requires domain-specific experience, intuition, and the ability to improvise. Modernity believed in predictability, plannability, and controllability, and our Western society remains dominated by the conviction that our world – including its future – can be entirely understood from a single perspective, consistently described in language, and entirely controlled through our actions. However, we no longer trust the popular slogan of the tech sciences: "The best way to predict the future is to create it."[19] Political, economic and social developments are just as unpredictable as the effects that our technologies have on us. Of course, we have to design our technologies and products responsibly with the intention to create a future worth living. Within a definable framework and for detailed questions, it is often not only possible to make very precise predictions but also important and desirable technical improvements. This striving for improvement is at the heart of technical development and design, although this does not tell us anything about how our lives will feel in the future. This scientific view that the world is completely controllable – in the short circuit of prediction and active design – should be overcome. However, seeing the world and our poietic actions within it differently remains a challenge for everyone who tries to create something today, including designers. In the currently prevailing scientific worldview, ignorance is still primarily seen as a deficit, as not yet knowing. However, there are also forms of not-knowing, such as not wanting to know, not being able to know in principle, or consciously forgetting to make a new beginning possible, all of which are not only important for mastering everyday life but also for creative processes.

In this publication, we proceed from the assumption that there cannot be a complete and coherent theory of design; rather, we assume that design itself is a fundamental human activity that needs an ontological rather than theoretical positioning. The basic form of this activity is captured in the term poiesis, which is

19 A saying originally associated with Abraham Lincoln. However, in the digital world, reference is usually made to Alan Kay: "The best way to predict the future is to invent it".

derived from the ancient Greek ποιεῖν and simply means "to make." Aristotle divided reason into three basic forms: practical, theoretical and poietic episteme. Theoretical reason analyses what is given, practical reason designs the rules of our behavior, and poietic reason is techne (art, skill, craft, and technique), an action aimed at production guided by appropriate planning. Poiesis thus asks about the forms of thinking, planning and acting that become active when a person designs and produces something: an object, a poem, a process, a machine, etc., which was not there before and which – as soon as it is brought into being – separates itself from its creator and becomes effective in the world. Aristotle's generic term for such a production is "techne." According to Georg Picht,[20] the theory of poiesis intended by Aristotle but never fully developed should have included everything that the Greeks called techne: all crafts, medicine, all arts, but also large areas of politics and economics. It would thus have been a theory of all possible forms of production, and it would have been a philosophy rather than a scientific theory.

This is where design comes into play. "Anyone who wants to do something must have an inner vision of what is to be done. Making is always the execution of a model, and the models that are executed are what we call drafts in everyday language. The primary content of the draft would therefore be the image, model or scheme of an inner vision."[21] Our modern understanding of design begins where preparatory and anticipatory activities are becoming increasingly important: activities that are no longer directly aimed at manufacturing a product or other artifact but instead comprise creating a draft. With design, poietic action becomes "action at a distance."[22] Thinking and acting become separated, although they are still related to each other. This temporal and methodological separation of thought and action underlying design is very crucial and powerful but also the source of many fundamental problems that design has to struggle with, especially today. Even though designing is also an action, it is no longer an action on the final artifact, but rather a symbolic, abstracted and model-based substitute

20 Cf. Georg Picht, *Die Kunst des Denkens, in: idem, Wahrheit, Vernunft, Verantwortung, Philosophische Studien,* (Stuttgart: Klett-Cotta, 1969), 427-434, (Translated by the author).
21 Ibid.
22 Cf. Robin Evans, *The Projective Cast. Architecture and its Three Geometries,* (Cambridge Mass.: MIT Press, 1995).

action. Models, sketches, technical drawings, notation systems and other semiotic practices take on a representative role, with the help of which the final properties of the product – whatever it may be – are gradually developed. The properties are anticipated by means of semiotic representations and thus made available for communication, the generation of variations and for evaluations. The practical basis of design lies in these semiotic renderings and the associated tools, operations, methods and distributed processes. With the advent of digitalization, this practical basis has fundamentally changed and continues to reflect a major challenge for the coming decades.

It is interesting to note that up to this point we still have not made a clear distinction between technology and design. Both make massive use of semiotic tools, and both are only successful if they fit properly into the global context in which their products become effective. The separation of technology and design is only possible if – as is common in the Western tradition – we forcibly divide our human productive imagination into rationality and intuition (or technical functioning versus sensation, meaning, and aesthetics) and let the two compete against each other. Only with this artificial division of a holistic human ability – a division that is due more to our striving for specialization than the matter itself – can one profession deal with functionality and the other with its aesthetics. In the course of this division of labor, the overall responsibility for the negative consequences of poietic activity is also lost. Taking back responsibility for our poietic actions primarily means seriously reconsidering the structures within which we operate, as we shape our living conditions with ever more powerful technologies, but under increasingly precarious conditions for the planet and our nature. Although the poietic system that we have implemented has been very successful in the past and led to material prosperity in large parts of the world, not only are the limits of the narrow disciplinary perspectives becoming increasingly apparent but the destructive powers of this system are now also clearly visible. It is obvious that our poietic reasoning urgently needs an update. The renewal that guided this publication is based on the ontology of the British philosopher Andrew Pickering:

> *… the first step is to characterize what I think of as humanity's usual pattern of acting in the world. This is a stance of dualist domination. We humans tend to act as if we are special, the lords of creation, transforming what we like to think of as a docile world to suit our own ends. This is the stance that Martin Heidegger (1977) called enframing – treating the world as a "standing reserve" – which has got us into so much trouble, and which we can think of as acting on the world. And then this other stance that I want to explore, this other pattern of acting, would have to acknowledge instead that we live in fact in a lively world that we cannot control and that we therefore have to learn to get along with. This is the stance that Heidegger called poiesis, which we can think of as acting with the world rather than on it.*[23]

This is a much more modest approach than the one formulated in today's design. We do not claim to solve the big problems of our time. At the same time, it is a challenging project because we need to develop new perspectives on the functions of knowledge, experience, and aesthetics as well as their interplay. Our concern focuses on the search for a new relationship between design, technology, and scientific knowledge, a relationship that allows us to take responsibility for our present-day poietic actions. No theory of poiesis that has this as its goal can be completely absorbed by science, nor can it be a purely technical or aesthetic practice. The four major themes from above (the thinking hand, digitalization and tools, teamwork and interdisciplinarity, uncertainties and ignorance) are still central in this perspective, although they now have a different coloring. Ultimately, this is still a sufficiently large project to be unrealizable in Brecht's sense, at least in the short term.

One of the central demands of our approach is that "the 'knowledge base position' needs to be complemented by the 'unknowledge base position' or by the competencies to deal with not-knowing," as Wolfgang Jonas is cited in the article by Zahra Ganjee.[24] As already mentioned, in traditional sciences, not-knowing is usually equated with not yet knowing, as a gap that needs to be closed. Nonetheless, the classical sciences have also always struggled with various forms of fundamental unknowability. Everything we know about the past – for example – must either be remembered, have been recorded in media, or have left other visible or at least measurable traces in

23 Andrew Pickering, "Acting with the World: Doing without Science," e-cadernos CES [Online], 38 | 2022, Online since 31 March 2023, connection on April 02, 2023, http://journals.openedition.org/eces/7894

24 Wolfgang Jonas, Design Research and its Meaning to the Methodological Development of the Discipline, in: Ralf Michel, Design research now, (Basel: Birkhäuser Verlag, 2007), 187-206, 202. See also the article by Zahra Ganjee in this book.

the present. If something has left no material marks of any kind, not even a trace in a person's memory, it simply did not take place. Indeed, traces are rarely unambiguous: they usually allow for different interpretations. Likewise, we have no access to events that may be taking place at this very moment but in places that are not accessible to us with our own senses or the technical extensions available today.

However, there are other forms of not-knowing that are not related to gaps in scientific knowledge but rather to strategies for dealing with what is known at an individual or social level. Conscious concealment and hiding (for personal or communal benefit), deliberate ignorance (to free oneself for a new beginning, to eliminate prejudices), not wanting to know (to simplify and narrow), not being allowed to know (for security or ideological reasons) are all variants of ignorance that also play an important role in connection with the production of artifacts and in poietic action. These interactions between knowledge and ignorance usually fulfill social and communicative functions and are very close to the concept of information, its transmission, distribution, provision, encryption, and – finally – its deletion. Knowledge here is something that has an external existence, something that can be traded, that one has and others do not have, or vice versa. Once transcribed, this knowledge can easily be exchanged between machines, allowing us to delegate increasingly more of the actual production to the machine and our networked technical milieu. What remains for the human being here is the planning of the making, i.e., the organization of the information necessary for production by machines. At the same time, this leads to the current situation, where "we live in complex societies with a high division of labor, in which all members are ignorant of almost all knowledge. Individuals know that their knowledge is limited. This contrasts with the fact that individuals benefit from knowledge that they do not know."[25] This form of knowledge processing today forms the foundation of the 'dualistic stance,' as Pickering calls it. Economically, it has been very successful in the past, but at the same time it has caused us enormous ecological problems and a drastic reduction in our self-determination. Therefore, today

25 Nico Stehr, Wissen und der Mythos vom Nichtwissen, in: Aus Politik und Zeitgeschichte, 63. Jahrgang, 18-20/2013, 48. (Translated by the author).

we find ourselves in the contradictory situation that science and technology are constantly increasing our ability to change our living conditions while at the same time the predictive control over their social consequences is decreasing. It is only the power of the techno-scientific system in its entirety that is growing, while the opposite is true for the individual. "Paradoxically, the ability of society as a whole to produce and operate complex technologies is constantly increasing while individuals are increasingly limited in their possibilities to produce something with their own hands, or even to secure their own survival."[26]

In contrast to these information-centered forms of knowing and not-knowing, there is this other form of fundamental unknowability that Andrew Pickering points to: the ontological fact that the future is neither controllable nor fully knowable. In a world in which we are largely unable to simulate and predict the future with the help of our semiotic processes, self-responsible human action regains its value. Nico Stehr's concept of knowledge comes very close to the requirements of Pickering's 'poietic stance': "Instead of defining knowledge as something that a person owns or can acquire relatively easily – an idea that applies more to the concept of information – the knowledge process and knowledge relations should rather be seen as an action, as something that a person does."[27] In this poiesis-based view, action and performance are more important than scientific knowledge. The poietic process is characterized by the fact that something unforeseen can happen at virtually any moment. Indeed, this moment of surprise is often the starting point for a new aesthetic search process. Put simply, one could say that the aesthetic experience is based on its unpredictability. In this picture, mistakes are not simply something that must be anticipated and eliminated, but something that is necessary to make progress. They are merely those actions that did not have the desired success, the divergence between intention and result. Only afterwards is one wiser. From this perspective, the cyclical nature of design processes is a natural consequence of our inability to fully foresee the consequences of our actions, often even the effects of smallest changes. Instead of control, it is about creating the frame conditions for phenomena to manifest themselves.

26 Georg Trogemann, Konstantin Butz, eds., *In the Making - An Investigation into Creation in Art, Design, Architecture and Technology,* (Cologne: Verlag der Kunsthochschule für Medien, 2022), 12.
27 Nico Stehr, Wissen und der Mythos vom Nichtwissen, 51.

However, the question of where the boundary between the foreseeable and the unforeseeable lies is undoubtedly a very tough nut to crack. An important question thereby is how far the area of prediction can be separated from the rest of the world. Only where it is possible to delimit the actors, their actions and interactions, as well as their effects, can prediction succeed, and even then there are still various epistemic obstacles to overcome. As long as we do not know the laws according to which the delimited areas develop, as well as their current state, and can also carry out the calculations necessary for a prediction quickly enough, no precise forecasts are possible. Mathematics – together with science and technology – has developed very powerful tools to make very precise predictions in a wide variety of fields. In this game, the unconsidered and undesirable aspects of the applied models find their place under the term 'side effects.' However, in most life-relevant situations, neither the network of actors nor their interdependence and sphere of influence can be fully determined. This is not a matter of a lack of information and a lack of predictability tools but real, ontological indeterminacy that cannot be avoided by any model. Here, in this infinite and inextricable entanglement with the world, all poietic projects have their origins, regardless of whether we attribute them to technology or design. Indeed, science becomes a problem when it claims responsibility even though it does not have the necessary skills and tools. Mathematics, science, and technology have joined forces to form a powerful troika for innovation and production. However, what we forget is the fundamental difference between creating and understanding: knowing and applying the actions necessary to produce something does not mean that we understand the effects that the artifacts have once they exist and are integrated into a living environment. The institutions of technology assessment – for example – have long since given up the idea of being able to predict the consequences of technology. Founded in the 1960s and 1970s, when the negative social and ecological effects of modern technologies became obvious, they have increasingly become an instrument for producing orientation knowledge for decision-making processes in politics, business, and society regarding the handling of upcoming technologies in recent decades. In this sense, we nowadays can produce far more than we understand and for which we can take responsibility.

One of the central questions in this context concerns what the thinking hand – in which doing and understanding were inextricably intertwined – can mean today. It becomes obvious that one of the basic characteristics of design – acting at a distance – is reaching its limits. This is also the core of Pickering's "poietic stance," which is based on an intimate reciprocal relationship that demands involvement and direct engagement with material processes and thus brings us closer again to nature. Sensual experience as well as thinking and reflection must remain united in the design process to achieve results that meet today's challenges, although developments in the digital field and AI in particular currently suggest the opposite. In the White Book, the example of image creation and processing is used to show how much the entire industry has changed as a result of digital technologies. All analogue image processing activities – which once mainly comprised manual operations and material processes – have been digitized, automated, and thus devalued as a service. "What remains then is merely to take a decision on nuances of taste, with judgment becoming the Kantian core competence of design."[28] This is not only a misunderstanding of the aesthetic challenges that new technologies pose to us today but also an illusion to believe that all design tasks can be solved by sitting down in panels to develop solutions at the green table, which can then be confidently left to the machines for implementation, or by using digital forecasting tools to decide on the future.

As already mentioned, we must also be aware that tools are never neutral, as if we are completely free to use them for both good and bad, as one often reads. However, in fact, our results are largely predetermined by our tools. It is unfortunately very common for the digital to be presented as something immovable and definitive that has come upon us like a natural phenomenon. Nonetheless, technologies are invented by humans and must be shaped and directed by them. AI – for example – is often either seen as a technology that merely filters patterns out of mountains of data or creates variants of the known, or – in the opposite – as a coming power that is about to take control. This is a fundamental misunderstanding of digitality and technology in general. It is neither

28 IF Design Foundation, Christoph Böninger, Fritz Frenkler, Susanne Schmidhuber, 30.

helpful nor does it solve the actual problems that digital technologies entail if they are positioned as an inferior counter-model to autonomous design. Anyone who wants to be effective and politically active in the digital sphere today cannot avoid engaging with the inner structure of technologies to such an extent that at least their horizon becomes visible and comprehensible. A deeper understanding of how algorithms and AI actually work is indispensable for this. Beyond this, in design, technology must be seen as an aesthetic field of experimentation of its own kind. The aesthetic potential of technology can only be exploited if we do not see virtual and augmented reality technologies or AI – for example – as completed developments but as open and exciting experimental fields for new aesthetics. Only through the direct and playful use of technology can new phenomena be discovered and stabilized in artistic laboratory experiments. Acquiring the technical and theoretical prerequisites for this is anything but easy, and it is insufficient to refer to interdisciplinary cooperation here; rather, a new transdisciplinary relationship must be created between technology and design, where the individual acquires the knowledge required for the specific problem across disciplines. At the same time, a critical attitude towards scientific knowledge and methodology is necessary, which does not always provide the solution but is often part of the problem.

With the book at hand, we bring together a series of essays highlighting individual ways of dealing with the unknown in various design situations. The 'poietic stance' outlined above – which has its roots in philosophy – forms the background for the very different points of departure in teaching, research, art, technology, everyday life, and even military policy. In contrast to scientific reflection, in which the material side of a topic is regarded as insignificant and pushed as far into the background as possible in favor of the conceptual side, we are striving for poietic reflection here. Although the scientific text refers to something outside itself, it claims to be conclusive and contain everything essential. It is based on logic and rationality and aims at secure knowledge that is repeatable and universal and can predict future events. On the other hand, poietic reflection is based on the inseparability of action and notion and refers to habitual knowledge and experience. It is aware that texts, i.e., linguistically formulated

reflection, cannot replace vibrant experience and our sensual being in the world. Since they are texts in a book, the articles presented here therefore necessarily contain only one side of the coin, namely the reflection of the absent other side. At the same time, language is a very powerful tool to depict the knowledge that arises when we reflect on our experiences and actions. These reflections do not have to be strictly rational and logical – as in purely scientific representations – but refer to research oriented towards action and embodiment, which only brings about the event that it reports through its own actions. This inevitably means that the contributions do not deal with current issues of industrial design processes but instead focus on experimental approaches to design challenges in academic environments. In this sense, the articles are to be seen more as contributions towards a yet-to-be-developed philosophy of making than as the presentation of building blocks for a design theory.

The first article is based on the observation that the current wave of generative AI tools is fundamentally reshaping the world of work in many industries, and consequently also changing the way in which designers work. In their contribution to this book, Steffen Mitschelen and Natalie Weinmann raise the question of how working with these new and yet unknown tools will transform the design discipline. The authors report on a workshop they have conducted with design students to address the question of which skills are necessary to navigate an uncertain future in which outcomes can increasingly be generated automatically. The article comprises two parts, each written by one of the authors. The first part reports on the workshop's setup and procedure, investigating the role of interpretation in dealing with the unexpected generated results by finding suitable applications for them. The second part explores how the students' experiences with unfamiliar tools and approaches are shaped by their knowledge, past experiences, and expectations, influencing their actions.

In her article, Zahra M. Ganjee discusses the complexity of design projects, highlighting ambiguity, uncertainty, and the impossibility of knowing all of the fields involved as key characteristics of complex problems. She argues that purely scientific research is unable to fully recognize the implications of acting in a space of uncertainty. Therefore, as already mentioned above, the 'knowledge base position'

should be complemented by an 'unknowledge base position.' In this context, primary generators in design (references and precedents) become important. Therefore, by comparing the two, she attempts to clarify the relationship between the use of references and the notion of not-knowing in the design process. In other words, the article discusses how the design process can commence from a state of not-knowing. It also addresses three existing approaches to facilitate complexity and interact with uncertainty in design: the transformation designer's co-evolutionary approach, Andrew Pickering's doing-without-science approach, and Donald Schön's interactive approach. Each one of their methods assists designers in dealing with ambiguity, unpredictability, and unknowns in complex situations.

Christian Rust's study explores the process of creating a violin bow through an autoethnographic approach. He aims to unravel the unknowns surrounding the question of what it is like to engage in this form of craftwork through the only route considered viable. The reflection upon the experiences and findings in this process leads to the proposition of a framework for research into artifacts centered around the three interconnected and interdependent key elements of skill, experience and knowledge. While the focus in this article is placed on experimental creation, it is believed that the threefold framework can be applied broadly to other forms of artifactual research.

The article by Somayyeh Shahhoseiny addresses one of the challenges in designing dwelling places for migrants in host societies. Populations forced to migrate as a result of war, natural disasters, or economic and political pressures often lose their ability to 'dwell,' exercise agency, and form a sense of identity in the host country due to unfamiliarity with the new situation. Her article defines the home as an objective and tangible extension of the self (body) and even a symbol of the self. To address this issue, she utilizes the concept of forgetting as a form of not-knowing, which plays a crucial role in alleviating the fear of the unknown and serves as a path toward dwelling in a new environment. Here, moments of forgetting are referred to as moments of insight.

In his research project, Tobias Bieseke investigates the interplay of narration and interaction in extended realities. He is particularly interested in the individual experience of participants when confronted

with unknown or unfamiliar forms of perception. An essential part of his research is the experience of participants as altered self-representations in the form of avatars, haptic feedback, and their behavior in mixed reality environments. The central research question concerning how actors integrate unfamiliar perceptual forms into their personal experience space is particularly important because unfamiliar experiences enable thought processes that lead to transformative sense-making.

Mattis Kuhn draws parallels between the ontology and epistemology of agential realism and aesthetic experiences to show that an essential characteristic of art is excluded from agential realism: the purposeful production of things of which we do not know what they are. The framework of agential realism takes the position that things have neither inherent properties nor clear boundaries. Instead, these emerge in "intra-actions" of agencies. Many of these agencies are constructed by us, i.e., through designed tools or structures. The article proposes works of art – "calculated alienation" – as »diffraction apparatuses« par excellence to question our ways of perceiving, thinking, and shaping the world.

Political security concepts – such as pre-emptive security policy – ask for technologies that are able to anticipate the future as precisely as possible. However, these policies can only be enforced by giving the concept of prevention an absolute character. A "collective acceptance of the future as a threat" is required for the resulting measures to be widely accepted. Christian Heck's article explores recent, data-driven prediction methods as tools to anticipate and proactively prevent future crises, conflicts, crimes, and terrorist threats, along with broader military and security service trends aimed at controlling and stabilizing the future. For this purpose, he questions the ethical and legal basis for such measures and discusses the implications for the rule of law, international law, and human rights. It is essential to understand the cultural and social consequences as well as the limits of these preemtive systems to preserve social freedom and participation in democratic processes.

The book concludes with an article by myself that discusses two completely different strategies for dealing with the unknown in the digital world: the chronos paradigm and the kairos paradigm. The chronos paradigm desires understanding, security, and predictability.

The intention here is the targeted design of our open future, for which the unknown must be avoided and systematically eliminated. On the other hand, the kairos paradigm draws from the unknown. It creates open spaces of action and looks for surprise and aesthetic experience within them. This openness and the search for the hidden makes it a suitable paradigm for engaging creatively and aesthetically with the digital.