Participatory Design and Sustainability–a literature review of PDC Proceedings

Giacomo Poderi
IT University of Copenhagen
Copenhagen, Denmark
gipo@itu.dk

Yvonne Dittrich
IT University of Copenhagen
Copenhagen, Denmark
ydi@itu.dk

ABSTRACT

This exploratory paper examines the relationship between Participatory Design (PD) and Sustainability as it emerges from the Participatory Design Conference (PDC). The reinvigorated political agenda of PD, together with the enlargements of its application domains and scopes of interest, calls for reinvigorating the early concerns of the field for long-term, durable, and positive change. The objective of this paper is to explore what "sustainability" means in and for the field. The study is based on a literature review of the PDC Proceedings and it provides both an outline of the structural aspects of the literature and a mapping of three use patterns of the concept: *PD for Sustainability*; *Sustainability of PD Practice*; and *Sustainability of PD Results*. Based on our interpretation of these patterns we also provide a general definition of sustainability. We believe the findings of this paper can support PD scholars in conceptualizing sustainability and to position their works in relation to it.

CCS CONCEPTS

• **Human-centered computing → Participatory design**;

KEYWORDS

Sustainability, literature review, PDC proceedings

1 INTRODUCTION

Since more than a decade, Participatory Design (PD) enlarged and diversified its main focus of interests to encompass contexts that go beyond, for instance, IT design for work practices, and that cover aspects, such as commons, living labs and publics, only to name a few [2, 27, 28]. This results in farther reaching implications for both the people involved in processes of socio-technical change and their contexts; and it brings back to the forefront the concern

for long-term, durable, and positive change that characterized PD since its early years.

The durability of PD projects outcomes has always been considered an important challenge to be addressed for the diffusion of PD field itself. Indeed, the lack to achieve such durability is a major barrier for having concrete influence on society, beyond the sphere of a research and experimental practice [11, 32]. Various scholars engaged with the tangled theoretical, ethical and practical relationship between PD and long-term implications or durability of interventions. For instance, for Bødker [3] the value of a PD intervention is primarily about empowering participants and their contexts, so that such empowerment will be meaningful also after the PD project ends. Similarly, Kensing and colleagues [25] held sustainability a grounding principle to allow IT systems to integrate more seamlessly into existing work practices. Others emphasized the relevance and challenges to explore PD practices in contexts that are not (any more) defined by a researcher, and to look at these challenges also from a perspective of sustainability [15]. However, for far too long, the topic of sustainability has been subsumed under the one of mutual learning. As a consequence, the challenges linked to sustainability were considered resolved therein [24]. Only recently PD scholars started devoting specific attention to the topic, and the field witnessed an increasing number of articles dealing with it.

Considering the emergence of a specific interest on sustainability as a means to revamp a founding concern in PD, this exploratory paper aims to provide an initial mapping of how sustainability is conceptually understood and treated by scholars in this field. The following general questions guided the work: *what do PD scholars mean or refer to when talking about sustainability (or being sustainable)? How does their focus on sustainability relate to their lines of inquiry or intervention?* Since PD comprises a variety of principles and practices that are adopted for different specific objectives, across a wide spectrum of possible application domains [33], we wanted the meaning(s) of "sustainability" to emerge from its actual use in research, rather than, for instance, evaluating how sustainability is practiced or achieved, based on a preconceived definitions of what "sustainability" is or should be[1]. Following these objectives, we grounded our work on the literature review of the most prestigious, oldest, and highly-ranked conference of the field, namely the biennial Participatory Design Conference (PDC).

This paper is structured as follows. In the next section, we clarify the methodology we adopted for the literature review and summarize the main outcomes of the search. In Section 3, we outline

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[1]As a clarification, it is not intention of this work to say anything about the quality of the published works that have been reviewed, but it is rather an attempt to describe the different ways of using the concept.

Table 1: Distribution of publications by type and year

	2002	2010	2012	2014	2016	TOT
Full	[8]	[5, 21]	[12]			4
Short		[26]	[13, 17]	[7, 18, 19, 23, 30, 34]	[1, 9, 20]	12
Other		[29]		[4, 14]	[16, 22]	5
TOT	1	4	3	8	5	21

the descriptive results of the review, which considered some of the logical and structural aspects of the articles. Section 4 presents the three main clusters that we identified from the literature - *PD for Sustainability*; *Sustainability of PD Practice*; and *Sustainability of PD Results*. In the last section, we highlight the crosscutting aspects among these areas and provide a general definition of sustainability.

2 METHODOLOGY

In this section, we present our research methodology and material. With the research question, which we presented above, in mind, we ran a literature search through *Scopus*. We focused on the "ACM International Conference Proceeding" series, and limited the search to the PDC Proceedings. As the search string, we used "sustain*" in order to cover also relevant publications that used various conjugations of the term, such as sustainable, sustained, and sustaining. We searched in any of the *Title*, *Abstract*, and *Keywords* fields. In addition, we complemented this search with a manual scanning of pdcproceedings.org to cover those conference editions which were not indexed by *Scopus* under the ACM series.

The search returned 21 items, out of the 693 publications of various type that build up the corpus of PDC's 14 editions. All the items that we found, except one, belong to the four latest editions of the conference: 2002 (1), 2010 (4), 2012 (3), 2014 (8), 2016 (5). As shown in Table 1, the set includes full research papers (4), short exploratory papers (12), and other types of submission (5), *i.e.* workshops, exhibitions, and posters. We included all items in the analysis.

Initially, the first author skimmed through the papers and built a simple spreadsheet, which was shared between the two authors. The following questions were used to identify relevant information in each article and to populate the spreadsheet: how does sustainability link to the paper objectives? How is "sustainability" defined? What is the specific target of sustainability, in the paper? This first step was useful to obtain the initial descriptive findings that we present in the next section, and to guide a more detailed reading of the papers. In the following step, we reviewed and discussed the elements of the spreadsheet in an iterative and inductive manner. The purpose was to find commonalities or points of convergence among papers. The result of this process is the grouping we describe in Section 4.

In the next section, we summarize the initial 'descriptive' findings, which concerned the logical and structural aspects of the articles, as they emerged from the three aforementioned questions.

3 LITERATURE SEARCH RESULTS

3.1 Sustainability and PD objectives

Half of the papers relate to the concept of sustainability as a central aspect of their objectives. That is to say that they explicitly bring "sustainability" in the formulation of the papers' objectives. Such as in the following example.

> *Objectives of the paper are: i) to clarify how Participatory Design could support the sustainability and effectiveness of an alternative, ii) to present an experimentation with renewable energy as CPR as an alternative model to the actual vision of the energy system. [9]*

The other half of the papers sample is more varied and is split between papers where sustainability is a contextual trait of the objectives or papers where it is either irrelevant or impossible to judge it. This was mainly due to the lack of explicit objectives in the papers. However, at a general level, it is possible to notice that "sustainability", in relation to the paper objectives, is treated in the majority of cases as a desired outcome. In other cases, it is treated as a contextual domain, a challenge to be solved, or an inherent characteristic of the method or tools used.

3.2 Defining "sustainability"

Quite surprisingly, the concept of sustainability is treated by PD scholars as given for granted or unquestioned. Only one paper includes a definition of the concept – understood as an explicit explanation, supported by references – which is used to place the paper's contribution in the specific area of sustainable design:

> *Blevis' (2007, p. 503) definition frames sustainable design as an act of choosing among or informing choices of future ways of being. Many sustainable design projects aim to realise future ways of being through generative participation. [23]*

Eight papers provided one or more references (evenly distributed between PD and sustainability sciences fields), but did not clarify the concept in the paper. The 12 remaining articles did neither define the concept nor referenced supporting literature. They used an implicit understanding of the concept in line with 'the ability to continue or be continued for a long time'[2]. In short, the intentional, connotative definition of the concept, which specifies the necessary and sufficient conditions of realizing sustainability, is never addressed.

3.3 The objects of sustainability

In the reviewed papers, the most diverse entities are targeted or associated with "sustainability": from IT systems to communities, from social innovation to participation, from energy use to e-health, from design to product development, from human living to global environmental challenges. No clear prevalent object emerged as catalyst of the concern on sustainability.

As mentioned in the previous section, by taking stock of these first findings, we grouped the articles under the following three broad areas: PD for Sustainability (PD4S); Sustainability of PD Practice (SPDP); Sustainability of PD Results (SPDR). As shown in

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[2]Common definition taken from the *Oxford Dictionary*: https://www.oxfordlearnersdictionaries.com/

PD4S	[7, 9, 12–14, 16, 23]
SPDP	[1, 4, 5, 8, 17, 20, 21, 34]
SPDR	[4, 9, 18–20, 22, 23, 26, 29, 30, 34]

Table 2, the areas are not mutually exclusive and one article can be found in more than one. For instance,[9] is placed both in PD4S and SPDR: despite being clearly positioned within the problem areas of sustainability sciences (*i.e.* energy efficiency/behavior), its core contribution rests on the implications for the long-term sustainability of the community process, which derives from the use of a PD approach to enable the process itself.

In the next section, we will discuss these three groups in more depth, referring to additional research where suitable.

4 EMERGING USE PATTERNS FOR "SUSTAINABILITY"

4.1 PD for Sustainability

Seven articles fall in this area. In these, PD scholars focus and reflect on how PD can contribute to the areas or topics that are defined by the various fields of sustainability sciences, broadly understood[3] [10, 31]. Rather than reflecting on the theories, methods or challenges of PD itself, the literature clustered here targets the diverse range of disciplines that are usually addressed as sustainability sciences – from sustainable development and sustainable design, to sustainable living, from environmental science and energy sustainability to sustainable transports – and it uses PD as a method or approach to tackle specific challenges of those fields.

The common thread linking PD as contributor to these fields rests on the core nature of the problems tackled by sustainability sciences. These are deeply characterized by the need to reconfigure, realign and renegotiate diverging and heterogeneous interests in many application domains and at several levels of scale. PD is perceived as well-equipped with a suitable set of techniques, methodologies and approaches to address such problems. For instance, Buhmann lays out different possible areas where PD can contribute to transnational rule-making for global sustainability [7]. Here, there is both a need for increasing trust in the process and for improving the legitimacy of rule-making outputs. The principles and approaches of PD can help to foster more transparent and inclusive IT tools. On another level, technologies for energy sustainability lack a proper balance between the theory driven approaches, which often support and drive persuasive technologies, and more nuanced understanding of people situated needs and habits. Davis suggests PD as a means to create more ethical and acceptable persuasive technologies and investigates possible methods [12].

Furthermore, Huybrechts and colleagues show that PD can also contribute with concrete methodologies to sustainable design [23].

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[3]None of these works positions itself under the label of sustainability sciences. However, they all explicitly refer to main (sub)fields or emerging problem areas that can be easily found in sustainability sciences literature.

Here, the issue of generativity is addressed through the "make-and-tell" method that is grounded on PD method.

Finally, it is also worth noticing that in a typical PD fashion, the strength and challenges of PD contributing to sustainability sciences were addressed through workshops. They engaged different scholars and practitioners to come together and address design challenges *e.g.* around the topic of sustainable urban planning [16] and PD and ICT for Development [14].

4.2 Sustainability of PD Practice

This area covers eight papers that focus on the reasons and approaches for addressing the sustainability of PD practice. We refer here to PD practice as the set of methods, theoretical underpinnings and approaches that are actively and intentionally adopted in concrete, situated contexts.

The rationale behind these papers' interests has mainly a pragmatic connotation. Indeed, a PD intervention that has a prolonged, committed participation of all actors (designers included) throughout its duration can provide more valuable results. For instance, in their retrospective analysis of the impact of a past PD project on a group of participants, Bossen and colleagues understood participants' frustration coming from the conclusion of such project. As participants are crucial to PD, there is both the practical stake of avoiding to disappoint them, and the ethical challenge about satisfying participants' expectations to be met [5]. The pragmatic value of sustaining PD practice during and after the time frame of PD projects is reiterated in [21] and [17], respectively. In the former, Hertzum and Simonsen propose a method for IT development to improve the sustainability of the process, and thus solving the challenge of ensuring valuable end-users feedback in all stages of IT design and development. The method vouches for a more efficient participatory process by shifting the focus of attention from system specifications to the effects to be achieved by users through system adoption. Ultimately, this also makes the system development process able to encompass design-in-use. This latter characteristic is also relevant in other contexts. For instance, when aiming at sustaining PD practice in difficult cases of urban design, where participation of marginalized groups is challenging, yet needed. In [1], an infrastructuring process promoting appropriation through design-in-use of public spaces is suggested as an approach to make PD interventions more durable even in these difficult contexts.

However, there are also articles that reflect on the theoretical or conceptual aspects that characterize the relationship between sustainability and PD practice. On one hand Bossen and colleagues engaged PD scholars in a workshop for reflecting on the links existing among evaluation, sustainability and long-term impacts and their value for PD. The workshop was driven by the intent to consolidate awareness and engagement in the community about fundamental aspects of the practice [4]. At another level, Haskel and Graham provide their perspective on the sustainability of PD practice by building on their experience with the study of Free and Open Source Software (FOSS). By focusing on the concept of infrastructuring they stress how the traits of extensibility, tailorability, and maintainability, which are typical of FOSS, well fit current approaches in PD and how synergies among these could greatly improve the sustainability of PD practice [20].

4.3 Sustainability of PD Results

This area includes eleven publications that have sustainability as a fundamental trait of PD intervention outcomes. As a clarification, we point out that here we found a similar rich diversity about what counts as a PD result that is described in [6]. Indeed, granted that all articles here are concerned with the achievement of long-lasting impacts or durable outcomes through PD, they work to obtain as different outcomes as the formation of new consortia and communities [18, 19] or the strengthening of existing ones [9, 30], the development of complex IT [29] and the consolidation of participatorily developed processes or practices[4] [22, 26].

More than in the previous two areas, here it is possible to identify a set of recurring themes that cross-cut most of the articles: sense of ownership, mutual learning, and the emergence of skills or expertise are all considered interrelated, practical implications of the use of PD that are useful to achieve a sustainable outcome. In short, by means of involvement in the actual making of, for instance, organizational change or IT design, people develop a sense of attachment, commitment and empathy – *sense of ownership* – towards the success and consolidation of their endeavors. Similarly, *mutual learning* emerges when actors are encouraged to bring their perspectives, needs, and expectations into the participatory process and confront them with the ones raised by other stakeholders. The same process can also facilitate the *emergence of skills and expertise.* Indeed, by opening up spaces for realignment of responsibilities, activities and new objectives, participants tend to put into use a series of skills or expertise that are often neglected in their daily context or work. All these aspects, resulting from the adoption of PD approaches, contribute to the creation of a more sustainable outcome.

Finally, several papers refer to infrastructuring, design-in-use and end-users development as conceptual frame to improve the sustainability of the outcome by means of PD.

5 DISCUSSION AND CONCLUSIONS

Relevant aspects have emerged from this exploratory work, which set out to provide a preliminary inquiry of the relationship between PD and sustainability, broadly understood.

At a general level, although PD scholars address the topic with the whole range of PDC publication types, from full research papers to workshop proposals, the theme is treated mainly at the level of exploratory research; and, as it emerged from the review, the topic has a role that is central for the paper objectives only for half of the articles, while it is contextual for most of the remaining ones. Furthermore, the pervasive lack of a concrete, explicit, and operational connotation of what "sustainability" means is a relevant finding of this paper.

We did not expect PD scholars to define the boundaries of such a complex and multi-faceted concept, whose meaning and definition are also debated within the boundaries of sustainability sciences. However, we consider beneficial and valuable that those who engage with the topic do lay out their explicit definition and interpretation of sustainability. This would make easier, for instance, to position the relationship of the topic with the various principles, approaches and methods in PD; to perform retrospective analyses

of PD interventions that target sustainability; or to compare different interpretations of the concept that can emerge among the many application domains of PD.

At a substantial level, three distinct, yet potentially overlapping, use patterns of the concept seem to emerge. These may be indicative of emerging areas of interest for PD scholars: (1) PD as the method or approach, which can be used to meet the challenges set forward by other fields (PD4S); (2) the second area is characterized by the concern of making the work-in-practice of participatory designers more sustainable (SPDP); and (3) the last group is concerned with the achievement of sustainable outcomes that can be obtained thanks to PD (SPDR).

Finally, at a conceptual level, a few constructs stood out more than others. *Infrastructuring*, understood as the process of aligning of social, technical, cultural elements for a given purpose, is used in several articles to conceptualize both the sustainability of PD practice and PD outcomes. Similarly, *design-in-use* and *EUD* conceptualize the means to empower people to evolve parts of their technical infrastructure by means of tailoring and customization and to nurture their sense of ownership towards such infrastructure. Taken together, these concepts allow us to square the circle and to abstract our reading of the literature review results further: infrastructuring the conditions for design-in-use and/or of end-users development can foster sense of ownership, mutual learning and the emergence of latent skills and, therefore, support sustainability. Therefore, we propose to define sustainability as the durability of alignments among the social and technical dimensions of PD processes, or PD outcomes, independently from and/or after the involvement and active intervention of an external participatory designer or researcher. As such, this broad definition can ideally support PD in any of the three identified areas.

Given the scope of this exploratory paper, it is important to highlight some of its limitations. First, the results presented here primarily reflect a reading at the structural and formal levels of the papers. They do not say much at the substantive level related to, for instance, theories and methodologies used for understanding and tackling sustainability. Second, relying exclusively on PDC proceedings could provide a distorted picture of the field, because PD scholars also target other conference venues or journals. Further research is needed to mitigate these limitations. More importantly, it is needed to understand how sustainability fits conceptually among the various theoretical and methodological underpinnings of PD and how it can be concretely studied, tackled, and assessed.

Regardless of these limitations, we believe that the findings of this exploratory paper can support PD scholars in conceptualizing sustainability and in positioning their works in relation to it.

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