PARTICIPATORY DESIGN PROCESS ENGAGING INTERGENERATIONAL COHORTS: USING VALUE ELICITATION TO CO-CREATE INTERACTIVE MEDIA EXPERIENCE

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Abbreviations

PP: Probing Project

PQ: Probing Question

CGEP: Cordon Gris European Project

IGP: Intergenerational Participants

ID: Intergenerational Dyad

Imi: Intergenerational Mediated Interaction

MIMI: Model of Intergenerational Mediated Interaction

Foreword

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As a millennial, I grew up in a society that was deeply changing.

I lived on my skin the arrival of computers, the Internet, mobile and smart phones, and I was really fascinated about the unbelievable power and attraction that those devices had on me and on society.

I also started to realise how technology was embedded in people's everyday life - particularly among younger generations - to the extent that their offline and online realities were increasingly becoming the extension one of the other. I experienced my everyday life changing because of technology. Moreover, growing up in Italy during the 'Berlusconi Era' really made me reflect on how TV and media outlets were impacting on the behaviour of the whole nation. I began questioning myself about the role that psychologists might play in media production.

Technology is here to stay, and I believe that as a psychologist I could contribute to the design and research of new technology that can be useful, meaningful, and can enhance people's experience and have an impact on their quality of life.

This Ph.D. allowed me to pursue this goal. I had the opportunity to embark in a research journey to explore how psychological theories and research methods can be applied to the design cycle of new technology, as I have the pleasure to present in this thesis.

Abstract

This thesis explores the inclusive design challenges of engaging intergenerational participants (IGP) in a participatory design process. The IGP comprise a paired generation, grandparent (aged 65 and over) and grandchild (4-6-years-old), leveraging their pre-existing relationship. Overarching research questions aim at exploring how to adequately reflect IGP voices and values in interactive media products intended for them; and how to integrate new and effective methodologies and tools for co-engaging the two generations between themselves with enhanced creativity in design processes.

Under the scheme of an industry-based Ph.D. programme, the investigation is phased with three probing projects building towards the fourth main project, conducted in close collaboration with small-scale and large-scale media companies anchored in the Northwest region of England. For the fourth project, a unique data set is drawn from participatory design sessions in the form of ethnographic documents (e.g., fieldnotes), video corpus, text-data, and artifacts acquired and co-created during 8 months of face-to-face and virtual participatory sessions with IGP. Data was analysed applying methods such as video coding and thematic and axial analysis across multiple documentation. The main findings are synthesized and presented as: 1) interaction patterns between two age groups when either sharing or co-creating interactive media experiences; 2) a set of IGP values elicited through storytelling-based methods in participatory activities; 3) a values-led model to predict IGP psychological processes guiding their shared media experiences; and 4) a set of methodological recommendations and criteria to engage younger and older citizens together, in participatory design processes. The resulting data highlight IGP's interaction patterns that are centred around purpose sharing, collaboration, fun seeking, helping each other, and mutual assurance. It also highlights that IGP place a high value on being safe, autonomous, and competent in shared media experiences. The main output is a values-led to comprehend intergenerational interactions and a methodological guide consisting of a list of recommendations on how to engage IGP in participatory design processes, aimed at designers or researchers working with intergenerational cohorts.

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The abstract could emphasise more strongly that the main output is a methodological guide.

The research contributes to social awareness by systemically modelling IGP's underlying values and interaction dynamics while informing values-led design practices in the media industry. Further design and research hypotheses can be generated using the model to facilitate and promote positive interaction behaviours and IGP's wellbeing. This research also contributes to strengthening participatory design methodologies through interdisciplinary research approaches with the theoretical underpinning from personal construct psychology (PCP) applied to data analysis and modelling in this work.

CHAPTER 1

Introduction

The work presented in this thesis is primarily built upon four projects in collaboration with the media industry in the Northwest of England and developed as part of Transformation Northwest Doctoral Programme (TNW). The TNW Doctoral Programme is rooted in design and creative practices and my contribution entailed the application of psychological theories and research methods to the design cycle of digital products (e.g., mobile app systems, interactive media, digital interfaces). The perspective on research is strongly interdisciplinary, ranging over clinical and media psychology, Human Computer Interaction (HCI), User Experience (UX), and Human Centred Design.

The central theme linking the four projects is the design of new technologies and media experiences for diversity and inclusivity of vulnerable and marginalised groups, specifically younger and older demographics. The research aimed at bringing awareness of those groups' position in the research and design community, driving the design of technology for sustaining and enhancing their everyday life, promoting accessibility and inclusivity in the digital society, and ultimately positively impacting on their wellbeing.

Through the collaborations with industry, an exploration of a cross section of current design practices was completed and triggered the idea of researching how to engage intergenerational cohorts in the design cycle. The benefits of intergenerational interactions have been widely acknowledged, for example by researchers such as Silverstein and Teater (Silverstein & Giarrusso, 2010; Teater, 2016), and inspired the methodological challenge at the core of the main thesis project run in collaboration with the BBC (British Broadcasting Company) and defined as follows: "How can we engage intergenerational cohorts in the design of media experiences to foster intergenerational interactions mediated by technology?".

Therefore, the project sought to develop new methodologies to engage intergenerational cohorts in the design cycle, enhancing their creativity and co-creating shared value through participatory design activities. To our knowledge, this was the first time that research was conducted involving young (specifically preschool children) and old cohorts together, in participatory design process. The intergenerational pairs were each engaged in the research activities as a whole system, rather than considering

children and adults separately, as individual entities. Their relationship with technologies was approached through the lens of Personal Construct Psychology (PCP) which provides a theoretical framework to understand the psychological processes that lead the interaction mediated by technology, between younger and older demographics.

Participatory design (PD), originated in the Scandinavian tradition (e.g., Nygaard & Bergo, 1975; Kyng and Mathiassen, 1982; Ehn, 1988), was selected for its democratic ideal that those who will be using an artifact should be given the right to decide how it should be designed. Intergenerational cohorts were therefore empowered with the right to share their expertise in their own practices and their contribution was considered essential in the design cycle. The design process was intended as an opportunity for mutual learning between intergenerational cohorts and professional designers, where knowledge from people's practice with technology and design expertise are necessary ingredients (Bratteteig et al., 2012).

It follows that a participatory design process is intended as a knowledge-generating process leveraging participants' habits and practice with technology in their everyday life (Bergold & Thomas, 2012).

This emphasis on active participation of all stakeholders was the guiding principle for the research presented in this thesis, where intergenerational participants (IGP) and designers were engaged as equal partners for interpreting and shaping activities as well as generating knowledge.

1.1. Transformation Northwest Doctoral Programme

Transformation Northwest (TNW) is a Doctoral Training Programme that applies design and creative techniques to maximize new product and service opportunities for business in the northwest of the England. TNW is one of the Northwest Consortium Doctoral Training Partnership (NWCDTP) programme, and it had 12 studentships, which were funded by the Arts and Humanities Research Council (AHRC) as part of the National Productivity Investment Fund (NPIF). The TNW Doctoral Programme is built on an innovative cooperation and collaboration model across five core NWCDTP partner institutions (Lancaster, Manchester Metropolitan, Liverpool, Salford, and Manchester Universities), and industry partners. Therefore, the outcome of the programme consisted

of several collaborations between students and industrial organisations in the northwest of England.

The nature of TNW Doctoral Programme requires strong interdisciplinary collaboration linking large and small-scale businesses together.

The starting point for this research was Teresa May's Government's Industrial Strategy (BEIS, 2017), which laid out plans for boosting productivity and growth in the country with investment in skills, industries, and infrastructure. In response to this document, the TNW cohort co-authored a report entitled "Driving Industrial Strategy for Northwest Growth: The Role of the Creative Industries" (TNW, 2018a), highlighting five research themes:

1. Forge stronger links between technology, design, and people
2. Boost productivity through digital, technical, and creative skills
3. Support Creative Industries and SMEs to grow, expand and export
4. Build united and inclusive leadership systems
5. Ensure communities are at the heart of all growth plans

Each researcher of the TNW cohort used one or more of these themes, as well as the Industrial Strategy (BEIS, 2017) as the starting point for their research. Over the course of the programme, the research themes continued to be revisited, re-examined, and redefined, to reflect the new and emerging challenges facing the Northwest of England and the UK as a whole. The research took place in extremely unique historical circumstances and further challenges were presented with the global pandemic of Covid-19 and the political landscape of the post-Brexit era. Challenges and outcomes of the research journey of the TNW cohort will be presented in a final report. A TNW Design Charter (TNW, 2018b) was also created to challenge the status quo of traditional design research. The charter aspires to illustrate how design holds the potential to increase connectivity, knowledge exchange and foster new, more participatory ways of working, offering the chance for a true transformation of the northwest region of England.

Collaborating across multiple channels using a variety of research methods, the focus of the research is on the application of this Ph.D. with a range of businesses, in the form of collaborations or co-creation of projects. Whereby an applied Ph.D. was

undertaken, comprising four thematically linked projects in collaboration with industry partners. In a continuous formative process, each project laid the basis for the next one.

The potential incompatibility between Ph.D. research and industry application (e.g., diverse needs, return on investment, business goals) can be avoided by designing alternative processes for forming research questions. In other words, starting with well-formulated research questions, as in traditional Ph.D., could fail to meet industry's real needs and interest. Therefore, this Ph.D. journey began with an exploration of what questions needed to be asked, through collaborations with businesses based in the northwest of England. Three probing projects were conducted to assess real world situations with industry products as a formative process for defining research questions for the fourth and main thesis project, completed in collaboration with the BBC.

The research questions for the main thesis project were established during the probing explorations and were iteratively refined and expanded according to the state of the art of the research in the field. Similarly, the research design of the main thesis project followed a formative approach and was informed by the methodological assessments completed through the probing projects. It is through this research journey that a methodological guide with recommendations about how to engage intergenerational cohorts in the participatory design process was created as the main contribution of this research.

1.2. Towards Inclusive and People Centred Design Practices: Understanding People's Relationship with Technology through the lens of Personal Construct Psychology

> "Indeed, the whole mechanism of generating ourselves as describers and observers tells us that our world, as the world which we bring forth in our coexistence with others, will always have precisely that mixture of regularity and mutability, that combination of solidity and shifting sand, so typical of human experience when we look at it up close." (Maturana and Varela, 1987, p.241)

Recently in HCI, research started to focus on the relationship between people and technology in terms of affective qualities rather than efficiency, experiences rather than

performance, fun and playability rather than task completion and error rate, and sociability rather than learnability (Hassenzahl & Tractinsky, 2006). Due to this focus shift in HCI research agenda, the appropriate methodology and procedures had to be developed to explore the relationships between human and machine that endorse affective, experiential, and fun quality of interaction.

In the first decade of the new millennium, researchers started reflecting on the ongoing changes in the HCI field and on the need to address human values in the development of intelligent interactions between human and technology (Stephanidis et al., 2019).

New societal challenges arise parallel with technology usage, such as techno-dependency, ethics, security and privacy issues, accessibility and universal access, well-being, health and eudaimonia. Chaired by Constantine Stephanidis, a group of 32 experts in the community of the HCI made the collective effort for identifying the seven Grand Challenges for redefining HCI research (Ibid.) (Fig. 1).

The authors outlined the urgence to approach research from a new paradigm, where boundaries between technology and people and between technology and the physical world are reconsidered. The need to outline and develop a new role, function and implications of design are highlighted by the experts. An interdisciplinary and multidisciplinary approach to research of the relationship between people and technology is the opportunity to acquire new tools, methods, theories, and perspectives, moving towards humane approaches on intelligent technologies (Ibid.).

Figure 1. The Seven Grand Challenges in HCI (Reprinted from "Seven HCI Grand Challenges," by Stephanidis et al., 2019).

In this context, the aspiration of this Ph.D. is to propose alternative solutions for this unsolved question, approaching the research of the relationship between humans and technology from an interdisciplinary perspective, through the lens of Personal Construct Psychology (PCP).

PCP is based on the Personal Construct Theory (PCT) by George Kelly (Kelly, 1955; 1963; 1969). The PCT attempts to approach psychology and the understanding of the human being from a holistic perspective, rejecting the fragmented approach of psychologies of cognition and emotion, instead concentrating on the individual as an "irreducible unit" (Bannister & Fransella, 1971, p. 29). This perspective could provide a holistic framework to the understanding of the experience of people with technology, not trying to identify the components that constitute the experience but instead approaching it as a process, as will be further presented in this thesis.

The PCT is rooted in the constructive alternativism assuming that "all of our present interpretations of the universe are subject to revision or replacement" (Kelly, 1955, p.11). This philosophical position states that there are alternative ways in which we can know and intend the external world.

Kelly's epistemological point of view suggests an alternative to the prevailing approach to psychology in his era, vastly based on the attempt to find a positivist

psychology. Instead of intending the mind as a 'black box' and approach the person as a passive responder of external stimuli (e.g., behaviourism) or as pushed by unconscious impulses (e.g., psychoanalysis), he approaches the individual as an active sense-maker, by conferring his/her free-will and agency.

According to the theory, we as human beings are constantly engaged in making sense of what is happening around us. Kelly emphasized human's ability to actively interpret the world through a set of *personal constructs* used to give meaning to the events happening in our life. The theory is anchored to the personal experience and the meanings that the person confers to it; in that sense, construing is meant as giving an interpretation to sensory information coming from the external world. Construing the external world, meaning interpretating the sensory experience, is not to be intended as an aware process; it is instead intended as a heuristic way adopted by the human beings to organise the countless stimuli coming from the external world.

Thus, PCP is deeply person-centred and focuses on the way the individual knows, interprets, and actively construes the world around him/her.

The foundational principles of PCP are that: (1) knowledge is not passively received but actively built up by the cognizing subject; (2) the function of cognition is adaptive to serve the enhancement of the organism's management of the experience, not the discovery of ontological reality.

The PCT is mainly used in psychotherapy, educational and organisational contexts, but rarely applied in research in the field of HCI and UX (see Chapter 2, Section 2.2, for an overview of PCT and HCI). Nevertheless, the PCT holds the potential for further elaborations and applications and according to Walker and Winter (Walker & Winter, 2007, p. 469): "the extensive developments that have occurred in personal construct assessment techniques have focused more on measures of the structure and content of construing than on construing processes. The assessment of the latter should be a priority for further developments in the area".

Therefore, the goal of this research is to explore the process of construing meanings and values involved in the relationship between people, specifically intergenerational cohorts, and technology to gather their unique perspective and how they make sense of their shared media experience.

The main contribution of this work is to explore methodologies to engage intergenerational cohorts, specifically preschool children, and older adults, in participatory design process. This involved the application of PCP to develop new techniques and methods to co-create media experiences with intergenerational cohorts, eliciting their values. Whereby, PCP guided the interpretation of their observed and reported behaviour, laying down the basis of the understanding of their construing processes, elicited through their co-engagement in the research activities.

In particular, under a comprehensive HCI umbrella, this work connects PCP - clinical psychology area, values-led PD – that is human-centred design field of research, and UX – specifically intergenerational user experience.

This research contributes to all three areas of subject domains, targeting as main beneficiary the intergenerational cohorts.

There is increasing recognition within HCI and UX for a values-led approach (Pereira and Baranauskas, 2018). Furthermore, this work is also of interest in Positive Psychology and Psychology of Ageing where a more empowering view of lifespan is gaining traction.

Therefore, the contribution of this research extends to the interdisciplinary area concerning intergenerational programs.

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1.3. Designing Technology for Vulnerable and Marginalised Groups: The Role of Ageing Population and Children in the Design Cycle

In the last decades, the interest in designing technology for vulnerable and marginalised groups, especially children and older adults dramatically increased. The attention of the market for developing products aimed at those age groups is high, considering that we are living in an ageing society in which the percentage of people aged 65+ is rapidly increasing and is "projected to jump to nearly a quarter of the population by 2045" (Haque et al., 2017) and that children, especially young children, are the more frequent users of digital devices and technologies in general, with 57% of children in the UK aged 5-7 years old owning their own tablet and parents reporting to find it harder to control their child's screen time, especially during the Covid-19 pandemic (Ofcom, 2021).

However, the role of those generations in the design cycle of new technologies is often limited and marginalised. Rare are the opportunities for designers to directly engage with those age groups in the design cycle and the risk is to develop obsolete technology, not tailored to those groups' needs but based on assumptions and stereotypes about those cohorts.

Designing technologies deeply tailored to people's needs, skills, and capabilities, and fitted to their everyday life routines has the potential to become the recipe for developing successful and long-lasting products. At the same time, fostering inclusivity and engagement of those groups in the digitalisation process have the potential to positively impact on a personal but also societal level, especially for vulnerable and marginalised groups which are often at risk of being marginalised. Designing with vulnerable groups could play a role in facing current societal challenges, such as isolation and individualism, promoting ethical digital cultures based on shared values.

According to Section 59 of the Safeguarding Vulnerable Groups Act (Hughes, 2009), vulnerable groups include children younger than 18-years-old and vulnerable adult who, for instance, are living in residential accommodation, such as a care home or a residential special school, are receiving domiciliary care in his or her own home or requires assistance in the conduct of his or her own affairs.

Inclusion and engagement in the digitalisation process could have also an impact on people's wellbeing, meant as the condition in which "every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community" (WHO, 2014). Furthermore, technology designed for diversity and aimed at impacting on people's wellbeing could contribute to the key economic goal of "an effective, efficient, and financially viable health and social care system" as stated in the Industrial Strategy Commission report (2017, p.5), for example promoting self-management of health condition, raising awareness about healthy behaviour, and promoting digital skills for all.

In this context, this research aspires to contribute to the understanding of how vulnerable and marginalised groups, especially older adults, and children, perceive and make sense of their experience with technology, the role that it plays in their live-world, and how it can enhance their life rather than just address their impairments. The ethos

driving the research is the establishment of an active role for intergenerational cohorts in the design cycle of new technologies, spurring their direct participation in the definition of problems and generation of solutions.

Starting with an interdisciplinary literature review, presented in Chapter 2 - Psychology And HCI: An Interdisciplinary Approach to literature review - an historical outline of the HCI research area is presented through a chronological excursus on the progression of the role of the final user in the design cycle, from the first attempt to combine psychological insights with software and technology development to the contemporary human centred approaches to design. This chapter aims at providing a context to the interdisciplinary perspective adopted in this Ph.D., highlighting future possibilities of applications of psychological knowledge, particularly of PCP, to the design of technologies. In this thesis, the term user is adopted when referring to existent research and literature, considering that this is the term predominantly used by practitioners, researchers, and designers. However, people involved in the projects designed and completed as part of this Ph.D. are addressed as participants, audiences or more simply as individuals, according to the role they played in the research. The choice not to use such a popular term as user highlights the aspiration to adopt a humane approach to the understanding of their relationship with technology, addressing them firstly as individuals, rather than simply as users of a product or a system.

The third chapter provides an overview on the methodology of the research. Action research combined with constructivist grounded theory (CGT) and participatory design (PD) have been adopted to meet the interdisciplinary and collaborative nature of TNW doctoral programme within which this research seats. The constructivist approach to GT has been adopted with the aim to explore how people make sense of their own experience with technology, generating insights into personal meanings (Denicolo et al., 2016).

As formalised above, this Ph.D. differs from classical Ph.D. for a lack of pre-established research questions; instead, the research questions have been established through the research journey and were revised and formalised through an initial explorative phase. The exploratory phase began with three probing projects run in collaboration with design studios and small businesses in the media industries based in

the northwest of England, as presented in Chapter 4 – Probing Projects: Assessing methodologies. This chapter elaborates the process which guided the definition of the scope of research and of the methodology of the main thesis project. The observations undertaken in the probing projects steered the research journey towards the adoption of participatory design as the main approach to the co-engagement of intergenerational cohorts in the design cycle of a media experience aimed at both those age groups. This led the basis for the research design of the main thesis project, run in collaboration of the BBC and presented in Chapter 5 – Model of Intergenerational Mediated Interaction (MIMI) project: Engaging Preschool Children and Older Adults in Values-Led Participatory Design of Intergenerational Media Experiences aimed at Fostering Interactions between Generations. The results of the participatory sessions run with intergenerational participants (IGP) and professional designers are reported and a model of intergenerational mediated interaction (the MIMI) is proposed. The model integrates patterns of interaction with a set of values established through the participatory activities designed for IGP. The model informed and guided the definition of a design concept – a narrative-based interactive game - then evaluated with the same sample of IGP. As a conclusion, a reflective exploration of the whole research journey is presented and a set of methodological recommendations for designing technology with and for intergenerational cohorts is discussed, in Chapter 6.

CHAPTER 2

Psychology and HCI: an Interdisciplinary Approach to Literature Review

2.1. Psychology and HCI: Historical Overview

Human Computer Interaction (HCI) is an interdisciplinary research area, ranging across psychology and the social sciences on the one hand, and computer science and technology on the other. It is the area of study defined as "the view the non-specialist public has of computer and information technology and its impact on their lives" (Carroll, 1997, p. 67); it is the 'visible' part of computer science, the one the general public interact with.

From its beginning, HCI evolved quickly. The historical foundation of the discipline goes back to the 1970s, with the emergence of the Software Psychology research area. The aim of Software Psychology was to guide software design and programming towards a better understanding of human behaviour and cognitive models. Software psychology was grounded on the methodological axiom of the waterfall model of top-down decomposition and sequenced stages (Carroll, 1997) (Fig. 2).

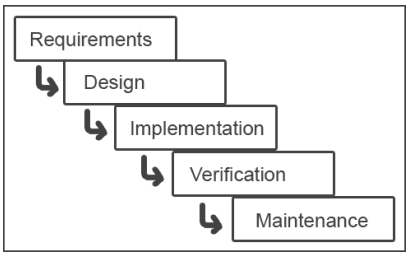

Figure 2. Top-down decomposition and sequenced stages (reprinted from Carroll, 1997).

Within this research paradigm, psychology had two main roles (Ibid):

1) to produce general descriptions of human beings interacting with systems and software, to be then synthesized in guidelines for developers

2) to verify the usability of systems and software

Those methodological applications of psychology to software development turned out to be problematic in terms of time and generalization of the outcomes (ibid.). This approach to research seemed to focus on unrepresentative situations and decontextualized observations of user interactions with the computing systems. Carroll (1997) described it as reductive and restricted in academic contexts, therefore the outcomes resulted in being representative of only a small sample of users, and not generalizable in guidelines for developers. Moreover, the inadequacies of the waterfall model clearly emerged from empirical observations of the design process; design is often a circular and iterative process and cannot be represented by the linearity involved in the waterfall model.

Those considerations led to a new approach to design, inspired by the ideas of the industrial designer Dreyfuss, who defined the design process as an iterative development constituted by different stages (Dreyfuss, 1955):

1) early prototyping
2) involvement of real users
3) introduction of new functions
4) many cycles of design iteration.

2.1.1. The Involvement of End Users

Inspired by Dreyfuss' approach to design, the focus in HCI in the '80s moved towards the rapid prototyping approach, user participation, user interface metaphors for presenting new computing systems, and iterative cycles of research. It was in this period that the thinking aloud method (Degroot, 1965; Newell and Simon, 1972) became the central empirical and evaluation method in HCI.

To overcome the problem of de-contextualized and non-generalizable research outcomes in HCI, Card et al. (1983) attempted to outline a scientific framework, GOMS: Goals, Operators, Methods, and Selection rules. The model provided a framework to systematically analyse the observed interactions between users and computing systems, and to quantitatively predict human behaviour. First, the model was accepted as a significant advance in the cognitive psychology of the time because it included many cognitive factors that enabled designers to produce predictions about real tasks (Carroll,

1997). Nevertheless, one of its biggest limitations was that the learning process of computing systems by non-expert users wasn't included in the framework; the learning process was at that time one of the liveliest topics of debate and the biggest challenge for designers (ibid.). Another limitation of the GOMS framework was the small amount of freedom that was provided to users (Carroll, 1997). The model approached users as information processors; while, on the contrary, empirical observations demonstrated that users were more likely to learn-by-doing and playing with the system, constructing their own understanding of the interaction with the interface rather than passively processing information (ibid.).

It is from this moment in the history of HCI that the approach to user research shifted towards the consideration of human agency and users' active role in the interaction with computing systems.

2.1.2. User-Centred Approach to the Design of Technology

In the '90s, we observed a radical shift towards a user-centred approach to design (UCD). In this sense, usability, users' needs, and preferences became the primary goals of the system development process.

In 1988, HCI was listed by the Association for Computing Machinery (ACM) as one of the nine core areas of the computer science discipline (Denning et al., 1989). It was in this period that usability engineering emerged as the umbrella terminology that encompassed a range of methodologies for the evaluation of the system usability. The research focus was on the evaluation of the system with respect to measurable criteria.

The interest here was towards user interface design in addition to the computing system, as it had been in previous years; it is from that period of research that the mouse, the 'desktop metaphor' and Windows management emerged (Carroll, 1997). This approach to design and user research pushed the concept of user involvement beyond engagement in the evaluation of initial prototypes; participatory design became prominent, and users

were also involved in setting design goals and planning prototypes rather than only in the testing phase (Carroll, 1997).

Attention to the context of use of the product also became central to the HCI investigation. Contextual design, as field study, was meant to replace the observation in laboratory, not as a representative of the real-world user interaction (Wixon et al., 1990). Following the establishment of usability engineering, the need to "position a given design in a larger context of issues" (Carroll, 1997, p. 72), resulted in the design rationale of the system. The design rationale included the perspective of designers, customers, users, and marketers in the design of the system. Thus, the system would embody needs, abilities, and expectations of all the stakeholders (Moran and Carroll, 1996).

Design rationale made "the process and outcomes of design more explicit and allows iterative development to be more systematic and manageable" (Carroll, 1997, p. 73). However, it can be deeply situation oriented and far removed from representing a classic user model. Moreover, the stakeholders involved in the design process are often from various disciplines, speak different languages and are driven by different values and motivations, and would therefore pay attention to different issues when addressing a design problem (Carroll, 1997).

It was in the late 1990s that the contribution to HCI shifted from being merely a topic of interest of cognitive psychology to one that engaged with the social sciences debate, thus also involving anthropologists and sociologists in the research (Bowker et al., 1995; Thomas, 1995).

In the history of HCI, this period is recalled as cooperative activity. As a result of the failure of the cognitive approach to provide a comprehensive paradigm in HCI, the attention moved to a more social and contextual orientation (Carroll, 1997). Traditionally, HCI tended to observe and analyse human behaviour in isolation from the context. Instead, the new stream of research was oriented to an alternative paradigm inspired by the Activity Theory of Vygotsky (Nardi, 1995; Wertsch, 1985). The Activity Theory (Vygotsky, 1978) affirms a continuous dialectical approach to the interaction between the individual and their context and considers the person as part of an active system of continuous interaction between technological factors, social factors, and individual attitudes.

This approach to HCI emphasizes that human activities are mediated and transformed by human creations (e.g., devices, technology), shifting the focus on how

people can negotiate with the social and technological environment to solve problems and learn (Carroll, 1997). The difficulty was (and still is) about the fragmentation of organizing and integrating a wide variety of methodologies, theoretical perspectives, problems, and people that were part of the HCI community.

2.1.3. Towards a Holistic Perspective on the User Experience

In recent years, new digital artefacts have undergone radical changes. With technological advancements such as mobile technologies, wireless networks, and the implementation of touch screens, a new range of products have become embedded in people's life, such as laptops, tablets, and smart phones. Nowadays, computers are pervasive and ubiquitous, and innovation in computing engineer is moving towards new scenarios including gestures, touches, movements, voices and sounds as new ways of interacting with technology.

It is in this context that interaction design emerged as an integrative approach to HCI, as a more holistic perspective to the understanding of the user experience. Interaction design assumes a multidisciplinary point of view, which is not only limited to user interaction with computers, but relates to a wider range of objects, products, artefacts, and services, in line with the ecology of current technological innovation.

Trends in interaction design and HCI include technology as experience (Mccarthy & Wright, 2004); usability and pleasure in interactive products (Norman, 2004); persuasive technologies (Fogg, 2000); affective design (Aboulafia and Bannon, 2004); virtual and augmented realities and artificial intelligence, among others.

The premises for exploring how humans can interact with digital technologies, and more fundamentally how this relationship is established, have also shifted from the consideration of human cognition as strongly linked to bodily actions. The introduction in cognitive science of the concepts of enaction and embodiment also opened a debate among HCI researchers and designers about how interaction can be understood "not only in terms of what is being done – as in the computational approaches – but more fundamentally how relationships between people and technologies develop" (Rocha, 2012, p. 6). As stated by Varela et al. (1992, p. 9) the concept of enaction "emphasizes the growing belief that cognition is not the representation of a pre-given world by a pre-

given mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs". Enaction is meant as the idea "that organisms create their own experience through their actions. Organisms are not passive receivers of input from the environment but are actors in the environment such that what they experience is shaped by how they act" (Hutchins, n.d., p. 428). Varela et al. (1992) claimed the centrality of the co-determination and co-specification of subject and object, organism and world, self and other, whereby being and knowing co-determine and co-specify each other.

In line with the contribution of social and psychological sciences to the HCI discipline, the contemporary debate moves towards the shift from cognitive to the enactive and embodied perspective on human cognition, recognizing the importance of understanding body, mind and context as deeply connected and co-dependent. Therefore, the open question is how the embodied cognition and enactive perspective can be applied to inform the design and development of technology.

Clark (2004, p.38) provided a strong example which illustrates the embodied nature of the experience of interaction with an application on a computer: "the accomplished writer, armed with pen and paper, usually pays no heed to the pen and paper tools, while attempting to create an essay or a poem. They have become transparent equipment, tools whose use and functioning have become so deeply dovetailed to the biological system that there is a very real sense in which—while they are up and running—the problem-solving system just is the composite of the biological system and these non-biological tools. The artist's sketch pad and the blind person's cane can come to function as transparent equipment, as may certain well-used and well-integrated items of higher technology, like a teenager's cell phone perhaps".

This approach to the understanding of the human experience of interaction with digital systems, while not neglecting the autonomy of human beings and the dynamic phenomena between action and context, could be a fruitful perspective in the field to develop more inclusive and transparent user experiences.

2.2. PCT and HCI: The Repertory Grid Technique

During the 1980s, interest in the Repertory Grid Technique (RGT) reached its peak with a special issue devoted to the topic in the International Journal of Man-Machine Studies (Vol. 13, No. 1, 1980).

The RGT is borrowed from the Personal Construct Theory (PCT) (Kelly, 1955) and is a technique for empirically eliciting and evaluating people's experiences, mainly in clinical settings. Before introducing how RGT was applied in HCI research area, an introduction to the foundations of the PCT is here provided.

The PCT has the structure of a mathematical theory, with a foundational postulate and eleven corollaries following from the postulate and, in part, elaborating it in greater detail. The postulate and the corollaries aim at providing a matrix of understanding of the psychological processes that channel human behaviour.

The PCT fundamental postulate states: "A person's processes are psychologically channelized by the ways in which he anticipates events" (Kelly, 1955, p. 32). As an example, and according to the postulate, if a child anticipates that when he/she cries, someone will rush to comfort him/her, he/she will cry every time in need of comfort.

The concept of *anticipation* is at the core of the whole theory. The person is seen as involved in a continuous effort to predict the events that will happen in the near future, rather than pushed by forces deriving from his past (as in traditional psychoanalysis). Further, the focus is on the person's processes, conceptualised from a psychological perspective. The person's processes are intended as his/her *actions*. In other words, the theory sees the person as a behaving organism constituted by a series of psychological processes (actions) targeted to move away from confusion, towards giving sense to the world around him/her. Whereby, the individual is not meant as a static entity, but as a kinetic organism.

Thus, according to the foundational postulate, the person's actions are guided (channelised) by a network of pathways (anticipations) which works for the individual as a map, facilitating and at the same time restricting his/her range of action.

Other psychological theories have assumed that a person is a system to process information, to reduce drives or to obtain fulfilment. Instead, the PCT stresses that a person is constantly engaged in understanding their own nature and the nature of the

world, testing that understanding in terms of how it is useful or useless to anticipate the future. In simpler words, the theory states that we all have our own view of the world and our own expectations (anticipations) of what will happen in given situations. These expectations are tested through our own actions and are validated or invalidated according to the results of our behaviour. Thinking about the previous example, if when the baby cries nobody will rush to comfort him/her, the baby would consider this anticipation not useful to predict what will happen in similar future situations and he/she would be likely to revision it.

Another core principle of PCT is that people actively give sense to the world through a set *of bipolar personal constructs* (e.g., white vs black), defined as dimensions of meanings and seen as constituted by two poles, a pole of affirmation and a negative pole. In other words, the theory suggests that we never affirm without implicitly denying, within a context. For instance, saying that something is white implies denying that is black. Personal constructs are intended as the minimal unit of knowledge that works for similarities and differentiations.

The dichotomous nature of the personal constructs allows the individual to discriminate among events, recognizing similarities between two phenomena that are therefore different from a third. This discrimination process is considered at the basis of the construing process of the individual. According to the PCT, it is through discrimination, using our personal constructs, that we give sense to events.

Personal constructs can be explicitly formulated, for instance when verbal labels are attached to them or implicitly acted, as in preverbal construing. Preverbal construing is typical of infants or children; it describes the discrimination capacity of events prior to the development of language (Kelly, 1955, Vol. 2, p. 6), meaning that no verbal labels are attached to the constructs used to discriminate those particular events. For instance, the discriminations babies make between faces at a very early age have no verbal labels attached to them, however, they can discriminate new faces from the face that appears regularly, making them more comfortable with the more familiar face than with other faces.

Preverbal constructs are intended as existing at a low-level of awareness, meaning they are often difficult to recognize.

Personal constructs are seen as 'personal coordinates' formed through the sense-making process based on the individual experiences. In this sense, we can intend the personal constructs as patterns of regularity emerging through the interpretation of the external world. For instance, the infant in the previous example can discriminate between familiar and unfamiliar faces, based on the faces that regularly appeared to him/her in previous experiences.

The PCT talks about *personal* constructs, meaning that each individual form their own constructs. This occurs because the same experience could be differently interpreted by people. As an example, while a deeply religious person may interpret the awakening after a long coma as a miracle, a neurologist may interpret it as the positive effect of the pharmacological treatment. According to the PCT, the personal constructs are hierarchically organized in a personal system that becomes the basis for anticipations about current and future events, channelling behaviour in particular directions.

Those two core principles of PCT, anticipation and personal constructs, are strictly related. According to the theory, anticipations are based on personal constructs and at their turn constructs are established from the experience, in a recursive cycle. To give an analogy, as the sailor uses different coordinates to predict how long to get to the destination, so the person uses his/her personal constructs as coordinates to formulate an anticipation (prediction) of how the course of an event would unfold. It is only through the experience of sailing that the sailor can test if his or her predictions are reliable enough or need to be refined.

The anticipation of the event could therefore be intended as the result of the interrelations of those personal constructs relevant to give sense to that given situation. For instance, a person could anticipate that if he/she is listening to good music then it would be traditional jazz and not modern jazz. This anticipation implies the use of several constructs formed through previous experiences listening to music, such as *music vs noise*, *good music vs bad music*, and *modern jazz vs traditional jazz*.

Within this theoretical framework, the RGT was designed by Kelly as a useful tool to access and elicit the personal constructs of the individual, mainly in clinical settings.

The RGT requires the respondent to compare sets of three significant people, products, or services, differentiating in which two of them are alike, and different from the third (Neimeyer and Neimeyer, 2002).

The individual is presented with one triad at a time and asked in what way two of the three elements are similar and differ from the third. For instance, if the focus of the study is the person's family system, the triad provided could be mum-dad-sister.

The respondent would be therefore asked "how two of those members of your family are alike and how are they different from the third one?". Instead, if the object of the study is the consumer perception of soft drink brands, the triad provided could be Coca Cola-Seven Up-Pepsi.

The respondent would be asked to answer how two of those brands are similar and different from the third one. The answers to those questions are considered as the personal constructs used by the individual to make sense of events related to that area of interest, for instance his/her family system.

The individual is then asked to rate the elements previously assessed according to their own constructs, which emerged in the first step. Therefore, through the comparison of a large number of triads, the respondent is spurred to elicit a broad sample of personal constructs used to give sense to their experience.

Repertory grids are powerful methods to combine idiographic and nomothetic assessments, revealing unique dimensions of meanings but also eliciting patterns across people (Neimeyer and Neimeyer, 2002; Grice, 2004); however, they require quite a high level of linguistic skills and therefore its applications, for example with children, might be limiting.

In HCI, the RGT was mainly applied to research and evaluation of the user experience; this method provides not only a qualitative perspective to gather insights in user's personal constructs but also a quantitative measure of the quality of their experience, through the rating system.

In their study, Hassenzahl and Wessler (Hassenzahl & Wessler, 2000) proposed a revised version of the RGT to assess user perceptions and evaluations of a set of prototypes to narrow down the design process and set the design space from a user's perspective. They engaged a sample of participants (N=11) and asked them to assess

seven protypes presented in a random order through the RGT. A range of more than a hundred personal constructs were collected and the Euclidean distances between the prototypes was calculated, based on differences of the personal constructs in the assessment of each prototype. In their discussion, the authors presented how the RGT could be a viable and efficient tool for gathering design-relevant information. The authors also discussed the limitations encountered when RGT was applied to an assessment of artefacts, as both participants and researchers found describing and labelling the constructs present significant challenges.

This study reflects a common misunderstanding of PCT, consisting in approaching personal constructs as intellectual or verbal creations. This misunderstanding of Kelly's theory has led many researchers and clinicians to explore personal constructs only in verbal terms, as testified by the popularity of repertory grid applications.

This perspective on PCT implies keeping knowledge and experience, theory and practice, mind and body separate, whereas construction cannot be considered either mental or somatic, but can only be construed on one or the other of these levels (Chiari & Nuzzo, 1988; Cipolletta, 2013; Kenny & Gardner, 1988). In other words, the event can be construed simultaneously in different ways; for example, fear can be interpreted as awareness of terror, or cold sweat, as well as imminent incidental change in one's core structure, as it is defined in PCP terms. In this sense, Kelly (1979) underlined the embodied nature of anticipation, defining behaviour as "our questioning act".

Despite the peak of popularity in the '80s, the RGT was then almost completely dismissed in the HCI field and subsequent research adopting this method is sparse (e.g., Dillon & Mcknight, 1990; Gaines & Shaw, 1997; Grose et al., 1998; Hassenzahl & Wessler, 2000).

Probably also because of the limitations in the practicality of the RGT, HCI researchers moved towards methods rooted in the quantitative research tradition allowing researchers to quickly generalize across users, and the interlude of popularity of PCT faded. Nevertheless, the underlying personal construct approach addressed a fundamental issue, still current in HCI, that is the value of the idiosyncratic perspectives of people towards technology. This approach also brings into focus the process of co-determination and co-construction of the relationship between people and technology.

Further, approaching behaviour as an embodied expression of the person's anticipations could open new opportunities for eliciting personal constructs and understanding people's experience with technology, beyond the adoption of RGT, as discussed in the next section.

2.2.1. The human experience of interaction with technology through the lens of the PCT

> "When we think of design as dialogical, concerned with the ways in which people interacting with technologies consummate themselves in the technologies and the technology in themselves, we point to the openness and unfinalizability of a world that, though already half-designed, is always becoming. This is a complex, changing world, marked by ambiguity." (Wright and Mccarthy 2004, p. 196)

> "To study a man's experience, then, is to have a look at that upon which, rightly or wrongly, he has placed some construction." (Kelly, 1955, Vol. 1, p. 119)

As previously stated, the nature of the research in HCI quickly changed over the last few decades, moving from a task-completion-oriented perspective in software development to a holistic approach focused on the experience of interaction between people and systems. As argued by Shneiderman (Shneiderman, 2003, p. 2) "the old computing was about what computers could do; the new computing is about what users can do". With the incredible advancements of technology, the role of users and their experience seem also to be constantly evolving. The understanding of the user has also changed in the progression of the research in the field and advancements in the technological landscape: user started as a cog in a machine, became a source of error, a social actor, and is then a consumer (Kuutti, 1996). In line with the consideration of 'user as consumer', the experience is also often used as a selling point and it has become extremely popular in areas such as branding and e-commerce websites (e.g., Pu and Faltings, 2000; Lee, Kim, and Moon, 2000).

However, the debate about what constitutes an experience with technology is still broadly open, and the struggle is mainly to escape from the subjectivity of it and

whether it is possible to design an experience (Wright and Mccarthy, 2004). At this regard, Wright, and his colleague (2004, p. 52) argue that "we cannot design an experience, but with a sensitive and skilled way of understanding our users, we can design for experience". Wright and Mccarthy (2004) adopted a holistic perspective to approach the research and the exploration of the user experience with technology, claiming that "rather than isolate the elements of experience, we seek to understand users and technology interaction, and how they mutually constitute each other" (2004, pp. 43-44). The user experience is in this sense meant as the person's process of sense-making while interacting with technology. This process of sense-making is reflexive and recursive (Wright and Mccarthy, 2004, p. 48), and the experience is therefore deeply situated, context-related and person-centred. Adopting this perspective, the user assumes an active role and construes technology through a process of sense-making, not simply engaging in experiences as ready-made.

In their attempt to describe the process of sense-making of the user experience with technology, Wright and Mccarthy (2004) define six stages: anticipating, connecting, interpreting, reflecting, appropriating, and recounting. These phases of the sense-making process are not at all related in cause-and-effect terms; instead, they are part of dialogical relations.

Figure 3. Sense-making process with technology (Adapted from Wright and Mccarthy, 2004).

Anticipating: users always have expectations when interacting with a system or a technological product; those expectations are used to anticipate the way the interaction would take place. The authors explained that "it is the relation between our continually revised anticipation and actuality that creates the space of experience" (Wright and Mccarthy, 2004, p. 124). Anticipating might be understood as the process of making hypotheses about the world/product/service/system. In this sense, anticipations are not just prior predictions about events; they are in their turn based on previous related experiences.

Connecting: this phase refers to a pre-linguistic stage in which the situation has a first impact on our senses. It refers to the immediate pre-conceptual reaction to a situation.

Interpreting: interpreting implies "discerning the narrative structure, the agents and the action possibilities, what has happened, what is likely to happen and how this relates to our desires, hopes and fears and our previous experiences" (Wright and Mccarthy, 2004, p. 125).

Reflecting: this often takes the form of an inner dialogue with oneself or with others. It is a kind of inner recounting. It serves to help us relate the experience to others

in an evaluative way in support of appropriation and recounting which in their turn help us reflect (ibid.).

Appropriating: it is meant as the stage in which we own the experience, "by relating it to our sense of self, our personal history and our anticipated future" (ibid., p. 126).

Recounting: involves telling the experience to others or ourselves.

Although Wright and Mccarthy do not connect their sense-making process to PCT, there are many similarities with the experience cycle as it is described by Kelly (1955). The PCT could provide an extensive theoretical framework to systematically explore the sense-making process with technology as it is described by Wright and Mccarthy, conceptualised in a psychological perspective.

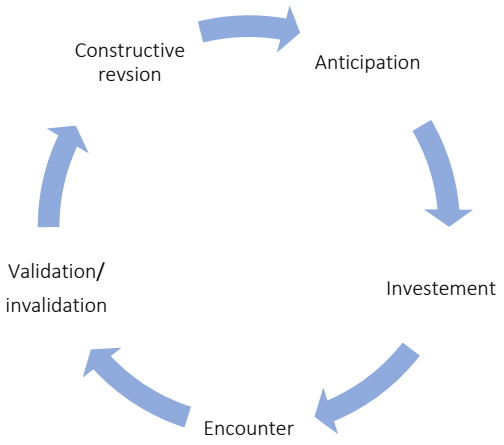

Figure 4. The five phases of the experience cycle as described by Kelly (1955).

First, similar to the sense-making process outlined by Wright and Mccarthy, also the experience cycle described by Kelly (1955) is intended as a recursive process (Fig.4).

Furthermore, both the processes are based on the consideration that the person interprets/construes their experience with technology or more in general with the external world.

Kelly's cycle could be misunderstood as a more cognitive approach to the understanding of the experience than the sense-making process described by Wright and Mccarthy which includes a pre-verbal stage related to sensory stimulation (connecting stage). However, the encounter phase of the PCT experience cycle is to be intended as embodied and therefore strictly related to the impact of the experience on our senses.

According to Kelly's, this phase entails action, expressed through the individual behaviour. As mentioned in the previous section, Kelly describes the person as an inquirer who actively formulates hypothesis about the world (anticipation) and test them against his/her own actions (Bannister & Fransella, 1971).

In this sense, it is arguable that the experience cycle is relatable to an embodied perspective on cognition, meaning that aspects of human cognition are shaped by aspects of the body experience and vice versa.

The experience cycle outlined within the PCT describes the process through which the person tests and refines his/her hypotheses (anticipations) about the world to form increasingly accurate anticipations of future events. In other words, this theory sees the experience cycle as the construing process of the individual.

According to PCT, it is through experience that the person learns to discriminate events and give sense to the external world. For instance, it is through the experience of seeing faces that the infant learns to discriminate between familiar and unfamiliar faces.

So, according to the PCT experience cycle, the person anticipates what may happen in a given situation and commits to the testing (investment phase) likely to be involved in the encounter with the external world (encounter phase). In the encounter phase the accuracy of the person's anticipation is checked through his/her own behaviour. It is in the encounter phase that the person can validate or invalidate his/her anticipations.

In the final phase of the cycle, the constructive revision of the anticipation takes place, based on the stage of validation or invalidation of them against the experience.

Thinking about the example of the crying baby provided above, it is through the experience cycle that the baby can test if his/her anticipation '*If I cry, someone will rush*

to comfort me' is accurate. The feedback to his/her action (crying) will validate (somebody rushes to comfort me) or invalidate (nobody rushes to comfort me) his/her anticipation. Further, Fransella stated (Fransella, 1995, p. 73): "it is not just that we are looking to see whether we are wrong or right in our expectations. It is the process that matters".

According to the PCT, without this process, meaning without experience, the individual cannot learn and develop. In this sense, the individual is approached as changing from moment to moment, probably never absolutely the same from one second to the next. This is an unusual perspective in psychology. It claims that since everyone is developing or changing from the moment they are born, they can indeed be seen as a form of motion.

Like PCP, the pragmatist tradition also stresses that the experience can only exist in terms of relations (Dewey, 1925, 1934; Bakhtin, 1986; 1993). Dewey (1934) took the strong position that experience and sense-making are relational processes, which, when decomposed into their constituent parts, simply disappear.

Thus, this perspective, anchoring the sense-making process with technology to the PCT experience cycle, could provide the researcher with a theoretical framework to approach the understanding of the human experience with technology as a psychological process channelled by people's anticipations.

This lens could be useful to systematically explore the meanings, intended as the personal constructs, that the experience with technology assume through the observation of actions rather than relying on verbally eliciting them.

This could be especially useful with children or groups of people with limited communication skills, as in the case of the intergenerational cohorts involved in the main thesis project.

This perspective could also provide access to preverbal construing, where no verbal labels are attached to personal constructs. As said in previous section of this thesis, preverbal construing is typical of young children and it is often related to aspects of people's identity, such as values.

Values are considered within the PCP as personal constructs related to our sense of self and they are at the core of the person's identity, obvious to the extent that they are hardly detected by the individual, especially through words.

According to this view on values, most of people's actions are channelled by their values. Whereby, eliciting values could help understanding deeper meanings behind people's actions.

More details about values and how the experience with technology was approached through the lens of the PCT follow in Chapter 3, Section 3.4., and Chapter 5, where the main thesis project is presented.

2.3. Technology for Older and Younger Demographics: A Review of the State of the Art

In response to demographic changes over recent decades, research and development of technology designed for the ageing population has dramatically increased, drawing on existing theories and models of gerontology (Burdick and Kwon, 2004).

Although the increasing interest in the design of technology addressed to this age group, older adults are rarely asked to play a central role in the design process and their involvement is often limited to the final stage of the design cycle.

Older adults are often involved in research only after the system prototype of a new piece of technology has been developed. They are usually asked to interact with it and then questioned about how the prototype might be improved to meet their needs and preferences, to be fully accessible, accommodating their cognitive, sensory, and motor abilities.

This approach might risk overlooking the broader contextual aspect of the everyday life of this cohort of people and might contribute to the design of technology solely informed by clinical perspectives and designers' assumptions (Rogers 2004; Blythe et al., 2005).

As it is stressed by Ballegaard and colleagues (Ballegaard et al., 2008), 'the citizen perspective' (ibid., p.1809) needs to be added to the clinical perspective and inform the design of technology that fits the users' everyday life. In their recommendations,

Ballegaard et al. suggested designing for understandability and learnability related to daily life, understanding the perspective of the ageing cohorts.

Furthermore, there is evidence regarding how "existing systems have not been developed based on the needs and preferences of the ageing population and thus usability, feasibility, and validity of such systems for the ageing population are not well documented" (Helbostad et al., 2017).

When considering usability for the ageing population it is important to consider that even though function is highly heterogeneous at an older age, there are several typical age-related changes in the cognitive (e.g., spatial orientation, memory), motor (e.g., movement speed, reaction time, force control, movement precision), and sensory domains (e.g. vision, hearing, touch sensibility), and in psychological factors (e.g. attitudes, beliefs) (Holzinger et al., 2007).

Studies comparing how the younger generation and older adults use smartphones conclude that there are five distinct human factors where older adults are different from their younger counterparts (Holzinger et al., 2007):

1. Learning time
2. Speed of performance
3. Error rate
4. Retention over time
5. Subjective satisfaction

In the context of an ageing population, technology advancements could bring new opportunities, as well as challenges, for autonomy and the self-management of health conditions and "play a transformative role in overcoming specific barriers faced by older people, if they are able to access it" (Government Office for Science, 2016, p. 36).

The UK government's envisaged future of the ageing population is about staying closely connected in society and in the workplace, and technology could play a vital role in this.

Technology-based solutions that connect older adults to friends, family, and community are becoming more viable; older adults and their caregivers are growing increasingly tech-savvy (Ghosh, et al., 2013, p. 1). However, it is also becoming evident

that many people with limited technology skills, support, and access, do not easily reap such benefits associated with the advancements in technology.

Many studies report that older adult tend to exhibit slow technology acceptance, often assuming a new technology is complicated and difficult (Feist, Parker & Hugo, 2012; Selwyn, Gorard, Furlong & Madden, 2003).

Many older adults tend to struggle to make sense of the digital world. West describes few underlying conditions; a lack of basic digital skills, a lack of experience of the Internet, low to no awareness of the opportunities what online presence can offer, a misperception of the Internet ('not for me') in general, an anxiety for making mistakes when using technology, and all these conditions can be worsened by the inadequate design of devices (West, 2015, p. 22).

Despite the technology competency is assumed to be a cornerstone of effective citizenship in our age, the levels of competence have been found to vary widely throughout the general population, and little is known about how diverse ways of learning to use computers may contribute to people's technology acceptance (Selwyn, 2005).

There is currently a digital divide where up to 11.7 million of the adult UK population lack basic digital skills; an estimated 9 million are unable to use the internet and their device by themselves; and 3.6 million have never used the Internet (Edwards, 2021). Digital exclusion is inextricably linked to wider inequalities in society and is more likely to be faced by those on low incomes, people over 65 and disabled people (ibid.).

The digital divide (Aarsand, 2007) concerns skill asymmetries in the usage of digital devices, which creates a gap between demographics; the gap might be even significantly wider between younger and older groups of the population, for instance the representative generations between grandchildren and grandparents.

According to the Digital Skills Crisis report (2016), this gap is costing the UK economy an estimated £63 billion a year in lost additional GDP. Nevertheless, Aarsand (2007) observed in a video-ethnographic study in family settings that the digital divide could be exploited as a strategic resource by adults and children.

Adults, such as grandparents were videotaped using the digital divide for entering dialogue with younger generations, taking the opportunity to join them in shared

activities. For example, a grandparent was observed exploiting his lack of knowledge concerning the logic of the present technology as a resource to enter social intercourse with his grandchildren.

For the children, the digital divide was used as a resource for demarcation of the 'non-adult space' of the playing field or as a resource for negotiation and control of the social organization of the activity. In the study, the digital divide became a resource for generations to enter and sustain participation in shared activities.

Considering the technology trends in the 21st century, children are particularly active users of technology with the most recent statistics in the UK showing that 52% of the 3–4 years-olds and 82% of 5-7-years-olds are online (Ofcom, 2019) and some research suggests that pre-schoolers sometimes become familiar with digital devices before they are exposed to books (Hopkins & Weisberg, 2017).

Therefore, it is arguable that besides the ageing population, children are also a relevant social group in the design and development of recent technologies, and the interest in digital interventions aimed at this age group has increased dramatically in recent decades.

However, children are also rarely directly involved in the design process, especially very young children. It is common for researchers and designers to ask adult caregivers such as parents or teachers what they think their children or students may need, rather than ask children directly (Druin, 2002, 2005, 1999, 2009).

Only in the last fifteen years have children become more involved and accepted as active participants from the start of the design process, exercising a concept of co-design, and enabling their creative contributions through group discussions, walking through various user scenarios (e.g., Druin, 2005) or participatory design approaches (e.g., Mazzone, Read, and Beale, 2008; (Landoni et al., 2016; Read et al., 2013).

Druin (2002) proposed a theoretical framework which defined the roles that children can play in the design process of new technology, based on literature review and her vast experience in the research lab.

According to Druin's framework, children may become the users, testers, informants, and design partners according to how adults relate to them, what stage in the design process they are involved in, and the goals of the research. Each of these roles

is based on three underlying dimensions: (1) the relationship to adults; (2) the relationship to technology; and (3) the goals for inquiry (ibid.).

In the role of users, children are considered as users of technology while the adult observes in order to understand their interactions, adopting various methods (such as videotaping, testing before and/or after technology use).

The goal is to test a concept idea and gather insights that might inform the design of new technologies or to understand the process of interaction with already existent technology.

As testers, children test prototypes of new technologies. The goal of this role is for children to contribute to designing and shaping new technologies before release into the market. As testers, children may be observed using the prototype, and the impact of the interaction may be assessed. Unlike the role of children as users, adults may ask them for direct feedback.

The child in the role of informant plays a part in informing the design process. In this role, children take part in the design process at various stages. They might be observed using existing technologies or they might be involved in sketching paper prototypes.

Children might also be engaged to provide feedback once the prototype has been developed. Low-tech materials, interviews, design feedback on prototypes, can all be used continually as methods for informants.

In the role of design partner, children are considered to be equal stakeholders in the design of new technologies. In this sense, children may contribute in any way that is appropriate for the design process. Within this role, the relationships to adults and technology are extensive.

The challenge of engaging with children in the role of design partners is that the notion of elaborating ideas is more difficult for children. Moreover, it takes time to build a trusting partnership between adults and children, meant as equal researchers.

Overall, each role described by Druin (2002) involves some challenges, both for the children and for the adult researchers. Children are naturally honest, and their assessments of technology might be harsh, and surprise and disrupt the schedule of the design team with some unexpected feedback.

Furthermore, it might take time to engage their attention and fully involve them in the research. This might slow down the overall process and add additional unexpected cost to the project. Another challenge for adults is to assess when the right time is to engage children in the design process.

Adult researchers must therefore carefully assess the needs of the project to make the best decision. The main challenge for children is that in most of the roles, adults are in charge and children might be frustrated by their lack of control or not be interested in the activities proposed by the researchers.

Despite the challenges, the resourcefulness of engaging with children in the design process is that they can help the researcher to think beyond the traditional needs, be a valuable resource of energy and creativity, and force the adults to keep questioning (Druin, 2002).

These challenges might be overcome adopting methods of communication, collaboration and partnership that can accommodate both children's and adults' needs and capabilities.

CHAPTER 3

Methodology

"There is nothing so practical as a good theory." (Lewin, 1951, p. 169)

The methodology described in this chapter emerged in response to the goals of the TNW Doctoral Programme and presents the researcher's approach to the four thematically linked projects run in collaboration with businesses based in the northwest England (Fig.5).

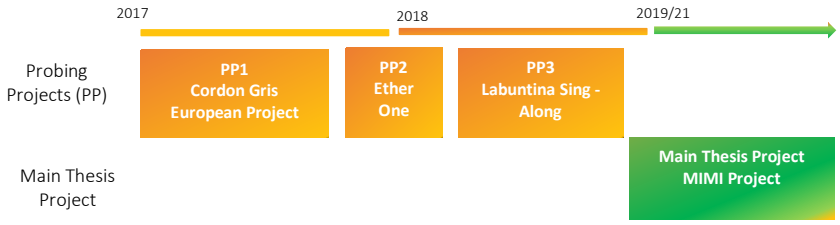

Figure 5. Timeline of the four thematically linked projects completed as part of this Ph.D.

As a preliminary phase, three probing projects (PP) fully presented in Chapter 4, were completed to establish the research questions, setting the scope of the research, and assess the methodology of the main thesis project planned in collaboration with the BBC, presented in Chapter 5. The research questions evolved, were established, and refined through the probing projects and were then measured against the main thesis project.

Essentially, four broad approaches influenced the methodological paradigm chosen for this Ph.D.: Personal Construct Theory (PCT), Action Research (AR), Constructivist Grounded Theory (CTG), and Participatory Design (PD).

An introduction to the PCT was already presented in the previous chapter (Chapter 2 - Sections 2.2.; 2.2.1) to formalise the psychological theoretical framework

used to approach the understanding of the participants' experience with technology, in the main thesis project. Further description of how the PCT influenced the methodology of the main thesis project is outlined in Chapter 5.

The following sections of this chapter introduce action research, the constructivist grounded theory, and participatory design frameworks; elements from those methodologies were combined to articulate the research design. The research through design (RtD) methodology (Frayling, 1993; Findeli 2004; Koskinen et al., 2011; Zimmerman et al., 2007; 2010; Bowers, 2012) facilitated the knowledge construction towards the finalisation of the Ph.D. thesis.

3.1. Action Research

Due to the highly interdisciplinary, collaborative, and repeatable project-based nature of the TNW Doctoral Programme, action research was considered the most appropriate approach for its strong foundations in participatory activity, where the researcher works in collaboration with practitioners with the common aim of solving practical issues and contributing to knowledge (Reason and Bradbury, 2001).

The action research approach was chosen with the aspiration to lead the definition of the research questions from an evaluation of the action by appropriate methods and techniques (Ortrun Zuber-Skerritt, 1992).

In other words, acting comes first and the following evaluation is meant as a reflection on the whole research process, which may lead to the identification of new problems that may require a new cycle of planning, acting, observing, and reflecting.

Action research is a practical research methodology that is usually defined as requiring three conditions that meet the context of this Ph.D.: (1) being situated in a social practice; (2) envisaging participatory activity where the researcher works in collaboration; (3) proceeding through a spiral of cycles of planning, acting, observing, and reflecting in a systematic and documented study (Swann, 2002).

Action research seeks to bring together action and reflection, theory, and practice, in participation with others with the aim of defining practical solutions to social issues (Reason and Bradbury, 2001).

It challenges the positivistic view of knowledge as objective and values free. Instead, this approach embraces the notion of knowledge as socially constructed and embedded in a system of values that promote models of human interaction (Brydon-Miller et al., 2003).

Dialogical action research recognizes that the researcher's experience, expertise, and praxis, largely shape how he/she understands the suggested actions (Mårtensson & Lee 2004).

Recoverability is the validity criterion of action research approaches, which means that the researcher must make sure that "the process is recoverable by anyone interested in subjecting the research to critical scrutiny" (McNiff, 2013, p. 18). The recoverable research process is based upon a prior declaration of the epistemology, for this research defined as the constructive alternativism.

As briefly mentioned in Chapter 1 (Section 1.3.), the philosophical assumption underlying the constructive alternativism implies that the events we face are subjected to many interpretations, according to who is the knower.

According to this perspective, we cannot know an objective reality, free from interpretation. Entirely different interpretation, or construction, using constructive alternativism's terminology, can be formed according to who is formulating it and in relation with the focus of interest of the knower.

The focus of interest is defined in constructive alternativism as the *range of convenience*. As an example, history can be construed from a political, religious, or social ranges of convenience. In this sense, the same historical event can be construed as political, religious, or social according to the aspects considered in the narration.

Therefore, according to this philosophical position, the events are not to be intended as ontologically political, religious, or social; they are instead to be intended as the result of different ways of construing the same event.

Action research cannot be used to perform comparative tests or to show cause and effect relationships (McNiff & Whitehead, 2011), for example, to define which product is better suited to the needs of the user, as it is in constant iteration process.

Nevertheless, the use of this approach guided the researcher through an exploratory journey in which the research process is as important as the specific outcomes.

The core ideals of action research are self-reflection and learning in and through action. In other words, the action in 'action research' refers to what the researcher does, and 'research' refers to how the researcher find out about what he/she does (McNiff, 2012).

Therefore, one of the principles of action research is that learning is seen as rooted in experience (Winter, 1989).

Specifically, Winter (1989) defined six principles of action research:

- Reflexive critique: by questioning things new arguments can be made and there is a possibility for new actions.
- Dialectical critique: discussion of different reflective interpretations of practice
- Collaborative Resource: intersubjectively working together to validate views.
- Risking disturbance: understanding our own personal processes and willingness to submit them to critique.
- Plural Structure: development of various considerations and critiques rather than a single interpretation.
- Theory Practice Transformation: theory and practice are not opposed; they are in a mutual relationship where theory informs practice and practice refines theory; they are seen as two interdependent yet complementary phases of the change process.

Due to its iterative, contextual, and participatory nature, action research doesn't have a normative approach and cannot be defined in terms of hard methods. Instead, it seemed ideal for collaborative and explorative projects and allowed the researcher to co-design research with industry partners based on the emerging and co-construed research questions.

In other words, the flexibility of action research allowed the researcher to start her work without requiring prior understanding; understanding of the situation was

construed while the study proceeded and as understanding was established, the research was modified according to the knowledge gathered.

Also considering the limitations of actions research, for instance in terms of lack of established guidelines, this methodology was adopted in this research as an inspirational source in the preliminary phase, where three probing projects were completed to assess the methodology and define the research questions of the fourth main research project.

Whereby, action research was considered as the meta-methodology and inspired a participatory, contextual, and dialogical approach to the exploration of existing design practices, informing the research design of the main thesis project.

The dynamic feedback loop process between action, data collection and analysis, and reflection guided the whole research journey, recursively following three broad phases: experiencing, enquiring, and examining.

Further, as already mentioned before, the participatory and collaborative emphases implied in action research was at the core of all the projects run as part of this Ph.D.

Another limitation of action research could be that although an essential aim of action research is to produce theory to inform practice in an iterative cycle, it is not clearly described how a theory is developed through action (Dick, 2003).

Therefore, for this Ph.D., action research was integrated with a constructivist grounded theory approach, presented in the following section.

3.2. Constructivist Grounded Theory

The methodological framework of this thesis is anchored in Grounded Theory (GT), defined as a systematic set of techniques and procedures that enable researchers to identify concepts and build theory from qualitative data (Glaser, 1967; Corbin and Strauss, 2014).

GT differs from other qualitative approaches because data collection and analysis proceed simultaneously allowing the researcher to understand from the beginning how participants construct their world (Lawrence & Tar, 2013).

In other words, GT differs from other qualitative approaches because it uses theoretical categories to shape data collection; instead, in other approaches, the researcher first collects all the data before starting the process of analysis.

Grounded theory is one that is "discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to a particular phenomenon" (Strauss and Corbin, 1990).

Charmaz (Charmaz, 2006; 2000) Clarke, 2003) offer a constructivist perspective to GT that is compatible with PCP approach (Denicolo et al., 2016), adopted as theoretical framework for this research. In this sense, CGT acknowledges both the contextual relativity of perceptual knowledge and the role of the researcher as an active interpreter of the data, as outlined in PCP (ibid, p. 145).

Charmaz (2000, p. 521) claims that "adopting a constructivist grounded theory approach, the researcher can move grounded theory methods further into the realm of interpretative social science consistent with an emphasis on meaning, without assuming the existence of a unidimensional external reality".

As a constructivist grounded theorist, the researcher assumes that data do not represent objective facts of a knowable world; instead, data and analyses are constructions that reflect what their productions imply (see also Bryant, 2002; 2003; Charmaz, 2000; Hall & Callery, 2001; Thome, Jensen, Kearney, Noblit & Sandelowski, 2004).

The constructivist grounded theorist offers plausible interpretations rather than verified knowledge (Charmaz, 2006).

The constructivist approach to grounded theory derives from the interpretative tradition, juxtaposed to the objectivist one. A constructivist approach to GT prioritizes the phenomena of study, whereby it focuses on understanding certain aspects of the situational phenomena rather than finding a generalisable explanation.

For this research, the phenomena of study were intended as the co-engagement of intergenerational cohorts in values-led participatory design process, as extensively presented in the following section of this chapter.

This approach sees both data and analysis as created from shared experiences and relationships between participants and researcher (Charmaz, 2000; Charmaz and

Mitchell, 2001), meaning that the resulting theory is an interpretation that cannot exist in a social vacuum and that was influenced by all the participants involved in the process, including the researcher.

The constructivist perspective on GT focuses on how - and sometimes why, as for this research – participants interpret/construe a specific situation in a certain way. As stated by Silverman (2015), it is only after establishing how people construe meanings and actions that the researcher pursue why they act as they do.

In contrast, the objectivist approach to GT derives from positivism that considers theory as a statement of relationships between abstract concepts based on a wide range of empirical observations.

A positivist perspective of GT seeks deterministic explanations, cause, and consequences, emphasizing generality and universality. However, the constructivist approach to GT is derived from an interpretative stand on theories, meant as the understanding of the phenomena of study rather than the explanation of it.

The theory intended thus cannot stand outside the researcher's vision; different researchers may come up with similar ideas, although how they render them theoretically may differ.

The interpretative perspective focused on the construction of contextualized emergent understanding rather than the creation of testable and generalizable truth.

Therefore, the data analysis consisted of search for meaning and interpretative understanding rather than testability of results (O'Connor, Netting and Thomas, 2008). According to CGT, theorizing "reach[es] down to fundamentals, up to abstractions, and probe[s] into experience" (Charmaz, 2006, p. 135).

In this Ph.D., the theorizing process comprised an iterative approach to the narration of the most compelling and meaningful data according to the researcher.

The data were ordered and clustered according to the logic of each project's scope, and drafts were created to integrate the data and present relations between them.

The writing process served as a hermeneutic tool to construct the analysis whereby writing and rewriting became crucial phases of the analytic process.

Thus, the CGT perspective led the construction of a model, presented in Chapter 5, integrating the coding process of the data set collected through the dynamic feedback loop of exploring, enquiring, examining, to the application of the PCT theoretical framework at the analysis and interpretation of the research outcomes.

More about how those frameworks were combined follows in Chapter 5, Section 5.6, where the data analysis process is described.

3.3. Embracing Participatory Design Processes to Engage Intergenerational Cohorts in the Design Cycle

In this section, the perspective on participatory design embraced to engage intergenerational cohorts in the design cycle is introduced; the research design will be further elaborated in a dedicated section (5.4), in Chapter 5, where the main thesis project is described.

As mentioned in the introduction to this chapter, the methodology of the main thesis project was assessed through a preliminary probing phase consisted in the completion of three probing projects (presented in the following Chapter 4) in collaboration with businesses of the media industry based in the northwest of England.

This initial probing phase led the research to focus on the engagement of intergenerational cohorts, specifically preschool children, and older adults, in participatory design process.

Participatory design (PD) approaches were embraced to engage intergenerational cohorts in the design cycle of a media experience aimed at fostering interactions between different age groups, such as children and older adults.

The adoption of PD approaches as the methodology of the main thesis project aimed at empowering and giving voice to the intergenerational cohort whose views, values and opinions might be overlooked or only partially represented in the design process of new technologies.

PD was chosen as the main approach to inclusive collaboration, partnership, and active engagement of intergenerational participants (IGP) so that their partnership informs the design cycle and impacts the final outcomes, side by side with the researcher

and the designers involved in the project (Guha et al., 2013; Large et al., 2006; Gregory, 2003.

PD has been proven to be an accessible way to conduct research with children because it entails interactive and hands-on techniques (Carmel, Whitaker, and George, 1993) that are particularly suitable for the cognitive and developmental stage of younger participants. Moreover, PD practices facilitate the one-on-one partnership through which children are more engaged in clear communication of their ideas (Guha, Druin, Chipman, et al., 2005).

The nature of PD promotes the empowerment of participants and their role as design partners, and because of that, it is widely used to approach and develop projects with vulnerable communities (e.g., Joshi & Bratteteig, 2016; Vines et al., 2017).

Participatory design is described as a way to gain deeper and better understanding of the targeted group while bringing them on board as research and design partners. It usually uses bottom-up, flexible, and reflexive strategies to reinforce participants as co-designers through the creation of safe spaces, promoting various levels of participation.

All these properties pointed to participatory design being a promising approach to work with intergenerational cohorts.

Specifically, the values-led PD approach (Iversen & Leong, 2012; Leong & Iversen, 2015; Iversen et al., 2010) was strategically selected to explore how to generate spaces for co-creation and co-exploration with the IGP and understand the values behind their observed behaviour.

The focus on the co-exploration and co-creation of shared values through PD practices could contribute to obtaining a deeper understanding of the intergenerational relationship and leveraging their resources in joint engagement, rather than addressing their differences (e.g., cognitive, digital skills and competences, preferences). This might overcome the challenge to engage in research and design for such different groups of people, like older adults and children.

The co-design process is regarded as a negotiation of participants' values construed through the collaborative experience (Iversen et al., 2010; Iversen and Leong, 2012).

This approach to values co-creation and co-exploration fits within a broader trend in HCI focusing on how the design of technology can be approached for lasting impacts, beyond the easiness of the interaction.

Many design approaches have emerged within this trend and embedded values in the design cycle (e.g., Fleischmann, 2013; Cockton, 2004; Friedman et al., 2006; Iversen & Leong, 2012; Sengers, 2005). However, values-led PD differs from other values-led design approaches, for its dialogical nature through which the sense-making process and the artefact result from the shared experience of co-creation.

In this sense, in values-led PD practices, values are not 'applied' to the design of technology as in other values-led design approaches (e.g., Cockton, 2004; Fleischmann, 2014; Friedman et al., 2006); instead, values and technology are mutually created and influenced by each other as the design process unfolds.

This situated view on values implies that the same values can be appropriate in one context but problematic in another and that there is no single interpretation of values that serves all situations (JafariNaimi et al., 2015).

Knowledge generation in PD is seen therefore as a dialogic process that is strongly situated and mediated by participants' personal values (Frauenberger et al., 2015).

The concept of value has been used in psychology to explain the motivational basis of attitudes and behaviour (Rokeach, 1973; Schwartz, 1992, 1994). Rokeach (1973), for instance, defines a value as "an enduring prescriptive or proscriptive belief that a specific end state of existence or specific mode of conduct is preferred to an opposite or converse end state or mode of conduct".

Schwartz (1992) identifies ten motivationally distinct values common to culturally diverse groups, suggesting a universal structure of human motivations.

This perspective on values refers to a system of learned beliefs concerning preferential objects, modes of conduct, or existential end states. In other words, values provide standards against which to evaluate things, people, and ideas. As noted, values have been described as bipolar, representing the oppositions among different types of values (e.g., Rokeach, 1973; Schwartz, 1994).

In this research project, values are approached with a psychological connotation, but they are not just intended as motivational cognitive entities. Instead, they are

approached as dimensions of meaning used by the individual to make sense of events and make choices (Kelly, 1955; 1969).

In line with Personal Construct Psychology (PCP) theoretical framework, the focus here is on the action instead of on the cognitive entities (such as motivations or emotions). The focus on action fuses thought, emotion and behaviour in the intentional way that people approach the world.

According to PCP, people give meaning to events through actions, construing their interpretations of the encountered realities through the experience cycle (see more details about it in Chapter 2 - Section 2.2).

Therefore, action is meant as a process of knowledge construction about the world and about us.

Values are in PCP language intended as core constructs ((Butler, 2006; Horley, 1991), that is "those [constructs] that govern people's maintenance processes, that is those by which they maintain their identities and existence" (Kelly, 1995, p. 482).

They are therefore meant as dimensions of meaning concerning the process of the self (Butt, Burr and Epting, 1997), which allows the individual to differentiate oneself in relation to other people. Being so tightly related to the sense of self and identity, core constructs are seen as existing at a low level of awareness (Leitner & Thomas, 2003).

Although not always readily accessible, the theory suggests that we come to understand the world through the lens of our core constructs with little conscious awareness (McWilliams, 2004).

According to PCP, core constructs are formed through experiences, as all the other constructs that constitute the personal constructs system of the individual.

As such experiences necessarily include the person's own notion of self, Kelly characteristically proposed that each person constructs the dimensions of their own identity. Thus, core constructs relate to a sense of personal identity by serving as information about who people are and what they represent.

Such constructs lie fundamentally at the heart of the individual's sense of self, guiding each anticipatory choice, action, and stance they may take.

The concept of the self is here approached as inseparable from the relationships with the other-than-the-self. This self-knowledge, inevitably tied to a set of roles and

relationships within a given social order and allows an individual to function socially (Horley, 1991).

According to PCP, all core constructs that govern social interaction, allowing the individual to construct oneself in relation to other people, are core role constructs (Horley, 1991, p.5).

Similarly, Kilmann (1981) presents the notion of interpersonal values as evaluative constructs used in real or imagined interaction with others, considered as the person's most important values.

It is in this context and based on those theorical foundations, that the research design of the main thesis project, presented in Chapter 5, Section 5.5., was defined.

The project embraced the methodological challenge of engaging such a diverse cohort as the intergenerational one in participatory design process, especially aiming at contributing to research on how to adapt PD process to the involvement of preschool children (4-6 years old) and older adults (65+ years-old) as equal partners in the design cycle.

Specifically, the focus was on defining and exploring methods to elicit their interpersonal values through participatory activities to inform the design of media experiences that serve those values.

Before outlining the main thesis project (Chapter 5), the probing phase that led to the definition of the research scope and the main research questions is presented in the next chapter.

CHAPTER 4

Probing Projects: Assessing Methodologies

A set of three probing projects were completed in collaboration with businesses based in the northwest of England to establish research questions and set the scope of research of the main thesis project, presented in Chapter 5.

Ethics approval was gained for the probing projects (Appendix a); specific ethics approval was granted for the main thesis project, considering that children were involved in the research activities (See Chapter 5, Section 5.4.1).

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The probing projects consisted of an assessment of methodologies and steered the research towards the adoption of Participatory Design (PD) processes, as already introduced in the previous chapter. The choices that guided the methodology toward the adoption of PD are presented in this chapter; the research design of the main thesis project is instead extensively outlined in Chapter 5.

The aim of the probing projects was to investigate and explore existing design practices to gain an understanding of how inclusion of vulnerable and marginalised groups in the design cycle is intended and applied.

The problems in current practices for designing products for vulnerable groups are partly described in Section 2.3. The main problem was hypothesized as there is a lack of methodologies and case studies to demonstrate how to involve and engage vulnerable groups in design processes prior to technology implementations.

Thus, the focus of the probing projects was on the role that vulnerable and marginalised groups play in the design cycle of new media and technologies.

Through a formative approach to research, the insights gathered in each probing project inspired the next one and led to the research design of the main thesis project.

The probing projects covered different but complementary areas: 1) the design of a digital solution to promote healthy eating behaviour in the ageing population; 2) the design of a videogame aimed at triggering conversations about the experience of living with dementia; and 3) the design of animated music videos aimed at entertaining young children.

The collaborations in which the researcher was involved in this initial phase of the research journey were multifaceted.

It must be noted that as the doctoral journey progressed and the inquiry became more focused and less exploratory, articulating a project that matched stakeholders' aims, and the quite specific requirements of the doctoral research, became increasingly challenging.

A range of methods to explore existing design practices were adopted including observation, field notes, and interviews (Tab.1).

The action research approach was adopted allowing the researcher and the industry partners to reflect on and learn from what was observed. All the probing projects contributed to the doctoral journey, although in different intensities, and were crucial for the definition of the research design of the main thesis project.

Table 1. *Overview of the probing projects (PP).*

PP	Role of the researcher	What?	Why?	Methods	Industry partner	Product	Product's target group
PP 1	Observer and UX researcher of the activities run as a conclusion of the field trials.	Observe the research activities run as part of the field trials to test the system prototype with older adults	Assess the methods adopted to run research with users and the role of older adults in the design cycle of the digital solution	Observation and field notes	Red Ninja Design-led technology company	Mobile application to help target users to balance their diet, fostering healthy behaviour	Ageing population
PP 2	Interviewer	Explore the design process of a video game aimed at raising awareness about dementia	Assess the methods adopted to run research with users and the role of people diagnosed with dementia in the design cycle	Semi-structured Interview	White Paper Studio	Videogame to raise awareness about the experience of living with dementia	Everyone
PP 3	Design researcher	Create a set of personas	Define the target user of the media product to inspire further development	Paired Persona	Labuntina Sing-Along	Animated music video	Preschool children (0-6)

Commented [VP6]: *Include a brief statement clarifying the collaborative nature of the research and the precise contribution of the researcher to each activity described. See Code of Practice p.44* If the thesis is based on joint research, the nature and extent of the author's individual contribution shall be indicated.

4.1. Cordon Gris European Project: Exploring User-Centred Approaches to the Design of a Digital Solution Aimed at the Ageing Population

The first probing project (PP1) consisted in a collaboration with Red Ninja, a design-led technology company based in Liverpool (UK).

The researcher took part as an observer in the research activities run as part of the final phase of a European Project called "Cordon Gris: Making sense of data to promote effortless healthy eating habits and autonomy for older people" (http://cordongris.eu/).

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The Cordon Gris European Project (CGEP) aimed at designing digital solutions to promote healthy eating behaviour among the ageing population. It was one of the 220 projects part of the AAL Programme – Ageing well in a digital world (http://www.aal-europe.eu), a funded activity that aimed to create better conditions of life for older adults and to strengthen the international industrial opportunities in information and communication technology.

The CGEP targeted eating behaviour among the ageing population to develop a digital tool to support this age group to better manage their diet, organize their food shopping, and ultimately promote healthy eating behaviour and improve their quality of life.

The CGEP started in 2015 and ended in August 2018. It had three partner countries: Portugal, the Netherlands, and the UK.

The UK stakeholders, all based in the northwest of England, were:

- A design-led technology studio specialized in developing digital solution to support health and well-being among the ageing population.
- A fresh food company that provides catering services to nurseries, schools, and residential homes.
- A care homes.

PP1 involved the collaboration of the researcher as an observer of the research activities run by the Red Ninja's design team in the field trials.

The field trials aimed at testing the system prototype of a digital solution developed based on preliminary research with end-users.

This first probing project sought to gather a general understanding of the methods used in user-centred approaches to research and design digital solutions aimed at supporting older adults.

Specifically, the aim of the PP1 was to explore how older adults were engaged in the design cycle and observe and analyse how they responded to the product proposed in the field trials (Section 4.1.3.).

The explorative probing questions (PQs) were articulated as below:

PQ1: What are the methods implemented in the user-centred design of a digital solution aimed at older adults?

PQ2: What roles do older adults play in the design cycle?

The PQs were addressed through the observation of the activities run in the field trials of the CGEP.

An overview of the methodology adopted in the whole design cycle of the CGEP, in the three years prior to the PP1, is here presented to contextualize the research activities directly observed in the field trials.

The methodology presented was defined and assessed by the cohort engaged in the CGEP before the undertaking of the PP1.

A discussion of the insights gathered during the observations occurred in the PP1 will then follow.

4.1.1. CGEP Methodology Overview

The CGEP methodology was defined by the European Project's stakeholders prior to their collaboration in the PP1. Hence, the researcher did not contribute to the design of the methodology presented in this section.

The choice to dedicate a section to introduce the CGEP methodology serves the aim to provide a methodological framework before introducing the activities directly observed by the researcher in the final stage of the CGEP (The field trials – see following section 4.1.2).

The intended approach of the European Project was to involve the ageing cohort in the design cycle from the initial phases of the project.

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Commented [VP9]: *The methodology is discussed in section 4.1.1 and this appears to be an overview of what methods were used in the project rather than a research methodology. The section talks about surveys, workshops, etc. It is rather unclear what research was being conducted in this phase.*

A range of different methods were adopted to gather their needs, preferences, existing eating habits and potential concerns.

A digital solution was to be identified based on those findings and was to be implemented through an iterative cycle of research and design.

The methodology of the project was co-designed by the three partner countries involved in the CGEP and mainly comprised the following phases:

a) User research and service planning: culminated in the development of personas, scenarios, and service blueprints.

b) Development of the system prototype through an iterative-based approach to the research and design.

c) Field trials of the final system prototype.

An overview of the methods adopted in each research phase is presented in the diagram below (Fig.6).

Each research phase was run in the same way in each partner country. For the scope of the PP1, the focus is on the activities run in the field trials conducted in the UK and presented in section 4.1.3.

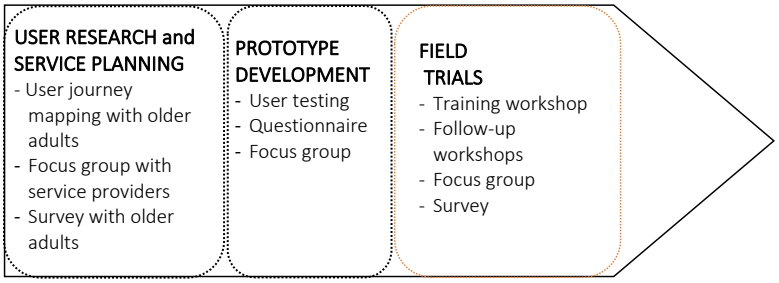

Figure 6. *Overview of the methods adopted in each research phase of the CGEP.*

a) User research and service planning

The objective of the research activities planned in this initial phase was to explore food-related habits, behaviours, preferences, and attitudes of older adults, as well as barriers and opportunities encountered by service providers (e.g., staff working in care homes) who work with or for an ageing population.

A set of two workshops were run: one aimed at engaging a sample of older adults and the other aimed at engaging service providers. The workshops took place in a care home in the northwest of England.

A total of seven older adults (N=7), living independently alone or in a couple in the care home were engaged in the workshop. The ages ranged between 63 and 80 years old.

User journey maps were used as a tool to address and understand older adults' habits, routines, and pain points related to food, in particular contexts.

This method tells a story of the individual's actions, feelings, perceptions, and habits about his/her interaction with a product or a service (Browne, 2011). It highlights positive and negative moments of the person's experience, providing a visualization of his/her interaction.

For each participant, a narrative was created, informed by the content discussed during the workshop. The older adults were asked a set of questions that informed their user journey map.

Questions ranged from exploring their eating habits, uncovering their food practices and food shopping, such as how they are used to buying, preparing, and eating their food. Other topics were explored such as weekend routines and food myths (e.g., popular beliefs about nutritional aspects of food).

A survey methodology was also adopted with a wider sample of older adults (N=36), aged between 65 to 80-years-old.

The survey covered various topics, referring first to the current state of independence among older adults, their nutrition status, and current physical activity status.

It aimed at exploring how older adults were willing to take action in order to prevent malnutrition, and at gathering understanding of their perceptions towards technology. Background information to define this target group was also collected such as gender, age, level of education, marital status, health status, and socio-economic conditions.

A group of service providers (N=4) (one activity coordinator, one personal care assistant, one assistant, and one administration manager) participated in the second workshop.

All the service providers worked at the same care home where the older adults involved in the first workshop live.

The scope of the workshop with service providers was to leverage the experience of service providers in a care home context to develop a solution that can improve nutrition in older adults.

The sample of service providers were engaged in a focus group to explore future scenarios, barriers, and opportunities of working with the older adults living in the care home.

In the focus group, topics such as older residents' needs, and their eating behaviours were discussed.

The data collected in this research phase informed the design of a set of four personas, four scenarios (one for each persona), and four service blueprints that led to the second phase of the research.

b) Development of the system prototype

A system prototype of a mobile application based on the findings gathered in the previous research phase was developed by the UK design-led technology studio.

Two versions of the same system prototype were developed, one for smartphone and one for tablet. The system prototype was then tested through an iterative approach to the design cycle. Two user testing sessions were organized. A sample of older adults were asked to interact with the prototype on a mobile and on a tablet.

The purpose of the user study was to conduct preliminary research regarding the acceptability and viability of tablets (Fig. 8) and smartphones (Fig. 7), in the context of the project. The study primarily aimed at informing the decision of choosing on which device (tablet or mobile) the system prototype would have been tested in the final phase of the project.

Figure 7. Example of the system prototype tested on mobile and tablet.

The user study consisted of two stages: individual usability testing sessions to collect quantitative metrics regarding the usability of the current prototypes and a focus group to evaluate the overall reaction of older adults towards the system prototype.

Seven older adults (N=7), between the ages of 61 and 86, were recruited. Prior to the testing sessions, a brief introduction to the basic touch gestures – tap and swipe – with touch screen devices was carried out, since most of the participants recruited for the testing did not have experience with smartphones, tablets, or touch-screen devices in general.

During the testing, participants were required to complete the same set of tasks on two different devices: smartphone and tablet. They started the test either on the

tablet, or smartphone, and then repeated the same tasks on the other device. At the end of each test, they were then asked to complete a brief questionnaire regarding their experience with the system prototype using an eight-point scale.

Beside the user testing, a focus group session was run with the same sample of participants.

The focus group aimed at exploring from a qualitative point of view the acceptability of the devices proposed (tablet or smartphone), as well as other functionalities of the system prototype to define the technology to be deployed in the upcoming field trials.

A set of open-ended questions such as "Which devices would you like to use on a regular basis to help you manage your meal plans? A smartphone or a tablet?" were asked.

The quantitative and qualitative findings gathered during the user testing and the focus group informed the development of the final version of the system prototype, finally tested on a smartphone in the last phase of the research, the field trials.

c) The field trials

The last phase of the CGEP consisted in a 6-week field trials. A dedicated section to the methods adopted in the field trials follows, considering that the PP1 involved direct observation of the activities run as part of this research stage.

4.1.2. The Field Trials

The PP1 involved the collaboration in the conclusive phase of the CGEP: the field trials. The main goal of the field trials research phase was to test and validate the final system prototype in field trials which took place across 6 weeks.

The field trials aimed at providing data to perform adjustments and improvements to the system prototype and to assess older adults' interest and acceptance of the digital solution implemented.

The main aims of the field trials were to ensure that the system prototype worked properly in the target environment and that the design meets older adults' requirements.

A mix range of methods were adopted; besides metrics to access the usability and accessibility of the system, qualitative data about the user experience with the system prototype and the perceived impact of the digital intervention on the older adults' lifestyle were also explored.

The field trials were organized in four stages:

1. Recruitment
2. Baseline Evaluation
3. Ongoing Evaluation
4. Final Evaluation

The methods selected to run the field trials are presented in Table 2.

Table 2. *Overview of the field trials stages and methods*.

Stages of the field trials	Methods
Recruitment	Mini Nutritional Assessment survey (MNA)
Baseline Evaluation	Training workshop Questionnaire
Ongoing Evaluation	Follow-up workshops
Final Evaluation	Focus group Questionnaire

In the recruitment stage, a set of inclusion criteria for recruiting the sample of participants were defined as follow:

- Adults 65+ living independently at home, not necessarily alone
- Older adults who are interested or curious to test the prototype
- Older adults who have problems to maintain their weight and eat healthily
- Older adults with a limited budget

A survey was conducted to assess the risk of malnutrition among older adults and select a representative sample of participants based on the recruiting criteria. In this preliminary stage, the shorter version of the Mini Nutritional Assessment (MNA) (Vellas

et al., 2006) was adopted. The MNA was developed nearly 20 years ago and was originally composed of 18 questions; a shorter version (6 questions) was created and adopted to streamline the recruitment process.

The shorter version retains the validity and accuracy of the original MNA in identifying older adults who are malnourished or at risk of malnutrition.

The revised MNA short form makes the link to intervention more easily and quickly and is now the preferred form for clinical use.

A sample of older adults (N=15), aged 57 to 85, were recruited. All participants were living independently, alone or in couple, in their home.

The incentives for taking part in the field trials were three ready meals and desserts per week, delivered for free during the trial period, and a free smartphone - supplied to carry out the trial. Participants were allowed to keep the mobile phone as a thank for their participation at the end of the trial.

The recruited sample was then asked to use the system prototype for six weeks in their day-to-day life. Specifically, the 'Ready Meals Delivery' blueprint service (Fig. 8) created in the first phase of the project was tested.

Figure 8. Ready meals delivery user workflow.

Every week participants were asked to place an order for three previously selected ready meals and desserts to be delivered on three days of the following week.

Besides the ready meals, the system also suggested daily recipes to maintain a balanced weekly diet. For example, if the participant requested ready meals for lunch, the system suggested recipes to cook for dinner.

The suggestions were meant to encourage older adults to cook their own food and maintain a healthy and balanced eating behaviour.

Before the field trials, participants were asked to provide their weight and height; the information was then implemented in a personal account and used as the basis for the weekly meal plan, generated by the system.

In the baseline evaluation stage of the field trials, the sample of older adults were engaged in a training workshop to familiarize themselves and learn how to interact with the system prototype and with the new smartphone supplied for the trials.

The main aim of the baseline evaluation stage was to support participants in the preliminary learning phase. Specifically, the aims of the workshop were to introduce and support them while learning how to place their first ready meal order through the system prototype.

The training workshop was meant to be a festive kick-off of the field trials to inspire a sense of community among the participants recruited.

Participants were also required to fill out a questionnaire to gather a clear picture of each participant's profile; general questions about socio-demographics, evaluation of daily diet, habits, and attitudes towards cooking and technology were explored.

The same questionnaire was then provided at the end of the field trials to get an evaluation of the impact of the adoption of the system prototype in participants' daily life.

Following the baseline evaluation, older adults were asked to use the system prototype in their everyday context at home.

The ongoing evaluation stage followed. During the actual duration of the field trials, the main researchers had regular contact with participants, at least every two weeks, to support them with the usage of the system prototype.

Regular contact was important to ensure participants didn't drop out and to strengthen the sense of being part of a common project.

Three follow-up workshops were therefore organized to support participants with any problems or issues with the system prototype and to monitor the progress of the field trials.

The first follow-up workshop was organized in the week following the training workshop.

The second follow-up workshop was scheduled in the 3rd week of the field trial, two weeks after the first follow-up. Only users who struggled the most were invited to attend the workshop.

The last follow-up workshop was then scheduled in the 5th week, a week prior the end of the field trials. Informal comments were collected during the follow-up workshops.

In the final evaluation stage, participants were engaged in a final focus group and then asked to fill out the same questionnaire completed at the very beginning of the field trials.

Beside the questionnaire, participants were also asked to complete the system usability scale (SUS) (Tullis and Stetson, 2004), a simple and standardized form to measure the usability of the prototype.

The SUS is a state-of-the-art tool for evaluating the usability of technical systems and has an outstanding reputation regarding validity (Tullis and Stetson, 2004).

The aim of the focus groups was to analyse the usability (through the SUSU), the user experience and acceptability of the system (through the focus group), after a meaningful period of use, as well as its impact on the daily diet quality, knowledge of nutrition and quality of life, as perceived by the participants (through the questionnaire).

Continuous feedback was provided to the design team about the progress of the field trials and at the end of the 6-week period a focus group was run to evaluate the interaction with the system prototype, as presented in section 4.1.3.

4.1.3. PP1: Data collection and Analysis from Field Trials with Focus Group

Commented [VP10]: *For example in chapter 4, PP1, it was not clear to me what was being observed, what data was being captured etc*

The focus group run in the final evaluation phase of the field trials had the aim to collect feedback on the overall experience of interaction with the system prototype, during the 6-weeks field trials.

The researcher took part in the focus group as an observer, taking notes and audio recording the discussion.

The audio recording was then manually transcribed (See Appendix b) and the transcription was analysed through thematic analysis. The focus group's transcription was integrated with the field notes collected during the observations run throughout the whole duration of the field trials.

Commented [VP11]: *The material in the appendices should be signposted and mention of their content integrated into the discussion in the main body of the thesis, where relevant e.g. p.100*

The observations mainly provided details on non-verbal communication and group's dynamics observed during the workshops.

First, the researcher read and re-read the transcription several times, dividing it in big chunks, according to the content.

A coding framework was then defined based on the chunks of content previously determined.

The coding framework aimed at capturing the most significant elements in the experience of interaction with the system prototype. For each code, a colour was assigned to facilitate the next step of the analysis, generating a colour code framework (Table 3).

At this point, the researcher, while re-reading the transcript, highlighted smaller portion of text (e.g., sentences, words), according to the colour code framework.

The portions of the text assigned to each code were then grouped and further analysed, according to recurrence and relevance of specific topics.

This last step of the analysis resulted in five themes. The themes were further developed in the form of design recommendations presented in the following section (4.1.4).

Table 3. *Colour Code framework defined to analyse the data collected in the focus group of the PP1.*

Code	Colour Code	Extract from the text
Desired design and content changes: accessible and usable UI	Yellow	*"I think there should be 'suitable for diabetic', 'suitable for gluten -free', so you don't have to go through the list and also you don't have to wait for the delivery and realise you can't eat it because it is not suitable for you".*
Difficulties with the CG System prototype: concerns, confusion, and frustration	Green	*"[…] I still couldn't do it…and then I had to log in again."*
Technology acceptance	Purple	*"I think that generally our age group…maybe someone has used a smartphone before but for who has never used a smartphone before…I was afraid of making a mistake."*
Positive aspects of using the CG System prototype	Light blue	*"Something to do. Something new."*

Perceived impact of the CG system on eating habits, health, and wellbeing	Grey	*"I would definitely look for more ready meals at the supermarket."*
Users Preferences: safety, independence, comfort	Red	*"PayPal is very secure; you get your money back."*

4.1.4. Design Recommendations to Improve the System Prototype

The PP1 resulted in the creation of a list of design recommendations, summarized in Table 4, for the design-led technology studio that developed the system prototype tested during the trials.

Table 4. *Design recommendations to improve the experience with the system prototype*.

Design recommendations	
Accessibility of the user interface (UI)	Bigger size of text, audio description option, voice command feature, brighter and more eye-catching colours could make the interaction with the system prototype more accessible and intuitive.
Provide feedback message	Provide feedback about people's action with the interface to prevent them making errors and confirming undesired options.
Privacy and data protection	Ensure that the login is straightforward and easily memorisable to allow people to easily start the interaction with the system prototype.
Personalization	For allergies or health conditions, implement the food restriction options in the personal account details rather than requiring people to manually select what they can't eat every time they place a new order.
Sociality	Adding social interaction opportunities (e.g., chat) through the system prototype might increase people's engagement and promote long-lasting adoption.

The adoption in real life of the system prototype highlighted many obstacles, first in the accessibility, usability and learnability of the system that significantly jeopardized the experience during the 6-weeks trials.

Overall, during the field trials, a high level of frustration among participants emerged in relation to poor usability, poor understanding of the system prototype, and a lack of familiarity with mobile devices in general, as reported by some extracts from the focus groups run in the final session of the trials: “It’s my fault, I am very slow, I am so bad”; “I think that generally our age group, maybe someone has used a smartphone before but for someone who has never used a smartphone before liking me…I was afraid of making a mistake.”

Usability and accessibility emerged as basic and necessary requirements to ensure a positive experience of interaction.

Participants expected the system prototype to have a bigger size text, voice command option and audio description.

They often reported difficulty in recognizing features, especially participants with poor eyesight. For example, the call to action (CTA) buttons were blending in with the background and easily overlooked.

The CTA buttons should clearly lead the interaction with the interface and guide users towards the completion of the process.

Furthermore, the importance of designing memorability enforcement and reminders features was observed as a fundamental requirement.

Participants reported struggling to remember their login details. Passwords were especially challenging.

Login details were randomly assigned by the design team before the launch of the field trials and the passwords were complicated random series of letters and numbers.

The login process was even more frustrating because participants were not able to see what they were typing in.

The password was encrypted and no ‘show password’ feature was provided. Privacy and security emerged to be crucial elements for participants; not having control of their log-in details made the interaction with the system untrustworthy, right from its initial step.

The need to provide clear feedback to people' actions with the system also emerged as essential. In the system prototype, no specific instructions, visual clues, or feedback were provided.

Participants were often observed blaming and judging themselves for the perceived failure with the system prototype. Feedback messages could prevent people making mistakes and alleviate the perceived sense of failure and frustration.

Furthermore, providing feedback messages could support people, especially those who are not-tech-savvy, to comprehend their actions with the interface.

Designing for personalization to meet personal needs and customize the experience of interaction was also established as valuable for older adults.

Participants expected to be able to customize their personal profile, for example adding their health conditions, intolerances etc. to tailor their options and avoid unnecessary steps, going through a simplified and customized process.

Participants also highlighted how socialization was central to their experience of interaction with the system and their overall participation in the project.

They would like to be able to communicate with other people through the system prototype to share their experiences and seek support when needed.

Providing the opportunity to share their experiences and ask peers for help through the system could also foster the learning process and promote long-lasting adoption.

4.1.5. Discussion

The PP1 entailed the collaboration as an observer in the last phase of the Cordon Gris European Project (CGEP), in partnership with the design-led technology studio that worked at the development of a prototype system of a digital solution aimed at ageing cohorts.

The CGEP terminated with the testing of the system prototype of the digital solution in field trials, with a sample of older adults.

The digital solution aimed at supporting older adults' food shopping management, ultimately fostering a behavioural change in their eating habits, thus having an impact on their overall health and wellbeing.

From the observations made in the PP1 and the reflections on the overall CGEP methodology, defined prior to the PP1, it was established that older adults were included in the whole design cycle, from its very early stages, mainly in the roles of *users* and *testers*.

The methods selected to engage them into the research activities were mainly descriptive or evaluative methods (e.g., user journey maps, user testing).

What was directly observed in PP1 seems to be in line with existent literature (see Chapter 2- Section 2.3) which reports how the ageing population, when included in the design cycle, mainly participate as testers or evaluators.

Other people, such as carers or clinicians, are instead addressed as informants to establish the needs or preferences of this cohort.

In the CGEP, this could be due to researchers' and designers' anticipations that engaging an ageing population in generative activities would have been too much challenging for this age group, perhaps due to a lack of creativity or for their declining cognitive capabilities.

Service providers were probably considered as more suitable informants to define older adults' needs than the older adults themselves.

A lack of appropriate methods to involve ageing cohorts in generative activities, in respect of their unique circumstances, might have also played a role in the methodological choices observed in the CGEP.

Generative methods aim at engaging participants in the design cycle through creative and propositional activities, rather than descriptive or evaluative ones, for example for creating future scenarios of usage or ideas for designing a product.

Generative methods are usually adopted to define the design space; for example, in the CGEP, such methods were chosen in the workshop with service providers to gather needs and potential obstacles in the older adults' routine to be addressed with a digital solution.

The methodological choices adopted in the CGEP led the design of a system prototype that meets the needs established by service providers (e.g., more nutritional balance in the older adults' weekly diet, more awareness of the nutritional value of

certain food) but failed to meet the actual needs of older adults, as observed in the field trials.

For example, it seemed that this cohort of people chiefly valued to be socially connected or feel independent in their daily routine. Having the food delivered at home, social connectedness, and economic reward (free ready meals and a free mobile phone) emerged as foundational aspects for the participants.

This insight was crucial for the definition of the methodology of the main research project of this Ph.D.; it is at this point that the focus on values was established as foundational for designing a meaningful and potentially long-lasting experience with the technological device.

From the PP1, it was noted that exploring deeper meanings underlying observed or reported behaviour of participants with the digital artefact could have been a game changer in the development of the system prototype.

Designing to initially address older adults' values, such as being connected, could have provided a more fitting and meaningful experience with the digital system, potentially prompting longer-term adoption and usage of the product, and indirectly fostering changes in the participants' eating behaviour.

To summarize, the insights gathered from this first probing project brought to attention the potential limitations of the well-established user-centred approach to the design of new technology.

Despite the intention to engage older adults from the very beginning of the design cycle, their perspectives, and their needs and ideas on the nature of the digital solution were overlooked, in the initial phases of the CGEP.

Assumptions about those age groups seem to have guided the methodological choices of the cohort of researchers and designers working at the European Project and a 'passive' engagement of older adults was adopted, leading the design of a system prototype that failed their expectations and didn't fit their needs.

This first probing project triggered the reflection on the potential of a more active engagement of older adults in the design cycle with roles such as *informants* or *design partners*.

This insight prompted the consideration of participatory design (PD) as a methodological solution for an active and inclusive approach of this cohort of people to the design of technology.

Most importantly, it is from the observations gathered in the PP1 that the research shifted the focus on values, meant as deeper meanings behind observed or reported behaviour, considered as important factors for designing media experiences that are meaningful for people, promoting long-lasting adoption of the device, and ultimately having the potential of impacting on their wellbeing, enhancing their quality of life.

4.2. Ether One: An Interview to Gather Understanding of the Design Process of a Video Game About Dementia

The second probing project (PP2) consisted of an interview to gather in-depth insights on the design process of a videogame called Ether One (https://ether-game.com/), developed to raise awareness about the experience of living with dementia.

Ether One is aimed at supporting people understanding the living condition of dementia patients.

The role of the researcher in the PP2 consisted in designing, running the interview, and analysing the data collected through thematic analysis (Section 4.2.2.).

Commented [VP12]: *Clarification of research procedures required in chapters 4 and 5. It is not always clear how the research was conducted and what data was captured.*

The PP2 was run in collaboration with the White Paper Games Studio, an independent game development studio based in Manchester, in the northwest of England.

The goal of the interview was to learn more about the design approach adopted during the development of the video game. Specifically, the focus was on the research run to gather understanding of personal experiences of people diagnosed with dementia and their circle of care, to assess their engagement in the design cycle.

The probing questions that led the PP2 were defined as follows:

PQ1: What was the design process adopted to design Ether One?

PQ2: Were people with dementia and their circle of care engaged in the design cycle? If yes, what are the methods used to engage them? What roles did people living with dementia and their circle of care play in the design cycle?

A semi-structured interview (see Appendix b) with representatives of the design team of Ether One was organized to gather in-depth understanding on the design process of the narrative-based video game about dementia.

The semi-structured interview format was chosen to provide the researcher with some flexibility while conducting the interview. The interview aimed at providing some relevant insights on the methodological process that shaped the design of the video game.

A set of thirty open-ended questions were defined ranging from questions about the design team's expectations and assumptions, and the motivations behind the idea of creating a video game about dementia, to more specific questions exploring the methods used to conduct research about dementia and the level of engagement of people living with dementia and their carers in the design cycle.

The co-founder of White Paper Games Studio and director of Ether One's design team, together with the audio and narrative designer who worked on the composition of Ether One's soundtrack and narrative took part to the interview.

Prior to the interview, the participants were provided with an information sheet with full details of the interview. Both participants provided informed consent (see Appendix a).

The interview took place at the White Paper Games Studio and lasted one hour and thirty minutes.

Following a brief introduction of the video game, the reflections gathered from the interview are discussed.

4.2.1. Ether One

Ether One is the White Paper Games studio's debut game, which was released in 2014 to positive critical reception, particularly for its atmosphere and immersive themes.

The experience of playing Ether One was reported as deeply meaningful, for some almost life changing, both by gamers and journalists of the videogame sector, as reported a in the quotes below (from https://ether-game.com/#devblog).

“Ether One made me feel something very real in a time of immense difficulty in my life. For that, I thank it."(Gamer- KOTAKU- from https://ether-game.com/#devblog)

“There are games that are so powerfully crafted, that the emotional response – by the time, the game ends– is overwhelming. Then, all you can do is ponder everything that happened. You just sit there. You’re sad. Upset. Satisfied." (GamesTM - videogame Magazine)

Besides entertainment, the final goal of Ether One is to engage the public in conversations about the topic of living with dementia, helping family and carers to understand what their family members diagnosed with this condition are experiencing in their everyday life.

Ether One could be therefore classified as a serious game. According to Corti (2006), serious games or game-based learning refer to the use of computer games in raising awareness about educational topics, acquiring new knowledge and skills by enabling learners to engage and participate in situations that would otherwise be impossible to experience.

Ether One was inspired by the experience of living with dementia and tried to recreate through interaction with the video game the experience of confusion, dismay, anxiety, and loneliness experienced by people living with this diagnosis.

Specifically, the video game aspires to represent the experience of living with dementia with Lewy bodies (DLB), which entails attentional impairment, problem solving issues, visuospatial difficulties, and persistent well-formed visual hallucinations (Mckeith et al., 1996).

It is a narrative-based video game, and the leading narrative tells the story of Jean Thompson, a 69-year-old woman diagnosed with dementia. It is a first-person adventure; the player is invited to explore and unfold the story of Jean and her husband through a series of puzzles.

There are two paths in the game the player can choose from: the foundational path is the story, free from puzzles, to be played at the player’s own pace, and the second path is a deeper, more adventurous one, to be completed by solving complex puzzles to

restore life-changing events from the protagonist's history to support the validation of their life.

The player assumes the role of a "restorer" whose job is to investigate the thoughts of Jean Thompson. The player must reconstruct Thompson's memories using three-dimensional simulations of the details she can remember, solving puzzles that become more complex throughout the gameplay, as the protagonist's thoughts continue to grow more unstable. Once a puzzle has been solved, the memory it represents can be played back.

The game is built around a central control room from which players access the four main areas of Jean's past—a seaside town in England, an industrial mine, a processing factory, and a lighthouse overlooking the ocean (see examples in Fig. 9).

Each area is filled with hundreds of mementos and everyday objects that could hold some long-forgotten significance.

Figure 9. *Extract from Ether One video game. The small seaside town and the industrial mine (Copyright White Paper Game Studio).*

4.2.2. PP2: Data Collection and Analysis

Commented [VP13]: *Clarification of research procedures required in chapters 4 and 5. It is not always clear how the research was conducted and what data was captured.*

The interview with the design team was audio recorded and then manually transcribed (Appendix e). The transcription was then analysed through thematic analysis.

Commented [VP14]: *The material in the appendices should be signposted and mention of their content integrated into the discussion in the main body of the thesis, where relevant e.g. p.100*

First, the researcher read and re-read the transcription several times, dividing it in big chunks, according to the content.

A coding framework was then defined based on the chunks of content previously determined. The coding framework aimed at capturing the most significant elements of the design cycle of the videogame.

For each code, a colour was assigned to facilitate the next step of the analysis, generating a colour code framework (Table 5).

At this point, the researcher, while re-reading the transcript, highlighted smaller portion of text (e.g., sentences, words), according to the colour code framework.

The portions of the text assigned to each code were then grouped and further analysed, according to recurrence and relevance of specific topics.

This last step of the analysis resulted in a set of insights regarding the design cycle, as presented in the following section (4.2.2.).

Table 5. *Colour Code framework defined to analyse the data collected in the interview run in the PP2.*

Colour code	Inisghts	Extract from the Interview transcription
Yellow	Designers' values and White Paper Games Studio mission	"*I think that everybody wants first of all to achieve a fun experience […] and then the bigger picture of that, we said it quite a few times, telling a story and getting people involved in narrative that affects a lot of people, but you just don't hear*."
Grey	Concerns about how to tackle dementia in the narrative	*"Specifically, dementia with Lewy Body. We don't say it in the fame, we didn't want to just blindly say: oh, by the way this is a game about dementia."*
Green	Design process and user engagement	*"We are talking about something that takes three and a half years to produce and iterate along the way….without talking in generality, there are hundreds of moments where the direction changed for the better or the worse."*
Pink	Game and Narrative Details	*"In the game you have freedom of movement, you can look wherever, you can stop for 15 minutes in one spot and then move to another spot, you can't necessarily know that the player will do exactly what you want him to do."*

Light blue	Research about dementia	*"We kind of pull first hand from medical case studies and then also members of the team who currently had grandparents suffering with the illness and or had experiences things…"*
Blue	Symbols representing dementia in the visual design of the game	"*There are some symbolic moments, the walls are closing around you at this moment of relapsing and then you are going into this dream world, this demented state don't understand, and you have to travel down through into a mine and then down and down and down through the depth and you don't understand."*
Red	Video Game's impact on users	"You just start receiving emails from people that you just don't *expect playing the game, like a parent playing the game and the kid comes and sit next to him and that then create…they pause the game and start a conversation about the grandparents for example…"*

4.2.3. Insights from the Interview: The Design Process of Ether One

The most relevant insights established from the interview's analysis with the design team that worked at the development of Ether One are here presented.

The aim of this section is to provide an overview on the whole design process of the videogame to guide a reflection on the methodologies adopted throughout the design cycle.

In the interview, the designers explained that the design process of the Ether One was a synergic non-linear iterative process, which lasted over three years. The video game was developed by a 6-person team and was influenced by the studio's desire "for rich and narrative experiences" as reported by the design director.

The overall process entailed the continuous refining of the narrative, that arose from a very broad and general idea and informed more technical aspects of the design and development of the video game (e.g., visual aspects, soundtrack) in an iterative and recursive cycle (Fig. 10).

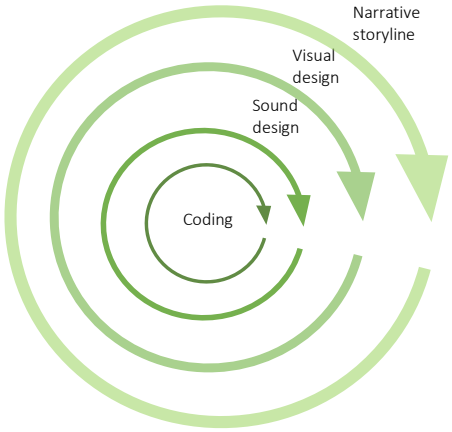

Figure 10. *Ether One iterative design cycle.*

The first step in the design cycle was the definition of the narrative core concept of the video game.

The core concept of Ether One wasn't originally specifically about dementia; it changed and evolved during the design cycle, starting with the broad idea of wanting to represent the fragility of the human mind through an immersive experience.

In this initial stage, through informal discussion among the team members, a common thread in their personal stories emerged: being exposed to some extent to the topic of dementia. Some of the design team had family members living with this condition, while others were close to professionals working with dementia patients (e.g., wife working as a nurse with dementia patients).

> *"Because everyone on the team had some experience in dealing with dementia patients, it felt like an ideal subject, something everyone could personally invest in." (Design Director)*

The design team shared the need to talk more about this condition and about the impact that this diagnosis has on families and carers. The narrative core concept of the video game was informed by their personal experience of dealing with the fragility of their loved ones and the suffering caused by the disorientation and the slow but constant

withdrawal into themselves due to loss of memory and the decline of communication skills.

Once the major narrative theme was established, the design team started to research the topic in more depth.

The interviewees explained that they mainly started by researching existing scientific literature in the field and asking friends and family working as clinicians with patients diagnosed with neurodegenerative conditions.

The symptoms of Dementia with Lewy bodies (DLB) inspired the designers for the presence of visual hallucinations (e.g., loss of colour differentiation) and movement difficulties that could be well represented by the visual design of the video game as well as with the narrative plot.

The visual hallucinations triggered the idea that some clues in the visual design of Ether One could be added to recreate a realistic and immersive experience and to simulate confusion and disorientation in the player throughout the unfolding of the story plot. In this phase of the design cycle, the design team never considered directly engaging people diagnosed with dementia or their families in the design process, mainly due to budget constraints.

Instead, as well as reading clinical and scientific literature, real-life case studies were researched through various online channels and integrated with the personal experiences of the designers.

> *"You have to think on a practical level, we didn't have a budget. We just researched as much as we could online and whatever personal knowledge we had" (Design Director)*

The development of more technical aspects followed, and the narrative plot was implemented with visual and sound design in a constant iterative cycle.

During the interview, giving consistency and credibility to the whole Ether One experience emerged as a priority for the designers.

The design team worked collaboratively to coherently integrate visual and audio design aspects to enhance the narrative.

Many visual design details were thought to symbolically represent the storyline that develops throughout the game (Fig. 11).

The sound design was also designed to amplify the narrative and provide an immersive experience.

Figure 11. *Extract from the video game Ether One. The house in the image is collapsing and the picture is pixeled to visually recreate the memory lapse (Copyright White Paper Studio).*

It also emerged from the interview that the design team worked constantly with their target audience in mind. Since the main aim of the game was to trigger conversations about the condition of living with dementia and get more people to talk about it, the target audience of Ether One was quite broad and varied. The design team wanted to design a game suitable for a broad range of players, both experts and beginners. For this reason, they provided different game plots: players can choose to simply follow the story of the protagonists, without the puzzles, or they can choose to engage in a more intricated game plot, full of complicated puzzles to solve and objects to collect.

> *"When we started the game, we asked ourselves 'Who is our target audience?'; you always design for an audience, there's no doubt about that"(Design Director)*

Ether One was deliberately designed to challenge the players' memory and create a sense of disorientation and confusion like the one experienced by people living with dementia.

Considering the convoluted puzzles and the many objects to collect, the design team expected that players would have found alternative ways to keep track of the elements, for example keeping written notes about the location of the items.

However, contrary to their expectations, after the launch on the market, numerous gamers reported that they played the game with a companion. From the interview it emerged that although the game was originally designed to be a single player experience, it emerged as a multi-player one.

Interestingly, the multi-player experience became a family time activity to be shared between family members and different age groups.

> *"What we didn't realize is that it would get couples playing the game together, one person being the memory and one person being the movement. I don't know how you could design for this anyway." (Audio and Narrative Designer)*

> *"You just start receiving emails from people you don't expect who are playing the game, like a parent playing the game and the kid comes and sit next to him, and that then they pause the game and start a conversation about the grandparents." (Design Director)*

4.2.4. Discussion

The aim of the second probing project (PP2) was to explore the design process adopted to create the video game Ether One. Specifically, the focus of the project was on understanding the level of engagement of vulnerable groups, such as people with dementia and their circle of care, in the design cycle.

From the interview, it emerged that people diagnosed with dementia and their carers weren't ever directly engaged in the design cycle; alternative ways to gather information regarding their living condition were adopted. Medical and clinical literature and personal experiences informed the narrative development of the video game, supporting the design team in bringing the topic into focus.

From the PP2, it was also established how the narrative nature of the video game resulted in being a powerful means to engage gamers in the experience of interaction with the digital game, and ultimately to trigger conversations about the topic of dementia.

In addition, the open-ended nature of the story, which emerges while playing instead of being imposed upon gamers, seemed to have facilitated more personalized interpretations of the storyline, fostering reflections and conversations among players.

The video game was designed to provide alternative game plots to players. Moreover, players have the freedom to play at their own pace and explore the various scenarios without being forced into a predetermined path.

They are allowed a certain amount of flexibility to choose what is more suitable for their needs and wishes. Hence, flexibility and the open-ended nature of the gameplay and of the narrative might have contributed to a more engaging experience.

Interestingly, contrary to the expectations of the design team, Ether One often emerged to be a multi-player experience.

Particularly, it transpired that it had the potential to be a multi-player intergenerational experience.

The designers reported that from the feedback sent by gamers, it was clear that the video game played the role of facilitator in intergenerational interactions, fostering conversations among and about generations, as in the case of parents talking with their kids about their grandparents diagnosed with dementia while playing the game together.

This insight triggered further reflections on the potential for digital games to play a role in cultivating interactions between different generations.

This was further explored in the next probing project, presented in the following section.

4.3. Labuntina Sing-Along: Designing Persona for a Media Product Aimed at Preschool Children

The third probing project (PP3) entailed the exploration of design practices in the field of leisure and entertainment of media products aimed at preschool children.

The PP3 involved collaboration with the creative director of Labuntina Sing-Along, a successful series of videos aimed at preschool children, launched on Sky Kids TV in 2017.

The aim of the PP3 was co-agreed with the creative director of Labuntina and consisted in the creation of a set of personas (Cooper, 1999).

The set of personas aimed at representing fictional profiles of preschool children imagined while watching the animated music videos to inspire and guide future development of the media product.

In this context, the probing question that led the PP3 was defined as follows:

PQ1: How to design persona for a product aimed at preschool children?

Labuntina Sing-Along is a media product consisting of a short series of animated music videos (3-4 minutes long) aimed at entertaining children from a very young age, up to early school years.

Kodi Fox, Lili Fish, and Judi Bee are the three main protagonists of the videos, and they explore a wide range of contents, from basic ones, such as numbers, ABC, actions, colours, and animal sounds, to more complex ones, such as feelings, time, friendship, and ultimately to daily routines, such as bath- and bedtime.

Originally funded via Kickstarter, the series has since been backed by Sky & Creative England.

4.3.1. Creating Personas for Labuntina Sing-Along

Persona is a popular method in design practices, however there is still no general agreement about how it should be created and used.

A common understanding is that the persona is a description of a fictitious person; it can be based on data, or it can be solely based on designer's experience and assumptions about the target audience.

The benefits of using this method range from increasing the focus on the target audience and their needs; to being an effective communication tool; to having direct design influence, such as leading to better design decisions and defining the product's feature set (Cooper, 1999; Cooper et al, 2007; Grudin & Pruitt, 2002; Long, 2009; Ma & Lerouge, 2007; Miaskiewicz & Kozar, 2011; Pruitt & Adlin, 2006).

Four perspectives on the creation of personas have been theorized. Alan Cooper (1999) is the originator of the persona method and viewed persona from a goal-directed perspective.

According to this perspective, a persona is defined by its personal, practical, and company-oriented goals as well as by the relationship with the product to be designed,

the emotions when using the product, and above all the goals of the persona in using the product.

The central core of the goal- directed perspective is the hypothetical archetype that is not described as an average person, but rather as a unique character with specific details.

The role-based perspective (Grudin & Pruitt, 2002; Pruitt & Adlin, 2006) is derived from Cooper's goal-directed persona but focuses on behaviour.

This perspective entails a more rigorous and detailed description of the interaction with the product. It is strongly data-driven and includes the involvement of the final target users in the creation of the persona profile (e.g., usability tests, market research, interaction with the prototype).

The fiction-based perspective (Adlin & Pruitt, 2006) is the only perspective that is not data driven and is solely based on designers' assumptions and imagination of the target audience.

This perspective on persona is based on the designers' intuition and experience and used to create an empathetic focus in the design process (Norman, 2004).

These three perspectives on the persona method are often criticized for creating a risk of stereotypical descriptions by not looking at the whole person, but instead focusing only on behaviour (Nielsen, 2004; Nielsen, 2011; Nielsen 2012).

Instead, the purpose of the fourth perspective, the engaging persona, is to move from stereotypes to designers actively involving themselves in the lives of the personas.

The engaging persona focuses on the power of storytelling and emphasizes how the story can engage the reader, producing involvement and insight (Madsen & Nielsen, 2010).

The focus is on the way people interact with other people. The interaction and relationship with others are therefore the key to understanding the target audience, using past experiences to anticipate their actions.

The scenario of usage is particularly meaningful in this perspective as a tool to investigate interactions and explore future solutions.

The set of personas created as part of the PP3 followed this last perspective, the engaging one, for its holistic approach to the personal story and for the strong interest in interpersonal relationships.

As mentioned in previous section of this thesis (Chapter 2, Section 2.3.), young children, such as preschool children, are generally an under-researched group for a number of reasons, including: the difficulty in accessing them; their not yet developed communications skills; their potential limited ability to interact and express themselves; and also due to the sceptical approach of parents and guardians towards technology.

Thus, having effective representative personas for young children could be a useful addition among the design toolkits available to designers.

Considering the demographic of the Labuntina Sing-Along animated music video (preschool children aged 0 to 6), it was extremely difficult, if not impossible, to imagine a story that avoided considering the children in interaction with their carer.

At this age, children's physical and cognitive development entails a strong attachment and dependence to their carers, and the engaging perspective on the development of personas allowed the researcher to focus on their relationship and their interaction mediated by the media product.

From a psychological perspective, children at this stage begin to think symbolically and learn to use words and pictures to represent objects. While their language and thinking are developing, they still tend to think about things in very concrete terms.

At the pre-operational stage (2-6 years old), children do not yet understand concrete logic, cannot mentally manipulate information, and tend to be egocentric and struggle to see things from the perspective of others (Piaget, 1955).

This is also related to the zone of proximal development (ZPD) proposed by Vygotsky (1978) referred as the difference between what a child, or more in general a learner, can do without help and what he/she can achieve with guidance and scaffolding from a skilled partner.

The term proximal refers to those skills that the children is close to mastering. According to the ZPD, some components are crucial for children to move through the zone of proximal development and master new skills, such as: the presence of a knowledgeable other, such as an adult carer or a capable peer; social interaction with a

tutor that promote observation and practice of new skills; and scaffolding through supportive activities to support the children.

Therefore, at this stage children depend greatly on their carer although their experiential progress is starting to lead them to an increasing independence. Similarly, children's interaction with media depends greatly on the mediation of an adult, particularly during the initial stage of the interaction (e.g., searching for videos, accessing the device).

In this context, the creation of paired persona was experimented. Paired persona describes the story of a relationship, in particular the relationship between preschool children and an adult carer.

Specifically, the persona method was adapted to represent the relationship between children and adult, mediated by their shared interaction with a technological device.

The paired personas aimed at exploring the role that the technological device plays in their shared media experience.

Various adaptations of the persona method have been proposed in existent literature to create persona specifically aimed at informing the design of technology and digital services for children, such us child-based persona (Antle, 2006; 2008) or the co-construction of child persona (Wärnestål et al., 2014; Sim et al., 2019).

The main difference between adult-persona and child-persona consists in one aspect: while adult personas are usually based on task-oriented goals, child-personas are tailored on children level of development and their specific needs determined by their age.

Recent papers by Abel and Grace (Abel & Grace, 2020) and Valguarnera and Landoni (Valguarnera and Landoni, 2021) respectively propose frameworks to create dyadic personas representing how caregivers mediate their children's use of interactive media or outlining how to create teacher-children's collective personas in preschool.

The main difference between the dyadic caregiver-child personas by Abel and Grace (2000) and the paired personas experimented in the PP3 is in the way the relationship children-caregiver-media is approached.

The framework by Abel and Grace draws from parental mediation theory and beside representing children using interactive media, aspires to highlight the tactics enacted by caregivers to mediate their children's practices.

Differently, the approach adopted in the paired persona focuses on the shared experience between children and adult mediated by the technological device. In other words, in the paired persona, the media experience is simultaneously shared by children and adult together and most importantly the digital artefact becomes a mediator or a facilitator of the intergenerational relationship.

In this sense, the paired persona aspires at representing not only the relationship between children and adult but also their relationship with the digital artefact.

This adaptation of the persona method was also inspired by the findings gathered in the PP2 (Section 4.2.3.) where playing the videogame Ether One became a multi-player experience promoting opportunities of sharing and bonding between different generations.

Thus, a set of three paired personas was created for the third probing project.

The relationship children-adult described in the personas is mediated by their interaction with the digital artefact.

Specifically, the relationship between preschool children and their adult carer is mediated by their shared experience of watching the music animated videos of Labuntina Sing-Along.

4.3.2. PP3: Data Collection and Analysis

Commented [VP15]: *In the paired persona creation how was the n=35 pieces of information actually used to create the personas? The personas are presented but it is not evident how the data was actually used to create these and thus the process could not be replicated*

The creation of the paired persona was based on the analysis of the audience's feedback sent to the team working at Labuntina Sing-Along (Appendix e), through various channels.

This included range of messages (N=35) (e.g., emails, Facebook, or Twitter messages) that were collected, and which informed the creative process of the paired persona.

The messages were collected and analysed through thematic analysis. First, the researcher read and re-read the text, dividing it in big chunks, according to the content.

A coding framework was then defined based on the chunks of content previously determined.

The coding framework aimed at capturing the most significant elements of the experience of watching the animated music videos. For each code, a colour was assigned to facilitate the next step of the analysis, generating a colour code framework (Table 6).

At this point, the researcher, while re-reading the transcript, highlighted smaller portion of text (e.g., sentences, words), according to the colour code framework.

Overall, the feedback sent by the audience was extremely positive. Parents and carers appeared enthusiastic about the animated music videos and excited to observe their children having fun watching the episodes.

Interestingly, some audience feedback reported how watching and singing Labuntina animated video became a family time activity, as reported in the quotes below.

> *"We discovered Labuntina just two days ago and have already cued up the songs for our regular family sing-along" (Message by the audience sent on Labuntina social media).*

The portions of the text assigned to each code were then grouped and further analysed, according to recurrence and relevance of specific topics. This last step of the analysis resulted in a set of insights that inspired the usage scenario descripted in the three paired personas created for the PP3 and presented in the following section. developed (4.3.4.).

Literature about preschool children's interaction with media and technology was also integrated into the design of the persona (e.g., Schmitt et al., 1999; Taylor et al., 2018).

Table 6. *Colour Code framework defined to analyse the audience messages in the PP3.*

Colour Code	Insights	Extract from the Audience Feedback
Yellow	*Demographic information (e.g., age and gender of the children)*	"*My 14-month-old son loves Labuntina!"*
Green	*Observed children behaviour while watching/singing Labuntina videos/songs*	"*He stops crying at any point when I sing him Labuntina songs."*

Blue	*Carer/s behaviour while watching/singing Labuntina videos/songs with their children*	*"We discovered Labuntina just two days ago and have already cued up the songs for our regular family sing-along._" _*
Purple	*Merchandise Requests (e.g., CD, DVD, Toys etc.)*	*"I just wondered if you do a doll/teddy of Lili that I could buy."*
Light Blue	*Children preferences (e.g., favourite episode, characters)*	*"Let's take a walk with Frida" is the new favourite bedtime song."*

4.3.3. The Set of Paired Personas Created for Labuntina Sing-Along

The first paired persona created tells the story of an infant - 9 months old - and her mother (Fig.12). The focus of the story is on a delicate moment in the development of their relationship: the end of the maternity-leave and the introduction of the baby into nursery.

The experience of watching Labuntina music videos is therefore imagined in this context. In the use scenario, the shared experience of mother and child mediated by the animated music videos becomes an opportunity to overcome the difficulty of the separation.

The use scenario describes an episode in the everyday life routine of the mother-and-child dyad: the child doesn't like being in the car and the mother struggles to cope with their journey to the nursery.

In this scenario, the animated music videos watched through the adult's mobile device, entertain the child while the adult drives the car. Despite the parental concerns about allowing her children to access digital devices, the media product becomes a mediator in the dyad's relationship.

The use scenario outlines the form and content of the media product preferred by children, according to their age (Schmitt et al. 1999).

The simple graphic, bold colours and the loud, catchy music that typify the animated music videos enhance the experience of the young children. Moreover, the child in the use scenario is seen as being more attracted by content including laughter, children's voices, and movements.

Figure 12. *Sophia and her mother Greta. Paired Persona for Labuntina Sing-Along.*

The second paired persona tells the story of the relationship between a 79-year-old grandfather and his 3-year-old grandson (Fig.13).

The pair is imagined spending most of their free time together, while the child's parents are at work.

In this context, the media product takes the role of mediator in entertaining both the child and the older adult. They are imagined watching the music animated videos together and singing along with their favourite songs.

Furthermore, the intergenerational interaction mediated by the media product is here presented as a learning opportunity for both the child and the adult.

For the older adult, it promotes the learning of new digital skills, such as staying connected with other family members through the device.

The interaction with younger generations is presented as having the potential to facilitate the learning process of digital skills for the older adult and a chance for the child to benefit from full attention and playful opportunities with a representative of the older generations.

Furthermore, the screen time exposes the children to the opportunity of learning novel vocabulary or concepts (Taylor et al., 2017), supported by the interaction with his grandfather.

Figure 13. *William and his grandfather Graham. Paired Persona for Labuntina Sing-Along.*

The third and final paired persona created as part of the PP3 tells the story of a pupil in her first grade - 5-year-old - and her teacher (Fig.14).

The pupil has been diagnosed in the autistic spectrum and sometimes struggles to interact with her peers. Her difficulty in integrating with other students in her classroom is described as mainly related to her struggle to govern her feelings.

In this context, the media product takes the role of mediator between the girl and her teacher but also as a facilitator in the communication with peers.

In the use scenario, the shared experience of watching the music animated videos with the teacher and with the classmates becomes an opportunity to reflect and make sense of her feelings.

The use scenario represents the potential for the animated music videos to promote peer-to-peer support and inclusion through active participation in the interaction between the adult and the children, mediated by the media product.

Figure 14. *Laura and her teacher Miss Giles. Paired Persona for Labuntina Sing along.*

4.3.4. *Discussion*

The PP3 resulted in the creation of a set of paired personas aimed at helping the design team working at Labuntina to empathize with their target audience and imagine use scenarios to inspire and lead further development of the media product.

Considering the young age of the target audience of Labuntina Sing-Along (preschool children, aged 0-6-years old) a set of paired personas was created, narrating the relationship between the children and an adult carer, mediated by the interaction with the music animated videos. T

he paired personas were presented in the form of stories and were particularly focused on the description of use scenarios describing the role that the media product could play in facilitating intergenerational interactions.

Like what was established in the previous project (PP2), and from the analysis of Labuntina Sing-Along's audience feedback, the media product resulted in being spontaneously used in the family system as an opportunity to do something together.

The sing-along through the animated music videos appeared like an enjoyable and entertaining pastime for both the children and for their carers, becoming a valuable family time activity.

So, through the paired personas, the media product was imagined as a possible promoter of intergenerational interactions, not only in the parenting relationship but also with older generations such as between grandchildren and grandparents.

The so designed paired personas were used by the researcher as an ideation tool and guided the definition of the scope of the main thesis project, leading the research towards the focus on intergenerational interactions mediated by a digital artefact, especially between grandchildren and grandparents.

4.4. Conclusion

From the exploration of design practices through the probing projects, it was established that vulnerable and marginalised groups seem rarely to be directly engaged in the design cycle.

First because of the difficulties for designers and researchers in accessing those groups of the populations, who are often isolated from the rest of the community (e.g.,

people diagnosed with dementia, older adults living in care homes); and second because of a poor understanding of who those cohorts of people are and how they can contribute to the design cycle.

As happens when there is lack of understanding and contact between groups, stereotypes based on assumptions flourish, potentially guiding methodological choices that tend to regard vulnerable and marginalised groups as unable to contribute as equal partners with designers in the design cycle.

Further, it was observed in the PP1, how limiting research to the evaluation of people's self-reported or observed behavior might prevent the understanding of deeper meanings behind their actions. Whereby, a turning point learnt in the probing phase was the need to define how to create the ideal circumstances for the elicitation of design ideas and active collaboration of vulnerable and marginalised cohorts with professional designers and researchers.

Additionally, it was established from this first phase that the importance of including vulnerable and marginalised groups in the design cycle comes with the intrinsic challenge of how to respect and address their unique circumstances during research.

Their participation in the design cycle raises the question of defining the ideal conditions for including them while at the same time enhancing their abilities and creativity.

Moreover, from the observations gathered in this probing phase and the exploration of existent literature, it emerged how a lack of methods suitable to engage vulnerable and marginalised groups in co-creative activities may play a role in the limited engagement of those cohorts in the design cycle.

Particularly, tools and techniques specifically tailored to enhance their contributions in the ideation phase of the creative process could be imagined and explored to facilitate equal partnership between participants and designers.

For instance, a lack of appropriate methods to involve ageing cohorts in generative activities, in respect of their unique circumstances, might have played a role in the limited involvement of those age group in the ideation phase of the European Project explored in PP1.

Moreover, from the observations gathered in this probing phase and the exploration of existent literature, it emerged how a lack of methods suitable to engage vulnerable and marginalised groups in co-creative activities may entail a role in the limited engagement of those cohorts in the design cycle.

Particularly, tools and techniques specifically tailored to enhance their contributions in the ideation phase of the creative process could be imagined and explored to facilitate equal partnership between participants and designers.

For instance, a lack of appropriate methods to involve ageing cohorts in generative activities, in respect of their unique circumstances, might have played a role in the limited involvement of those age group in the ideation phase of the European Project explored in PP1.

Also, there is a scarcity in literature presenting PD processes where intergenerational participants are involved in design activities as equal partners (for more details see Chapter 5 – Section 5.6.).

Although, PD seems to result effective in engaging children (e.g., Fitton et al., 2015; Sanders, 2018; Korte et al. 2021) or older adults in the design cycle (e.g., Vines et al., 2012; Lindsay et al., 2012; Joshi and Bratteteig, 2016), little research has been done about which methods can be applied to engage both those cohorts at the same time as equal design partners in participatory design processes (e.g., Xie et al. 2009; Yip et al. 2017).

Therefore, considering that every person can become a design partner to the extent that they are provided with the appropriate tools for expressing themselves through their creativity (Sleeswijk Visser et al., 2005), one of the aims of the main thesis project presented in the following chapter (Chapter 5) is indeed to explore novel techniques to engage young children and older adults as equal design partners throughout the whole design research.

According to Sanders (2006) four diverse levels of creativity can be recognized in people's lives: (1) creating, meant as expressing ideas; (2) making, related to ability or skills; (3) adapting, intended as the appropriation of an already existent artefact; (4) doing, that is the production of something.

In these terms, the research question at the core of the main thesis project was established as the methodological challenge of defining criteria and exploring tools to actively engage intergenerational cohorts as design partners in the design cycle of media experiences ultimately aimed at promoting intergenerational mediated interactions.

Commented [VP16]: *Having looked at the literature and examined company practices in chapter 4 what was the rationale for deciding that new techniques for PD were required? The end of chapter 4 to link to chapter 5 could be better motivated.*

CHAPTER 5

Model of Intergenerational Mediated Interaction (MIMI) Project: Engaging Preschool Children and Older Adults in Values-Led Participatory Design of Intergenerational Media Experiences aimed at Fostering Interactions between Generations

The research journey of this Ph.D. started with a probing phase and culminated in the research design of the main thesis project, the MIMI project, presented in this chapter.

The insights and reflections gathered through the three probing projects informed the methodology of the MIMI project, defining the scope of the research and the research questions.

The probing phase steered the interest towards the role the digital artefact might play in moderating and fostering interactions between generations, especially between preschool children and older adults, such as grandchildren and grandparents.

Participatory design was embraced as the main approach to the inclusion of those cohorts in the design cycle, as equal design partners. Specifically, values-led participatory design was adopted to access deeper meanings behind participants' behaviour.

A set of research methods was selected to elicit the intergenerational participants' (IGP) values with the aim to co-create media experiences aimed at fostering intergenerational interactions.

Following an introduction to the main benefits and challenges of intergenerational interactions mediated by technology, the research design is outlined, and the outcomes of the research are presented and discussed.

5.1. The Benefits of Intergenerational Interactions and the Role of Technology

Intergenerational interaction has been widely recognized as beneficial to the well-being of both children and older adults.

For older adults, intergenerational interactions have beneficial impacts on their physical and mental health, reducing stress, promoting relaxation, and facilitating positive changes in mood (e.g., Silverstein & Giarrusso, 2010; Lloyd, 2015).

Teater (Teater, 2016) conducted a study on the effectiveness of intergenerational programmes to promote active ageing across seventy-five schools in the southwest of England.

The programme facilitated older adults' participation in a range of artistic or creative projects with young students at schools or in the community.

Teater adopted a survey methodology to examine what impact an interaction with the younger generation might have on the ageing population.

In her findings, she outlines how the interaction with younger groups had positive effects on the perceived health and well-being of the older adults engaged in the programme (N=70). They reported their participation had contributed to their emotional and overall health and well-being, enabling them to learn about others and feel connected to their community.

The most common contact between younger and older generations occurs in family contexts, such as between grandparents and grandchildren.

Griff (Griff, 1999) discusses how grandparents may be an important source of emotional support and may exert a positive influence within the family system.

The researcher explored the impact of the engagement of grandparents in family play therapy interventions.

Participants were parents, children (aged 2 to 6) and maternal or parental grandparents. Eighteen families were randomly assigned to three groups: families that were in the list but didn't take part in family play therapy (control group); families that participated in nine sessions of the family play therapy; and families that participated in nine sessions of intergenerational family play therapy that involved the grandparents.

The findings report how the presence of grandparents made a significant positive impact on children's behaviours, such as reducing distractibility and demanding attention.

Similarly, grandparents who took part in the study expressed deep satisfaction about their new role with their grandchildren, as emotional supporters, and motivators for positive change within the family system.

For children, the contact with older generations could be a source of emotional support, as described in the previous study, but also an opportunity for learning and sharing values with different generations, and an incentive to have more positive attitudes towards ageing (e.g., Hannon & Gueldner, 2008; Harwood et al., 2005).

However, it has been shown that mere intergenerational intergroup contact is not sufficient to observe benefits and attitude change, and a series of conditions seem to be necessary to promote valuable intergenerational interactions (e.g., Harwood et al., 2005; Sherif, 1966; Paolini et al., 2004).

Harwood et al. (2005) were particularly interested in exploring those specific interactional experiences that affect the contact-attitudes relationship within the family system.

They examined the intergroup contact hypothesis (Allport, 1954) particularly focusing on the contact between younger and older members of the family, such as grandchildren and grandparents.

The contact hypothesis is an influential theory in social psychology that explores how the contact with members of a different social category (out-group) leads to attitude change concerning the out-group (Allport, 1954).

Scholars have suggested that to lead to attitude change the contact between the individuals of different group should present the following characteristics: being cooperative (Sherif, 1966); ensuring equal status of the members (Cook, 1978); taking place in a close long-term relationship (Pettigrew, 1997; Wright, Aron, McLaughlin-Volpe, & Ropp, 1997); and involving shared values and disconfirmation of stereotypes (Cook, 1978).

Within this theoretical framework, Harwood et al. (2005) hypothesized that personal relationships featuring frequent contact between grandchildren and grandparents (the out-group) have greater potential for changing attitudes in younger individuals toward older adults.

Their interest was mainly on an individual level, considering the specific relationship with one member of the out-group (one grandparent), rather than on a group level (e.g., Voci & Hewstone, 2003).

Three mediating factors were defined as being associated with a satisfying and enjoyable interaction between grandchildren and grandparents: perspective taking; a reduced level of anxiety; and accommodation in communicative dynamics, intended as the adaptation of the communication style to a communicative partner.

In other words, according to this study, an enjoyable and satisfying intergenerational interaction seems to be associated with reduced levels of anxiety; an interpersonal solidarity typified by the communicative adaptation to the partner style; and the willingness to put oneself in the other person's shoes.

Perspective taking emerged as the most powerful variable in the relationship between quality of contact and attitude change (Aday et al., 1996).

The intergenerational experience can also offer opportunity for learning and meaning making, for both generations (e.g., Davis et al., 2012; Takeuchi et al., 2011), and researchers have recognized the potential of play to promote connection and intergenerational learning (IGL) (e.g., Davis et al., 2002; Kaplan et al., 2012).

Playing with a child affords older adults the occasion to reminisce about their own childhood, while children can gain an enriched learning experience from interacting with positive role models.

For children, playing with members of older generations typically serves as a resource of wisdom, skills, and attention, as well as affection (Newman & Hatton-Yeo, 2008).

Play is particularly important for very young children, such as preschool children whose verbal literacy is still developing; play often becomes their way to express themselves.

In this respect, Davis et al. (Davis et al., 2012) explored intergenerational play, particularly between grandparents and preschool grandchildren, through ethnographic research in community-based playgroups.

The study resulted in the understanding of how grandparents and grandchildren manage their physical and social differences when playing together. In their discussion,

the authors outline how playing various roles incorporated in intergenerational play is one of the common ways in which grandparents and grandchildren manage these differences.

Some of the roles observed during intergenerational play are traditionally accepted, such as the role of educator or storyteller by grandparents or the role of imitator and apprentice by the children.

However, from the study it emerged that intergenerational play also offers the opportunity for experimenting various and less traditional roles such as playing the equal playmate or entertainer by older adults or the initiator and co-player by preschool children.

In recent years, there has also been increasing interest in the potential of media and technology to foster intergenerational interactions (Kaplan et al., 2012; Zhang & Kaufman, 2016).

Adopting a survey methodology, Kaplan et al. (2013) investigated forty-six intergenerational programmes characterized by heavy technological adoption, across eleven countries all over the world.

In their findings, they discuss how technology can become a vehicle and a pretext to enhance and promote intergenerational interactions in terms of cooperation, communication and relationship formation between the generations involved.

The study highlighted how the challenge that many of the surveyed programmes had to face was primarily related to relationship-building between the older and the younger generations.

The authors suggest that new ways of stimulating conversation and maintaining long-term interest and engagement should be created, and that technology could play a role.

On the technology development front, numerous new software systems, devices and digital games have been developed and tailored for strengthening relationships between older adults and younger family members (e.g., Chua et al., 2013; Voida and Greenberg; Ypsilanti et al., 2014).

For instance, Cur-ball (Kern et al., 2005) and Age Invaders (Khoo et al., 2006) are both physical games based on movement which deploy technology for intergenerational play.

Age Invaders is a game inspired by Space Invaders where players stand on a floor display, shoot their opponents with hand-held guns, and avoid collisions by moving around the floor display.

Digital games for intergenerational play have also been developed to re-connect intergenerational relatives living apart. Magic Box (Davis et al., 2008), Collage (Vetere et al., 2009), and Distributed Hide and Seek (Vetere et al., 2007) are games which exploit technological advances to connect members in geographically distributed families, such as grandchildren and grandparents separated by distance.

In contrast, studies on the roles that technology might assume in intergenerational play are rare. Chua et al. (2013) examined the effects of video game play on intergenerational attitudes, amongst younger and older generations.

Participants were recruited in pairs of one youth and one older adult (N=28 pairs) and were randomly assigned to two experimental conditions: video game condition and non-video game condition.

participants assigned to the video game condition were requested to play Nintendo Wii once a week over two months. Instead, the participants in the non-video game condition were required to interact through the daily routines of activities organized in the local senior centres.

In their findings, the researchers outline how participants in the video game condition reported more positive changes in intergroup anxiety and general attitudes towards the other age group than the participants in the non-video game condition.

They associate the stronger effect of intergenerational digital play to the novelty of the experience. Voida et al. (2021) use a mixed methods research approach to explore the intergenerational gaming practices of four generations of console gamers, from ages 3 to 83, focusing particularly on the roles that the intergenerational players assume when playing together.

The findings of this research reveal how in contexts mediated by digital games, a more generationally flexible range of roles were documented than in previous studies of

more traditional intergenerational interactions with no deployment of technology. Younger generations took on more leadership roles and the older ones had the opportunity to practise more host or hostess roles.

Among the benefits of computer-mediated intergenerational interactions, the authors list the opportunity to enter computer and media literacy for a broader demographic. Technology might also therefore play a role in fostering intergenerational learning (IGL), encouraging digital literacy among different age groups.

In IGL, the interactive process that takes place between different generations results "in the acquisition of new knowledge, skills and values" (Ropes 2013, p. 714).

Through IGL, the individuals become active actors in the learning process through engagement, familiarity, and intrinsic learning (e.g., unintentional learning) (De Freitas and Levene, 2004; De Freitas and Oliver, 2006).

This is also in line with the emergent instructional approach of the heutagogy (Hase and Kenyon, 2000) that takes the andragogy (Knowles, 1968) a step further, and reframes lifelong learning processes as self-determined learning.

Heutagogy is deeply student-centred, which can be maximized using digital media, emphasizing a continuous desire to thrive through rapid change and to develop the skills for a future digitally knowledgeable society, ready to live in the fourth industrial age and beyond (Blaschke, 2012; Hase & Kenyon, 2013).

Furthermore, for older adults, research has found that informal social contexts, such as play, especially in the home, were key elements in acquiring digital skills (Selwyn, 2005).

Based on data from in-depth interviews with 100 adults in the United Kingdom, Selwyn examines the range and the social stratification of formal (e.g., formal courses in community sites) and informal learning about computers, suggesting that formal computer instruction orientated towards the general public may inadvertently widen the digital knowledge gap.

In particular, the study highlights the importance of informal learning about IT and of encouraging such learning, especially in the home.

Intergenerational interactions mediated by technology seem therefore to have the potential to promote relationship-building between generations, fostering positive

attitudes through intergroup contact, prompting intergenerational and lifelong learning processes through a sustained engagement in role play, shifting the agency onto the social actors involved in the experience, and potentially encouraging a sense of self-efficacy and self-esteem (e.g., Newman, 2008), ultimately impacting on the well-being of those age groups.

5.2. The Challenges of Intergenerational Interactions Mediated by Technology

Despite the potential of technology as a vehicle to connect generations and foster intergenerational relationship-building and learning, the experience with technological devices is gradually transforming into an on-the-go, individual, and often unaccompanied experience.

The advent of new technologies and new media in recent years has drastically changed the ways we access digital tools and consume media content.

The fast pace of innovation of new technologies is also presenting the family system with new challenges (Livingstone & Byrne, 2018), for example, in relation to the control or mediation of children's technology usage by older family members (Livingstone and Helsper, 2008; Clark, 2011).

These circumstances might potentially fuel the digital divide (Becker, 2000; Tapscott, 1998; Papert, 1996), where adults feel challenged in their societal role, often due to a lack of competence in learning new technologies, rather than promote intergenerational bonding (Cheung et al., 2017; Aarsan, 2007).

This is particularly evident among young children who are extremely frequent users of new technologies, such as tablets or mobile phones.

As reported in a recent study in the UK, 75 per cent of infants, toddlers, and preschool children use a touchscreen device daily (Cheung et al., 2017).

Further, a recent survey conducted in the United States and Israel highlighted that 42% of grandchildren aged 2-3 and 58% of older children aged 6-7 spend about half the time under their grandparents' supervision engaged in various media-related activities (Nimrod et al., 2020).

Recommendations about preschool children's media and technology usage by the American Academy of Paediatrics (Guram and Heinz, 2018) suggest maximizing opportunity through more active mediation of adults, such as active talking, rather than only setting restrictive rules like time restrictions or parental controls (Blum-Ross and Livingstone, 2017; 2018).

Studies suggest that an active interaction with preschool children while using technology or accessing media content could promote healthy cognitive and physical development and enhance learning and greater interaction (Guram and Heinz, 2018).

Adults' interaction with the child, especially with younger children, during media or technology usage seems to play a crucial role in helping the child to make sense of their experience with the digital device and transfer the learning in social contexts.

For instance, starting at 15 months of age, toddlers can learn novel words from touchscreens in laboratory-based studies, but they struggle to transfer this knowledge to their real-world environment for a lack of social interaction (Zack et al., 2009; 2013).

Prior to the recommendation from AAP and Blum-Ross et al., (2017), a range of forms of mediation with technology and traditional media (e.g., television) were considered to promote a positive impact of media consumption on children's development, such as co-viewing and joint media engagement (JME) (e.g., Valkenburg et al., 1999; Stevens & Penuel, 2010).

Co-viewing is usually referred to as occasions when adults and children watch television together, sharing the viewing experience, but not engaging in any discussion about the programme.

It is considered a form of mediation because it has been shown to have positive effects on children (Valkenburg et al., 1999), such as children reporting feeling closer to their parents after co-viewing (Bryce & Leichter, 1983), and learning more about human relationships from a family programme when they co-view rather than when they watch it alone (Dorr et al., 1989).

Joint media engagement (JME) is also considered a form of mediation and it refers to spontaneous and planned experiences of people using media together.

Modes of JME include viewing, playing, searching, reading, contributing, and creating, with either digital or traditional media (Stevens & Penuel, 2010).

JME can happen anywhere and at any time when there are multiple people interacting together with media.

Differently from co-viewing, JME entails an active engagement of both children and adults in the shared experience and in a conversation about it. It therefore provides opportunities for generations to start a conversation and learn and share the values of the common activities they are living together through active participation (Naranjo-bock and Ito, 2017).

Most research about mediation and co-viewing of children media use focuses on parental mediation, overlooking the role of other caregivers such as nannies, older siblings, or grandparent.

However, a study (Nimrod et al., 2019a, 2019b) consisted in an online survey with Israeli grandparents (N=356) of young children (aged 2-7), highlighted that grandparent are taking care of their grandchildren at least once a week and that they are highly involved in various mediation practice, more likely with non-interactive media activities.

Participants to the study claimed to be less confident about handling their grandchildren's use of interactive digital media rather than screen viewing.

Further, participants reported relatively low involvement in co-use of the media, missing the opportunity for shared leisure time (Ibid.).

Designing for media experiences aimed at stimulating intergenerational interaction, joint engagement, and co-use of media, rather than fuelling individual experience, could promote the bonding between generations by bridging the societal and digital gap between different age groups.

Media experiences designed to fulfil this aim could consequently have a positive impact on the well-being of both younger and older generations and promote life-long learning in informal settings to ensure their inclusion in the digital society.

However, designing media experiences for intergenerational audiences poses challenges as there are differences between the younger and older generations, for example in terms of cognitive development, digital literacy, and content preferences.

The difficulty of engaging with children in research, particularly very young children such as pre-schoolers, might be a further deterrent (Davis et al., 2012).

With regards to older generations, the risk might be to reinforce the stereotype that the ageing population is a homogenous group classified only around their 'declining' capabilities, and potentially instigating fear, and denigration around the ageing process (Vines et al., 2012, 2017).

Due to radical improvements in health and advances in ageing research, older adults are indeed increasingly experiencing a better quality of life, and enjoying active, participative, and fulfilling lives into old age (Davis et al. 2012; Grady, 2012). Many older adults report they do not consider themselves as 'being old' (Zhang & Kaufman, 2016).

Further, although computer anxiety has been identified as a potential barrier to computer-based learning in older adults, recent evidence suggests that technological acceptance is similar in younger and older people and that negative stereotypical views about older adults can determine their attitudes towards computers (Broady, Chan, and Caputi, 2010).

In this context and with the aspiration to overcome assumptions and stereotypes about the intergenerational cohort, this research was designed to directly engage and actively involve the intergenerational cohort into the whole design cycle.

The research aims to tackle the following research questions which were inspired by the insights gathered through the probing projects (see Chapter 4) and then further refined:

RQ1: How do intergenerational cohorts use technology together? How is the shared interaction mediated by technology construed by intergenerational cohorts?

RQ2: How can we engage intergenerational participants in the values-led design cycle of media experiences to foster mediated interaction between generations?

RQ1 was established following the exploration completed through the probing projects, and it was further developed in the methodological challenge as defined in RQ2 of which exploration leverage findings from RQ1 – to explore new opportunities with new methodological criteria, specifically inspired by JME and IGL.

5.3. Aims and Expectations

In the specific context of the research, the project had two aims. First, it sought to understand how intergenerational participants (IGP) use technology together (RQ1);

and second, how to engage intergenerational participants in the design cycle of technology aimed at promoting interaction between preschool children – 3-6 years-old – and older adults, defined here as over 65 years-old (RQ2).

Therefore, RQ1 mainly focuses on gathering understanding of intergenerational cohorts and their experiences mediated by the digital artefacts.

In contrast, the methodological challenge defined in RQ2 envisages the exploration of the engagement in the design cycle of IGP and for designers to establish methods and approaches for inclusion of vulnerable groups in values-led participatory design processes.

The research sought the definition of a Model of Intergenerational Mediated Interaction (MIMI) to inform values-led design processes of media experiences that could foster interactions and contact between generations and ultimately positively impact on their wellbeing.

Intergenerational participants (IGP) were recruited to take part in the research activities and are here meant to be addressed as one group, rather than approached as two separate entities.

They were engaged in research in pairs, here defined as the intergenerational dyad (ID), and they were informed that they were 'equal partners' engaged in both design and research activities (Yip et al., 2017).

A dyadic system view of their relationship (Leclère et al., 2014; Jaffe et al., 2001) framed the research. Their interactive partnership was defined and explored as a single unit and the ID is considered as an interacting system (Leclère et al., 2014; Sameroff, 2009).

The early study on ID suggests that a socially coordinated context is important for the quality of the caregiver-child social relationship.

For example, Jaffe et al. (2001) provide strong evidence that a quality experience of coordinated social interactions predicts better cognitive and social development, especially in infants.

In their study, mother and infant were conceived as dyadic social partners; videos were captured during mother-infant interaction for observation and the timing of coordinated interaction was analysed to assess the quality of interaction.

The findings of the mother-infant observations highlighted that coordinated timing has emotional qualities and impact positively on the development of attachment and cognition.

In the dyadic system view, any action of an individual is jointly defined by the behaviour of both partners, in an active co-construction of the relationship (Bowlby, 1969; Field, 1994a; Fox, 1994).

For instance, the emotional regulation of the infant is defined by the emotional availability of the mother (Field, 1994b), and the parental discipline emerged to be a strong predictor of children's behavioural problems (Brenner & Fox, 1998).

This approach leverages the idea that the individual does not psychologically exist independent of their relationships (Winnicott, 1965).

The term psychologically is here used to specify that the dyad's relationship is conceptualized in a psychological perspective, not that the process is psychological. It focuses the attention on the dyad's joint action and choices and on the roles played in the relationship.

A role is here intended as "an ongoing pattern of behaviour that follows from the person's understanding of how the others who are associated with him in his task" (Kelly, 1955, Vol.1, p.66).

Personal roles are seen as construed in interaction with others, through the experience, and rather than only being thought are embodied ((Burr et al., 1998). In this sense, the roles played in the intergenerational relationship were explored to understand how children and older adults make sense of their interactions mediated by technology, as a dyad.

Furthermore, behaviour is not here meant as the consequences of inner drives, as in traditional psychoanalysis, nor as the response to external stimuli, as in behaviourism; instead, behaviour is meant as a continuous experiment through which the individual tests their own theories about the world and their own anticipations of what will happen in given situations (Bannister & Fransella, 1971).

The IGP behaviour is here approached as a process through which the IGP make sense of their experience through "the anticipation of given events by constructing their replications" (Kelly, 1955 p. 35).

The anticipation of the events should not be confused with a rational, and hence communicable, process. It is instead intended as a natural and often pre-verbal way of testing a hypothesis about the world, about themselves and the others, based on previous experiences, as described in Chapter 2, Section 2.2.1. Anticipation always occurs within a relationship, as interactionist and social constructionist authors indicate (Berger & Luckman, 1966; Gergen, 1985, 1999; Mead, 1934).

This perspective on the IDs could overcome the difficulties of designing with and for such different age groups, approaching them as a system rather than as two separate entities.

The focus is on the IGP relationship rather than on individual attitudes or temperament. In the research, the IDs are always observed together and asked to co-engage in shared activities.

They are not addressed separately, for example, asked to answer questions individually. This co-engagement process is indeed meant as the IGP construing process for co-engaged interaction with technology, that is their way of making sense of their shared interaction with technology.

The focus of the exploration is therefore on the joint action in simultaneous and synchronous intergenerational interaction mediated by technology.

Specifically, the age groups recruited to take part in the research activities were preschool children – 3 to 6 years-old, and adults, 65 years-old and over.

The particular focus on those age groups was inspired by the previous probing phase (see Chapter 4). Interactions mediated by technology were reported as having the potential to foster interactions between family members of different age groups.

The second aim of the research project was to create a set of methodological recommendations about how to engage with preschool children and older adults together in values-led participatory design.

It follows that the activities for this research were designed to discover and report techniques for actively engaging IGP throughout the whole design cycle, eliciting their values through participatory design.

This is a countertendency in existent research, especially with children, who have traditionally been engaged in the role of tester, and user, less frequently in the role of

informant, and sporadically in the role of design partner (Isola and Fails, 2012; Druin 2002; 2012).

This also seems to be a common practice with older adults (e.g., Berg, 1999; Xie et al., 2012), as highlighted in previous sections, where the ageing population were engaged in the role of user and tester but excluded from more active participation, especially in the ideation phase of the design cycle.

To summarize, the two aims of this research project were defined as follows:

1) Define a model of intergenerational mediated interaction (imi), embedding in-depth knowledge of the IGP cohort behaviour with technology and their interpersonal values.

2) Define a set of methodological recommendations about how to engage IGP in values-led participatory design to inform the design of valuable media experiences and long-lasting adoption of technology.

5.4. Research Design

The project presented in this chapter was run in collaboration with the BBC Children's and R&D departments.

The recruitment process comprised two phases: (a) the first consisted in the recruitment of a sample of IGP to engage in the design cycle; (b) the second sought the recruitment of professional designers to be included in the research activities together with the IGP.

The recruitment of IGP was run in the UK and in Italy.[1] The UK sample was integrated with a sample of IGP participants from Italy – the researcher being a native Italian speaker – and some of the research sessions were therefore run in Italian.

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The recruitment of the sample of professional designers was mainly run within the design teams of the BBC Children's and R&D departments who collaborated with the project.

The BBC sample of designers was integrated with professional designers from a USA Master of Fine Arts programme and designers from the TNW cohort.

[1] The pandemic situation naturally suggested an opportunity to include Italian IGP due to the researcher's temporary relocation during the project.

a) IGP sample and recruitment

The IGP sample (N=10) (Tab.7) was recruited to take part in the whole design cycle, from its initial stage.

They were recruited in pairs, here defined as intergenerational dyad (ID), of pre-schoolers and older adults.

Two UK IDs were recruited before the pandemic and a total of four sessions were run in-person before the first lockdown due to the COVID-19 emergency. One of the IDs withdrew after taking part in two sessions, for matters of safety related to the pandemic.

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The recruiting criteria were initially defined as follows:

1. Age: children between 3 to 6-years-old and older adults over 65 years of age.

2. Dyad's relationship: children and older adults must already know each other. They must have a trustful and intimate relationship (e.g., family friends, grandchildren and grandparents, or caretakers).

3. Live locally: they should live in the Salford or Manchester areas and be able to travel to the facilities where the participatory sessions can be recorded when needed.

This last recruiting criteria was suspended since the methodology of the research was partially revised due to the pandemic and the IGP's residency became an obsolete criterion.

Table 7. *IGP Sample.*

Intergenerational participants (IGP)	Older Adult		Children		Country
	Age	Gender	Age	Gender	
ID 1	65	M	4	M	UK
ID 2	65	M	5	F	UK
ID 3	67	F	6	M	IT
ID 4	72	F	5	M	IT
ID 5	67	F	6	F	IT

The research project was advertised through several channels within the University of Salford, social media, and through the researchers' private network of friends and family.

Those who were interested were contacted through phone calls. The first contact took place with the children's main carer who played a central role in the recruitment process.

A brief introduction to the research aims and activities was provided, and a few informal questions were asked to assess the eligibility of the dyad, such as the nature of the relationship between the children and the adult.

Following the first contact, the main carers were given some time to discuss and talk about the research to the IGP. Information sheets with full details about the research activities were also provided.

Tailored versions of the information sheet were created: one for the main carer and one for the older adult (as research participant). The main carers were invited to read the information sheet with their child to introduce the research main aims and activities.

Once the candidates agreed to take part in the research, the time, date, and place of the first session were decided.

Maximum flexibility for the sessions' location was given before the COVID-19 pandemic. They were encouraged to choose the place they preferred and where they felt at their ease, either among their homes or the University of Salford facilities.

Eventually, all the pairs recruited were of grandparents and grandchildren, and they all chose their homes as the place designated for the research activities.

Only one pair decided to travel to the University of Salford facilities for one of the sessions, before the COVID-19 emergency.

The main carer claimed that a trip to the University was a chance for her son to live a new experience and visit the University.

All the children's main carers were also invited to observe the research activities. However, all of them were happy for their child to spend some time alone with their grandparent. The recruited pairs were engaged in the research activities one at a time.

b) Sample of Professional Designers

A sample of professional designers (N=26) were recruited to take part in the research activities, from the BBC Children's and R&D departments (N=14), from a US Master of Fine Arts programme (N=8), and from the TNW cohort of Ph.D. (N=5) students who are currently working with industry as a part of the doctoral programme.

The only criteria for recruitment were that designers are currently working or had previous experiences in the industry.

Designers were originally meant to participate in the in-person sessions with the IGP, engaging in the research activities with them, as equal design partners.

However, their engagement was re-thought, and a set of sessions were specifically designed to maximize the creative process and avoid social contact with vulnerable groups, limiting the risk of infection of COVID-19 virus.

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Designers were provided with the information sheet with full details about the research project and their engagement in the research activities.

They all provided informed consent and agreed for their contributions to be used for the research.

5.4.1. Ethics

The research project was approved by the University of Salford Research ethics committee (see Appendix a).

The participation in the research was entirely voluntary and participants were informed that they could withdraw at any time, without explanation.

All participants provided informed consent; the children's main carer provided it on behalf of the children.

The information sheets were designed to be accessible and suitable for the age groups and roles of participants (both IGP and designers).

The information sheet detailed the purpose of the study, methodological approaches, and any associated risks; what happens to the data and who has access to it; measures for anonymity and confidentiality; the university complaints procedure; and contact details of the main researcher and supervisor.

Participants and the children's main carers gave consents for the data collected to be stored on encrypted online storages such as Box or OneDrive or in a locked cabinet,

and that data containing their personal information to be made anonymous or protected by password. The consent forms are stored separately from any research data.

Participants were also informed and gave consent that the data are used only for research purposes and their consent is conditional upon the researcher complying with her duties and obligations under the General Data Protection Regulation (GDPR).

As the research project was in collaboration with an industry partner, participants were made aware that their data could be used for reports or presentations to the external stakeholder.

5.5. Methodology: Research Stages

The research was designed with multiple research activities including participatory sessions to investigate the two leading research questions, RQ1 and RQ2.

The project was designed to achieve better understanding of the intergenerational experience with existing media and technology (RQ1), gaining insights on the intergenerational relationship, and the meanings that the interaction mediated by a digital artefact might assume in their everyday life.

RQ1 is meant to provide a set of elements to anticipate future scenarios of intergenerational mediated interaction (imi).

RQ2 leads the research design to explore new methods and tools to co-engage IGP in values-led participatory design processes in partnership with professional designers.

As previously said, rather than attempting to combine knowledge about preschool children and older adults separately, the research design aimed to explore and define tools and methods to investigate their construing processes, as dyadic systems, through their simultaneous co-engagement in the research activities.

The research was therefore designed for ethnographic observation of IGP using technology in their natural environment and for their joint engagement in the design cycle, in partnership with professional designers.

Originally, the research comprised three main stages: the first aimed at tackling RQ1 mainly through ethnographic observation of the IDs; the second and third stages involved a mixed engagement of IGP and professional designers in participatory design

sessions to co-create concepts and ideas for media experiences aimed at intergenerational cohorts.

However, the original research plan was revised due to the COVID-19 pandemic and a further stage involving a sample of professional designers separately from IGP was introduced to maximize the opportunities for participation and limit the contact with vulnerable groups, avoiding the risk of infection.

A fourth stage was therefore added, and the research stages were established as follows:

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1. *Explore Stage* with IGP to elicit existing intergenerational media experiences and anticipate future possibilities.

2. *Create Stage* with IGP to elicit values, foster the creative process, and to generate ideas for future possibilities of interaction and engagement with media.

3. *Define Stage* with professional designers to translate ideas and possibilities in design solutions.

4. *Evaluate Stage* with IGP to test emerging design concept(s).

The stages (Fig. 15) do not indicate that the process would be clearly divisible into separate activities. Instead, we refer to a stage to indicate the primary aim of that phase of the research. The research methodology was formatively refined through each stage, informing the next.

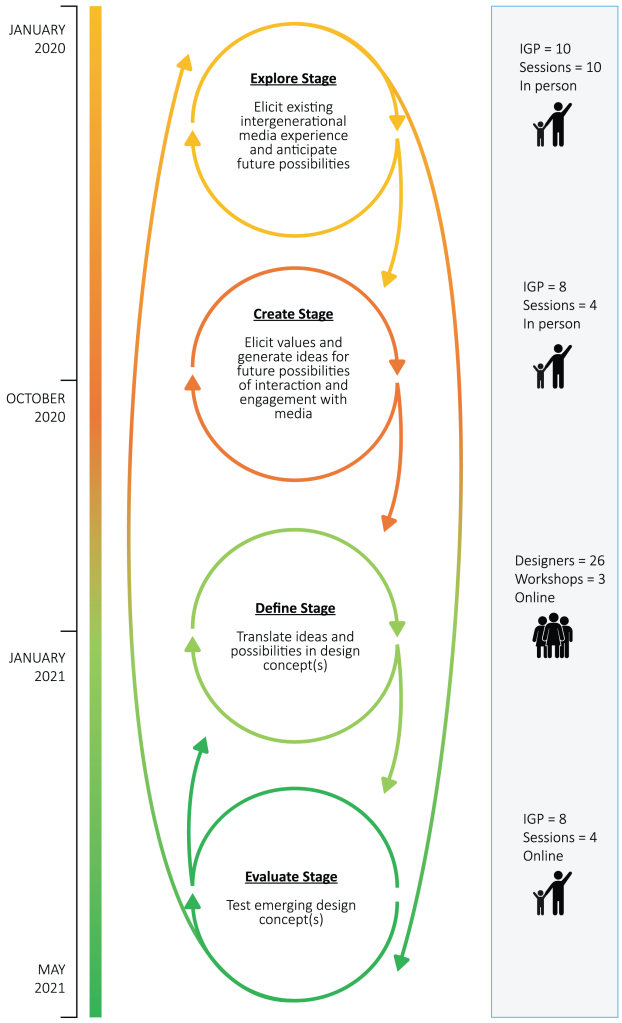

Figure 15. *Overview of the iterative cycle of the research stages.*

A total of a maximum of six sessions per ID were planned, two sessions for each research stage. For matters of convenience, the number of the sessions with IGP was reduced to four in total, while the activities were ongoing.

The sessions were planned to be a of maximum of 90 minutes long and one or two breaks were included to keep participants fully engaged during the activities.

All research activities were initially designed to take place in-person, focusing on the active and simultaneous participation of IGP and designers into the research activities.

However, some of the sessions were adapted to take place online, to comply with the safety measures suggested by the UK Government and the University of Salford for responding to the pandemic emergency.

Some sessions were therefore redesigned to be run remotely, aiming at exploring joint engagement of IGP and designers in online settings, in addition to the in-person condition.

5.6. Quasi-Experimental Setup: The Four Stages of Participatory Sessions

The research was designed in four stages of participatory sessions (Fig.16). The methods were deliberately chosen for designing activities that are versatile and can facilitate co-engagement of diverse cohorts.

The research activities have been subjected to change, allowing the flexibility to improvise when participants seemed not to be engaged or interested.

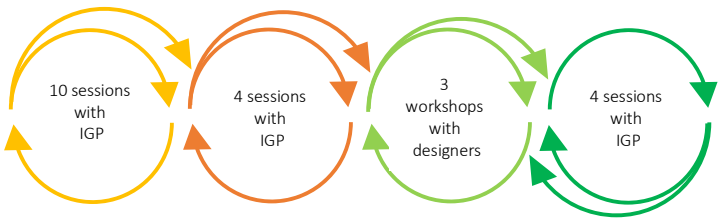

Figure 16. *Total of participatory sessions per stage.*

A range of well-established tools and techniques were strategically selected, based on previous literature on PD and design research with children and intergenerational cohorts (e.g., Read, et al. 2013; Read et al. 2009; Sanders, 2018).

The methods so selected for this research project were organised according to Sanders et al. (2010) framework.

The framework organises tools and techniques used in the tradition of PD practices to engage participants from very early stages of the design process.

Based on key review papers in the field of PD, both from USA and Europe tradition, the framework considers three main groups of methods that could be used to harness and enhance creativity of people engaged in the design cycle: *making, telling, and enacting*.

According to the Sanders et al. (2010), '*telling methods'* are useful to gather what people can say about their needs and their idea, entailing verbal expressions and communication through language.

Those methods, such as focus groups or interviews, can be limited in understanding unaware needs or dreams and could be challenging for cohorts of people with not yet developed language skills such as young children.

'*Enacting methods'*, such as acting out or game boards, focus on what people do and how they do it, and are valuable for accessing information about behaviours (ibid.). However, those methods often lack in accessing people's deeper motivations or emotions (William and Sanders, 2002).

'*Making methods*' explore what people make and how they make it, involving creative tools provided by the researcher. Such methods are described as enabling creative expression by giving people ambiguous stimuli to work with (Sanders et al., 2010).

As presented in a study conducted by Sanders (Sanders, 2018) with children, the selection of a mix of methods from the framework (telling, making, enacting), seems to be an efficient approach to engage children in PD processes.

Specifically, the aim of the study was to examine how generative toolkit (drawn from the making methods) and interview (drawn from the telling methods) can be used in PD to empower young people to express and reflect on their experiences.

The methods aimed at enhancing young people's creativity and reflexivity while compromising the adult-child power dynamics (ibid.).

The study focused on how high school students, administrators and teachers can co-construct understanding of and express their emotions; how emotions shape

student's performance in school; and what strategies students use to manage their emotions at school.

The methods toolkit so selected was therefore tested with 1007 high school students in the USA. Interviews were conducted and collaging was used during generative sessions.

Collaging consisted of a large blank posterboard with an arrow in the middle representing time. Students were provided with images and encouraged to tell stories placing images on the posterboard representing their earliest experiences and their present impressions.

The methods so selected resulted to be effective in enhancing young students' creativity and capability of expressing themselves and their emotions. The integration of tools and techniques from different types of methods (e.g., making and telling) allowed the researcher to overcome the limitations of solely relying on linguistic or drawing abilities.

Participatory design community has also widely discussed how to adapt PD process to engage with older participants (e.g., Grönvall and Kyng, 2011, 2013; Eisma et al., 2003), and accommodate their diversity in contextual factors, daily activities, or health conditions.

For instance, in their paper, Joshi and Bratteteig (Joshi and Bratteteig, 2016) propose a set of recommendations to engage older adults in PD.

They conducted a study involving 104 persons aged 84 years-old on average for investigating how to develop technology for this target group to live longer independently in their own homes. The researchers adopted a wide range of different activities such as observation, interviews, usability testing, and home visit.

Five main factors emerged as facilitators of active participation by older participants: recruit for activities rather than long-term commitment; adjust to their rhythms and plan for several shorter sessions; create continuity in their participation; select a representative sample; and make participation more accessible by making it more immediate.

Although PD seems to result effective in engaging children (e.g., Fitton et al., 2015; Sanders, 2018; Korte et al. 2021) or older adults in the design cycle (e.g., Vines et

al., 2012; Lindsay et al., 2012; Joshi and Bratteteig, 2016), little research has been done about engaging both those cohorts at the same time as equal design partners in participatory design processes (e.g., Xie et al. 2009; Yip et al. 2017).

In their exploratory study, Xie et al. (2009) explored co-design methods to connect generations through their engagement in the design cycle.

The aim of their study was to develop co-design methods that work for older adults and children and develop technologies to promote intergenerational interactions.

A sample of 13 participants, 7 children aged 6-9-year-old and 6 adults 68-year-old and over, took part in the study. Participants didn't know each other prior their engagement in the research.

As a result, the authors (Xie et al., 2009) presented a list of recommendations for methods to engage children and older adults in participatory design activities.

Shared time and distributed collaborations were established as necessary for productive co-engagement. Some shared time between children and older adults was needed to get to know each other and imagine the needs and preferences of the other.

At the same time, distributed collaboration assured a relaxed environment, for instance enabling older adults to work without feeling intimidated by the younger children (Ibid.).

This could be because older adults and children didn't have an already established relationship and they weren't used to spend time together, in their everyday life.

The authors also outlined how small group brainstorming experiences were the most successful, both for children and older adults. The use of sticky notes resulted in an intimate and empowering method to present their ideas.

Participants appeared to be at their ease and more focused on the collaboration when using together this method (Xie et al., 2009).

Yip and his colleagues (2017) presented a case study of a year-long intergenerational design team of children (7-11-year-old) and adults.

The aim of their study was to define what an 'equal partnership' between children and adults entails when engaged together in the design cycle. They defined four dimensions for a balanced partnership: facilitation – meaning how much support and mediation takes place between the adults and children; relationship building – meaning

how much social interaction occurs in the co-design group; design-by-doing – emphasising the active participation and the use of practical skills when participating in design processes; and elaborating together – that is taking part in the ideation phase (Ibid.).

Therefore, according to the authors, an equal partnership occurs when the adult and the child are in a close relationship, they equally facilitate activities, are engaged together in design-by-doing, and are both actively involved in the generation of ideas.

Research about PD and children mainly targets work on children aged 6-12-years-old and only a small body of literature is focused on co-designing with pre-schoolers (e.g., Farber et al. 2002; Tikkanen et al., 2011; Farber et al., 2004; Borum et al. 2015).

There seems to be a lack of research about engaging younger children, such as preschoolers in participatory design processes; particularly, to our knowledge, no research has been done yet on how to engage preschool children and older adults together, in PD.

One of the common outcomes derived from previous case studies about co-designing with pre-schoolers is that typical prompts usually used with children in PD activities might not be sufficient to engage young children in the research activities.

Young children seemed to need more structure and more storyline to contextualise the research methods (Farber, et al., 2002), making them more understandable and accessible.

Some researchers specifically focused on tailoring research methods for preschoolers. For example, Guha et al. (2004) created 'Mixing Ideas', a technique for combining the design insights of multiple children.

Collaboration emerges as a big challenge for children at preoperational developmental stage (2-6 years-old) who are still egocentric (Piaget, 1955).

'Mixing Ideas' aimed at addressing this difficulty through a step-by-step procedure to combine children's ideas into one big plan.

Through a case study conducted at the Centre for Young Children (CYC), at the University of Maryland, with 11 children aged 5, the authors (Guha et al., 2004) used this technique to enable young children to successfully collaborate in the design process.

From the case study, it was observed that young children need more structure to collaborate during the brainstorming process. They needed more pre-established parameters to collaborate with others and just asking a thought-provoking question wasn't enough to encourage idea-generation (Ibid.).

In their case study, Hiniker et al. (Hiniker et al., 2017) highlighted as one of the main challenges when working with preschoolers, the difficulty of conveying their responses and their ideas in a clear and comprehensible way.

The authors engaged a group of preschool children aged 4-6 years-old in design workshops with the aim of exploring co-design tools aimed at this age group. They used fictional inquiry and comic-boarding to elicit design ideas from young participants.

Fictional inquiry involves the creation of a fictional context to develop ideas and attempts to reduce the limitation of reality, allowing participants to be more generative (Iversen et al., 2017).

Comicboarding is a participatory technique that provides participants with a framework composed of comics strips for scaffolding children's brainstorming of ideas (Moraveji et al., 2007).

In their discussion, the authors (Hiniker et al., 2017) outlined how the fictional inquiry and the comicboarding methods resulted efficient for children 5 to 6-years-old, who were able to creatively respond to the prompts provided and understand the storyline proposed. Instead, younger preschoolers' (4-years-old) responses were often difficult to be interpreted; most of the time, their ideas resulted 'off-topics' to the researchers.

Nevertheless, Hinkler and his colleagues (2017) suggested that with a deeper commitment from researchers to follow the child's lead, a better understanding of young children's insights could be gathered to access deeper and not obvious meanings on their experiences and values.

Borum and her colleagues (2015) adopted visual methods (e.g., mixing ideas method) with young children, ranging from 3 to 5 years-old, to create a practice-based technology-enhanced playful learning environment.

The main insights gathered from their work suggest that when working with young children, preparation must be carefully considered to create a common ground essential to communication and engagement.

Building trust between the children and the facilitators was also a key learning point and techniques for breaking the ice, such as spending some time with the children, reading books, or singing songs, were beneficial (Ibid.).

In this context, projective methods have been chosen to invite IGP to express their desires and thoughts and to elicit new ideas.

Projective methods are usually ambiguously instructed (Hannington, 2007) to allow the elicitation of spontaneous insights that come from flexible and creative play.

Chiefly, activities were selected that are child-centred, progressively tailored to the intergenerational cohorts' preferences, and require scaffolding with multiple planes of engagement (Takeuchi et al., 2011).

For instance, activities based on talking or telling (e.g., interview) were integrated with game-based activities about making tangible things (e.g., drawing, mock-up creation) or enacting (e.g., role-play).

Each method has been then tailored according to cognitive skills, motor skills, and the developmental stage of the intergenerational cohort. Since children at this young age make sense of their world through play and stories (Bruner, 1987; Piaget, 1962; Vygotsky, 1978), the research activities have been designed around such activities.

The modifications were guided by an intention to foster an equal partnership and collaboration between children and adults (Muller, 2008).

Each activity was presented as highlighting the importance of co-engagement; ambiguous instructions served this purpose to spur the IGP to make sense together of what they had to accomplish (e.g., create a story about two protagonists using those cards).

No specific rules or roles were assigned to the IDs, and they were encouraged to co-engage in a continuous dialogical process to make sense together of the activities and of their roles in the interaction.

The design tools selected for the research project were then integrated or blended with techniques used for psychological assessment, such as laddering (Fransella,

2003; Hinkle, 1965) and self-characterization (Fransella, Bell, and Bannister, 2004). In addition, innovative techniques were designed specifically for this research as highlighted in Table 8 and then incorporated in an iterative process with participants.

Table 8. *Range of methods selected and designed for the research stages, inspired by the methodological framework proposed by Sanders et al. (2010).*

Stage	**Methods**		
	Making	*Telling*	*Enacting*
Explore	Drawing	Semi-structured Interview	Free play with devices
Create	Mock-up creation	Laddering **Storytelling Card Game**	Role-playing
Define	Crazy-8s	Brainstorming **Message in a bottle (MIB) game**	Dot-voting
Evaluate	/	Storyboard Self-reported measures Smileyometer	/

5.5.1. Explore Stage with IGP

The purpose of this research stage was to gather general understanding on the intergenerational dyad (ID): their habits, expectations, and experiences with existing media. Therefore, the focus was on the intergenerational mediated interaction (imi), and the contribution of the researcher was quite limited in this stage.

Video-ethnography at participants' own houses was chosen as the main approach and a total of ten one-hour-long sessions were run.

In the very first session, as an ice-breaker activity, the researcher spent some time with the ID to present herself, the project's activities, the aims of the research, and to get them to familiarize themselves with their role as participants.

Afterwards, in an informal conversation, verbal and visual prompts were used to probe them on their habits and preferences and start a conversation about their previous and current experiences with technology.

A semi-structured interview was used to solicit information about the dyad's preferences (e.g., favourite games and activities), and to get a sense of the co-usage of devices, such as TV, laptop, tablet, mobile phones, video games and so on.

As part of the ice-breaker activity, children were also invited to draw a portrait of themselves with their adult partner and describe it to the researcher.

This initial conversation allowed the researcher to start observing how the pairs negotiate the answers to questions, providing some outlined insights on agency and roles in the intergenerational relationship.

The ID was then left alone and filmed while playing together and interacting with their own media and devices, in their own familiar environment.

Participants were invited to play together and were observed using their own devices (e.g., tablet, laptop); they were free to choose the activities they wanted to engage with.

Data gathered from the Explore Stage were then collected and analysed, and the findings informed the content of the activities planned in the following stage.

5.5.2. Create Stage with IGP

The activities in the Create stage were designed for priming IGP in the domain of their shared experiences, probing about the values that lead their common activities.

The researcher role in the Create Stage was active and vital to maintain the flow of the activities, monitor the IGP level of co-engagement, and facilitate the co-creation processes.

Values are often difficult to verbalize because of their abstract nature, especially for children who might often experience a difficult time verbalizing their thoughts (Piaget, 1962).

Therefore, careful observation, interpretation of actions, in terms of choices and underlying meanings, and the auto-reflexivity of the researcher were essential to elicit them (Iversen et al., 2010). In this stage, all the research activities with IGP took place in-person and the dyads were engaged in the sessions, one at a time.

The first planned activity - the storytelling card game - was designed specifically for this research as a combination of the self-characterization technique, borrowed from

PCP, the 2D collage, and laddering technique. The game consists of the co-creation of a fictional story by each ID, in which they are the protagonists.

The storytelling card game was intended as a playful method to prompt the IGP to elicit their values, through a bottom-up level of abstraction.

As, arguably, all aspects of a person's functioning are considered to relate to values (Butler, 2006), the starting point for the game appears largely immaterial.

The design of this method was also informed by existing literature on developmental psychology and attempted to integrate and stimulate the symbolic thinking typical of preschool children (preoperational developmental stage), and the abstract thinking usually distinctive of adulthood (Erikson 1950; 1959; Piaget, 1962).

The self-characterization technique (Kelly, 1955; Fransella, Bell, and Bannister, 2004) is mainly used in PCP as an assessment tool to explore the personality of the individual.

The person is asked to describe him/herself as if he/she was sketching the personality of a fictional character. The individual is asked to write a story using the third person (e.g., John is a brave but impulsive guy…etc.), as if a good friend was talking about him/her.

The technique is used to explore the construing of self-narration and elicit the core constructs (values) chosen by the individual to describe themselves.

Similarly, the aim of the card game was to investigate the most relevant values through the co-creation of an illustrated story in which the IDs were the protagonists.

Criteria borrowed from the 2D collage technique were integrated to facilitate the co-creation process of the story with visual triggers, particularly with respect to the potentially limited verbal skills of the children.

The collage technique (e.g., William and Sanders, 2002; Stappers and Sanders, 2003) allows participants to express through visual communication their thoughts, feelings, desires, and other aspects of their experience they might find difficult to elicit via other means.

This technique consists in providing participants with a set of stimuli (e.g., pictures, stickers) and a space to arrange them according to the instructions.

The stimulus set should be ambiguous and not too precisely defined to allow participants' own interpretation and prompt creative expression (William and Sanders, 2002). Therefore, illustrated cards were used to facilitate IGP in expressing themselves during the game.

Ambiguous illustrations were specifically selected to give the IGP the freedom to assign their own meanings to what was represented.

A set of cards from DIXIT illustrated cards (illustrations by Roubira, Bonnessée, and Cardouat, 2008) (Fig.17) was pre-selected ensuring that the illustrations are open to multiple interpretations; the content is diverse with multiple contexts, the number of positive and negative images is balanced; and the image representations of people cover different ages, genders, and races (Visser et al., 2005).

Laddering technique was also embedded in the storytelling card game.

Figure 17. *Example of illustrations from DIXIT (Copyright Roubira, Bonnessée, and Cardouat, 2008) provided during the storytelling card game.*

Laddering involves asking why a person would choose one option over another and is used to elicit the values that underlie a person's construing of their personal world (Hinkle, 1965; Fransella, 2003; Fransella, Bell and Bannister, 2004).

In adapting the process for children, Butler et al. (2007) suggests using fewer intimidating questions, such as “How come that is important for you?”, rather than directly asking them about their choices.

The IDs were therefore prompted through laddering to explain their choice of cards during the game.

To sum up, the storytelling card game originated from the mash-up of the self-characterization technique combined with visual triggers, as in the 2D collage, and integrated with laddering, to elicit underlying meanings of IGP choices, realized as the values that led to the selection of some cards rather than others.

First, participants were asked to observe the collection of character cards presenting animated figures (e.g., king, cat) and then choose their favourite characters. They were then provided with a set of context cards, showing non-animated figures (e.g., landscapes, castle), and asked to choose their favourite images to co-create a story in which the previously chosen characters are the protagonists.

While selecting the cards and developing the story, the researcher explored their choices through the laddering technique.

The game’s procedure was refined in an iterative process through the course of the research sessions, according to participants’ feedback and observed engagement. For instance, initially the cards were provided all at once (characters cards and contexts cards together), face down with the intention of stimulating curiosity.

The IDs were invited to turn over the cards, revealing the images, and then choose their favourite ones to create their story. However, this procedure seemed to intimidate the IDs rather than arouse their curiosity.

Participants weren’t revealing all the cards provided and were observed choosing from a limited number of options.

They were probably overwhelmed by too many choices. Therefore, the procedure was revised, and the cards were presented in two separate groups, one after the other. In this way, the IDs were faced with a limited number of cards at once, having the chance to explore the illustrations and to better focus on their choices.

In the second activity, IGP were provided with creative toolkits (William and Sanders, 2002) (Fig.18) and engaged in creative opportunities together with the researcher.

This tool is a generative design method which engages participants in creative expression through participatory activities using physical elements.

The kits are usually a collection of materials and physical objects provided in participatory modelling, visualization, or creative play. In this research, creative toolkits were selected to facilitate creative play through the manipulation of physical objects.

Materials and elements suitable for an intergenerational cohort, such as playdough, stickers, and drawing kits were provided to accommodate a various range of participatory design activities.

Figure 18. *Example of the set-up of the PD session run in the Create Stage at the University of Salford Lab (on the left). Materials provided as part of the creative toolkits (on the right).*

Participants were asked to create a mock-up of a tool (e.g., magic weapon) they could use together, based on the story they had previously co-created.

Once the mock-up was created, they were then asked to engage in a role-play game, using the tool they created and impersonating the characters who were the protagonists of their story.

Acting through role-play aims at providing a further means of expression, also allowing the researcher to observe how the artifact is used in the interaction between participants.

The data collected from the activities planned in this stage with IGP were analysed and informed the next one.

5.5.3. Define Stage with Professional Designers

As with the IGP sample, the activities designed for engaging professional designers in the Define Stage were all based on play and storytelling to provide a relaxed and safe environment, encouraging collaboration between professionals, and eventually sparking creativity.

The aim of the workshops was to define the concept(s) for a media experience aimed at an intergenerational cohort through a top-down process.

Starting with very broad and abstract ideas, informed by findings gathered in previous research stages with IGP, designers were asked to refine their contributions through various methods to ultimately propose design solutions.

The workshops took place online, through a software-based conference room solution, and an interactive online whiteboard was also set up to maximize engagement and interactions of designers in an online environment.

The potential of online whiteboard is that with unlimited space, each step of the workshop can have its own dedicated area, also providing a visual roadmap at the beginning of the activities, guiding the participants through the process.

This unlimited space also allows the set-up of the group's space dedicated to work in groups and the movement of the group's work into a shared area for voting and clustering. Beside the main researcher, three moderators helped with the facilitation of the activities. The workshops were video recorded.

A range of methods borrowed from design sprint approaches (Knapp, Zeratsky, and Kowitz, 2016), were strategically selected and adapted according to the aim of the session.

In design sprints, small teams (usually up to 7 participants) work on problems and goals differently than when siloed in their departments in the traditional waterfall process.

This approach to design is based on collaboration between members from various teams of the organization engaged in activities ranging from defining a design challenge to testing a potential solution, in a limited time – usually within 5 days.

The main value of sprints is the speed at which design teams can concentrate a narrow focus on one or more design challenges and sharply defined goals.

The design sprint approach usually follows five stages:

- Understand to determine the overall goal.
- Sketch to explore potential solutions through ideation.
- Define to critique and integrate the ideas most likely to succeed and transform them in storyboards.
- Prototype from the storyboards.
- Validate the prototype thorough user testing on a sample of at least five users.

Primarily, tools and techniques inspired by the Sketch and Define stages of the Design Sprint approach were selected.

Most importantly, the content of the activities was informed and shaped according to the findings gathered in the previous research stages with the IGP.

The role of the main researcher as an ambassador of the ideas and insights co-created with the IGP was vital in this stage.

The main aspiration of the workshop was to engage designers in a series of activities to dismantle the broad design challenge as defined here: “How can we design values-driven media experiences to foster intergenerational interactions?”

To do so, the workshop roadmap was organized in four steps:

1. Presentation of the design challenge and the design requirements gathered with IGP in previous stages of the research.
2. Brainstorming of ideas
3. Crazy 8s technique
4. MIB game – The Message in a Bottle game

First, a presentation of the overall research and of the previous stages completed with the IGP was presented to contextualize the activities planned.

Particular attention was given to emphasizing the equal role of IGP as design partners. In this sense, all the activities run with designers were fully informed and guided by the findings (e.g., design requirements established with IGP) gathered from previous research stages run with IGP.

Small groups were then created, and designers were randomly assigned to each group. The main researcher and the moderators were also randomly assigned, one for each group, to facilitate the managing of the activities.

The designers were then engaged in a brainstorming activity. They were asked to reflect on a set of design requirements previously established with IGP and brainstorm ideas of media experiences aimed at intergenerational cohorts, based on their requirements.

A mix of online and offline resources were used to keep the activity engaging and make the interactions among designers more active.

For example, each of them was asked to individually brainstorm ideas on a piece of paper; they were asked to write down everything that came to their mind, even the most bizarre or absurd ideas.

After the individual brainstorming, designers were then invited to choose their favourite idea(s) and share it(them) with their group, using their group's dedicated space on the online whiteboard. Each group then selected their favourite idea and was invited to present it to the bigger group.

A dot-voting session followed. Dot-voting technique was selected as a simple method to democratically make decisions in a group setting (Gibbons, 2019); designers were asked to assign a dot to their favourite idea(s) among the ideas shared by the smaller groups. The dot-voting session awarded the best idea to be developed throughout the rest of the workshop.

Following the brainstorming, designers were asked to engage in the Crazy 8s technique (Kaplan, 2017).

The method was chosen to visually represent the winning idea defined in the brainstorming activity, proceeding a step further in the top-down process to define design solutions.

The technique consists in sketching eight sketches in eight minutes, one sketch per minute. This technique imposes a time limit to solicit spontaneously emerging ideas from designers.

Individually, designers were therefore invited to reflect about the winning idea and visually represent it on a piece of paper using the Crazy 8s technique.

They were then asked to pick their favourite sketch and share it with the other participants through the video-camera. Screenshots of the sketches were also taken and shared on the online whiteboard.

The activity planned in the fourth step of the workshop was specifically designed for this project, and consisted in a storytelling-based method, called The Message in the Bottle game – The MIB game.

The aim of the game is to define design solutions through a process guided and informed by a story - in the form of a short message - presenting elements that serve as coordinates in the ideation process.

The coordinates provided in the MIB represented the IGP's collective voice, resulting from the interpretation of the findings gathered in the Explore and Create stages, analysed, and integrated in a model.

The insights gathered from the model were translated into a message to provide a synthesis of the IGP contribution.

To make the elements of the message even more accessible, they were further synthetized in design questions such as "How might we design for…" and "How might we prevent designing for…".

More details about how the findings gathered with IGP in the Explore and Create stage were integrated in a model, informing the MIB game, are presented in Section 5.7.4.

Designers were therefore presented with the Message in a Bottle sent by IGP and then asked to reflect on the coordinates provided in the message, presented in the form

of design questions. As an ultimate request, they were asked to write down as many design solutions, in the form of design features, to the design questions provided.

The data collected from the workshops resulted in the definition of a design concept for a media experience that was tested in the final stage of the research with IGP.

5.5.4. Evaluate Stage with IGP

The aim of the sessions planned in this stage was to evaluate with IGP the design concept for a media experience, defined in the previous stage of the research.

The activities planned in this stage aimed at including the IGP in the final stage of the design cycle, informing them about the progressions achieved with designers.

Originally, two sessions were planned to take place in-person with IGP. However, the initial plan was rearranged due to the safety measures related to the COVID-19 pandemic. Consequently, one session per ID was run online, using video-conferencing software.

The ID were engaged in the session one at the time. The session was adapted to last a maximum of 30 minutes to keep participation and attention focused on the online setting.

The contribution of the children's main carer was vital in getting the younger participants to join the video call.

The main carer helped the children with the technical set up of the session and were asked to stay in the room with the children in case some technical help was needed during the video call.

The ID was given the choice to be together during the session or to be apart and connected from their own devices. They were also free to choose the software they preferred, or were more familiar with, to connect to the session. Each session was video recorded.

The main activity designed for the session consisted in the presentation of a brief and simple storyboard telling a story about a grandfather and his grandson spending time together while playing with a new game.

The storyboard was meant to help participants imagine the design concept for the media experience in a practical and familiar context.

Storyboard technique provides a visual narrative aimed at generating empathy and communicating the context in which a technology will be used (Vertelney et al., 1990; McLoud, 1994; Truong et al. 2006).

Different options to personalize the narrative of the storyboard were provided in the form of 2D paper prototypes to make the story more engaging and meaningful for each ID.

After the presentation of the storyboard, the ID was asked to rate the design concept using a Smileyometer (Read, MacFarlane, and Casey, 2002) to facilitate children's participations.

They were asked to answer the following questions: How would you rate this game? (1: Brilliant -2: Good - 3: OK - 4: Bad - 5: Awful); How likely would you be to try the game together? (1: Very likely – 2: Likely – 3: Neutral – 4: Not likely – 5: Not likely at all).

As a conclusion, two open questions were also asked: "What do you like the most about the game?"; "Is there anything that you don't like, or you would change?".

IGP spontaneous reactions to the game were also observed to assess non-verbal indications such as smiling, yawning, leaning forward, frowning and so on.

The data gathered in the Evaluate stage were integrated into the design concept in an iterative cycle.

5.6. Data Collection and Analysis

Altogether, eighteen sessions with IGP and three workshops with professional designers were run.

The data collection and analysis were progressively completed for each stage and the findings of each stage informed the activities of the subsequent one (Fig. 19). This was a continuous and simultaneous process.

The analysis of data followed a procedure of constant comparison ensuring that all data were systematically compared to all other data (Glaser, 2017; Charmaz, 2006).

A qualitative stance on data analysis was adopted for 'thematizing meanings' (Holloway and Todres, 2003, p. 347) and a combination of different methodologies was selected to analyse the various data collected.

Different kinds of data were collected from the four research stages to give the researcher different views from which to approach the RQs.

These different perspectives on data have been called "slices of data" (Glaser and Strauss, 1967, p. 65) and consist in:

- Audio-video: captured during the video-ethnography and the participatory sessions.
- Text-data: collected during the participatory sessions and other informal conversations with participants or children's carers, such as fieldnotes, annotations, transcriptions, or memos taken just after the research sessions and while watching and re-watching videos, and transcriptions of verbal interactions (Appendix l).
- Artefacts: created and collected during the participatory sessions with IGP and designers (e.g., sketches) (Appendix n).

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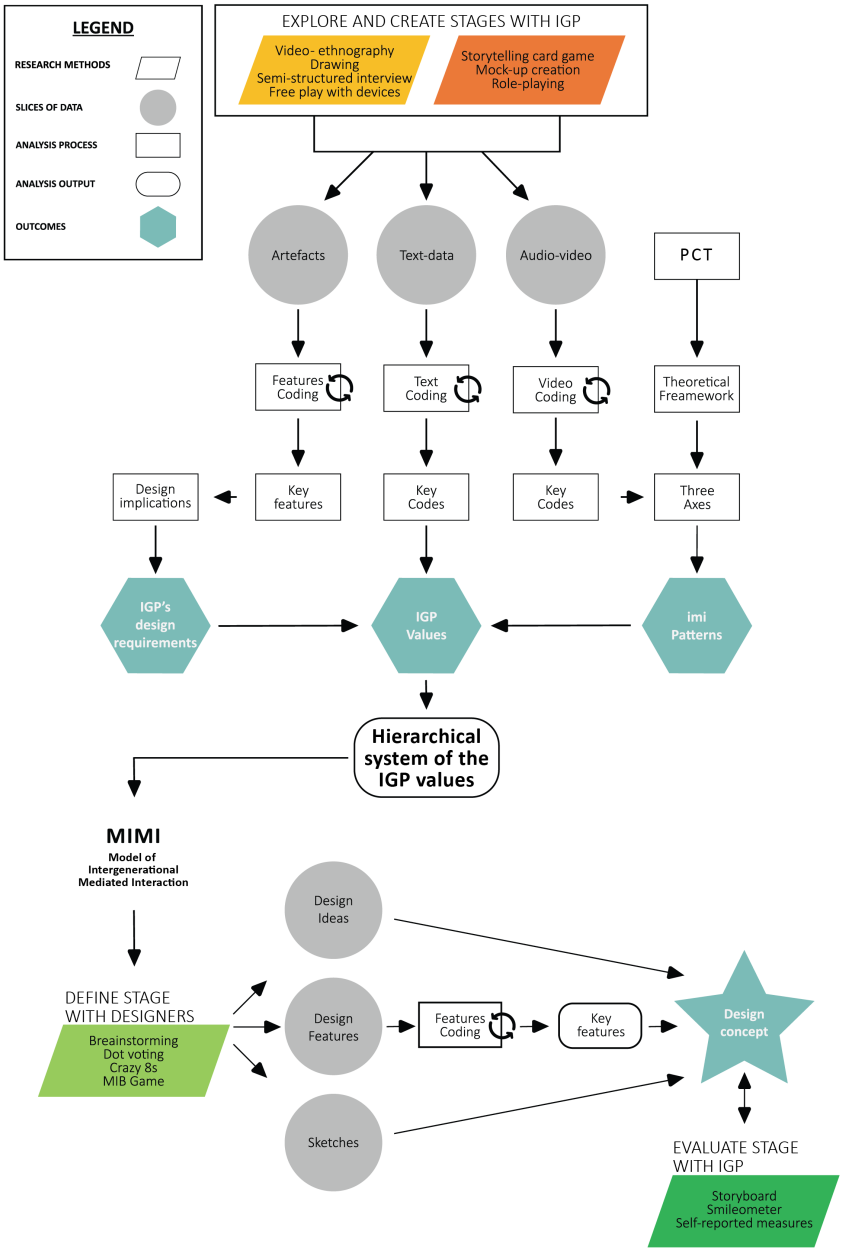

Figure 19. *The flowchart representing the data collection and analysis process.*

Audio-video data (34 hours in total) was predominantly collected from the Explore, Create and Evaluate stages with IGP. In the Explore and Create Stages, two cameras and an audio-recorder were used to record the sessions and obtain different perspectives of the interaction between children and older adults.

In the Evaluate stage, a total of 4 online sessions of 30 minutes were run for a total of 2 hours of video-data collected.

The video-data corpus provides helpful information about non-verbal activities that might be missed from the audio recordings. However, video can be more intrusive, and the observation might be jeopardized by the camera shyness of participants.

A range of ways were taken into consideration to minimize such influences, such as acclimatizing participants and providing clear description of the research's aims and activities.

The video-data collected was supplemented by fieldnotes taken during the sessions and in informal conversations, for example with children's parents over the phone, in the recruiting process.

Annotations and memos were also taken while watching and re-watching the videos captured during the participatory sessions with any comments or notes.

The fieldnotes and the annotations were used to improve understanding and develop a more informed approach to the other slices of data. When possible, transcription of the verbal interactions was made, and the data analysis worked with a combination of videos and written transcripts.

Artefacts were also collected in the participatory sessions with IGP in the Create Stage (e.g., mock-ups).

The 34 hours of audio-video material were analysed through a video-coding procedure (Fig. 20) that followed the following ten phases:

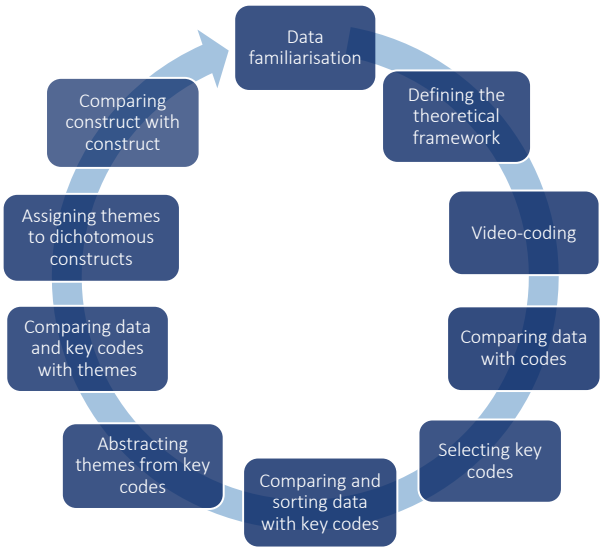

Figure 20. *Phases of the audio-video data analysis recursive process.*

The analysis of the audio-video data corpus aimed at defining patterns of interactions between the two generations when either sharing or co-creating interactive media experiences (RQ1).

First, the researcher became familiar with the video-data corpus, watching and re-watching the video-data several times.

Annotations were taken while watching the videos about any interesting elements, early impressions, rough extracts, or any insights or considerations of the researcher.

The visual-data were then organized by segmenting the data corpus in video-clips, using a video editing software application (iMovie).

The clips were not more than 1 minute long, on average, and mainly represented the participants either co-engaging in the co-creation activities or sharing media experiences.

Out of 34 hours of coded videos, a total of 57 segments were identified as most relevant to RQs. Therefore, a total of 57 clips were created (N=57) and these formed the data set of the research.

The data set is intended as all those data from the data corpus that were used in the analysis.

The video-clips selection answered questions like "What are the participants doing?", "What do I think is important for the research in this video?" or "What are they trying to do with their behaviour, both verbal and non-verbal?".

The remaining clips were discarded because interpreted as redundant or not significant according to the RQs; for instance, clips not directly related to the co-usage of technological devices or clips that reported disruption to the intergenerational interaction (e.g., doorbell ringing, other members of the household entering the room), were excluded.

Commented [VP22]: *Another example of where clarification is required is in the coding of the video in Chapter 5. It would be useful to understand the actual codes that were generated, how many clips were created, how this was actually merged to form the themes, what was discarded and why? You could show this in a summary table. Often in section results are not clearly presented. The process of data analysis is described and then the end output is shown without a clear understanding of the results and how this map to the outcome. Presenting results would significantly improve the quality of the thesis.*

It is from this very early stage of familiarizing with the video-data that a theoretical framework was established as a mind map to organize the data in a meaningful and systematic way, informed by three corollaries of the PCT (Table 9).

Table 9. *The theoretical framework guiding the data analysis.*

Axes	Definition	Questions	Corollary
Replicas[2]	This axis comprises IGP's shared habits and recurrent behaviour with technology.	• How are IGP used to interact together with technology? • What are their previous experiences with technology?	**Construction corollary:** "a person anticipates events by construing their replications" (Kelly, 1955, Vol. 1, p.35).
Practice	This axis comprises the IGP's behavioural tendencies in the shared mediated interaction.	• How do IGP use technology together? • Why do they behave this way and not another way?	**Choice corollary:** "a person chooses for himself that alternative in a dichotomized construct through which he anticipates the greater possibility for extension and definition of his system" (Kelly, 1955, Vol. 1, p.45).

[2] Replicas are intended as abstractions of properties of the imi based on IGP's previous experiences with technology. Replicas are used to anticipate future imi.

Relationship	This axis focuses on the roles that children and older adults play in the shared interaction.	• Which roles do IGP play in the interaction? • What is their understanding of each other?	**Sociality corollary:** "To the extent that one person construes the construction processes of another, they may play a role in a social process involving the other person" (Kelly, 1955, Vol. 1, p.66).

In the data analysis, the theoretical framework provided a structure that guided the coding process and led to the creation of a theoretical space for thinking in the realm of the psychological processes underlying IGP's co-engagement in the research activities and with technology.

Three broad categories, defined as theoretical axes, were identified: 1) replicas, 2) practice, and 3) relationship.

The *Replicas Axis* refers to IGP's habits and recurrent behaviours, observed and self-reported (e.g., reported in the semi-structured interview or informal conversations), regarding the intergenerational mediated interaction (imi).

The codes assigned to this axis answer the questions: "How are IGP used to interact together with technology? What are their previous experiences of imi?". This axis is informed by the construction corollary (Kelly, 1955, Vol.1, p.36) which describes the construing process as the anticipation of events based on replicas (of similar events), learned from previous experiences.

To give an example, we learn the concept of 'day' through the streaming of the time. We can therefore anticipate that tomorrow is another day, although different from today but conserving some similar elements from any other day.

According to this axis, IGP's habits and recurrent behaviours are meant as the replicas informing their anticipations of the imi.

For example, the interaction observed while playing a game during the research session is based on the IGP's general understanding of how to play together based on their previous play experiences (replicas).

The data collected upon this axis provide a broad understanding of the IGP's previous experiences with technology, laying the basis for predictions about how they would anticipate future ones.

1) The *Practice Axis* focuses on data related to the 'direction of behaviour' observed during the mediated interaction. In simpler words, this axis comprises the IGP's tendencies and trends when interacting together with technology.

The codes assigned to this axis answer the questions: "How do IGP use technology together? Why do they act this way and not another way?".

It is informed by the choice corollary (Kelly, 1955, Vol.1, p.45) which describes how the person acts according to one of two poles of a dichotomous construct.

According to PCT, choice is at the basis of human behaviour and every action implies a choice. However, people do not choose between logical alternatives, and their choices are not intended as an aware and rational decision.

People choose between the alternatives they see as open to them and based on their previous experiences (Winter, 1987; Butt & Bannister, 1987).

For instance, what might be construed as assertive by someone, could instead be interpreted as aggressive by someone else, according to the constructs available to the individual.

The pole of the construct chosen by the individual provides him/her with a more detailed understanding of the event.

In other words, the individual chooses the pole that he/she thinks will provide a more accurate prediction of the event.

Thinking about the metaphor of the sailor previously provided (Chapter 2 Section 2.2.1.), the chosen pole for the sailor is the coordinate that he considers to be more reliable to predict the route to the get to destination, based on his previous sailing experiences.

So, if the IGP construe their experience with technology using the construct good vs bad, the experience cannot be construed as good and bad at the same time. Understanding which of the two poles – good or bad – is chosen could provide us with an understanding of which of the two alternatives is more elaborative and desirable.

In other words, if we observe IGP tending to construe their experience with technology as good, then we can establish that the more elaborative pole of the construct is good and not bad.

This is adding an extra layer to the understanding of the IGP's construing process of their shared media experiences, and the researcher can start reflecting on what are the implications of their choices and for instance why it is more desirable for IGP to construe their interaction with technology as good rather than bad.

2) The third axis - *Relationship Axis* – focuses on the roles played by IGP while co-engaged in the research activities or in the shared media experience.

The codes assigned to this axis referred to the roles' negotiation process and answered questions like: "Which roles do IGP play in the interaction? What is their understanding of each other?".

It is informed by the sociality corollary which states that a relationship takes place to the extent that the actors involved comprehend each other.

Relationship is therefore here intended as co-construed through the interpersonal interaction in which each person understands the construing processes of the other; in this way, the person plays a role in the social process and can relate to the other.

Once the theoretical framework was defined, the previously selected video-clips (N= 57) were coded; each video-clip was labelled with words or sentences describing the content of the clip, adapting the title feature of the video-editing software as an annotation feature (Fig. 21).

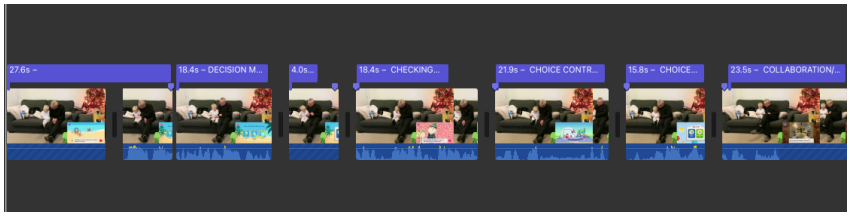

Figure 21. *Extract of the video-coding analysis. The selected clips were coded through the video-editing software.*

The codes were then transcribed using a spreadsheet and grouped according to their relevance against the theoretical axes in a recursive process.

The codes' assignment to the theoretical axes was led by the questions relevant to each axis, as outlined in the theoretical framework.

For instance, codes like 'child being an expert', 'child supporting the adult', 'being a bystander' were assigned to the relationship axis because of the relevance to the roles played by IGP in the interaction.

Once the codes were all assigned to one of the axes, the analysis focused on considering how different codes within the axis may be combined in patterns.

Based on the questions defined in the theoretical framework and going beyond the semantic content of the data, the analysis focused on examining the underlying psychological processes that are theorized as shaping the observed behaviour.

Key codes were then defined for each emerging pattern to move from a descriptive level to a more abstract one (Table 10).

Table 10. Extracts from Audio-Video Coding collection and analysis from Explore Stage.

Axes	Codes	Key codes
Replicas	• Adult in control of laptop • Child in control of touch screen • Child reclaiming control • Control in the problem-solving process	Control
	• Adult explaining media content • Child explaining how to interact with the device • Sharing memories • Passing of skills	Educational aim
	• Mutual support • Adult struggling to follow child's interaction with the interface • Building a partnership	Support
Practice	• Interaction with physical toys while watching videos • Active acting • Physical movement Personification of the story's character	Enacting

Commented [VP23]: *Another example of where clarification is required is in the coding of the video in Chapter 5. It would be useful to understand the actual codes that were generated, how many clips were created, how this was actually merged to form the themes, what was discarded and why? You could show this in a summary table. Often in section results are not clearly presented. The process of data analysis is described and then the end output is shown without a clear understanding of the results and how this map to the outcome. Presenting results would significantly improve the quality of the thesis.*

	• Rewatching the same content multiple times • Routine	Control Predictability
	• Auditory clue to prompt interaction with the interface • Shared goal • Choice negotiation • Planning	Collaboration Shared Purpose
Relationship	• Fun time • Joy • Laughing • Reclaiming attention • Humour • Power	Freedom Fun
	• Child expert of the story content • Adult is the bystander • Reversed roles • Child supporting the adult in the interaction with the device	Playing with Roles
	• Reclaiming autonomy • Negotiation of roles • Frustration when task not accomplished • Boredom • Apprehension	Empowerment Autonomy

An interpretative level of analysis (Patton, 1990; Burr, 1995) of the key codes was then taken; the researcher focused on theorizing the significance of the established key codes and their broader meanings and implications.

This step resulted in the identification of meaningful aspects and connections between the key codes that informed the establishment of a set of overarching themes.

Themes capture multiple observations and more abstract interrelations between data (Charmaz, 2006).

Comparison constituted each stage of analytic development (e.g., comparing data with data, codes with data, key codes with codes), and comparative method analysis was continually used throughout the whole video-coding process, integrating the analysis with other slices of data (e.g., fieldnotes, annotations).

The themes were then labelled with a set of dichotomous constructs, defined as imi patterns, representing the dimensions of meaning used by IGP to interpret their shared interaction.

The imi patterns can be considered as the structures within the framework of which the imi take shape or assumes meaning.

The patterns are therefore based on data regarding IGP' habits and previous shared media experiences (replicas axis), and the directions of their observed behaviour (choice axis) in the context of their relationship (relationship axis).

For the text-data and the artefacts collected with IGP in the Create stage, the analysis involved the elicitation of a set of IGP values.

This was chiefly text-data derived from the transcriptions of the stories created through the storytelling card game (Appendix m), and the artefacts that consisted in the mock-ups co-created by IGP.

Commented [VP24]: *The material in the appendices should be signposted and mention of their content integrated into the discussion in the main body of the thesis, where relevant e.g. p.100*

A reflexive thematic analysis (TA) approach was embraced for the analysis of the text-data, meaning that the analysis consisted of a situated and interpretative reflexive process (Fig. 23). The text-data collected were analysed following the guidelines outlined by Braun and Clarke (Braun & Clarke, 2006, 2021).

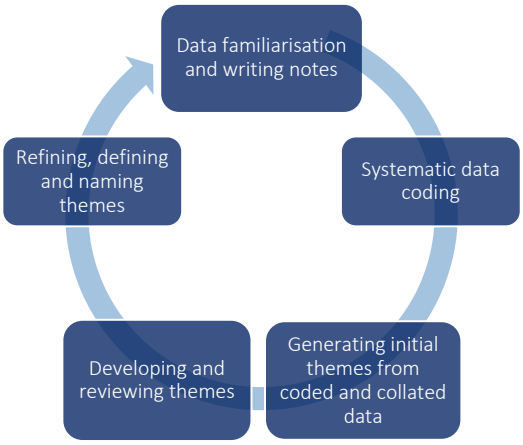

Figure 22. *Phases of text-data analysis based on reflexive TA's guidelines by Braun and Clarke (2021).*

According to Braun and Clarke (2021, p. 334), in reflexive TA "meaning and knowledge are understood as situated and contextual, and researcher subjectivity is conceptualised as a resource for knowledge production, which inevitably sculpts the knowledge produced, rather than a must-be-contained threat to credibility".

Therefore, for the values' elicitation, the coding process was open and organic, with no use of any coding framework.

The recursive TA didn't happen in a theoretical vacuum but was informed by the theoretical framework previously defined (Table 5) and by existing literature on values (e.g., Rockeach, 1973; Schwartz, 1992, 2006; Butler, 2006).

Furthermore, the whole data analysis process was a simultaneous and recursive process, and at this point the researcher was already analysing the ethnographical material through the video-coding process; therefore, the data analysis of the text-data was to some extent also interpreted through the lenses of the outcomes (the imi patterns) gathered from the Explore Stage.

In the first step of the analysis process, the researcher became familiar with the text-data corpus, reading and re-reading the transcripts, and noting down initial ideas.

In this phase, the researcher searched for commonalities in the storyline, for instance: recurrent topics and concepts; sequences of narrative elements (e.g., What's the first event narrated? What is the last one?); presence of other characters besides the protagonists; casual links and frequency of terms or words.

At this stage, the researcher drew together data that on the surface appear rather disparate but that were interpreted as having similar meanings.

Codes were then assigned to sections of text; the codes identified latent content, going beyond the descriptive level to identify underlying meanings shaping the data.

The codes were then collected in a spreadsheet, compared, and searched for patterns to start defining overarching themes (Table 11).

A set of themes were therefore established and labelled with a set of dichotomous constructs representing the IGP values, meant as the core dimension of meanings channeling their behavior in the shared interaction.

Table 11. *Text-data coding collection and analysis from Create Stage.*

Extracts from the text	Codes	Themes
*"The boy and the **freedom** lady are **spending time together** at their house at the seaside, with their family. They love eating and walking on the beach with lots of friends.[3]" (ID5)* *"The knight travels to space with a rocket to fight the monsters. His **helper** jumps over the rainbow to come and help him **fighting the monsters**. They need to solve the maze and fight the dragon to get to the rocket." (ID1)* *"A king and a queen live close by; they live in the **flying castle**, and they want to stop **the magician** and **the fairy**, but they are less powerful." (ID3)*	• Playtime • Fun • Freedom • Adventure • Risk	Empowerment Freedom
*"The toilet paper boy and the man on the bench **live in the flying castle**, in the floating windy universe. One day, their planet falls, and **they are in real danger**. They therefore call a fairytale who lives in the sea to save them from the terrible catastrophe." (ID5)* *"They must go up to a long stair to arrive to **the castle where they live**. Mummy lives in the castle with them, she's half asleep and grandma and dad are also there. **All the knights' family lives in the castle**." (ID1)*	• Family members • Shared family house • Safety • Protection	Safety
*"The magician and the fairy get married**. Their powers are now united**. The magician is more powerful than the fairy and therefore she needs him. That's why they got married. For example, the magician makes her hair longer." (ID3)*	• Problem-solving • Learning • Having power • Passing of skills	Shared purpose Competence
*"The fairy is looking for a **young helper** that can do spells for her. She asks the young magician to work with her. She gave him the power to do magic potions to create a vortex to kill the big hunts. The magician can also **help her finding solutions** to problems such as escaping the labyrinth." (ID3)* *"One day, they were walking on the beach and suddenly it was raining. It was windy, and they saw a castle floating in the sky. In the castle lives a king. The floating castle was landing on the beach, and **they helped the king** to park the air balloon. The king*	• Helping each other • Support • Collaboration	Autonomy

Commented [VP25]: *Another example of where clarification is required is in the coding of the video in Chapter 5. It would be useful to understand the actual codes that were generated, how many clips were created, how this was actually merged to form the themes, what was discarded and why? You could show this in a summary table. Often in section results are not clearly presented. The process of data analysis is described and then the end output is shown without a clear understanding of the results and how this map to the outcome. Presenting results would significantly improve the quality of the thesis.*

[3] The stories co-created by the Italian participants were translated in English by the researcher to facilitate the analysis and the generation of codes.

invited them for lunch at his castle as a thank you for their help." (ID5)		

The artefacts collected (N=9) (Fig.24) were instead analysed to elicit recurrent themes in tangible design features, meaning the features convey the perceivable attributes salient in the mock-ups (e.g., wearability or portability); and their design implications, meaning the benefits of having those features (e.g., mobility while playing) observed through the role-playing activity (Table 12).

A list of design features was created and for each feature the design implications were specified.

It is from the list of design features and their implications that the set of IGP's design requirements were synthesized, informing part of the activities run in the Define Stage.

Table 12. *Tangible Collection and analysis of the artefacts' design features and design implications from Create Stage.*

Tangible design features	Implications
Wearable Portable Used while moving	Mobility while playing
Used to communicate Sharing their location Stay together Connected	Communication Spatial orientation
Used in autonomy Personal artefact	Personalisation Independence Autonomy

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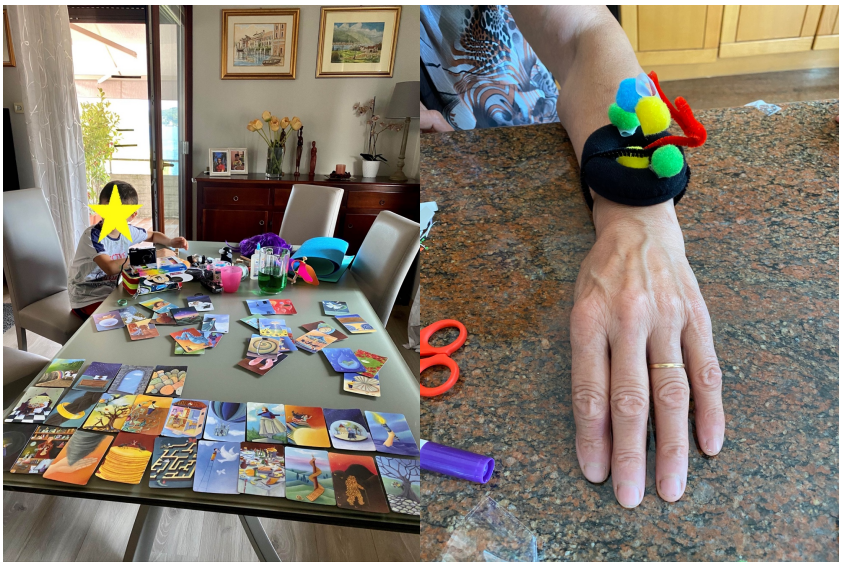

Figure 23. *The photo on the left shows the sequence of cards used by ID3 to co-create their story. On the right, example of a mock-up - wearable compass - co-created by ID5.*

To conclude, the data collected in the Define Stage included a list of design ideas and design features gathered with professional designers.

The ideas and the features were collected and grouped according to recurrence and similarities and then bundled together in a design concept, represented in 2D paper prototypes inspired by the sketches created by designers and evaluated and improved in an iterative cycle with IGP in the Evaluate Stage.

5.7. Findings

> *"The main purpose of constructivist methods is to help reveal the meanings behind the words, the deeper themes between the lines of the stories [people] tell themselves and us." (Neimeyer 2009, p. 9)*

In this section the findings of the research project are presented.

The diagram in Fig. 25 provides an overview of the outcomes achieved for each stage of the research.

From the data analysis of the data set collected in the Explore and Create Stages, a set of themes describing imi patterns and IGP values were established.

In the Create Stage, a set of design requirements were also defined through the analysis of the artefacts created by IGP.

Based on the findings gathered in the two initial stages of the research, designers generated a set of design ideas and design features for a media experience aimed at the intergenerational cohorts.

This process resulted in the definition of a design concept, evaluated, and improved with IGP, in an iterative cycle.

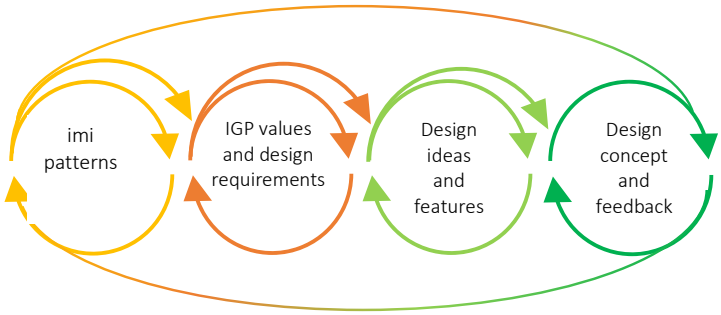

Figure 24. *Findings from each stage of the research.*

5.7.1. The imi Patterns

Controllable vs Uncertain

IGP were often observed shifting and negotiating control over technology.

For instance, children were likely to reclaim control on the choice of the content or the game to play.

It seems that they find it enjoyable to play the same game because it allows them to gain mastery over the interaction, establishing an equal role and their independence from the adult's mediation.

Having control over the action seems also to promote self-efficacy in the adult, exerting their support with their skills and capabilities.

For example, ID2 was observed negotiating control over the device to solve a technical issue (Fig. 26).

The child seemed frustrated by not being able to access the application on the tablet. She seemed not to be sure about what to do and she was observed frantically tapping on the screen and putting the device in stand-by mode, many times in an attempt to solve the issue. She was reluctant to let the adult help her, reclaiming control over the interaction and establishing her autonomy.

The adult stepped in only when the solutions proposed by the girl were repeatedly tested, providing her support in solving the problem.

Adults were often observed controlling the mediated interaction to cope with the unpredictability of accessing material not suitable for children.

As reported by many adult participants, the access to technology is controlled or monitored by an adult most of the time.

Also, adults often reported controlling the time spent with the device or the type of game played to prevent potentially negative consequences (e.g., violent content, bad consequences due to screen exposure).

For example, the grandmother of ID5 reported: “I don’t want her to spend too much time in front of a screen, she seems mesmerized. I feel like we are losing our time when we are playing silly games on the tablet.

I prefer to use the tablet to search for inspirational activities to do together or to learn something new.”

Another example was reported by ID4; they explained that before watching TV or playing with videogames the adult set a timeframe, often setting an alarm, to monitor and control the time spent in front of the screen.

Figure 25. *ID2 negotiating control over the interaction with the device*.

Construing the imi as controllable seems to imply a sense of power to influence the course of an action and predict the consequences.

In other words, having control over technology could minimize the uncertainty of the consequences of the interaction, avoiding being at risk or feeling unprepared.

If the event is construed as controllable, the anxiety of the uncertain seems avoided, both for children and older adults.

Anxiety[4] is not here necessarily used with a negative or positive connotation; anxiety, as intended in PCP, might be the gateway for curiosity and for a more active

[4] According to the PCT, anxiety is intended as the impossibility to construe an event for a lack of constructs to give meaning to it (1955/1991, Vol. 2, p. 7/1991).

elaboration of the events. The mid-way between control and uncertainty may therefore be ideal for prompting curiosity and co-engagement in the shared interaction.

Enactive vs passive

Construing the imi as enactive entails embedding sensory stimulation in the shared interaction, for example auditory cues or physical motion. Sensory-motor stimulations were mostly used by IGP to cope with boredom and disengagement due to a passive interaction with technology.

Some common and frequent behaviours were observed, such as enacting the media content with physical movement; interacting with physical toys while using technology; or using auditory cues to prompt an action while watching videos on the device.

For example, auditory cues were used by ID1 to prompt interaction with the interface, while using a storytelling app together.

The child (who couldn't read) was observed in control of the device while the adult was reading the story aloud. An arrow was displayed on the interface to prompt the user to skip to the next page and continue the reading.

The child seemed disengaged and bored of being a passive bystander in the interaction; he was just holding the device but couldn't read the text displayed on the screen and wasn't able to autonomously understand when to press the arrow to turn the page.

Therefore, the adult started to use the auditory cue "ping" to prompt the child to click on the arrow every time he had to turn the page.

The child appeared to feel active and more engaged in the interaction after the adoption of this sensory prompt.

ID1 was also observed while watching videos on YouTube of their favourite motorbike racers (Fig. 27).

The adult was in control of the laptop and was choosing the content to watch.

At the beginning the child was passively observing the adult interacting with the device; he seemed disengaged by the limited interaction with the laptop.

He then started playing with a motorbike toy, simulating the content of the videos, shifting to a more participating role, jumping on the sofa to celebrate the victory of the racer, and hugging the adult.

Similarly, ID2 were observed acting through body movement the content of the dialogues represented in the video they were watching on a tablet device to make the interaction less passive and more engaging (Fig. 28).

Figure 26. *ID1 watching videos and enacting the content with physical toy and physical movement.*

Figure 27. *ID2 enacting through body movement the content of the video they are watching on the device.*

Collaborative vs competitive

Construing the imi as collaborative entailed construing the interaction with technology as a joint cooperation to achieve a common goal.

The IGP were observed combining their skills rather than measuring their competences against each other while using devices.

When we think about games we usually think about a winner and a loser, however, it was observed that IGP were rarely competing against each other.

Instead, they tended to play complementary roles, using their competences and skills together as a team. For example, they were observed helping each other while playing a game on the device, integrating their resources, and covering those tasks that were more difficult for the other.

Collaborative experiences also entailed the experimentation of less familiar roles; for example, the children were often observed playing the role of the "expert", explaining to their grandparents how to play the game or interact with the interface.

Conversely, the adults played the role of "learner". For example, as showed in the pictures below (Fig. 29), ID3 and ID5 were observed while interacting with the tablet; the children helped the adults to complete the game, guiding their hands or showing them where to tap.

Figure 28. *ID3 and ID5 collaborating to complete the task on the tablet.*

Fun vs Judgmental

IGP were repeatedly observed construing their shared experience as fun.

The IGP tended to make fun of each other, laughing together while interacting with the device, especially when they were struggling to complete a task or do something with technology.

Laughing and humour seemed to be used to avoid feeling judged and allowed exploration without feeling wrong or incapable.

Construing encountered difficulties through humour seemed to empower them in their roles of equal partners, making them support each other and integrating their competences to achieve a shared purpose with fewer concerns about failing or making errors.

Adults often jokingly self-reported feeling “clumsy” or “slow on the uptake” and the children appeared to be entertained by this and empowered in their role, for example, as experts.

As showed in the sequence reported in Fig. 30, ID5 were playing a game on the tablet and laughed when the girl lost the game. Laughing seemed to be used to dissolve tension and promote a general sense of safety.

Figure 29. *ID5 having fun while playing a game on the tablet; the girl just lost the game, and the dyad was observed laughing at it.*

Then again, ID2 were observed laughing when the adult was given a go at a game and mistakenly tapped the wrong icon, quitting the application; the girl, playing the role of the expert, took control of the device and they both laughed about it (Fig. 31).

Figure 30. *ID2 having fun while playing on the tablet; they were observed laughing at the adult's mistake.*

5.7.2. The IGP Values

Competent vs Feeling ill-suited

The importance of establishing their competence during the interaction was a recurrent thread, from the stories co-created.

For example, in the story of ID3, the Fairy (impersonated by the grandmother) and the Magician (impersonated by the child) have different powers and they use them together to protect their home from the Evil King of the floating castle.

Similarly, the story co-created by ID1 talks about a Knight and his Buddy leaving for a mission on a space rocket to kill the big hunters of the Planet of the Eggs; they had to combine their competences to solve a maze, kill a dragon, and protect the castle where their family lives, to finally accomplish their mission.

In this respect, being able to use their competencies in a joint mission to achieve a common goal seemed to promote a sense of self-efficacy and empowerment, also assuring the establishment of clear and mutually recognized roles. Self-competence, as suggested by Tafarodi & Swann (1995), relates to the sense of oneself as capable, effective and in control, judged against some internal standard.

In Deci and Ryan's (1985) self-determination theory, competence is described as a basic human need and is satisfied through developing a sense of mastery over challenges.

Competence for the IGP seems to be meant as the ability to do something, being recognized for that quality by the other, and ultimately feeling engaged in the interaction.

On the other hand, a lack of competence may lead to feeling ill-suited, resulting in a sense of disappointment and frustration.

For instance, the younger partner of ID1 was observed complaining and moaning while co-creating the mock-up with his grandfather, because he was finding it difficult to realize his idea with the physical material provided (e.g., paper, dough).

The adult promptly supported him by scaffolding his idea and helping him in the realization of their mock-up.

Being invalidated in their sense of competence seems to imply disengagement, and the sense of not having power in the interaction could potentially lead to avoidance.

On the contrary, feeling competent might imply a sense of empowerment and autonomy over the interaction.

Autonomous vs Constrained

Both adults and children were observed valuing the autonomy to freely express themselves and their needs in the co-creation activities.

The adult often seemed more willing to compromise their freedom to satisfy the child's needs. For example, the engagement of the adults in the co-creation of the story appeared to be often voluntarily subordinated to the creative initiative of the children.

The older adults tended to scaffold children's ideas and support their narrations, adding details and coherently linking together the sequences invented by their younger partners.

However, it sometimes seemed that the limitation imposed by the structure provided by adults jeopardized the sense of autonomy of the children.

For instance, ID4 encountered several difficulties in finding an agreed storyline; the child proposed surreal and magic plots, but the adult was guiding him towards a more serious and structured storyline.

This limitation seemed to jeopardize their engagement in the activity, with the boy turning away from it and the adult struggling to continue.

In other words, it seems that the interaction between IGP might entail support and collaboration, but it is also balanced and integrated with opportunities for free exploration which encourage the feeling of being competent and autonomous.

Feeling autonomous seemed therefore related to the opportunity of establishing a role and having the chance to satisfy their needs without limitation or imposition.

It also entails recognizing and respecting the needs of the other in the relationship.

A fair balance between autonomy and constraint appeared necessary for joint engagement. Again, being autonomous is recognized as a basic psychological need for well-being according to the self-determination theory (Deci and Ryan, 1985), and it is also included in the ten universal values identified by Schwartz (1992), defined as the control over their choices as opposed to having to consider others and shared rules.

Empowered vs Powerless

Establishing a well-defined role for each character was fundamental in the story co-creation, and empowerment seemed related to the recognition of each other roles in the interaction.

This gave a sense of autonomy and power to IGP, being recognized as competent and useful in the achievement of a shared purpose, and respected in their autonomy, with limited rules or impositions from the other.

Being empowered seemed therefore closely related to the values previously described.

On the contrary, not being recognized in their role could promote a passive and subordinate interaction, stimulating a sense of powerlessness and a lack of agency over

the interaction, leading to disengagement. For instance, from the story created by ID3, about the Fairy and the Magician, the Fairy (impersonated by the grandmother) wants to retire and hires the Magician, assigning him the role of commander-in-chief to protect their home from the Evil King.

ID5 co-created a story about a boy exploring his surroundings and getting lost while looking for shells on the beach; in the story, the boy met the Freedom Lady (impersonated by the grandmother) taking a walk on the beach, and with her support he found the way back home.

Both the adults in those stories were observed voluntarily choosing supportive and subordinated roles for their characters, as if they were willing to leave the children free to lead the interaction and encourage them to independent choices and actions, exploring their competences, ultimately feeling autonomous and empowered in their role.

Having sense of Purpose Vs Being Disengaged

A common thread of the co-created stories was having a shared purpose.

For instance, they had to fight an enemy (ID1), protect their home from the evil king (ID3), or save their collapsing planet (ID5).

Purpose is here understood as the effort to achieve a goal that is meaningful for both children and adults. Feeling to have a common purpose seemed to drive participation and engagement.

William Damon and his colleagues (Damon et al., 2003, p. 121) define purpose as "a stable and generalized intention to accomplish something that is at once meaningful to the self and of consequence to the world beyond the self".

Besides the concept of meaningfulness, purpose also seemed to also include a component of "engagement in the world beyond the self" (Damon & Malin, 2020, p. 2).

It appeared that the feeling of having a purpose gives consistency to participants' roles, empowering them and fuelling an active engagement.

Having a shared purpose provided them with the opportunity to apply their competences and feel empowered. In contrast, a passive interaction with no shared goal seemed to lead to a sense of disengagement.

Feeling Safe vs Feeling at risk

Feeling protected from harm and danger and mastering a sense of safety was common to all the stories that were co-created.

A recurrent thread in the stories was the description of a safe space, often to be protected, represented by a house or a castle where the family was living.

For example, ID3 used their powers together to protect the family home from the Evil King or similarly, ID1 wanted to protect their planet from the big ants, and ID5 engaged in a mission to find their way back to the safety of their home. It seems that safeness and protection are a fundamental recurrence in the intergenerational interaction.

Feeling safe seems to be meant as a general sense of wellness, familiarity, and security.

This seems to be deeply related to all the values previously listed; feeling competent, empowered, and autonomous, and having a shared purpose provides a sense of safety that allows experimentation and engagement in the interaction.

5.7.3. The IGP's Design Requirements

A set of design requirements (Fig. 32) were established through the analysis of the design features and their design implications extrapolated from the artefacts co-created by IGP in the Create Stage.

Three of the four IDs co-created two mock-ups, one for the adult and one for the child, based on the same idea but slightly personalized and to be used autonomously.

All the mock-ups created were portable or wearable to allow physical movement while playing with them.

The mock-ups were mainly used for communicating between the children and the adults, also facilitating orientation in their surroundings. For example, the mock-up created by ID5 (the smart compass) was used in the role-play activity to share their location and, similarly, the one created by ID4 (the walkie-talkie jewellery) had the option to send geographic coordinates as well as allowing the ID to communicate with each other.

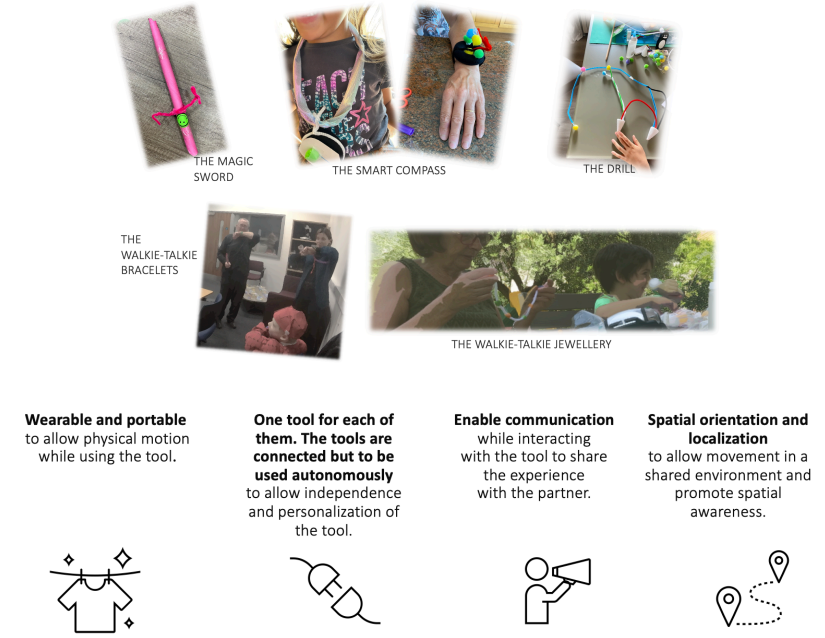

Figure 31. *Mock-ups co-created with IGP (see pictures above). Design requirements established from the Create Stage with IGP (below).*

Before presenting the findings gathered from the last stages of the research (Define and Evaluate), a dedicated section is presented to discuss how the imi patterns and the IGP values were further elaborated to inform the next steps of the design process.

The findings from the Define and Evaluate stage will follow.

5.7.4. MIMI: Model of Intergenerational Mediated Interactions

Following the analysis of the data gathered in the Explore and Create stages (Fig.33), a model called MIMI, model of intergenerational mediated interaction, was elaborated to represent how the imi patterns and the IGP values are interrelated and influence each other.

The MIMI is a values-led model to predict IGP's psychological processes channelling their shared media experiences. In other words, the aim of the MIMI is to provide a framework for researchers and designers to formulate hypotheses on the IGP's future behaviours with technology to inform and guide values-led design processes.

In this sense, simply knowing that the IGP construe their interaction with technology as controllable vs uncertain gives us little understanding of the implications of this construing.

Similarly, establishing that autonomous vs constrained is one of the IGP values tells us little about how to inform the design process of media experiences that meet this value. Hence, the need for the integration of imi patterns and IGP values in a model.

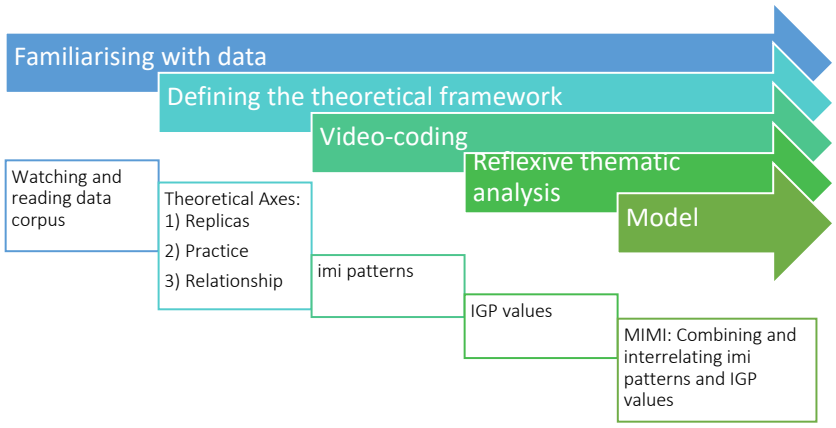

Figure 32. *The data analysis phases that led to the creation of the MIMI.*

The creation of the MIMI followed two steps, informed by the organization and range corollaries of the PCT.

The organization corollary states that "each person characteristically evolves, for his convenience in anticipating events, a construction system embracing ordinal relationships between constructs" (Kelly, 1955, p. 39).

According to the PCT, each of us has a personal construction system constituted by a set of constructs, based on our life experiences, and hierarchically organized according to ordinal relationships.

The ordinal relationships are defined by the range of convenience of the constructs, meaning their domain of application to anticipate events.

The range corollary is explained in the theory:" a construct is convenient for the anticipation of a finite range of events only" (Kelly, 1955, p. 48). For example, considering the construct tall vs small, we can say that a person is small, and a tree or building are tall, but we usually don't say that fear is tall, or happiness is small.

We could therefore deduce that this construct can be applied to construe a person, a building, or a tree but it is not relevant to interpret feelings, such as fear or happiness.

Thus, for many of us, feelings are out of the range of convenience of the construct tall vs small.

According to these two corollaries, the constructs hierarchically higher in the system are called superordinal and are more comprehensive and applied to make sense of broader range of different events than the constructs lower in the system.

Constructs lower in the system are called subordinal. Their range of convenience informs the anticipation of a more limited number of events.

For this research, 'events' are intended as all the interactions occurring between grandchildren and grandparents mediated by technology.

This means that the constructs presented in the MIMI are only relevant to the anticipation of the events in the context of the imi and might not be relevant to other events, for example, with no technology mediation.

Informed by these two corollaries, hypothesis of interrelations between imi patterns and the IGP values were formulated, based on the data gathered in the previous research stages.

First, the imi patterns and the values were organized in a hierarchical system according to their ordinal relationships (Fig. 35).

Values, as mentioned previously in the thesis (Chapter 4, Section 4.4), are for this project intended as the core constructs that lie at the heart of the person's sense of self, guiding each anticipatory choice in relation to other people (Horley, 1991).

According to this definition, values tend to be superordinal constructs because they are used to anticipate a broader number of events than other constructs, being

tightly linked to the person's identity. Nevertheless, some values can be more superordinal than others.

Therefore, the laddering technique was used as a reflexive method to interpret the ordinal relationships between the IGP values.

The laddering technique was originally planned to be used during the sessions with IGP. Fransella (2003) and Fransella et al. (2003) suggested successful laddering requires the listener to suspend their own construing, meaning tempering their own assumptions, and seek to subsume the other person's construing.

However, considering the IGP's difficulties to reflect on such an abstract level, the method was adopted by the researcher, in the data analysis phase. The technique was used not as an explanatory mining, but as a reflective framework that facilitated IGP to be thoughtful on their choices, which helped the researcher to gain further insights and data.

In this sense, starting from the data collected during the participatory sessions, the researcher used this technique to analyse and establish relationships between the themes (imi patterns and the IGP values).

So, based on the data collected in previous research stages and starting from the imi patterns, which describe how IGP construe their shared media experiences, the researcher started asking why of those patterns of interaction, as in climbing a ladder from the bottom (subordinal constructs) to the top (superordinal ones). Thus, for instance, starting from the imi pattern controllable vs uncertain, the researcher asked herself: "Why do IGP prefer controllable interactions?", and "Why do they avoid uncertain interactions?" (Fig. 34).

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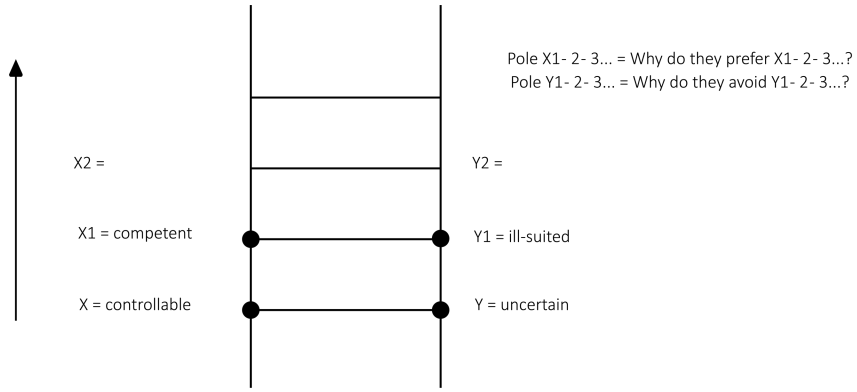

Figure 33. *Examples of the laddering technique used by the researcher as a reflexive tool to establish the ordinal relationships between IGP values.*

The answers to those questions were defined according to the data gathered in the participatory activities and led the process a step further in the establishment of the hierarchical system of the IGP values.

So, for instance, the IGP were observed preferring controllable interactions because they seemed to master their competences when feeling in control; on the contrary, uncertain outcomes to their interactions with technology seemed to favour the feeling of being ill-suited (see examples in Section 5.5.1).

Once established that competent vs feeling ill-suited was higher in the system than the imi pattern controllable vs uncertain, the same procedure was completed for the value competent vs feeling ill-suited.

The researcher asked herself: "Why do the IGP prefer feeling competent?". According to the data, feeling competent seemed to imply feeling empowered and autonomous in the shared interaction.

Therefore, the values empowered vs powerless and autonomous vs constrained were established as a more superordinal value than competent vs feeling-ill-suited and so on.

The value being safe vs being at risk was interpreted as the most comprehensive and overarching, being at the core of all the plots of the stories co-created by IGP.

This was established as the most superordinal value in the system, the one necessary to allow the IGP to play an equal role in the co-engagement, allowing them to construe themselves in relation to their partner.

In other words, all the shared media experiences seemed to tend towards the validation of a general sense of safeness and security.

It is through this process, that the hierarchical system of the IGP values was organised as shown in Fig. 35.

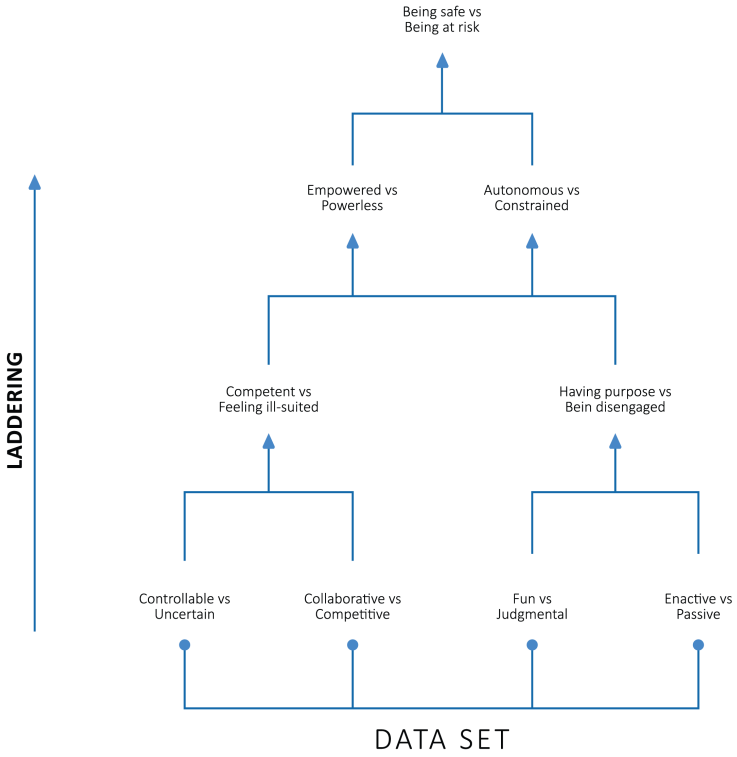

Figure 34. *The Hierarchical system of the IGP values.*

The hierarchical system so defined provides a systematic procedure to organize the ordinal relationships between IGP values; however, it still tells us little about the implications of those relationships.

Therefore, the second step of the model's creation consisted in the translation of the hierarchical system in a circular model (Fig. 36) to have a comprehensive understanding of the values that drive the IGP's patterns of shared interaction with technology.

We might imagine the imi patterns and IGP values as pathways, defined by the dichotomous poles, along which the IGP can move while making sense of their interaction with technology.

Thus, the interrelations represented in the MIMI consist of the intersections of those pathways of meanings, defining IGP's trajectories of behaviour with technology.

Kelly himself talks about 'network of pathways' and when describing the personal construct system, he explains: "one may say, therefore, that the system of constructs which one establishes for oneself represents the network of pathways along which one is free to move.

Each pathway is a two-way street; a person can move either up or down the street, but he cannot strike out across country without building new conceptual routes to follow.

Whether he goes up or down a particular street is a matter of choice, and we have indicated that this choice is governed by what we call the principle of the elaborative choice" (Kelly, 1955, Vol. 1, p.89).

As already previously mentioned in this thesis, personal constructs are used by people to form anticipations about events, often at a very low level of awareness, then tested through the experience cycle (see Chapter 2, Section 2.2.1).

Specifically, according to the choice corollary (see Section 5.4.), when anticipating events, people choose the pole in a dichotomous construct that they predict as being more elaborative, meaning it provides a more accurate anticipation of the event.

Being that the personal constructs are dichotomous, the anticipation the individual makes is a differential prediction.

In other words, when we choose the pole of the construct that is more elaborative for our system, we necessarily exclude the opposite one. So, for instance, if the IGP construe their interaction using the construct good vs bad, then we can deduce that if they anticipate the interaction to be good, they also anticipate that it cannot be bad.

Thus, specifically, the MIMI aspires to represent the interrelations between the poles of imi patterns and IGP values, defining differential predictions on how IGP anticipate their shared interaction with technology to form hypotheses of IGP's future behaviour with technology that can inform the following steps of the design process.

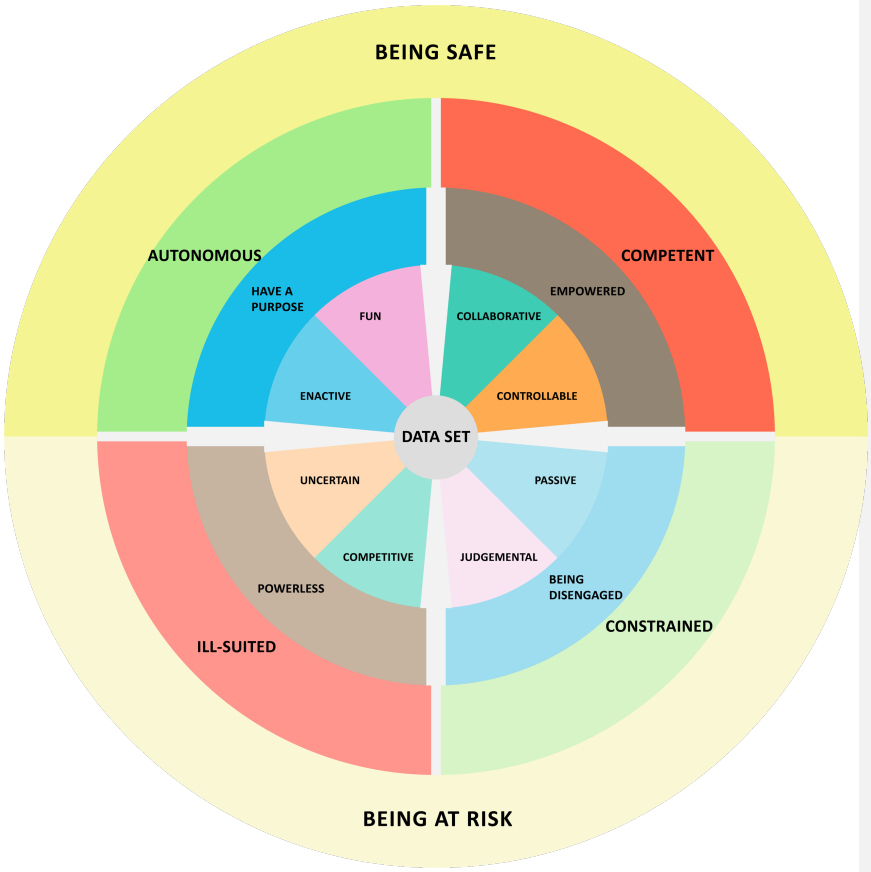

Figure 35. *The MIMI: Model of Intergenerational Mediated Interaction.*

In the MIMI, the two poles of each construct (imi patterns and IGP values) are represented as specular sections of the circle, with the same colour but different saturation.

On the upper half of the circular model (more saturated colour) the desirable poles of the constructs are represented, meaning the poles that are more elaborative for IGP.

On the bottom half the opposite poles are represented. Starting from the centre, the model expands as the constructs' range of convenience gets broader.

The range of convenience of each construct is related to the size of the section. The widest section is represented in yellow and corresponds to the most superordinal value (being safe vs being at risk), according to the hierarchal system.

At the centre of the model the imi patterns (subordinal constructs) are represented.

Looking at the model, we can start making some hypotheses of the IGP's anticipations of the imi, combining the intersected poles to form differential predictions. The prediction is that if certain qualities are present, others will be excluded, and certain other outcomes will result.

For instance, according to the model, the controllable and collaborative poles are subsumed, or included, in the empowered pole of the superordinal value empowered vs powerless. In other words, the empowered pole includes all the events that are construed as controllable and collaborative.

Instead, the powerless pole includes those events that are construed as uncertain or competitive.

So, we can then deduce that if the imi is interpreted as controllable, then it won't be construed as uncertain, and thus the IGP would anticipate that they would feel empowered, avoiding feeling powerless.

Similarly, if they anticipate the interaction to be empowering then they would probably predict feeling competent and safe while interacting together with technology.

Therefore, we can also hypothesize that if the interaction with technology was anticipated as empowering, they would predict avoiding feeling powerless, thus preventing them also feel ill-suited and at risk.

The MIMI provided in-depth coordinates of understanding of the IGP's interaction with technology that informed the next stage of the research, the Define Stage.

The IGP's trajectories of behaviours with technology defined through the MIMI were translated for the MIB Game (run in the Define Stage) in the simpler form of a story (Fig. 37), embedding the coordinates of the IGP's direction of behaviour and scaffolding questions such as: "How might we design to make IGP feel in control of their interaction to feel competent?", "How can we design to prevent them feeling that the outcome of their interaction with technology is uncertain, to prevent them feeling powerless and ultimately ill-suited?".

Through the coordinates provided in the MIB game, a list of design solutions in the form of design features were established with designers, as presented in the following section.

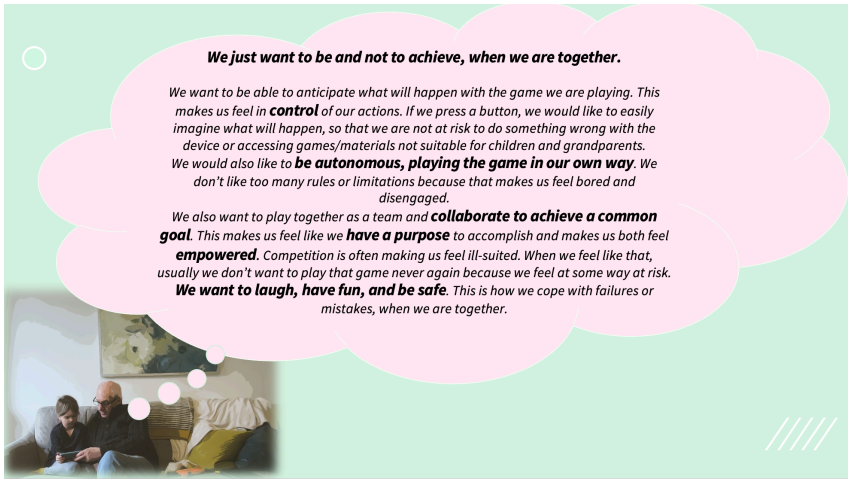

Figure 36. *The story presented in the MIB Game run with designers in the Define Stage, based on the MIMI.*

5.7.5. The Design Concept

> *"To a certain extent, our action depends on the contingent configuration of the territory, as a river course is determined by and, in the meantime, determines the configuration of the surrounding landscape." (Von Glasersfeld, 1984)*

The design concept consisted of the integration of the design ideas created by designers, based on the IGP's design requirements, and a list of key design features, informed by the coordinates inferred from the MIMI, through the activities run in the Define Stage.

The concept was also informed by existing literature and design recommendations on co-viewing and JME (e.g., Vetere et al., 2009; Takeuchi and Stevens, 2011).

Particularly, differentiation roles and multiple planes of engagement to suitably entertain and sufficiently challenge participants were considered as foundational elements for a JME and embedded in the design concept.

The key design features were established as follows:

- Shared goal
- Turn-taking
- Mix of physical and digital interactions
- Simple set up
- Flexible storylines
- IGP's familiarity with traditional game
- Non-timed requirements
- Physical movement
- Flexibility in location (outdoor or indoor)
- Customization and personalization
- No right or wrong
- No score
- Fantasy experiences (not attached to reality)

The design ideas were bundled with the design features resulting in the design concept of a narrative-based game called imi game; 2D prototypes were then created, representing the design concept.

The 2D prototypes were inspired by sketches created by designers during the workshops (Fig. 38). The design concept was then improved according to IGP's feedback, in an iterative cycle.

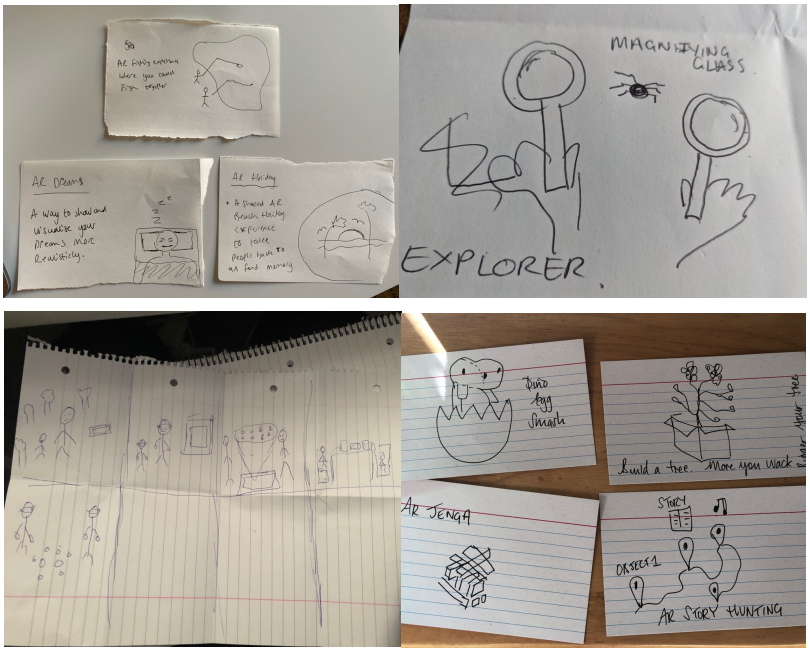

Figure 37. *Examples of sketches collected from the Define Stage.*

The imi game consists in a narrative-based game in which the intergenerational pair is engaged to uncover a story that is hidden in a map.

Different routes lead to the development of different stories and the aim of the game is to collect objects while moving around the room or in an outdoor space to create their own areas.

Through the collection of objects, the story hidden in the map is revealed.

In terms of technology, the game entails interaction between different devices, integrating digital, physical, and augmented realities:

- Digital Application system (e.g., mobile app)
- Augmented Reality device - discovery tool (e.g., binoculars, glasses, magnifying glass etc.)
- Wearable tracker – geo-localization and fitness tracker (e.g., smart watch)

Each player is provided with one discovery tool, and they must choose among multiple different adventures to be completed (flexible storyline).

The players can choose the role of the Hunter or of the Navigator (turn-taking). The Navigator must guide the Hunter in the adventure, giving directions to find out as many hidden objects as possible, as in a treasure hunt game (IGP's familiarity with traditional game; no scoring).

First, the players must select which adventure they want to undertake (e.g., space, tropical forest, ocean) on their mobile app (fantasy experiences).

After that, the Hunter's discovery tool is activated, and the Navigator is provided with a map displayed through the mobile app, showing an overview of the positions of the hidden objects (simple set up); a tracking of the Hunter's movement (through the wearable tracker) is also displayed on the map (mix of physical and digital interactions; physical movement).

The objects can be implanted by the Navigator or randomly assigned by the system (customization and personalization).

The Hunter will move around the room, or the area set for the game, searching for the object displayed in AR through the discovery tool, guided by the instructions provided by the Navigator (flexibility in location).

The hunt can be saved and completed in more than one round (non-timed requirements). When the hunt is completed, the players have access to the full story and can enjoy reading it (no right or wrong).

The 2D prototypes of the imi game were then organized in a storyboard and presented to the IGP in the Evaluate Stage (Fig. 39).

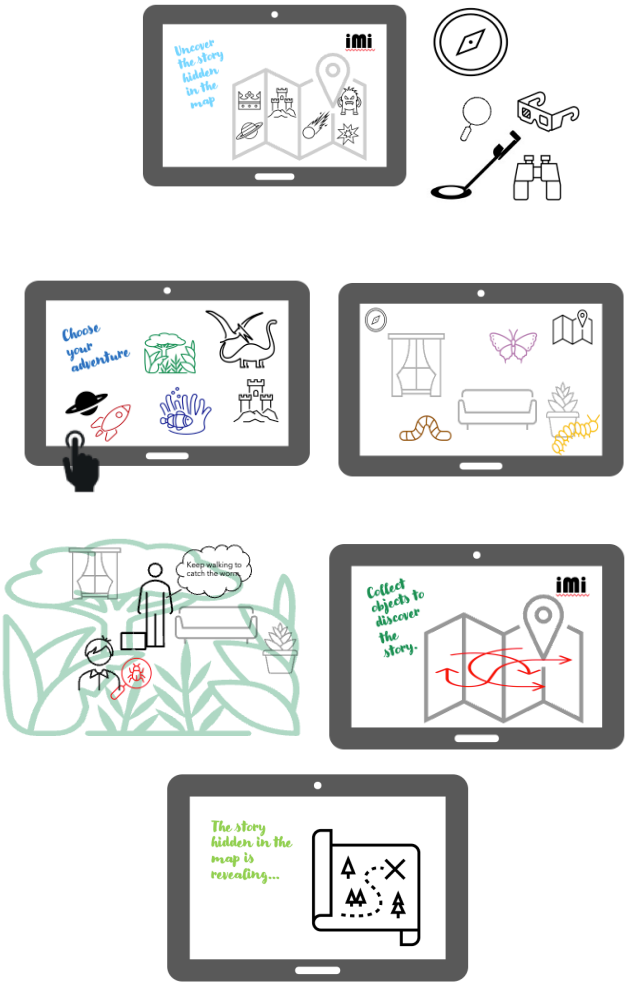

Figure 38. *Storyboard presented to IGP in the Evaluate Stage.*

Figure 39. *Examples of the 2D paper prototypes used in the Evaluate Stage with IGP.*

The IGP positively ranked the design concept, with two pairs ranking it as 'brilliant', one as 'good', and one ID ranking it 'ok'. They all claimed they would be very likely to play with the game.

The ID that scored 'ok' struggled to provide an evaluation of the game based only on the presentation through the 2D prototypes and the storyboard.

All the IDs expressed their enthusiasm for the discovery tool (AR device: e.g., magnifying glass, binoculars); having tools in the form of concrete physical objects to play with, besides the interaction with the digital device, was rated as their favourite feature.

Furthermore, the majority of IGP suggested integrating a catching tool (e.g., a net) as well as the discovery tool to catch the objects displayed in AR.

The IGP also liked the idea of having different options for the adventures. The adults were particularly positive about not scoring points; the concept of developing a story while playing the hunting game was also accepted favourably.

Although the game was presented as a game to be played when physically together, the potential for it also to be played when apart emerged as a desirable option.

This was probably influenced by the experience of lockdown and distance measures imposed by the pandemic, most of the older adults highlighted how the game could be an opportunity to engage with their grandchildren when apart.

At the end of the session, each ID was rewarded with a certificate of participation to the project (Fig. 41).

Figure 40. *Example of the certificate provided to each ID at the end of the research. The drawing was the ID portrait created by the children in the Create Stage (the names on the certificate shown in the picture are invented).*

CHAPTER 6

Conclusion

The focus of this final chapter is to reflectively explore the whole research journey and the methodology adopted in the MIMI project, and in doing so, discuss the process of designing with and for intergenerational cohorts.

The main contribution of this research consists in the definition of a values-led model (MIMI Model) aimed at designers and based on PCP to understand intergenerational experiences with technology. The purpose of the model is to predict IGP's psychological processes guiding their shared media experiences.

The research also explored two generative techniques specifically created for the MIMI project - the storytelling card game and the MIB game. The techniques were designed for this research and never used before. They could be applied by researchers and designers exploring values-led processes with IGP, in further research. The observed benefits and challenges of adopting those techniques with IGP and designers are discussed in section 6.2.

Laddering technique was used as a reflective and analytical tool by the researcher to organise the IGP elicited values in a hierarchical system, in the data analysis phase. This is a novel application of the method; it is commonly applied with an explorative aim directly with participants, rather than as a reflective tool to code and organise data.

A set of methodological recommendations to co-engage intergenerational cohorts in the design cycle is consequently proposed, as a contribution to participatory design practices, presented as a conclusion of this thesis.

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6.1. Reflections on the Research Journey

The research presented in this thesis was a continuous dialogical process of sense-making that followed itself the steps described in the experience cycle presented in Section 2.2.1 of Chapter 2. Equality, mutuality, and reciprocity were the values that channelled the researcher's choices with the aim of creating a research space that enables contact, relationship, and mutual understanding between participants, through values-led participatory design practices.

The research journey started with broad anticipations of the importance of active inclusion of vulnerable and marginalised groups in the design cycle, for a democratic, accessible, and diverse society, in the era of the digital transformation.

In the initial probing phase of the research (see Chapter 4), defining the status quo of the engagement of vulnerable and marginalised groups in current design practices was fundamental to open-up a space for observation and conversation, and establishing gaps and possibilities.

The three probing projects completed in this phase, validated the hypothesis that a lack of direct contact between designers and vulnerable groups might lead assumptions and stereotypes to inform the design of digital products and services that are not meaningful for those cohorts, jeopardising access, and long-term adoption of technology in their everyday life.

The lack of methodologies specifically tailored for engaging those cohorts into research also seemed to be one of the major obstacles to their direct involvement in the design cycle.

Moreover, it is from this initial exploratory phase that the potential was established for technology to cultivate relationships between generations and promote positive attitudes towards the ageing process and towards younger generations.

The insights gathered in the probing phase guided the interest towards the engagement of children and older adults in the design cycle to foster possibilities of active participation and collaboration in the ideation and design of media experiences aimed at those cohorts.

The literature on the benefits of intergenerational interactions and the potential for technology to play a role in fostering contact between different generations strengthened the idea that the engagement of both those age groups in the design cycle, at the same time, could nurture opportunities for mutual learning and value creation between generations, at the same time fostering an inclusive and diverse digital society.

Further, from the literature review emerged how participatory design approach to the involvement of intergenerational cohorts in the development of ideas for new technologies have been widely explored in existent research; however, it was established a lack of research about direct engagement of younger children, such as pre-schooler and

older adults together, as equal partners in the design process, specifically in participatory design process.

This opened an opportunity for further research. Nevertheless, this opportunity came with the methodological challenge of how to engage such diverse cohorts in the design cycle to design with and for them, enhancing their creativity and eliciting interpersonal values to inform the design of media experiences for long-lasting impact and intergenerational learning, ultimately also impacting on their well-being.

The choice of a participatory design approach mirrored the intention to engage IGP as equal partners from the very early stages of the design cycle, as in the Northern Europe tradition of PD (e.g., Ehn, 1993; Kuhn & Muller, 1993; Sanders & Stappers, 2008).

Participants became a source of inspirations and beside gaining access to their ideas the aim of the main thesis project was to achieve contextual knowledge about this cohort of people, leveraging on their values to access the meaning assumed by their interactions with technology.

This focus reflected the need to explore design approaches that supplement the "citizen perspective", as suggested by Ballegaard and colleagues (2008) (see Chapter 2, Section 2.3), gathering a broader understanding of the IGP contexts to ultimately inform the design of technology that is meaningful in their everyday life.

The co-engagement of IGP in the design cycle contributed to the creation of a 'hybrid space' (Muller & Druin, 2002) that took place between the IGP's and designers' worlds.

The creation of a hybrid space through the planning of playful sessions based on storytelling and the direct engagement of IGP from the initial stages of the design process offered the chance for mutual learning and reciprocal validation of diverse perspectives.

Engaging such diverse cohorts in the design cycle, preserving, and protecting their unique circumstances also poses the challenge of how to create meaningful contact between their worlds and the world of designers.

As noted by Suchman (2002), the world of the end-user and the world of designers have their own knowledges and practices; each world has well-defined boundaries and movement from one world to the other is known to be difficult (Dewulf

& Van Meel, 2002; Kensing & Blomberg, 1998; (Kujala, 2003; Olsson, 2004; Reymen et al., 2005).

In this regard, Warr (2006) suggests that the solution is not to remove distance entirely between groups, but rather to preserve the situated nature of each participant's own world while creating a common space for mutual learning and creation.

Merkel et al. (2004, p.7-8) similarly described a need for "a new set of skills and competencies that go beyond technical design skills...to create conditions that encourage a collaborative design process and active reflection...for working with groups...that push on the traditional boundaries between users and designers".

The main thesis project, the MIMI project, was therefore designed to create a common space for contact between groups, to promote chances for reflection, change of perspectives, and mutual learning.

The combination of multiple perspectives in PD, blending theories and methods selected from HCI tradition, and UX methods with tools and techniques borrowed from PCP practice, resulted in a valid approach to tackle the complexity of the human-technology relationship.

The research activities were deliberately planned to introduce experiences that could bring IGP and designers out of their comfort zone for re-negotiating roles and assumptions.

A deliberate level of ambiguity and abstraction of the research activities aimed at creating space for uncertainty and doubt and inspire mutual collaboration in making sense of each other and of their shared goal.

This was valid both for IGP and for designers.

The adoption of playful contexts as the main approach to co-engagement resulted in an accessible and versatile mean to facilitate communication between groups, both between children and adults and between IGP and designers, as previously discussed.

Play was particularly powerful for allowing children to express themselves and motivated IGP to experiment with roles, opening new perspectives toward their partnership and towards technology. In this sense, the participation in the research activities brought new questions to the table.

The IGP co-engagement triggered conversations and reflections on technology usage and on the design process in general, with participants often asking questions related to what research is and how the design of new technology unfold.

Frequent questions were “What’s research?” “What is a prototype?”, “Why do we need to build a prototype?”, between both older adults and children.

Similarly, inviting professional designers to engage with open-ended methods such as the MIB game, led them to think about IGP from a more intimate and personal perspective, addressing specific requirements and focusing on IGP’s anticipations of their shared media experience, rather than concentrating on the final product, during the creative process.

The co-creation process with designers pushed the usual creative cycle further with the presentation of more abstract but deeper insights about the IGP cohorts to inspire creativity with no strict requirements or constraints.

Ambiguity was used with designers to allow for in-depth reflections on the IGP cohorts, challenging their assumptions and exposing them to the heterogeneity of different interpretations.

Many professional designers claimed that this was a new experience considering their strongly product and market-oriented practice.

The interpretation of IGP’s interaction with technology through the lenses of PCP provided a systematic and comprehensive approach to eliciting their values and generating hypotheses on this cohort’s future behaviours with technology.

The anchor on values gains not only a comprehensive but also a deeper understanding of who this cohort of people are, unfolding the psychological processes behind their behaviour with technology.

Within PCP theoretical framework, values, and more in general personal constructs, have often been considered only as intellectual or verbal creations.

However, personal constructs that are used by the individual to form anticipations, can be verbal but also implicitly acted (preverbal), without having any verbal label attached to it. In Kelly’s words, “we know an event through our own act of approach to it.

We ask questions about it, not merely academically, but also experimentally" (1979, p.26). This perspective on behaviour is coherent with the embodied cognition and the enactive perspective of Maturana and Varela (1984) since it requires to approaching people as 'acting entities', attempting to make sense of their world through their interactions with their environments, in a recursive cycle.

Thus, this research moved from a verbally focused exploration to a preverbal and embodied one.

The focus on actions, rather than simply on verbal expressions, allowed the researcher to get access to the IGP values as they often lie at low levels of awareness and are not easily expressed in words, especially for younger cohorts.

The establishment of a set of imi patterns and IGP values in the form of dichotomous constructs with the theoretical underpinning from PCP allowed the researcher to escape the semantic dilemma inherent to verbal labels, meaning that, for instance, what it is intended as 'control' for someone can be intended differently for someone else.

The imi patterns and the IGP values being defined by two poles, which are not merely antonyms of each other, allowed the researcher to establish the dimension of meanings that are relevant for that construct.

Furthermore, the specific list of values may vary radically from project to project but for this research the interest was not so much in the content of specific lists but primarily with methodology to establish a systematic process that designers and researchers might follow to elicit and organise the values shared by intergenerational audiences.

Furthermore, the anchor of the PCT provided the researcher with criteria for organizing the findings of the initial stages of the research in a hierarchical system that informed the MIMI. Thus, the model aspired to provide a systematic way to organise the values of participants.

The aim of the MIMI was "to move beyond a descriptive account of the topic and derive a theoretical conceptualisation that adequately explains the collective findings" (Denicolo et al., 2016, p. 146).

This was crucial to authentically represent the IGP voice with designers and avoid semantic misinterpretation, reducing potential stereotypes or assumptions.

Therefore, the MIMI provides a theoretical framework that could be applied to understand how IGP's values channel their actions with technology.

It offers an organized structure to interpret and anticipate IGP's behavior with digital artefacts. Thus, the MIMI serves as a theoretical framework to psychologically comprehend the IGP's behavior with technology and form hypotheses on their anticipations that can inform the design process.

The main contribution of a model organised in this way lies in the application of the PCT to the derivation of hypotheses concerning the construing processes of groups, specifically the intergenerational cohorts.

The model goes beyond the usual application of PCT, mainly used to explore how the individual makes sense of his/her personal world. It instead focuses on how two cohorts make sense together of their shared interaction.

In this sense, the MIMI could be used as a theoretical framework to approach the construing processes of dyads but also expanded to the extent of exploring the construing process of groups, co-engaged in shared interactions.

Similarly, the methodology suggested in the MIMI project is certainly tailored to the unique circumstances of the intergenerational cohorts, but this does not prevent some methods and tools from also being used with other cohorts, in future research.

The flexibility of open-ended, story-based, and playful methods could make them appropriate for many other dyads or groups, leveraging on the active interpretation of the activities in their co-engagement.

The research activities being so specifically designed provided the opportunity to give participants a voice and consistency to their needs, challenging assumptions through the negotiations of roles and the co-creation of mutual understanding, both between children and grandparents but also between IGP and designers.

The idiosyncratic approach to the data analysis, rooted in the strong individual perspective of PCP, met the small sample size of IGP recruited for the main research project.

Due to the small sample size, the findings are not applicable to represent a wider population. Nonetheless, this was the first attempt to apply PCT from participant engagement, data acquisition, data analysis, and values elicitation, bringing a step closer towards more generalisable approaches. Future research could further explore how PCP theoretical framework could be applied to entangle and organize people's construing processes of their co-engagement in shared media experiences and beyond.

Based on the concept of the range of convenience, the PCT could also provide a framework to hierarchically organise values, as it was done for the MIMI project.

To our knowledge, this was the first time that research on co-engagement of preschool children and older adults in participatory design process was conducted.

Therefore, one of the contributions of this work consists in a set of methodological recommendations about how to approach this diverse cohorts in participatory design process, as presented in the final section of this chapter (Section 6.3.).

Furthermore, two new techniques, the storytelling card game and the MIB game (presented in Chapter 5, sections 5.5.2 and 5.5.3), were specifically created for this project and resulted to be effective tools for the engagement of intergenerational cohorts in the design cycle.

Those methods could be further explored and applied in future research with intergenerational cohorts or extended to the co-engagement of other dyads in the design cycle.

The storytelling card game appeared to be a playful and engaging method to elicit IGP values; and the MIB game was positively embraced by designers as a tool to understand the values of the intergenerational cohorts, creating empathy and mutual understanding.

More about those two techniques is discussed in the following section.

6.2. Designing with and for Intergenerational Cohorts: Contributions from the MIMI Project

The MIMI project tackled the broad question of how we can engage intergenerational cohorts in the design of media experiences aimed at fostering contact between generations through interactions mediated by technology.

Specifically, the research aimed at gaining understanding of how to engage intergenerational participants as equal design partners in values-led participatory design process to co-explore and co-create ideas for future technologies aimed at this cohort.

A process-oriented paradigm was adopted focusing on intergenerational mediated interactions (imi) approached from a psychological perspective to understand the deeper meaning behind and beyond observed behaviours.

The research design reflected the aspiration of exploring tools and approaches rooted in dialogical sense-making processes of co-exploration and co-creation, through co-engagement in participatory design.

The combination of PD approaches with Constructivist Grounded Theory and Action Research methodologies allowed the flexibility required by the collaborative nature of this Ph.D. The triangulations of those methodologies could be considered as a viable solution to balance out the limitations of each method.

Action Research informed the PD approach for creating in-situ scenarios and sessions. Constructivist Grounded Theory was then integrated by imposing PCP theoretical framework to systematically organise and analyse the data.

Such methodologies so combined, provided a framework for organising and interpreting the different phases of the research, from planning for collaboration (PD), to the meaning-making processes (CGT) based on the researcher and participants' experience (Action Research).

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The participatory design approach was chosen as a constructivist tool to explore future possibilities of intergenerational mediated interactions (imi) and elicit the IGP values in the shared experience. The group of IGP recruited in two cultural contexts was planned to meet a small sample size and didn't intend to reflect diversity in ethnicity, socio-economical, and literacy level. Instead, it served the in-depth qualitative analysis

approach guided by PCP theoretical framework, anchored on personal meanings based on the IGP's life experiences.

Despite the challenge of focusing on abstract concepts such as values, PD techniques proved to be particularly useful for the variety of tools and techniques provided that stimulated abstract thinking, and at the same time provided opportunities for concrete manipulation of specific reference materials (e.g., cards, mock-ups, drawings).

Projective and open-ended methods were chosen to move participants into unfamiliar and hence reflective experiences. These methods enabled experimentations encouraging participants to construct their own understanding of the research activities and ultimately find their own approach to accomplish a shared goal.

Specifically, the Explore Stage was crucial for understanding how to approach the IGP for co-engagement in the research activities.

Co-engagement was intended as the sustained and active engagement of IGP with the activities and with each other in the dyad as equal partners. It allowed children and older adults to settle in their role of research participants and establish a rapport with the researcher.

Scheduling more than one session in this stage was fundamental in allowing participants adequate time to get to know the researcher and familiarize themselves with the research goals.

This was a fundamental step for the activities planned at the following stages, which involved more active participation. In this stage, the choice to collect data in the form of video-recordings was particularly valuable in gathering insights about non-verbal language that would have been lost with only audio-recordings.

Co-engagement was particularly important because, as explained previously (Chapter 3, Section 3.3), it is meant as the IGP's construing process of their shared interaction mediate by technology, which this research aspired to understand and untangle.

In the Create Stage, a certain level of flexibility and room for improvisation were needed to maintain IGP's engagement.

Overall, we observed that both younger and older participants' engagement was more frequently prompted by sensory stimulation (e.g., movement, tactile or visual prompts) than by symbolic or abstract thinking.

This caused little surprise, especially for the younger participants. In this sense, the strategic combination of "making-telling-enacting" methods resulted as a valuable methodological strategy to deal with the challenge of the research setting, considering the peculiarity of the IGP cohorts (e.g., differences in their cognitive development) enhancing their unique creative contribution through a variety of ways to express their ideas.

The mix of methods contributed to overcome potential limitations in verbal expression or limited manual skills (e.g., dexterity issues), allowing participants to talk when desired (e.g., interview), make things if needed (e.g., mock-ups) or acting out when convenient (e.g., role playing).

The combination of methods so selected scaffolded the activities planned with IGP, supporting them while making sense of what was required, without imposing rigid rules.

This range of methods seemed to accommodate the diversity and the peculiarity of the intergenerational dyads.

The effort to create a storyline to contextualise the methods, connecting each research activity to the previous one, also appeared to be an efficient strategy for keeping participants engaged and help them understanding what requested.

The criteria considered to evaluate the effectiveness of the novel techniques specifically created for the MIMI project (storytelling card game and the MIB game) referred to key factors defined in existent literature (Bowen et al. 2013; Drain et al. 2021).

There are many aspects and dimensions that could be examined when evaluating PD methods, from multiple perspectives; for example, the quality of designed outputs, the achieved benefits for participants, the level of engagement, or changes in people's perspective on the topic (Bowen et al., 2013).

For this research, ensuring that participants had strong ownership of the whole research and design process, empowering them in their role as equal design partners, and promoting active collaboration were the main elements considered to evaluate those

methods. In other words, the researcher focused on reflecting on the observed level of engagement of participants and analysing their feedback on the final design concept, gathered in the Evaluate Stage.

The storytelling card game was specifically created for this research to elicit abstract concepts like values through a playful and story-based approach.

Although it often proved challenging for IGP, it provided rich data about the values shared by younger and older generations and resulted in being a stimulus for the pairs to co-opt their own interpretation in the common activities, promoting collaboration and equality in finding a strategy to achieve a common goal.

As to be expected, older pre-schoolers (5- to 6-years-old) found it easier than younger ones (4-years-old). The children's age differences here outlined may be specific to the small sample.

Future work remains to understand if the participants age, particularly the gap between 4- and 5-year-olds, is an important inflection point for this method or if the struggles of the younger participants were specific to the research context and personal differences.

Interestingly, the open-ended nature of the game was particularly uncomfortable for some of the adults who seemed challenged in their socially accepted role of 'educator' and had to cope with the experimentation of new roles, such as 'creator'.

The use of a laddering technique to guide participants towards a higher level of abstraction was also challenging for both participants; nevertheless, the co-created storylines were a relevant source for eliciting their values deduced from the implications of their narratives.

The adoption of the laddering technique as a reflective tool by the researcher, in the data analysis phase, resulted to be valuable for hierarchically organise the IGP values in a model.

The novelty consisted in the application of the laddering method not only as an explorative tool with participants, rather as an analytic technique for coding data and as a reflective tool to establish relationships between the themes defined in the data analysis.

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The researcher borrowed this application of the laddering technique from her psychotherapy practice where the method is constantly used to formulate hypothesis on the processes behind the patient's reported behaviour.

The storytelling card game method could be defined as borderline for its combination of 'telling and making methods' (self-characterisation; laddering; collage), resulting in an alternative approach to values' elicitation, particularly valid for young cohorts. Having visual prompts to manipulate, such as the DIXIT cards, resulted to be an efficient scaffold to prompt IGP's abstract thinking, spurring the creation of the stories.

Further, although the fictional stories co-generated by IGP could at first sight appear very far away from telling something about their values, with a deeper analysis of the plots, the recurrent themes, the chosen characters and so on, they provided deeper insights on what IGP value the most. In this sense, this method resulted to be a playful and engaging experience for IGP and a useful technique for the researcher.

It allowed IGP to express who they are and what they care about through the impersonation with fictional characters, at the same time providing access to the values embedded between the lines of the story-plots and the adventures co-created.

The mock-up creation activity ran smoothly and seemed to be an IGP-friendly and familiar activity, however some of the younger children found it difficult to represent their ideas with physical artefacts.

The older adults were observed to engage in supporting their younger partners with manual skills and scaffolding their ideas, rather than in providing creative inputs. This method was particularly insightful when combined with the role-playing activity.

As already said, IGP struggled to verbalize their choices or provide explanations at a more abstract level, therefore observing them playing with the mock-up was useful for understanding about their creations through the observation of how they used the artefact, rather than asking them to talk about it.

Although participants weren't directly invited to reflect on the overall experience of taking part in the research project, the story-collection and story-telling approach used through all the research stages (e.g., storytelling card game, MIB game, storyboard) proved to be an accessible and cross-cutting means to approach the IGP cohort and

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translate their contributions, establishing a shared communication style between participants and designers, in the design cycle.

The use of storytelling mainly tuned in the communication between IGP, allowing participants to accommodate the communication style of their partner, leading to reciprocity, and understanding, and contributing to active participation.

The narrative approach also helped the parties to empathize (both within the dyad and between IGP and designers), communicate, and commit to shared goals and outcomes.

In other words, the use of stories to communicate and co-create with participants resulted as a useful means to bring all participants closer, without necessarily having the in-group (IGP) to be in direct contact with the out group (designers).

In this sense, the MIB game appeared to have much potential by facilitating the communication between intergenerational cohorts and designers.

As in the case of the storytelling card game, this method was created specifically for this research project.

It proved to offer an efficient approach to present IGP's values to designers in an organised manner, guiding the definition of design features that serve those values.

In other words, having the IGP's values contextualised in a story (the 'message in the bottle') resulted to be a practical way to unfold their values and connect them to the IGP's everyday practice with technology.

People are storytellers by their very nature (Lieblich et al., 1998), and the story-based approach adopted in the MIB game provided a way to coherently organise the IGP's experience with technology and create a sense of continuity across different events, at the same time embedding their values to explain deeper meanings behind their actions.

The MIB game resulted an effective tool to empower IGP in their role of equal designers, giving a voice to their values and a role in the definition of ideas for a design concept, although they weren't physically interacting with designers in this phase of the project.

Furthermore, the dichotomous structure of the IGP values, hierarchically organised and integrated in the model (the MIMI), provided designers with prompts to

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reflect on design solutions, but also prompts to think about design preventions, reflecting on what it is not desirable for IGP when interacting with technology.

This approach, anchored in PCP, allowed to communicate concepts such as values, providing not only abstract notions but more specific dimensions of meanings.

In this sense, knowing that IGP prefer being *collaborative* rather than *competitive* because this makes them feel *competent* instead of *ill-suited*, provides designers with several additional elements to elaborate the implications of those values on IGP's interaction with technology, facilitating the creation of design ideas and media experiences tailored on those implications.

The Define Stage run with designers was completely run online to comply with the safety measures imposed by the Covid-19 pandemic.

The online displacement of the workshops with designers resulted in a valuable solution for the co-creative process.

As said before, some time was needed for the intergenerational pairs to become familiar with the researcher.

Consequently, having designers take part in the research activities in person with the intergenerational pairs would have required extra time for them to get to know each other.

Instead, the online sessions run in the Evaluate Stage with IGP resulted instead to be challenging. Engaging the intergenerational pairs in online settings poses several challenges especially regarding collaboration and co-engagement.

The limitation imposed by the online setting was mainly related to a lack of embodied interaction between the children and the adult and with the research material provided for the session.

Online, the dyads were observed being less cooperative and less bonded than in previous face to face sessions.

A tendency to disengage from the partnership of the dyad was observed, with participants often providing individual answers rather than committing to negotiate a common response to the questions posed by the researcher.

Only one ID participated to the session together, from the same location, connected online with the researcher.

Having them in the same physical space contributed to a more active participation, with the pair observed discussing and negotiating their answers and being more confident in expressing their feedback and suggesting improvements to the design concept.

The online setting was particularly challenging for younger children who were observed being intimidated by having to express themselves and interact with the researcher through the video call.

Further, the presence of another adult (e.g., children main carer) for taking care of the technical set up could have jeopardize the intimacy of IDs, biasing some of the responses. Nevertheless, the online sessions were still a valuable resource to overcome the distance and engage children and adults together in a shared activity that otherwise wouldn't be possible.

Some measures could have helped the running of the sessions; for example, providing each ID with physical 2D paper prototypes (e.g., printed at home, sent by post) to manipulate during the online session, rather than showing digital versions of the prototypes through the screen could have improved their engagement through sensory prompts.

Further, scheduling more than one session in this stage to help the IGP familiarize with the online setting could have also benefited their inclusion and commitment.

Collaborating with the intergenerational cohorts brought invaluable energy to the MIMI project.

There were also challenges because IGP often could not express their ideas or represent what they had in mind.

Nonetheless, they remain to be the experts on themselves and their needs.

Their insights or needs may not be obvious to, both IGP themselves and researchers, for which the engagement activities were designed to co-discover their values, needs, and design insights.

Their view on technology, on themselves and on their relationship might differ from those of the researchers and designers and represent a different perspective that should be recognizable in the design results.

Learned from the participatory sessions in the MIMI project, a set of methodological recommendations is distilled as a contribution to the design practice.

They are enumerated below as to conclude this thesis.

6.3. Methodological Recommendations for Engaging Intergenerational Cohorts in Values-Led Participatory Design Process

The PD process and methods adopted in the MIMI project were tailored to facilitate active participation and co-engagement of the intergenerational cohorts, specifically preschooler and older adults, involved as equal partners in the design cycle.

A set of methodological recommendations distilled from the participatory sessions are here presented.

1) **Process-oriented paradigm:** The adoption of a process-oriented paradigm, rather than a product-oriented one, motivated designers and researchers to think beyond the end-product itself, prompting abstract rather than concrete thinking that requires listening, reflexivity, reciprocity, and questioning.

2) **Equality among participants**: It is important that equality among all participants is clearly communicated from the early stages of the research.

This is important to convey a democratic and inclusive message right at the very beginning of the research, empowering and validating IGP in their role of equal partners in their co-engagement in the research activities.

3) **Long-term relationship between IGP**: Researchers and designers are recommended to consider the importance of well-established relationship between preschooler and older adults.

It is desirable to engage IGP with long-term relationship in the participatory sessions; this may increase the opportunity for collaboration and synergy.

In the research, the family bond, all being grandchildren and grandparents, provided a solid basis for interpersonal solidarity and facilitated cooperation and equal status in the achievement of a shared goal in the research activities.

4) **Deliberate ambiguity in presenting the research activities**: Present activities with a certain level of ambiguity to spur participants (both IGP and designers) to actively engage in construing their own interpretation of what needs to be done.

This is a valuable opportunity to elicit their construing processes and the deeper values that underlie their behaviour. For example, not providing them with specific rules or limitations but leaving them instead with the freedom to express and manifest their own way of understanding how to achieve shared outcomes and goals.

5) **Storytelling approach**: Stories are an efficient way to assure an aligned communicative style among different groups.

An aligned communicative style is a necessary condition for meaningful intergenerational contact, as stated by Voci and Hewstone (2003). Stories can build connections even without direct contact between people and designers.

Approaching the co-engagement of intergenerational cohorts through stories becomes a hermeneutic tool that is easily accessible to diverse cohorts, such as IGP and designers. Stories enabled new languages for IGP and designers to empathize and express themselves, contributing to the process through mutual learning.

6) **Personalization of the research activities**: Personalize the activities to facilitate bringing in IGP's voices into the design process by focusing on things they like and master and use these things as a basis for bringing in methodological choices.

Furthermore, personalization is described as another necessary factor for impactful intergenerational contact (Voci and Hewstone, 2003).

7) **Informal and familiar settings for IGP**: Choose a setting that is familiar for IGP participants (e.g., their home).

Familiarity in the setting could overcome ethical issues, respecting the vulnerability of this cohort but also enhancing their experience in a safe and non-threatening environment, with low level of anxiety and potentially higher engagement in the research activities.

A reduced level of anxiety, interpersonal solidarity and perspective-taking were essential conditions for an impactful contact between children and older adults, as stated by Voci and Hewstone (2003) in the intergenerational contact hypothesis.

Informal and familiar settings (such as the IGP's own living room) contributed to put the IGP at their ease, in a safe and familiar environment, with low-perceived risks and anxiety.

8) **Neutral settings for designers**: For designers, neutral settings (as in the online environment), which are different from their usual workplace, could offer a space to experiment new experiences with members of other teams and departments.

9) **Sensory prompts**: Provide IGP with prompts that stimulate their senses such as visual and physical materials that can facilitate their interaction and expression of ideas, ultimately keeping them engaged through sensory stimulation rather than just verbal expression.

10) **Small groups and short sessions**: Engage IGP and designers in small groups. The IGP's engagement as dyads, involved one at a time in the research activities, resulted in being ideal for maximizing their contribution and avoid distractions or reluctance to actively participate (e.g., express their ideas, feedback) due to a lack of familiarity with strangers.

Small groups of designers (6-8 designers) facilitated in-depth reflections, with the chance for everyone to express their ideas and have a voice in the process.

Open-ended and ambiguous instructions can make participation in the research activities exhausting, especially for intergenerational cohorts.

Also, for professional designers who have spent many years building up competence and identity within a domain of specialized professional practice, placing oneself again onto unknown ground is a difficult thing to do.

Hence, close frequency of short sessions (30 minutes to 1 hour maximum) might be the ideal condition for active, rewarding, and creative participation.

Glossary

Psychologically: The term is used to indicate that the concepts reported in the thesis are conceptualized in a psychological manner, not that the processes are psychological rather than something else.

Behaviour: The experiment through which people test their own anticipations of what will happen in given situations, through the five phases of the experience cycle.

Anticipation: The individual seeks predictions about the future, called anticipations. The PCT is not based on concepts such as emotions or motivations, but instead on the capacity of the person to anticipate future events.

Event: Sensory stimulation derived from the encounter for example with the environment or with other people; it is construed by the individual according to his/her personal constructs system.

Construing: Giving an interpretation to the event.

Personal Construct: The minimal unit of knowledge that works for similarities and differentiations. It is dichotomous and based on the experience of the individual. The constructs can be explicitly formulated or implicitly acted.

To Channel: The psychological processes of a person are conceived as operating through a network of pathways (personal constructs) which works for the individual as a map, facilitating and at the same time restricting his/her range of action. The verb 'to channel' is used to indicate the flow of those processes along the network of pathways.

Preverbal Construct: Used as any other construct even though it has no consistent word symbols. It may or may not have been learned before the person could speak. "A large portion of human behaviour follows nameless channels which have no language symbols, nor any kinds of signposts whatsoever. Yet they are channels, and they are included in the network of dichotomous dimensions with relation to which the person's world is structured" (Kelly, Vol.1, 1955, p. 91).

Values: Those personal constructs that govern people's maintenance processes, by which they maintain their identities and existence.

Range of Convenience: The context in which the personal construct is relevant to make sense of the events.

Role: It is a pattern of behaviours based on one's interpretation of the thinking of another person with whom one is interacting. The sense of self of a person is built on role relationships with significant others, and for Kelly the core role structure is central to a person's sense of integrity.

The Self: Intended here as a personal construct, used by the person to differentiate between him/herself and the other individuals.

Level of Cognitive Awareness: The level of cognitive awareness ranges from high to low. A high-level construct is one which is readily expressed in socially effective symbols, such as language. A construct at a low-level of awareness is difficult to recognize; often constructs related to our sense of self or preverbal constructs are at a low-level of awareness because they are at the core of the person's identity and obvious to the extent that they are hardly detected by the individual.

Superordinate Constructs: A superordinate construct is one which includes another as one of the elements in its context (Bannister and Fransella, 1986).

Subordinate Constructs: A subordinate construct is one which is included as an element in the context of another (Ibid.).

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Appendices

a) Appendix a: Ethics Approval Letters

University of Salford MANCHESTER

Research, Innovation and Academic Engagement Ethical Approval Panel

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15 May 2018

Dear Veronica,

RE: ETHICS APPLICATION AMR1718-10 – Assessing User Digital Experience with Digital Artefacts

Based on the information you provided, I am pleased to inform you that your application AMR1718-10 has been approved.

If there are any changes to the project and/ or its methodology, please inform the Panel as soon as possible by contacting A&M-ResearchEthics@salford.ac.uk

Yours sincerely,

Dr Samantha Newbery
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1 November 2019

Dear Veronica,

RE: ETHICS APPLICATION–AMR1819-009 Engaging Intergenerational Cohort In The Design Of An Interactive Media: How To Design for meaningful user experience for Young Children And Older Adults?

Based on the information that you have provided, I am pleased to inform you that ethics application HSR1819-009 has been approved.

If there are any changes to the project and/or its methodology, then please inform the Panel as soon as possible by contacting A&M-ResearchEthics@salford.ac.uk

Yours sincerely,

Chair of the Arts & Media Research Ethics Panel
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b) Appendix b: PP1 – CGEP Focus Group's Transcription and Analysis

Commented [VP33]: *In chapter 1 I am interested to understand the subject domain the work contributes to. Does the candidate think it is Computer Science (HCI), Psychology or the Arts?*

Colour Code Framework

Yellow – Desired design and content changes: accessible and usable UI

Green - Difficulties with the CG system prototype: concerns, confusion, and frustration

Purple - Technology acceptance

Light blue - Positive aspects of using the CG system prototype

Grey - Perceived impact of the CG system on eating habits, health, and wellbeing

Red - Users Preferences: safety, independence, comfort

R[5]: What sort of changes would you do it? How do you think it could be improved?

U[6]: Add the calories so you know what you are eating.

U: Calories and sugar content before you buy…

R: yeah, you want to know it before you choose…

U: so, you can make the right choices, do you know what I mean? Because majority of the food look really nice.

U: I was fed up with constantly changing the coffee part of it, it constantly said, 'with sugar or black' and I only just take it with milk…I was fed up to constantly change it.

U: I didn't change tea, coffee...I did it a few times and then I have been chased off.

U: and you know what you are doing yourself anyway, it's not that you are buying it

U: I found the app straightforward.

U: it doesn't give you the salt content.

U: I'd like if also the protein content has sourced, you know, like meat…I definitely liked to know it.

U: another thing is that it never puts information whether things are gluten free or not.

R: Yea, so having allergy information and things like that available, yes definitely. And what you think was the most important function on the app? Be honest.

[5] R indicates the Researcher

[6] U indicates Users. It was difficult to recognise different voices from the audio recording, so U has been chosen to indicate all the participants.

U: the ability to change the recipes was really good…

U: I think it was all right, we were doing it for three days but if you'd doing the week, it'd be different…

R: How easy to use was the system in terms of using all the different functions, from 1 to 5? (5 being really easy, 1 really hard)

U: I found it very difficult

R: yeah, you struggled with yours, did you?

U: I'll give 5

U: I don't think it was the app's fault, it was just to memorise and how to use it, the app itself was very easy

U: some people didn't understand how to log in to their own wifi

R: if we wouldn't be here and you'd just be given the phone, do you think it'd be really difficult to do it?

Us: yes

U: another thing about the phone was that you had to keep re-logging in…

R: yeah, it logged it out. Did you need help after the first installation, or do you feel you were able to do everything by yourself?

U: no, we needed you

U: we needed a second session

R: what major problems did you have and what did you do to overcome them? I know there were a few technical issues, but just beyond that, what other things you felt you had to overcome every week and going through it?

U: We could choose our own pudding, but I never got that bit, I just accepted it

R: I remember a few people struggled with the confirmation button, so once you confirmed you couldn't go back and change, that was a big thing…

Us[7]: yes

U: you get the choice on the website [Can Cook website], 'confirm, are you sure, yes or no', so if you press then 'oh! I wanted to change that'…

U: what was ambiguous for that confirmation button was that you got the impression that you got to confirm what you've chosen for that day.

R: Do you think you'd use the system going forward? If you would like to plan your diet, do you think it is something you want to use?

U: no, preferably more information

U: have you thought to add the leaflet [with receipts options] to the app? Because you want people to buy them, so you need more presentation…

R: yes, just on the app itself having more the big range instead of having just seeing the options you were having sort of thing?

U: is it question 6? Oh yes, I'd definitely use it, even as advanced because a few improvements would make it better.

R: would you recommend the system to friends and family?

Us: yes

R: If you'd recommend the app to friends or family what would you say are the advantages of using the app?

U: same benefits we had. Ordering meals without having to go out, having meals delivered.

R: …so sort of ease of food delivery and things like that…is there any health benefits? Improved your diet or helped your food shopping?

U: sorry, what do you mean with home delivery?

[7] Us indicates users when all participants replied unanimously.

R: being able to order your food and get it delivered to your home or to the Centre…

U: not true in our case, that was a disadvantage…I think there should be 'suitable for diabetic' suitable for gluten free', so you don't have to go through the list and also not wait for the delivery and realise you can't eat it because it is not suitable for you…

U: does it have to be put in your dietary requirements?

R: you can block certain food off from the food restrictions so you don't have to go through each thing, I know that was a bit of a difficulty that some people had, but you can't just say 'I'm allergic to diary' you have to go through each one, was that something that you would say would be a disadvantage of the app?

Us: yes

U: You know the food we have on the app at the moment? Would that be the total list that will be on the app, because when I go [to the website] I see so many more things that I would rather have…I'd like to see that they are available

R: yes, say that you put your ready meal for lunch, it will only show you a list with a certain number of options rather than the full page of the menu, would that be an improvement? Having the full range?

Us: yes

R: Would you be confident in using the system?

Us: yes

R: Did you feel any sort of nerves going through it? I know some people were afraid of making a mistake and having those meals for the week? Is that something you feel you have been going through?

U: sorry, I can't…

R: the pressure of making a mistake? Is this something that would put you off in using the app in the future?

U: yes, and I think that generally our age group, maybe someone have used a smartphone before but for who has never used a smartphone before I'd say…I was afraid of making a mistake. That's why I feel the confirmation button is… "do you really want this yes?" would help.

R: If it was on a tablet device, do you think that it would be easier to use?

U: yes

R: just because of the layout?

U: Even on a laptop or a computer

R: Overall did you enjoy using the system?

Us: yes

R: Why?

U: something to do. Something new, I never used a smartphone before…

R: Do you think it became more enjoyable when you became more confident using the system?

U: oh yes

R: Would you trust any assistance provided? Meaning ourselves?

Us: Oh yes. (I'll give you that)

R: Do you feel like the system is quite intuitive?

U: it was all right

U: first time I found it dead quick

R: Was it easy at the first time when you went through just by yourself?

U: yes

R: have you got any concerns about the security of the system? Would you feel comfortable on making a payment online using the app?

U: no, I won't give my information online at all

U: I wouldn't mind paying online, but my husband won't.

U: would you be using PayPal? Because PayPal is very secure, you get your money back.

U: it depends, if it was encrypted with a padlocked. I would feel comfortable using PayPal.

R: Have you got any concerns about the look of the systems, was the text too small, too many items?

U: I've dexterity so I found it a bit difficult with the text, to type in. Particularly for the log in details.

R: would you prefer to have a feature that shows the password, so you don't make mistakes while you are typing in or having the tab bigger when you log in?

U: I did that, but I still couldn't do it…and then I had to logging in again…I mean that's a minor problem…

R: Well, that's an improvement that should be made.

U: I found when I was helping people ordering stuff, but it might just be me, there was one bit that I couldn't pass by…I just didn't notice the confirmation or replace button, I couldn't pass a certain point, I had to phone my mum and she told me it was right at the bottom… I found that very difficult to see that might just be me…It was at the bottom of the screen, it was pale grey.

U: Sometimes you forget to click that replace [button] and you confirmed but I didn't want the sausages…

U: I think that's the replace button, it took me a while to recognise it.

R: So, if there was an option in the app with all the meals listed and you can tick what you would like and then press the confirm button, would that be easier than going through each day?

Us: yes

U: How would you do that though? Because you have to set up days. I would like the list for that day I am doing.

R: In terms of support for your health and wellbeing, do you think the app helped to do that or do you feel it didn't make much of a difference?

U: what do you mean with 'health and wellbeing'?

R: Well, so for example did it help you to be able to shop healthier or the ready meals help you to eat healthier than usual or do you feel it didn't make too much of a difference?

U: Until you won't see the content on the meal when you are ordering…

M: you won't know, won't you?

U: that was a bit of an issue…because when the meal comes it is labelled with all the ingredients and I noticed 'Wow, there's 8 grams of sugar in that' so…

R: In terms of the food items beyond the ready meals, do you think it helped to make healthier choices or you just get the same thing you usually get, regardless the app or not?

U: not sure I understand the question…when you are ordering so if you can't get to the shop, it's very helpful

U: The printing on the label for the cooking instruction were extremely tiny and also if the label would be under the package, it might be a problem for someone…if they can't manipulate it properly.

R: Do you think that having cooking instructions on the app when you order the meal would have helped?

U: Possibly, but it was the content…

U: mm, I don't think so, it's more the content of the meals…

U: The film covering the package very very difficult to take off, particularly for elderly people, it's very difficult…

R: In terms of the app, would you all prefer to use a tablet rather than a phone?

Us: yes

U: No, I prefer the phone because my tablet is crap.

U: what did you say about the accessibility on the phone works on the app? Because on my phone I often like to have the…instead of having it written down, I have the speech thing. Could you put that on the app? Where instructions can be read out?

R: that's a good point.

U: it'd be good because I struggle to see…

R: so, do you think that an improvement would be to voice control things like that would improve the app overall? So, you could just tell things to the app rather than select it.

U: I don't know…

U: I think it would be good because I really got only one eye so it's hard for me to see…

R: So, improvements can be made in that regard for people with different…

U: so, if you are going to do that, on voice…you'd have to speak to users first, 'would you like to order, number 1" and then say what it is…

R: interesting…has it changed the way you cook? So, we had the shopping list in one of them, has it changed that?

U: no, I don't cook at all.

U: no, I don't either.

R: so, it hasn't affected yourself in that regard.

U: so, what was the shopping list, was the big list?

R: yes, it was the big list beyond the ready meals, there was a list with ingredients to prepare a meal. Is it something that you used when you wanted to cook a meal and you go out to buy ingredients or is it something that you just disregarded?

U: disregarded (majority)

U: I've not seen that…[laughing]

U: I just don't cook…

R: Do you feel that one of the missions/aims of the app would be to improve your quality of life in terms of healthy and diet and budget management?

U: sorry I didn't get it…

R: [Repeat]

U: yes (majority)

R: Overall, has it affected your diet at all? Has anything changed in 6 weeks in terms of your habits?

U: no

U: yes, I never had so many ready meals…[laughing]

U: I have a small freezer, I freezed some of them…

R: Has anyone perception of ready meals changed?

U: yes, the portion size does help you to satisfy your nutrition need…

U: that's the problem, you can always add you flavours…but you can't add that before you don't know people taste.

U: There wasn't enough gravy.

U: It has changed because I never used to book for ready meals before…I would definitely look for more ready meals at the supermarket.

U: This is what I found, when my husband is ill, I did order with Chiffon (?) because I couldn't go out and leave him, and they were quite nourishing, but they had a quite different range of what you got…there again you just started. But they are expensive. You couldn't get them all the time.

R: They provide the frozen food when is delivered, it's not…

U: It's solid, yes. The idea is good but when yours arrive I am pleased anyway.

R: Do you prefer chilled or frozen meal?

U: Better chilled.

U: I never tried them frozen.

R: but you can't cook from frozen, you need to take it off the night before to defreeze it.

U: One thing on one meal that I can't remember which one it was, you said carrots and potatoes and mix your own mash, but it just had pieces of carrots and pieces of potatoes, it wasn't what I was expecting.

U: My concerns if you order a week supply, the ready meal lasts 5 days, how does that work?

R: Free delivery on a Wednesday and they should last till the Tuesday.

U: On Sunday, there was a sweet on the fridge and it should be eaten on Saturday, but I eat it on Sunday. If you taste it and it's all right, I will say that it's all right.

[unclear chatting]

U: I wouldn't eat the chicken or the fish though.

R: Thanks

c) Appendix c: PP2 – Consent Form

Participant Consent Form

Please tick all boxes and sign were indicated below:

1. I confirm that I have read and understood the information sheet for the above research and understand what is expected of me. ☐

2. I understand that my participation is completely voluntary. ☐

3. I understand that I am free to stop the research session and to withdraw my data from the study at any time. ☐

4. I give my consent to participating in this research. ☐

5. I agree to the use of my data being collected and analysed for results. ☐

6. I confirm that I have been given the opportunity to ask questions regarding the research, and if asked, the questions were answered to my full satisfaction. ☐

Data Protection Act

I understand that data collected from me during this research will be stored on computer and that any computer files containing information about me will be made anonymous. I also understand that this consent form will be stored separately from any data that I provide.

I agree to the researcher recording and processing my data and that these data will be used for research study and may be presented to conferences. I understand that my data will be used only for research purposes and my consent is conditional upon the researcher complying with her duties and obligations under the Data Protection Act.

Your name (print) ……

Your signature …… **Date** ……

Researcher's name (print)

Researcher's signature Date

Thank you!

Please do not hesitate to contact me if you have any questions.

d) Appendix d: PP2 – Semi-structured Interview Discussion Guide

Discussion Guide

Introduction

Thanks for taking the time to attend this meeting. (Introduce myself).

I am a PhD student based in the University of Salford. My background is in clinical psychology, I hold a specialization in media psychology, and I have industry experience as a UX researcher. I am one of 12 studentships part of the TNW programme, across 5 universities; TNW is a fully-funded doctoral training program that applies design and creative techniques to maximize new products and service opportunities for businesses in North West. I am required to co-create a program of applied research in collaboration with large and small businesses based in the region. My first project was in collaboration with Red-Ninja, a design-led company based in Liverpool; I collaborated with them to the testing of the prototype of an app aimed to ageing population, to help and support them managing their diet and their food shopping.

Today, I would like to ask you some questions about the design process adopted for the development of the Ether One narrative-based videogame. I am interested to explore the main aims of the project, how (and if) you have achieved your goals, the motivations that inspired you to develop a videogame about dementia, if you engaged with people diagnosed with dementia and/or their carers while developing the narrative of the Ether One and so on.

First, could you please introduce yourself and explain your role in the Ether One's team.

Vision and Values

1. Overall, how would you define the vision of White Paper Games?
2. How did you come up with the idea of developing a narrative-based videogame about dementia? *(What spurred/motivated you to design a videogame about dementia?)*
3. Could you explain what are the main features of a narrative-based videogame?
4. Why did you choose a narrative-based approach for the Ether One videogame?

Aims and desired impact of the project

5. To whom Ether One is aimed for?

6. What are the aims of the videogame?

7. What did you expect to achieve with the Ether One? What were the main goals set for this project?

8. Why those goals were/are so important for you and the company?

9. Which of those goals did you manage to achieve after the launch of the Ether One on the market?

10. Did you achieve any unexpected goals?

11. I read online that one of the aims of the videogame was to raise awareness about the fragility of the human mind *(If this aim doesn't emerge from previous answers*). How do you think the Ether One can help to achieve this aim?

12. What impact do you think the Ether One has had on the user-community?

13. What impact do you think the Ether One has had on people living with dementia and their carers?

14. Overall, have you measured the impact of the Ether one? If yes, how? (e.g., ROI)

Design process

15. How long did it take from the very early stage of the project to the launch of the Ether One on the market?

16. What are the main stages of the design and development process you went through?

17. What would you say are the main challenges encountered while designing and developing the Ether One?

18. Did you run any research about dementia while developing the videogame?

If yes to the question 18

19. Which kind of research about dementia did you run?

20. Did you engage with people living with dementia and/or their carers during the research? *(Participatory research sessions, user research, focus groups etc.)*

If yes to question 20

21. Why did you decide to conduct research engaging with people living with dementia and/or their carers?

22. What were the aim of the research?

23. What are the advantages of conducting research with this target group?

24. And what are the challenges?

25. How did you implement the data gathered in the research with people with dementia and/or their carers to the design of the videogame?

If no to question 18

26. What was your understanding of how it is to live with dementia while developing the Ether One? *(Perhaps personal experience, literature etc.)*

27. How did you implement your knowledge about the experience of living with dementia to the design of the videogame?

28. Did you run user testing to assess the usability and the user experience of the videogame?

If yes to the previous question

29. Could you tell me which methods you adopted to run the study?

30. How did you implement the data gathered in the testing to the design of the videogame? *(Evidence of the implementation of the data gathered during the testing to the design of the videogame)*

Conclusion

Do you have any plans for ongoing development or testing of the product?

Is there anything else you would like to talk about that I haven't ask you?

Thank you!

e) Appendix e: PP2 – Transcription of the Interview with Members of the Design Team[8]

Colour Code Framework

Yellow – Designers values and White Paper Games Studio mission

Grey - Concerns about how to tackle dementia in the narrative

Green – Design process and user engagement

Pink – Game's and Narrative's details

Light blue – Research about dementia

Blue - Symbols representing dementia in the visual design of the game

Red – Video Game's impact on users

P: we want to focus on narrative driven games that want to push what we believe, close to us whilst respecting place and time more than anything.

We signed off with the game called Ether One based on dementia, we didn't start off with that theme in mind.

It was actually a story about memory, but more of a sci-fi aspect, less grounded aspect and then we realised that it wasn't so impactful, it wasn't that thing that we wanted to discuss and there was people in our family that worked in the medical field, first time experience with people in physiotherapy, doctors, we kind had that clinical medical side; but then we also had lot of members of the team with grandparents suffering with the illness and it just seemed that the common thread that we can all kind contribute to and which allows us to create those two character roles in the game called Phillis who was more the medical practitioner and Jene who it appears was the person suffering with the illness, trying to repair the memories…and so it was kind of a nice back and forth between those two characters.

[8] P. indicates the co-founder of White Paper Game Studio and director of the design team of Ether One. N. indicates the soundtrack and narrative designer of the design team of Ether One. R. indicates the researcher.

N: As Pete said, we didn't start with the idea of dementia, it started more as a game about memories, the fragility of memories, loss of memories.
As we start to make the game it became more obvious that it was becoming about mental illness, in some way; a few people picked up at that in a way we didn't necessarily fully intend at first and it kind of force ourselves to look at what we were making and if we were handling it respectfully. If we start to tackle an issue that a lot of people are relate to in a way, we have to be respectful of, if we are going to continue it, which is when we made the decision to fully focus on dementia.
Specifically, dementia with Lewy Body, we don't say it in the game, but we didn't want to just blindly say 'oh, by the way this is a game about dementia'

R: Why not?

N: because we wanted to focus it.

P: it was too specific.

N: we were all at the time, some people taught at university, some people just left university, and we were all really aware that to achieve…when you are doing a dissertation for example you have to have a focus, we didn't want to give the game the same level of attention that you'd give perhaps to a dissertation, that was just while we were doing it.

P: also, it allowed us to inform the puzzle design, so when we saw about the mixing of colours and just common things that people were doing on a daily basis, dementia with Lewy Body gave us almost a specific list of things that people with dementia of LB were suffering and would impact their daily lives and so than we would create a game play puzzle based on those things whether is a mixing of colours or loosing things and just piecing those things together helped to inform the game.

N: Two other things that were massively, I guess inspired and tight to Dementia LB were hallucinations with colours red and blue…which some of the things we had in place in the game, when we decided to focus it, just seemed to fit it in and other things didn't fit in so we had to sort 'oh that actually doesn't belong to it', trying to focus on things specific.
So in the game we had a red ribbon, Jene's ribbon, which is one of the focusing goal of the game and the blue crystal and if you look at the very first crystal in the game there is the shape of the Lewy body…so things like that that not only stayed but we then modelled because of that; and the ribbons were already red, so we say that fits so it can stay.
Then, some of the narrative part of the game, the actual main character who has dementia in the game he talks about how he was in the house and decided to leave and then he was in the car and the next thing he knew is that he was in a car accident and he could have sworn that the light changed blue, which in his mind he did see blue and then got confused, 'wait a minute, it should be green, not blue', we put that kind of things into the narrative and how somebody can become confused and how time jumps happen…There is a moment were you have to try and recall what went wrong and the only things you had to recall but perhaps you had an hallucination…Intersperse throughout the narrative, really subtle places; like I said we never said Dementia with Lewy Body but that's the main focus.

R: How did you research dementia with Lewy body? How did you collect information about it?

P: We started off asking family member and then we were researching even people online, didn't we?
N: *Gladis Knights*…I don't want, I'll google it…we used the Internet to research it, it's the United states but…it was actually videos of the treatment…it's been so long since I looked at this, obviously that was 5-6 years ago. Gladis Wilson, yes. There were two, Gladis Wilson and Naomi Field; Naomi Field was the doctor that we modelled Phillis around.

R: P., when you were talking about family members, do you mean relatives diagnosed with dementia?

P: Both, my dad is a GP and my girlfriend is a physiotherapist and then James's dad is a medical research that transcribes, he lives in Spain and he transcribes English medical case studies and things like that…so we kind of pulled first hand from medical case studies and then also a number of the team who currently had grandparents suffering with the illness and or had experienced things; and it was just very specific memories where people could call back at the time were they have been communicating with their grandparents and their grandparents were just looking through them all and they didn't recognise them and trying and get those situations and feelings…when you sat across the table with someone suffering with dementia, trying to get that into the game, that then became the focus and just making sure that all…Another thing is, when you are doing this kind of game, it is not easy, but it is easier to say 'here is the story, here is what we want', the players are been taught throughout the game, but then in a lot of games the game player can conflict with that, so certain things because games *[inaudible]*…in a film you can just point them in the right direction to say 'this is what we are telling you', whereas in a game you have freedom of movement, you can look wherever, you can stop for 15 minutes in one spot and then move to another spot, you can't necessarily know that the player will do exactly what you want him to do. So, trying to combine story with the gameplay, that is always the hardest bit, so it is just trying to pull out those bits, specific plots throughout the game and then just trying to make sure that they all connect. The game-play approach was a world that we wanted to create, with optional areas…so it wasn't just a linear experience you could go, and so we tried to make the reward in each area a specific memory of this person, so we kind of mapped their life, actually from childbirth until the 70 plus years old, and just specific items, because we found in our research that when you brought items and they can touch them and feel the item, this helped to restore the memories…so the items were the puzzle rewards, you get these rewards, and then you get the kind of, like you present an item to this person and then they can tell you about their memory of that, that helps to restore their memory that way

N: My girlfriend at the time back them was a community carer, she cared for people with dementia every day, so although I personally not experienced a family member with

dementia I was constantly…best way to say it, dealing with somebody who was affected by seeing it all day every day, and having to…this is a common, when it comes up…in the film *the Notebook* deals with the exact same scenario, having to talk to somebody, as if their loved ones are still alive so that you don't upset them right there, was something that she came home with, a lot of the time crying because they are talking about someone who has died recently and they have no idea and she knows that might have happened like years ago and in some cases she actually knew the person because she was caring for both so…as far as personal experience that's what I knew but I didn't actually have a family member suffering with it.

With what P, was just saying about let those kind of things inform the game-play and the narrative of the game-play, one of the things that I am pretty sure it was from the same interview actually [referring to the Gladis Wilson video] that ended up in the game was little things like having some kind of artefact to…one example was the perfume, an old perfume sprayed at the back of the chair, so they were trying to trigger memories emotionally and sensory as opposed to try to remember it…so that made it into the puzzle design because when it was part of the narrative we were dealing with, we would have Phillis who is the main therapist in the game, part of her procedure is to bring in every single time something from this person past, and then the puzzle in the game would then be based around that narrative and getting toward unlocking that thing and…have you played the game yet?

R: Well, not more than half an hour, and I am not really a gamer so…

N: as you get further into it, the main three levels of the game are basically designed in a way that…I don't know whether to spoil it…if you are not a gamer you might not play it as a gamer, if you are doing it as a researcher…basically, the game you going with pretends that you are helping Jene because she has dementia, in reality you as the player have dementia, but you don't know that, you are playing as the character with dementia which why all the puzzle in the world are so puzzling and which is why the colours red and blue you are following and which is why all of the memories you are uncovering…and

Jene who you are trying to help passed away long ago, but you don't know that…Jene is your wife…you have a narrative that you are going to save her and the doctors are an evil corporation, they are not trying to help you, you are helping Jene and they are trying to stop you and as you go through the game, the narrative of Phillis, the main therapist goes from being this kind of clinical, 'this is what you must do' and I'm rebelling against it, to this realisation…and several points through the game we go through that moment of clarity where you understand again and then you relapse…and that happens several times…so the very first thing that happens in the game is this up and down, who is a theme and the music *[inaudible]* did this as well, but basically the first part of the game you are going own in an elevator and you are relapsing and you are in a state of dementia that it's confusing you…*[inaudible]* there are some symbolic moments, the walls are closing around you at this moment of relapsing and then you are going into this dream world, this demented state that you don't understand, and you have to travel down through into a mine and then down and down and down through the depth and you don't understand that you are now a man in your late 80s, your wife passed away, you have dementia, these people are trying to help you, you have family members who love you, all of these things that you did throughout the game, all of these puzzles that had these items attached to them that means something to you and meant something to your wife are laid around you and it's like, these helped you get through the game…as the main character…so we slowly transition throughout the game, you start to hear this lady Phillis who sound *[inaudible]* at the start and then you understand that she is trying to help in subtle ways and then towards the end she is talking to you really like passionately and supportively and it feels that 'this person really changed' but she hasn't, well, she has but is you who changed as you have come to realise and understand and then you relapse again…but the core point in the game is that at the start you are relapsing and as you trying to destroy this Lewy Body dementia that's when you have…everything just goes to hell in the game and falls apart and then you have a moment of clarity and the game slowly…that's when you are going to the memories and you start doing the puzzles and trying to remember everything and you are restoring your mind, and then when you get to the middle point of the game there is this epic moment where you are in an elevator and it falls and you are relapsing again and then from there you build up again through

the next level and the very end of the game, the final challenge is this light house with an illumination at the top, and you climb at the top of the light house and you fall again and you climb it again and you get to the top and there is this moment when everything is clear…

R: What's the aim of the videogame? What did you want to achieve with the videogame?

N: I think that everybody wants first of all to achieve fun experience for somebody to attach to, and by fun I mean something that keeps you playing, keeps you coming back to it; and then the bigger picture of that, we said it quite a few times, telling a story and getting people involved in narrative that affects lot of people but you just don't hear; every game has, not every but most of the games have guns and some kind of explosion, you know, something going around, where you got to have to do something bad…there is just so many real stories out there and subjects that just don't get head of in game that I guess informed also our latest game.

R: Did you design the videogame with someone in mind, talking about end-user?

P: yes, when we started the game we asked ourselves 'who is our target audience', you always design for an audience there's no doubt about that, I don't believe that kind of answers like 'we don't have a target audience', we just want to create what we want to create but the story and game-play comes first and that then appeal with a certain kind of person, but what we never expected was…so when we realised the game we had a kind of discussion about the game, even things like this is that you just start receiving emails from people that you just don't expect playing the game, like a parent playing the game and the kid comes and sit next to him and that then create, they pause the game and start a conversation about the grandparents for example…and we never expected to receive emails like that, but we received quite a lot of emails like that of people…even game journalist, a couple of people who were reviewing the game said that 'I'm currently working during the day, and then I go home to my father who is suffering with dementia and I'm just trying to take care of them', like people realise during the game that they are

frustrated for example and when they play a game like this helps them to understand almost the internal frustration the person is suffering with illness and hearing people communicate staff like that was really interesting…and I don't think you can have set out to target those people, you put something out that you believe is an interesting story to follow, we were just trying to tell a story that we believe is interesting to us and hopefully, even though not it doesn't appeal to everyone it resonates then more deeply with the people that do pick it up and kind of connect with it.

N: *[inaudible]* you could sit with a pencil and paper, and you could gather your thoughts like…it's not that kind of game that tells you where to go, you pull up a menu and it says, now do this, now do that…none of that, at all. One of things that Pete said from the beginning, one the main design thing, if you are sat in your house and you are playing the game and you are thinking about it, you would find actually beneficial in the real world to keep notes 'this parcel was', because the game doesn't help you to remember…but what I didn't realise, I don't know, how you would design for this anyway? Is that would then get couples playing the game, and one person being the memory and one person being the movement, we had a few people saying 'we played it with' 'I sat down…' older people playing with younger people, or boyfriends and girlfriends playing the game together and trying to solve the puzzles together…

P: it just creates a conversation.

N: and the people who really got it, when they sent us email, really got is as well…some people just on the audio side of it, some said 'thank you for making the sound-tracking, it changed my life', and I messaged them back saying 'thank you for playing the game, it means so much to us that you spent time', they said 'I didn't realise what my family member was experiencing until I got to the end of the game and I realised that I was that and that's what they must be thinking', and that's just amazing.

R: So, in a way we can say that was an unexpected consequence, that you didn't plan for, but it happened.

N: We hoped that the conversation would happen, but we had no idea of the level of the things we got back, and I don't know what the variables would be to put in another game or how to bottle that…

R: did you run user testing to assess the usability and the user experience of the game?

P: Yes, I mean, not at the level you probably do with the UX stuff...we had tiny budget, tiny team, we were all just trying to make the game and that kind of stuff is difficult enough when you are just trying to build something, but we would regularly get people to play the game for us, especially understanding the main bits of feedback that we wanted from the player, like ok 'at this point of the game, do you know who this person is?', just certain things that we wanted from the game, almost like main plot points that we wanted the player to understand, even if the middle bits are completely optional, there are key things that we wanted people to resonate with throughout the game, but we didn't go too deep in UX staff.

R: Do you do it regularly when you are developing a videogame?

P: yes, it's part of the process. Coming back to the kind of thing like allowing the players do whatever they want to do, there are just certain things that you know about the game that you just do, and when you give the controller to someone that has never played your game, or even doesn't play any games, there's just certain things that you just take for granted, but people can just get completely lost, so you just have to design and iterate...so you start with the idea, with the main plot but you can't just start with a plan and just do it all the way through, you have to constantly keep checking, just to make sure that people understand what you are trying to do. Even though in a lot of our work, we do try to make a lot of things optional, so we never want to say explicitly 'this', but there are certain things that you need to put in place to just prevent the player to disengage completely with what you are trying to do.

P: What were the main stages of the design?

N: This is a really hard things to do, we are talking about something that takes three and a half years to produce and iterate along the way…without talking in generality, there are hundreds of moments where the direction changed for the better or the worse, for a month, and then until it found his feet. 'Oh, this has to stay', just keep meandering until you are on the right track. Pete was talking about it, when you get people to play it, even that is a minefield, because you are not only getting people to play the narrative, you have also people get them to play 'do I like the way the game feels, do I understand how to move, do I understand what a puzzle is', and there is technical issues that you are playing as well, and sometimes is actually very hard to see the big narrative picture until the game works and isn't breaking in some way until the end or sometimes you get to the end, you get 'nailed it! But I don't get it, who is this person?' 'Aw, we haven't referenced that, this character needs an introduction…', so even that you get someone to play it, and there is a level of understanding that you hope that you put in because you have the whole picture in your head, but you have then iterate…it's just that constant process.

P: …And tiny game-play shifts affect the narrative and tiny narrative shifts affect the game-play, but they snowball into a bigger thing, so something you thought it was a small change, something needs reference in several different places and obviously you just trying to get better and better every project but the general process is you are having a pre-production time – almost similar to a film – you figured it out what you want to do, you learn if there is any general technical process, but I think we wanted to approach narrative in a certain sense for this game, and then you have a production phase which is just trying to get everything together and then you kind have an alpha, which is, theoretically everything is there but isn't necessarily polished and if you give to someone they wouldn't know necessarily what they are doing; and then you have a beta phase where you try to polish stuff and then you have a gold phase where everything is locked, this is the game now, you just need to fix things like software, bugs and things like that… But you also have in parallel, as a generalisation, audio, art, animation, design, narrative, code so that's generally the areas that you are working in and each one of those discipline

just takes a little bit longer, design and narrative are genuinely constantly iterate, but code, it just takes a long of time to build this code basis online, you may have first pass, second pass, third pass but then you have things to clean up and tighten up; and then artists, they want everything to be locked before they start doing things but they can't just be sat and thrilling their fingers so they have to start doing things but if narrative and game-play change they have to revisit things. There is just all that kind of staff going on between these core stages and so trying to figure it out from a production point of view just gets interesting, trying to balance…

R: How many people worked at the project?

P: 5 on Ether. We kind of got together around the middle of 2010/11ish, we grew the team to 5 within that time period, we became an actual company in June 2012 and then we released in March 2014. So having an official business and having a studio for working, that was two and half-ish year, but then there was one year of working remotely, trying to communicate online, and trying to pierce pieces together…

N: the game certainly wasn't formed, even fully conceptually at that point, so…

P: it was only when we got in the same space…it's like working in any team as soon as you are all together ideas start going back and forth and you could see on what someone else is working and they can see; that's just made the game feel more coherent.

R: Did you select the players who you invited to play the game while developing it or were they randomly selected?

P: There are different phases that we go in, there's developers, so people that make game, so we get them to test it in the rougher stages because they can fill in the missing part, they know 'oh, this will be polished at some point' so they can give you good high-level feedback on general points, pacing, usability, that kind of stuff. And then we do had people who we had just no idea who they were; they were a friend of a friend, someone

may play one game a year, someone may play a game every week; we just tried to get that all broad span of people that play games. And that's design to try to see what they are understanding, they have no connection with the studio, they can tell us what they think about the game, what are their understanding and non-understanding; I worked at UCLAN and a couple of people worked at Future Works across the road and we were getting a lot of students to play and break the game and just find anything that…as a generalisation, more of a passive experience, I am just running through the game and you know, that kind of less…students uncovered issues that you would have never seen and they helped to tighten up the whole experience, catch up all the little things.

R: Did you ask them if they had any kind of experience with people living with dementia?

P: I can't recall.

N: That wasn't the focus of the game-play testing; again, because one of the reasons being that we were trying to bring up the subject to people that didn't see it, I don't think that it would have benefit necessarily to select people who had experience that…because we were trying to bring out something that wasn't talked about to people that wasn't experiencing that.

P: And you have to think on a practical level, we didn't have a budget and we were paying for ourselves and even just taking a couple of months away and just to try and research it…we'd love in future games, we'll definitely try to get first time experience and get the research done; we just researched as much as we could online and whatever knowledge we could have and of course it's definitely staff we would like to do in the future but it was a never a focus on that just because of time and money.

N: I wish that narrative was the only element to make a game, but everything else gets in line…

P: it's hard to push a top story, especially when you are trying to create a video-game at the end of the day, it has to…not that anything should prioritised but there are certain things that you say 'ok, this kind of happen narratively because of this' and for certain

things we just believe in the technical process, for example like a cinematic event…when the players play we don't just want to say 'ok, grab your face, look over here, this things happened and now you are back', games used to do that and we tried just to push that design philosophy and we asked 'how can we deliver the narrative in such a way?' and that all requires tech time and code time and animation time and I want you to commit to something, say an animator can spend two weeks on something and then 'oh that's not right', what do you do in that situation? It's easy to change narrative but the technical process…it's hard to make those changes. I think we've done a much better job with this game [The Occupation] we had the high-level bits in places and locked down. And in the first one we didn't have characters, it was an intentional choice…no one in the team know to make a 3D character, so it's the world that is the main character so we put a lot of time into it. They call it environmental storytelling, so if you see you are walking into a room and a chair has been throwing over and glasses smashed and maybe a picture on the wall so maybe you say "right, did something happened here?' and your kind start asking questions just because of the way the 3D environment is laid out…so hopefully that tells a story.

N: it wasn't like something we wanted to do, we realised it was something that we knew we shouldn't be tackling, so we designed it to be about environmental storytelling and we didn't even attempt to go into something that would have slowed us down or took attention away from what we were trying to do.

R: How did you implement your knowledge about living with dementia to the design and the narrative of the videogame? You already mentioned something about the use of colours…

P: I think the core feedback was the case and that became the central thing…

R: With the case, do you mean the story you saw online?

P: No. So, we had this *'case'*…maybe you are in a fishing village, maybe you are in a mine, an industrial centre but there is a place in the game where you press a button and you can go back there, you teleport there and you are just in this kind of…it is like most of the sci-fi environment, it seems almost like…have you seen Lost? Like the bunker from Lost, so there is someone living here, there is a projector machine in place, and there is like a dark room whit photos being developed and you can…from completing the puzzles in the world, you can go back to this place, pick-up this projector and see the perfume bottle that he was talking about and hear the memory about this perfume bottle and just this place where you get all those feedbacks from the progressions that you are making in the game and so anything that you are doing to solve puzzles and regain memories is being put in this kind of case, in this living environment and then at the end of the game we bring you back here and it's the same wall and the same layout but it is just different, there is wall paper on the wall instead of metal wall...instead of metal shelves there are bookcases and it is actually the care home where you are staying in so this clinical metal bunker space, the layout you were familiar with but it looks like a place where you have never been and then we brought you back at the end of the game and the exact same environmental layout is there but now it just looks like a care home, a care facility.

N: yeah, a way to think about it…a common things that you find in a game now is that you have an inventory, some kind of backpack or deep pockets that you can fill forever and you just have them on you…so our 'case' was a physical backpack, like a space, so instead of having a backpack 'oh, I take that and that and that' and walk around with all these stuff, I pink this up and physically go to this space that is where I put it on the shelf and it's in my memory and when I go back to my place and I can look at all my progressions, memory wise, if you know what I mean…and if I picked up a key, I choose where I put it in my memory, in this case…you go to this space, there's metal walls, this vision that you have created, and I put this key and I choose where to put it on the shelf and all of the keys I found on the shelf and all of the capsules are on that one and I can sort everything out…we saw players randomly spread things around and we saw people lying things up in rows of exact things do whatever they would do to sort out their own mind, remember where things were. So that's how you play the game…and as Pete said, at the end of the

game you have this realisation that this space you are in it is actually the care home that you are in, and when you have the moment of clarity and you realise where you are, all of the shelves, the decorative shelves in the care home and we tight narrative with design there, the narrative…there is a secret ending of the game, there is an ending that you get and then there is a secret ending if you get everything basically and the secret ending is just the ultimate truth: you are in this care home, and you have imagined I guess, all of this story as you delved back through the relapse in dementia and when you realised where you are and these shelves are around you and there is actually a note from one of the carers saying 'I found Mr Fletcher today, he has taken all of the items from the room and put them on shelves and when I asked him what he was doing he told me that he was trying to organise his memory, his thoughts'…so that's the player throughout the game, because he has dementia then realise that they have been organising their thoughts in their headspace and then in the reality of the game the person with dementia has been doing that…so it's a really nice fusion of design and narrative ad that's something that got iterated…

P: About specific things, only we got it done in two weeks…we didn't have, all of a sudden, this could be this and then we just put all our effort into tight that back; it wasn't an organised production, it wasn't the start project 'yeah, this would be really clever if this happens', it was more an organic thing, where you just sat and pierce things together…

N: You are sorting out your game and the headspace was…your design was like that, but it is only after seeing it that 'Oh my God, it should be like'…all tights together, you start make connections and you can really double down who you are and what you have realised and things like that…

R: Do you have any plans for the ongoing of Ether One?

P: I think we would love to do something again…it is just trying to find out where that fits, because right now we are not a multi-projects studio, we just have one game and there

is just a certain amount of organisation and you have to get the right idea, the right focus and I think to do it along, but it is just…

N: In my mind, we told our story in its entirety there, but there are other things that we can dig into, maybe thematically from it, or telling a similar story but from a completely different perspective, a different experience but what Pete said about the right idea…we wouldn't do it for the sake of doing it, you want to do it because there is something to say.

P: One thing that was conflicting trough…I forgot about this…one thing that was conflicting with the narrative is…Thomas Fletcher who is the person who is suffering with dementia and his father was an alcoholic who suffered with depression and we did try…it was an interesting narrative thread in the game and we started exploring it and then we thought, well…now we are asking the player, again coming back to being very specific with Dementia with Lewy Body, if you start introducing these other really important things to explore but not really doing anything with it but it's just there in the game…we decided to completely back from that, but that would be a thing 'ok, do we want to explore alcoholism more, male mental health of a 35/40 year old person' and being again very specific about the subject of the story rather than exploring dementia again or…I think we explored that story in a whole, but what we are trying to do is making the game part of a larger universe; this game we are working on now, exists in the same world of Ether One…Ether One was more 1940s, whereas this game is based in the 80s, this one is based in northern industrial town, like Manchester or Liverpool and that one was based in a Cornish fishing town...so trying to make things pierced together in the same world, again exploring a very specific topic…I think is interesting.

R: What's the new videogame about?

N: The new game is slightly different, it's about an overarching…it's about…

P: The issue here is that we haven't released it, we will release it in a month, so we have been so focussing on the game…this is a marketing thing 'how we are going to communicate it'…

N: You could say it is about information gathering, you could say it is about immigration, but this is not what it is about…

R: is it a narrative-based game?

N: Yes, it is. Basically, you play a journalist investigating a company who is about to voting an act that will give them the power to change their lives…of everybody basically in the country. It's been voting with reasons that a lot of people agree with but they don't understand the implications…so it's politically driven but it is not politically driven from the point of view where we are saying 'hey, we are conservative, listen to our side of the argument', we are not trying to take side…like with Ether we are trying to talk about the subject 'what do you think?', so basically, without going too much into it, there are a lot of different political points of view in the game that would conflict each other…because we are not trying to say 'one side is good, one side is bad', we are trying to say 'people are talking about this things, and when they are talking about a subject that don't really realised what might happen because of this subject', like think about everything…again, it's just part of the story, but someone might vote in a certain act because that person might agree with it, because that person is racist or that person might not realise that is racist and vote something is not realising that they are changing things for millions of other people based on that prejudice that they have…or maybe that person is not racist, maybe that person just really agrees with the policy of something, and if that happens it's going to end up seeming racist to other people because of how it affects people because of something else you believe…and I making it sounds really explicit but it's…

P: it's the kind of high level thing…with Ether, we allow you to take your own time so you can explore it at your own measure, some people play it for four hours some people play it for fifty hours, it's just 'take it at your own pace'; instead this one, now we have

characters, so we have core characters that all have their own lives, they all wonder around doing their won jobs, they will go to the toilet if they need to use the toilet and you go to the toilet and it's all real simulated and so one time in the game world in one minute in your real time so is up to you as a journalist what threads to follow and what story you want to cover, because the game just keep going…so if you just stand still the game will just keep going…that's the core thing.

R: Interesting, I guess it's about the social responsibility of your choices…

P: that's a good way to phrase it…

R: Well, I think it's good timing as well, with the Brexit…not being political but…

N: Do you know what? Every single event that has happen over the past 3 years, we've gone 'oh my God, that is so relevant', shall we tackle it? That's kind of what happens in our game…' it's just kind of show you that every single issue that we are having is universal and has been happen for a hundred years, a thousand years…the only thing that changed is which side of it you look on or what side you take or what information you see compared to the information there is to see…and one other theme in the game…there is this Union Act, this act that people are voting and there is a revelation of a question in a meeting which is happening later on, when the guy just says 'yes, we are doing it because of this', and you are 'hang on, I thought it was about that' and 'yeah, if you read that part of it, but that it is only there because of this', 'ohhh'…it's that kind of political minefield where you listen to the BBC and you get the BBC perspective, then you listen random on YouTube and you get this random perspective…you listen to both of them, and you might be somewhere close to…and because there is a time element in the game, you probably can't listen to all of them or read everything…but you choose which things to look at…

P: I guess, also the subject theme…we were developing this story in the 2015 and so when…this is something that we don't know how to tackle yet…so when we release the trailer the reason for this Act being passed is because this explosion happens and it kills

many people and they blame on an immigrant person, and so there is this theme in the game that is a strong catalyst for pushing it through, which is why the player might think 'yeah, I believe that because this thing happened' and then obviously with the incident that happened in Manchester where the exact thing happened and that was in our game already, so we gonna be questioned on that as well…and it is, ok, these themes are actually reflecting, without intending to reflect how our country is like in turmoil at the moment…so just we gonna be asked quite a lot those stuff, so we are trying to figure out how to best communicate this…ultimately it is a game at the end of the day…

N: when we started working on it, Donald Trump wasn't a big a deal, Brexit wasn't happening, a lot of the terror attacks hadn't happen and…as all of these things started to happen, we started to realise that 'Oh my God, the game…how is it going to be compared to this, compared to that?'…you can either say, we can striped that out and not make any interesting story or realise that…

P: That's why we have to make this game…

N: yes, that there has always been these things…and one thing that I am confident we haven't done is that this is THE story you must take from this game, you are going to it…something starting at the beginning of the project actually…that you'd be interested to see...because you can watch people playing on YouTube nowadays, some developers don't want to look at anything…

P: Yeah, I don't watch anything…

N: I watch everything, even if is self-destroying sometimes but…people are going in this game as they are going into any game with preconception…again I don't want to double down into racism but it's the first thing that came to mind…I don't want to make that the game is about that because it is not that one the focus, but if…I don't want to use too extreme examples…but imagine a neo-Nazi when they play a WW2 game, they are not going to have perhaps the same compassion that I might have for certain scenarios if they

have those believe system, so there is a spectrum that people might think 'Oh, I never thought about that, but I kind of think this, no I think this'…so there is a massive spectrum of players who go into it and they will be thinking different things, so I'd be interested to see if any of them get to the end of it and pick a side or get to the end of it and change their mind…it's nothing to do with neo-Nazi or racism, it was just a random example, just to say about the spectrum and so you don't have any idea of what people will do…

P: I think when you talk about aims as well, what's the aim, we came off about Ether and was…ok, we understand how we want the player to emphasise and feel about this character at a very very strong emotional level, and we had many responses saying just how not upsetting in a bad way but how engaged and connected they made them feel with the character…so ok, we know how to make the player feel this way, and now we are trying to think about how do we make them feel like, that they want to give more and make more choices and have stronger believes and opinions...just make them at least question those things...just trying to have a different narrative aim of what Ether had I guess.

N: A lot of the time in film, especially in a linear story you have to choose if you have an active or a passive protagonist as well, and I think just by the nature of what we are doing, the player will have to decide how active they are...technically they can just sit on a bench and wait for an hour and then the meeting will happen and they can go to the meeting and ask boring questions because they didn't do any kind of 'Oh, I wonder if they are telling the truth', but if they are active player they can spend the whole hour hacking, sneaking, stealing things on other people's computers 'oh my God, they lied about this' and when they get to the meeting ask question one, 'so, how do you feel about the current immigration?' 'Oh, I think this.' 'Oh, that's strange because I found this' and then they are like 'where did you get that? That's not important…', how do you feel…that's basically the gameplay.

R: I guess you can also go back and re-play the game in a different way…

P: Yes, there are a few examples of games like that...I am not that kind of person that goes back to it, I play the game once, and that was my story and I am happy with that…but the opposite, you can play and find other little bits, and that's good, it is good that a game can allow that…so, again comparing Ether One to The Occupation, Ether…you can play the game once and you know about it, there is a lot of things to do but it's just all very linear and nothing different happens…whereas in the Occupation different emerging things can come from playing, so that's the interesting aspects, hopefully…

N: we know what story the person can get but we don't know what they will get for that reason…again with a film, because it's linear you show a bad guy doing bad things and then you show a good guy doing a good thing...and the good guy can do a million of bad things, but because you show him as the good guy they are the good guy…if you show them in a different order and show the bad guy doing a little good thing he is still the good guy because you showed him doing the good thing first…the order that you do it determines…lots of game where the main guy kills a hundred people and you as the player do it, but you are the good guy…there's such a weird things with those games, because literally you can go off and 'I am going to do this area' and you spend an hour there…we don't know what piece of information the player will get first, second or third…so technically there are various of thought process; they might listen to something 'oh, this is suspicious' and then everything they will get about that person will be suspicious…or they might say 'oh, that's person is going on a date tomorrow…oh, I like this person!' but we have no idea…

R: You are not framing any characters; the player will take the decision…
Did you have any concerns before launching the videogame on the market?

P: About the narrative?

R: Anything really…while you were talking, I had the feeling you have some concerns about the Occupation, like how people are going to play it, the spectrum…there might be some bad implications…

N: The past 2/3 years specifically has been a completely minefield on the internet of people taking offense…being insulted about lot of things and I am worried that when people dig on our game and they understand that we are not saying 'this is how you should feel or think', I do worry that people might play five minutes and say 'this is racist' or 'this game is conservative' or 'this game is liberal'… I really worry that people might sneak into the game and jump to 'oh, look there is an explosion'…but every single piece of media at the moment is subject to that …so I just really hope that people will actually play it and 'I get what they are doing' 'I get what they are trying to say' that's my only concern…

P: I am not as worry as the backsplash as more how do you communicate these feelings, because there is definitely a vibe the day after Manchester…there is something that makes you take…I am now trying to communicate that something that happened in the game makes me question about this real-world that I didn't even know that was there but it impacts everyone on an emotional level and then obviously the conversation become about that instead of the game…when you just…this game takes 4 years to develop, every day you put just hundreds and hundreds of hours into it…it is like any creative project you try to put out there; you have invested everything you can into that and so there is a part of me that is 'ok, let's just hope that people engage with it, people that are interested in it engage with it and understand what we are trying to do'…that people understand the game that we have created rather than just take small bits of it and make it not about the game we have created and make it about something else…I think that's gonna be about any creative piece of work, there is always going to be that level of apprehension before the release, because we have no idea.

R: With Ether One, was it difficult to find a way to communicate the story of the game?

P: Yes, you have marketing points…'this is a game about dementia', this is not really…you can't marketing it this way 'by the way this is a game about dementia, buy it', how do you try to get people to…because ultimately this is what marketing is…make people to invest

their money into something you have created and so how do you market something like that. I think you just have conversation; it's such a case where you have to hook people within 23 second otherwise, they lost interest...it's trying to figure out how to have a meaningful discussion and engage with the people you want to engage with more than anything else.

N: It is like with us talking to you, I went straight to the end and spoiled it and you were 'that sounds great', but you can't do it when you are marketing, you can't tell the story you can't tell who the real character is…

P: I think you just have to think about a couple of buzz words to thrill them…that's what this month is going to be…because the game is pretty much done now so now it's just trying to figure out how we communicate it…you have an interview with The guardian you communicate that completely different than a play-station magazine, so they are two different interviews…about the game like The Occupation there is going to be very different conversations happening on different levels so you have to get in that space 'who am I communicating with? Who are their audience?'…it creates a lot of challenge there.

R: Where the name of the game comes from?

N: Ether One, like ethereal projection, something spiritual…so it's…hundred percent transparency on it…it started with that in mind and as the game moved we already named it, so…but you are still not in a physical place, you are still in the realm of memory, so it still makes sense and then half way through development we realised 'this is a big story in a big game, shall we split it into two parts?

P: No, a third of it…there were three…so there two third of it and that's Ether One…so the game was originally this big thing, and we were like 'this is massive, we have to cut it', even then was still a big game, so that's the Ether One…

N: so, there is maybe One, Two and Three to tell the story…but what we did, that name, Ether One which stuck and then the story ended up expanding in a bigger one but with focus…so we ended up telling that story in a big way in the end.

f) Appendix f: PP3 Messages from the Audience

Colour Code Framework

Yellow code - Demographic information (e.g., age and gender of the children)

Green code - Observed children behaviour while watching/singing Labuntina videos/songs

Blue code – Carer/s behaviour while watching/singing Labuntina videos/songs with their children

Purple code – Merchandise Requests (e.g., CD, DVD, Toys etc.)

Light Blue code - Children preferences (e.g., favourite episode, characters)

Hello,

I came across Labuntina on Sky TV. I recently had a look on your website and noticed that there are other songs which currently aren't available on Sky. I was wondering whether you will be making a CD of all the songs to purchase in the near future or be able to download via your website? The reason I ask is that I have a little girl who is only 6 months old who absolutely loves Labuntina and gets so excited when she hears the Labuntina theme tune. I've never known my little girl get so excited over these short songs. Her favourite is the number song and I have had to learn it word for word so I can sing it to her! She smiles so much especially when she sees Judi Bee.

I am also a Deputy Manager and Room Manager of Preschool in a private nursery. During my career in Early Years, I have never come across anything like Labuntina. The songs are catchy, and the characters are very likeable. Overall, I can see how Labuntina would help children learn in a fun way and tackle those hard areas such as phonics and numbers which I know some children do struggle with. I just wanted to let you know that as someone who works in Early Years, I think Labuntina would be a great tool to have available for settings to access.

Kind regards,

*****

Is there any way of buying the abc song please?

***

Hi !!

I just wanted to email you to say thank you for such a wonderful programme. My daughter is almost 3 and absolutely adores the programme! I have a question. Obviously, I missed the Kickstarter, but do you have anywhere where you can purchase the toys? I'm in the UK and I'd love to get some for my daughter for her birthday.

Don't worry if not, but just wanted to say the programme is beautifully done!

Thank you!

@Labuntina we're watching Labuntina a lot in this house at the minute, but are the songs available to download from anywhere? We really need them in the car!

***

*** Brilliant, our granddaughter ADORES watching and joins in howling with W for wolf. Great party piece

We downloaded some episodes from sky and myself and my little one absolutely loves them!

Thankyou!

***

My little boy loves Take a Walk so much that when we went away, we had to FaceTime my mum so he could watch it on her TV! When are the next episodes out (especially the one about sleep )?

***

My 14-month-old son loves labuntina! He's starting to say some of the words in the alphabet song! Hope you produce more! #Welovelabuntina! Xxx

***

Hi, my daughter loves Labuntina! It's the only thing that will keep her occupied! Me and my partner sing the songs all day they are amazing! We were wondering if there were any soft toys available.

I have been recommending your programme to all the ladies at my mum groups! Keep up the good work! This could be something super amazing! x

***

Hi,

I found your incredible animations on sky demand and wanted to send you a message to tell you how much my 9-month-old and I love them!!

My son does not sit still for anything other than Labuntina. The songs and music are amazing.

Also, as a primary school teacher, I love the exposure to the alphabet, numbers & animals.

I searched for more on YouTube and found the project video. Would you ever consider making and selling the dolls? I would love to have some for my son's 1st birthday.

Really hope you are able to make more gorgeous animations.

Thank you for your wonderful work!

*** & *** :)

Many thanks,

*** ***

Maths Coordinator

*** Community Primary School

Hi!

I am a mother of a 6-month-old baby boy who absolutely ADORES Labuntina! We stumbled across it on Sky and ever since it's been a part of the daily routine, both watching it and singing it to him. He stops crying at any point when I sing him Labuntina songs.

My first question is where can I buy the dvds with every song as there are a few missing on Sky?

And could they be made in other languages? I read that they were made for non-English speaking children, but if they were in other languages, I could teach Alba the songs and help him learn languages too!

Many thanks!

***

Hi there,

Our family has just found Labuntina on Skykids and we love it! We have 2 children under 5, our children's preschool has taken a huge interest in the songs our children have learnt from Labuntina, is there a cd or dvd we can purchase? (We would like a few if possible as news has spread and lots of the parents want to get involved!)

Kinds Regards

*** & Family :)

We are eager for more episodes! My daughter is 21 months, and she absolutely adores labuntina! On our sky kid we episodes 1,2,3,4,5! We would love more! My daughter is usually very reluctant and stubborn to join in with anything educational! The numbers song she actually wiggles her fingers like she's trying to count!!! Can't wait for some merchandise (cuddly toys) to hopefully come also! Thank you Xxx

***

Good morning,

I just wanted to contact you to say how amazing Labuntina is! My 1-year-old absolutely

loves it and it's the only thing she will sit and watch without taking her eyes off it! The only problem is, she can only watch it when she is at her grandparents as we don't have Sky TV because we live in a remote area. So, I was wondering if you would be kind enough to send me the episodes on DVD/Blu-Ray? I'm happy to pay for the disc and of course cover the postage. Please could you kindly let me know if this is possible? Many thanks and best wishes,

***

Fantastic show! My 2 year old daughter loves running around singing 1-2-3-4 and Me and You. Just wanted to say good work. I actually work for Sky for the online video platform and was disappointed there are only a few episodes. Any idea when more will be released? Also do you do have episodes in other languages? My daughter speaks Italian and English.

***

Can I learn more about a product?

My little granddaughter who is autistic is learning really well with this program. She loves it! Is this really only available on Sky? Can you buy it on DVD? Download it?

Hi, I've just seen your program labuntina on tv and my little girl is obsessed by it, I currently work in a nursery and was wondering if this is going to be made on dvd ??

Thank you,

***

Hello,

I just wanted to message to say how impressed we are with Labuntina, so much so that it has now become part of our daily routine.

My little boy Theodore aged 3 absolutely loves your learning songs (as do I)

We were wondering if these were available to purchase in cd format so that we can continue the fun learning in the car.

Thank you again for creating such a fun way to educate our little boy.

***

Our love affair with @Labuntina continues. I am me; you are you. Catchy. Cute. Critical.

***

Hi,

We love Labuntina so much that we would like to buy videos with the songs! They are amazing!

Please publish them, they are gorgeous!

Thank you.

***

Hello, I have a 6-month-old little girl who gets very excited when Lili comes on screen. I just wondered if you do a doll/teddy of Lili that I could buy.

Thank you

***

@Labuntina Hi there. My little boy loves your series on Sky and just starting to sing Labuntina puts a smile on his face. I wonder if there is anywhere, we can download the tracks?

***

We discovered @Labuntina just two days ago and have already cued up the songs for our regular family sing-along. Perfect, just perfect!

***

@Labuntina, are you making more episodes? My baby loves it and only the 5 on Sky 😢

@SkyUK

Good afternoon.

I am just writing to say how fantastic Labuntina is. I have a one-year-old boy and three year old girl and they absolutely love it. My favourites are "me and you" and "colour spy". I am constantly replaying them!

I was wondering when they are going to be available on cd or dvd please?

Also, I can only get a episodes 1-5 and 11-14 on sky on demand at the moment.

Thanks

***

Hello, my daughter loves Labuntina- how do we get access to more episodes? Will there be dvds available? Toys? My parents have sky, but we don't so looking for something other than there if possible?

***

My daughter *** watches all these on a loop all day , she's 7 and has autism and and loves every single song😀😂

***

Congratulations!

What a great job you guys have done on Labuntina, they are so clever, thoughtful as well as being educational.

Our 13-month granddaughter absolutely loves your videos as shown on Sky. She really concentrates on them with joy.

The only problem is is that Sky only shows episodes 1-5 and then 11-14.

How easy is it to get Sky to show the missing episodes?

Once again well done on a great job and can't wait to see more of your expertise on screen as well as see you maximising character merchandising opportunities.

Regards

***

Great video, thank you. What a lovely backstory to your creation. I love music too and it's a strong theme in our family. Although none of us is a professional, we all love to dabble with instruments, and we sing all day long. Keep it up and please know your creation is well appreciated x

***

We enjoyed watching the programme and Jake's favourite song is Take a Walk too!

***

My 5- and 3-year-old absolutely adore labuntina and have all the songs currently on sky memorised. Here is ***'s drawing of Kodi, Judi and Lili- thanks for such a great programme for them to share!

***

My little girl loves labuntina... she was singing the let's go for a walk song today!

Just came across your animation this past Saturday on Sky Kids. Since then, my two year old is absolutely obsessed with all of the episodes (and I think I am too!) It has been nonstop from then on and now played multiple times a day.
It is such a lovely cartoon with lovely characters and wonderful songs for my daughter (and myself) to sing along to. I hope even more comes of it in future

***

Hello! My boys come across labuntina on Sky, but they only have the first two episodes! I was wondering where I can find the rest as it's very rare, they are into something this much on tv. My son already knows the abc song after 1 day lol please help lol

***

Take a Walk is absolutely the best thing Frida has ever seen!
"Let's take a walk with Frida" is the new favourite bedtime song.

**

g) Appendix g: The MIMI Project - Information Sheets Provided to Participants (Children's Main Carer and Older Adults)

Children's Carer Information Sheet

The Power of Playing Together! How can Technology Contribute?

Engaging Intergenerational Cohort in The Design of An Interactive Media: How to Design for meaningful user experience for Young Children and Older Adults?

Invitation paragraph

I would like to invite your son/daughter to take part in research that aims to understand how to engage children and older adults in the generation of ideas for the creation of new technology. If you agree to let your son/daughter take part in research, he/she will participate in a set of sessions accompanied by the older adult (e.g., grandfather, untie, family friend). **Please, consider that one of the requirements to take part in research is that your son/daughter and the older adult have an intimate and close relationship, so that you trust them spending time together**.

The purpose is to involve both in the creative process and co-design of a basic "prototype", through playful and fun activities.

Before you decide whether to let your son/daughter take part, you need to understand why the research is being done and what it would involve for him/her. Please take time to read the following information carefully. Ask questions if anything you read is not clear or you would like more information. Take time to decide whether to let him/her take part or not.

What is the purpose of the research?

The main purpose of the research is to help us to design a piece of technology (e.g., digital game, app, interactive video etc.) aimed to promote interaction between younger and older generations. We would like to know their ideas and what they think the new technology should be like.

The research is run in collaboration with an industry partner - BBC Children. Researchers

and designers of the BBC Research and Design team will support and contribute to the research activities.

Why has your son/daughter been invited?

Your son/daughter has been invited because he/she is a potential user, and we are very keen to get him/her contribution and him/her feedback to help us creating technology that he/she likes, and he/she would like to use in the future.

Does my son/daughter have to take part?

Taking part in the research is entirely voluntary. It is up to you to decide and feel free to take at least 24 hours to decide your son/daughter involvement. Declining to participate will have no consequence for you and your son/daughter whatsoever. If you do decide to let your son/daughter take part you will be asked to complete a consent form to show you agree to let him/her to take part, but you are free to withdraw at any time, without giving a reason. If you do decide to withdraw, all your son/daughter data will be destroyed and there will be no need to take any further part in the research.

What will happen to my son/daughter if he/she takes part?

If your son/daughter participates, he/she will attend a set of sessions. Four to a maximum of six sessions will be run, spread across the next months. Each session will last approximately one hour. Dates, time, and location will be agreed according to your availability and preferences (see below for more details).

Your son/daughter and the older adult will participate in the sessions together; the researcher/s will also be with them. They may play and we may ask for their creative input in helping us to create new ideas for games or activities they would like to do together. To help them do this, we will provide drawing materials, games, tools, and a fun and enjoyable environment, suitable for both of them. We may also ask them to watch some cartoons or some videos or to use devices such as tablets or mobile phones while playing together.

They might be asked some questions about what they usually like to do together. Some questions may also ask them to describe their thoughts or feelings, and what they like about spending time together or what they would like to be different.

There are no right, or wrong answers and any ideas are useful and valuable for us.

The sessions will be video, and audio recorded using a voice recorder and video cameras to facilitate the data collection and analysis.

Where will the research take place?

According to your availability and preferences, the sessions will take place:

- at your place or at the older adult place
- in a room at the University of Salford (e.g., MediaCityUK Campus, Frederick Campus)
- at the industry partner facilities in MediaCityUK (e.g., BBC Studios – Bridge House)

Directions and travel information will be provided to you once we will agree on the location and the timeslot of the sessions.

The research will be conducted by a PhD student from the University of Salford. It might be also observed by other researchers. You will be informed about this. **According to your availability and discretion, you will be also able to observe the research activities. After each session, if you would like, you will be debriefed and will have a chance to discuss the session.**

What will happen to your son/daughter data?

The data collected from the sessions will be used by the PhD student as part of their final thesis. They might be also used by the industry partner (BBC Children) which collaborates to the project, just for research purposes. **Your son/daughter data will be confidential and any recording that identifies him/her will be stored in a password-protected folder, encrypted memory card (regarding videos and photos) or within a locked filing cabinet**. Video, photos, and audio recording might be shared with the industry partner to be used only for research purposes. Any videos, photos or audios will be edited according to research purposes before being shared and faces and all identifiable features will be anonymised, when possible.

They will also be given a unique participant ID should you wish to withdraw any of their data after the study has been completed. Data will be stored for no longer than is necessary for the research purposes, according to the General Data Protection Regulation (GDPR).

What are the possible benefits of taking part?

We cannot promise the research will help your son/daughter personally but the information we get from it will help to increase the understanding of how to design technology that could mediate and promote intergenerational interactions. We assure that it will be a fun and creative experience!

Contact details: If you wish your son/daughter to participate, or would like any further information, please contact the researcher using the details below. We will then contact you for more details.

Participant Information Sheet

The Power of Playing Together! How can technology contribute?

Engaging Intergenerational Cohort in The Design of An Interactive Media: How to Design for meaningful user experience for Young Children and Older Adults?

Invitation paragraph

I would like to invite you to take part in research that aims to understand how to engage children and older adults in the generation of ideas for the creation of new technology. If you agree to take part, you will participate in a set of sessions. **Please, consider that one of the requirements to take part in research is that you and the child must have an intimate and close relationship. You also should be used to meet and spend time together at least every two weeks.**

The purpose is to involve both you and the children (e.g., grandchildren, family friend, nephew/niece) in the creative process and co-design of a basic "prototype" through playful and fun activities.

Before you decide whether to take part, you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or you would like more information. Take time to decide whether or not to take part.

What is the purpose of the research?

The main purpose of the research is to help us to design a technological product (e.g., digital game, app, interactive video etc.) aimed to promote play experiences between younger and older generations. We would like to know your ideas and what you think the new technology should be like.
The research is run in collaboration with an industry partner - BBC Children. Researchers and designers of the BBC Research and Design team will support and contribute to the research activities.

Why have I been invited?

You have been invited because you are a potential user, and we are very keen to get your contribution and your feedback to help us creating technology that you like, and you would like to use in the future.

Do I have to take part?

Taking part in the research is entirely voluntary. It is up to you to decide and feel free to take at least 24 hours to decide your involvement. Declining to participate will have no consequence for you whatsoever. If you do decide to take part you will be asked to complete a consent form to show you agree to take part, but you are free to withdraw at any time, without giving a reason. If you do decide to withdraw, all your data will be destroyed and there will be no need to take any further part in the study.

What will happen to me if I take part?

If you participate, you will attend a set of sessions. Four to a maximum of 6 sessions will be run, spread across the next months. Each session will last approximately one hour.

Dates, time, and location will be agreed according to your availability and preferences (see below for more details).

You and the child will participate in the sessions together; the researcher/s will be with you. We may play and we may ask for your creative input in helping us to create new ideas for games or activities you would like to do together. To help you do this, we will provide you with drawing materials, games, tools, and a fun and enjoyable environment, suitable for both of you. We may also ask you to watch some cartoons or some videos or to use devices such as tablets or mobile phones to play. You might be asked some questions about what you and the child do when spending time together. Some questions may also ask you to describe your thoughts or feelings, and what you like about spending time together or what you would like to be different.

There are no right or wrong answers, and any ideas are useful and valuable for us.

The sessions will be video, and audio recorded using a voice recorder and video cameras to facilitate data collection and analysis.

Where will the research take place?

According to your preferences and availability, the sessions will take place:

- At your place or children's house
- In a room within the University of Salford (e.g., MediaCityUK Campus or Frederick Campus)
- At industry-partner facilities in MediaCityUK (e.g., BBC Studios – Bridge House)

Directions and travel information will be provided to you once we will agree on the location and the timeslot of the sessions.

The research will be conducted by a PhD student from the University of Salford. It might be also observed by other researchers. You will be informed about this. After the session you will be debriefed and will have a chance to discuss the session.

The children's main carer will also be allowed to observe the research activities, according to their availability and discretion.

What will happen to my data?

The videos and the recording from the sessions will be used by the PhD student as part of their final thesis. They might be also used by the industry partner which collaborates to the project, just for research purposes. **Your data will be confidential and any recording that identifies you and the child will be stored in a password-protected folder, encrypted memory card (regarding videos and photos) or within a locked filing cabinet.** Video, photos, and audio recordings might be shared with the industry partner to be used only for research purposes. They will be edited according to research purposes before being shared and faces and when possible, all identifiable features will be anonymised.
You will also be given a unique participant ID should you wish to withdraw any of your data after the study has been completed. Data will be stored for no longer than is necessary for the research purposes, according to the General Data Protection Regulation (GDPR).

What are the possible benefits of taking part?

We cannot promise the research will help you personally but the information we get from it will help to increase the understanding of how to design technology that could mediate and promote intergenerational interactions. We assure that it will be a fun and creative experience!

Contact details: If you wish to participate, or would like any further information, please contact the researchers using the details below. We will then contact you for more details.

Main Researcher - PhD Student

Veronica Pialorsi Mobile E-mail

Main Supervisor

Prof. Insook Choi E-mail

h) Appendix h: The MIMI Project - Participants Consent Form

Participants Consent Form

The Power of Playing Together! How can technology contribute?

Engaging Intergenerational Cohort in The Design of An Interactive Media: How to Design for meaningful user experience for Young Children and Older Adults?

Please tick all boxes and sign where indicated below:

1. I confirm that I have read and understood the information sheet for the above research, and I understand what is expected of me/my son/my daughter. ☐

2. I understand that my participation/my son's/my daughter's participation is completely voluntary. ☐

3. I understand that I am free/my son/my daughter is free to stop the research session and to withdraw my/my son's/my daughter's data from the research at any time. ☐

4. I give my consent to take part in this research/I give my consent to my son/my daughter to participate in this research. ☐

5. I agree to the research sessions being video and audio recorded solely for research purposes (e.g., facilitate the data collection). ☐

6. I agree that photographs will be taken during the research activities solely for research purposes. ☐

7. I agree for videos, photos, and audios to be shared or published in accordance with normal academic practice, such as in academic publications, seminars, or conferences. ☐

8. I agree to the use of my data/my son's/my daughter's data being collected and analysed according with the research purposes. ☐

9. I confirm that I have been given the opportunity to ask questions regarding the research, and if asked the questions were answered to my full satisfaction. ☐

Data Protection Act

- I understand that data collected from me/my son/my daughter during this research will be stored on encrypted online storage such as Box or Dropbox or in a locked cabinet and that data containing personal information about me will be made anonymous or protected by password. I also understand that this consent form will be stored separately from any data that I provide.
- I understand that the data will be used only for research purposes and my consent is conditional upon the researcher complying with her duties and obligations under the General Data Protection Regulation (GDPR).

Your name (print) …… Child name (print)……

Your signature …… Date …….

Researcher's name (print) ……

Researcher's signature …… Date …….

Thank you!

Please do not hesitate to contact me if you have any questions.

i) Appendix i: The MIMI Project – The Discussion Guide of the Interview Run with IGP, in the Explore Stage

Discussion Guide

I would like to know more about what you usually do when spending time together. I will ask you some questions about what you like to do together and also what you don't like, and you would prefer to be different.

I will also ask you for some information on the use of technology such us tablet or video games while spending time together. Please, consider that there are no right or wrong answers, so feel free to tell us whatever you want. Your opinion is really important to us! Thank you.

[The researcher is allowed to some flexibility in running the interview. Questions will be adapted according to the progression of the conversation. Both older adult and children will be asked to answer together. Drawings, stickers, and creative material might be also used to facilitate the engagement of the children.]

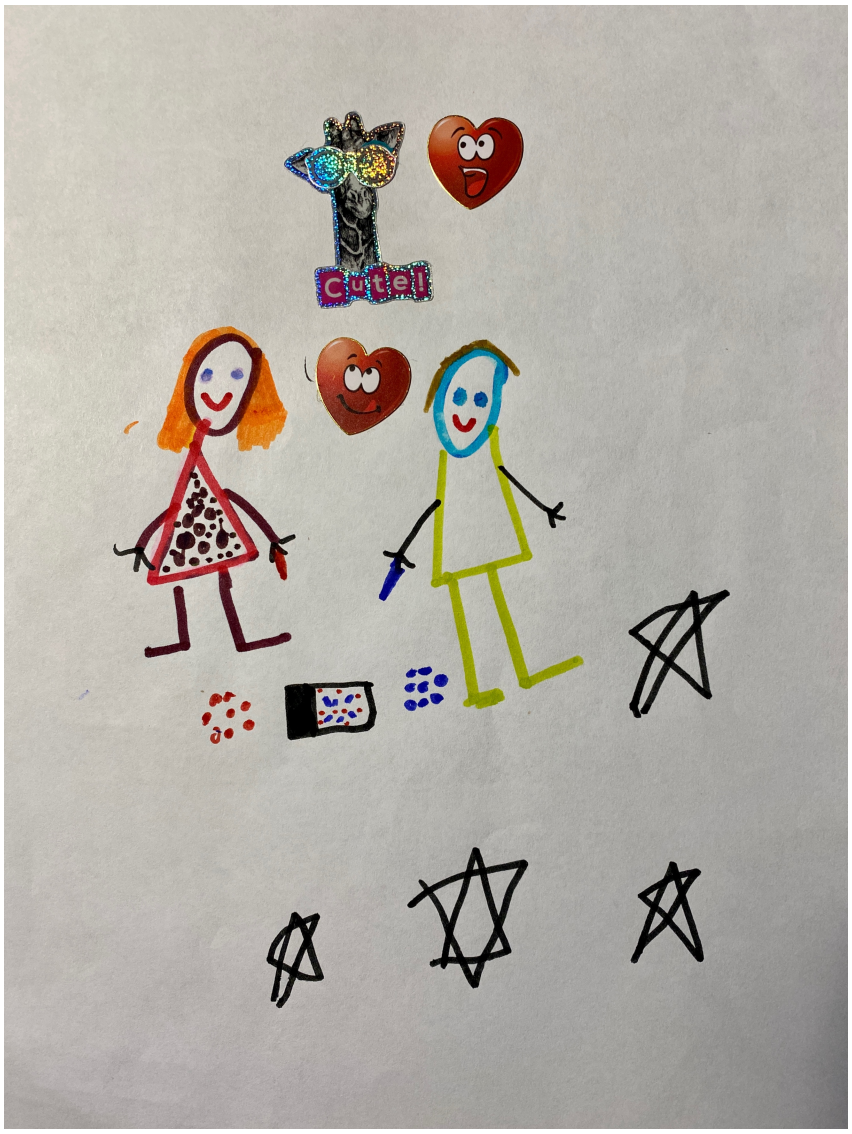
1. How often do you spend time together?
2. Which devices/technologies/games do you habitually use? E.g., Computer, tablet, videogames
3. How frequently do you use those together? E.g., playing videogames together, watching TV together)
4. What do you use them for? Can you give me some examples? E.g., communication, listening to the music, watching videos.
5. How would you describe your relationship? Please choose three significative words (e.g., sincere, friendly, difficult) to describe your relationship / Could you please draw a picture of you with your… (older adult)?
6. How would you describe how you feel when you spend time together? Please, choose three significant words to describe your feelings (e.g., happy, nervous, challenged). [I might use smile faces, stickers to facilitate children's expression].
7. What kind of activities do you usually do when spending time together? (e.g., reading books, cooking)

8. Do you play games? If yes, which games do you usually play? What do you like about those games?

9. Do you play with any apps? If yes, which app do you usually play/use? What do you like about those apps?

10. What is your favourite activity when spending time together? Why?

j) Appendix j: The MIMI Project - Drawings Created by IGP in the Explore Stage portraying the ID


Cute!

k) Appendix k: The MIMI Project - Data Collection of the Interview with IGP Run in the Explore Stage

Questions	ID1	ID2	ID3	ID4	ID5
How often do you spend time together?	At least three times a month, for the weekend	Every two weeks	Every day	Every week	Every week
Which technology/devices/game do you habitually use?	Laptop, mobile, play station 2	Tablet, Mobile phone	Mobile phone	Mobile phone	Mobile phone, tablet, laptop
How frequently do you use those devices together?	Sometimes	Rarely	Rarely	Rarely	Rarely
What do you use them for?	Card games, solitary, watching videos of motorbikes, photos on the mobile	Watching videos, photos	Watching cartoons, movies on TV	Cartoons, videos on the Tv, YouTube	Pinterest to get inspirations for DIY to do together
How would you describe your relationship? Please choose three significative words	Playtime	Fun	Fun, engaging, educational	Joyful and tiring	Satisfying but really tiring and demanding. The adult claims not to have free time for herself anymore
How would you describe how you feel when you spend time together?	Fun, happy, enjoyable, very good, tired.	n/a	n/a	n/a	Engaged but challenged.

What kind of activities do you usually do when spending time together? (e.g., reading books, cooking)	Trying new things Routine	Outdoor walking Cycling	Homework Cooking Housekeeping Watching TV	Running Walking Cooking	Functional activities Homework or housekeeping
Do you play games? If yes, which games do you usually play? What do you like about those games?	LEGO	Jigsaw Board games	Rarely	LEGO	Rarely
Do you use/play with any apps? If yes, which app do you usually play/use? What do you like about those apps?	Card Games on the laptop	no	no	no	Pinterest
What is your favourite activity when spending time together?	Physical games Bicycle	Jigsaw	Cuddling	Physical games	Sewing

I) Appendix I: The MIMI Project -Example of Field Notes and Annotations from the Participatory Sessions run with IGP

Field notes from session 3, ID1[9]

Before the session

A few weeks before the session, I contacted B.'s mother to schedule the appointment and provide full details about location and meeting point.

Arrival

The participants travelled by bus. They arrived punctual.

I was expecting only B and his grandad; however, B's mum was with them too. B. recognised me and they all seemed enthusiastic about being at the University. David mentioned some disruption on the bus line that made them walk more than expected. The journey from their address to Uni was quite a commitment. It takes approximately one hour to get to Uni from where they live.

Everything was already set in the lab, at their arrival. I invited them to have a look around while they were taking off jackets. I also invited B.'s mum to observe the activities but she preferred to leave us, and we agreed to meet her downstairs at the end of the session. Before leaving, she helped B. to dress up as a superhero. I invited her to bring costumes for the session since B. loves dressing up. Being dressed up as superhero might make the activities funnier and contribute to keep engagement high.

Before starting with the first activity, I offered them some drinks and chocolate and I briefly recap what done in the previous two sessions together.

Annotations from the storytelling card game from Session 3 ID1

A set of illustrated cards representing 'characters' were presented face-down on the table. I firstly invited B. and D. to have a look at the cards.

[9] The name of the children is abbreviated in the text with B.; the name of the grandfather is abbreviated in the text with D.

After a short exploration of the pictures (perhaps too short), I gave them a task. B. was spontaneously turning the cards, leaving them face-up on the table.
D. spurred B. to leave the cards face down because the task was to pick a card without showing it to us, yet. B. seemed unsure about what was going on.

Leaving him the freedom to leave the card face-up on the table could have helped him to gather a better understanding of what was going on.

Moreover, B. was tempted to immediately show the card chosen to his grandad. It might be that he wanted to find out from his grandad if he was correctly doing the task. Another hypothesis is that the kid prefers collaboration rather than competition, when playing with his grandad.

While showing his card, B. was whispering. He appeared quite intimidated and not confident about what he was doing. The grandad reassured him saying that there was no need to whisper.
B. explained that card because he loves knights. He struggled to further describe the card and motivate his choice.
Even using laddering to scaffold his answer, B. wasn't able to further explain his choice.

Researcher: "Why did you pick that card?
B.: Because I love knights.
Researcher: And why do you love knights?
B.: Because they fight, and I think he's going to win.

More scaffolding could have been asked to further explore why B. chose the card.

The grandfather chose his card because he likes the rainbow and the countryside.
Both the kid and adult chose horses, and they started talking about how they like them. Commonality triggers conversation.

The grandfather seemed struggling to further explain the why he chose that card.
It might be worth considering leaving the children playing around as they wish. I observed that the game can be challenging, especially for younger pre-schooler. The pictures are quite detailed, and the ambiguous nature of the illustrations might confuse and overwhelm participants. Therefore, leaving them free to familiarise with the cards as they prefer, before starting the game, might foster engagement. Showing the cards face-up may also facilitate the children to have an overview of the pictures. The idea to present the card face down was to add interaction with the cards. However, it seems to confuse the children. Moreover, asking the pairs to collaborate while choosing their favourite card might reassure the children and support them to articulate their choice.

I then added more cards to the table, representing "settings/landscapes".
This time all the cards were visible on the table. We took some time to have a look at the new cards.
B. was just partially engaged in the previous task, therefore I thought to pick myself a card that reminded me my last holiday to test if the new activity could be of any interests for the boy and his grandad.

B. seemed tired, he rubbed his eyes, and he didn't interact very much with the cards. I therefore left them some more time to observe the cards and study the illustrations, before giving them the task. After a while, I asked if some of the pictures remind them of something they did together or a game they played.
D. replied saying that the card with the knights reminds him when they play knights together, with swords.
B. struggled to connect the images on the cards with some of his memories. He was attracted by some of the cards but when guided to answer he seemed disengaged and slightly confused.

Considering the low level of engagement, I decided to slightly modify the aim of the game to make it easier to understand and hopefully more engaging.
I asked them to create a story rather than recall a memory.

We started to create a story starting from the cards they chose for themselves.
The storytelling activity seemed to be more appealing for the boy. He stood up and started looking at the cards with more attention.
He started interacting with cards more spontaneously, although his attention span was really short. He seemed tired. The grandad was then spurring him to imagine and continue the story. He suggested other cards.

D.: "There might be the seaside on the planet? Shall we add a card with the seaside? What do you think?
B: "what?"
D.: "the beach on the planet…"
[B. stand up and look around, he seems confused]

B. then selected a card that was the 'castle' where the protagonists of the stories live. He also chose other characters that represent his family members (such as mum, grandmother, dad etc).

Annotations from the mock-up creation activity from session 3, ID1

Participants started immediately to build the sword using the material provided. There was no planning or designing phase. B. had a quick look at the materials, and he went for the paper.

B: "I know how to do it…we can roll the paper…"

The grandfather was in control of manual activity. B. tried to create the sword with paper himself, but he struggled, and the grandfather gave him his paper sword.
While he was creating the sword, the kid was giving him instructions. The grandfather was extremely careful not to disappoint the kid. Any imperfection of the sword was making the kid very frustrated, and the grandfather was doing his best to avoid frustration, as possible.

The activity seemed more entertaining for both the kids and the grandfather. The kid struggled to actually create himself something using the materials provided. He was trusting his grandfather to do it, rather than trying himself.

It seems that B. had a clear idea in mind of how the sword should be, but he was struggling to create it using the material and to express how the sword should be. His grandad was giving shape to his idea and was in control of the manual activity; he was trying to minimise and promptly respond to his requirements in order to minimise B. frustration.

m) Appendix m: The MIMI Project: Cards Selected by each ID to Co-Create their Stories through the Storytelling Card-Game, in the Create Stage and Transcriptions of the Stories Co-Created

ID1

The knight travels to space with a rocket to fight the monsters. His helper jumps over the rainbow to come and help him fighting the monsters. They need to solve the maze and fight the dragon to get to the rocket. They want to travel to the eggs' planet where the big hunts live. They want to kill the hunts because they eat all the chocolate coins. They have to go up to a long stair to arrive to the castle where they live. Mummy lives in the castle with them, she's half asleep and grandma and dad are also there. All the knights' family lives in the castle.

ID3

The fairy is looking for a young helper that can do spells for her. She asks the young magician to work with her. She gave him the power to do magic potions to create a vortex to kill the big hunts. The magician can also help her finding solutions to problems such as escaping the labyrinth. He can also fly in the sky, generate shapes with clouds and create food. The fairy is in charge to assign jobs to the magician and valuate his work. She now wants him to do smaller tasks such as giving life to flowers from a dead tree. The magician and the fairy get married. Their powers are now united. The magician is more powerful than the fairy and therefore she needs him. That's why they got married. For example, the magician makes her hair longer. They live together in the countryside in a brand-new house, close to the forest. The fairy is seeding because she has less powers and so she can benefit from seeding. A king and a queen live close by; they live in the flying castle, and they want to stop the magician and the fairy, but they are less powerful.

The fairy is hiding from the king in a glass ball and the magician can't find her. She is trapped there, and the magician is now alone. The magician seeks for another helper to kill the king and the queen…he needs some tools to release the fairy from the glass ball.

ID4

The toilet paper boy and the man on the bench go into the garden to play together. They catch butterflies and pick up flowers. In the garden, there is also a scarecrow whose job is to protect seeds. The toilet paper boy and the man on the bench live in the flying castle, in the floating windy universe. One day, their planet falls, and they are in real danger. They therefore call a fairytale

who lives in the sea to save them from the terrible catastrophe. However, they don't know how to let the fairy know their location in the universe.

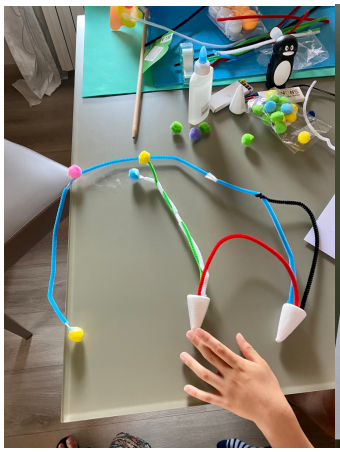
ID5

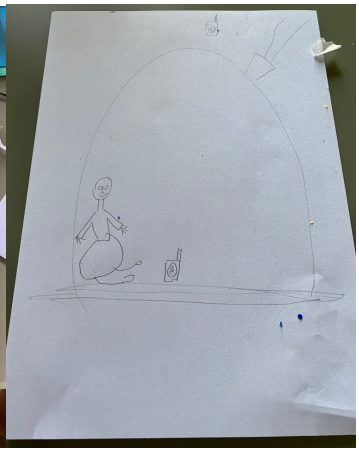
The boy and the freedom lady are spending time together at their house at the seaside, with their family. They love eating and walking on the beach with lots of friends. They always walk with their compass because they don't want to lose their way. They walk together on the beach, and they found shells and flowers for the brother. One day, they were walking on the beach and suddenly it was raining. It was really windy, and they saw a castle floating in the sky. In the castle lives a king. The floating castle was landing on the beach, and they helped the king to park the air balloon. The king invited them for lunch at his castle as a thank you for their help.

n) Appendix n: The MIMI Project: Artefacts Co-Create in the Create Stage

ID1

ID3





ID4

ID5