Rowing Together, Learning Between:

Visualising boundary spaces in community co-design.

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Abstract

Positioned within Social Design (design motivated by social demands and not by the market), this paper reports on PhD research focused on uncovering the relationship between informal-mutual learning and community-based co-design. As the study progressed, following an ethnographic approach into a pilot study and two case studies, I raised awareness of a collective learning process supported by the co-design situations which engaged different people, all learning from each other, usually unconsciously. As a result, I developed a theoretical framework, based on Cultural-Historical Activity Theory (CHAT), one capable of itemising a myriad of entities and interactions entangling in co-design situations, describing their relationships and functional dynamics. The framework visualises this relationship and draws attention to the relevance of informal-mutual learning as an essential synergy towards achieving collaboration.

1 Introduction

This research study is about uncovering the relationship between informal-mutual learning and community-based co-design. The journey began by exploring the impact of community co-design from the participant perspective, thereby filling a gap and contributing to the practice of co-design. As the study progressed into my immersion in a pilot study, I raised my awareness of a collective learning process supported by the co-design situations which engaged different people, all learning from each other, usually unconsciously. Co-design literature refers to such learning as 'mutual learning', considered the cornerstone for the emergence of meanings, skills and competences (or state of readiness) for co-designing (Bratteteig et al. 2013; Fuad-Luke 2009; Karasti 2001;

Simonsen & Robertson 2013, others). So the impact in co-design moved away from being the focus of research to being understood in terms of the learning process. The premise then of this paper is: how can design research visualise the relationship between informal-mutual learning and co-design situations? To unveil this relationship between learning and co-design, I employed Cultural-Historical Activity Theory (CHAT) as the overarching theoretical framework towards a better understanding of the multi-dimensions interrelated in co-design situations, hence, unpicking how design-researchers can engender inclusive spaces of collective creativity, through boundary spaces.

2 Context of research

Community engagement shapes the sociocultural context of this research: an evidence-based approach to carrying on community-research-public partnerships and bridging the gap between theory and practice. This approach adopts different names depending on the discipline – Community-Engaged Research (CER) in Health (Goodman et al. 2017), Participatory Action Research (PAR) in Social Sciences (Walter 2009), and Participatory Design (PD) in design research (Spinuzzi 2005), all sharing community engagement principles: foregrounding participants and their context, aiming for a positive social impact (transformation). Community engagement is identified as a suitable means of investigating communities and their problématiques (Davis et al. 2011), and in turn enhancing community conditions (Balazs & Morello-Frosch 2013).

The context of research also derives from its association with Leapfrog (leapfrog.tools), an AHRC-UK-funded research project (January 2015 - June 2018) focused on transforming community engagement through design. In the space between collaborates – the Academy (design research), local/regional authorities (public sector) and the third sector (non-profit organisations, social enterprises, community trusts, etc.) – Leapfrog structured the research throughout a nationwide research network of urban and rural communities, and with a variety of socio-economic-cultural contexts. This served as my basis for the 'infrastructuring' (Star & Bowker 2002) of practice-led research. This

research network assisted in setting up my pilot study and two case studies, conducted in the Highlands and Islands of Scotland. This required a methodological approach adaptable to the rural context: the geographical features affecting human settlements and, in turn, the construction of infrastructures like roads, broadband networks etc. This drew on a research scenario of small communities living together and facing different levels of isolation, shaping a lifestyle linked to a place with a shortage of public spaces (Calvo & De Rosa 2017).

3 'Rowing' together in the era of participation

In the last half-century, there have been calls to consider new design methods (Sanders & Stappers 2008), as traditional design excludes people from the creative process (Bason 2010) and so fails to address the complexity of current challenges (Calvo 2017). This practice responds to the cultural demands of an emerging society in the 'era of participation' (Smith, Bossen & Kanstrup 2017); a vernacular tendency of solemn participation in public and semi-public realms supported by the proliferation of digital domains (DiSalvo 2012; Jerkins 2006). This has led to widespread public engagement in community initiatives of different natures and purposes (Fuad-Luke 2009; Simonsen & Robertson 2013), through bottom-up and informal movements which aim to confront societal issues at different levels. This practice is modifying economic and productive systems, as well as development processes, encouraging social innovation (Smith et al. 2017), yet it also foregrounds concerns about the notion of participation, inclusion, and collective creativity.

The calls for change exude democratic principles embedded in a myriad of practices aiming to support the increasing demands on participation. Practices such as co-creation, social design and design activism, co-design, and participatory design are all intertwined (Bason 2010). They share the idea that creativity resides in everyone and therefore any creative process should include participants covering the social spectrum – private, public and voluntary sectors with all types of citizens. Jungk (1973) envisioned a motivational shift in design

which would radically reshape the future of the discipline. This shift has arrived (Fuad-Luke 2017); society now wants designers back in the public sphere, with greater involvement in socio-political problems and civil society. To confront such challenges and fulfil societal demands, we all need to 'row' together towards joint goals, join our efforts, share knowledge, and embrace the unfettered social learning which emerges in (between) boundary spaces.

Positioned within the theoretical strand of Social Design (design motivated by social demands and not by the market (Manzini & Meroni 2014)), this paper reports on design processes aimed at supporting social innovation. This strand of design research is increasingly used in the voluntary sector as a means of addressing societal issues (Bannon & Ehn 2012), due to its democratic and open design processes (Fuad-Luke 2009). Therefore, it also has the imperative to investigate and identify the added value brought to complex and interdisciplinary 'landscapes of practice' (Wenger et al, 2015). This uncovers another gap, in the value of design, which crosses its disciplinary boundaries and acquires prominence against 'wicked problems' (Rittel & Webber 1973) like human migration, sustainability, lack of resources (Ahmed 2017), the growth of social inequality and polarised communities (Sennett 2006). We know that co-design brings efficient and greater design outcomes (Fuad-Luke 2009; Sanders & Stappers 2008; others), but relatively little about its contribution to the laypeople involved.

Design, as social action, raises awareness of sustainable ways of living and working together; it renegotiates the relationships we establish within the socio-materials of human situations – between what we do and how we feel about doing it (Markussen 2013). So design aesthetics entwine emotional reconfigurations and the allocation of meaningful meanings to such socio-materials. This entails interlacing people's needs within the designing process in order to foster alternative forms of inhabiting and reshaping identities, hence eliciting social and behavioural change (Calvo & De Rosa 2017). This requires methodologies capable of studying human agency and its interactions with the

socio-materials of co-design situations. Think of design as an act of intervening in people's perceptions and affecting their behaviour. It also needs a learning process underpinning such an impact.

3.1 Mutual learning in co-design

My explorations of co-design also disclosed a strong connection between mutual learning and co-design (Bratteteig et al. 2013; Fuad-Luke 2009; Simonsen & Robertson 2012; Karasti 2001; Zahedi, Tessier & Hawey 2017; others), yet this relationship also remains unexplored, embedded in the co-design process (Robertson et al. 2014) and passing unnoticed for years.

Co-design is "a process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective 'reflection-in-action'" (Simonsen & Robertson 2013, 2). Here we can appreciate how 'mutual learning' is considered the cornerstone, the foundation, for the flow of interpersonal synergies that can erupt. These synergies characteristically are highly complex, due to the multiplicity of agency, motivation, power relations and the diversity of roles each participant brings and therefore, they influence the setting-up of group dynamics. Synergy is understood as the interaction or cooperation of two or more organisations (community level) or agents (individual level) to produce a coupled and combined effect greater than the sum of the effects taken separately. In other words, it is a multi-actor interplay that produces an impact greater than the efforts alone. Hence, it can deepen our understanding of how the impact of community co-design occurs. This implies analysing such synergies which cause it, with the focus on mutual learning.

In co-design, mutual learning refers, on the one hand, to designers acquiring a better understanding of the participants' contexts and, on the other, the non-design-trained participants acquiring knowledge about possible future design solutions (Karasti 2001; Bjerknes & Bratteteig 1989). According to Bratteteig et al. (2013), mutual learning is bidirectional and enables participants to know

enough about the problématique. By understanding the different stances and perspectives, participants develop mutual respect and build trust (Bejknes & Bratteteig 1988). This leads in turn to balancing the power-relations and 'having power implies having responsibility' (Bratteteig et al. 2013, 132). This mutual partnership relies on the principle that participants are experts in their respective fields, and it differentiates co-design from other design processes. However, this concept manifests a traditional view of learning based on knowledge acquisition, where it still resonates at certain levels of hierarchical relationships like teacher-student. This opposes the concept of learning adopted in this research, influenced by social theories of learning. Freire's (1970) emancipatory aspirations need to come to the fore. In this light I adopted the term informal-mutual learning, aiming to expand the concept of mutual learning (Bratteteig et al. 2013; Robertson et al. 2014; Simonsen & Robertson 2012; Fuad-Luke 2009; Karasti 2001) by incorporating social theories of learning: situated learning (Lave & Wenger, 1991), communities of practice (Wenger 1998), experiential learning (Kolb 1984; Dewey 1958), informal learning (Cross 2011; Schugurensky 2010) and learning by expanding (Engeström 1987). The word 'informal' denotes another understanding of learning as a social phenomenon arising through socialisation and participation (Dewey 1997; Oxford 1997; Zahedi, Tessier & Hawey 2017; Vygotsky 1971; Mündel & Schugurensky 2008). In response to this gap, I concentrated research effort on unfolding the relationship between community co-design and learning.

4 Selecting a theoretical framework: CHAT

My explorations of community co-design-based learning, out of participation in 'public designery engagements' (Lindström & Ståhl 2016), led me to identify CHAT as the suitable theoretical framework, a holistic approach that sheds light onto a research context consisting of emergence, nonlinearity, uncertainty, adaptation and constant change (Patton, McKegg & Wehipeihana 2015). I found that most theories isolate the components - people and community, culture and history, tools and activities (Kuutti 1996; Nardi 1996; Roth & Lee 2007; Sam 2012) - or simplify socio-material situations into a system of knots and networks,

displacing key human processes such as emotion and motivation in the enactment of agency. Motivations and emotions influence interpersonal interactions (e.g. building trust, empathic relationships), but also learning (Bisquerra 2015). Indeed, collaborative objectives based on trust, intimacy and friendship are easier to achieve (Cipolla 2008). CHAT as the overarching research framework provides a strong theoretical structure to incorporate those key dimensions configuring the co-design situations (personal and social, tools and design activities, rules and social conventions, roles and distribution of power), yet CHAT remains unexplored and undervalued in design research. The few studies using CHAT are mostly in human-computer interaction (Sam 2012; Kuutti 1996, 2009; Nardi 1996) or service design and product design (Sangiorgi 2009; Menichinelly 2015). Co-design studies barely register (Zahedi, Tessier & Hawey 2017). CHAT afforded a holistic approach to explore the relationship between informal-mutual learning and co-design. CHAT was employed as a lens, observing from the background of my theorising, to assist in: (i) extracting insights from the patterns discovered during the affinity diagramming process; (ii) focusing upon specific, consenting participants, (iii) interpreting their descriptive accounts using the unit of analysis (Engeström 1987, 78) as the foundational theoretical structure.
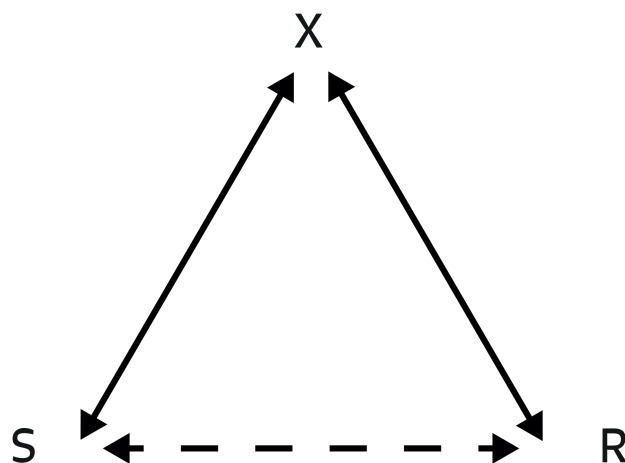
Figure 1. Mirian Calvo, triangular model of mediated act.
Reinterpretation of Vygotsky's model (1978, 40)

The unit of analysis in CHAT stems from Vygotsky's (1978, 40) triangular model of mediated act (figure 1) "in which the conditioned direct connection between

stimulus (S) and response (R) was transcended by 'a complex, mediated act'"(Engeström 2001, 134) depicted by X. This unfolded Vygotsky's notion of cultural mediation in any human agency.
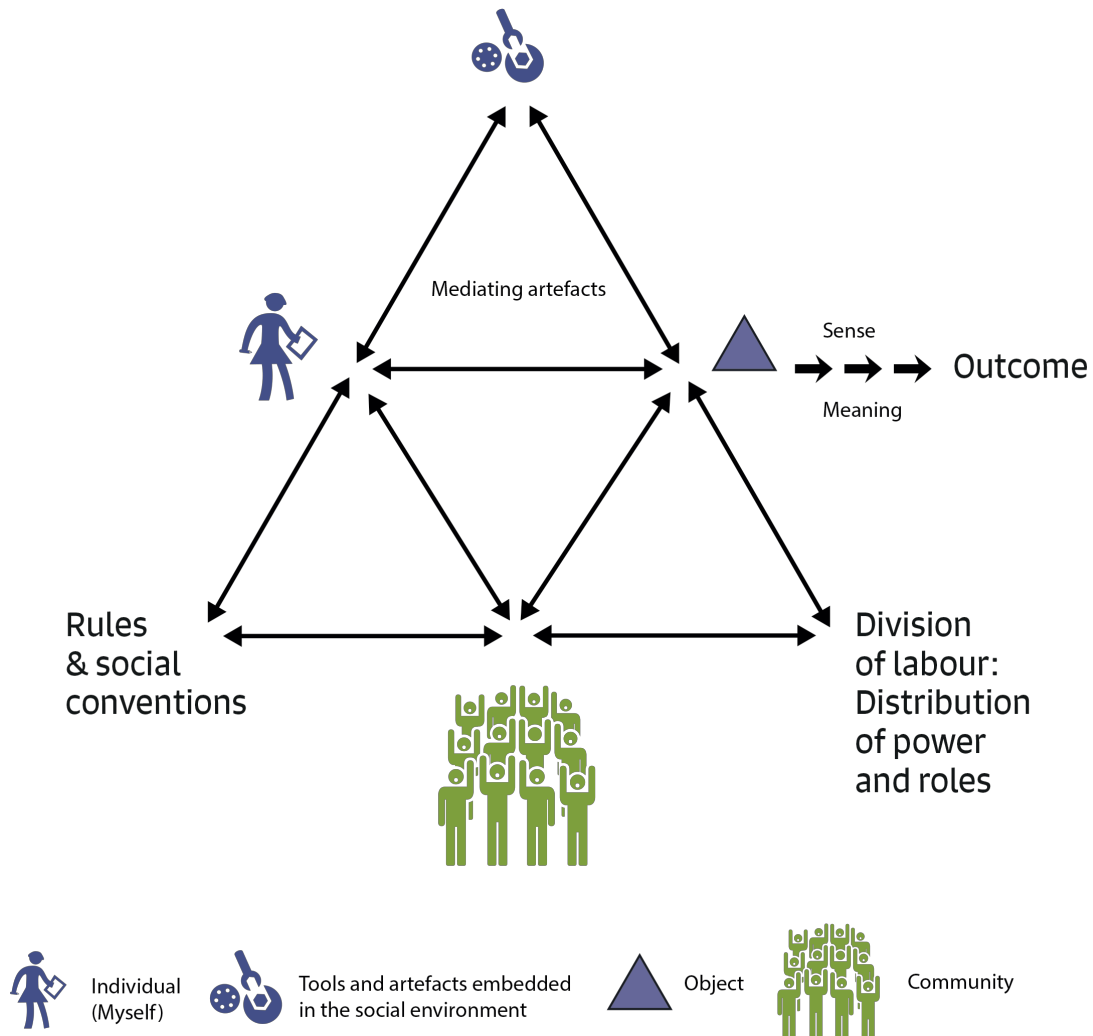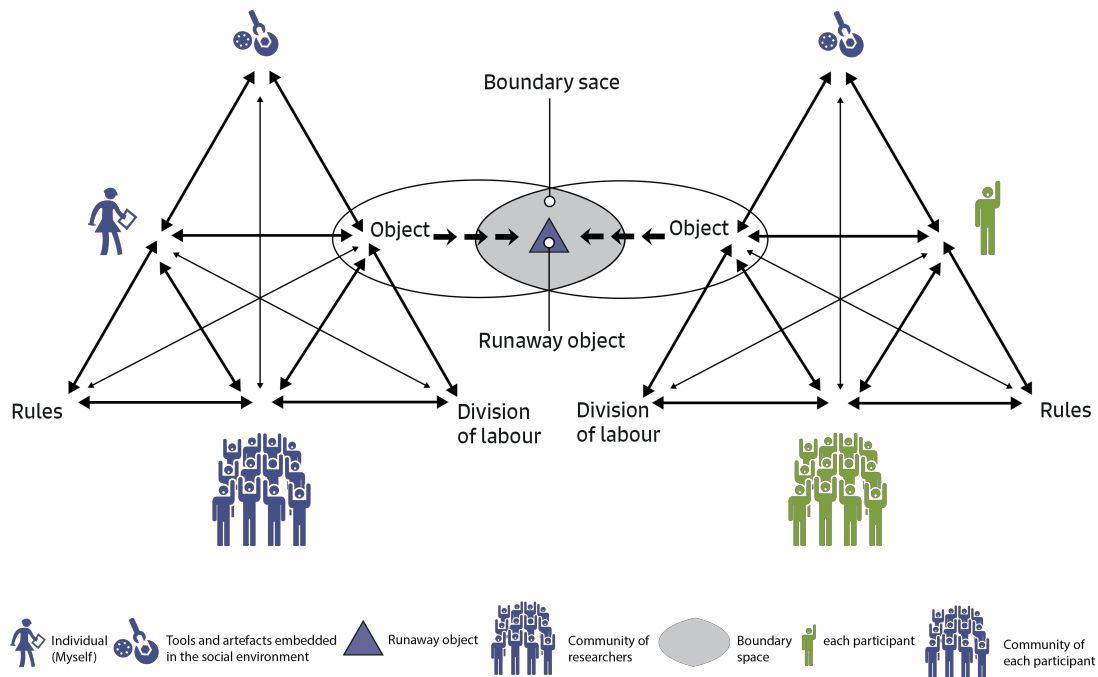

Figure 2. Mirian Calvo, minimum activity system. Reinterpretation from Engeström's model (1987, 78)

This triangular model has been reinterpreted by Engeström (1987, 78) illustrating a triangular unit (depicted in figure 2) where the subject represents a person carrying on an activity, which is always object-driven (Engeström 2008), and where tools and artefacts mediate in the chain of actions defining such an activity. Engeström (1987) expanded the triangular model, including the component of the community, with the intention of studying individual learning and personal development within a socio-historical and cultural context. Figure 2 illustrates the components of social activity: the individual (each participant of

co-design situations), the object (the goals that brought them to participate) and the community (the historical-cultural background of each participant and their communities of practice). This model also illustrates another three components which mediate on each interaction: between the individual and the community lie a set of rules and social conventions influencing (mediating) such interaction; between the individual and the object, Engeström (1987) considered mediating artefacts or tools; and between the community and the object, the division of labour also mediates, which in this study is understood as the distribution of power and roles. According to Engeström (2009a) the model was developed to examine and grasp the whole myriad of interactions, thereby avoiding the separation of connections.

Figure 3. Mirian Calvo, minimum unit of analysis. Reinterpretation from Engeström's model (1987, 78)

Figure 3 depicts the unit of analysis of the third generation of CHAT, where two or more activity systems interact through a partially shared object, called by Engeström (2009b) a 'runaway object'. He defines runaway objects as 'matters of concern' (Latour 2004). In the interstitial space between objects (ellipses), a conceptual space emerges, called in this study boundary space. Runaway objects are shared by a wide number of communities, often geographically scattered in a globalised world. They are amorphous wicked problems in their internal

structure and usually are not controlled at the individual level of human interaction (Engeström 2009b); for example, here the main societal issues addressed in the pilot study and the two case studies are considered each a runaway object: how to [re-]engage people in participating in community initiatives (pilot study); how to tackle loneliness and isolation in elderly life (case study 1); and how to involve wider communities in exploring sustainable ways of inhabiting and working together (case study 2). In this study, figure 3 illustrates the minimum unit of analysis of an activity (Engeström 2001), adding the "minimal meaningful context for understanding individual actions" (Kuutti 1996, 28).

4.1 Boundary space and boundary crossing

The multiplicity of expertise and skills in co-design (divergence) reveals two challenges: (i) how to integrate the voices of those who are not familiar with the design language and hence its methods and techniques (Ehn 2017); and (ii) how to enable those participants to visualise what it is they get from such a design process a priori, without having a sense of what is possible (Simonsen & Robertson 2013). These challenges reveal another gap, in understanding, between co-design and informal-mutual learning processes. For example, the Utopia project discloses the need to mutually develop a design language game (Ehn 1988). This also relates to the conceptualisation of 'boundary space' or 'third space', the assembling space of divergence. According to Lefebvre (2003), practice is divided into two different mind-set spaces: the abstract and the concrete. According to Lee (2007), when these two spaces converge, a new space is created, called a 'realm of collaboration'. This concept is developed in CHAT through the notions of boundary, boundary crossing, and boundary space – also called the 'third space' (Gutiérrez 2008).

A boundary is described as a domain where sociocultural differences lead to discontinuities in the course of actions and interactions (Akkerman & Bakker 2011). So the notion of boundary is the process in which an individual enters unknown spaces of practice and needs to overcome the challenge of re-

negotiating social and relational positions vis-à-vis the other individuals who also crossed the boundary (Akkerman & Bakker 2011). This definition stems from the principle that every learning process entails boundaries, which establish differences in expertise (Engrestöm 2015) or differences between peripheral and central members within a community of practice (Wenger, 1998). Thus, boundary crossing is when an individual moves and establishes relations across different disciplines or sites (Suchman 1994), and it is considered a category of the cognitive process (Engeström et al. 1995). Engeström et al. (1995) state that people 'boundary crossing' need to ""face the challenge of negotiating and combining ingredients from different contexts to achieve hybrid situations" (319). In this process, each individual also needs to learn from the others' expertise and come up with his/her own recipe through the combination of these new ingredients, which entails an informal-mutual learning process: "learning across and between multiple social worlds and thus expands education research beyond the study of learning within single domains and practices" (Akkerman & Bakker 2011, 150).

Boundary space is a notion introduced by Gutiérrez et al. (1995), with the term 'third space', to describe certain situations in classroom activities where the roles - called by Gutiérrez et al. (1995) 'script' or 'counterscript' - and perspectives of the teacher and the students encounter and interact to co-construct new meanings that expand the boundaries of both. As Gutiérrez (2008) states, the third space emerges from differences in the engagement and participation, as well as from the multiple social scenarios that informal situations provide, which have commonly egalitarian structures of power-relations and therefore, the conversation flows under inclusive and relaxed social conventions.

4.2 The notion of perezhivanie

Perezhivanie is a Russian word introduced by Vygostky (1998), and lately reinterpreted by González Rey (2008, 2014, 2015, 2018), to describe a dialectical unit capable of establishing indivisible connections between the social and the individual dimensions, the "path along which the social becomes the

individual" (Vygostky 1998, 198). This concept serves to relate the personal development of an individual with the sociocultural environment. The paradigm shift lies in understanding the social environment as a source that has the capacity to stimulate the personal development of individuals interacting in such an environment. This dissolves the deterministic vision that social environment and its material ecologies determine our development (González Rey 2008) and draws attention to experiential theories of learning (Kolb 1984), which build upon the Aristotelian concept of the development of virtues and character through a lifetime of experience (Stonehouse, Allison & Carr 2011). Dewey (1958) states: "It is not experience which is experienced, but nature – stones, plants, animals, diseases, health, temperature, electricity, and so on. Things interacting in certain ways are experience" (4a). So the difference between 'experience' and 'experienced' lies in the human senses, emotions and cognitive processes that emerge – stimulated by the social environment. It also presents a socially-related and constructed environment operating on symbolic and emotional levels, called culture (Bandura 2006). In other words, experience must be lived, and it is through living experience that individuals learn.

This concept of perezhivanie widens the focal point of our understanding of learning based on social constructivist theories (Bruner 1966; Vygotsky 1978) where the nature of knowledge and hence, learning, is seen as a synergy between human interactions with others and within the sociocultural context. This understanding of socially-constructed learning calls attention to informal environments and experiences; and fits well with the theorisation that emotions, perezhivanie and subjectivity are indivisible entities entangled in generative operations embedded in the process of learning, leading to consciousness-raising (Fleer et al. 2017). The individual, in turn, establishes bidirectional dynamics within the social situation through living the experience in a never-ending process of subjective constructs, of subjective realities. The notion of learning is employed here in its broader sense, including the co-articulation of mutual understanding and, hence, new understanding of different perspectives, broadening everything from knowledge-based horizons, personal development

in values and motivations, attitudes and behaviour, to transformative agency within the participants' practices and, lastly, organisational development through the reconfiguration of relational patterns.

5 Methodology

Drawing on the focus of research, the methodology used a Participatory Action Research (PAR) approach (Lewis 1946; Freire 1994; Bradbury 2015), and design ethnography (Salvador et al. 1999; also called design anthropology, Smith et al. 2016) as a multi-perspective path to the fieldwork, and co-design methods to ensure participation. PAR, an applied and flexible framework, seeks to validate knowledge emerging from practice (Bradbury 2010), foregrounding participants and their context as the focus of the research (McNiff 1988; Whyte 1991). PAR enables a greater understanding of how communities construct their realities and produce knowledge. In addition, design ethnography assists in revealing the dynamics of social interaction that, without participation and observation, would pass unnoticed. My participation in concrete experience was crucial to forming a sound and idiosyncratic understanding, and to identifying those learning situations. Design ethnography in this study came close to traditional ethnography but drew attention to the wide patterns of daily existence relevant particularly for learning in co-design situations. It consisted of myself, as the researcher, adopting an insider-outsider role. This enabled me to locate myself as a third-party observer, gradually gaining trust, understanding local sociocultural contexts, and unpicking the generation of shared meanings (LeCompte & Schensul 1999).

6 Case studies

During year one of my PhD, I conducted a pilot study (PS) over six months on the Isle of Mull with a total of four visits which served as the basis for developing an on-going methodology: (i) co-design situations; (ii) learning from the context; (iii) delivery, (iv) access to natural settings; and (v) systematising learning. It involved a series of workshops in which a range of stakeholders participated and focused on the co-construction of knowledge and development

of shared meanings around issues of central concern to community participants. Topics included how to enhance the quality of life for local people, the conservation of biodiversity on the island and how to strengthen local communities (see Calvo 2017). I used a grounded theory (Corbin & Strauss 1990) for my immersion, making context the source of knowledge that emerges from practice, rather than assuming a specific viewpoint.

Thereafter, I adjusted the premise of the research, focusing on participant learning and the emerging shared meanings. I composed an iteration of the methodology based on critical analysis of how socio-material situations unfolded in the PS, before grafting it onto two case studies, launched during year two. Each case study assisted the refinement and completion of the methodology following the principles of PAR, where the previous case study informs the next cycle of research.

Case Study 1 (CS1) consisted of six visits over six months and drew participants from social enterprises and public service providers operating in the Inverness and Moray area, devoted to tackling loneliness and isolation, particularly in later life. Together we explored issues experienced when sharing their tacit knowledge with other organisations (and people) involved in the same venture. In the interests of best practice, we embarked on a series of co-design situations and ethnographic visits. These design and ethnographic situations became a creative platform to share experiences and knowledge acquired from practice. Likewise, CS1 served me as a community-led living lab where I could apply my open-ended methodology, and thus observe how the spontaneity and improvisation of everyday life affects and modifies the course of events and thus co-design situations.

Case study 2 (CS2) structured seven planned visits alongside the Newbold Trust, a social enterprise committed to sustainability in Forres, N-E Scotland. This collaboration established favourable conditions for attempting an immersive (ethnographic) approach, staying with them accelerated my immersion as I

navigated their social life and accessed otherwise private areas. At the beginning of the year, Newbold Trust initiated a transformative process, shifting away from an organic and unstructured community to a social enterprise. They explained their need to initiate an engagement process with the communities living and operating in the area, as they felt somewhat isolated from wider community life. They suggested working together, so I set up CS2, another community-driven initiative. We explored ways in which the renewal of their physical assets could invite and engage the wider community to influence decisions on the uses of such assets. After a series of co-design and ethnographic activities, walking (Careri 2001; Ehrström 2016) became the method of engagement.

7 Systematising learning

The analysis phase adopted affinity diagramming, a well-established ethnographic data analysis process, both iterative and conceptual. This method entailed myself, as researcher, engaging in a systematic and cognitive three-stage process: item, pattern and structural analysis, phases describing "three levels of abstraction in the process of cultural theory building" (LeCompte & Schensul 1999, 150). Items were grouped under higher themes (or patterns), and structural analysis emerged once I was able to establish connections or relationships between the patterns. The analysis started right away, from my earliest immersions. My theorisations unfolded from the fieldwork, embedding reflective practice, forming the articulation of a well-supported 'research-story' that answers the premise of the research, albeit much of this process happened latterly.

8 Findings

During the PS analysis, I used the components described on the unit of analysis (Engeström 1987, 78) as the basis of my analytical categories, which assisted in clustering the emergent items before identifying patterns. This exploratory analysis developed my understanding of co-design situations under the gaze of CHAT. In addition, new insights (items) transpired from practice, so patterns such as 'learning', the role of 'emotions' and 'motivations', all gained relevance.

For instance, when I asked participants about their motivations to engage in the co-design situations, all of them replied that the main motive was learning how to engage better in their community. Yet, the affinity diagramming underlined that behind this motive, there was another one: to convince (by persuasion) as many members of their community as they could. I was also able to identify a direct connection between the emotion of frustration and the persuasion-motivation, the most common in the PS. This persuasion-motivation could also be related to job requirements, as most of the participants were working in non-profit organisations. The participants' emotions intervened in the assemblage of their personal-social motivations. Since then, I began perceiving the participants' motivations as complex entities rather than "a representation of motive as based on an individual's action such that motive appears to be "motive of learning", "motive of playing", "motive of reading", and so on" (González Rey 2014, 427). So motivations were reframed as complex knots of individuals' needs, desires, emotions and intentions. The analysis also illustrated a strong relationship between informal learning and co-design situations, where the conversations and the social environment were vehicles for learning. The participants usually overlooked their own learning processes (mostly associated with schooling), so learning was an unexpected and peripheral outcome. The complexity, however, of the co-design situations, a skein of agencies and perspectives, hindered the formation of sound conceptualisations (structures) on how learning related to co-design.

In CS1 I readjusted the analytical categories regarding my findings and research questions: motivations, emotions, and learning process. From these overarching categories, I created an 'evidence wall' to organise and visualise items, patterns and even structures, after systematically looking over, re-reading, re-engaging and tidying up the data. Out of this analysis, I discovered that informal-mutual learning reveals itself within concrete sociocultural situations; it is situated (Lave & Wenger 1991); it is unintentional and unconscious (Mündel & Schugurensky 2008); and it emerges through socialisation in designery interactions with the social environment and with the people involved in it. Learning happened

through participating, an experience-based learning through listening and sharing personal stories – which unfolded the participants' values, motivations and symbolic-emotional meanings. Another insight was that co-design situations are capable of configuring boundary spaces. Here the participants went through a previous stage: boundary crossing. The group of people subtly and implicitly negotiated the rules of the conversation. Boundary space is a theoretical concept related to the setting of a social situation of development. The boundary space accumulated the knowledge of each participant and hence amplified the potential to learn from each other. The informal-mutual learning process was activated here as an intermediary synergy in the process of building common understanding, trust and respect for the other participants. The designery activities, games and tools helped in the process of setting the terms of such a conversation, breaking down the hierarchical power relations that usually dominate human conversations and interactions. They brought inclusiveness, integrating the quieter voices while at the same time compressing the strong ones.

Likewise, in CS2, I replicated the analytical process, although I reframed the analytical categories, based on the incipient theoretical framework: boundary space and social situation of development, areas of learning, how we learn, motivations, and emotions. The analysis reinforced the patterns found in CS1. For example, the way participants learnt was mostly through sharing space and time together (situatedness); through listening and sharing their perspectives and ideas, focused on envisioning future uses of their spatial assets; and through undertaking designery activities and/or walking together. The sharing adopted the shape of spatial stories, which disclosed the organisation interplay and chronicled their relationships with the physical space. It also emphasised the great potential for co-design situations to provide the conditions for the emergence of boundary spaces; and vice versa, the practice of co-design requires the setting of boundary spaces to actually achieve collaboration between multi-actors with different expertise and backgrounds (divergence), through the mediation of informal-mutual learning.

Structures emerged: (i) motivations, emotions and personal stories which shed light on (ii) how the participants learn; (iii) how co-design situations can support the flourishing of boundary spaces and hence, amplify learning. I also (iv) identified key areas of learning such as the production of shared meanings around the conceptualisations of co-design and collaboration, designery skills, and learning to work together (as Mündel & Schugurensky 2008); and unfolded a series of (v) designery conditions to support informal-mutual learning.

9 A theoretical framework to achieve/enact collaboration

From a Historical-Cultural standpoint, human agency is driven by human motivation (see González Rey 2015). My study took a designery activity-based approach and focused on visualising the emergence of learning. A theoretical framework emerged, organically elaborated throughout the analysis of CS1 and CS2; where the results assisted in the formulation of a reinterpretation of CHAT, and the visual language of design helped me visualise the relationship between informal-mutual learning and co-design situations.
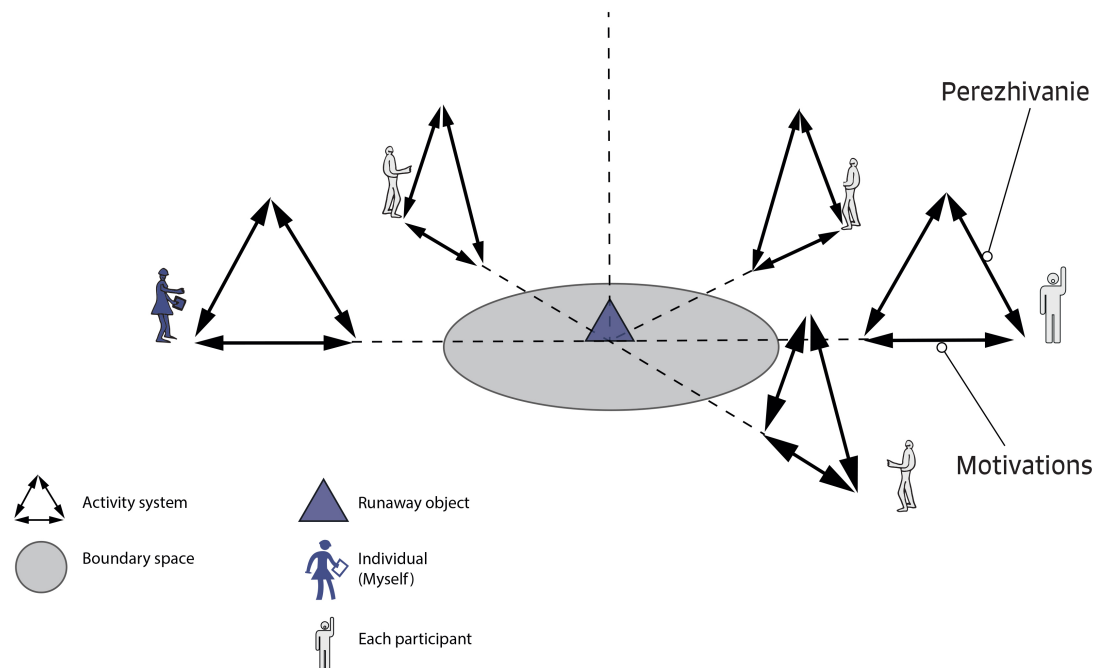
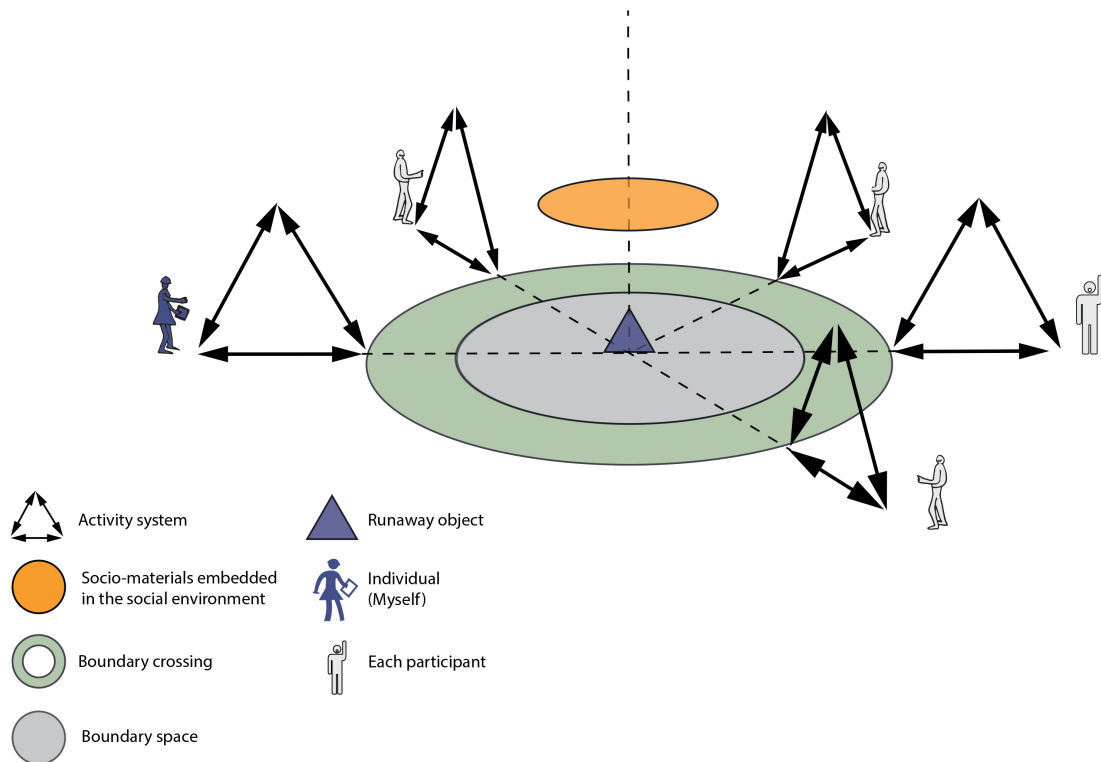**Figure 4. Mirian Calvo, theoretical framework structure 1, 2019**

Figure 4 illustrates the skeleton of the theoretical framework, in which each participant (including design-researchers) is represented by an activity system (CHAT triangular-model of bidirectional arrows) approaching the boundary space (grey circle), with the runaway object at the centre (the locus of each co-design situation). Figure 5 reflects the reinterpretation done in this study of the activity system, based on CHAT (see section 4). The diagram illuminates the relationships of each participant. In this case, the person depicted is myself, the design-researcher, engaging with the socio-materials, which define the social environment, through my perezhivanie, and my socio-personal motivations (research agenda) to participate in the co-design situation.
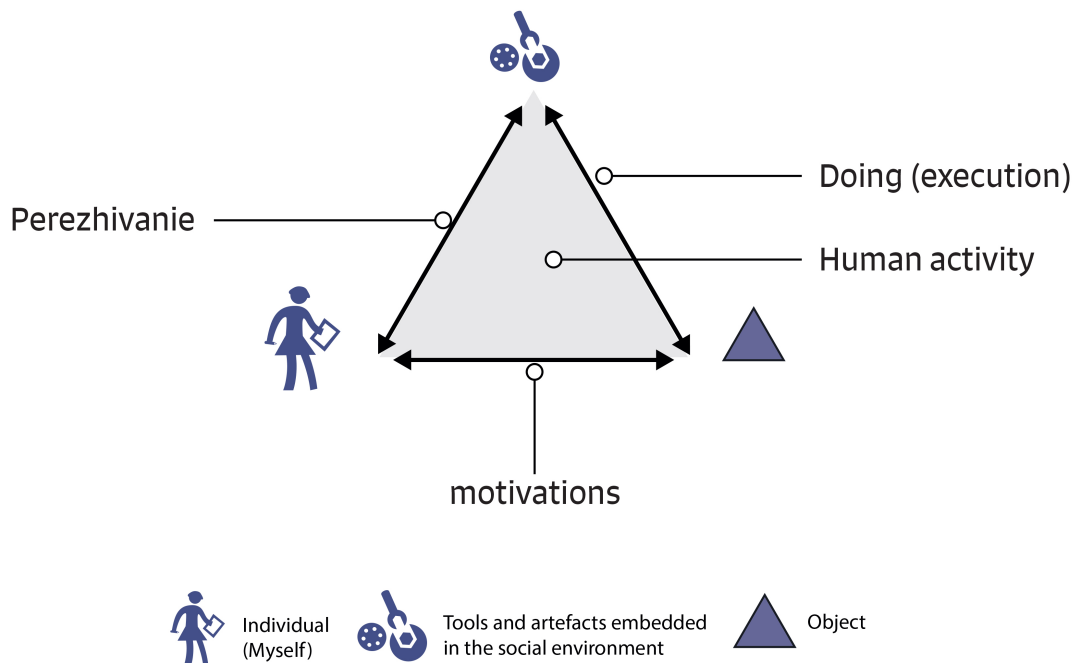
Figure 5. Mirian Calvo, Elements and relationships of each activity system, 2019

Figure 6 shows another two dimensions that make up the structure of the theoretical framework: the social environment (orange circle) and the crossing of boundaries (green peripheral ring), representing the first phase of the theoretical framework. The social environment is defined in this study as the set of socio-materials and ecologies interacting in certain ways, setting the socio-environmental conditions for each co-design situation. This notion of the social environment embraces the idea, developed by Fleer et al. (2017), that the social environment is a source influencing the personal development of the

participants. It also aligns with the notion of experience, developed by Dewey (1958) and expanded in section 4.2.
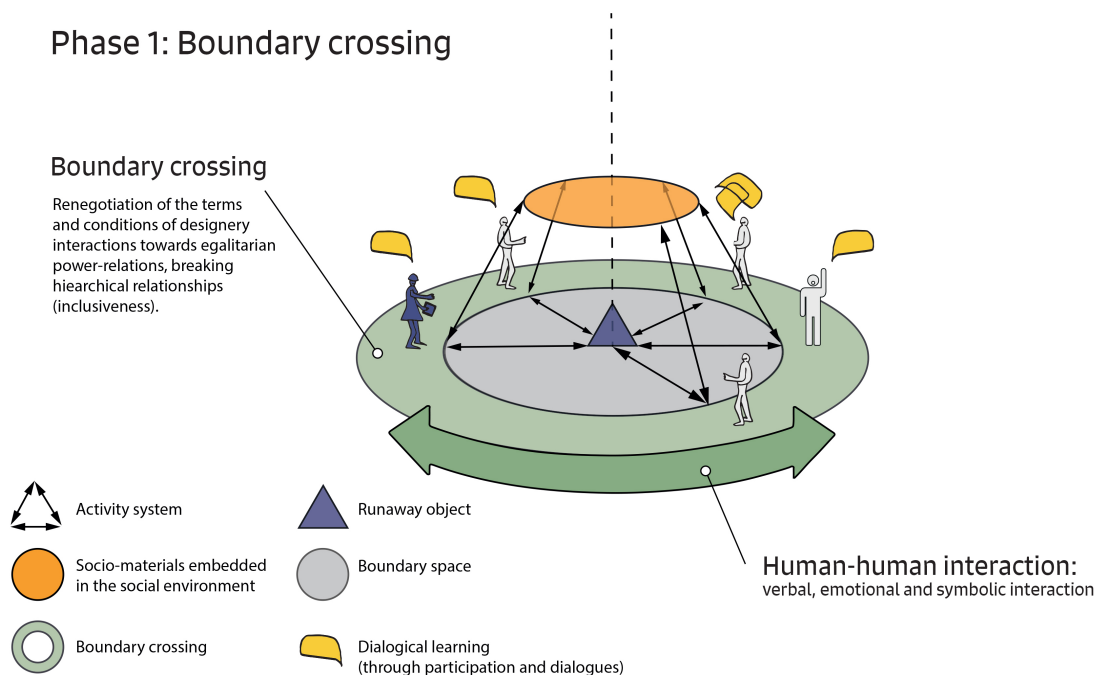

Figure 6. Mirian Calvo, Theoretical framework structure 2, 2019

Once all the components and dimensions have been disclosed, I proceed to unfold the theoretical framework, which follows a three-phase process: (i) boundary crossing, that means renegotiating the terms and conditions for the flourishing of inclusive and creative spaces; (ii) boundary space, learning from each other from balanced positions of power 'towards the co-articulation of issues' (Lindström & Ståhl 2016); and (iii) collaboration, current multi-actor interplay in the 'telling', 'making' and 'enacting' (Brandt et al., 2013).

9.1 Phase 1: boundary crossing

To reach the boundary space, the participants of this study firstly experienced the phenomenon of boundary crossing (i). Boundary crossing describes a social situation in which the participants enter an intermediate phase that reconfigures the terms and conditions under which human interactions and cooperation will occur, based on the co-construction of dialogues, and by engaging in the choreography and orchestration of designery activities. Figure 7 depicts this

phase, the participants are in the boundary crossing, with two interactions: human-human interaction (big green two-way arrow), and socio-environmental interactions, through perezhivanie. The participants subtly readjust their attitudes, adopting roles free of the social pressure that contracts and recalibrates our behavioural patterns according to our learning, based on our perzhivania, which defines us as social individuals. This recalibration of attitudes can be understood as a learning mechanism called identification by Akkerman and Bakker (2011). Identification entails redefining our identity by putting ourselves in relation with other participants. The socio-cultural differences, brought by the divergence of multiple experts and perspectives, lead to a negotiation of the diverse identities in place. This brings forth a new consensus that, as Garfinkel and Sacks (2005) explain, sets the norms, values, rules and distribution of power between the parties involved in the conversation.

Phase 1: Boundary crossing

Boundary crossing

Renegotiation of the terms and conditions of designery interactions towards egalitarian power-relations, breaking hiearchical relationships (inclusiveness).

Human-human interaction:
verbal, emotional and symbolic interaction

△ Activity system

🔺 Runaway object

🟠 Socio-materials embedded in the social environment

⚪ Boundary space

◯ Boundary crossing

🟡 Dialogical learning (through participation and dialogues)

Figure 7. Mirian Calvo, Phase 1: Boundary crossing, 2019

One insight emerging from the analysis was the realisation that designers have a great accountability in setting the favourable socio-environmental conditions to engender boundary spaces, inclusive spaces for assembling divergence. They have the means, consequently, to intervene in the participants' behaviour towards adopting horizontal relationships. For instance, in CS1, participant 2 reflected on how the choreography and orchestration of the co-design activities

brought playfulness as an implicit rule, which allowed quieter voices to participate:

The way you devised the games and the sequence of those games allowed somebody like him also bringing his valuable contribution, which, you know, another way he might not done it if evolving just chat, chat, chat, chatting. He might not be able to engage without that at all, but through the thing of writing down the things in the cards, and then share it. You know, that was fun. It was just fun!

This reflection shows how the social environment is capable of supporting or hindering inclusiveness and creativity, but also informal-mutual learning. In CS2, participant 6 mentioned:

By the fact of us being a group, I felt like all the stuff of me having to perform or do something, just about me personally and my need to perform well, that just felt apart! That just did not happen! So I relaxed and enjoyed it.

This quote reflects how participant 6 experienced boundary crossing, and how he felt once he entered the second phase: (ii) boundary space. Here he expanded his boundaries by recalibrating his power-relations with the other participants, and also his (theatrical) way of performing, adjusted to the 'new' social order.

9.2 Phase 2: boundary space

 The second phase began when the participants relaxed and understood the hybrid situation, their roles in relation to the others, and the socially designery environment. Figure 8 illustrates the second phase: (ii) boundary space. The diagram shows how the boundary space expands, including each participant under the implicit rules of co-design: inclusiveness, diversity, tolerance, respect, egalitarian relationships and mutual understanding. This is facilitated by the orchestration and choreography of collective designery engagements, the games, the tools and techniques displayed. The orange truncated cone

represents the human-environment interaction, through perezhivanie. It also describes how the informal-mutual learning emerges, out of the collective engagements. This is disclosed in two indivisible dimensions: the social learning (upper yellow ring) and the personal learning (two-way orange arrows). Informal-mutual learning, in its social dimension, condenses the sharing, listening and understanding of multi-voice perspectives, which were unfolded through in-depth conversations, enabling dialogic learning. Each participant had the generative capacity of mediating in the co-design situation. This reveals a designery activity approach illustrating the dynamic relations between activity systems and between the person and the environment (Chen 2017) as a whole.
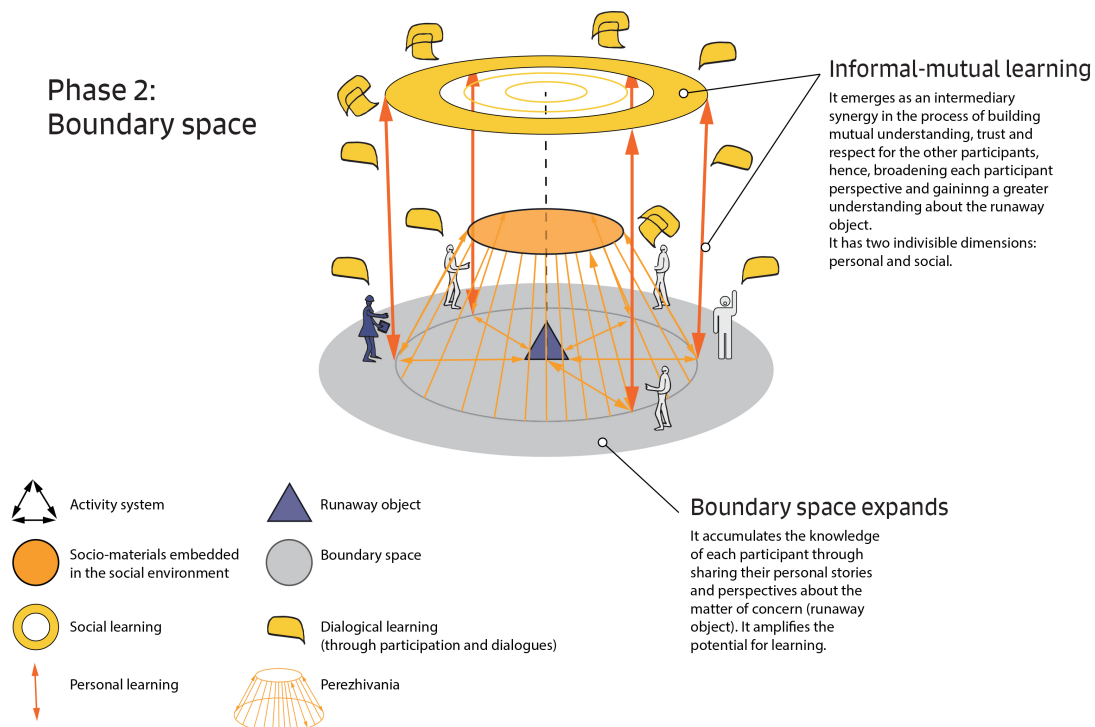
Figure 8. Mirian Calvo, Phase 2: Boundary space, 2019

9.3 Phase 3: collaboration

The analysis uncovered a pattern in the co-design situations, in which the participants, after gaining mutual understanding and broadening their perceptions, shifted the focus of the conversations and activities: from co-articulating the issue, towards idea-generation, the making and enacting of design concepts. The matter of concern was co-defined by the sharing of multi-

perspective stories, and in turn, it was perceived as an opportunity to explore transformative agency in their practice of community engagement.

Figure 9 describes this moment: the social dimension of learning (upper yellow circle), in its idealisation as a theoretical framework, becomes saturated thanks to the congestion of personal narratives (illustrated by the yellow speech bubbles); then a collaborative synergy ignites, depicted with a inverted cone of green lines connecting the social learning and the runaway object, mediated through the social environment, and the participants, all collaborating towards materialising ideas.

Phase 3: Collaboration

Activity system — Runaway object

Socio-materials embedded in the social environment — Boundary space

Social learning — Dialogical learning (through participation and dialogues)
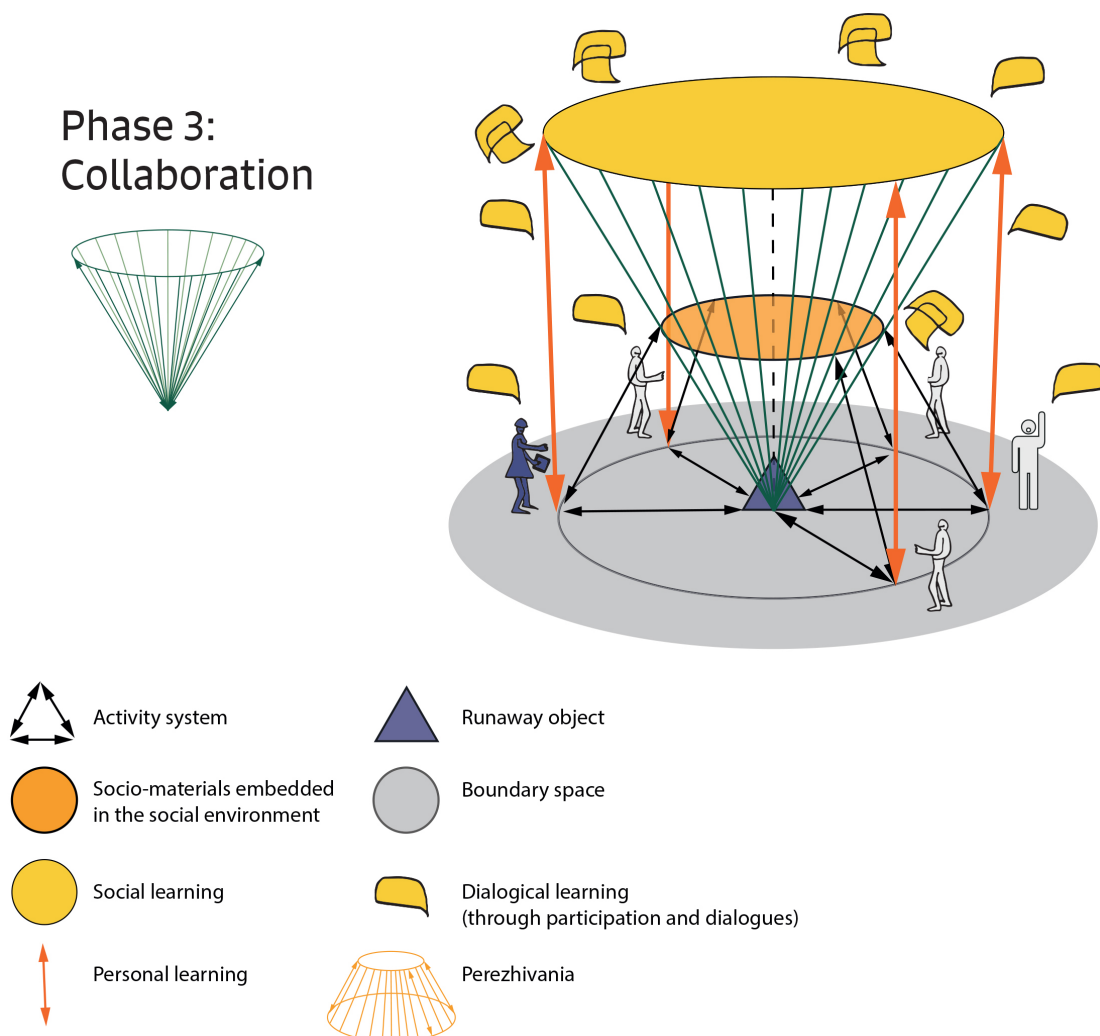
Personal learning — Perezhivania

Figure 9. Mirian Calvo, Phase 3: Collaboration, 2019

In line with Bronstein (2003), this study defines collaboration as an interdisciplinary, interpersonal and effective "process that facilitates the achievement of goals that cannot be reached when individual professionals act on their own" (299). Hence, collaboration differs from other interpersonal processes such as cooperation, communication, coordination and partnership (Bruner 1999). For instance, coordination describes a process of differentiation of roles where leadership and decision-making are not consensual (Kane 1980); as opposed to collaboration built upon the dilution of roles, horizontal relationships, continuous consensus, and collective agreement on the flow of rules and social order holding the group together. As participant 3 (CS1) summarises:

Trust is very important, commitment, the balance between control and letting go control. Those central principles (...), the 'co' in co-design and collaboration is a reminder that the best work emerges out of community.

The theoretical framework illuminates an abstract model to describe highly complex designery public engagements, itemising participant interactions and describing their relationships and dynamics. The framework identifies and visualises this relationship - when informal-mutual learning emerges and under which conditions - and it can support the reflections of designers and practitioners upon how participants learn in co-design situations.

10 Discussions

This paper describes a research study carried out to gain a greater understanding of the relationship between co-design and informal-mutual learning. The study shed light on this relationship, concluding that informal-mutual learning is an essential mediating synergy, which encourages the participants - by listening and sharing their personal perspectives, and being there - to build empathic relationships of trust, respect and mutual understanding. All these interpersonal features, according to the analysis, are essential requirements to reach the point where the participants are ready and willing to collaborate. This crystallises group dynamics towards co-designing in an inclusive and creative space, where social and professional roles are broken and diluted, breaking down hierarchies and establishing horizontal relationships. This draws attention to the theoretical concept of boundary space. According to CHAT, boundary space is a theoretical outline that delimits a space of confluence which individuals approach from

their different perspectives. The boundary draws an imaginary line that establishes and realigns the multiplicity of perspectives, human agencies, personal motivations and structures of social interaction. The 'co' in co-design is, of course, crucial, and informal-mutual learning plays a key role leading to the co-articulation of the issue and, ultimately, collaboration.

References

Ahmed, N. M. (2017) *Failing States*, *Collapsing Systems*. Springer.

Akkerman, S.F. & Bakker, A. (2011) Boundary Crossing and Boundary Objects, *Review of Educational Research*, Sage Journals, Vol. 81, No. 2, pp. 132-169.

Balazs, C. and Morello-Frosch, R. (2013) The Three Rs: How Community-Based Participatory Research Strengthens the Rigor, Relevance, and Reach of Science, *Environmental Justice*, Vol. 6, No. 1, pp. 9-16.

Bandura, A. (2006) Toward a Psychology of Human Agency, *Perspectives on Psychological Science*, Vol. 1, No. 2, pp. 164–180.

Bannon, L.J. & Ehn, P. (2012) Design: Design Matters in Participatory Design, in J., Simonsen & T., Robertsen [Eds] *Routledge International Handbook of Participatory Design*. New York, NY: Routledge, pp. 37-63.

Bason, C. (2010) *Leading Public Sector Innovation. Co-creating for a better society*. Bristol: Policy Press.

Bisquerra, R. (2015) *Universo de Emociones* [Universe of Emotions]. Valencia: PauGea Comunicación S.L.

Bjerknes, G. & Bratteteig, T. (1989) Florence in Wonderland – Systems Development with Nurses, in G., Bjerknes, P., Ehn & M. Kyng [Eds] *Computers and Democracy – A Scandinavian Challenge*. Aldershot: Avebury, pp. 279-295.

Bjerknes, G. & Bratteteig, T. (1988) The memoirs of two survivors – or evaluation of a computer system for cooperative work, *Proceedings of CSCW'88*. Portland, Oregon, New York: ACM, pp. 167-177.

Bradbury, H. (2015) *The Sage Handbook of Action Research*. London: Sage.

Bradbury, H. (2010) What is good action research? *Action Research*, Vol. 8, No. 1, pp. 93-109.

Brandt, E., Binder, T. & Sanders, E.B.-N. (2013) Tools and techniques. Ways to engage telling, making and enacting, in J., Simonsen & T., Robertson [Eds] *Routledge International Handbook of Participatory Design*. New York: Routledge, pp. 145-181.

Bratteteig, T., Bødker, K., Dittrich, Y., Mogensen, P.H. & Simonsen, J. (2013) Organising principles and general guidelines for Participatory Design projects, in J., Simonsen & T., Robertson [Eds] *Routledge International Handbook of Participatory Design*. New York: Routledge, pp. 117-144.

Bronstein, L. (2003) A Model for Interdisciplinary Collaboration, *Social Work*, Vol. 48, No. 3, pp. 297–306.

Bruner, J. (1999) Folk Pedagogies, in J. Leach & B. Moon [Eds] Learners and Pedagogy. London: Sage and The Open University, pp. 4-20.

Bruner, J.S. (1966) *Toward a Theory of Instruction*. London: Harvard University Press.

Calvo, M. (2017) Reflective Drawing as a Tool for Reflection in Design Research, *The International Journal of Art & Design Education*, Vol. 36, No. 3, pp. 261-272.

Calvo, M. & De Rosa, A. (2017) Design for social sustainability. A reflection on the role of the physical realm in facilitating community co-design, *The Design Journal*, Vol. 20, Sup. 1, pp. S1705-S1724.

Careri, F. (2001) *Walkscapes: Walking as an Aesthetic Practice*. Barcelona: Gustavo Gili.

Chen, F. (2017) Everyday Family Routine Formation: A Source of the Development of Emotion Regulation in Young Children, in M. Fleer, F. González Rey & N. Veresov [Eds] *Perezhivanie, Emotions and Subjectivity. Advancing Vygotsky's Legacy*. [Online] Springer, pp. 129-144.

Cipolla, C. (2008) Creative communities as "relational" innovations: a service design approach, in F., Jegou & E. Manzini [Eds] *Collaborative services: Social Innovation and Design for Sustainability*. Milano: POLIDESIGN.

Corbin, J. & Strauss, A. (1990) Grounded Theory Research: Procedures, Canons and Evaluative Criteria, *Zeitschrift fur Soziologie*, Vol. 19, No. 6, pp. 418-427.

Cross, J. (2011) *Informal learning. Rediscovering the Natural Pathways that inspire innovation and performance*. Pfeiffer.

Davis, S.W., Cassel, K., Moseley, M.A., Mesia, R., Herrera, P.A. De, Kornfeld, J., & Perocchia, R. (2011) The Cancer Information Service: Using CBPR in building community capacity, *Journal of Cancer Education: The Official Journal of the American Association for Cancer Education*, Vol. 26, No. 1, pp. 51–57.

Dewey, J. (1997) *Experience and Education. New York: First Touchstone*.

Dewey, J. (1958) *Experience and Nature*. New York: Dover.

DiSalvo, C. (2012) *Adversarial Design*. Cambridge, MA: MIT Press.

Ehn, P. (2017) Learning in Participatory Designas I Found It (1970-2015), in B. DiSalvo et al. [Eds] *Participatory Design for Learning. Perspectives from Practice and Research*. London: Routledge, pp. 7-21.

Ehn, P. (1988) *Work-Oriented Design of Computer Artifacts*. Falköping: Erlbaum.

Ehrström, P. (2016) Reflections on Deliberative Walks – A Participatory Method and Learning Process, in: *ESREA: 8th Triennial European Research Conference. Imagining diverse futures for adult education: questions of power and resources of creativity*, Maynooth University, Ireland, 8-11 September 2016.

Engeström, R. (2009a) Who is Acting in an Activity System?, in A., Sannino, H., Daniels & K.D., Gutiérrez [Eds] *Learning and Expanding with Activity Theory*. Cambridge, UK: Cambridge University Press, pp. 257-273.

Engeström, Y. (2009b) The future of activity theory: a rough draft, in A., Sannino, H., Daniels & Gutiérrez, K. [Eds] *Learning and expanding with activity theory*. Cambridge, UK: Cambridge University Press, pp.303-328.

Engeström, Y. (2008) *From teams to knots: Activity-theoretical studies of collaboration and learning at work*. Cambridge: Cambridge University Press.

Engeström, Y. (2001) Expansive Learning at Work: toward an activity theoretical reconceptualization, *Journal of Education and Work*, Vol. 14, No. 1, pp. 133-156.

Engeström, Y., Engeström, R. & Kärkkäinen, M. (1995) Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities, *Learning and Instruction*, Vol. 5, No. 4, pp. 319-336.

Engeström, Y. (1987) *Learning by expanding: An Activity-Theoretical Approach to Developmental Research.* Helsinki: Orienta-Konsultit.

Fleer, M., González Rey, F. & Veresov, N. (2017) *Perezhivanie, Emotions and Subjectivity: Advancing Vygotsky's Legacy*. Singapore: Springer.

Freire, Paulo (1994) *Pedagogy of hope.* New York: Continuum.

Freire, P. (1970) *Pedagogy of the Oppressed*. New York: Continuum.

Fuad-Luke, A. (2017) Design Activism's teleological freedoms as a means to transform our habitus, *Agents of Alternatives – Re-designing Our Realities*, Berlin. [Online] available from: http://agentsofalternatives.com/?p=2539 [Accessed: 15 January, 2019]

Fuad-Luke, A. (2009) *Design Activism: Beautiful Strangeness for a Sustainable World.* New York: Earthscan.

Garfinkel, H. & Sacks, H. (2005) On formal structures of practical actions, in Garfinkel, Harold (Ed.) *Ethnomethodological Studies of Work*, pp. 157-190. London: Routledge.

González Rey, F. (2018) Vygotsky's "The Psychology of Art": A foundational and still unexplored text, *Estudos de Psicologia* [Psychological Studies], Vol. 35, No. 4, pp. 339-350.

González Rey, F. (2015) A new path for the discussion of Social Representations: Advancing the topic of subjectivity from a cultural-historical standpoint, *Theory & Psychology*, Vol. 25, No. 4, pp. 494-512.

González Rey, F. (2014) Human Motivation in Question: Discussing Emotions, Motives, and Subjectivity from a Cultural-Historical Standpoint, *Journal for the Theory of Social Behaviour*, Vol. 45, No. 4, pp. 419-439.

González Rey, F. (2008) Subjetividad Social, Sujeto y Representaciones Sociales [Social subjectivity, subject and social representations], *Diversitas: Perspectivas en Psicología* [Diversitas: Perspectives on Psychology], Vol. 4, No. 2, pp. 225–43.

Goodman, M., Thompson, V., Arroyo Johnson, C., Gennarelli, R., Drake, B., Bajwa, P., Witherspoon, M. and Bowen, D. (2017). Evaluating Community Engagement in Research: Quantitative Measure Development, *Journal of Community Psychology*, Vol. 45, No. 1, pp.17-32. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/jcop.21828 [Accessed: 9th January 2019]

Gutiérrez, K.D. (2008) Developing a Sociocritical Literacy in the Third Space, *Reading Research Quarterly*, Vol. 43, No. 2, pp.148-164.

Gutiérrez, K., Rymes, B. & Larson, J. (1995) Script, counterscript, and underlife in the classroom: James Brown versus Brown, [Board of education], *Harvard Educational Review*. Vol. 65, No. 3, pp. 445–471.

Jenkins, H. (2006) *Convergence Culture: Where Old and New Media Collide.* New York: New York University Press.

Jungk, R. (1973) Anfange eines anderen Wachstums, in C., Horn, M.P., von Walterskirchen & Wolff, J. [Eds] *Umweltpolitik in Europa.* Referrate und Seminarergebnisse des 2 Symposiums fur Wirtschaftliche und Rechtliche Fragen des Umweltschutzes an der Hochschule St. Gallen 31. Oktober bis 2. November 1972. Frauenfeld, Stuttgart, pp. 34-44.

Kane, R.A. (1980) Multidisciplinary teamwork in the United States: Trends, Issues and Implications for the Social Worker, in S. Lonsdale, A. Webb & T.L. Briggs [Eds] *Teamwork in the personal and social services and health care*. London: Personal Social Services Council, pp. 138–151.

Karasti, H. (2001) Bridging Work Practice and System Design: Integrating Systemic Analysis, Appreciative Intervention and Practitioner... *Computer Supported Cooperative Work*, Vol. 10, No. 2, pp. 211-246.

Kolb, D. (1984) *Experiential learning*. Englewood Cliffs, NJ: Prentice Hall.

Kuutti, K. (2009) Artifact, Activities and Design Knowledge, in S. Poggenpohl & K. Sato [Eds], *Design Integrations: Research, Methods, Collaboration*. London: Intellect, pp.67-85.

Kuutti, K. (1996) Activity Theory as a Potential Framework for Human-Computer Interaction Research, in B. Nardi, [Ed] *Context and consciousness: Activity theory and human-computer interaction*. [Online] Cambridge: MIT Press. pp.1-22. Available from: https://www.ics.uci.edu/~corps/phaseii/nardi-ch2.pdf [Accessed: 5th January 2019]

Latour, B. (2004) *Politics of Nature*. London: Harvard University Press.

Lave, J. & Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

LeCompte, M.D. & Schensul, J.J. (1999) *Designing and Conducting Ethnographic Research, Ethnographers Toolkit*. 1. Walnut Creek, CA: AltaMira Press.

Lee, Y. (2007) *Design participation tactics: involving people in the design of their built environment*. PhD thesis. Hong Kong Polytechnic University.

Lefebvre, H. (2003) *La Révolution urbaine* [The Urban Revolution]. (1970 1st Ed.). Minneapolis: University of Minnesota Press.

Lewin, Kurt (1946) Action Research and Minority Problems, *Journal of Social Issues*, Vol. 2, No.4, pp. 34-46.

Lindström, K. & Ståhl, Å. (2016) Politics of Inviting: Co-Articulations of Issues in Designerly Public Engagement, in R.C. Smith et al. [Eds] *Design Anthropological Futures*. London, UK: Bloomsbury, pp. 183-198.

Manzini, E., Meroni, A. (2014) Catalysing social resources for sustainable changes. Social innovation and community-centred design, in C., Vezzoli et al. [Eds] *Product-service system design for sustainability*. Greenleaf Publishing.

Markussen, T. (2013) The Disruptive Aesthetics of Design Activism: Enacting Design Between Art and Politics, *Design Issues*, Vol. 29, No. 1, pp. 38-50.

McNiff, J. (1988) *Action Research, Principles and Practice*. London: MacMillan Education.

Menichinelli, M. (2015) Open Meta-Design: Tools for Designing Collaborative Processes, in D. Bihanic [Ed], *Empowering Users through Design: Interdisciplinary Studies and Combined Approaches for Technological Products and Services*. [Online] Springer, pp. 193-212.

Mündel, K. & Schugurensky, D. (2008) Community based learning and civic engagement: Informal learning among adult volunteers in community organizations, *New Directions for Adult and Continuing Education*, Vol. 118, pp. 49-60. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/ace.295 [Accessed: 26th November, 2018]

Nardi, B. (1996) Studying context: A comparison of AT, situated action models, and distributed cognition, in B., Nardi [Ed] *Context and consciousness: AT and human-computer interaction*. Cambridge, MA: MIT Press, pp. 7-160.

Oxford, R. (1997) Cooperative Learning, Collaborative Learning, and Interaction: Three Communicative Strands in the Language Classroom, *The Modern Language Journal*, Vol. 81, No. 4, pp. 443-456.

Patton, M.Q., McKegg, K. & Wehipeihana, N. (2015) *Developmental Evaluation Exemplars: Principles in Practice*. New York: The Guildford Press.

Rittel, H.W.J. & Webber, M.M. (1973) Dilemmas in a general theory of planning, *Policy Science*, Vol. 4, No. 2, pp. 155-169.

Robertson, T., Leong, T.W., Durick, J. & Koreshoff, T. (2014) Mutual learning as a resource for research design, in *PDC '14 Proceedings of the 13th Participatory Design Conference*: Short Papers, Industry Cases, Workshop Descriptions, Doctoral Consortium papers, and Keynote abstracts, Vol. 2, pp. 25-28.

Roth, W. & Lee, Y. (2007) "Vygotsky's Neglected Legacy": Cultural-Historical Activity Theory, *Review of Educational Research*, Vol. 77, No. 2, pp. 186-232.

Salvador, T., Bell, G. & Anderson, K. (1999) Design Ethnography, *Design Management*, Vol. 10, No. 4, pp. 35-41.

Sam, C. (2012) Activity Theory and Qualitative Research in Digital Domains, *Theory Into Practice*, Vol. 51, No. 2, pp. 83-90. Available from: https://goo.gl/k8eyNB [Accessed: 25th January 2019]

Sanders, E. B.-N. & Stappers, P. (2008) Co-creation and the new landscapes of design, *CoDesign*, Vol. 4, No. 1, pp. 5-18.

Sangiorgi, D. (2009) Building up a framework for Service Design research, in the *8th EAD (European Academy of Desgin) conference 'Connexity'*, Aberdeen, Scotland.

Schugurensky, D. (2010) Introductory essay: Citizenship learning for and through participatory democracy, in E. Pinnington & D. Schugurensky [Eds.] *Learning citizenship by practicing democracy: International initiatives and perspectives*. Newcastle upon Tyne: Cambridge Scholars Publishing, pp. 1-16.

Sennett, R. (2006) *The Culture of the New Capitalism*. London, UK: Yale University Press.

Simonsen, J. & Robertson, T. (2013) *Routledge International Handbook of Participatory Design*. New York: Routledge.

Smith, R.C., Bossen, C. & Kanstrup, A.M. (2017) Participatory design in an era of participation, *CoDesign*, Vol. 13, No.2, pp. 65-69.

Spinuzzi, C. (2005) The Methodology of Participatory Design, *Society for Technical Communication*, Vol. 52, No. 2, pp. 163-174.

Star, S.L., & Bowker, G.C. (2002) How to infrastructure?, in L.A. Lievrouw & S.L. Livingstone[Eds], *The handbook of new media. Social shaping and consequences of ICTs*. London: Sage Publications, pp. 151–162.

Stonehouse, P., Allison, P. & Carr, D. (2011) Aristotle, Plato, and Socrates: Ancient Greek Perspectives on Experiential Learning, in T.E. Smith & E.K. Clifford [Eds], *Sourcebook of experiential education: Key thinkers and their contributions*. London: Routledge, pp. 18-25.

Suchman, L.A. (1994) Working relations of technology production and use, *Computer Supported Cooperative Work*, Vol. 2, No. 1, pp. 21-39.

Vygotsky, L. (1998) *The collected works of L. S. Vygotsky. Volume 5: Child psychology*, in R.W. Rieber [Ed] New York: Plenum Press.

Vygotsky, L. (1978) *Mind in society: the psychology of higher mental functions*. Cambridge: University Press.

Vygotsky, L. (1971) *The Psychology of Art*. London: MIT Press.

Walter, M. (2009) *Social Research Methods* (2nd ed.), Australia: Oxford University Press.

Wenger, E. (1998) *Communities of practice.* Cambridge, UK: Cambridge University.

Wenger, E., Fenton-O'Creevy, M., Hutchinson, S., Kubiak, C. & Wenger-Trayner, B. (2015) *Learning in Landscapes of Practice*. New York: Routledge.

Whyte, W.F. (1991) *Participatory Action Research*. Newbury Park: Sage.

Zahedi, M., Tessier, V. & Hawey, D. (2017) Understanding Collaborative Design Through Activity Theory, *The Design Journal*, Vol. 20, sup1, pp. S4611-S4620.