

BIOINCLUSIVE ETHIC AND COLLABORATIVE DESIGN

**Implications for Research
and Practice**

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Master's Thesis

Bioinclusive Ethic and Collaborative Design

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ABSTRACT

Human society is unsustainable, and solving the environmental crisis has become a pressing, urgent matter. The underlying cause of the crisis seems to be the anthropocentric culture of humans. This human-centric culture shapes opinions and behaviours of humans. Their worldviews and actions are also formed by design. Design has been one of the disciplines that explicitly acknowledges and promotes its human-centric value base. It has instilled these values into the society through design processes and solutions. Collaborative and Participatory Design (C&PD) has especially focused on the human-centric perspectives. Thus, reimagining this sub-field of design might be a starting point to envision a less human-centric design practice overall. To envision a less anthropocentric C&PD, this thesis has gathered inspiration from the bioinclusive ethical framework. This ethical framework views humans as part of nature and urges humans to rethink their perspectives on and relationship with nature. To view Collaborative and Participatory Design through this bioinclusive lens, the researcher conducted two systematic literature reviews, distilled key insights about the ethic and C&PD and, then, integrated these insights to identify potential implication for design research and practice. These implications suggest that C&PD might evolve into a less human-centric design sub-field if it explicitly acknowledges natural entities as non-designers who might be involved in design processes to a varying extent. The field might need to include the necessity to and benefits of natural entity participation in its core drivers and principles. The key approach groups within C&PD might want to envision principles, processes and methods that involve natural entities, embrace their perspectives and provide them sufficient decision-making power. These developments in C&PD field might lead to a less human-centric and more nature-inclusive design. In turn, the renewed value base of design might have the power to shift the anthropocentric positions of the society and address the sustainability crisis.

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1. INTRODUCTION

Currently, the human society is unsustainable, and the likely cause of the sustainability crisis is the anthropocentric culture of humanity. Increasingly, various researchers and studies report about the dreadful state of the planet, climate and nature. In 2017, more than 15000 researchers and scientists signed a petition urging humans to stop the current damaging practices and, ideally, attempt to reverse the detrimental impact on nature (Ripple et al., 2017). Other researchers concluded that the significant loss of biodiversity might already be irreversible (Ceballos et al., 2015). Meanwhile, another study showed that the loss of biodiversity along with climate change would likely have an adverse effect on human civilisation (Watts, 2018). These various reports also highlighted that humans and their anthropocentric culture have caused the environmental crisis. Humans have been extensively focusing on their own needs and placing them above the needs of the natural systems (Hajjar Leib, 2011; Kotzé, 2014). This human-centric position has dominated the modern culture and resulted in the environmental crisis. To address the crisis, the anthropocentric worldview and culture of humanity would need to change. One of the potential tools for this change could be design. However, first, the design practice itself would have to transform to be less human-centric.

Traditionally, design has extensively focused on the human, their needs and desires, but this focus would have to shift in the future. So far, the human-centric values have been so prominent in design that a clear ISO standard for such design has been developed. The standard outlines requirements and recommendations for designers to maintain the anthropocentric focus while developing solutions (DIS, 2009). The solutions that have been designed through such human-centred processes have carried and further engrained these values into the society (Keinonen, 2017; Winner, 1980). The humanity, in turn, has further demanded more human-centric solutions. The sub-field of Collaborative and Participatory Design (C&PD) emerged to support the humans in shaping design solutions to satisfy their needs better (Simonsen & Robertson, 2012). This sub-field places human at the centre of the design and involves humans into the processes. Through participation in

these processes, future users and other stakeholders can express their needs and build solutions that satisfy them. Thus, C&PD seems to carry a strong human-centric focus. This strong focus on the human might serve as a starting point for rethinking anthropocentricity of C&PD and the whole design discipline. Some researchers (e.g. see Avila, 2017; Forlano, 2016; Jönsson & Lenskjold, 2014; Mancini, 2011; Thomas, Remy, & Bates, 2017; Westerlaken & Gualeni, 2016) have already raised the need to rethink the discipline to be less human-centric and more inclusive of non-humans. However, their work does not seem to provide a holistic insight into a less anthropocentric Collaborative and Participatory Design. Such perspective could arise from a systematic assessment of the C&PD and its reinterpretation through a less human-centric lens.

Various environmental ethics can serve as lenses for re-imagining human-centric values and focus of design. First, the Western environmental ethics can provide valuable insights and inspiration. The anthropocentric perspective is one of the ethics within the field of Western environmental ethics (Palmer, McShane, & Sandler, 2014). The other Western environmental ethics are less human-centric and focus either on the individual animal, species or ecosystems (Palmer et al., 2014). Second, indigenous ethics and worldviews can also provide a less human-centric perspective. Such viewpoints are prominent in, for example, early Daoism, Native American cosmologies or indigenous Sami belief systems (Bahr, 2015; Gudynas, 2017; Hassoun & Wong, 2015; Johnsen, Mathiesen, & Eira, 2017). Third, nature-inclusive and non-anthropocentric ethics and value systems developed by individual philosophers can also serve as inspiration for a new value base of design. This category would include the bioinclusive ethic outlined by Freya Mathews and the Deep Ecology framework described by Arne Naess. All of these ethics, worldviews and value frameworks have their pros and cons. Consequently, all of them could equally well inform and inspire the initial attempts to envision a less human-centric design discipline. One of the frameworks, the bioinclusive ethic, seem to be based on a limited amount of works by one author. This narrow range of sources fitted the scope and timeframe of the thesis project. Therefore, the author chose the bioinclusive ethic as a source of inspiration to reinterpret foundations of Collaborative and Participatory Design.

1.2. Research Aims & Questions

This thesis aims to reimagine Collaborative and Participatory Design as a less human-centric practice by viewing it through the lens of the bioinclusive ethic. It seeks to answer the following research questions:

1. What is the bioinclusive ethic, and what are its characteristics?
2. What is the Collaborative and Participatory Design and its main approaches?
3. What are the existing examples of nature-inclusive projects in Collaborative and Participatory Design?
4. What implications would the introduction of bioinclusive ethic potentially have on the Collaborative and Participatory Design discourse?

To answer these questions, the researcher conducted two systematic literature reviews, distilled key insights about the two fields and integrated these insights to outline potential implication. The systematic literature review approach extensively shaped the processes and findings of this thesis. Therefore, first, Chapter 2 presents the methodology used in the thesis. Next two chapters outline the results of the two literature reviews. Chapter 3 presents the outcomes of the literature review on the bioinclusive ethic, and Chapter 4 presents the outcomes of the literature review on Collaborative and Participatory Design. Then, Chapter 5 presents the findings of the research through seven implications that the bioinclusive ethic might have on C&PD. It also outlines potential limitations and avenues for further study. Finally, Chapter 6 presents the conclusions of the research project. These six chapters strive to holistically demonstrate not only the outcomes but also the process of the thesis.

2. METHODOLOGY

This chapter on methodology, in particular, showcases the four phases of the research process. In the first phase, the author conducted research on potential approaches to literature reviews and developed her research plan. In the second phase, she conducted a systematic literature review on the bioinclusive ethic and distilled three key insights about the ethical framework. In the third phase, the author conducted a systematic literature review on the Collaborative and Participatory Design. She distilled seven key insights about the field and its approaches in relation to the notions raised by the bioinclusive ethic. In this phase, she also reviewed existing publications on involvement and participation of nature and natural entities, for example, animals, in design processes. In the final phase, the author questioned each of the seven insights about C&PD through each of the three insights of bioinclusive ethic. She combined three implications of the bioinclusive ethic on each insight about the C&PD into one holistic implication. Finally, the author reviewed whether readings on nature in design include any notions similar to the induced implications. This chapter presents these research phases in more depth.

2.1. Systematic Literature Review

During the project, the student undertook two separate systematic literature reviews. As a novice researcher, she started by building an understanding about the various approaches to literature reviews. She was attracted to the systematic literature review because it seemed like an appropriate approach to develop a reliable review and to decrease potential bias (Grant & Booth, 2009). After selecting the approaches, the author researched the processes of conducting a literature review by reading several guides (see Booth, Sutton, & Papaioannou, 2016; Hart, 1998; Ridley, 2012). While reading these guides, she developed her research plan. This plan served as a guide throughout the research processes, but especially during the two literature reviews. In her written thesis, she aspires to increase the level of systematicity of her review by clearly stating her research questions, and showcasing her processes to the reader. Thus, this chapter will present her methodology.

2.2. Literature Review on the Bioinclusive Ethic

After outlining her research strategy, the author conducted the literature review on the bioinclusive ethic. She employed several search methods to compile a list of potentially relevant sources. Then, in several iterations, she selected the sources which were included in the review. Finally, she read and analysed the sources. This section presents the search, appraisal and reading strategies for the review on the bioinclusive ethic.

2.2.1. Search Strategy for the Literature Review on Bioinclusive Ethic

Step 1: Bibliographic and Citation Search of the Deeper Philosophy to Biomimicry Article

First, the author checked bibliographic references of the article *Deeper Philosophy of Biomimicry* (Mathews, 2011) which defines the concept of bioinclusive ethic. Then the author conducted a citation search of the article on Google Scholar. While scanning through the references and citations, the author read the abstract or book description of each potential source. She selected the sources which would be relevant to answer her research question and added them to the list of potential sources.

Number of sources added to the review process in this step: 35

Step 2: Academic Search Elite Database Search

Second, the author searched the Academic Search Elite database. The search terms and parameters are presented in Table 1. As in the first step, she scanned through the abstracts and book descriptions of the sources and selected the ones relevant for the review.

Number of sources added to the review process in this step: 6

Step 3: Grey Literature Search

Third, the author conducted a grey literature search, seeking to uncover dissertations and conference proceeding papers related to the bioinclusive ethic.

She searched for theses in the ProQuest database. While searching, she was operating the database as a Higher Education researcher and conducted a basic search. The search terms and parameters of this search are presented in Table 2. Additionally, she searched for any conferences and their proceedings available on the topic. She found two relevant conferences: Twenty-First and Twentieth Annual Meetings of The International Association for Environmental Philosophy. However, she could not locate the proceedings of these conferences. She also discovered the description document of the *Environmental Humanities and New Materialisms: The Ethics of Decolonizing Nature and Culture* conference, which she added to the list of potential sources. While scanning through the grey literature sources, she employed the same selection strategy as in the first two steps.

Number of sources added to the review process in this step: 9

Step 4: Serendipitous Discoveries of Sources

Next, the author conducted a small, serendipitous search for sources. She inquired for suggestions of references from her thesis supervisor, thesis advisor and professional contacts in the UnSchool of Disruptive Design (“UnSchool of Disruptive Design,” n.d.) Alumni Facebook group. While scanning through the recommendations, she reviewed abstracts, book descriptions of full sources and selected those relevant to her research question.

Number of sources added to the review process in this step: 22

Step 5: Bibliographic and Citation Search of the Sources Found in Steps 1, 2, 3, 4

Finally, the author intended to conduct a reference and citation search of the sources already added to the list. Unfortunately, the time allocated for this activity only allowed her to do the citation search for sources included during Step 1 of the search process. She reviewed the references and citations of the sources and added the relevant ones to the review.

Number of sources added to the review process in this step: 2

Total number of sources added to the review process: 128

Table 1. Search Terms Used During the Database Search on the Bioinclusive Ethic

Term	Search Parameters	Number of results	Notes
Bioinclusive		0	
bio-inclusive		1	
bioinclusive ethic		0	
bio-inclusive ethic		87	No direct results; result shown suggested by SmartText Searching function of the database
bio-inclusive AND ethic		1	
bio-inclusive AND ethics		1	
bio-inclusive environmentalism		91	No direct results; result shown suggested by SmartText Searching function of the database
bio-inclusive AND environmentalism		91	Same results as in the search query without [AND]
bio-inclusiveness		1	
nature-inclusive		1	
trans-species ethics	Full text, peer-reviewed;	31	No direct results; result shown suggested by SmartText Searching function of the database
trans-species AND ethics		1	
environmental AND ethics	Peer-reviewed; Source type: Reviews	393	
environmental AND ethics NOT health	Peer-reviewed, Published since 2015	806	Results arranged by relevance and first 500 of them re-viewed
deep AND ecology NOT sea NOT fish	Peer-reviewed, published since 2015, in English	1288	Results arranged by relevance and first 200 of them re-viewed
Eccentrism	Peer-reviewed, published since 2010, in English	43	
Biocentrism	Peer-reviewed, published since 2010, in English	36	
Biophilic	Peer-reviewed, in English	58	

Table 2. Search Terms Used During the Grey Literature Search on Bioinclusive Ethic

Term	Search Parameters	Number of results	Notes
bioinclusive		2	Search results already on the list
bio-inclusive		6	Search results already on the list
bioinclusive ethic		2	Search results already on the list
bio-inclusive ethic		5	Search results already on the list
bioinclusive AND ethic		2	Search results already on the list
bio-inclusive AND ethic		5	Search results already on the list
bio-inclusive environmentalism		1	Search results already on the list
bio-inclusive AND environmentalism		1	Search results already on the list
bio-inclusiveness		0	
bio-inclusivity		0	
nature-inclusive	Published since 2010, field of anthropology	19	
environmental AND ethics	Published since 2010, field of Women's studies, most recent studies shown first	0	

2.2.2. Source Appraisal Strategy for the Literature Review on Bioinclusive Ethic

After compiling the list of 128 potential references for the review, the author selected the sources which seemed the most relevant to answering the research questions. She employed inclusion strategy and criteria devised during the planning phase of the thesis project. This section presents these criteria and the procedure in more detail.

Inclusion Criteria:

1. Does this source contribute to answering the research question?
2. Is it an academic source?
3. If this source is not academic, can I trace it back to its author, publication date and place?

Step 1: Appraising Studies Based on Their Abstracts or Book Descriptions

First, the author reviewed the abstract and book descriptions of all sources included in the list of potential sources. While reading through each of them, she examined the source according to the research question. The studies that seemed to answer the research question remained on the list. Meanwhile, the studies that likely did not answer the research question were excluded from the further review process.

Number of studies excluded in this step: 39

Number of studies remaining in the list of potential source: 85

Step 2: Appraising Studies Based on Their Full Texts

Second, the author briefly reviewed the full texts of academic articles and books remaining in the list of potential sources. While reading through each of them, she examined the source according to the research question. All source and parts of sources that seemed to answer the research questions were included in next step of the appraisal.

Number of studies excluded in this step: 28

Number of studies remaining on the list of potential sources: 57

Step 3: Arranging Studies According to the Level of Relevance

Finally, the author prioritised the studies according to their relevance for the research aims. She considered the number of articles and books she had to read and analyse in three weeks. Taking into the account her little experience with the topic, she decided to divide the studies remaining on the list of potential sources into four categories: (1) sources that seem to be most relevant to answer the research question; (2) sources that seem to be relevant to answer the research questions; (3) sources that seem to be only partly relevant to answer the research questions; (4) sources that were not accessible or available online nor in the local libraries. During the reading process, the author made several changes in the list of the studies. She moved several sources from the relevant studies section to the highly relevant and vice versa. None of the studies from the partly relevant or unavailable categories was moved.

Number of highly relevant studies: 23

Number of relevant studies: 11

Number of partly relevant studies: 12

Number of unavailable studies: 11

2.2.3. Reading and Analysis Strategy for the Bioinclusive Ethic

Once the search and appraisal phases were completed, the author carried out the reading and analysis stages of the process. She started by reading the article *Deeper Philosophy of Biomimicry* by Freya Mathews (2011). Then, she read the other relevant articles by Mathews: *On Desiring Nature* (2010), *Thinking from Within the Calyx of Nature* (2008) and *Beyond Modernity and Tradition: A Third Way for Development* (2006). Third, the author expanded her knowledge in the fields of traditional and emerging Western environmental ethics (Batavia & Nelson, 2017; Gupta, 2015; Hassoun & Wong, 2015; Palmer et al., 2014), indigenous worldviews (Bahr, 2015; Gudynas, 2017) and philosophy of biomimicry (Dicks, 2016). During the reading process, the author took referenced notes and created a visual map of each source. During the data synthesis, she developed several summaries and conceptual frameworks of the data. Then the researcher outlined and wrote the review. As the last step in this first review process, the author examined the written review

again and outlined three key insights about the bioinclusive ethic. After the review on the bioinclusive ethic was finished, the author conducted the second literature review on Collaborative and Participatory Design.

2.3. Literature Review on Collaborative and Participatory Design

The next phase of the research project strived to build an understanding of Collaborative and Participatory Design. Similarly to the first literature review, the author utilised several search and appraisal methods. While reading the selected sources, she continuously developed an analytical framework which she used as a base for the written review. This section presents the search, appraisal, reading and analysis strategies the author used in the review on C&PD.

2.3.1. Search Strategy for the Literature Review on C&PD

Step 1: Inquiring for Expert Suggestions

While conducting the literature review on C&PD, first, the author inquired for source suggestions from experts. She created a list of experts which included C&PD researchers that author was familiar with from her studies, uncovered in the previous research or had found to be the organisers of the Participatory Design Conferences. The final list included ten experts; it is presented in Table 3. Once the list was compiled, the author emailed each of the ten experts inquiring for two types of suggestions. She asked for suggestions of sources that define the Collaborative and Participatory Design and of sources that include involvement of natural entities in C&PD processes. Four of the experts provided their suggestions, one of which guided the author to a set of conference proceedings relate to animal participation in design. Additionally, the supervisor and advisor of this research provided several suggestions. The author reviewed all of these suggestions. She read through the abstract or book descriptions and questioned whether the source might

Table 3. List of Experts Contacted During the Literature Search on C&PD

Name	Current Position	Reasons for Inclusion in the Expert List
Akama Yoko	Associate Professor at the RMIT University, Australia	Has taught, researched and designed with Daoism worldviews in mind.
Avila Martin	Researcher and Senior Lecturer in Design for Sustainable Development at Konstfack, Sweden	Has studied and speculated upon the interrelations of artefacts, humans and non-humans
DiSalvo Carl	Associate Professor at the School of Literature, Media, and Communication at Georgia Institute of Technology, USA	Has researched and published on designing with animals. Has researched and published on collaborative and participatory design
Eriksen Mette Agger	Associate Professor specialized in co-design and sustainable change at The Royal Danish Academy of Fine Arts, Denmark	Has taught, researched and published on co-design and participatory design
Galloway Anne	Senior Lecturer at School of Design at Victoria University of Wellington, Australia	Has researched intersections of people, nonhuman animals and technologies. Has been running the More-Than-Human lab
Hillgren Per-Anders	Associate professor in design and social innovation at Malmö University, Sweden	Has been teaching collaborative design
Hyyssalo Sampsa	Professor of co-design at Aalto University, Finland	Has been teaching C&PD approaches and tools
Lenskjoeld Tau Uiv	Research Assistant at the Department of Design and Communication at the University of Southern Denmark, Denmark	Has been researching about involvement of nonhumans in design processes. Has strived to challenge anthropocentric design practices
Mattelmäki Tuuli	Associate Professor at Aalto University, Department of Design	Has been teaches collaborative design and methods
Westerlaken Michelle	Doctoral student of interaction and game design at Malmö University, Sweden	Has been researching about animals as participants in design processes. Has strived to challenge anthropocentric design practices

help to answer the research questions. All of the potentially relevant sources were added to the review.

Number of sources on C&PD added to the review process in this step: 9

Number of sources on nature in C&PD added to the review process in this step: 48

Step 2: Serendipitous Discoveries of Sources

At the same time, the author discovered a few relevant sources while searching for experts and reviewing the work they had done.

Number of sources on C&PD added to the review process in this step: 1

Number of sources on nature in C&PD added to the review process in this step: 3

Step 3: Bibliographic and Citation Search of the Routledge International Handbook of Participatory Design

In the third step, the author conducted a bibliographic search of the first three chapters of the *Routledge International Handbook of Participatory Design*. This handbook is seen as a key guide to Participatory Design. This book was especially suggested to the author by one of the experts and her advisor. Additionally, the author conducted a citation search of the whole book through Google Scholar. She reviewed abstracts and book descriptions of the cited and citing sources and added the relevant references to the list.

Number of sources on C&PD added to the review process in this step: 57

Number of sources on nature in C&PD added to the review process in this step: 0

Step 4: Academic Search Elite Database Search

Fourth, the author conducted a search in the Academic Search Elite database. The search terms and parameters are presented in Table 4. While she

was scanning through the search result, the author reviewed the abstracts and book descriptions. If the article or the book could potentially contribute relevant data, the source was added to the review.

Number of sources on C&PD added to the review process in this step: 135

Number of sources on nature in C&PD added to the review process in this step: 11

Step 5: Review of Sources Used in the Courses of the Collaborative and Industrial Design Programme at Aalto University

Finally, the researchers reviewed sources on Collaborative and Participatory Design that she had encountered during her studies at the Collaborative and Industrial Design programme at Aalto University. She considered the literature used on the of the following courses: Strategic Co-design, Designing for Services, Sustainable Product and Service Design. She identified relevant sources by inquiring whether the references related to the research questions of the thesis. After this step, she moved to the appraisal stage of the process.

Number of sources on C&PD added to the review process in this step: 5

Number of sources on nature in C&PD added to the review process in this step: 0

Total number of sources on C&PD added to the review process: 207

Total number of sources on nature in design processes added to the review: 62

Table 4. Search Terms Used During the Database Search on C&PD

Term	Search Parameters	Number of results	Notes
Collaborative AND participatory AND design	Peer-reviewed, in English	416	
Collaborative AND Design	Peer-reviewed, in English	11625	Results arranged by relevance and first 1300 of them reviewed
Co-design	Peer-reviewed, in English	779	
Participatory AND design	Peer-reviewed, in English	4559	Results arranged by relevance and first 1000 of them reviewed
Co-design AND nature		24	
Co-design AND species		1	
(co-design) AND (animal)		2	
(participatory) AND (design) AND (animal)	Peer-reviewed, in English	91	
(participatory) AND (design) AND (species)	Peer-reviewed, in English	32	
(participatory) AND (design) AND (nonhumans)		1	
(participatory) AND (design) AND (non-humans)		4	
(participatory) AND (design) AND (plants)		119	
(participatory) AND (design) AND (nature)		292	
(collaborative) AND (design) AND (animal)	Peer-reviewed, in English	154	
(collaborative) AND (design) AND (species)	Peer-reviewed, in English	127	
(collaborative) AND (design) AND (non-humans)		5	
(collaborative) AND (design) AND (nonhumans)		1	
(collaborative) AND (design) AND (nature)	Peer-reviewed, in English	610	
(designing with animals)	Peer-reviewed, in English	200	
(Trans-species) AND (design)		5	
(design with animals)	Peer-reviewed, in English	6,333	Results arranged by relevance and first 700 of them reviewed

2.3.2. Source Appraisal Strategy for the Literature Review on C&PD

The selection phase in this review was based on the selection criteria defined in the initial phase of the research. The appraisal strategy, however, evolved during this phase. This section presents both the criteria and the appraisal strategy in more depth.

Inclusion Criteria

1. Does this source contribute to answering the research questions?
2. Is it an academic source?
3. If this source is not academic, can I trace it back to its author, publication date and place?

Step 1: Initial Arrangement of Sources

To select which sources are relevant to the literature review on C&PD, the author, first, arranged all of the found sources into seven primary categories. These categories were (1) user participation in design, (2) definitions of the field and its approaches, (3) benefits and results of user participation, (4) definitions of participation; (5) ethical and political consideration, (6) application areas and (7) nature in C&PD processes. The author induced these initial categories by reviewing the abstracts and the full texts of the sources and outlining key notions presented in the source. Several of the sources were included in two or more categories because these sources covered several ideas.

Step 2: Re-arrangement of Sources

In the next steps of the process, the author read the five sources that she initially included in the user participation in design category. Based on the readings, she outlined the potential landscape of Collaborative and Participatory Design; this landscape provided a big picture view on the field. This perspective and a large number of potential sources urged the author to re-focus. She further focused on building an understanding only of the large-scale picture and the various approaches of C&PD. Then, the author rearranged all of the potential sources into new categories which she based on the approaches uncovered in initial readings.

Step 3: Appraisal of Sources Based on Their Abstracts or Book Descriptions

In the last stage of the appraisal process, the author reviewed full texts of the potential sources in each category. She questioned whether the source could contribute to answering her re-focused research question. All the relevant sources in each group were included in the further review process.

Number of sources on C&PD discarded: 157

Number of sources on C&PD remaining in the review process: 50

Number of sources on nature in C&PD discarded: 14

Number of sources on nature in C&PD remaining to the review process: 48

2.3.3. Reading and Analysis Strategy for the Literature Review on C&PD

After compiling the list of included sources, the author continued with the reading and analysis stages of the review. She focused on reading all articles included in one category before moving to the next one. While reading through a source included in the study, the author took referenced notes and summarized the key notions presented in the source. If she uncovered a reference that could provide additional information on the topic but was not on the reading list, the author included that source or its parts into the review. Throughout the reading process, she continuously developed a theoretical framework about the key characteristics and approaches of C&PD. Once the reading was complete, the author continued to iterate the developed framework. The framework served as an outline for the written academic review. This review served as a material for distilling 20 insights about C&PD. Next, the author further examined these insights to understand the extent to which each of them might be questioned through the bioinclusive lens. Through this examination, she uncovered the seven key insights about the field that should be questioned through the perspectives of the bioinclusive ethic. As the last step of the review, the author read the sources in the Nature in C&PD category. She took referenced notes; however, she did not write a full aca-

ademic review of these sources. Instead she used them as example in the next phase of the research project. After completing the second review, the author started to integrate the key findings to distil potential implications.

2.4. Integration of the Findings

In the last part of the project, the author integrated key findings of the bioinclusive ethic with the key findings about Collaborative and Participatory Design. She arranged these key insights into a table: the key insights on C&PD were arranged vertically, and the key insights on the bioinclusive ethic were arranged horizontally. She continued by investigating the questions and ideas that each of the bioinclusive insights might raise about each of the C&PD insights. Then, she combined these three perspectives and outlined the holistic implication that the bioinclusive ethic might have on each of the C&PD insights. Finally, the researcher reviewed whether any of the notions within the readings on Nature in C&PD might include consideration similar to those raised by the implication. Relevant examples were included in the final written version of the implications of the bioinclusive ethic on C&PD. Before presenting these implications, the thesis will first present the outcomes of the literature reviews on C&PD and the bioinclusive ethic.

3. BIOINCLUSIVE ETHIC

The bioinclusive ethic is an ethical framework outlined by the environmental philosopher Freya Mathews. Mathews (2011, pp. 365–366) defines the bioinclusive ethic as an ethic that attributes equal moral considerations to humans and the natural systems.

An environmental ethic which somehow places humans and nonhumans in the same moral camp. . . Even if it is conceded that our moral reasoning starts within the human circle, this circle needs to be expanded to include the interests of the members of the larger life system (Mathews, 2011, pp. 365–366).

The bioinclusive ethic aims to replace the current worldview (Mathews, 2011) which accentuates that humans are detached from and superior to nature (Mathews, 2011, pp. 365–366; Palmer et al., 2014, p. 423). This separation seems to decrease the chances of humans embracing nature as a guide and ally. Therefore, the ethic proposes a more inclusive conception of humans, nature and their relationship to one another.

The bioinclusive ethic is similar to deep ecology; nevertheless, the creator of the bioinclusive ethic outlines one fundamental difference between her ethic and deep ecology. Deep ecology accentuates the need for humans to change their view of nature and to acknowledge “the inherent value of all living beings” (Drengson, 2005). The value of nature is highlighted in the platform of deep ecology. The platform also emphasises that humans have the right use natural resources only to satisfy vital needs (Naess & Sessions, 1984). This position is likely the critical difference between bioinclusive ethic and deep ecology. Mathews (2011) perceives that deep ecology focuses on stripping away the culture, self-meaning and self-intentionality of humans and on placing a culture-less, primitive, nature-dependent yet ecological human into nature. Such change tends to be unappealing to individuals living in modern societies (Mathews, 2011, p. 366). Therefore, bioinclusive ethic tries to avoid stripping the human of its culture. Instead, it focuses on creating an appealing, novel, larger worldview that encompasses both, the cultural human and nature (Mathews, 2011). This broader, inclusive concept could provide

a cultural shift towards a less-anthropocentric society; the society would be shaped by the notions underlying the bioinclusive ethic.

3.1. Aspects Underlying the Bioinclusive Ethic

Even though the bioinclusive ethic is defined by Mathews in a few sentences in one of her publications, it carries three complex notions. These notions are outlined in other works of the philosopher. First, the bioinclusive ethic argues for a non-dualistic concept of nature (Mathews, 2006, 2008, 2011). Second, it urges to expand approaches through which nature is understood and studied (Mathews, 2006, 2008). Third, the ethic proposes and argues for a synergetic relationship between the humans and nature (Mathews, 2006, 2010, 2011). The following sections outline these three concepts in more depth.

3.1.1. Non-Dualistic Perception of Nature

The first notion that the bioinclusive ethic proposes is a non-dualistic concept of nature which should replace the current dualistic one. Nature is a complex term and phenomenon which tends to carry varied meanings (Dicks, 2016, p. 226; Mathews, 2011, pp. 364–365). The current meaning of nature defines it as those organisms and natural systems that exist autonomously from humans: nature is something separate from and opposed to humans (Mathews, 2011, pp. 364–366). This perception largely influences the ways in which humans treat the world, and, in turn, the human actions further shape the logical reasoning, behaviour and culture (Mathews, 2006, p. 86). To change culture, behaviours and reasoning, the bioinclusive ethic strives to define a non-dualistic concept of nature.

The non-dualistic conception of nature suggests a new approach to defining nature. Currently, nature is defined as something that is autonomous of humans (Mathews, 2011). The bioinclusive ethic proposes that the new concept should define nature as a “collective pursuit of conative ends in accordance with the principle of least resistance” (Mathews, 2011, p. 374). This definition accentuates the joint, collective existence of all living entities, including humans. It seeks to create a concept in which nature and humans are not op-

posed to each other. Moreover, the definition provides two principles which define nature: the principle of conativity and the principle of least resistance (Mathews, 2011, p. 374). In essence, both principles seem to be equally applicable to humans and other natural entities. Thus, the new definition seems to characterize humans and nature in the same ways. Next two subsections outline the principle of conativity and the principle of least resistance in more detail.

3.1.1.1. Principle of Conativity

The principle of conativity outlines a parameter through which living entities could be identified. This parameter is based on the impulse of all living beings and systems to maintain and increase their existence, for example, through survival or procreation (Mathews, 2008, p. 50, 2011, p. 368). Due to this impulse, all conative beings are meaningful to themselves. “A conative entity is meaningful to itself in the sense that it matters to itself; it has an end, namely to survive and to actualise its own inherent potentials” (Mathews, 2008, p. 50). Living beings seem to be meaningful to themselves and their larger goals of, e.g. maintaining the species, are meaningful to them. Some authors (e.g. see Dicks, 2016, p. 228) consider that the bioinclusive ethic seems to also assign conativity to non-biological entities. However, the ethic does not explicitly highlight this notion. Clarification of the type of entities that the ethic assigns the principle of conativity to lies beyond the scope of this thesis. Therefore, further in the thesis, the author will use the ideas behind the principle of conativity without specifying entities that it encompasses.

3.1.1.2. Principle of Least Resistance

The second parameter through which the bioinclusive ethic defines nature is the principle of least resistance. The principle of least resistance is an internal programme of a living entity to pursue own ends using the least amount of energy possible (Mathews, 2011, p. 368). It states that a living entity avoids countering a resistance or chooses to counter the resistance by using the smallest necessary amount of energy. This principle allows living entities to pursue own ends while allowing others to pursue theirs (Mathews,

2011, p. 368). However, this principle seems to have less effect on humans because humans are capable of reflective thinking. Humans are able to see behavioural scenarios alternative to those outlined by the natural programme and to carry out these alternative plans (Mathews, 2011, p. 370). Reflective thinking provides humans an option to either obey or disobey the natural laws and the principle of least resistance. When disobeying the principle of least resistance, humans need to use external energy from other natural entities and deplete resources of those entities (Mathews, 2011, pp. 370–371). The use of external energy seems to differ humans from other living entities. If humans would adopt the principle of least resistance then they might realign themselves to the natural systems (Mathews, 2011, p. 371). The adoption of the principle of least resistance might allow humans to view nature in a less dualistic manner. Meanwhile, certain activities might also urge people to reshape their view of nature.

3.1.1.3. Emotional Entanglement: A Step Towards More Inclusive Definition of Nature

The inclusive concept of nature is drastically different from the current dualistic one. The shift from one concept to the other would require a large, complicated transition in perceptions of humans. Traditionally, such cultural transitions seem to have been guided by science and education (Mathews, 2010, pp. 2–3). The bioinclusive ethic considers them insufficient as they are rooted in the dualistic perceptions of nature and, predominantly, focus on intellectual reasoning rather than emotional underpinnings for change (Mathews, 2010, pp. 2–3). Instead, the ethic proposes emotional engagement with nature as the first step towards a more inclusive conception of nature (Mathews, 2008, p. 47, 2010, p. 3). The emotional engagement could be built through first-hand, exploratory observations of nature which do not aim to answer any pre-set questions (Mathews, 2010, p. 3). Such observations could develop a sense of involvement with the nature, emotional investment into the lives of natural entities and moral considerations for their lives and well-being (Mathews, 2010, pp. 3–4). The ethic recognizes that sole emotional entanglement is insufficient to drive humans to align their desires and needs to those of other natural entities (Mathews, 2010, p. 4). However, it does not envision any other steps that might support the transition. Meanwhile, Mathews outlines the second notion in relation to the bioinclusive ethic.

3.1.2. Post-Materialistic Perception of Nature

The second notion outlined by the bioinclusive ethic is a post-materialistic perception of nature. The ethic highlights that there is a need to change the ways in which humans learn about, understand and engage with nature.

The bioinclusive ethic criticises some of the current approaches to building knowledge about nature, such as the Western Sciences. It perceives Western Sciences as an approach of learning about the world and nature solely through observable mechanics of nature (Mathews, 2006, p. 90). The current empirical approach of Western science can only uncover observable aspects about the world while it cannot provide sufficient justification that there are no unobservable parts to it (Mathews, 2006, p. 89). Such position seems to have aimed to remove any metaphysical, poetic, mystical considerations and debates (Mathews, 2008, p. 42). The ethic does not clarify the exact meaning of the words unobservable, metaphysical, poetic, mystical. Instead it exemplifies these terms by contrasting the current materialistic and the potential post-materialistic perceptions of nature. These two perceptions are further outlined in this section.

3.1.2.1. Materialistic View of Nature

The perspectives and methods of Western Sciences have led to the materialistic and instrumental views on nature. From the materialistic point of view, natural entities do not possess mentality (Mathews, 2006, p. 88). The ethic defines mentality through aspects which can be largely attributed to the logic of humans: “subjectivity, spirit, sentience, agency or conativity” (Mathews, 2006, p. 86). Thus, the materialistic perceptions of nature only view it as a set of materials and their properties. Such materialistic perspective dictates an instrumental view of nature which only evaluates the components of the world based on their usefulness to the humankind (Mathews, 2006, p. 86). Based on these perspectives, the human seems to be in control of nature, as nature lacks any self-meaning and is solely a resource for the humans. Moreover, these perspectives reinforce the detached and dominant positions of humans over nature (Mathews, 2006, p. 89) and set humans as the ultimate decision makers (Dicks, 2016, pp. 224–225). This notion seems to contradict the strives of the bioinclusive ethic which aims to place humans and natural

entities as equals and views nature as a guide and measure for human desires and behaviour. However, the materialistic and instrumental perceptions of nature are heavily ingrained in the current society.

Instrumentalism and materialism extensively shape humans and their actions. These two perceptions have a tremendous impact on the modern culture, social norms, politics, technology and, of course, nature (Mathews, 2006, p. 86). Viewing nature only as a set of materials or resources has removed moral constraints around nature and its use (Mathews, 2006, p. 91). Consequently, it has enabled humanity to exploit nature to any extent to satisfy the ever-growing needs of humans (Mathews, 2006, p. 91). The development paths outlined by humans do not seem to be based on the common good and, even, the existence of all natural entities. Instead, it seems to focus only on satisfying needs of all or a fraction of humans. This focus has removed a sense of self-meaning, gratitude and belonging to the natural world that was present in pre-materialistic societies of the past (Mathews, 2006, p. 88). To counter this human-centric and materialistic view of nature, the bioinclusive ethic suggests that humans should adopt a post-materialistic view of nature.

3.1.2.2. Post-Materialistic View of Nature

The post-materialistic view of nature outlines that nature is not a set of materials but a system of living beings that have self-meaning and spirit. Spirit in this context refers to “an animating or vital principle held to give life to physical organisms” and “the immaterial intelligent or sentient part” of an entity (“Spirit,” n.d.). Term sentient refers to “(being) responsive to or conscious of sense impressions” (“Sentient,” n.d.). Thus, the post-materialistic perspectives interpret nature as a system of living beings who have self-intelligence and understand the world and themselves in a particular, peculiar way. The ethic states that such perspectives strive to combine Western Science and their materialistic understanding of nature with more spiritual perspectives (Mathews, 2006, p. 96). The ethic describes the term spiritual through the terms non-religious, cosmological and metaphysical, but does not further explain their meanings.

The ethic does, however, describe that the post-materialistic perspectives are not institutionalized and are governed by all people. Individuals and groups need to discover their own pathways towards post-materialism and continu-

ously renegotiate the meanings behind this worldview (Mathews, 2006, pp. 93, 95). The post-materialistic perspectives would be continuously evolving and non-prescriptive, and humanity would need to closely follow the ongoing natural development and adjust themselves to those (Mathews, 2006, p. 94). Thus, the post-materialistic perspectives seem to urge every human, community and society to discover and govern their own non-materialistic attitudes towards nature. Such post-materialistic perspectives could transform the dominant, materialistic attitudes towards nature (Mathews, 2006, p. 86). Though the ethic highlights that such post-materialistic worldviews have not existed yet, it recognizes that some indigenous worldviews are similar to the ideas to post-materialism.

3.1.2.2.1. Indigenous Worldviews Similar to the Post-Materialistic View of Nature

The three precedents of post-materialistic perceptions of nature seem to be early Daoism, Indigenous Andean cosmovision Pacha Mama and Native American worldviews. Early Daoism urged humans to acknowledge self-meaning of nature and to adjust own lives according to the developments in the nature (Mathews, 2006, pp. 97–98). It viewed humans as part of the nature (Hassoun & Wong, 2015, pp. 179, 181), and it focused on uncovering appropriate human behaviours towards other entities and systems of nature (Hassoun & Wong, 2015, p. 180; Mathews, 2006, p. 99). The Indigenous Andean cosmovision Pacha Mama acknowledged personhood of individual and collective natural entities (Gudynas, 2017, pp. 264–265). It was focused on natural contexts, landscapes with human presence and activity, e.g. agriculture, in which the human-landscape relationship was governed by a moral that kept the interactions sustainable (Gudynas, 2017, pp. 264–265). Pacha Mama viewed social relationships and relationships with natural entities as equally important (Gudynas, 2017, p. 265). The Native American belief system was based on the notion that nature is something related to humans, equal to humans and deserves respect and care (Bahr, 2015, pp. 71–72). Their perspectives included both animate and inanimate creations and beings of the universe (Bahr, 2015, pp. 71–72). The Native Americans believed that the universe is in constant flux, and humans need to contribute to the maintenance and restoration of the balance in the moment and location of their existence (Bahr, 2015, p. 71). The early Daoism, Pacha Mama and

Native American perspectives all seem to recognize that nature is not only a set of materials but rather a system of entities that have self-meaning. Along with the indigenous worldviews, at least one contemporary movement seems to be similar to the post-materialistic perceptions of nature outlined by the bioinclusive ethic.

3.1.2.2. Contemporary Movements Similar to the Post-Materialistic View of Nature

The Andean-Amazonian Biocentrism is an environmental movement that strives to combined the Western, materialistic perception of nature with the indigenous cosmovision Pacha Mama. This local environmental movement has developed in the Andean and Amazonian parts of South America in the 1990s and early 2000s (Gudynas, 2017, p. 262). It encompasses various stakeholders, such as environmentalists, activists and leaders of the indigenous groups and aims to change perspectives about nature (Gudynas, 2017, p. 262). The overall movement critiques perspectives of the Western modern societies. It strives to expand the types of knowledge recognized by the Western modernism by acknowledging and including the indigenous perspectives (Gudynas, 2017, p. 262). The movement is rooted in the Pacha Mama cosmovision, described above, and strives to bring forward a non-dualistic perception of nature (Gudynas, 2017, pp. 263–265). Moreover, it assigns value to and recognize personhood and self-meaning of natural entities, such as animals, trees, lakes and spirits of the dead (Gudynas, 2017, pp. 263–265). Andean-Amazonian Biocentrism expands the concept of Pacha Mama towards a concept of Buen Vivir that strives to establish appropriate, good life in joint human and nonhuman communities (Gudynas, 2017, p. 263). This movement seems to be similar to the post-materialistic perceptions outlined by the bioinclusive ethic. These post-materialistic perspectives of nature also link to the type of relationship humans should have with nature.

3.1.3. From Domination of Towards Synergy with Nature

The third notion outlined by the bioinclusive ethic urges humans to change their relationship with nature from domination to synergy. Currently, humans

are dominating the nature, as it is only a material, an instrument to satisfy human needs and desires. However, domination over nature is not the only potential relationship with it. There are four more potential types of agencies towards nature: letting be, Wu Wei, mutualism and synergy (Mathews, 2011, p. 374). Letting be is an agency in which humans fulfil own needs without interfering with other entities, e.g. through a traditional preservation approach (Mathews, 2011, p. 374). Wu Wei is an agency in which humans would strive to fulfil own goals with the help of natural entities without actively or passively disturbing them (Mathews, 2006, p. 100, 2011, p. 375). Traditional hunter-gatherers, for example, strived to fulfil own needs with a minimal intervention into the natural world (Mathews, 2006, p. 100, 2011, p. 375). Mutualism is an agency in which humans strive to attain own goals while contributing to the efforts of others natural entities to attain theirs (Mathews, 2011, p. 375). A person, for example, might choose a non-toxic detergent to wash their car to avoid polluting a nearby river. Synergy is an agency in which humans align their goals and actions to the goals of nature and natural systems (Mathews, 2011, pp. 373–376). A human might choose to walk everywhere instead of using any vehicle to minimize use of any natural resources and production of any harmful substances. The bioinclusive ethic outlines that these agencies are related to one another.

The five human agencies towards nature can be arranged on a spectrum based on the sensitivity towards other natural entities. The ethic organises four of these agencies on the spectrum of sensitivity, starting from the least to highest sensitivity towards nature as follows: letting be, Wu Wei, mutualism and synergy (Mathews, 2011, p. 374). It does not explicitly include domination over nature on the spectrum, yet domination does not seem to entirely overlap with any of the agencies described by the ethic. Domination could be added to the spectrum as the least sensitive agency, as it focuses only on the humans and seems to disregard any considerations of other natural entities. Thus, the full range would include domination, letting be, Wu Wei, mutualism and synergy. The spectrum is represented in Figure 1. This arrangement seems to also correspond with the level of sustainability: domination is the least sustainable agency while synergy is the most sustainable agency (Mathews, 2011, p. 373). The ethic accentuates that synergy has the highest potential to lead to sustainability. “To achieve environmental sustainability then, we need to let the river shape not only our means but also our ends” (Mathews, 2011, p. 376). Therefore, the agency of synergy can be

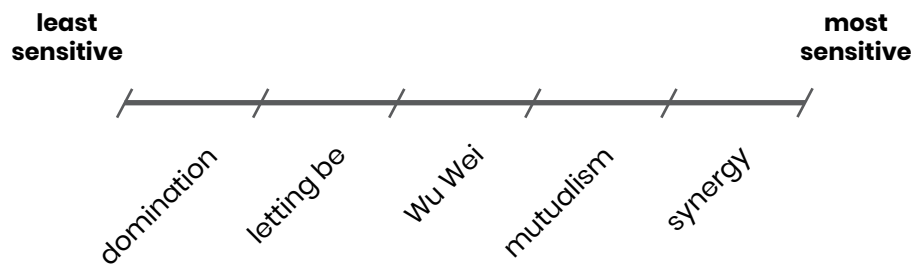


Figure 1. Spectrum of Types of Human Relationship with Nature

seen as the most promising when changing human perceptions and behaviour towards bioinclusive ones. It might also be an approach to shifting society towards deep sustainability. The next section describes this type of agency in more depth.

3.1.3.1. Synergy

Synergy is an encounter of a human and one or more other natural entities, during which the human can re-shape their self-meaning and, potentially, align it with the natural systems. Synergetic encounters between humans and natural bodies allow the participants to communicate, engage, re-shape their self-meanings and to create new, joint meanings, goals and desires (Mathews, 2006, p. 102, 2008, p. 48, 2010, p. 4). Through these encounters, each participant adapts and expands their goals and ways of action, as they can immediately experience perspectives of others (Mathews, 2008, p. 48). These new goals and modes of activity would still be true to the nature and self-meaning of humans and natural entities (Mathews, 2008, pp. 50–51). Joint goals could be possible because every living body has different potential that can reveal themselves in very different settings, can contradict each other and could not be expressed simultaneously (Mathews, 2008, pp. 50–51). Thus, the human would not be removing self-identity and self-meaning but only adjusting them or letting certain aspects to expand and take over. The bioinclusive ethic suggests that synergy allows involved parties to create new perceptions, goals and behaviours which would be impossible to find by the individual parties themselves (Mathews, 2008, p. 48). It accentuates that all synergetic encounters can lead to new, joint developments, as

novel meanings and goals always arise if different entities and their perceptions encounter one another (Mathews, 2006, p. 104). Thus, synergy would allow humans and nature to shape mutual goals. Moreover, it would support the transition towards other notions outlined by the ethic.

The bioinclusive ethic suggests that synergy is key to non-dualistic and post-materialistic perceptions of nature. The ethic accentuates that synergy, not rational deliberation, is the key to inducing moral considerations towards other natural entities (Mathews, 2008, p. 52). Moreover, it suggests that, if humans started perceiving themselves as co-creators of the universe, the individuals and society overall would begin transitioning towards post-materialism (Mathews, 2006, p. 108). The humanity would start aligning itself with the rest of nature. However, this alignment does not have to reduce the self-meanings and cultural and technological developments of humans. The bioinclusive ethic argues that sophisticated economy and technology can still be incorporated in synergy and should not be reduced to the simplistic ones (Mathews, 2006, p. 108). It seems to suggest that modern societies can evolve to be more sustainable without sacrificing their culture and technological developments. However, humans should be cautious in practising synergy over conjunction or cooperation.

The bioinclusive ethic actively strives to differentiate synergy from conjunction and cooperation. It accentuates that in synergy participants aim to create new synergy through which they get to express their true selves (Mathews, 2006, p. 103). “Synergy has been defined here not merely as the coming together of two parties to create something new, but their coming together to create something new which is nevertheless true to the inner principle of each” (Mathews, 2006, p. 103). In synergy, the parties should jointly discover goals and ways that are novel yet desirable for and representative of all parties (Mathews, 2006, p. 103). Meanwhile, in conjunction participants seem to cluster perspectives in a way that the outcome does not represent either of the parties (Mathews, 2006, p. 103). In cooperation, participants seem to agree upon a superficial, instrumental goal, which does not stem from the true self-meaning of the participants; then the parties forcibly guide their efforts to achieve that goal (Mathews, 2006, pp. 103–104). Thus, synergy suggests that the encounters should allow parties to learn from each other, shift own perspective and create genuinely mutual goals. Such synergy seems to happen in two ways.

The ethic outlines two types of synergy: causal and intentional. The causal synergy takes place when natural entities align their goals and actions through coevolution and natural selection (Mathews, 2011, p. 376). This type of synergy does not seem relevant in the current context of human interaction with nature. The intentional synergy takes place when natural agents deliberately adjust goals and means through interaction with other agents (Mathews, 2011, p. 376). Thus, all natural entities, except human, might have already aligned their goals and the humans are the last to align themselves with the joint goals of nature. Thus, the humans might need to embrace the intentional synergy to realign themselves to nature. Synergy, in this context, could be summarised as encounters of humans with natural entities, during which humans intentionally seek to understand perspectives and self-meanings of those entities to adjust own views and develop joint goals with other natural entities. These encounters between humans and nature could happen in several ways.

3.1.3.1.1. Potential Synergetic Activities & Communicative Encounters

The bioinclusive ethic outlines that most human activities could be carried out in a synergetic manner. Every human action is an opportunity to support and expand conativity of other natural entities. Therefore, synergetic mode of interaction could be applied to any human activity to decrease self-imposition of humans (Mathews, 2006, pp. 105, 107). Many activities, e.g. discussions, verbal exchanges, creation of music and sexual encounters, could be done in a synergetic manner, but often they are not (Mathews, 2008, p. 49). Nevertheless, such synergetic engagements can be easily imagined and envisioned between humans and species with communicative skills (Mathews, 2010, p. 4, 2011, p. 377). For example, it is possible to envision a musical exchange with a singing-bird during which a human and the bird create music that is greater than each party can do alone and, at the same time, reconfigure personal perspectives about the other entity and potential joint goals (Mathews, 2011, p. 377). However, synergetic encounters between humans and non-communicative species or large scale natural entities can be hard to imagine with the current dualistic and materialistic perspectives on nature.

These encounters seem to be possible with the outlook proposed by the views. The non-dualistic, post-materialistic encounters human could support acknowledgement and development of new, experimental communicative and synergetic contacts (Mathews, 2010, p. 4, 2011, p. 377). The ethic proposes invocation as one of the potential novel encounter (Mathews, 2010, pp. 5–8). Merriam-Webster (“Invocation,” n.d.) dictionary defines invocation as “the act or process of petitioning for help or support”. Thus, invocation seems to be a sincere, serious request or petition for help or support. The ethic outlines that such invocation should be spiritual, poetic and should urge humans to ask natural entities to reveal their self-meaning, for example through rituals that celebrate natural entities (Mathews, 2010, p. 5). Invocation towards nature could be either an individual or a collective practice (Mathews, 2010, p. 5). Through this practice humans could develop emotional attunement to other natural entities.

3.1.3.1.2. Attunement to Nature: A Step Towards Synergy with Nature

Emotional attunement to nature can be seen as the first step towards synergy with nature. Attunement can be defined as “being [in] harmony” or “a feeling of being “at one” with another being” (“Attunement,” n.d.). This feeling of unity could catalyse the inclusive, post-materialistic, respectful perception of nature and could align humans with other natural entities (Mathews, 2010, pp. 7–8). The emotional attunement could stem from recognition of self-meaning of natural entities, leading to respect towards and desire to establish synergy with nature (Mathews, 2008, pp. 55–56). Moreover, it could increase and transform human creativity (Mathews, 2008, p. 56). Thus, humans might gain new insights and develop new approaches for synergetic encounters.

The bioinclusive ethic outlines three approaches to develop attunement to nature. These approaches are exposure to nature, community of inquiry and Council of All Beings (Mathews, 2008, pp. 52–58). Exposure to nature occurs when a human, especially a child, learns about natural entities around them through unstructured, meditative, explorative observations of these entities (Mathews, 2008, p. 55). Through this exposure, the human internalizes nature and starts perceiving it as an equal and as a part of self (Mathews, 2008, pp. 55–57). Community of Inquiry is an activity in which a group

of humans, usually students, are engaged in a facilitated discussion with each other (Mathews, 2008, p. 52). During this session they are exposed to perspectives of others and, consequently, question own attitudes and presumptions (Mathews, 2008, p. 52). This activity trains participants to listen in an attentive and respectful manner, to sympathise and empathize with the perspective of other beings and to question own attitudes (Mathews, 2008, p. 52). Finally, Council of All Beings is an activity during which a human participant needs to observe, learn about, impersonate a nonhuman natural entity and then represent it to the council of other participants (Mathews, 2008, p. 53; Seed, n.d.). Even though the activity builds on the imagination of participants, the interactions and joint exchange of perspectives urges individual participants to go beyond the imaginable aspects of natural entities and to construct novel views about the natural world (Mathews, 2008, p. 53). These three activities aim to develop skills, e.g. explorative observations, and mindsets, e.g. questioning of own perspectives, which would be necessary when trying to envision and establish synergetic encounters with other natural entities. Therefore, they can be seen as the first steps towards a synergetic agency with nature. The synergy with nature could evolve humans to act in a manner more aligned with the notions outlined by the bioinclusive ethic.

3.2. Key Insights

The bioinclusive ethic is an environmental ethic that assigns equal moral considerations to humans and non-humans. The ideas put forward by the ethic have been summarised in Table 5. Out of these ideas, three key insights can be derived in relation to the goal of this research.

1. The bioinclusive ethic assigns equal moral standing to non-human and natural entities. It perceives humans to be a part of and equal to other natural entities, e.g. individual animals, species and ecosystems.
2. The bioinclusive ethic urges humans to view natural entities not only as a set of materials but also as living beings with self-meaning and peculiar experiences of the world.

3. The bioinclusive ethic urges humans to establish a synergetic relationship with nature. In this relationship, nature would be able to define the goals of humanity as well as the means to achieve the goals. This relationship should be based on direct, communicative encounters between humans and non-humans. Through the synergetic relationship, humans could keep their sophisticated culture and technology but also ensure that they comply with the goals of natural systems and do not destroy them.

These three notions present a holistic perspective of the bioinclusive ethical framework, and they should be jointly considered when outlining potential implications of the bioinclusive ethic on Collaborative and Participatory Design.

Table 5. Summary of Findings About the Bioinclusive Ethic

The Ethic	Underlying Notions	Details
<p>Bioinclusive Ethic</p> <p>An environmental ethic outlined by philosopher Freya Mathews.</p> <p>Assigns equal moral standing to humans and non-humans.</p> <p>Urges humans to align their culture and technology with the natural systems.</p>	<p>Non-Dualistic Concept of Nature</p> <p>Defines nature as joint, collective pursuit of existence according to the principles of least conativity and least resistance.</p> <p>Suggests that the first step towards a non-dualistic concept of nature is emotional entanglement with nature.</p>	<p>The Principle of Conativity</p> <p>Establishes that all living beings are important to themselves; they have self-meaning and strive to maintain their existence through survival or procreation</p> <p>The Principle of Least Resistance</p> <p>Establishes that living beings should use as least energy as possible for their existence and needs thus allowing other entities to pursue their existence and needs.</p>
<p>Urges humans to align their culture and technology with the natural systems.</p>	<p>Emotional Entanglement with Nature</p> <p>Perceived as the first step towards non-dualistic concept of nature.</p> <p>Could be built through first-hand, exploratory, open-ended, open-minded observations of natural systems and beings that create emotional investment into lives and well-being of these systems and being.</p>	<p>Emotional Entanglement with Nature</p> <p>Perceived as the first step towards non-dualistic concept of nature.</p> <p>Could be built through first-hand, exploratory, open-ended, open-minded observations of natural systems and beings that create emotional investment into lives and well-being of these systems and being.</p>
<p>Post-Materialistic Perception of Nature</p> <p>Suggests that natural systems and entities are not only a set of materials but also have self-meaning, spirit and experience the world around them.</p>	<p>Synergetic Relationship with Nature</p> <p>Suggests that humans should alter their goals and actions to actively contribute to the natural systems.</p> <p>Describes synergy between humans and nature as a relationship in which humans allow nature and its goals to define goals, needs and desires of humans.</p> <p>Proposes that synergetic encounters for establishing the synergetic relationship.</p>	<p>Similar Perceptions</p> <p>Indigenous: early Daoism, the Andean cosmovision Pacha Mama and the Native American belief system. Contemporary: Andean-Amazonian Biocentrism</p>
<p>Synergetic Relationship with Nature</p> <p>Suggests that humans should alter their goals and actions to actively contribute to the natural systems.</p> <p>Describes synergy between humans and nature as a relationship in which humans allow nature and its goals to define goals, needs and desires of humans.</p> <p>Proposes that synergetic encounters for establishing the synergetic relationship.</p>	<p>Synergy with Nature</p> <p>A type of human agency towards nature in which humans allow nature and its goals to change, adjust and dictate goals of humans.</p> <p>Positions humans as one of the co-creators of the natural world</p>	<p>Spectrum of Human Agency Towards Nature</p> <p>Includes domination, letting be, Wu Wei, mutualism and synergy.</p> <p>The types of agency are arranged from the least to most sensitive and sustainable ones.</p>

The Ethic	Underlying Notions	Details
	<p>Acknowledges that synergy requires new, experimental forms of communication with nature and attunement to nature.</p>	<p>Synergetic Encounters</p> <p>Are direct encounters of one or several humans with one or several natural entities during which the participants communicate, learn about each other and create new joint meanings, goals and desires.</p> <p>Allow humans to re-shape their self-meaning and goals so that they are align it to the natural systems.</p>
		<p>New, Experimental Communication Approaches</p> <p>Should enable humans to experience and communicate with natural systems and entities which do not have direct communicative capabilities, e.g. via collectively or individually invoking and praying to natural entities.</p>
		<p>Attunement to Nature</p> <p>Arises from recognition of strives and needs of other living beings</p> <p>Initial attunement could be built through emotional entanglement with nature, Community of Inquiry sessions, and Council of All Beings session.</p>

4. COLLABORATIVE & PARTICIPATORY DESIGN

To outline potential implications of the bioinclusive ethic on Collaborative and Participatory Design, it is important to understand the key notions and approaches encompassed in this sub-field of design. The following chapter presents outcomes of a systematic literature review on C&PD. It reviews fundamental notions of the design field, outlines types of participant involvement in design and presents three key approach groups in C&PD.

4.1. Design

To understand Collaborative and Participatory Design, first, it is important to understand the term design. The word design has several meanings (Bannon & Ehn, 2012, p. 40). The verb ‘to design’ describes the process of creating new alternatives (Lenskjold, Olander, & Halse, 2015, p. 69; Steen, 2013, p. 17) through creation of, for example, a concept or a product. During this process, participants simultaneously shape the design problem and seek to solve it (Steen, 2013, pp. 17–18). The countable noun ‘a design’ describes an outcome of the design process. The uncountable noun ‘design’ seems to describe the discipline overall. In this thesis, all three meanings of the term design will be used; however, the main focus will be placed on the process of designing.

4.1.1. Design Process: Design Time and Use Time

From a holistic, extended perspective, the design process can be divided into two periods: design time and use time. During the design time, participants involved in the design process envision the future circumstances and the needs and desires of the prospective users (Fischer, Nakakoji, & Ye, 2009, p. 39). The vision of the future, though grounded in research of the current situation, is an imagination (Fischer et al., 2009, p. 39) and might not fully predict the actual use. The genuine use, user needs and desires only emerge during the use time. “At use time, users employ the artifacts (sic.) to ac-

complete their tasks in the world as they experience it” (Fischer et al., 2009, p. 39). The use time is strongly related to the design time; therefore, it is included in the extended perspective on the design process. This extended view has been fundamental when categorizing approaches of Collaborative and Participatory Design. Another aspect fundamental to building an understanding of C&PD is the roles of people involved in the design process.

4.1.2. Key Roles: Designer and Non-designer

There are two main categories of participants in design processes: designers and non-designers. Designers are those participants who are accountable for the design process and emphasise the importance of the process and approaches in the particular project (Bødker, Kensing, & Simonsen, 2011, p. 117). Predominantly, designers have been trained in designing. The non-designers are all other stakeholders of the process. These stakeholders are the individuals who have commissioned, payed for and manage the project (Bødker et al., 2011, pp. 120–121). Moreover, stakeholders are those who have theoretical or practical knowledge relevant to the process and those who supply products or services to the project (Bødker et al., 2011, pp. 120–121). The key stakeholder in the processes is the user. The users are individuals or groups of people who will use or interact with the outcome of the design process (Simonsen & Robertson, 2012, p. 3; Zhang & Dong, 2016, p. 142). Predominantly, design research and practice focuses on the users. However, this thesis will focus on the broader term non-designer to highlight the variety of stakeholders that can be involved in the process.

4.1.3. Spectrum of Non-designer Participation in Design Processes

There is a six-level spectrum of ways in which designers can include non-designers into the design process. Four levels of this spectrum stem from the design literature: non-designers as sources of inspiration and non-designers as objects for investigation, non-designers as design partners, non-designers as designers. Researchers tend to categorize and name the levels of the spectrum differently. For example, Hyysalo and Johnson (2015) outline four key levels: inspiration, investigation, cooperation and community. Zhang and

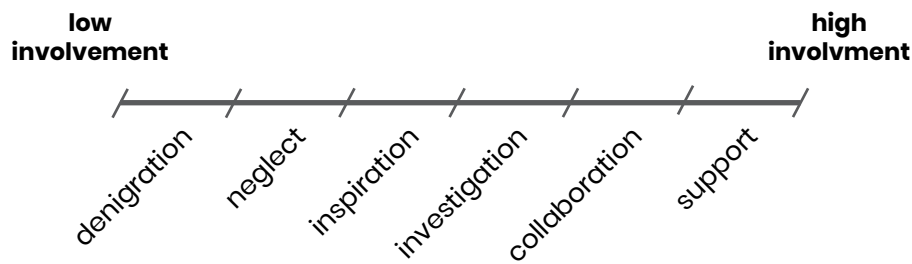


Figure 2. Spectrum of Non-designer Participation in Design

Dong (2016) outline four similar levels. Lee (2008) outlines different levels: designers representing non-designers, designers actively collaborating with non-designers, non-designers collaborating with designers and designers executing orders of non-designers. Nevertheless, approaches outlined by Lee can be incorporated into the four levels of the spectrum outlined by others. These four levels outlined by the design field can be complemented by two more levels outlined by the field of participatory development. Harder et al. (2013) outline denigration and neglect as potential ways to involve non-designers. These two levels add a greater perspective to the design participation spectrum. Thus, the final spectrum of non-designer participation includes six levels. The levels describe the relationship of the designers towards non-designers. The spectrum is represented in the Figure 2.

The six levels of involvement of non-designers are: (1) denigration of non-designers, (2) neglect of non-designers, (3) inspiration from non-designers, (4) investigation of non-designers, (5) collaboration with non-designers and (6) support of design by non-designers. At the denigration level, in which denigration means “to deny the importance or validity of” (“Denigration,” n.d.), the idea of involving non-designers into the design processes is disregarded. At the neglect level, in which neglect means “to give little attention or respect to” (“Neglect,” n.d.), there is a recognition that non-designers might need to be involved, but this need is neglected. At the inspiration level, the designer does not involve any non-designers (Zhang & Dong, 2016, pp. 144–145), and the non-designers are only participating through representation by designers (Lee, 2008, p. 36). At the investigation level, the non-designers are seen as passive sources of information which the designers can use in the design process (Zhang & Dong, 2016, pp. 145–146); this approach

is often referred to as the user-centred approach (Sanders & Stappers, 2008, p. 5). At the collaboration level, designers actively involve non-designers as partners in the design process (Lee, 2008, p. 36; Sanders & Stappers, 2008, p. 5; Zhang & Dong, 2016, p. 146). The non-designers can voice opinions and make decisions about the process and the outcomes (Sanders & Stappers, 2008, p. 5), yet some decisions are undertaken by designers without the participation of non-designers (Harder et al., 2013, p. 47). At the support of design by non-designers level, non-designers independently develop, modify and produce designs (Zhang & Dong, 2016, pp. 146–147) while designers might be involved as professionals who can assist in executing the design outlined by the non-designers. Out of the six levels, this thesis will focus on the collaboration with non-designers level of the spectrum.

4.2. Collaborative and Participatory Design

The collaboration with non-designers level, in which non-designers actively participate in the design processes, corresponds with the Collaborative and Participatory sub-field of design discipline. In C&PD, designers acknowledge the non-designers as experts of their lives (Simonsen & Robertson, 2012, p. 4). Meanwhile, designers position themselves as the experts of designing and act as facilitators of the processes (Taffe, 2015, p. 41). Involvement of non-designers adds perspectives and knowledge from various domains and levels of expertise (Mattelmäki, Brandt, & Vaajakallio, 2011, p. 80). Some authors and design practitioners (e.g. see Kleinsmann, Valkenburg, & Buijs, 2007) can define co-design as a setting in which several designers collaborate on a project (Sanders & Stappers, 2008, p. 6). This perspective does not involve non-designers, and thus will not be considered in this thesis. Meanwhile, a broad range of perspectives can be included in Collaborative and Participatory Design.

The framework of C&PD is flexible with regards to focus of the processes, actors that lead the process and parameters of participation. First, Collaborative and Participatory Design can have a research focus or a design focus (Sanders & Stappers, 2008; Steen, 2013). In research-focused projects, participants strive to build an understanding of the context and to define the problem; in projects focused on designing, participants strive to collectively

build solutions. Second, in C&PD either designers or non-designers can set the goals of the design process (Sanders & Stappers, 2008; Steen, 2013). In some processes, the agenda is set by the non-designers and the designers merely act as consultants of how the process should be carried out (Lee, 2008, p. 36). Meanwhile in other processes, only the designers or designers together with non-designers set the goals. Third, the participation of non-designers can differ in depth, breadth and scope (Harder et al., 2013, p. 44). The depth of participation reveals the extent to which participants can affect decisions and the process (Harder et al., 2013, p. 44). The breadth showcases the number and variety of stakeholders involved in the process (Harder et al., 2013, p. 44). The scope illustrates the stages of the design process that non-designers are involved in (Harder et al., 2013, p. 44). The flexibility of C&PD allows designers and non-designers to shape the design processes according to their needs, skills and mindsets (Sanders & Stappers, 2008, p. 8). Most likely, this flexibility has resulted in development of several groups of approaches in C&PD, which are in-depth discussed in the section 4.3. These groups of approaches have also developed during the evolution process of designing with non-designers.

4.2.1. Historical Context of Collaboration with Non-designers

Design as a discipline emerged in early 20th century, and, besides being an economic tool, it strived to create social impact through design of material goods. After the World War 1, some designers viewed design as a tool for societal change (Bannon & Ehn, 2012, p. 38). They strived to embed “progressive social and cultural” values and norms into the objects they designed and, through these objects, aimed to create conditions needed for social change (Bannon & Ehn, 2012, p. 38). In this era, design was an interdisciplinary and collaborative practice, as varied experts joined their efforts in the studios (Bannon & Ehn, 2012, p. 38). The second wave of social design, which emerged after World War 2, again embraced the power of design to solve social problems, especially in the Scandinavian countries (Bannon & Ehn, 2012, p. 38). Nevertheless, it seems that non-designers were not involved much in these processes. Participation of non-designers became more prominent after the 1960s.

In the second half of the 20th century, designers were moving closer to the people they were designing for through two different paths. The design community started to officially establish the importance of non-designer participation in various design sub-fields in 1971 at the ‘Design Participation’ conference (Lee, 2008, p. 31). In the introduction of proceedings of that conference, the term “user participation in design” was especially accentuated (Cross, 1972, p. 11). Since the 1960s and 70s, designers have “been moving increasingly closer to future users of what they design” (Sanders & Stappers, 2008, p. 5) and the discussions of non-designer involvement have been quite prominent in the field (Harder et al., 2013, p. 41). Various sub-fields of design have accentuated participation (Lenskjold et al., 2015, p. 68). However, two routes have been predominant in the evolution and acceptance of non-designer participation: user-centred design and Participatory Design (Harder et al., 2013, p. 41; Hyysalo et al., 2014, p. 211). The user-centred design aimed to involve non-designers for pragmatic reason of developing better designs. Meanwhile, Participatory Design strived to include non-designers due to political and moral considerations. The practical and political underpinnings are described more in one of the next sections. Even though the two reasons gave concrete grounds for evolution and acceptance of non-designer participations, the involvement of non-designers built approval rather slowly.

4.2.2. Current State of Collaboration with Non-designers

As pioneers of collaboration with non-designers had predicted, it required decades for the new perspectives to be embraced by the majority of the design community. The closing words of the proceeding of Design Participation conference noted that it might take decades for the involvement of non-designers to become widespread across the design sub-fields (Cross, 1972, p. 122). Participation of non-designers was contrary to the established norms of design (Lenskjold et al., 2015, p. 68). Nevertheless, the changing social and technological context allowed participation to be more accepted. Sanders and Stappers (2008, pp. 9–10) outline five shifts that had to happen for participation to be more accepted. First, design community had to gradually accept all humans as creative beings (Sanders & Stappers, 2008, p. 9). Second, the collaborative approach had to evolve from a strictly academic discipline to a practical methodology (Sanders & Stappers, 2008, p. 10). Third, the

design community had to accept that active participation of non-designers in the creation of product and services might satisfy human need better than passive consumption (Sanders & Stappers, 2008, p. 9). Fourth, designers and others in power positions had to gradually accept that they need to share decision making and creative power with future users to create better designs and more profit (Sanders & Stappers, 2008, p. 9). Fifth, the business world had to experience a stagnation of technological development to start embracing innovation through customer involvement as a strategy for business development (Sanders & Stappers, 2008, p. 10). However, these changes in the design and business communities were supported by significant societal changes.

One strong reason for broad acceptance of non-designer participation was an increased demand for the involvement from the society. In the past decades, people have increasingly demanded involvement in decision making (Harder et al., 2013, p. 41), especially in the innovation and development processes (Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010, p. 283). This increase has likely been supported by the fast evolution of technology, e.g., the Internet (Hoyer et al., 2010, p. 283). The technology and various possibilities it provides have increased the “sense of “empowerment”” of the users to demand more involvement and has made participation easier (Hoyer et al., 2010, p. 283). People started to request participation across disciplines, including healthcare, international development and sustainable development (Harder et al., 2013, p. 41). The society has evolved towards a participatory culture (Teli, Di Fiore, & D’Andrea, 2017, p. 83). This participatory culture has affected the design field, as the non-designers have demanded more participation and designers have built their openness towards the involvement of non-designers.

Currently, it seems that participation of and collaboration with non-designers has been acknowledged and accepted by all sectors. Participation of people has become not only widely accepted but also promoted (Bannon & Ehn, 2012, pp. 40–41) for various causes (Teli et al., 2017, p. 83) in the public sector (Bradwell & Marr, 2008, p. 21) and in various commercial industries (Steen et al., 2013, p. 59). The commercial sector has uncovered strong business drivers to involve non-designers and, especially, the future customers, in innovation and development projects (Sanders & Stappers, 2008, p. 8). Participation is especially widely accepted and acknowledged in the field of

Human-Computer Interaction and development of digital product (Bannon & Ehn, 2012, p. 53; Simonsen & Robertson, 2012, pp. 5–6; Vines, Clarke, Wright, McCarthy, & Olivier, 2013, p. 429). It might even seem that designers are not the most prominent supporters of participation, as the business and marketing sectors are increasingly demanding involvement of non-designers (Sanders & Stappers, 2008, p. 8), at least in the Western countries (Bannon & Ehn, 2012, p. 53). Participation of non-designers in design processes seem to be widely accepted and promoted across various sectors. These sectors might be grounding their acceptance of participation in different factors.

4.2.3. Underpinnings for Collaboration with Non-designers

There are four key bases for involving non-designers into design and development processes: political, pragmatic, innovativeness and commercial underpinnings. The political underpinning, sometimes also referred to as the moral underpinning, highlights that people must be able to affect decisions about their lives (Bannon & Ehn, 2012, p. 41; Carroll & Rosson, 2007, p. 243; Kujala, 2003, pp. 11–12; Simonsen & Robertson, 2012, p. 6; Vines et al., 2013, p. 430). It asserts that participation ensure that the design and development processes are democratic, ethical and considerate of those who will be affected by the outcomes. The pragmatic underpinning accentuates that participation of non-designers in design processes increases the quality, applicability and usability of the designs (Bradwell & Marr, 2008, p. 10; Carroll & Rosson, 2007, p. 243; Hyysalo & Johnson, 2015; Kristensson & Magnusson, 2010, p. 149; Lundström, Savolainen, & Kostiaainen, 2016; Steen, 2011, p. 50). This basis argues that ultimately designers can create better designs if the non-designers also participate in the process. The innovativeness underpinning highlights that participation of non-designers increases the amount and innovativeness of ideas and design outcomes (Kristensson, Magnusson, & Matthing, 2002; Mitchell, Ross, May, Sims, & Parker, 2016, p. 2). Therefore, if non-designers take active part in the design process, the solution will be much more novel and unique. Finally, the commercial underpinning emphasizes that participation of non-designers, especially of the future customers, strengthens the brand, builds customer loyalty and, ultimately, increases competitiveness and revenue of the organization

(Kristensson et al., 2002; Sanders & Stappers, 2008, p. 8; Steen, Manschot, & De Koning, 2011, pp. 53, 57–59; Vargo & Lusch, 2004). It indicates that participation increases success of the commercial or non-commercial organization. These four underpinnings are likely to have impacted acceptance of non-designer participation across various sectors. However, this acceptance has also led to some confusion in the meaning of terms used to describe participation.

4.2.4. Lack of Standard Terminology and Framework

Each discipline as well as various sub-fields, schools and individual researchers of design seem to attach different meanings to the same terms. There seems to be a lack of joint, standard terminology and of a standard framework of approaches for non-designer participation (Taffe, 2015, pp. 41–42). “The methodology of co-design is not stabilized or generally agreed upon, but is highly interdisciplinary and subject to continued experimentation” (Lenskjold et al., 2015, p. 69). Terms participation, participatory design, co-design, co-creation, collaborative design carry multiple meanings (Harder et al., 2013, p. 41; Sanders & Stappers, 2008, p. 6). This is especially prominent across various disciplines. However, even in the design field, every design school might have their own terminology (Lenskjold et al., 2015, p. 69). In some cases, even one design researcher within a framework of one published work can use the terms interchangeably (e.g. see Binder, Brandt, Ehn, & Halse, 2015; Lundström et al., 2016; Mattelmäki et al., 2011). Moreover, terms co-design, co-creation and participation seem to be buzz-words (Degnegaard, 2014, p. 108; Steen et al., 2011, p. 53) and are increasingly used instead of, for example, the term participatory design (Sanders & Stappers, 2008, p. 7). It seems that it is common to label many types of projects as co-design projects, and such use dilutes the meaning of the terms (Steen, 2013, p. 16). Overall, the terms related to collaboration with non-designers can be hard to understand and use. Additionally, the challenges with terminology create problems with categorization of various approaches of non-designer participation.

Design researchers not only name C&PD approaches differently, but also organize them into dissimilar frameworks. Steen (2011, p. 48) presents C&PD approaches in a matrix that is arranged on two axes: the designer-led vs. us-

er-led axis and the present-focus vs. future-focus axis. He outlines participatory design, the lead user approach and co-design as approaches that actively involve non-designers (Steen, 2011, p. 48). Sanders and Stappers (2008) outline a similar matrix. However, they view participatory design as an umbrella approach that includes co-design, co-creation, mass-customization and the lead-user approach (Sanders & Stappers, 2008). Meanwhile, Hyysalo and Johnson (2015) arrange design approaches along the non-designer participation spectrum. They place collaborative design and co-creative design in the collaboration with non-designers interval of the spectrum (Hyysalo & Johnson, 2015). They differentiate between these two approaches by highlighting whether the collaboration happens during the design time or the use time (Hyysalo & Johnson, 2015). Hyysalo and Johnson (2015) outline four types of collaborative design: codesign, socio-technical systems design, classical Scandinavian participatory design and emancipatory participatory design. They also outline four types of cocreative design: corealization, metadesign, end-user development, living labs (Hyysalo & Johnson, 2015). The frameworks of C&PD approaches outlined by these three researchers differ much. Moreover, the researchers use the same terms to describe different concepts and approaches. Therefore, there seems to be a need to develop a custom classification of C&PD approaches for this thesis.

4.3. Approaches of Collaborative & Participatory Design

The custom classification for this thesis categorizes the Collaborative and Participatory Design approaches into three groups: Participatory Design, Collaborative Design Before Use and Collaborative Design-in-Use. The Participatory Design category includes approaches that highlight the political underpinning of democratizing innovation and giving control and decision-making power to the non-designers. The Collaborative Design Before Use category encompasses those approaches that do not carry a strong political agenda and occur during the design time. The Collaborative Design-in-Use category contains those approaches that involve collaboration with non-designers during the use time. The following sections describe the categories and the included approaches in more depth.

4.3.1. Participatory Design

The Participatory Design (PD) category includes those approaches that focus on democratizing design and innovation across the whole span of the design process. Participatory Design is strongly rooted in the political underpinning of collaboration with non-designers. This underpinning accentuates that people need to have control over the change in their lives, developed technologies and their future (Bannon & Ehn, 2012, p. 41; Carroll & Rosson, 2007, p. 243; Hyysalo & Johnson, 2015; Kujala, 2003, pp. 11–12; Simonsen & Robertson, 2012, p. 6; Vines et al., 2013, p. 430). This political basis has been a key reason for establishing the Participatory Design in the 1960s and 70s. (Simonsen & Robertson, 2012, pp. 1–2; Steen, 2011, p. 49). Since its establishment, PD strives to redistribute and equalize power between stakeholders and to establish equal, democratic relationships among them (Kensing & Greenbaum, 2012, pp. 33–34). This section of C&PD seeks to work with the tensions between the varied parties to ignite change and create new possibilities (Buur & Larsen, 2010, p. 112; Kensing & Greenbaum, 2012, p. 22). Participatory Design predominantly focuses on the design time (Ehn, 2008, pp. 91–92), yet there are some contemporary PD projects also use participatory methods during the use time (e.g. see Seravalli, Agger Eriksen, & Hillgren, 2017). Nevertheless, in the context of this framework, Participatory Design with predominantly refer to the projects taking place during the design time. These projects usually follow several core principles.

4.3.1.1. Core Principles of Participatory Design

Participatory Design strongly focuses on the political underpinning and core principles. It focuses on the design processes and ways in which to democratize the development and to create alternative perspectives (Kensing & Greenbaum, 2012, pp. 33–34). PD is defined by its core principles not by a rigid methodology, exact approaches or strict rules (Simonsen & Robertson, 2012, p. 3). The *Routledge International Handbook of Participatory Design* outlines five core principles of PD: (1) designing with real people for real people; (2) ‘genuine’ participation, (3) mutual learning of all participants; (4) use of action-based tools and methods and (5) commitment to understanding practices of people (Kensing & Greenbaum, 2012, pp. 33–34; Simonsen & Robertson, 2012, p. 3). These five principles could be arranged into three

groups which focus on the participation, the process and the hands-on approach. These three groups are presented in the next paragraphs.

The first group of principles showcases that Participatory Design strives for direct, genuine participation of real people. PD approaches are committed to designing futures with real peoples who will use or will be affected by the use of the design outcomes (Simonsen & Robertson, 2012, p. 5). PD especially accentuates genuine participation of the people (Kensing & Greenbaum, 2012, p. 22; Simonsen & Robertson, 2012, p. 5). The genuine participation can be seen as a situation in which non-designers do not solely inform the design process but actively participate in it, e.g. by drawing, discussing or making (Simonsen & Robertson, 2012, p. 5). This type of participation requires a trustful relationship among all participants, so they can cooperate voluntarily and share their perspectives easily (Simonsen & Robertson, 2012, p. 5). Moreover, it requires resources, access to all needed contexts and people as well as a decision-making power for the participants (Kensing & Greenbaum, 2012, p. 22). These requirements shape the Participatory Design processes. Moreover, they urge PD practitioners to continuously develop processes, methods and tools to enable this genuine participation (Simonsen & Robertson, 2012, pp. 6–7). The genuine involvement of non-designers usually manifests itself also in the learning of the involved people.

The second group of principles accentuates that Participatory design focuses on creating a process of mutual learning among all participants rather than on the design outcomes. The final designs play a secondary role in Participatory design while the democratic, participatory design process is the key focus (Bannon & Ehn, 2012, p. 41; Binder et al., 2015, p. 157; Simonsen & Robertson, 2012, p. 8). For example, PD has focused on the process of prototyping rather than on the prototypes themselves (Binder et al., 2015, p. 158). In these processes, the key goal is to stimulate mutual learning among the participants (Simonsen & Robertson, 2012, pp. 2–3). Mutual learning is crucial in PD because all participants of the design process need to understand experiences, needs and requirements of other participants to envision a future that might be usable for all (Simonsen & Robertson, 2012, pp. 2–3). From the perspective of mutual learning, Participatory Design can also be defined as “a process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective ‘reflection-in-action’” (Simonsen & Robertson,

2012, p. 2). In this context, ‘reflection-in-action’ refers to an act of reflection about certain actions and their underlying aspects, e.g. experiences, thoughts or emotions (Schon, 1984). To foster this reflection in action, Participatory Design uses a lot of hands-on activities.

Therefore, the third group of principles highlight the focus of Participatory Design on hands-on activities, tools, and contextual practices. Even if the PD project is research-driven, the designers aim to understand the real practices of people (Ehn, 1993; Simonsen & Robertson, 2012, pp. 7–8). This focus on real actions has urged Participatory Design to extensively focus on developing tools and methods to foster collective reflection-in-action, such as “mock-ups, scenarios, prototypes and various types of design games” (Simonsen & Robertson, 2012, p. 9). These tools and methods aim to increase practical action, personal reflection as well as engagement, communication and mutual learning among the participants (Simonsen & Robertson, 2012, p. 6). “Design tools such as models, prototypes, mockups, descriptions, and representations act as reminders and paradigm cases for our contemplation of future [...] systems and their use. Such tools are effective because they recall earlier experiences to mind” (Ehn, 1993, p. 63). For example, Participatory Design has extensively embraced make tools through which participants can express their knowledge, feelings and dreams (Sanders, 2002, pp. 2–4) and reflect upon them with other participants. These three groups of principles are crucial across the whole range of Participatory Design approaches.

4.3.1.2. Types of Participatory Design

The Participatory Design group consists of two key approaches: Classical Scandinavian Participatory Design and Contemporary Participatory Design. The Classical Scandinavian Participatory Design refers to the early PD efforts of democratizing workplace technology development in the Scandinavian countries in the 1960s and 70s. The Contemporary Participatory Design encompasses the current PD projects and initiatives that strive to democratize design and innovation across various disciplines. Hyysalo and Johnson (2015) use the term Emancipatory Participatory Design to describe recent and current participatory efforts. They seem to place the emancipatory label on the initiatives which aim to develop user competence in technology to empower future actions towards appropriation of technology (Hyysalo

& Johnson, 2015). However, according to the political underpinning and the core principles of participatory design, current PD initiatives can also include other agendas. Therefore, this thesis will focus on the wider range of initiatives and describe the general state of the Contemporary Participatory Design. The current Participatory Design along with the Classical Scandinavian Participatory Design are describe in the next two sections.

4.3.1.2.1. Classical Scandinavian Participatory Design

The roots of Participatory Design are typically traced back to the Classical Scandinavian Participatory Design: a movement in Scandinavia in the 1960s and 70s which strived to democratize the workplaces and empower the workers. This democratization agenda was strongly related to the introduction of information technology into the workplaces (Ehn, 2008, p. 93; Simonsen & Robertson, 2012, p. 2). Especially two reasons led to the establishment of PD practices. First, management practices in the workplace increasingly strived to de-skill the workers; they aimed to automate jobs and aspired to have “interchangeable workers as well as interchangeable manufacturing parts” (Kensing & Greenbaum, 2012, p. 24). Second, a political decision was made in Scandinavian countries to give power to employees to impact decisions about their work (Clement & Van den Besselaar, 1993, p. 29; Kensing & Greenbaum, 2012, pp. 24–25; Vines et al., 2013, p. 430). Therefore, designers established the participatory design approach and carried out several projects; for a review of these early Participatory Design projects see Clement and Van den Besselaar (1993). The early projects aimed to empower the weaker stakeholders of the workplace: “participatory design sided with resource weak stakeholders (typically local trade unions), and developed project strategies for their effective and legitimate participation” (Ehn, 2008, p. 93). The trade unions actively supported development and use of the participatory practices.

The strong Scandinavian labour unions were extensively interested in Participatory Design because the aims of the approach corresponded with the objectives of the unions. “The unions were concerned with deskilling, lack of influence, health, and safety” (Ehn, 1993, p. 48). Therefore, they supported the aims of the Participatory Design efforts (Ehn, 1993, p. 46; Kensing & Greenbaum, 2012, p. 24). The PD designers aimed to expand democracy at the workplace and in the design processes by giving decision making power

to the workers (Ehn, 2008, p. 93; Keshavarz & Mazé, 2013, p. 8). They also strived to empower workers to take a proactive stand about development of their future (Clement & Van den Besselaar, 1993, p. 34; Vines et al., 2013, p. 430) and to enable workers to extend skills and work in new areas while technology carries out the laborious tasks (Simonsen & Robertson, 2012, p. 2). At the same time, they purposefully focused on the tacit knowledge and involvement of the workers while designing potential solutions (Ehn, 2008, p. 93; Keshavarz & Mazé, 2013, p. 8). Because these aims were addressing the needs of the trade unions, the worker organisations contributed to the feasibility and success of the early PD project (Kensing & Greenbaum, 2012, p. 22). However, the success of these projects was measured in rather relative terms.

The early Participatory Design projects were considered successful if they elevated the political agenda of participation in workplace development and design. These projects focused on building knowledge and capacity of the workers about the technology rather than on design of outcomes (Vines et al., 2013, p. 430). Therefore, some early projects, e.g. the UTOPIA project, can be considered as failures, as they did not create concrete, long-lasting outcomes (Clement & Van den Besselaar, 1993, pp. 34–35). However, they succeeded in shining attention on the potential of participation in design and developing techniques and models for user participation (Clement & Van den Besselaar, 1993, pp. 34–35). It seems that all early PD projects succeeded in showing that “under appropriate conditions, users are capable of participating actively and effectively in information systems development” (Clement & Van den Besselaar, 1993, p. 34). This notion paved the route for further research on and practical application of Participatory Design approach and its ideology, core principles, tools and methods. The field was able to develop further and to morph into the Contemporary Participatory Design.

4.3.1.2.2. Contemporary Participatory Design

Since the 1960s and 70s Participatory Design has extensively evolved and expanded beyond the workplace. In these decades, there was “a wave of social, economic, political and technological developments” (Bannon & Ehn, 2012, p. 49) which urged the field to evolve (Bannon & Ehn, 2012, p. 49; Huybrechts, Benesch, & Geib, 2017a, p. 145). The evolution took place in four areas of PD: (1) further development of the theoretical base and core

principles, (2) development of new tools and methods, (3) work with the emerging technologies and, most importantly, and (4) expansion into new domains (Halskov & Hansen, 2015). Participatory Design has diffused into areas such as technology development outside of the workplace (Kensing & Greenbaum, 2012, p. 22); development of healthcare (Vines et al., 2013, p. 430); design of spaces, enterprises and institutions (Simonsen & Robertson, 2012, p. 2); and urban planning and community development (Bannon & Ehn, 2012, p. 41). Moreover, techniques and approaches of PD have been widely adopted by other disciplines; however, these disciplines have not embraced the emancipatory, democratising political agenda of the early Participatory Design (Kensing & Greenbaum, 2012, p. 28). Meanwhile, the Contemporary Participatory Design still focuses on its political underpinning.

Contemporary PD extensively accentuates the need to continuously refocus on democratising innovation and the political underpinnings of the Classical Participatory Design. Already in 1993, this need to focus more on the underlying political aspects of democratisation in the projects and approaches emerged (Clement & Van den Besselaar, 1993, p. 35). Also in the last decade, researchers have claimed that Contemporary Participatory Design is losing its political agenda and instead focuses on various practical aspects of participation (e.g. see Buur & Larsen, 2010, p. 123; Keshavarz & Mazé, 2013, p. 8; Lenskjold et al., 2015, p. 68; Teli et al., 2017). At the same time, many contemporary PD authors, also those criticising the loss of the political agenda, (e.g. see Bannon & Ehn, 2012; Binder et al., 2011, 2015; Björgvinsson, Ehn, & Hillgren, 2010; Halse, Brandt, Clark, & Binder, 2010; Keshavarz & Mazé, 2013; Teli et al., 2017) urge researchers and practitioners to maintain and strengthen this political agenda. It seems that Contemporary Participatory Design continually pushes itself to strengthen and deepen the political, democratising approach.

This strive to re-establish the political agenda manifests itself in four ways. First, Contemporary PD focuses on the process of participation and sharing of differing perspectives rather than on building an outcome or consensus (Keshavarz & Mazé, 2013, p. 7). It seeks to raise issues rather than develop concrete solutions (Binder et al., 2015, p. 162). Second, current PD practice strives to involve marginalised communities as participants in the design and development processes (Lenskjold et al., 2015; Seravalli et al., 2017). Third, it strives to build infrastructures of stakeholders, which can be interpreted

as extensive and long-term collaborations (Björgvinsson et al., 2010, p. 43), around a specific topic (Björgvinsson et al., 2010; Ehn, 2008; Huybrechts et al., 2017a). PD practitioners build these infrastructures by framing and staging relationships of the stakeholder (Keshavarz & Mazé, 2013, p. 8). Fourth, the Contemporary PD focuses on creation and maintenance of public commons, the structures and resources jointly owned by the public (Parker & Schmidt, 2017; Teli et al., 2017). These four ways accentuate the need to focus on political underpinnings of design work. At the same time, they urge current PD practitioners to enter the public sphere.

The democratization efforts are especially manifested in the strive of PD designers to engage with issues of the public sphere. The focus in Participatory Design has shifted from “the workplace and the worker to the public space and the citizen” (Binder et al., 2015, p. 155). The designers are moving from working within organizations and companies towards working in the public realm (Björgvinsson et al., 2010; Lenskjold et al., 2015) and participatory governance (Parker & Schmidt, 2017, p. 203). In mid 2017, the CoDesign journal devoted a full issue to the topic of PD and collaborative approaches within the public realm (Huybrechts, Benesch, & Geib, 2017b). The public space has become a prominent and widely accepted application area of Contemporary Participatory Design and its political underpinnings. These underpinnings are not prominent in the other contemporary collaborative design approaches.

4.3.2. Collaborative Design Before Use

The second category - Collaborative Design Before Use - includes those approaches that involve non-designers into processes without as strong political agenda and during the design time. This category has also been called co-design, co-creation, collaborative design, co-creative design and cooperative design (Halskov & Hansen, 2015, p. 81; Mattelmäki et al., 2011; Mattelmäki & Sleeswijk Visser, 2011). In this category, the design time is the key time-frame for collaboration with the non-designers (Giaccardi & Fischer, 2008, p. 19,21; Steen et al., 2011, p. 53), and the designers do not strive to achieve any political goals (Bannon & Ehn, 2012, pp. 53–54; Steen, 2011, p. 52; Teli et al., 2017, pp. 83–84). Instead, the collaborative design practitioners focus on placing the human at the centre of the design process and satisfy-

ing their needs (Bradwell & Marr, 2008, p. 17; Degnegaard, 2014, p. 104; Mattelmäki et al., 2011, p. 79). The design process focuses on producing a concrete result (Bannon & Ehn, 2012, pp. 53–54; Sanders, 2002, p. 1) not only on the process of participation like the Participatory Design. However, PD is definitely one of the source of inspiration for the Collaborative Design Before Use.

Collaborative Design Before Use stems from two places: Participatory Design and User-Centred Design. The first source of Collaborative Design Before use is the Participatory Design (Steen, 2013, p. 16). As Participatory Design was evolving, parts of it lost the political agenda but maintained the tools, methods and techniques of PD (Buur & Larsen, 2010, p. 123; Kes-havarz & Mazé, 2013, p. 8; Lenskjold et al., 2015, p. 68; Teli et al., 2017). These apolitical approaches became widely known as the collaborative design approaches. The second source is the user-centred design, also known as the human-centred design (Sanders, 2000). As the user-centred design was striving to satisfy user needs better, designers started to embrace user participation (Sanders, 2000, 2002, p. 1). Meanwhile, at the turn of the millennia, users demanded more control over the products, services and systems they use (Sanders, 2002, p. 2). The user-centred design had to start seeing users as design partners and to actively involve them in the processes (Taffe, 2015, p. 40). Therefore, the evolving user-centred design embraced the tools, techniques and methods of the Participatory Design, morphing into the Collaborative Design discourse. This discourse started to enter various domains and settings.

Collaborative Design has been embraced as an approach to achieve various agendas across different contexts. Currently, designers and organisations use Collaborative Design Before Use to solve varied challenges (Huybrechts et al., 2017a, p. 145). The collaborative design is used to collectively create “shared meanings”, values, experiences, ideas, products, services or technological solutions (Degnegaard, 2014). This flexibility allows the collaborative design to be used across various domains. It is used in the commercial setting (Buur & Matthews, 2008), where it can also be called user-driven innovation (Björgvinsson et al., 2010, p. 42), open innovation (Björgvinsson et al., 2010, p. 42; Chesbrough, 2006) and participatory innovation (Buur & Larsen, 2010, p. 122). Collaborative Design Before User is also used in the public sector (Bradwell & Marr, 2008; Mitchell et al., 2016, p. 2; Seravalli et

al., 2017) to redesign public services, prepare public policy (Kimbell & Bailey, 2017) and support urban development projects (Steen et al., 2013, p. 3). Across these agendas and application areas, the Collaborative Design Before Use can differ significantly.

The collaborative design initiatives and projects can differ in degree of collaboration. The degree of collaboration consists of two parameters: scope of collaboration and intensity of collaboration (Hoyer et al., 2010, p. 284). The scope of collaboration showcases the extent to which designers collaborate with non-designer across the whole process of development or innovation (Hoyer et al., 2010, p. 288). If non-designers are involved in all stages of the design process, then the project involves a high scope of collaboration (Hoyer et al., 2010, p. 288). Meanwhile, the intensity of collaboration demonstrated the extent to which the non-designers are involved in the particular stage of the design or development project (Hoyer et al., 2010, p. 288). If a project utilises only non-designer input in a certain phase of the project, then that phase involves high intensity of collaboration (Hoyer et al., 2010, p. 288). These two parameters showcase that collaborative design is a very flexible discipline and the individual projects within the same approaches can differ substantially from one another. Nevertheless, two distinct approaches can be outlined in the collaborative design.

Collaborative Design Before Use seem to include two key approaches: co-creation and co-design. This thesis distinguishes between these two approaches according to their key agendas. Co-creation is seen as a predominantly business approach that focuses on the commercial underpinnings; meanwhile co-design is interpreted as a largely design approach rooted in the pragmatic and innovativeness underpinnings of non-designer participation. This distinction differs slightly from that outlined by the design researchers. For example, Sanders and Stappers (2008) differentiate that co-design is a particular instance of co-creation, which they views as any act of collective creativity. Meanwhile, Hyysalo and Johnson (2015) interpret that co-creation takes places during the use time while collaborative design or co-design happens during the design time. Additionally, they include sociotechnical systems design, the approach that aims to improve the fit of products into lives of people, as a collaborative design approach (Hyysalo & Johnson, 2015). These differences seem to stem from the fragmented terminology and categorisation. Therefore, this thesis chooses to focus on the underpinning of

approaches as the key categorization criteria and outlines co-creation and co-design as the two key approaches of Collaborative Design Before Use.

4.3.2.1. Co-creation

In the context of this thesis, co-creation is seen as a business activity used by companies and organizations. Though design researchers might use term co-creation differently (Hyysalo & Johnson, 2015; Mattelmäki & Sleeswijk Visser, 2011; Sanders & Stappers, 2008) business and marketing literature extensively uses term co-creation to describe processes that involve participation customers to achieve business objectives (e.g. see Hoyer et al., 2010; Humphreys, Samson, Roser, & Cruz-Valdivieso, 2009; Pini, 2009). In the commercial context, co-creation can be defined as “a form of collaborative creativity, that’s initiated by firms to enable innovation *with*, rather than simply *for* their customers” (Humphreys et al., 2009, p. 3, emphasis in original). Such approach is increasingly embraced by the business sector to drive development (Degnegaard, 2014, p. 96). When creating new or redesigning existing products or services, co-creation allows companies to understand the rational and the emotional aspects about their consumers (Humphreys et al., 2009, p. 5). This understanding increases the “product quality, reduce risk, and increase market acceptance” of products and services (Hoyer et al., 2010, p. 283) and raises customer satisfaction (Pini, 2009, p. 61). Ultimately, co-creation increases and strengthens business opportunities for the company. Therefore, the commercial sector has embraced this approach. Meanwhile, the design community has embraced the co-design approach.

4.3.2.2. Co-design

Co-design, in the framework of this thesis, is a design activity or a type of design processes. In co-design designers involve non-designers, especially future users, to create solutions to a concrete problem (Bradwell & Marr, 2008, p. 17). “Users as design partners help determine product or service needs” (Hyysalo & Johnson, 2015) during the whole span of the design time (Sanders & Stappers, 2008, pp. 6–7). Therefore, co-design can be defined as “an attempt to facilitate users, researchers, designers and others – or diverse people with diverse backgrounds and skills – to cooperate creatively, so that

they can jointly explore and envision ideas, make and discuss sketches, and tinker with mock-ups or prototypes” (Steen, 2011, p. 52). From the practical point of view, co-design and its tools, methods and techniques are similar to those of Participatory Design. Nevertheless, co-design lacks the democratic underpinning of PD and focuses on the pragmatic underpinning of creating better designs (Steen, 2011, p. 52). Better designs are the goal of co-design, and designers can shape co-design processes in a way that supports this purpose (Sanders & Stappers, 2008, p. 8). Thus, it seems that co-design is a flexible approach to involving non-designers into design processes during the design time to develop more usable and fitting solutions. Meanwhile, other approaches aspire to achieve similar goals during the use time.

4.3.3. Collaborative Design-in-Use

The third group of approaches in C&PD is the Collaborative Design-in-Use which involves non-designers into the design process during the use time. Throughout the use time, the users iteratively shape and further develop the designs created during the design time (Hyysalo & Johnson, 2015). The approaches in the Collaborative Design-in-Use group can strive to fulfil one or several of the four participation underpinnings. For example, the political underpinning has motivated the work of Giaccardi and Fischer (2008) and Seravalli et al. (2017). The pragmatic underpinning was the driver for Botero and Hyysalo (2013) and Ehn (2008). The innovation underpinning lead Churchill et al. (2009) and Von Hippel (2005); meanwhile, the commercial underpinning was present in Churchill et al. (2009), Von Hippel (2005) and Habicht and Thallmaier (2017). Therefore, the underpinnings of participation are not key in the Collaborative Design-in-Use approaches. Moreover, these approaches can be applied various industries and sectors (Botero & Hyysalo, 2013, p. 39). Thus, the key common characteristic of these approaches seems to only be the participation of non-designers in shaping the design during the use time.

The participation of non-designers in the use time answers the need for the systems to evolve during the actual use. This idea stems from the belief that during the design time it is impossible to predict the actual use and user needs fully (Botero & Hyysalo, 2013, p. 38; Giaccardi & Fischer, 2008, p. 21) even if future users participate in the process. This challenge can be

addressed by continuously adjusting the design during its use. However, the non-designer participation usually ends once the design is “taken into use” (Botero & Hyysalo, 2013, p. 37). The valuable understanding of the actual use might not be incorporated into the solution during the design time. This gap can be filled if non-designers are involved in the Design-in-Use (Botero & Hyysalo, 2013, p. 38). Therefore, the Collaborative Design-in-Use approaches focus on creating open, flexible socio-technical solutions that can be adjusted as new, unpredictable situations and needs arise (Giaccardi & Fischer, 2008, pp. 19–20). This flexibility can be created in several ways.

Design researchers outline several approaches for Collaborative Design-in-Use. Sanders and Stappers (2008, p. 8) view mass-customisation and lead-user approach as the collaborative variations of Design-in-Use. Botero and Hyysalo (2013, pp. 39–40) outline three approaches: co-realization, meta-design and co-configuration. Meanwhile, Hyysalo and Johnson (2015) also add end-user development and living labs to the list of the collaborative approaches during the use time. Thus, the list of Collaborative Design-in-Use approaches seems to include mass-customisation, lead-user, co-realization, meta-design, co-configuration, end-user development and living labs approaches. However, some of these approaches can be merged, as they are very similar. Therefore, this thesis adds the mass-customisation, co-realization and co-configuration approaches under the umbrella approach of meta-design. In the framework of this thesis, the Collaborative Design-in-Use group consists of three approaches: meta-design, living labs and lead-user approach. These approaches are described in the next three sections.

4.3.3.1. Meta-design

Meta-design is an approach that aims to create flexible, adjustable systems and tools for the users to adjust these systems during the use time. Throughout the use time, new use cases, contexts and circumstances may arise, and often the design created during the design time does not support these emerging needs (Ehn, 2008, pp. 94–95; Fischer et al., 2009, p. 39; Giaccardi & Fischer, 2008, p. 19). Proponents of meta-design argue that “if a tool doesn’t satisfy the needs or tastes of users, who know best what their requirements are, they should be able to develop their own solutions” (Fischer et al., 2009, p. 38). Therefore, meta-design approach strives to accommodate

user development by creating “opportunities, tools, and social structures” for the users to adjust the systems (Fischer, Giaccardi, Ye, Sutcliffe, & Mehandjiev, 2004, p. 36). Designers aim to create complete but “underdesigned”, flexible, adjustable systems (Botero & Hyysalo, 2013, p. 39; Ehn, 2008, p. 95; Fischer et al., 2004, p. 35). This approach is also called “design-in-use”, “continuous design and redesign”, and “unfinished design” (Ehn, 2008, p. 95). Some researchers, e.g. see Vassão (2017), might view meta-design as all decisions, rules and artefacts that guide actions of people, such as legislation, laws, cultural norms. However, this interpretation of meta-design is irrelevant for this thesis and framework. In the context of this thesis, meta-design will only refer to the process of incorporating and facilitating non-designer participation during the use time.

Meta-design seems to be predominantly used in the development of Information and Communication Technologies (ICT) where it unfolds in three stages. The development of “computational” tools has been the key focus of meta-design (Fischer et al., 2009). In this context, the process of meta-design includes three stages: “*seeding, evolutionary growth, and reseeding*” (Fischer et al., 2004, p. 36, emphasis in original). During the seeding stage designers and developers, with or without the participation of non-designers, create the first flexible, “underdesigned” system (Fischer et al., 2009, p. 39; Fischer & Scharff, 2000, p. 399). They also develop the structures and the tools that users will use to adjust the system (Fischer & Scharff, 2000, p. 399). During the evolutionary growth stage, the system evolves as the developer of the system and, predominantly, the users of the system make “incremental” change to the system over an extended period of time (Fischer et al., 2009, p. 39; Fischer & Scharff, 2000, p. 399). The users utilise the previously designed tools and pathways to make the changes (Fischer & Scharff, 2000, p. 399). After an extended period of evolutionary growth, designers of the system initiate the reseeding stage. During this stage, designers strive to majorly redesign the initial system and tend to incorporate the adjustments made by the users (Fischer et al., 2009, p. 39; Fischer & Scharff, 2000, p. 399). After the redesign, the system should be applicable for evolutionary growth (Fischer & Scharff, 2000, p. 399). Therefore, the meta-design cycle might start again. In this cycle, one of the key roles is played by the tools and techniques which users can utilise to adjust the system.

As stated above, meta-design creates tools for the future users to modify or develop a design after the design time. One of the key ideas of meta-design is the notion that user should not need to master design and development skills to have the opportunity to adjust the design (Fischer et al., 2009, p. 38). Therefore, designers create clear, understandable pathways for the users to carry out the adjustments. These pathways can be divided into three groups. First, designers can develop physical, digital or social protocols and conventions of how the redesign should unfold (Ehn, 2008, pp. 95–96). If the meta-design approach is applied to social innovation, then designers might build an infrastructure of stakeholders, locations and objects to support the ongoing change (Ehn, 2008, p. 95). Second, designers may place clear indicator of redesign possibilities (Ehn, 2008, pp. 95–96). Third, designers can develop building blocks for users to utilise during the redesign work (Ehn, 2008, pp. 95–96). If the meta-design approach is applied to physical objects, the building blocks are usually referred to as modules. Modules are the “components or parts, or physical elements in a product that contribute to a given function or a set of functions” (Bonvoisin, Halstenberg, Buchert, & Stark, 2016, p. 489). These three pathways enable future users to adjust or redesign the systems or its parts if the need arises. These pathways, along with other principles of meta-design are also prominent in similar approaches. In the context of this thesis, such approaches have been included under the umbrella of meta-design.

The approaches that can be understood as types of meta-design are mass-customisation, co-realization and co-configuration. Mass-customization is an approach in which the user adjusts or finalises a design before it is produced (Habicht & Thallmaier, 2017). This approach usually unfolds via online interactive toolkits (Habicht & Thallmaier, 2017, p. 116) such as the NIKEiD shoe customisation tool (“NIKEiD,” n.d.). Co-realization is an approach in which an implemented, custom technology is adjusted according to the emerging needs (Botero & Hyysalo, 2013, p. 39). Co-configuration is an approach in which generic technology is continuously readjusted to the emerging needs after the initial configuration (Botero & Hyysalo, 2013, p. 39). The co-realization and co-configuration approaches have been used to continuously develop, for example, medical technology and applications (Botero & Hyysalo, 2013, p. 39). These three types of meta-design, as well as the

umbrella approach, strive to enable the users to adjust the technology and designs after the initial design is completed. Meanwhile, another approach focuses on giving the power to redesign only to an elite group of users.

4.3.3.2. Lead-User Approach

The second key Collaborative Design-in-Use approach is the Lead User approach; it involves a select group of users to develop innovations and redesign existing solutions. The lead users are those users who are stretching the boundaries of use and experience needs before others (Churchill et al., 2009, p. 3; Von Hippel, 2005, p. 4). Such users tend to develop solutions to their futuristic needs which would be relevant to other users at a later stage (Churchill et al., 2009, p. 3). At the same time, lead users combine an in-depth understanding of the use and future needs with knowledge about products and technologies (Kristensson & Magnusson, 2010, p. 149). This combination allows the lead users to adjust existing designs or develop entirely new solutions (Kristensson & Magnusson, 2010, p. 149). The lead users design the next version of a product or service while the majority of the people still use the previous version (Churchill et al., 2009, p. 3). Due to this perspective, Lead User approach is included in the Collaborative Design-in-Use group.

The futuristic perspective of the approach has urged many domains to include it as part of their design and development initiatives. The approach seems to be predominantly used in the business, commercial settings to drive innovation (Churchill et al., 2009; Steen, 2011, p. 51; Von Hippel, 2005). Especially the gaming industry and producers of sports and outdoors gear have embraced the contributions of lead users (Kristensson & Magnusson, 2010, pp. 147–148). However, the approach has also been used in non-commercial settings. For example, Hyysalo et al. (2014) used the lead-user approach, more specifically, the lead-user workshop method to envision the future makerspace in the Helsinki Central Library. The approach seems to be applicable to various contexts and to address varied needs and challenges (Churchill et al., 2009, p. 24). Depending on the application context, the Lead User approach could have different underpinning for the participation of the lead users (Hyysalo et al., 2014, p. 2011), ranging from the commercial to pragmatic to political ones. However, regardless of the project

underpinning, the lead-user approach only allows for the participation of a small, elite group of people who, most likely, cannot represent all future users (Sanders & Stappers, 2008, p. 8). The next Collaborative Design-in-Use approach, on the other hand, focuses on involving many ordinary users.

4.3.3.3. Living Labs Approach

The Living Labs approach aims to engage ordinary people in testing and further development of a design. “Living labs are technological installations in real-life settings with the objective of conducting medium- or long-term technological innovations in cooperation with users living in the environment” (Kanstrup, 2017, p. 50). Thus, living labs can be interpreted as real-life setting for technological innovation with people. However, labs can also focus on social innovation (Almirall & Wareham, 2011, p. 90; Bannon & Ehn, 2012, p. 54). The labs are user-centred (Björgvinsson et al., 2010, p. 42; Garcia Robles, Hirvikoski, Schuurman, & Stokes, 2016, pp. 12–13; Mulder & Stappers, 2009, p. 3) and operate within the use time after the initial design is completed (Mulder & Stappers, 2009, p. 1). Living labs strive to achieve three aims. First, they want to study users and test use of technology or innovation in real-life settings (Garcia Robles et al., 2016, p. 18; Kanstrup, 2017, p. 49; Mulder & Stappers, 2009, p. 1). Second, they aim to foster collaboration and co-creation among various stakeholders (Hawk, Romine, & Bartle, 2012, p. 225; Mulder & Stappers, 2009, p. 3; Westerlund & Leminen, 2011, p. 20). Third, they focus on fostering innovation (Mulder & Stappers, 2009, p. 1) and act as “innovation intermediaries” (Almirall & Wareham, 2011, p. 88). The role of intermediaries urges the labs to “facilitate co-creation of a product, service, or application” among the stakeholders (Mulder & Stappers, 2009, p. 4). These three aims seem to be universal, yet living labs tend to differ much.

The fundamental goals of the living labs might be the same; nevertheless, each living lab is unique. The labs can be seen as a combination of specific methods and the research environment (Garcia Robles et al., 2016, p. 19). However, the lab consists not only of the infrastructure and processes but also of “a living network of real people” (Mulder & Stappers, 2009, p. 1). The interrelated social, methodological and environmental contexts shape a living lab in a unique way. This particular way is shaped by many, inter-

connected and overlapping factors. These factors can be arranged into five categories: (1) all of the individual involved in the living lab setting, (2) the tasks and activities carried out by the individuals, (3) types of technology being tested or being used to collect data, (4) physical and psychological environment, and (5) the way in which the lab is organized (Kanstrup, 2017). These factors and their flexibility allows the Living Labs approach to engage with various challenges in diverse domains.

4.4. Key Insights

In summary, Collaborative and Participatory Design is a diverse field which predominantly focuses on involving non-designers into design processes. Table 6 summarizes all notions of C&PD discussed above. Out of these notions, seven key ideas could be questioned through the perspectives of the bioinclusive ethic. These key insights predominantly relate to the definition of non-designers, the ways in which non-designers can be involved in design processes and the approaches in which the non-designers are involved as partners within the design processes.

1. The design processes include two key types of participants: designers and non-designers. Designers are professionals who are trained in design processes and approaches and are responsible for the project and use of the design approaches. Non-designers are the stakeholders of the design processes, such as future or current users, commissioners, funders, managers, experts, information providers, suppliers.
2. Non-designers may be involved in design processes to varying extent. The levels of non-designer participation can be arranged on a spectrum that consists of six levels: denigration of, neglect of, inspiration from, investigation of, collaboration with and support of non-designers. The collaboration with non-designers segment of the spectrum corresponds with the Collaborative and Participatory sub-field of design.
3. Non-designers can have a varying impact within C&PD processes. The goals of C&PD projects can be set by

either the designers, non-designers or both, and the non-designers can either have a small or large decision-making power.

4. There are four key underpinnings driving non-designer participation in design. The political underpinning argues that people should be able to participate in development of and affect decisions about their future. The pragmatic underpinning argues that participation of non-designers and especially future users enables designers to develop solutions that better satisfy stakeholder needs. The innovativeness underpinning argues that number and innovativeness of ideas, concepts and solutions increases if non-designers participate in the process. The commercial underpinning emphasizes that participation of non-designers, especially customers, strengthens the brand and ultimately, increases the revenue of the company.
5. Participatory Design approaches aim to democratise design processes by giving voice and decision-making power to the underrepresented, less powerful stakeholders. PD focuses on the process of designing rather than on the outcomes. It is rooted in five core principles: (1) designing with real people for real people; (2) 'genuine', active participation of people in design processes which requires decision making power and resources; (3) mutual learning of all participants, including designers and non-designers; (4) use of action-based tools and methods through which non-designers can express their perspectives, needs, desired and challenges; and (5) commitment to understanding practices of people.
6. Collaborative Design Before Use approaches place humans, most often the future users, at the centre of the design process and strive to satisfy their needs in the best way possible. The Collaborative Design Before Use approaches utilize the Participatory Design tools and methods yet disregard their political underpinnings; they also use various User-Centred and Human-Centred

Design tools and methods. The approaches focus on the outcomes of the design process.

7. Collaborative Design-in-Use involves non-designers in design processes during the use time. The non-designers are involved because most design solutions need to evolve during the use time to satisfy actual user needs and to adjust to ever-changing social, technological and economic context.

These seven insights seem to be most relevant to investigate to build an understanding of the potential implications of the bioinclusive ethic on C&PD. The next chapter presents these implications and outlines existing examples of similar notions in design research and practice.

Table 6. Summary of Findings About Collaborative and Participatory Design

Field	Subfield	Category of Approaches Within the Subfield	Approaches
Design	<p>Collaborative and Participatory Design</p> <p>Subfield of design in which designers collaborate with non-designers and view non-designers as partners within the design process.</p> <p>Views non-designers as creative experts who can add invaluable perspectives, interpretation, knowledge and ideas to the design process.</p> <p>Views designers as the experts of the design processes and facilitation of creative work of others.</p> <p>A flexible discipline that includes a vast range of approaches, processes and projects.</p> <p>Design processes can be driven by the political, pragmatic, innovativeness and commercial underpinnings.</p> <p>Lacks standard terminology and framework</p>	Participatory Design	Classical Scandinavian Participatory Design
<p>Extended design process consists of the design time and the use time.</p> <p>Design processes include two key types of participants: professional designers who are trained in designing and non-designers who are the stakeholders of the process.</p>		<p>Strives to involve non-designers because of political underpinning.</p>	<p>strived to democratise the workplace and development processes 1960s and 70s.</p>
<p>The levels of non-designer participation in design processes can be arranged on a six-level spectrum: denigration of, neglect of, inspiration from, investigation of, collaboration with and support of non-designers.</p> <p>The collaboration with non-designer level corresponds to the Collaborative & Participatory Design sub-field of design.</p>		<p>Collaborative Design Before Use</p> <p>Strives to involve non-designers because of pragmatic, innovativeness and commercial underpinnings during the design time</p>	<p>Contemporary Participatory Design</p> <p>strives to establish democratic, participatory processes and to facilitate genuine, active participation of marginalized groups.</p> <p>Co-creation</p> <p>strives to co-create products and service offerings with the current and future users and customers.</p> <p>Co-design</p> <p>strives to co-design solutions to design problems with future users and other non-designers.</p>
		<p>Collaborative Design-in-Use</p> <p>Strives to involve non-designers during the design time</p>	Meta-design
			Lead User approach
			Living Labs approach
			<p>strives to engage an elite, highly skilled group of users who are experiencing future needs to redesign existing and develop new solutions.</p> <p>strives to involve various types of non-designers in real-life settings to test and further develop initial designs.</p>

Table 7. Key Insights about Collaborative and Participatory Design and Bioinclusive Ethic

Key Insights about Bioinclusive Ethic	Key Insights about Collaborative & Participatory Design
<p>1. The bioinclusive ethic assigns equal moral standing to non-human and natural entities. It perceives humans to be a part of and equal to other natural entities, e.g. individual animals, species and ecosystems.</p>	<p>1. The design processes include two key types of participants: designers and non-designers. Designers are professionals who are trained in design processes and approaches and are responsible for the project and use of the design approaches. Non-designers are the stakeholders of the design processes, such as future or current users, commissioners, funders, managers, experts, information providers, suppliers.</p>
<p>2. The bioinclusive ethic urges humans to view natural entities not only as a set of materials but also as living beings with self-meaning and peculiar experiences of the world.</p>	<p>2. Non-designers may be involved in design processes to varying extent. The levels of non-designer participation can be arranged on a spectrum that consists of six levels: denigration of, neglect of, inspiration from, investigation of, collaboration with and support of non-designers. The collaboration with non-designers segment of the spectrum corresponds with the Collaborative and Participatory sub-field of design.</p>
<p>3. The bioinclusive ethic urges humans to establish a synergetic relationship with nature. In this relationship, nature would be able to define the goals of humanity as well as the means to achieve the goals. This relationship should be based on direct, communicative encounters between humans and non-humans. Through the synergetic relationship, humans could keep their sophisticated culture and technology but also ensure that they comply with the goals of natural systems and do not destroy them.</p>	<p>3. Non-designers can have a varying impact within C&PD processes. The goals of C&PD projects can be set by either the designers, non-designers or both, and the non-designers can either have a small or large decision-making power.</p> <p>4. There are four key underpinnings driving non-designer participation in design. The political underpinning argues that people should be able to participate in development of and affect decisions about their future. The pragmatic underpinning argues that participation of non-designers and especially future users enables designers to develop solutions that better satisfy stakeholder needs. The innovativeness underpinning argues that number and innovativeness of ideas, concepts and solutions increases if non-designers participate in the process. The commercial underpinning emphasizes that participation of non-designers, especially customers, strengthens the brand and ultimately, increases the revenue of the company.</p>
	<p>5. Participatory Design approaches aim to democratise design processes by giving voice and decision-making power to the underrepresented, less powerful stakeholders. PD focuses on the process of designing rather than on the outcomes. It is rooted in five core principles: (1) designing with real people for real people; (2) 'genuine', active participation of people in design processes which requires decision making power and resources; (3) mutual learning of all participants, including designers and non-designers; (4) use of action-based tools and methods through which non-designers can express their perspectives, needs, desired and challenges; and (5) commitment to understanding practices of people.</p>
	<p>6. Collaborative Design Before Use approaches place humans, most often the future users, at the centre of the design process and strive to satisfy their needs in the best way possible. The Collaborative Design Before Use approaches utilize the Participatory Design tools and methods yet disregard their political underpinnings; they also use various User-Centred and Human-Centred Design tools and methods. The approaches focus on the outcomes of the design process.</p>
	<p>7. Collaborative Design-in-Use involves non-designers in design processes during the use time. The non-designers are involved because most design solutions need to evolve during the use time to satisfy actual user needs and to adjust to ever-changing social, technological and economic context.</p>

5. DISCUSSION

Collaborative and Participatory Design is a vast, human-centred sub-field of design. C&PD might have to be re-imagined as a less anthropocentric field, and this thesis has strived to sketch out possible perspectives of such C&PD. In this work, the notions of the bioinclusive ethic served as an inspiration for potential change. Through two independent systematic literature reviews, this thesis has outlined the key insights about the bioinclusive ethic and Collaborative and Participatory Design. These key insights are presented in Table 7. These insights served as the critical base for re-imagining C&PD. This chapter outlines seven notions which might inform a less anthropocentric and more nature-inclusive Collaborative & Participatory Design. It also describes potential limitations of the outcomes and avenues for further research.

5.1. Seven Implications of the Bioinclusive Ethic on Collaborative & Participatory Design

The seven implications of the bioinclusive perspectives on C&PD could be summarised as follows. First, C&PD might outline a nature-inclusive concept of a non-designer which explicitly acknowledges natural entities as potential non-designers. Second, C&PD might envision a nature-inclusive matrix of non-designer participation which can showcase the extent to which not only humans but also natural entities are involved in the process. Third, C&PD might acknowledge the need to include non-humans in goal-setting and decision-making during the design processes which would urge researchers and practitioners to share power with natural entities. Fourth, C&PD might outline nature-inclusive underpinnings for non-designer involvement which acknowledge the participation and potential contributions of non-humans to design processes. Fifth, Participatory Design might outline nature-inclusive core principles which would highlight the need to directly or indirectly involve non-humans in participatory processes. Sixth, Collaborative Design Before Use might place the natural entities and systems at the centre of the processes and ensure that non-humans can affect the goals of

the projects. Seventh, Collaborative Design-in-Use might encourage designers and humans to be more open-minded and accepting of the adjustments and developments made by the non-humans. The next sections present these seven implications in more detail and outlines potential examples of similar thinking already present in design research and practice.

5.1.1. Nature-Inclusive Concepts of Designer and Non-designer

Traditionally, design processes exclusively consider only humans as designers and non-designers. However, the lens of the bioinclusive ethic seems to suggest that design processes might have to explicitly acknowledge natural entities as potential participants of design processes. The current definition outlines that a designer is trained in design. It is challenging to imagine a non-human being specifically trained in design, and, therefore, this thesis does not claim that non-humans might be designers. However, the definition of non-designer does not prescribe any specific skills or training. The lack of pre-requirements makes it easier to envision a non-human as a non-designer. Currently, design field seems to predominantly view living entities as materials or resources. However, through the lens of the bioinclusive ethic, design processes might have to recognise living entities as non-designers due to two reasons. First, living entities might possess certain knowledge, understanding and perspectives that might be vital to the design processes and outcomes. Second, if goals of natural entities should shape human goals and needs, then these natural entities should be involved as participants in the design processes. Therefore, a less human-centric and more nature-inclusive Collaborative and Participatory Design research and practice would recognise non-humans as non-designers, acknowledge their perspectives and grant them with certain decision-making power.

There already seem to be several examples of similar thinking in design research. Thomas, Remy and Bates (2017, Chapter 3) suggest that the definition of a user, which this thesis refers to as a non-designer, should be expanded to include “an object, person, animal, or ecosystem”. Schweikardt (2009) urges designers to recognize humans, living entities and the Earth as indisputable stakeholder of design processes; meanwhile, Forlano (2016) argues for de-centring the human as the only focus of design processes. Some

design researchers and practitioners acknowledge animals (Jönsson, 2014; Westerlaken & Gualeni, 2016) and plants (Aspling, Wang, & Juhlin, 2016) as stakeholders or direct participants of the process. Especially, the field of Animal Computer Interaction strives to view animals as key users and participants of design processes (Driessen, Alfrink, Copier, Lagerweij, & Peer, 2014; Mancini, 2011; Wirman & Jørgensen, 2015). All of these examples seem to recognize non-humans as potential or actual non-designers.

5.1.2. Nature-Inclusive Concept of the Non-designer Participation Spectrum

According to the bioinclusive perspectives, humans and non-humans are equal and both would need to be considered as non-designers. This notion of the ethic suggests that the spectrum of non-designer participation would need to represent participation of not only humans but also of non-humans. Thus, the single spectrum could be split into two spectrums which could be placed perpendicularly to create a matrix. One axis would represent the participation of human non-designers in the processes; the other axis would represent the participation of non-human non-designers in the design processes. Such matrix is drafted in Figure 3. The nature-inclusive matrix would showcase that collaboration with human non-designers, as we know it now, can be further sectioned into six types: (1) collaboration with humans and denigration of non-humans; (2) collaboration with humans and neglect of non-humans; (3) collaboration with humans and inspiration from non-humans; (4) collaboration with humans and investigation of non-humans; (5) collaboration with humans and non-humans; (6) collaboration with humans and support of design by non-humans. The six types of non-human participation hint that design processes could be flexible with involvement of non-humans.

However, the bioinclusive ethic might question to which extent non-humans should be involved in design processes. On the one hand, the bioinclusive perspectives suggest that natural entities might have a peculiar experience of themselves and the world. From this perspective, the natural entities and systems could be viewed as experts of their lives and contexts. These entities can provide invaluable perspectives, interpretations, knowledge and ideas to the design processes; no other stakeholder might be able to provide these perspectives. Thus, the non-human experiences and perspectives might

have to be incorporated into design processes through inspiration, investigation, participation or support of design work by non-designers. On the other hand, the spectrum of participation seems to demonstrate to which extent non-designers can affect and have control over the design process and outcomes. The bioinclusive ethic suggests that natural entities and systems should be able to shape goals, desires and needs of humans through direct interactions between humans and non-humans. However, this notion does not clarify whether the direct encounters should happen between only one, several, many or all humans and the living entities. Therefore, it might be possible for natural entities to be represented by certain humans in design processes. Thus, natural entities could be represented by only one or several humans, could be involved as direct participants or could be supported by human designers. Therefore, a less human-centric and more nature-inclusive

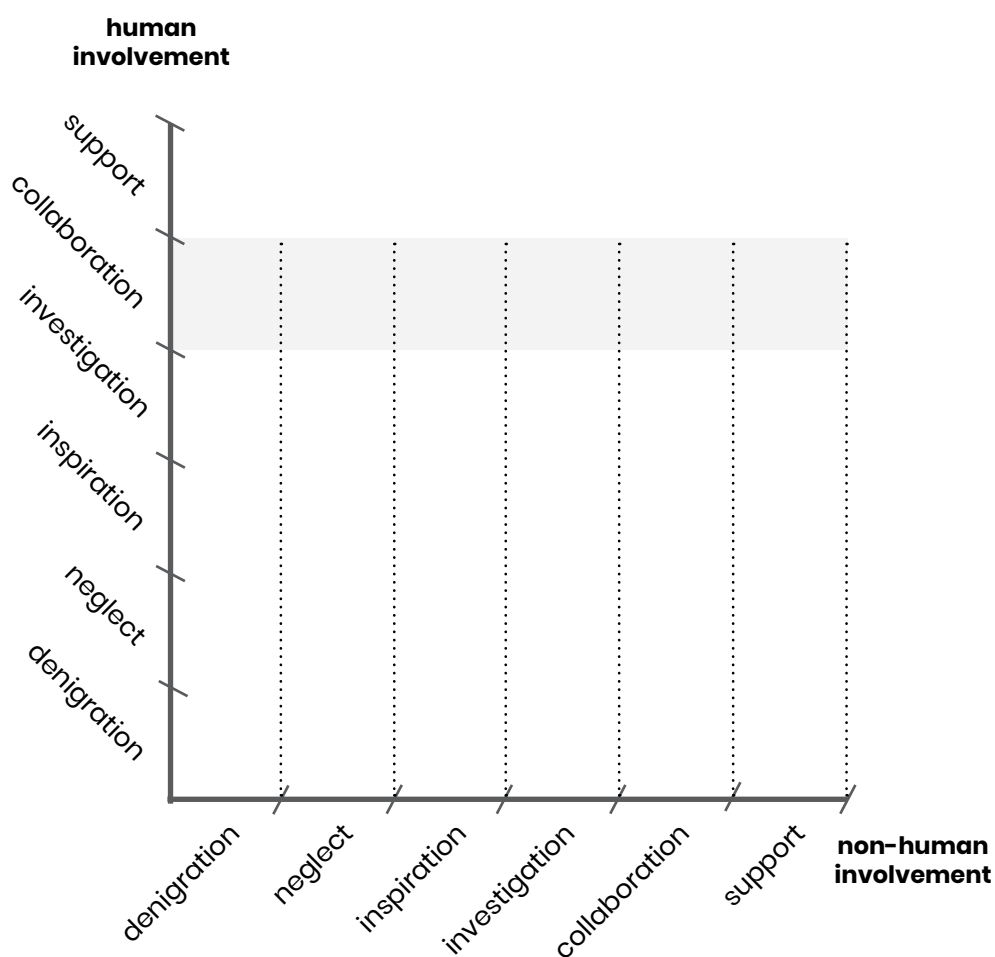


Figure 3. Matrix of Human and Non-human Non-designer Participation in Design Processes

Collaborative and Participatory Design research and practice might strive to collaborate with humans and involve non-human non-designers through investigation of, collaboration with or support of these non-designers.

Some members of the design community have already questioned extent to which non-humans should be involved in design processes. Some project seem to recognize non-humans as non-designer and choose to investigate them in their natural habitat rather than involve them as direct participants of the processes (e.g. see Avila, 2017; Bos, Koerkamp, Gosselink, & Bokma, 2009; Isokawa et al., 2016; “More-than-Human Participatory Research,” n.d.; Wirman & Jørgensen, 2015; Zeagler et al., 2016). Meanwhile, other projects (e.g. see Jørgensen & Wirman, 2016; Mankoff, Dey, Mankoff, & Mankoff, 2005; Westerlaken & Gualeni, 2014, 2016) have strived to involve non-humans, more specifically mammals, as direct participants and co-creators of design processes. Meanwhile, Westerlaken and Gualeni (2016) and Ritvo and Allison (2014) recognize that non-humans might never be equal participants of design processes but highlight that they still should be involved in design processes in some ways. These considerations directly tie into the extent to which non-humans could be included in design processes.

5.1.3. Nature-Inclusive Goal-Setting and Decision-Making

The bioinclusive ethic, as described in Implications 1 and 2, seems to suggest that Collaborative and Participatory Design should involve non-humans as participants of design processes. Moreover, the ethic suggests that non-humans should have a direct impact on the goals of humans. This notion might question the goal-setting and decision-making principles within C&PD. Traditionally, the goals can be set by designers and non-designers. From the bioinclusive perspective, the goals of the process might be shaped either by the designer, the human non-designers, the non-human non-designers; by two types of these participants or by all three of the types collectively. Moreover, the bioinclusive might question the extent of decision making power that non-humans should or could have. The bioinclusive perspectives suggest that humans should allow nature to shape their goals. This perspective might suggest that non-human non-designers should have a large impact on the processes and might need to have enough decision-making power. In

this case, the designer and human participants might have to be very open to the perspectives of non-humans and open-minded enough to consider their perspectives and decisions as valid and important. Thus, a less human-centric and more nature-inclusive Collaborative and Participatory Design research and practice could grant decision-making and goal setting power to the non-human non-designers.

There seem to be some considerations within the sub-field of Animal Computer Interaction (ACI) on whether the non-humans get to set goals or make decisions during design processes. Grillaert and Camenzind (2016), for example, have questioned whether dogs in ACI project actually are able to set goals of the project or whether they are coerced into taking part in achieving goals outlined by humans. Ritvo and Allison (2014) have questioned whether animal participants of design processes can genuinely give consent to participate or to leave the process at any point. Westerlaken and Gualeni (2016) have accentuated that, even if animals are participants of design processes, only the humans have decision-making power. Moreover, in their project, they have strived to acknowledge and respect a desire of one potential dog participant not to partake in the activities (Westerlaken & Gualeni, 2016). Jørgensen and Wirman (2016) have also focused on acknowledging and respecting potential desires and decisions of the orangutan participants. These projects have been questioning the ways in which goals are set and decisions are made within nature-inclusive design processes.

5.1.4. Nature-Inclusive Underpinnings for Non-designer Participation

The bioinclusive perspectives might have an impact on the underpinnings for non-designer participation in design processes.

- A more nature-inclusive political underpinning might state that both humans and non-humans should be able to participate in and affect decision-making about their joint future.
- A more nature-inclusive pragmatic underpinning might suggest that the participation of both human and non-

human non-designers might enable designers to develop solutions that better satisfy the needs of all stakeholders and the natural systems. This underpinning might also be called the sustainability underpinnings, as better designs in this context, might allow humans to align their goals and systems to the natural systems and reach sustainability.

- A more nature-inclusive innovativeness underpinning might suggest that participation of both human and non-human non-designers might increase the number and innovativeness of ideas, concepts and solutions because non-humans can provide perspectives, ideas and solutions that are novel and unimaginable for humans.
- A more nature-inclusive commercial underpinning might suggest that participation of human and non-human non-designers could strengthen the brand of the company as sustainable and nature-inclusive. Moreover, it might indicate that nature-inclusive design processes and outcomes create a new market niche and commercial opportunities.

Therefore, a less human-centric and more nature-inclusive Collaborative and Participatory Design research and practice might have to explicitly represent non-human non-designers in the core underpinnings of the field.

The existing examples that question underpinnings for non-human involvement in design predominantly represent non-humans in the pragmatic underpinning of reaching sustainability. Thomas et al. (2017) and Schweikardt (2009) suggests that participation of non-humans in design processes might address the sustainability crisis. The field of Animal Computer Interaction also recognises that “designing with other species” has a potential to create a more sustainable society (Mancini, 2013, p. 2235). These considerations relate to the pragmatic underpinning; however, there seem to be no explicit considerations about the political, innovativeness or commercial underpinnings.

5.1.5. Nature-Inclusive Participatory Design

The bioinclusive ethic appears to suggest that non-humans are equal to humans and should have a direct impact on the goals of humans. These notions suggest that Participatory Design might need to involve non-humans into the design processes to give these currently underrepresented, less powerful stakeholders a voice and decision-making power. Moreover, the bioinclusive perspective suggests that the core principles of PD might need to evolve. The new core principles might be as follows:

1. designing with real humans and natural entities for real humans and natural entities;
2. ‘genuine’, active participation of humans and non-humans in design processes and sufficient resources and decision-making power for both types of participants;
3. mutual learning among all human and non-human participants;
4. use of appropriate, action-based tools and methods through which human and non-human participants can express and understand each other’s perspectives, needs, desires and challenges;
5. equal commitment to understanding practices of humans and non-humans.

These five nature-inclusive principles for Participatory Design highlight the equality of humans and non-humans.

In theory or as speculation, Participatory Design with these nature-inclusive core principles can be envisioned. However, the nature-inclusive PD might be challenging to implement in practice because of the fundamental differences between humans and non-humans. Non-humans are likely to experience themselves, the others and the world in very particular, peculiar ways. These ways might be unimaginable for humans, yet the non-humans might not be able to share their perspectives in a way that is understandable for other participants. Challenges in communication between humans and non-humans and among several non-humans pose substantial challenges for nature-

inclusive PD. Each type of participant might be speaking a “language” that no one else understands. Thus, it might be impossible for designers to invite participants to the process and explain the reasons, goals or methods of the design process. Nevertheless, it might be possible to initiate more nature-inclusive participatory processes.

The challenges of communication within nature-inclusive PD seem to correlate to the extent to which designers should aim to involve non-humans. The non-humans might be involved through investigation, collaboration or support of their work by the designers. It might be easier to imagine involvement of non-humans in PD processes if non-humans are investigated and then humans represent their perspectives during the design process. This approach might require an extensive participation of experts on nature, species and natural systems. This approach might not include direct involvement of non-humans in the design processes; nevertheless, it might be less human-centric and more nature-inclusive. Thus, a less human-centric and more nature-inclusive Participatory Design could explicitly include considerations of non-humans in its core principles and develop methods to directly or indirectly involve the non-human stakeholders in the design processes.

Several existing projects seem to aim at establishing more nature-inclusive Participatory Design processes. Frawley and Dyson (2014) state that their project strives to develop participatory design processes with birds, yet they recognise that in their work non-humans are represented by humans. Mankoff et al. (2005) and Westerlaken and Gualeni (2016) have tried to establish Participatory Design projects with dogs; meanwhile, Jørgensen & Wirman (2016) aimed to develop such processes with orangutans. Several of these projects acknowledge communication challenges between humans and non-humans as the critical challenge for a more nature-inclusive PD (Jørgensen & Wirman, 2016; Mankoff et al., 2005; Westerlaken & Gualeni, 2016). Two of the projects have tried to overcome these challenges through play as the mode of communication and direct engagement (Jørgensen & Wirman, 2016; Westerlaken & Gualeni, 2016). Thus, PD has already taken the first steps in acknowledging non-humans as legitimate participants of participatory processes.

5.1.6. Nature-Inclusive Collaborative Design Before Use

The bioinclusive ethic suggests that human goals, needs and desires should be shaped by the natural entities and systems. From this perspective, Collaborative Design Before Use might strive to place nature at the centre of the design processes; thus, the satisfaction of the needs of natural systems and entities would be the central premise of Collaborative Design Before Use. The group of approaches would strive to develop solutions that better satisfy needs of natural systems, entities and all living beings. However, the ways in which project and initiatives might attempt to design these solutions might remain as flexible as the traditional approaches of Collaborative Design Before Use. Various projects and initiatives might involve non-humans only in one phase or throughout the project. They might also allow non-humans to make decisions for themselves or just provide perspectives and comments for the designers to work with. However, non-human non-designers might have to be involved in the goal-setting phase of a design process and might have to have enough decision-making power to ensure that the set goals are aligned with the overall goals of natural systems. Thus, a less human-centric and more nature-inclusive Collaborative Design Before User would place the goals of natural entities and systems at the centre of the design process and ensure that nature can set or influence the goals of the project.

There seem to be existing examples of designers seemingly placing the needs of the natural entities at the centre of design processes. Initially, Resner (2001) and now also the field of Animal Computer Interaction claim that their projects strive to place the animals at the centre of the processes (Mancini, 2011, 2013). However, some researchers (e.g. see Grillaert & Camenzind, 2016) question whether the needs of animals or desires of humans are indeed at the centre of ACI processes. Moreover, several projects (Cheok et al., 2011; Lee et al., 2006; Mancini, Harris, Aengenheister, & Guest, 2015; Westerlaken & Gualeni, 2014) strive to involve non-humans, predominantly animals, as co-designers at different stages of the design process. However, it seems that animals had no impact on the goals of the design processes.

5.1.7. Nature-Inclusive Collaborative Design-in-Use

The bioinclusive perspectives suggest that natural entities can be non-designers. Thus, the Collaborative Design in Use might have to enable not only humans but also non-humans to re-shape, adjust and further develop solutions that have been implemented in the real world. On the one hand, this might seem like a challenging aspiration. Collaborative Design in Use typically strives to enable and encourage users to adjust the technology, yet it might be impossible for a designer to explicitly allow or inspire a natural entity to adjust a solution. On the other hand, natural entities might already be directly or indirectly shaping all solutions that humans have implemented in the real world. For example, natural entities extensively strive to reshape solutions of landscape architecture; meanwhile, dogs tend to chew up toys or rearrange their beds. In such instances, the perceptions of the human about what the natural entity has done to the design might play a key role: has the entity damaged the human design or has it adjusted the design to satisfy their needs better. Designers might have to be very open-minded and willing to give up their power to view adjustments to the design as an instance of design-in-use by non-humans. If the designers and human non-designers can embrace that solutions have been improved by a natural entity, then they might be embracing a more equal power dynamic between humans and non-humans. Therefore, a less human-centric and more nature-inclusive Collaborative Design in Use might allow and welcome adjustments to solutions which have been made by natural entities or systems.

There seem to be at least two examples of similar thinking within design research. Wirman and Jørgensen (2015) have deployed prototypes of solutions into the real habitat of captive orangutans to study behaviours, reactions and adjustments made by the animals over an extended period of time. The More-than-Human Lab has also developed a long-term, open-ended process in which they study interrelations of natural entities, humans and human-made solutions through ethnography and creative research (“More-Than-Human Lab,” n.d.). These two projects have strived to suspend human judgement about the actions of non-humans.

5.2. Limitations

The seven implications for a less human-centric and more nature-inclusive Collaborative and Participatory Design might have been affected by three types of constraints. The first type of limitations relates to the selection of the foci for the literature reviews. First, the researcher selected the bioinclusive ethic as the environmental ethic for the project. This ethic has been outlined by one philosopher in a few works; moreover, there seem to be no interpretations of and further elaborations on the ethic by other authors. Thus, the ethic appears to provide perspectives of only one person and barely outlines similarities to or differences from other ethical frameworks. Selection of another environmental ethic as the focus of the literature review might have provided another, potentially more detailed perspective of nature-inclusive concepts. Second, the author decided to conduct a literature review that aimed to define Collaborative and Participatory Design and the key approaches within the sub-field. This literature review uncovered definitions and, predominantly, theoretical considerations about the sub-field and the approaches. Meanwhile, the study left out various aspects about the field, such as the practical methods and tools, areas of application, appropriation of the field by various disciplines and discussions on ethics and politics of the field. Another focus of the literature review on C&PD would have provided another set of insights and would have led to induction of different implications.

The second type of limitations relates to the methodology used in the project. First, the project was extensively affected by the short timeframe available for conducting the research. The author had to realise the project within a seven-month timeframe; the limited time affected the number of sources included in the reviews. Moreover, it affected the extent and depth of the considerations about the implications of the nature-inclusive perspectives on C&PD. Second, the author predominantly based selection of sources for the literature reviews on her personal judgement and might have excluded essential sources and views from the study. Third, the researcher deliberately decided not to purchase or order sources that were unavailable through the library service. These purchases and orders would have clashed with the time and budget restraints of the project. Thus, some, potentially crucial, resources might have been left out of the reviews. The inclusion of these sources might have shifted the outcomes of the project. Exclusion of sources in these three ways affected the findings of the literature reviews and the project

overall. Additionally, the author used a self-developed method to analyse the key insights from C&PD through the lens of the bioinclusive ethic. If the researcher had used an established analysis method, the outcomes of the project might have been different.

The third type of limitations relates to the profile of the researcher. First, the research project was conducted by a novice, Master's level researcher with no previous experience in academic research. The lack of experience might have affected the goals, methods and outcomes of the project; if conducted by an experienced researcher, the findings of the project might have been different. Second, the author is largely unfamiliar with concepts, ideas and terminology of philosophy, ethics and, in particular, environmental ethics. The level of knowledge about these fields affected the ways in which the author interacted with and interpreted the sources on the bioinclusive ethic. The outcomes of the review on the bioinclusive ethic and, consequently, the results of the research project would have been different if it was conducted by a researcher more familiar with philosophy and ethics.

5.3. Avenues for Further Research

The outcome of this thesis and its limitations suggest three avenues for further research. First, not only the bioinclusive ethic but also other environmental ethics and nature-inclusive perspectives could be considered when further envisioning and developing routes through which C&PD might be a less human-centric and more nature-inclusive field. Second, future studies might investigate not only implications for the definitions of the sub-field and groups of approaches of C&PD but also the potential implications for concrete tools, methods and projects. Third, future research on the topic could also extend the application of nature-inclusive perspectives from the C&PD to the whole field of design. The initial limitations presented in this thesis should be continuously re-evaluated and re-considered as additional insights may arise.

6. CONCLUSION

This thesis aimed to explore how Collaborative and Participatory Design could be reimagined as a less human-centric practice. It selected one environmental ethic, the bioinclusive ethic, as a less anthropocentric and more nature-inclusive source of inspiration. To envision potential implications of the nature-inclusive perspective, the author conducted two systematic literature reviews. The first review focused on building an understanding of the bioinclusive ethical framework. The second review strived to create a broad understanding of Collaborative and Participatory Design and its approaches. The study on C&PD also included a brief review of existing examples of nature-inclusive C&PD processes.

The first literature review established that the bioinclusive ethic is an environmental ethic that assigns equal moral standing to humans and other natural entities. An environmental philosopher Freya Mathews outlined this ethic. The literature available on the ethic is very limited; nevertheless, the previous works of Mathews expand the three notions underlying the bioinclusive ethic. First, the ethic proposes a non-dualistic perception of nature that considers humans as part of an equal to nature. Second, the ethic urges humans view nature in a post-materialistic manner which suggests that natural entities are not sole materials but have self-meaning and experience the world around them in particular ways. Third, it urges humans to establish a synergetic relationship with nature; in such relationship, the natural entities would be able to impact the goals of humans through direct contact. These three notions served as the critical perspectives through which the author reimagined C&PD.

Collaborative and Participatory Design is a sub-field of design discipline that strives to involve humans as direct participants and decision makers in design processes. C&PD processes, similarly to all design processes, can encompass two types of participants: designers and non-designer. Traditionally, all participants of these processes are humans. C&PD as a discipline correlates to the collaboration with non-designers section of the non-designer participation spectrum. The full spectrum includes denigration of, neglect of, inspiration from, investigation of, collaboration with and support of non-designers. In C&PD, the non-designers are given goal-setting and decision-

making power. However, each process can vary in regard to the types of participants and ways to make such decisions. Moreover, each process can be rooted in the four underpinnings of non-designer participation in design: the political, pragmatic, innovativeness or commercial underpinnings. Each approach can be driven by either one or several underpinnings. This thesis arranged the approaches within C&PD according to the underpinnings and the time during which participation of non-designers takes place.

The custom framework developed by this research categorises three key groups of C&PD approaches: Participatory Design, Collaborative Design Before Use and Collaborative Design-in-Use. Approaches in the Participatory Design group stem from the political underpinning of C&PD and strive to democratise design processes. To achieve this objective, PD approaches involve and provide decision-making power to underrepresented, less powerful stakeholders. Direct and genuine participation of various stakeholders, designing with real people, mutual learning of all participants and use of action based tools are the core principles of Participatory Design. Meanwhile, approaches in the Collaborative Design Before Use group focus on the pragmatic underpinning to design better solutions and involve non-designers. These approaches borrow relevant tools from other design disciplines and can be very flexible to the extent of non-designer participation. Nevertheless, these approaches always involve the non-designers during the design time while the solution is still being developed. In contrast, the Collaborative Design-in-Use approaches involve non-designers once the solutions have already been implemented in the real context. These approaches strive to build opportunities and tools for non-designers to adjust the solutions in a way that would better suit their needs or the evolving context. These three groups of approaches and the four notions about C&PD outlined above served as a base for imagining a less human-centric and more nature-inclusive Collaborative and Participatory Design.

The perspectives of the bioinclusive ethic suggested potential changes for Collaborative and Participatory Design to evolve into a less anthropocentric sub-field of design. Collaborative and Participatory Design might need to explicitly acknowledge both humans and natural entities as potential non-designers. It might have to outline a nature-inclusive matrix of non-designer participation; this matrix would showcase the level of human and non-human participation. The humans involved in C&PD projects might have to

share their power for making decisions and setting goals with the involved non-humans. Meanwhile, the four underpinnings of C&PD processes might have to evolve to acknowledge participation of non-humans and the potential benefits of their involvement. Correspondingly, the approaches within C&PD might have to evolve as well. Approaches within the Participatory Design group might need to highlight the needs of direct or indirect involvement of non-humans in their processes; these approaches might also need to elaborate on particular ways to involve or represent natural entities in their processes. Approaches within the Collaborative Design Before Use group might need to explicitly place the natural entities and systems at the centre of the processes and adjust the goals of the processes according to the input of the natural entities. Finally, the approaches within Collaborative Design-in-Use category might need to build an open-minded and accepting attitude towards adjustments and further developments made by the non-humans. All seven of these suggestions already seem to have precedents within Collaborative and Participatory Design. C&PD as a discipline might already be taking the first steps towards a less anthropocentric design research and practice.

The first projects and publications on more nature-inclusive Collaborative and Participatory Design set initial grounds for a less anthropocentric value base of the design field. This thesis strived to develop a more systematic and broad understanding of potential changes needed to establish such value base. This initial understanding was built upon a single environmental ethic outlined and discussed by one author. Other environmental ethics and non-anthropocentric worldviews and belief systems could provide an even broader and deeper insight into possibilities for a less human-centric and more nature-inclusive, nature-centric design research and practice. Such value base for design might transform not only design processes and developed solutions but also those who will be using and interacting with these processes and solutions. Eventually, the non-anthropocentric values of design and the society might transform thoughts and actions of humans. New types of behaviours could decrease or eliminate the negative impact of humanity on the natural systems and help the society to achieve sustainability.

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