INCLUDE

Inspiring designers

Mapping as a means to inspire Inclusion through Design (MID)

Paula Trigueiros

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Over more than two decades of teaching dedicated to inclusion through design I have treasured many drawings and projects created with my students. Many were truly prescient and innovative. When I see them, I always have the feeling that instead of being stored away they should be available on the market for those who could benefit from them. These feelings also inspired this work. It tells true stories that illustrate some of the lessons I have learned along the way. The stories I have chosen are a sort of tribute to my students - in particular, to those who have rewarded me with their motivation and shared my enthusiasm for this vision of Design. They tamed me and make me believe that at some point I have tamed them too.

– 'Please, tame me,' asked the fox,

– 'What do I have to do?' said the Little Prince.

– 'You have to be very patient,' replied the fox. 'First, you will sit down a short distance away from me, like that, in the grass, and you will say nothing; words are the source of misunderstandings. But each day you may sit a little closer to me.'

(…)

– 'Goodbye,' said the Little Prince.

– 'Goodbye,' said the fox. 'Now here is my secret, very simply: you can only see things clearly with your heart. What is essential is invisible to the eye. People have forgotten this truth,' said the fox. 'But you must not forget it. You become responsible forever for what you have tamed.'

(Tu deviens responsable pour toujours de ce que tu as apprivoisé)

The Little Prince, 1943
St. Exupéry

This book is dedicated to my students and to all those who believe
that Design can change the world.

Foreword

by Alison Burrows

I recently got my first pair of reading glasses. Having wanted glasses since I was a child, I now feel somewhat ambivalent towards them and have to make a concerted effort to wear them before my eyes begin to show the telltale signs of too much screen time. Personal adjustments aside, I am reminded of Graham Pullin's reflections on glasses in his compelling book *Design Meets Disability*. Glasses are a rare example of a product originally designed for disability that has transitioned from being a source of stigma for the wearer to becoming mainstream. In fact, for some people – my younger self included – wearing glasses is aspirational, an opportunity to quietly tell people something about yourself. It is a credit to designers that societal attitudes towards glasses have shifted so radically. And we need more of this.

Designing for human diversity seems to be inescapable and at the same time inspiring. After all, pursuing inclusivity is one way designers can make a difference and make different – different products, different interfaces, different services, different systems, different spaces. However, despite the strength of arguments that inclusive thinking makes for good design, many designers do not embed it in their practice. We could speculate as to the reasons for that, but it is perhaps more important to find ways to encourage those designers to have a go, to look at the world through different lenses and thus reframe their own purpose in the world. More often than not, it is a transformative process that helps form more thoughtful and focused designers. This has been the heart of Paula Trigueiros' work as a design educator and the gift that she is sharing with readers of this book.

Twenty years ago, at a point in my undergraduate studies when I was becoming disillusioned with the idea of designing yet another thing in a world already overflowing with things, I attended a talk by Paula on Universal Design. This was our very first encounter and I remember being instantly gripped by this idea that design could be an agent for equity and positive social change. I went on to be her student the following year and have worked with her as a colleague for a while now, so I have continued to benefit greatly from her expertise and enthusiasm for encouraging a kinder way to be a designer. I am delighted that she has distilled some of this vast knowledge and experience into this book, itself a testament to the power of design that is accessible and inclusive.

This book offers two major contributions. The first is a curated selection of projects that show various ways in which Design can foster inclusion. These projects are organized into five themes – *Arguments*, *Pedagogy*, *Interdisciplinarity*, *Partnerships*, and *Dissemination* – each of which is carefully unpacked and explored for the reader. The second contribution is an original tool that not only helps designers identify where they can make a difference, but also where they *should* make a difference. This model for Mapping as means to inspire Inclusion through Design (MID) is a modified form of perceptual mapping that juxtaposes different user profiles with markets and distribution networks, to visually pinpoint opportunities for meaningful innovation. This book invites the reader to reject a status quo where design perpetuates inequality and instead embrace their role in designing a truly inclusive future.

It is a book for everyone.

Introduction

Figure 1. School stool for an African village, made from reused school books. 'Addressing challenge 'Design for the Real World' – 1st year, Bachelor in Product Design at EAAD-UM (students: F. Machado, I. Braga, M. Delgado, P. Pereira, 2015).

The real world is inspiring

Social challenges inspire designers. Inclusive Design conveys one of the ways designers express their natural inclination for improving the world around them. It's one of the expressions we can incorporate in the notion of Responsible design – just like Design for sustainability, for the circular economy, for social innovation, among many other causes that affect people's lives. This vision is an heir to the legacy of Victor Papanek (Figure 1)[1]. Like 50 years ago, Design today cannot ignore the problems it plays a part in, and so it has no other choice than to help solve them (de Bont, 2021).

The efforts to study, understand, act and think about the forms and impact of the practice of Design lie between inspiration and responsibility.

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1. Inspired by Papanek (1971), the 'Design for the Real World' exercise* proposes an intervention based on the study of real news stories. Between 2015 and 2018 we worked on emerging themes such as possible approaches for solving issues faced by migrant populations living in isolated places in Africa, looking for solutions based on scarce resources by reusing discarded newsprint or books.

Redström (2020) chooses an historical approach to the paradigm shifts in Design, from when it was dedicated to 'making things' to the current perspective in which it engages in 'making things possible' (p. 89). The author does not believe that the problems have changed significantly – but rather the perspective and willingness of designers to understand them and get involved in dealing with them was the actual change. Buchanan (1992) notes the importance of the emergence of *Design thinking* in the 20th century, linked to the initiatives that seek to understand and integrate the growing conceptual diversity and the number of factors involved in creative processes. Alongside the progress and importance of specialisation and the resulting fragmentation of knowledge, 'Designers, are exploring concrete integrations of knowledge that will combine theory with practice for new productive purposes' (Buchanan, 1992, p. 6).
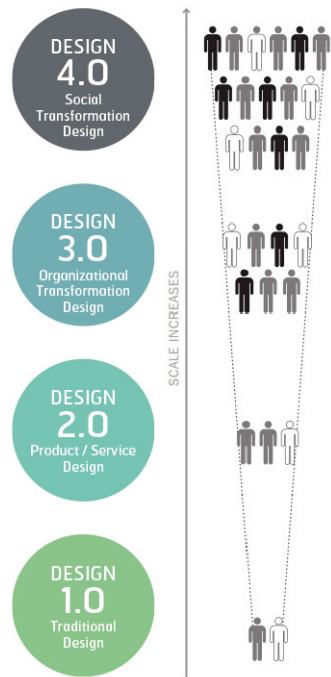
Figure 2. Mapping design process to challenge complexity, by Jones and van Patter, 2009 (P. H. Jones, 2014, p. 8).

P. H. Jones (2014) explains the mapping of the processes and areas of expertise of Design in four levels of complexity (Figure 2). Along with Buchanan's reflections on the various domains in which Design operates (Buchanan, 1992), this perspective helps us understand why the means and knowledge that are applied to a lower level will not be suitable or sufficient to deal with and work in the subsequent domains, in an upward sense. The four levels identified by the author are as follows:

Design 1.0: Artifacts and communications
Design as making, or traditional Design practice.

Design 2.0: Products and services
Design for value creation (including service design, product innovation, multichannel, and user experience), Design as integrating.

Design 3.0: Organisational transformation
Change-oriented, Design of work practices, strategies, and organizational structures.

*Design 4.0: Social transformatio*n
Design for complex societal situations, social systems, policy-making, and community design'
(P. H. Jones, 2014, p. 8).

Social challenges are part of complex problems or, as Rittel and Webber put it, '*wicked problems*' (Rittel & Webber, 1973, p. 161), problems that cannot be fully formulated and that are never completely solved: it is never a matter of 'right or wrong, but rather a question of better or worse' – these are two of the ten features listed by the authors to define them. The evolution of paradigms and the increased complexity of the issues have been so pronounced that much of what we traditionally take for "granted" in Design can no longer be upheld (Redström, 2020).

To understand what this implies for Design and how we educate designers is critical, as failing to do so very likely will result in education even further reinforcing ways of living, doing, and thinking that we now know cannot be sustained (Redström, 2020, p. 84).

Meyer and Norman (2020) reflect on the training of 21st century designers, concerned about the inadequacy of the schools' approach to the context – which they claim has been the same since Papanek's published work, as denounced by the latter himself (Papanek, 1971). Meyer and Norman propose four scenarios to illustrate the relationship between different challenges and the skills needed to work in those contexts. In order to adapt the existing offer from the education systems to the diversity of the required approaches, these authors suggest that, after a core training stage, schools should choose to offer differentiated curricula focused on subjects in which they specialise within Design (Meyer & Norman, 2020). And they restate that critical thinking remains a key factor for the desirable attitude inherent to the designer's creativity: 'questioning everything is an important attribute of the creative designer' (Meyer & Norman, 2020, p. 18).
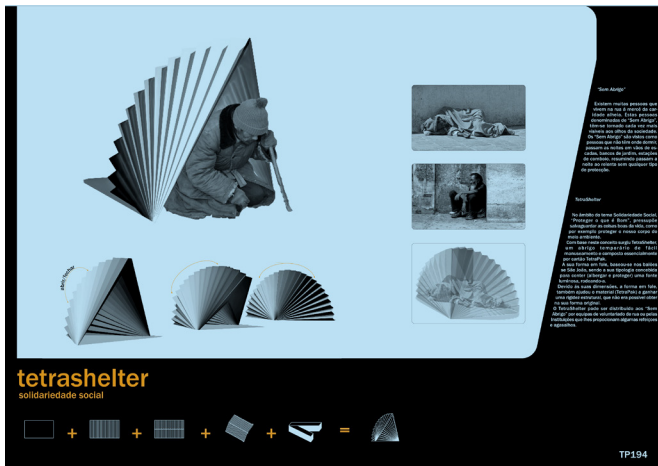
Figure 3. 'Tetrashelter': winning proposal entering Tetrapack's 'Protege o que é bom' [Protect What's Good] competition in 2005 (author: D. Caria).

Inclusive is complex and topical

Inclusive is comprehensive, evolutionary and complex – and very topical. Inclusion is about recognising diversity, the rights and values of democracy, of civilisation as we see it today.

The adjective 'inclusive' is probably the most repeated word in the United Nations' seventeen Sustainable Development Goals (UN, 2015). Talking about sustainability is almost akin to promoting balanced, socially inclusive and responsible solutions. This is also one of the new marketing arguments, because as Kotler et al. say: 'Gone are the days when being exclusive was the goal. Inclusivity has become the new name of the game' (Kotler et al., 2017, p. 7). According to the same source, the emerging technologies and miniaturisation drastically reduce costs and enable innovation in disruptive businesses; they have

brought opportunities for the development of cheap and simple solutions devoted to emerging markets and small, poorer niches previously considered non-markets (Kotler et al., 2017).

Although related to marketing strategies, corporate social responsibility has brought social issues into the academic context and into Design schools. Promoting competitions for the best ideas and other institutional partnership initiatives are some possible ways of doing this. An example is given here using the winning proposal submitted to the competition launched in 2005 by the Tetrapack company, aimed at several national Design schools. 'Tetrashelter', a concept for a shelter for homeless people, proposed by student D. Caria. Caria, was the jury's choice. The slogan for this competition was 'Tetrapack protects what's good' (Figure 3).
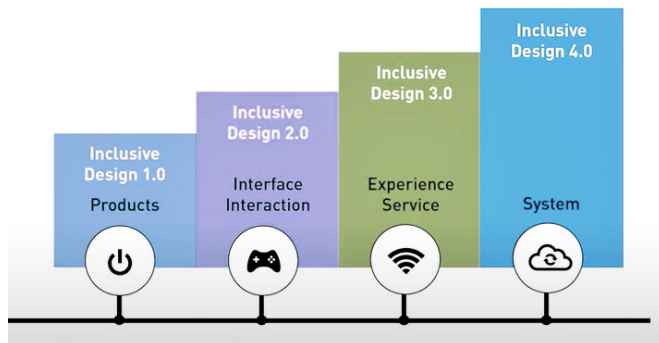
Figure 4. Graphic illustration depicting the evolution of Inclusive Design (taken from a frame of the Loughborough University video, 2020).

Keeping up with the requirements – and opportunities – provided by the new global challenges, the vision of the Inclusive Design approach has also evolved. In parallel with Jones's scheme (2014) it is described in four stages by Hua Dong and Sharon Cook (Loughborough University, 2020) as illustrated in Figure 4: starting with a focus on users' capabilities for product design (Inclusive Design 1.0); with the emergence of interactive products, the focus shifted to processes (Inclusive Design 2.0); later the products became associated with services (Inclusive Design 3.0) and systems (Inclusive Design 4.0), thus extra attention was paid to diversity and customisation.

We must inspire

The really great challenges are not tackled by isolated designers, but by larger teams, customized according to the nature of those realities (Redström, 2020). However, in the learning context and in the course of the work process – in the teaching environment or in their studio – the designer may have to play several successive roles in order to accommodate different perspectives: design, ergonomics, product engineering – and the client's own position (Herriott & Jensen, 2013). Considering it is possible to choose more conceptual and autonomous resolution alternatives, what will make the designer decide to observe social and contextual factors and deepen their knowledge in order to accommodate the users' personal preferences? From the perspective of students, designers, and entrepreneurs, choosing an inclusive approach to Design can seem to be a difficult decision. This is a crucial matter that has been addressed by countless authors and researchers – and which is also a premise approached along this work.

'to design is to foresee'

The literature review by Herriot and Jensen (2013) lists various works focusing on Inclusive Design in the context of university education. They found that in most cases where Inclusive Design is mentioned, it is merely introduced in the structure of the respective syllabuses. To better understand its integration into design practice, these researchers have committed themselves to observing the process of developing ideas based on various documented creative methods (Herriott & Jensen, 2013).

We have found similarities between the processes described by several authors and those we have observed throughout our experience – awareness-raising activities, disability simulations, contact with the context (real or fictional), interaction with different people (e.g. elderly, disabled, in vulnerable situations), the information and detailed task analysis processes, among others. We agree with the authors who refer to disability simulations as an initial process for raising awareness: students are often deeply surprised by the experience (Herriott & Jensen, 2013). The quality of these experiences can make a huge difference. They are inspiring and can mark turning points in the career and professional future of young people. And, assuming that Design is becoming a more complex and more theoretical discipline than it used to be, we also agree that it is not driven by the will to find out 'how things are', but by the need to find 'how things can be' (Redström, 2020).

And 'to design is to foresee', as Professor and Architect Fernando Távora[2] used to say. This mysterious doubt about the future, combined with the perception of the ability designers have to improve people's lives, is a driving factor.

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2. Professor and architect Fernando Távora taught architecture at the Escola Superior de Belas Artes do Porto – ESBAP (currently known as FBAUP) until the end of the 1980s.

Problems, objectives and methods

At issue

The reflection clarified some of the questions that were identified as issues to be dealt with:

- The natural talent and the resources available to design students contrast with a something of a sense of frustration and lack of motivation observed at the beginning of projects, sometimes leading to proposals lacking meaningful content and short-term solutions;

- Inclusion and, in general, global challenges do not always manage to stimulate the attention of students, teachers and researchers to make themselves priority topics in their activities;

- There are some barriers to using existing information and tools to promote knowledge and more inclusive projects – they are not considered 'inspiring'.

Objectives

When we see rights where we previously saw a desirable but dispensable add-on, big changes will begin to happen *(Partington-Sollinger & Morgan,* 2011, p. 7).[3]

Change begins in education, at school and, in this case, in the way we teach Design. Not just in the form of content and methods, but also through sharing good examples; based on value formation and the maturing of a more critical attitude that is aware of the responsibility and professional ethics of designers; and also, with the sense of the opportunities that open up to those who accept these challenges to seek creative solutions to make the world a better place.

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3. Marcus Weisen, referring to the recognition of right of people with disabilities to be part of the culture, promoting adaptation measures in museums, cultural spaces and products in an accessible way.

This work envisages contributing to change by inspiring designers towards inclusion through Design. Considering the area of intervention in Design education, we have defined as specific objectives:

- to understand the potential contributions of Inclusive Design practices for training designers;

- to contextualise the social role of Design and Design teaching, in particular, within today's challenges;

- to study and propose ways of overcoming barriers to inclusion through Design, particularly in the context of pedagogical practices, raising awareness, and promoting interaction with groups from different subject areas.

Methods

The following methods were used to achieve these objectives:

- Collection and classification of documents with examples of good practices in Inclusive Design, revisiting the author's experience;

- Literature review of authors who have specialized in processes and tools that promote inclusion through Design, particularly in the context of teaching Design;

- Preparation and description of a proposal for a referential model for Mapping as a means to inspire Inclusion through Design (MID), a tool designed to inspire designers by overcoming some of the barriers listed in the issue identified;

- Verification of inclusion dynamics in the MID, based on selected examples.

Layout of the work

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This work is organised in three chapters:

Chapter 1. INSPIRATION – Five Stories

This chapter consists of five stories than can be read independently. They relate to the author's experience and aim to illustrate and inspire practices that promote inclusion through Design.

Chapter 2. PROBLEM IDENTIFICATION – The literature

The second chapter provides some reflections and references from the literature on the tools used in the context of Inclusive Design and their relationship to and suitability for the profile of designers, and especially Design students.

Chapter 3. PROPOSAL – The MID Referential Model

This chapter presents the benchmark for Mapping as a means to inspire Inclusion through Design (MID) – a tool consisting of two axes that are the foundation for mapping solutions and opportunities based on variables that promote inclusion right from the beginning of the process. It encourages communication between people from different areas and backgrounds in a practical, dynamic and visual way.

The Concluding remarks and prospects for the future development of the MID are compiled at the end.

1. Inspiration: Five Stories

Story structure

The first steps of this work focused on reviewing several hundred documents produced over nearly three decades of teaching and research – all of which were related to Inclusive Design, in some way.

As the documents were collated, we identified work in a wide variety of fields: from urban design, transport, building accessibility, to the Design of furniture and equipment, products, fashion and communication, and even including interaction with technology, with services, and access to information, etc.

Each story is structured as follows: it begins with a general framework and summary of the message we want to convey. Next comes the introduction and contextualisation of the topic. Then the description of examples and a discussion of their contribution to the key message conveyed by the story; it ends with a short reflection and final remarks, which include historical aspects or circumstances to be considered.

From the documentation analysed, several examples were selected around a broader message, resulting in the following five stories. They have been arranged in such a way as to organise the discourse and to fulfil the purpose of this chapter: to bear witness, and perhaps to inspire. These are the messages and the story titles:

#1. Arguments: The Right to Design

#2. Pedagogy: The Good Problem

#3. Interdisciplinarity: Small interventions with big impact

#4. Partnerships: Workstation for Alberto

#5. Dissemination: Inclusive House of the Future

#1. The right to design

#1.

Arguments:
The right to design

It is typical for minority defence movements and excluded groups – such as people with functional diversity – to base their demands on the general principles of universality and equality that govern the Portuguese Constitution. But it is not typical to think of Design as being related to roles so fundamental that they could even be raised as a banner.

Each of the examples in this story invites an exploration of the different contributions and responsibilities of Design in promoting fundamental rights – such as dignity, freedom of choice, and the right to personal identity – of people who are ill, disabled, or who have functional diversity (Figure 5). In other words, this text presents arguments for the right to Design.
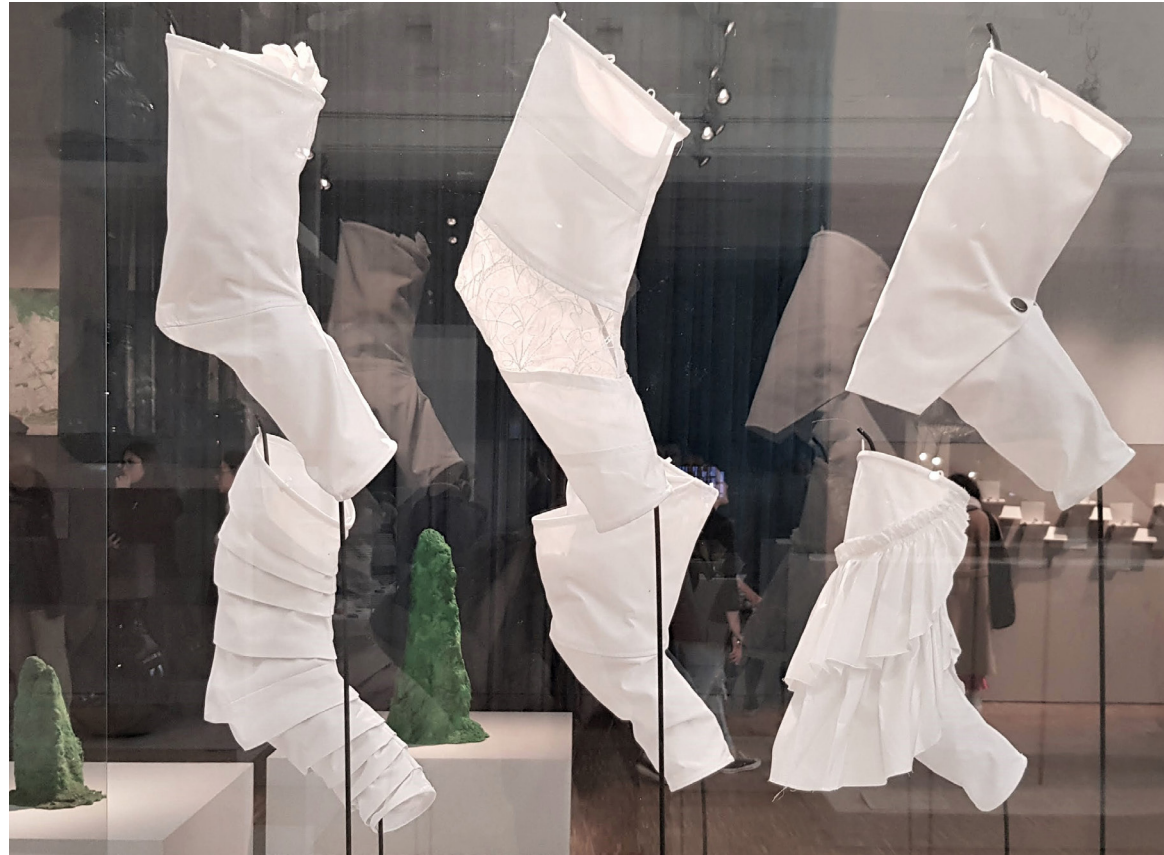

Figure 5. Sleeves for dressing seated people from the 'Seated Design collection' by L. Jones. Photo at the exhibition 'Broken nature', Milan Triennale, 2019 (author).

Key words: Right to Design; Freedom; Privacy; Identity.

Introduction

After stating the general principles of dignity and freedom on which our fundamental law is based, in Article 26 we find explicit mention of 'other personal rights' such as 'the rights to identity, to the development of personality, (...) to image, to speak, to private and family life (...etc), for which we recognise countless ways to participate, working within the various areas of expertise of Design. Along with this expertise, which gives it the power to drive change, comes the responsibility to do so.

In his famous book 'Design for the Real World', Vitor Papanek drew attention to the fact that Design should make the world a better place, 'designing for many, instead of designing for money. (…) Students should be encouraged to work in this manner (Papanek, 1971, p. 80) [1]. In the course of his line of argument, he described an idyllic scenario in which a Design company focused exclusively on solving the needs of humanity, which would result in products to help people with intellectual disabilities and functional diversity, among others, in a context of inequality and disadvantage. As a kind of social return, a form of civic service, he argued that all designers should devote 10 per cent of their time and talent to helping solve the problems of the 75 per cent of humanity in need (Papanek, 1971).

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1. *"designing for many, instead of designing for money. (…) Students should be encouraged to work in this manner"* (Papanek, 1971, p. 80)

#1

Plenty of positive things have happened since that book was published, but in essence – regarding the mentality and priorities of the developed world – this message is still relevant and opportune. Change has been urgent for fifty years.

Margolin (2014, p. 15) emphasised the 'struggle between worldviews' exposed in the confrontation between reality and the intentions set forth in the UN declaration of human rights and the declaration on the rights of the child. And he stated that 'a policy of principles, which presume a commitment to ensuring rights for all, is in fact in direct competition with a policy of power, rooted in the pursuit of self-interest, whether at the individual, organisational or national level' Margolin (2014, p. 15).

Though it is a fact that there has been a positive evolution in the degree of attention paid and within the relevant practices that encompass the social vocation of design in several areas, such as the ones related to sustainability, citizenship, and the inclusion of groups in vulnerable situations. Whilst describing the evolution, since the 1980s, of the interest in 'social design' among schools (at PUC-Rio), Joaquim Redig also said: 'Social Design is a pleonasm (...) I don't really understand this term because there is no such thing as a Design that isn't social – for society. If it really isn't, then it isn't Design' (Redig, 2011, p. 92).

'Nothing about us, without us'

'Nothing about us, without us

'Nothing about us, without us': this is a recurring assertion from people with functional diversity. And rightly so, since events, discussions and proposals are often held to allegedly help people with functional diversity without actually involving them in either the decision-making or the development process. Nor is having a condescending or paternalist attitude appropriate or favourable to the purposes of inclusion. From the examples we have dealt with in this story, we would like to highlight those whose origin is in decision-making processes and direct interaction with people with functional diversity.

Inclusive and exclusive

The specificity of the problems that affect the daily lives of people who are ill, disabled, and depending on others to carry out essential tasks sometimes leads to very complex challenges when the task is promoting inclusion through Design. For those cases, the most comprehensive solutions and products on the market often fail to properly meet their requirements. It may seem like a contradictory statement to the message being conveyed in other chapters of this work, but the truth is that Design often needs to be *exclusive*, i.e. dedicated specifically to each case. And this is the only way to promote the inclusion of some people.

Figure 6. Cover of the book on the topic reflecting on the first TOM event in Porto, 2017

Changing the world in Porto: TOM-Porto

TOM is an acronym derived from the Hebrew expression 'Tikkun Olam Makers', which means 'makers fixing the world'. This non-profit organisation was created in 2014 and made its debut in Portugal in June 2017, in Porto. It was featured online as follows:

We are a global movement of communities that put makers, designers, developers and engineers in contact with people with disabilities (Need-Knowers) to develop technological solutions for everyday challenges. The projects are free and available for any user to adapt to their needs.[2].

They organise *maker* marathons, having as a starting point the inclusion of people with disabilities and functional diversity in the teams that will develop the proposals. It is the people themselves and/or their

carers who assess the priorities and describe the constraints inherent to the challenge. In short, they decide which challenges are worth solving.

At the TOM-Porto event, ten challenges were selected and worked on by over fifty volunteers for a period of about 48 hours. The results were presented in a plenary session in which each group demonstrated their working method and presented their arguments to the jury. Three cash prizes were awarded, essentially for them to develop their own ideas (Trigueiros et al., 2017) (Figure 6).

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2. tomglobal.org, accessed on 12 May 2020.

27

Makers and designers

Makers and designers

Enjoying 'getting your hands dirty' and doing things for a cause are common features among the followers of the maker movement, a growing trend around the world that brings together groups of volunteers to deliver solutions to real problems in a short time frame – hence the marathon metaphor. This desire to transform ideas into solutions that help change the world is also inherent to the nature of those who choose to be designers. However, it turns out that most of the marathons in the maker movement are aimed at, and more attractive to, participants from engineering disciplines. This was

the case with TOM-Porto, although some people from other areas such as health, rehabilitation, and Design, also took part. The challenges proposed usually seek technological solutions to adapt objects to the proponents' situation. Therefore, given the time constraints and limited resources, the results are also focused on the more practical and functional scope of the problem, without a proper timeframe for developing the Design, the finishes or for dealing with aspects regarding the user experience.
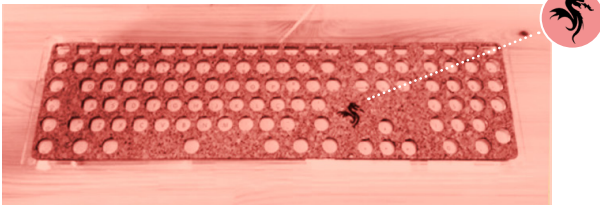
Figure 7. The TOM team testing the layout grid for Francisco's keyboard; personalisation detail with a small, engraved dragon (author)

Francisco's keyboard layout grid

One of TOM-Porto's challenges was presented by Francisco. He is a web designer and has cerebral palsy. He uses an Apple keyboard to work on his computer and realised that there were no keyboard grids on the market suitable for the layout of that type of keyboard. The keyboard layout grid is a plate placed on top of the keyboard with a circular hole above each key that allows only one key to be pressed at a time. It is used by people who find it difficult to control their hand movements. Regarding functionality, it was just about a simple equation that involved replicating the position of the keyboard keys and cutting circles with a laser on an acrylic plate, after a few test runs using cardboard. The last step was to conceive supports to fix it in the right position over the keyboard.

Once the practical goal had been achieved – because it was relatively simple – the team could concentrate on Francisco's other preferences. A cork coating was added to make the surface nicer to touch. And finally, at his request, the image of a small dragon – the symbol of Francisco's football club – was laser engraved on it (Figure 7).

Even though it was a very simple intervention, this case highlights the important role of Design as a specialised service intended exclusively for one person. A type of service which, though it still fulfils practical, functional and aesthetic requirements suitable for the general public, meets the individuality of one person's desires and expectations. In this context we would like to highlight the right of people with functional diversity to have access to expert Design services that focus on their needs and, perhaps, are also able to meet their preferences.

Figure 8. Cutlery from Cutipol's Goa model.

The Right to Design – Workshop

'The Right to Design – merging boundaries' was the title chosen for a workshop held as part of the 'Senses and Sensibility' conference in 2017 (Trigueiros, 2017). The proposal was presented as a declaration of principle:

The right to Design states that the benefits of well-designed products – whether they are functional, emotional or any other – should be available to anyone. This statement recognises the power of Design to make a difference (Trigueiros, 2017, p. 3).[3]

It explored two different ways of promoting inclusion through design: 'From mainstream to exclusive' and 'From exclusive to inclusive'.

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3. *"The right to Design states that the benefits of well-designed products – being it functional, emotional or any other – should be available to anyone. This statement recognizes the power of Design to make a difference"* *(Trigueiros, 2017).*

The first theme – 'From mainstream to exclusive' – was approached using Cutipol's Goa cutlery collection as an example (Figure 8)[4], by José Joaquim Ribeiro, designer and a partner of that company.

Winner of the Good Design Award 2016, this tableware is characterised by its slender design with a handle made of coloured polymeric material, featuring clean and coherent lines for the various pieces of the cutlery set. This cutlery is iconic, much appreciated (and replicated) all over the world; it is also often used in promotional material by chefs and fine restaurants.

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4. https://www.cutipol.pt/, accessed on 12 July 2021.

"Cute-lery"

The issue here is that some of the simplicity features that contribute to its identity and success can make it difficult for those with limited hand control or grip to use. Since the pieces are quite slender and circular in the cross-section, the handle easily turns and slips through the fingers. This can make it more difficult for people with hand control or grip issues to handle these pieces of cutlery. This problem occurs in many other objects that we consider elegant, or good examples of product Design. Objects that at some point, surely, anyone would like to own – which is why we think this deserves to be analysed.

If there are suitable solutions, why is this a problem?

In fact, there are countless alternatives in terms of assistive products, which may be much more functional and suitable for easing the task of eating. Without affecting the possibility of using these products, the question that we would like to address here is: how to expand the range of users – i.e. include more people – who will be able to benefit from the pleasure of using this cutlery; to ensure that they can decide and perhaps be on equal terms with the other people at the same table.

Or to put it more simply: how can we promote the right of people with hand disabilities to have access to 'good design'?

Figure 9. The proposal named Cute'lery for accessories inspired by a butterfly, to make it easier to grip cutlery (authors: C. Motta, G. Baldacchino and N. Souleles) (photo by the author).

Freedom of choice: 'Cute-lery' accessories to promote inclusion at mealtime

Inspired by the exuberant flora on the Island of Madeira – where the event was held – one of the groups modelled a butterfly-shaped accessory to be applied (as if landing) on the cutlery handles (Figure 9). By extending the perimeter of the handle with a sticky, elastic material such as silicone, this butterfly would also help to keep it in position and improve the grip on the cutlery. This is the same principle used for the wide handles of assistive products and also for the gripping aids – accessories made of rubber or sponge used to enlarge the diameter of pens, cutlery and other assistive products for people with functional diversity[5].

If it was an isolated object, just lying on the table in front of a disabled person, this butterfly could indicate the difference – provoking the discomfort of the stigma associated with assistive products. Which is why the discussion of the proposal evolved to consider options that would include all seating areas and, thinking about the different types of users at the dining table, to include a range of shapes for adhesive accessories that could be used to help hold and identify the glasses, for example.

Thinking of a family group with children and older or disabled people, this strategy could prevent discrimination and stigma and generally make the environment more inclusive and fun.

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5. Products available in catalogues ans websites of assistive devices, made for people with functional diversity.
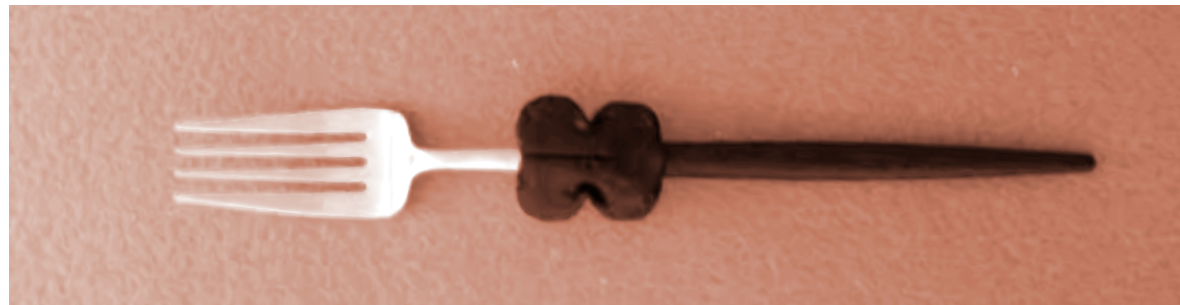
Privacy and autonomy – Design is needed!

The second group tackled the topic 'from exclusive to inclusive', starting with a prototype designed to help people with urinary catheters. The result of one of TOM-Porto's challenges, the 'UrinAll' (Figure 10) is a device conceived to make it easier to open the tap of a urinary catheter, in order to empty it from a slightly distant position, taking into account severe mobility limitations of the upper limbs. Its purpose is to assure the autonomy and, above all, privacy for people in this situation. Thus, it has a handle about 80 cm long and a mechanism that allows the bag to be opened from a compatible distance with little effort.

At TOM-Porto, it was just a matter of solving the problem with a prototype focused solely on operating a mechanism. In this event dedicated to Design, the team tried to examine other practical and sensitive features of this object. How can one make the Design of an object with such specific functionalities more generic?

The brainstorming began by examining the feasibility of switching from a type of object seemingly so unique and handcrafted like the prototype that had been made, to a more comprehensive product niche. This was the challenge of promoting inclusion through design.
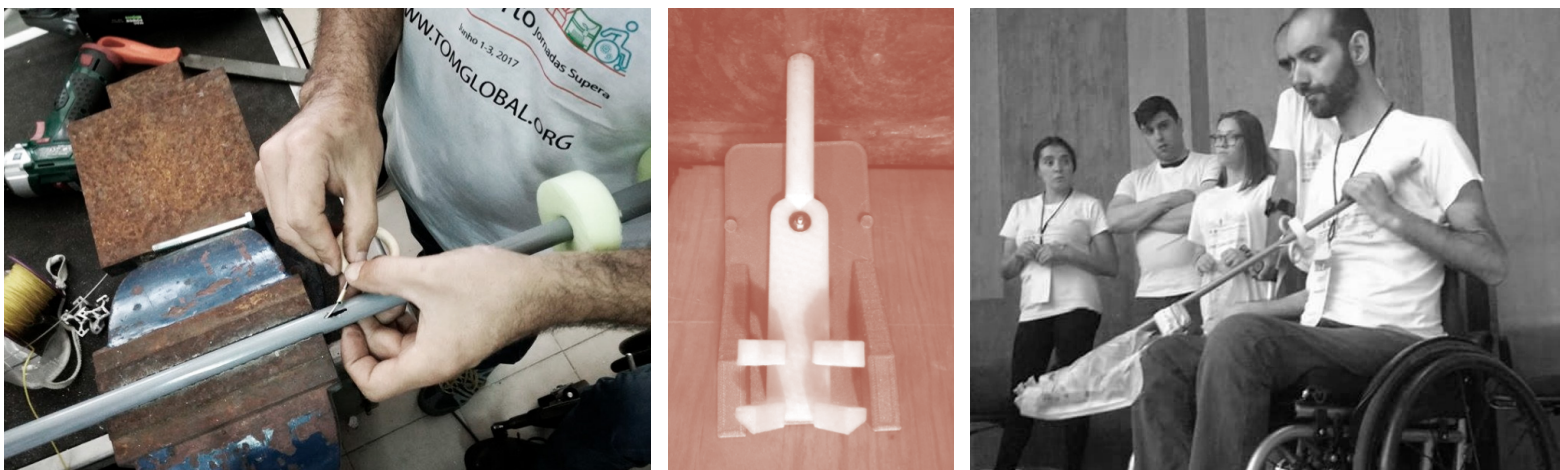

Figure 10. Development and presentation of the 'UrinAll' prototype at the TOM-Porto marathon.

Figure 11. 'One Handle fits all' – illustration depicting the concept of one handle for several functions, based on the range of multiple club options in a golf bag (authors: D. A. Gamberra, A. Clemente, I. Oliveira).

Therefore, to bring it in line with other objects with similar functions, the proposal was inspired by the diversity of clubs in a golf bag and was entitled 'One handle fits All' (Figure 11).

This proposal established a framework for the mechanism to open the tap as one of the parts of a set of other accessories that would be connected to the same handle. For example, it could include a pair of tweezers to pick up objects from the floor, a hook or a flashlight with a magnet to light up and collect small objects lost under a cupboard. As with tool kits, in which the same handle is used to manipulate different tools applied in its tip, according to the intended function, the proposal would transform 'UrinAll' into a specialised part of the set. At the same time, the handle and accessories could be generic, with standard joints enabling its use by

a wider public. Thus, a more refined and elegant type of production and finish could be envisaged, provided by the intervention of Design.

Identity and Clothing Design

Clothing Design is directly related to the right to identity. People with long-term illnesses, hospitalised and with permanent disabilities are directly targeted by the power of clothing and fashion Design when it comes to securing their right to personal identity and image. To achieve this, it is important for designers to be confronted with scenarios of diversity that appeal to their talent and vocation. Sensitivity and knowledge of specific cases promote flexibility in the creation of design solutions.

Sabrina's wedding dress

Sabrina suffers from a form of Multiple Sclerosis and uses two crutches to get around daily. In an interview with the author (in Genoa, 2018) she said that for her wedding day, she 'dressed' the crutches with the same fabric as her dress, because 'they were already part of her body'. This testimony had a significant impact when creating this notion of the right to Design in connection with fashion and clothing Design.

Sleeves for people sitting

In the centrepiece exhibition of the Milan Triennale in 2019 (*Broken Nature: Design Takes on Human Survival – XXII Triennale di Milano*, 2019), a proposal by L. Jones entitled 'Seated Design collection' was presented. It was conceived in 2015 and consisted of a set of sleeves designed for clothing worn by people sitting (Figure 12).

The sleeves become creased and wrinkled after a while, with the wear resulting from folded arms. With this observation, the author realised that common solutions do not favour either the look or the comfort of people who sit for a long time, as their arms are always folded. This led the designer to propose a range of sleeve Design alternatives suitable for this position and applicable to different types of clothing.
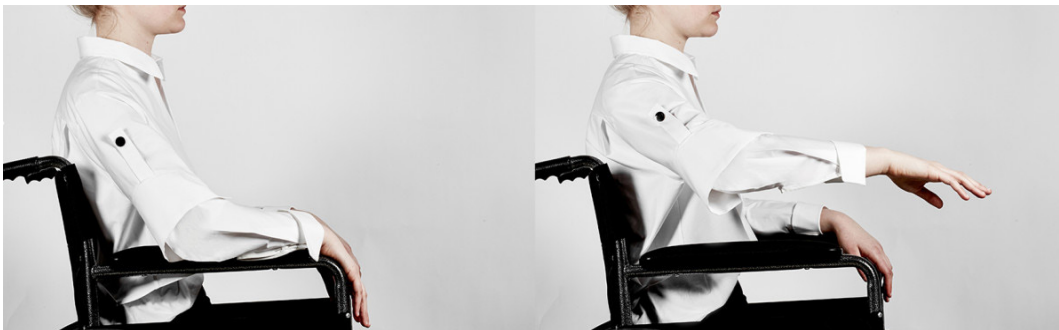

Figure 12. Illustration accompanying the description of the proposal 'Seated Design collection' by Lucy Jones (L. Jones, 2015).

Figure 13. Photographing the drawing of a dress during the workshop dedicated to inclusion through clothing Design (L. Marteli and the author).

Clothing Design and inclusion for people with Parkinson's Disease – workshop

Affected by the symptoms of Parkinson's disease, such as difficulties with mobility, balance, tremors and so on, people are progressively forced to change their wardrobe: they are no longer able to wear their favourite clothes that are suitable for every occasion. Gradually they become restricted to wearing flexible, loose-fitting garments made of knitted fabrics. In more acute cases of immobility, greater loss of autonomy and, above all, when institutionalised, many people spend the day wearing the same clothes they wear to sleep in, for practical reasons that are understandable. However, this serves to reduce self-esteem and leads to a progressive loss of self-identity. Clothing, being an extension of one's body, reflects our identity and promotes the well-being of the human being (Marteli et al., 2021). With this introduction, participants were invited to attend a workshop dedicated to 'Inclusion through clothing Design', held at the Design Institute of Guimarães (IDEGUI), in July 2021 (Figure 13). This event was organised with designer Letícia Marteli in the context of her research on people with Parkinson's disease.

In a hybrid model, eight designers came together, all of them female. Five were attending in person and three followed the works online, creating two working groups. Following a common script for the different stages, provided on paper and in digital format, they created short fictional narratives, based on real cases of people with Parkinson's disease. These narratives were inspired by real cases collected in the previous stages of the research.

The debate emphasised the relationship between clothing and the identity and self-esteem of the characters: one case concerned the youth of a fado singer and the importance of being able to wear the clothes she used to when singing; the other concerned someone attending a family ceremony and how appearance is relevant to people's well-being in these cases.

Even considering the duration of the event (three hours in total), the proposals emphasised some aspects to be taken into account in clothing Design, including:

• the need for a more careful and diversified Design of accessories related involved in movements used when putting on/taking off clothes (buttons, press studs, Velcro and zips) so that people's autonomy while dressing and undressing is maintained as long as possible;

• exploring the concept of modular clothing to develop garments that can evolve and adapt to the person's situation. When it is no longer possible to wear a complete garment, try to prolong the functional use of some parts of it, selecting the most characteristic and differentiating sections of that garment.

• It is thus possible to create more interesting and varied clothing alternatives compatible with the condition of people who are immobilised and bedridden, so that the clothes can meet their differentiation needs.

Reflection

The variety of examples presented sought to illustrate different ways of approaching and understanding what is, ultimately, a right for everyone – that of enjoying the benefits that Design can provide. In the same way, these words echo the importance and social duty of those who have the talent and skills, but also the power and the opportunity to change the world, to shape it and decide about the evolution and the quality of life of the most vulnerable people.

The voluntarism and proactive attitude implicit in Victor Papanek's call and manifesto are not alien to the nature and vocation of designers. We often see how rewarded they feel when they witness the positive consequences of their work and even when they receive proof of joy (perhaps even gratitude) from the recipients of their services.

However, in order to wake up to this calling, it is important to nurture this feeling of responsibility and debt to society, mentioned by Papanek, from the very beginning of training. Sharing knowledge and experiences is essential. In particular, the most privileged institutions and agents with decision-making power and social visibility need to lead by example in encouraging the greater involvement of people with functional diversity in learning events and decision-making processes.

#2. 'The Good Problem'

#2.

Pedagogy: 'The Good Problem'

In the course of the Design project process, formulating the problem is crucial to making Design students enthusiastic about their work. It is clearly a good problem when the solution can bring real benefits to people. And the more people that are reached and the more relevant those benefits are, the better.

Based on two pieces of academic work, one focusing on amputees or people unable to control their fingers and the other on the elderly, this story illustrates the pedagogical role of a good problem identification. Furthermore, it reflects on some of the contributions of works on Inclusive Design, showing examples of how 'Good Design for people with disabilities is often good Design for everyone' (Gill, 1997).
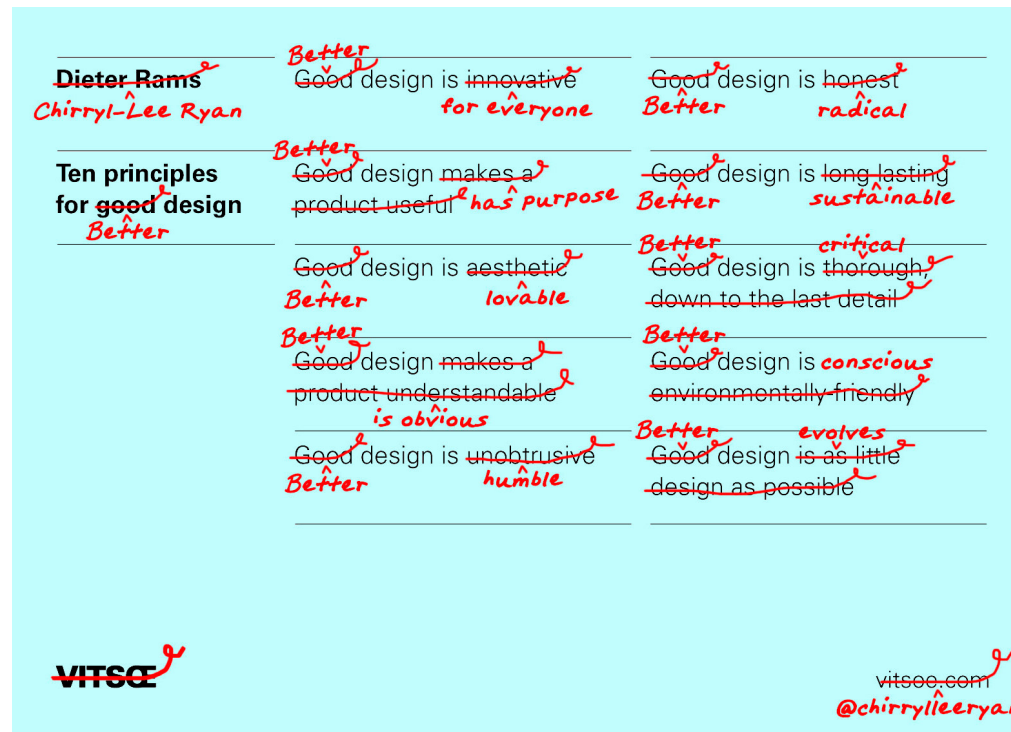

Figure 14. The ten principles of good Design revised into principles of 'better Design'. A publication by C. Ryan on LinkedIn (2018).

Introduction

When beginning a new project, it is usual to see students starting right away to making abstract drawings, developing conceptual discourses that are devoid of content. Without a distinct purpose to sustain substantive research and reasoning, they cling to the superficial elements of objects without really questioning them. But this lack of purpose can be demotivating (Trigueiros, 2006). Observing people is always inspiring and helps to dispel some initial inertia, the well-known 'blank paper drama'.

In the academic context, exercises on Inclusive Design usually entail observing people. As well as raising awareness empathy among young people, the purpose of this approach to the real world is to find a calling for the project, in other words, a good problem.

This is a critical stage in the Design project process because it helps to identify some of the project's variables from the outset. These include requirements for use, materials or context and, more importantly, to identify the preferences and viewpoints of the people, the target users themselves. Regarded as interlocutors – with a face and even a name – they are no longer abstract (or, as is often the case, a mirror of the designer's personal profile).

For many everyday situations, anyone – who still have no references or training – can make the connection between a simple problem and an immediate, straightforward solution, even if it is improvised to some extent. When compelled to see how arduous it is to carry out a specific task, ideas and scenarios for coming up with a solution quickly start to emerge. It is in this process of cause and effect that the current idea that 'we are all a bit of a designer' lies, in a sense (P. H. Jones, 2014).

#2

And that feeling of power, of being able to change and improve the world, makes all the difference to building students' confidence and motivation, even among the less focused or naturally talented. When faced with the daily lives of people with disabilities, problematic issues are highlighted by the different way they perform certain tasks and by the barriers they encounter in many situations. On the other hand, the potential benefits of Design for these people's lives are also emphasised. The empathy generated by contact with them promotes personal motivation, which often translates into increased commitment at work.

The Good Problem

Future designers are also expected to create beautiful things. And this aspect comes naturally as the project unfolds, paving the way for a succession of factors with a positive return. In addition to its role in developing real solutions that have a direct impact on people's lives, the good problems equation has a pedagogical aspect in terms of training designers. This is a key argument throughout this work.

When are we looking at a good problem?

In addition to the pedagogical outcomes that we have mentioned above, a good problem brings an innovative variable to the previous equation; it creates opportunities and brings benefits to someone, through either the creation or the further development of an interesting product, service or complement, among other features. Observation and also getting people with functional diversity to participate often introduce variables that had not been considered in the Design equation of existing solutions. So, initially some proposals stand out for the assumed originality from that aspect, such as products to help blind people, for people with disabilities, etc.

Is 'Good Design' always good?

Then, when you analyse the possible solutions, you realise that the variables introduced can actually by applied to many other cases, thereby creating opportunities for innovation. Being aware of this problem generalisation makes it even more relevant and thus also contributes to considering new versions or accessories for the project.

Setting aside the academic context, we realise that by tackling problems under more demanding or challenging conditions, Design can create solutions with the potential to benefit much wider groups of people.

In their work, Persson et al. (2014) illustrate this idea with two examples from the business world. The first is a study by Microsoft (from 2003) according to which the solutions developed to facilitate accessibility on websites benefited a large proportion of workers (60 per cent). The other, from 2011, refers

to the technical specifications contained in the CEN TS 15945:2011 Packaging. Ease of opening. Criteria and test methods for evaluating consumer packaging'[1]. For the first time, this standard contained indications resulting from the participation of a group of elderly people, realising that what some people need can also be useful for many others with fewer needs.

Is 'Good Design' always good?

Listing the principles of good Design no longer makes sense if today, every minute, everything is questioned – what was once considered good quickly changes after a few 'likes'. In the 21st century's everchanging reality, we seek to find out how can Design be better (Ryan, 2018).

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1. 'Packaging – Ease of opening – Criteria and test methods for consumer packaging (CEN TS 15945:2011 standard).

We learn the principles of good Design during our Design training. We appreciate the clarity and the practical austerity transmitted by the statement made by Dieter Rahms and other 20th century authors. Design should be useful, discreet, simple, functional, economical, timeless... Nowadays, other subjective, ephemeral and circumstantial aspects of Design are also valued – the emotional connection and the possibility of personalisation that (good) Design can confer on products and services, their suitability for each circumstance, promoting user experience. The identity, the humour, the poetic sensitivity, and charisma that can be derived from Design, which contaminate people and places – all these elements are part of the power that we assign to Design.

In a quite humorous and critical publication, Ryan (2018) questions Dieter Rahms' principles for

Inclusive and complex

Good Design, transforming them into ingredients for a Better Design. This statement underlines the circumstantial and emotional aspects of our relationship with the material world. And it highlights the changing and fickle nature of our expectations as consumers, beyond the functional and pragmatic aspects of any possible initial equation. The author also says that the product of creation is in itself an invitation, a proposal to establish a relationship:

When we create something, we establish a relationship with those who will use it. As instigators, it is in our best interest to ensure that these relationships are caring, mutually respectful, and healthy in the long run – rather than superficial (Ryan, 2018).

Inclusive and complex

Going beyond their typical areas of intervention, designers' skills have been called upon to play an important role in decision-making processes and in dealing with today's complex problems – where the attributes of flexibility, shrewdness in adapting and integrating processes and social impacts are valued (P. H. Jones, 2014). The diversity of people's profiles – their preferences, their own circumstances, and expectations – that characterise the current approach to Design, especially in the context of this notion of its inclusive vocation, makes the assertion of what can be considered 'good inclusive Design' more complex. This statement by Rittel and Webber applies to complex problems:

"There is no definitive formulation of a wicked problem (…) Solutions to wicked problems are not true-or-false, but better or worse (…)" (Jones, 2014 p. 6, cit. Rittel and Webber, 1973).

Figure 15. Scale model of the Dedeta (student: M. Ribas, 2002).

The common variable

Dedeta – a pen wrapped around the finger

Dedeta was born from an exercise entitled 'Gestos sem mãos' [Gestures without hands]. It was a project to raise awareness about Inclusive Design. Its purpose was not to develop products, but only to analyse new problems and identify opportunities for Design intervention (Figure 15).

Students choose some everyday gestures in which they use simple objects, such as opening a door, drinking water, writing a note or making a phone call. They should try doing it 'hands-free', i.e. simulating and purposely constraining their fingers or hands while carrying out those tasks. Then, follows a careful observation and analysis of those gestures, trying to identify moments and factors that may be problematic during that interaction.

In 2002, one of the first editions of this exercise witnessed the appearance of 'Dedeta'. A clear and simple idea that results from the fusion of the word and the object: 'finger' and 'pen'. It is designed to help those who lack some or all of the fingers needed to hold a pen to write. If the rigid body of a biro was removed, its flexible cargo would be wrapped around anywhere, or around any of the other fingers. The functional writing nib is located at the end. This convergence between the functional side of the object and the hand facilitates the coordination of writing movements.

The proposal is a direct result of the problem addressed: without some of the fingers – and in particular, without a thumb – how can we hold a pen in our hand? Once the variable (holding with the hand/finger) had been identified, the items already part of the pen itself were used to solve it, thus the helical spring solution. This last was represented with some drawings illustrating different hand configurations and by building a scale model (Figure 15).
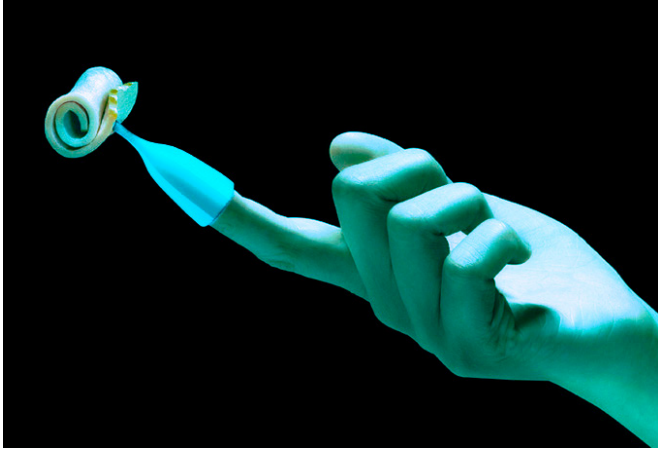
Figure 16. Pintxos de dedo [Finger Pintxos] (Rodrigo Alonso, 2009).

The solution's flexibility enables it to be adapted to different finger and hand configurations. This feature ended up showing its inclusive potential, as it can be used by, and ease the task of writing for, anyone, whether or not their hands have a functional disability.

The simplicity of the solution makes Dedeta a good solution – a good example of Inclusive Design. The potential for generalisation and its broad scope make this a good problem.

We can find this same problem and formulated solution in other products, both on the mass market and in more specialised niche markets. But let us look at the following two examples.

a) Pintxos al dedo, by Rodrigo Alonso

To illustrate this, we've chosen *Pintxos al dedo* by Rodrigo Alonso – an original and fun proposal for a piece of 'cutlery' for eating snacks (Figure 16).

This proposal won the Chilean Design Award in 2009. Its author supports the proposal with '*the pleasant sin of eating with your hands and sharing*'.' In addition to its practical aspects – comprising a basic and obvious use – the description adds other features from the gestures and attitudes that can be associated with this way of 'dressing up your fingers' and participating.

The 'Pintxos', being used in the same way as the 'Dedeta', dressing the fingers, are placed next to superfluous, unnecessary products. It should be noted that it is at the other end of the scale of provision of needs (Jordan, 2002) that products aimed at people with disabilities tend to be found. There is a lack of solutions and alternatives to meet a wider range of needs and expectations placed on products.

Figure 17. Baby toothbrush (Knijnik, 2015).

b) Baby toothbrush

There are several manufacturers and models for this type of baby toothbrush (Figure 17). They are shaped like a finger cot and made of a material suitable for massaging babies' gums and their first teeth. The position of the textured elements – at the most sensitive part of the fingertip – enables an easy control of pressure and movements adjusting these to the delicate task. It somehow transforms the task into a way of caressing the baby, enhancing the baby's corresponding tactile feedback.

The demanding nature of this task, due to the danger of hurting the baby, means it is delicate and needing total control. This way of instrumenting the finger itself proves to be the most effective.

Make up kit for older ladies

The Kit Make Up (Figure 18) was the result of a longer academic exercise that included the typical phases of a project[2]. Given that this work is on Inclusive Design, it began with some awareness-raising activities involving simulations, observation of case studies and real-life testimonies. In this context, one student observed how difficult it was for older women to apply make-up, given the detail and small size of the usual items in those products. Instead of several loose objects, she proposes a kit that combines three different make-up items in a single

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2. 'Acessibilidade no Design de Embalagens' [Accessibility in Packet Design] – Exercise carried out with 2nd year Design students at the Lusíada University, Vila Nova de Famalicão, 2010-2011.
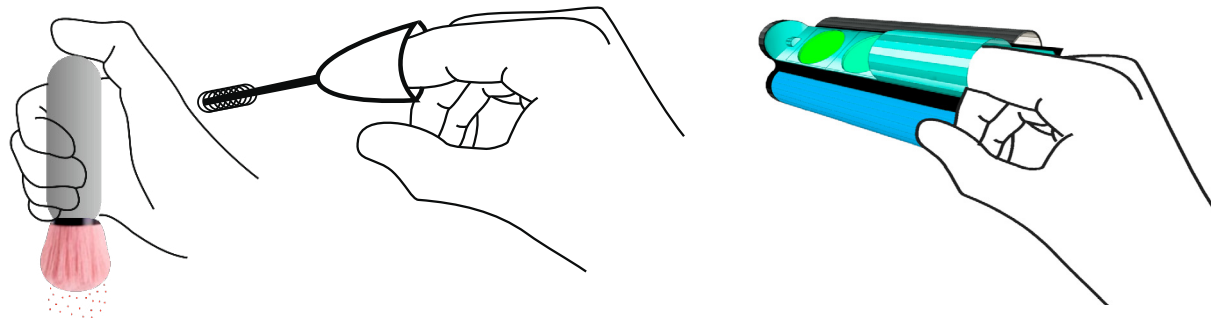

Figure 18. Kit Make Up – blush, eyeshadow and mascara brush (author: L. Bacelar, 2011).

Figure 19. Deodorant packet with multiple features to facilitate use and reading instructions (Degree INC).

roll, which is easier to hold and keep stable with one hand, while using the other to stick the mascara brush on your finger or a finger cot to apply eyeshadow; the blush is self-filling with a single click while using it.

This was considered a good problem because it can promote the self-esteem of many older women – an aspect emphasised by the author in the context of the initial research. The proposed solution has several features that make it easier for people with limited dexterity to use it, making it easier to carry out the most demanding tasks using just one hand or one finger.

Inclusive packaging for deodorant

We have established a parallel between the previous academic work and the commercial packet proposal illustrated in Figure 19. Degree INC is a roll-on deodorant packet specifically designed to make this task easier for people with limited use of their

upper limbs and people with visual impairment. It is an industrial product of the Degree brand – a brand aimed at the niche market that is called Inclusive, with products 'designed for and with a diverse community' (Maril, 2021). As well as embossed information, this packet holds the hand to make it easier to apply. Its hook-shaped lid makes it easy to open, hang, open and use using just one hand. Furthermore, it proposes its reuse by replenishing the content. This reduces the initial investment making it a durable, easy-to-use packet. This is a proposal specifically aimed at a more upmarket niche, specialising in people with functional diversity.

It is important to stress that students, guided by the process of identifying a good problem, find solutions with variables and formulations similar to those drawn up by professional teams. This observation reiterates the pedagogical role and innovative potential of the solutions resulting from this type of approach and inclusive Design strategy.

Considerations

'When a problem is well thought out, the solution is already in sight.' This is a quote attributed to Sena da Silva. The two initial works found a common variable in the problems that can occur when we manipulate everyday objects and propose identical solutions in the formulation of that analysis: if we don't have or can't use our other fingers to hold and control the object, we wrap up the finger itself with the object. It's a generalisable equation, in which the object becomes like an extension of the actual body/limb – like a 'wearable object' – giving it specific, instrument like functionalities; reducing the size and distance of the object/interface facilitates control and provides other dimensions to the use experience.

This conceptualisation is common both in assistive products and in many products aimed at the mass market. Since they share the same formula for solving the problem of fixing something to the fingers, we can easily deduce that both the 'Pintxos al dedo' and the baby toothbrush are equally suitable for amputees or people with limited control over certain fingers.

In short, a generalisable equation belongs to a good Design problem.

In general, the various examples presented have one part of the problem identification and Design solution in common: the way to control the movement of the object by wrapping it around or dressing the fingers or hand with it. These are not presented as universal proposals, but as alternative concepts that can improve the market. They are also inclusive proposals because they offer people with different disabilities a choice. As Renato Bispo rightly pointed out, the impossibility of choosing between different solutions is in itself a key aspect of the stigmatising stereotype (Bispo, 2018).

These examples translate different ways of promoting inclusion through Design. On the one hand, we have proposals specifically for people with disabilities, which, as it turns out, can be used by anyone. On the other hand, we realise that many other products, conceived under the same logic of being held and controlled as an extension of the limbs, can fill some gaps in the supply of solutions for amputees or for people with limited finger motor functions. All you have to do is look at the world through this same lens.

Inclusion occurs by promoting knowledge and offering alternatives to choose from. But these cases also emphasise how, during the Design process, there was a potential to create products that can be used by a more diversified range of possible users. This reasoning resulted from picking that initial variable – the 'identification and analysis of a good problem' – as a pedagogical tool and from a critical view on the Design of other products on the market.

Other considerations

The morphological similarity between the objects presented can raise a persistent question: if the solution proposed by a student turns out to be similar to something that already exists, should we consider it a valid proposal? Should it be encouraged and accepted as a correct answer to the given Design project exercise? Or should it be considered a copy or even an appropriation of the original?

In an open lecture given at the University of Minho – 'Dez Aforismos de Projeto' [Ten Project Aphorisms]

– Francisco Providência (2016) explained that if you base several proposals on the same set of assumptions (or variables), the solutions can be identical. In a pedagogical context and in terms of the 'problem identification', it could be said that if a Design student has followed the same reasoning or steps that other experienced professionals have taken before and came to identical conclusions, it could mean that they have done it well.

It is worth emphasising that the product of the work done in the classroom – in other words, the result of Design training – is not the set of 'objects' and creations from each student, but the construction and skill training of the students themselves – the future designers. Only after this stage, having been properly trained to find the drive and will to embrace such wide-ranging variables of people's diversity, will they be able to contribute to creating a more inclusive future.

#3.
'Small interventions with big impact'

#3.

Interdisciplinarity: Small interventions with a big impact

Interaction is a word we cannot escape from today – whether it's about work, leisure, or exercising citizenship. This broad scope is also a good way to gauge the relevance of the interventions that promote accessible facilities for all. This is stated in recently approved European directives on accessibility, which are mentioned below. Knowing that there are technical solutions, it is a question of integrating those requirements when designing accessible interfaces.

But we cannot always change everything at once (Figure 20). With this story we have realised that some relevant changes can be made with small interventions in interfaces for public use, with functionalities inspired by screen-swiping systems and by adapting the software, offering alternatives for viewing and usage preferences.

Figure 20. Porto Metro station with vending machine and validator (author, Porto 2004).

Key words: Interaction; Public Use Interfaces; Vending Machines; Swipe; Transport.

Introduction

Figure 21. Interaction with the ticket vending machine (author)

This story goes back to the beginning of the operation of Metro do Porto, at the beginning of this century (Fig. 21)[1]. Incorporated into the architecture Design of the stations, the ticket vending machines created difficulties for users, causing long queues and countless complaints (Figure 21).

The company found that many interaction problems resulted from the impact of certain technological innovations, such as the *andante* contactless cards, and to changes in the way the fares were organised, since the zones are organised in a honeycomb, rather than in a concentric layout, the most common

choice in many cities[2] . In this area, Metro do Porto, then already associated with TIP-ACE (Transportes Intermodais do Porto), was quite innovative[3]. Even the most informed and well-travelled citizens needed some time to get used to the new system.

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1. Metro do Porto began operating on 7 December 2002 – it is, therefore, a 21st century project that has changed the configuration and the experience of the city, as well as its relationship with the municipalities of the Porto Metropolitan Area, shortening the distances and boosting development and accessibility *(História do Metro do Porto, n.d.).*

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2. Transportes Intermodais do Porto (TIP) was created in 2002, bringing together Metro do Porto and STCP (Sociedade de Transportes Coletivos do Porto), which have since been joined by almost all the other public transport operators in the 17 municipalities of the Porto Metropolitan Area – all of which share the *andante* fare system *(História do Metro do Porto, n.d.).*

3. The foundation of this ACE (Complementary Grouping of Companies) dates back to 2002, when the new operator (MP) joined STCP – the largest local operator – with the aim of promoting intermodal use of public transport, with a single tariff plan for all transport modes *(Transportes XXI – Portal, n.d.).*

#3

In order to understand the reasons for so many problems, Metro do Porto decided to ask the author to study the interactions with that system. They wanted to identify the problems and indicate possible solutions (as long as they were compatible with an intervention on more than a hundred machines that had just been installed throughout the Metro network).

To this end, an assessment methodology was drawn up, resulting in a technical report (Trigueiros, 2004). It describes in detail the stages and obstacles detected when different types of users interacted with the vending machines and the validators of the *andante* system. Eventually, some proposals for improvement were tested, illustrating ways of mitigating some of the critical aspects highlighted in that diagnosis.

It should be noted that the development of solutions was not part of the services requested, so those were not implemented (at the time, the company had only contracted Design services from a local company). In the course of expanding ACE-TIP's network of operators, the company's experience led

them to acquire new types of machines, which were more accessible and up-to-date[4].

Adapted software

The results of this work were presented and discussed in a publication presented at the first national conference dedicated to Software Development for Improving Accessibility and Fighting Info-exclusion – Desenvolvimento de Software para a melhoria da Acessibilidade e combate à Infoexclusão – DSAI 2006[5].

The article is entitled 'Software adaptado a pessoas como nós!' [Software adapted for people... like us!] (Trigueiros et al., 2006), establishing a link between the universal nature of the aim 'all of us', citizens, and the technical term used: 'adapted

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4. This work created opportunities that would culminate in the author's PhD research, which focused on the study of the interaction with Public Use Interfaces in general and, in particular, on the large number of transport ticket vending machines in Portugal.

5. DSAI 2006 took place at UTAD – University of Trás-os-Montes and Alto Douro, on 24 March 2006.

software'. This expression was meant to designate a set of technical solutions used to enable people with functional diversity to interact with different equipment. Nowadays, most computer-controlled equipment is fitted with software that ensures accessibility. But modules can also be added to make assistive products compatible. This software is usually adapted to each person with functional diversity, according to their profile, specifications and preferences.

In addition to specialised products, this adaptation, among other things, may:

a) Offer alternatives for the layout settings, for the way text and image content is received, creating greater contrasts or changes in size and colour, and sound reproduction, etc.;

b) Provide alternative ways to use it, such as how the cursor moves or how to control pointer devices (mouse, switch, validation buttons, and others);

c) Consider software compatible with screen readers, which allow audio description of the content displayed in smartphones or computers. Currently, the integration of mobile devices into

these systems is already widely used. It offers versatile solutions that are much better suited to the specifications and preferences of each user, rendering a lot of interaction with such interfaces unnecessary.

One of the alternatives is to swipe through the on-screen options. This method of indirect selection works by 'scanning' the screen through the several menus available. This process enables the user to highlight each of the selected chosen elements, step by step. Validation is carried out with a single click when the desired option is selected. This is one of the methods used to adapt interfaces to people with different types of functional diversity. Combined with equipment such as the Track ball, Eye tracking, Switch or even a normal mouse, swiping allows computer controlled systems to be used with just a few movements of the limbs, the head or even the movement of the iris (Encarnação et al., 2015). For those not familiar with this type of equipment and to illustrate this example, we can recall Stephen Hawking – he was often photographed with this sort of equipment.

Figure 22. Detail of the relationship between the screen and the vending machine's side buttons (author).

Analysis of the interaction with the ticket vending machines

The work began by observing the interaction process and how the people involved behaved, in the context of using public transport (Figure 22). Firstly, and from a general perspective, some aspects related to accessibility were pointed out regarding the installation of the vending machines and the validators – their position and signage, at the stations or outside. To analyse interaction, four types of users were considered:

• regular customer, fully able and sufficiently informed;

• inexperienced users, elderly, physically weak or who have difficulties in accessing information;

• users with physical disabilities in the upper and/or lower limbs;

• users with sensory, visual and hearing disabilities.

Illiterate people and foreigners were also considered. Some problems related to accessing information share aspects with those from the last group.

The analysis of the interaction throughout the process of purchasing, charging with more credit and validating the transport ticket identified and noted, at each stage, the issues identified as (potential) obstacles that were observed for each of these groups.
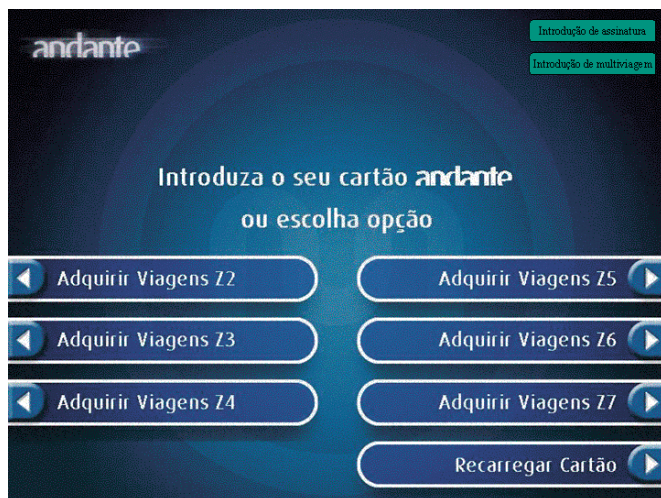
Figure 23. Screen configuration (options) at the time of the study (TIP).

Three types of obstacles to interacting with machines were identified. We called them 'Hardware'; 'Hard-Soft' and 'Software'. 'Hardware' refers only to the physical components of the machine – the on-site installation, the shape, size, and accessories of the machine itself. *The position and discreet design of the slot for inserting the andante card were the cause of one of the most common errors detected during the analysis. It was often confused with the ATM card payment interface. The slot was placed to the left of the dashboard, but it was hard to spot it.* Inserting coins into narrow slots directly in the steel panel is another example of an action that required a certain precision and control of movements – and this could be made easier.

Furthermore, built-in into a flat panel without enough space to approach it from the front, that machine can be difficult to use, particularly for wheelchair users.

'Hard-soft' obstacles are those found in the relationship between the material and immaterial parts of this sort of equipment: they refer to difficulties in understanding instructions, texts or diagrams on the screen and its relationship with the physical elements of the machine. For example, when there is a misalignment between the plane of the screen and that of the buttons, this can lead to misunderstandings due to the parallax effect (Figure 23).

The obstacles labelled 'Software' are those that only involve immaterial and digital features. *These are obstacles detected, for example, in communication elements. Unlike many others, these were directly related to Design skills. To illustrate this, we can point out the use of abstract pictograms that are hard to understand, or instructions for use installed on the front panel without sufficient contrast, which can lead to difficulties in distinguishing and/or understanding them. We have also found cases of inconsistency in the layout of the options and on-screen interaction. This led the user to hesitate and be forced to search for the information on the screen, instead of finding it naturally in the expected place.*

Figure 24. Illustration of the proposed reorganisation of the façade and of the vending machine display (with the collab. of L. Lopes).

'Soft Design' proposals

Some problems have been identified – now what?

This entailed taking action on new, complex and expensive equipment, so changing the hardware was out of the question. Thus, other forms of intervention more directed at the 'soft' elements of interaction were studied.

Each screen was studied to simplify content, hierarchy and consistency of information throughout the presentation of the various options. General suggestions were made, such as adjusting the font used, considering that the 'Z' could be confused with the digit 7 (Figures 23 and 24).

Swiping as an alternative proposal for interaction

Knowing about the swiping interaction inspired the proposal, particularly in terms of configuring solutions for the most demanding user profiles. Once access for was secured for this group, it would then be easier to solve the problems of the others, who had fewer requirements.

The proposal could be implemented on all the machines or in stages, selecting just a few strategically located ones. Illustrated in Figure 24, it envisaged:

a) Deactivating one of the 4 option buttons on the side edges of the screen, leaving only 3. This would make it easier to refer to the desired option – top, middle or bottom – regardless of its position on the panel. Removing one of the four buttons (from the bottom) on each side of the screen from the selection functions. These would be assigned the 'Language' and 'Cancel' functions – permanent functions throughout the process. Thus, this would also free up that area of the screen to be used as a footer, for example, to track the progress of the task, with a bar that would let users see how much had been completed and what remained to be done until the task was finished;

b) Releasing the two buttons that currently have those functions – 'Language' and 'Cancel', at the bottom – to work as navigation keys ('Forward' and 'Back/Cancel');

c) Applying a coloured cover (green and yellow respectively) to the navigation buttons, slightly raised above the frontal face of the machine. This detail would allow them to be pressed with the palm of the hand, or with the arm, without much need for precision or strength;

d) Adapting the software to enable the various options to be displayed by swiping. By doing this, the two largest buttons would be enough to select all the machine's options: to accept an option the moment it appears on the screen, using the green 'Ok' button (on the right), or to go back using the yellow 'Back' key (on the left). This adaptation could be presented as an alternative to a more expedient option, and it would only be triggered when needed, by pressing the 'Ok' key for longer (like the way the sound interaction is triggered, as it is in some ATM terminals). Regular and more skilled users wouldn't have to face and be annoyed by slow interaction. The sequential presentation of options is also the most suitable for implementing audio interaction – technically simple, with recorded instructions accompanying each displayed step.

Finally, a face interacting with people in the centre of the screen was conceived to promote empathy. This would include a friendly voice to improve user experience.

The Design and proposal for intervention was not part of the analysis commissioned, so the changes were not implemented. Still, we have noticed that over the last few years various adaptations and interventions have been made in line with that diagnosis and suggestions. In short, we still believe that all the proposed interventions would make this interface more accessible and more friendly for everyone, using the existing means and current technologies. These would increase usage autonomy for people with different types and degrees of disability.

'Alternative'
'flexibility'
'compatibility'

Topicality and the European regulatory framework

It is not appropriate here to review the legal context of this issue, but we believe that the topicality of this agenda could not be ignored. The entry into force of EU Directive 2019/882 on the accessibility requirements for products and services directly targeted this type of equipment and the transport services themselves. In fact, an extensive list of accessibility requirements is listed in this document, which generally aims to ensure that:

'The product, including its user interface, shall contain features, elements and functions, that allow persons with disabilities to access, perceive, operate, understand and control the product'(Directive (EU) 2019/882).

However, Directive (EU) 2016/2102 on the accessibility of the websites and mobile applications, the same principles were maintained and the solutions and requirements for accessing information in digital format were disclosed. This is a key element pertaining to the equipment and services discussed in this story (Directive (EU), 2016/2102). For the most part, these are old and recurring demands – for which there are technical solutions that have been widely published – but which have been given visibility and echoed by the law.

On the other hand, the key words for observing most of these accessibility requirements are 'alternative', 'flexibility' and 'compatibility', as opposed to 'exclusive', 'special' or 'adapted' (i.e. suitable for people with disabilities).

'Alternative', 'flexibility' and 'compatibility' are the truly appropriate words to describe intelligent 'good Design' solutions, i.e. potentially inclusive solutions!

Considerations

Today, more than ever, accessibility and inclusion are being discussed in all fields of activity. The digital revolution that has taken place over the last few decades has made access to information and Information and Communications Technology (ICT) increasingly important in everyone's daily lives and in their quality of life.

From then (2002-2004) until today, there has been great progress in awareness regarding accessibility problems and the consequent forms of discrimination associated with the lack of accessibility. These facts have highlighted the need to regulate and disseminate knowledge and good practices, particularly regarding the creation of new products, but also including the transformation of existing solutions. The recent COVID-19 pandemic has further contributed to collective awareness and mobilisation regarding this issue.

Here it is important to emphasise how a swiping solution, when used specifically in the software suitable for people with disabilities, benefits the proposed intervention in equipment intended for the general public. Thus, this case illustrates the benefits of a wider knowledge about accessible technology and solutions compatible with its interaction with people with disabilities. This is the only way we can hope to integrate them into the design of new equipment. On the other hand, we realised that keeping the existing equipment, and just with small interventions, it would be possible to make changes with a major social impact.

#4. Workstation for Alberto

#4.

Partnerships: Workstation for Alberto

This is a story that begins with the 21st century. There are some characters who have already disappeared and others who continue to mark the history of inclusion through Design in Portugal. With it we want to highlight the benefits of partnerships between academia, social institutions and a large office furniture company that has since disappeared – Handy. It is based on one of the first Inclusive Design exercises focused on the workplace – HANDYcap. This work, carried out at the EUAC[1], resulted in a set of full-scale prototypes produced with commitment by extraordinary students (Figure 25). It reveals the impact of these works and its recognition in 2002 with the award of an Honourable Mention in the Jaime Filipe Prize. We decided to organise this plot around a story: a workstation for Alberto.

Figure 25. Prototypes from the six work groups of the HANDYcap project (author and students).

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1. EUAC: Coimbra University School of the Arts (closed down on 30 November 2016).

Introduction

Figure 26. Photo of the façade of the Handy company, during the first field trip with the students (author).

The products on offer in the office furniture market are generally geared towards standardised solutions, aimed at production in profitable quantities. One of the problems faced by people with functional diversity is access to equipment that meets the needs of their condition. Adapted solutions are often improvised. Thus, even when they are functional, they end up being handmade objects, devoid of aesthetic values, unpleasant to the eye and very stigmatising. Because of all this they are often rejected by the recipients themselves. In this exercise we wanted to find out the specific requirements of people with functional diversity in order to innovate in the office furniture market.

A partner company: Handy

The desire to innovate in the field of furniture Design led us to find out more about the market and the constraints of producing metal furniture (Figure 26). Handy was a large company that manufactured (metal) office furniture[2]. It was located in the school's geographical area and it agreed to collaborate for this exercise. It organised a study visit for the students and provided some technical documentation to support the implementation of the proposals. We know that, in the meantime, several companies have been specialising in providing competitive solutions for the market for products with use and accessibility requirements, compatible for people with functional diversity. In the realm of interior fittings and furniture, we can mention the example of Easyliving[3], which combines the design service with the supply of the products themselves.

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2. Handy no longer exists.

3. http://www.easylivinghome.co.uk/index.htm

#4

Historical and current context

This story starts at the beginning of the 21st century. The fact that more than 20 years have passed since then is significant since it confers consistency on the initiatives that have continued to this day. This is the case with the Engineer Jaime Filipe Prize. It was inaugurated on that date and continues to promote and reward innovative projects every year. The importance of this figure led us to dedicate the following paragraphs to him.

The Engineer Jaime Filipe Prize in Portugal

Jaime Filipe (1932-1986) was an electrical engineer who became famous as an inventor of technological solutions for people with disabilities, and it was he who introduced the concept of Rehabilitation Engineering and Technical Aids in Portugal. Besides developing his inventions – some of which were patented and produced in the USA – he was concerned with organising and disseminating knowledge on the subject, taking initiatives such as founding CIDEF – the Innovation Centre for the Disabled in 1974 and, in 1978, creating a programme for national television about innovation in solutions for people with disabilities, entitled 'Novos Horizontes'[4].

---

4. Meaning 'New Horizons'.

Figure 27. Presentation of ENIPD on the National Rehabilitation Institute (INR) website.

The creation in 2001 of an award with his name – currently promoted by the National Rehabilitation Institute (INR) – intended to evoke and recognise the example of his life and work. He was the one who inspired this same competition which, among other things, aims to promote research, innovation and creativity with respect to 'technological and Design solutions' (…) 'that contribute to promoting the functionality and social participation of people with disabilities' (Prémio Engineer Jaime Filipe_Regulamento, 2021). Currently some higher education institutions are already involved in publicising this initiative, which has also awarded several academic research works. Although we are aware of the positive evolution and greater visibility regarding the role of Design for the inclusion of people with functional diversity, here we find another way to nurture innovation in Design and in other disciplinary areas, in favour of improving the quality of life of people with functional diversity.

The relevance of these events is also highlighted when we look at legislative initiatives such as the Estratégia Nacional para a Inclusão das Pessoas com Deficiência (ENIPD) [National Strategy for the Inclusion of People with Disabilities], approved on 31 October 2021 by the Council of Ministers (*Resolution of the Council of Ministers 119/2021, 2021-08-31*, n.d.), (Figure 27).

In the introduction that contextualises and explains the purpose of that document, we can read:

A number of specific initiatives and measures aimed at promoting the autonomy, the participation and self-determination of people with disabilities are worthy of note: the Social Benefit for Inclusion, the Legal Framework for Inclusive Education, the creation of the 'Independent Living Support Model' Programme, the approval of the new Legal Framework for the Accompanied Adult Person, the Promotion of the Employability of People with Disabilities and the Promotion of Physical and Digital Accessibility *(*Council of Ministers Resolution 119/2021, 2021-08-31*, n.d.)*.

The time gap and the enduring impetus guiding these initiatives unite them in the same plot. They open a window of opportunity to insist on promoting the quality of designers' services to optimise products – because they make a difference to people's lives and working conditions.

Figure 28. Exhibition showing the works and prototypes at the final presentation event at the APCC in Coimbra (17th December 2002).

The HANDYcap project

In 2001-2002, the 4th year students of EUAC's Degree in Interior and Equipment Design were offered a programme of project work guided by the principles of Inclusive Design. This entailed designing a 'Workstation for people with special needs' and was called the HANDYcap Project, a little play on words using the name of the Handy furniture company, which collaborated in this exercise.

Based on a partnership with the Núcleo Regional do Centro da Associação Portuguesa de Paralisia Cerebral (NRC-APCC) [Regional Centre of the Portuguese Cerebral Palsy Association], six people with very different features and diagnoses were selected and made themselves available, sharing the fact that they had some physical disabilities. The work focused on designing furniture solutions to improve the working conditions for these people. As part of the initial research, the students also visited the Centro de Reabilitação Profissional de Gaia (CRPG) [Gaia Vocational Rehabilitation Centre] – an institution that has maintained a regular partnership in this sort of exercise. With the support of these two institutions, the students were able to understand everyday problems faced by people with disabilities and learn about some of the solutions proposed by the technicians. These solutions included assistive products for everyday tasks, rehabilitation services for work, training and technologies to support using computers, etc. They came into contact with a whole range of people, objects, and vocabulary, in short, a whole world that was practically unknown to them.

The set up and the work process

The students were divided into small groups. They began by getting to know the selected people in person and studying their working conditions. A few tasks were analysed in detail, chosen by the group after analysing the data they had collected and the constraints the premise implied.

Throughout the proposal development, and following the creative process of Design as a subject, they kept in close contact with the people concerned, and showed them drawings and models of the ideas they had come up with. The final solutions were also presented to the recipients and later to the public, locally, at an exhibition organised by the APCC along with the school (Figure 28).

Inclusive Design in the workplace

Alberto's workstation

Authors: A. Ferreira e T. Simões
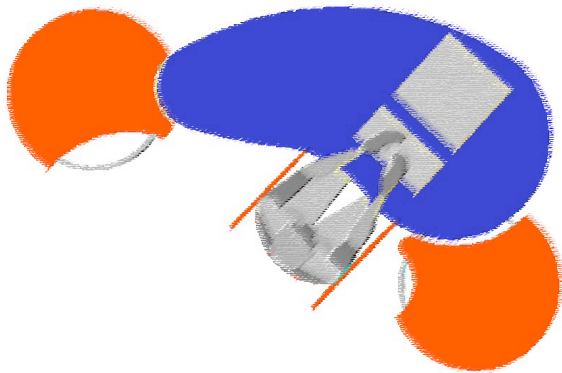
Figure 29. Proposed layout for Alberto's new workstation (Authors: A. Ferreira and T. Simões).

Problem/Target

Alberto carried out a number of administrative tasks at the reception desk of the Coimbra Cerebral Palsy Association. He was one of the volunteers for this study. Diagnosed with Friedreich's Ataxia – a progressive and very incapacitating disease marked by difficulty in coordinating movements, associated with other neurological signs (...) leading to a loss of autonomy in walking, and many other impediments to sufferers having independent lives (Orphanet, n. d.).

Limited arm movement and the use of a wheelchair affected the organisation of his office space. He used a computer with a very bulky screen and found it difficult to reach and handle personal objects – such as his wallet, for instance – because the workspace was filled with the equipment, the keyboard, etc.

Figure 30. Alberto's workstation, equipped with the prototype created by the students (Authors: A. Ferreira and T. Simões).

Solution

The proposal reduced the dimensions of the main worktop to the bare essentials (Figure 29). A satellite table was made to complement the main table, allowing for a more flexible working space organisation. Underneath the main worktop, a small detachable surface has been added, and slightly lowered, making it easier to handle personal belongings when needed. Flexibility and mobility make it easier to organise the various elements in the space, making this proposal's relevance wider-ranging than the specific case that gave origin to it. This is the main response and contribution to inclusion – which we will see again in the work we present below.

This case stood out from the others because the prototype of the proposed equipment, built by the students in an academic context, was being used by Alberto himself at his workplace (Figure 30). This was this story's motto: to exceed the boundaries between what is produced in academia and the real impact on people's lives.

Tabletop with a slot and an adhesive area for attaching objects

Authors: F. Coimbra e J. Carvalho

Problem/Target

The case studied involved someone with paralysis in one of his arms. Because of this, he had problems writing on slippery surfaces and without the support of one of his arms or hands. Anyone with a hand temporarily occupied can benefit from the solution.

Solution

Tabletop with v-shaped slot for attaching paper or envelopes (Figure 31). This establishes the boundary of an area lined with non-slip material that facilitates the tasks of writing and putting the sheets into envelopes for sending correspondence (a task the students had observed). This solution comes in a version that can be customised. A feature that could be added to existing worktops.
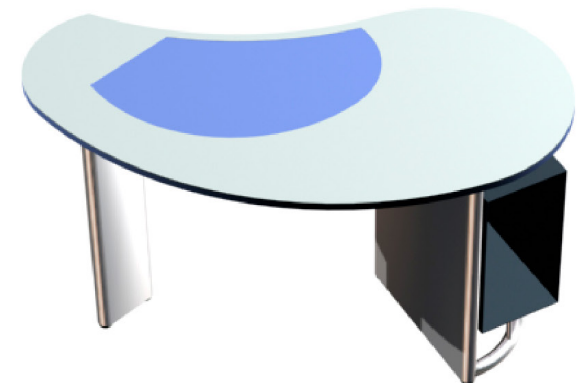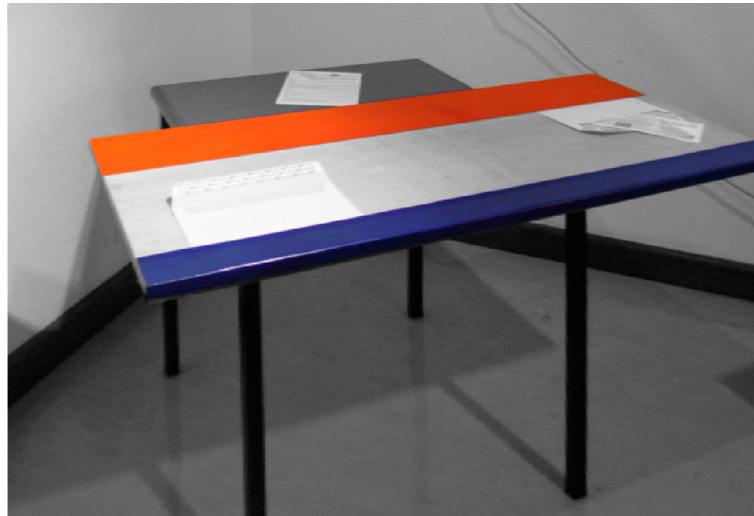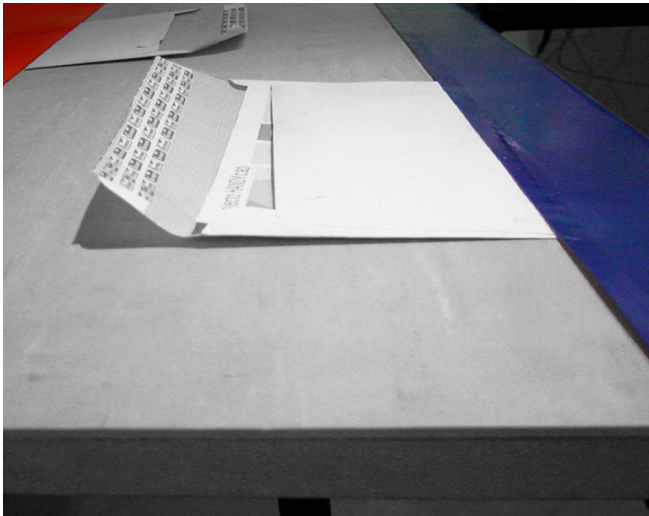
Figure 31. Proposal for tabletops with a slot and an adhesive area for attaching documents (Authors: F. Coimbra and J. Carvalho).

Workstation lowered for use with one foot

Authors: C. Cavaleiro, J. Moreira e P. Carvalho.

Problem/Target

The case under study concerned a person with cerebral palsy, who had major difficulties speaking and coordinating movements. The right foot was his way of using the computer equipment, so there were several problems with the inadequacy of the equipment he used. In brief, the following were identified:
a) distance to and viewing angle of the monitor;
b) position of and reaching the necessary equipment; and
c) interface with standard equipment: keyboard with small keys, difficulties switching on the CPU, and inserting CDs and sheets into the printer.

Solution

Given the rather particular features of the case, it was necessary to create a set of elements specifically for this user: a hinged table that could be manoeuvred in such a way that the printer and the scanner could be placed closer to a place easier to reach with the user's right foot (Figure 32). The monitor would be placed on a fixed central base, at a height compatible with the natural angle of the user's head when looking towards the keyboard, avoiding having to constantly move and switch focusing distances.

The keyboard can be attached to the wheelchair to ensure that its relative position does not change when the wheelchair is moved. This keyboard must be wireless to facilitate all manoeuvres (Figure 32).

Despite having been designed for a very specific user, this solution could be turned into something more generic, considering the advantages of the hinge features of the lateral elements used on a table planned for any sort of user, just by adjusting the height of the table legs.
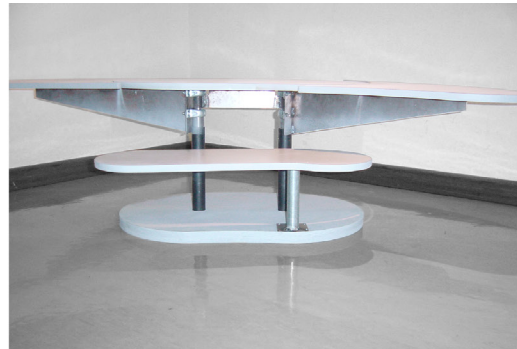
Figure 32. Images of the desk proposal with hinged arms and lowered keyboard support (Authors: C. Cavaleiro, J. Moreira and P. Carvalho).

Multifunctional hinged table

Authors: F. Pais e R. Pereira

Problem/Target

This proposal was based on the study of children with cerebral palsy in a learning context. It turned out that a large number of considerably diverse people use an equally large number of tools and perform tasks in the same space. On the other hand, it was difficult to group several tables together and some wheelchairs were difficult to fit – particularly those with electric controls facing upwards.

Solution

A modular table was proposed, compatible with classroom, occupational therapy or dining functions. It is comprised a rectangular, reclining top for painting tasks; its height is adjustable, so that it is compatible with standing (on its stabiliser) and sitting tasks (Figure 33).

The front is covered with non-slip material and has a folding tray on both sides, which allows wheelchairs to fit in and, at the same time, can be used as a stand for displaying reference books.
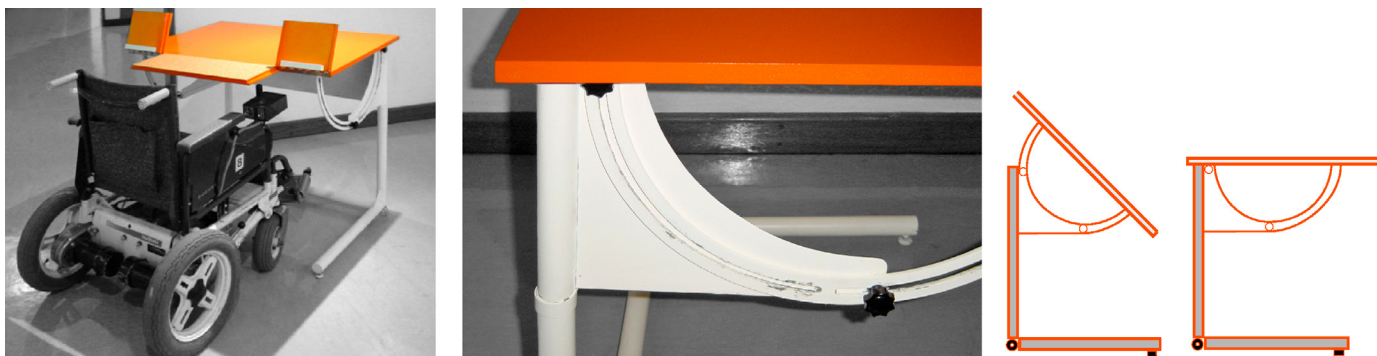
Figure 33. Images of the hinged table proposal, illustrating the position of an electric wheelchair facing the tabletop frontal layout (Authors: F. Pais and R. Pereira).

Table with swivelling shelf

Authors: C. Duarte e S. Rato

Problem/Target

People who use wheelchairs and have limited mobility find it hard to move around to fetch any piece of equipment and files they might need during the working day and get back to their workstation.

Solution

The proposal is based on optimising the working area by combining the worktable with a cylindrical shelf, which provides greater on-site storage capacity (Figure 34). Each shelf rotates individually, which allows the users to bring the objects placed on it closer to them. One shelf is right beside the tabletop and serves as an extension of it. Several solutions for combining worktops were tested to assess their potential versatility within a workspace, thus checking the principles of Inclusive Design once again.

Figure 34. Desk combined with swivelling top shelves (Authors: C. Duarte and S. Rato).

Figure 35. Trophy for the Honourable Mention received at the Engineer Jaime Filipe Prize, awarded to all the works in the HANDYcap project (INR).

Considerations

This work was remarkable for several reasons. First, because it is the result of collaboration between academia and two social institutions, with the support of a company. This sort of inter-institutional collaboration is now a flagship for many funding programmes that look to society for inspiration and motivation to invest in research and development.

In Alberto's day-to-day life and that of the other participants

One of the prototypes of this set, built with suitable finishes and robustness, was immediately installed in Alberto's workstation. This brought benefits to the daily life of a specific person. For the students and authors, this brought the joy of seeing a project become reality. Also, apart from this case, and even if these were students without specialised training, we can see in this set the tangible result of how the problematisation of the project, based on the specific requirements of users with disabilities, brought about solutions relevant for so many other people in a range of circumstances. And this is what we should be looking for when promoting inclusion through Design.

Dissemination and participation in other events

The visibility of this work has led to requests for some of these prototypes to be shown as examples of good practice. The Centro de Reabilitação Profissional de Gaia (CRPG)[5] took some to its stand at AJUTEC, an event specialising in disability solutions, at Exponor. They were also put to use at UTAD's Centro de Engenharia de Reabilitação em Tecnologias de Informação e Comunicação (CERTIC) [Centre for Rehabilitation Engineering in Information and Communication Technologies] and were presented at an exhibition featuring Design and assistive products as part of the 1st DCI – Design, Comunicação e Inclusão [Design, Communication and Inclusion] event held in 2004[6] at UTAD (Figure 35).

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5. Centro de Reabilitação Profissional de Gaia (http://crpg.pt).

6. There have been four DCI events to date, described in a blog (Design, Comunicação e Inclusão, n.d.).

Figure 36. Troféu da Menção Honrosa do Prémio Eng.º Jaime Filipe, atribuída ao conjunto dos trabalhos do projeto HANDYcap (INR).

The interest shown in the solutions developed by the students underscored their worthiness and the importance of Design in qualifying the products and the working conditions for people with functional diversity. From an academic viewpoint, at national level, this exercise marked the beginning of continuous work to promote Inclusive Design in higher education. The methodological approach and the growth of implicit skills and attitudes in the development of inclusive projects has revealed a number of other beneficial effects on students' professional and personal training. Our enthusiasm for these visible outcomes among students can be gleaned from this 2007 article:

'By associating the pedagogical dimension of the exercises with their results, the introduction of the topic of Inclusive Design not only means creating better products, but also better students and so better designers for the future.'[7] (Trigueiros & Burrows, 2007).

_____

7. Tradução livre de: *By associating the pedagogical dimension of the exercises with their results, the introduction of the topic of Inclusive Design not only means creating better products, but also better students and so better designers for the future.*

Honourable Mention awarded by the jury of the 2002 Engineer Jaime Filipe Prize

The set of proposals from the HANDYcap project received an Honourable Mention in the 2002 Engineer Jaime Filipe Prize, which made all the participants very proud (Figure 36). This is what the Jury said:

'To the students and teacher of Interior Design II at ARCA – Escola de Tecnologias Artísticas de Coimbra | HANDYcap Iniciativa Académica and the set of solutions resulting from the analysis of workstations for people with special needs, which proposes equipment Design solutions based on universal Design principles and which begins by studying real cases for research work, bringing innovation to Design and raising awareness about universal 'Design', by adapting what is standardised to specific cases and actual needs, and making materials more usable (effectiveness, efficiency and user satisfaction).'

(Document drawn up by the jury of the 2002 Engineer Jaime Filipe Prize)

#5. Inclusive House of the Future

#5.

Dissemination: Inclusive House of the Future

There is great potential for innovation in Design courses. Sometimes Design work results in interesting proposals that could be of great use to society. However, these don't usually leave the classroom or the academic context where they are produced. The exhibition part of Casa do Futuro Inclusiva [Inclusive House of the Future], at the Museu das Comunicações in Lisbon, stands out for overcoming these barriers. In a context of business and technological innovation, the exhibition made it possible to share with a wide audience, for over two years, several works dedicated to Inclusive Design, produced by students (Figure 37).

Figure 37. Poster for the exhibition on Inclusive Design at the Fundação Portuguesa das Comunicações, Lisbon (Author: P. Pereira).

Key words: Exhibition; Dissemination; Museu das Comunicações; Domotics.

Introduction

In 2005, a permanent exhibition was on display at the Museu das Comunicações[1], in Lisbon, which aimed to give context in terms of houses to the use of some of the technological products and innovative services offered by the company then called Portugal Telecom (PT). In the bedroom, there was a (landline) telephone with a screen, explaining the possibilities of using it for telecare for sick people; in the kitchen, the fridge door had a built-in TV screen which, besides showing TV programmes, could be used to view the video intercom doorbell; the living room showed how the TV allowed normal programming to be alternated with some home automation controls that had been installed, such as lighting control or the movement of windows and blinds, concealed in the decoration. This exhibition was called 'House of the Future'.

When I visited the exhibition, I saw it as an opportunity to publicise some of the work I had done in previous years with students from the Equipment Design degree course at the Coimbra University School of Arts (EUAC). It comprised a series of projects created from the perspective of people with special needs in various everyday situations.

Some of those works had interesting solutions, and thanks to the students' commitment great exhibition-quality prototypes were made. At that time, the most recent academic exercise was focused on the relationship between domotics (home automation) and accessibility, so it seemed appropriate to complement the solutions presented at that exhibition with the students' proposals.

As a teacher, I was convinced of the relevance of their work. When I asked who to contact to present this idea, I was taken to the office of Gonçalo Areia, director of PT (Portugal Telecom) and mentor of the exhibition. After he had seen some documents related to the students' work, he was very enthusiastic and invited me to include those works in the exhibition, taking advantage of the fact that it was being refreshed and renamed 'Casa do Futuro Inclusiva' [Inclusive House of the Future] (Figure 38). To this end, a protocol was signed between the company and the Coimbra University School of Arts. A budget was allocated for the production of various posters illustrating the works to be exhibited, along with the respective scale models.

1. https://www.fpc.pt/pt

Figure 38. At the opening of the exhibition at Fundação Portuguesa das Comunicações, Lisbon (FPC, 2006).

DESIGN INCLUSIVO | EUAC

DREAMS FOR ALL

INTERFACES PARA ACÇÃO E COMUNICAÇÃO

SWITCH & MÓVEL
Pulseira com Switch para Control

Problema / Alvo
Control ambiental para pessoas com problemas motores
e de comunicação (paralisia cerebral).

Solução
É um comando em forma de "bracelete" constituído
por duas peças, que podem ser usadas juntas ou
separadas como pulseiras. Permite, com gestos
grosseiros da mão ou do próprio braço, activar diversas
funções domóticas (como por exemplo: ligar/desligar
a televisão, ligar/desligar o computador, acender/apagar
luzes, abrir/fechar estores).
Numa das peças existe um ecrã digital que mostra,
uma de cada vez, as funções disponíveis. Na outra
peça, situam-se dois botões - ON/verde e OFF/vermelho
- que serve para seleccionar e activar ou desactivar os
comandos, respectivamente.

PROJECTO DE EQUIPAMENTO DE INTERIORES
DOCENTE Paula Trigueiros
ALUNAS Andreia Tefile
2003/2004

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www.inac.pt

Exhibition project

Several tasks had to be carried out to deliver the project, starting with selecting and collecting suitable works and getting the agreement of the respective authors.

Communicating with a wide audience requires great discipline in selecting the communication criteria and media. The heterogeneity of the students' documents required some work to organise and standardise the content. New descriptions had to be written for each proposal and the images of each design project and model had to be collected or edited to ensure the minimum quality required for large format printing. P. Pereira, then in charge of EUAC's communications office, was in charge of designing the poster and display panels.

Presentation structure

The concept defined for this presentation was distinctly rational and in simple language. The graphic organisation of the panels was based on a matrix for positioning texts and images that included

some shared data (affiliation, date and authorship) and distinguished each of the five exercises carried out so far and dedicated to Inclusive Design.

The descriptive texts for each project have been summarised into three main topics:

• Product name and title of work;

• Problem and target audience: based on the theme for each statement, the students studied the existing solutions and observed real situations and the difficulties experienced by a specific person (the case study). This approach and task analysis led to defining a problem – first from the perspective of that person and then generalising it to consider other people and situations in which the same may occur;

• Description of the proposal: a summary text explaining the main attributes and objectives of the proposal and how it addresses the problem in question.

Accompanying the text, some images illustrating the project were displayed (Figure 39).

Figure 39. Summary panel of the 'Switch and mobile' – a wristband for home automation controls (by A. Tefile).

77

Exhibition route

The Design exhibition was part of the 'Inclusive House of the Future' tour. A panel at the beginning of the route described the concept of Inclusive Design and the academic context of the exhibition.

Visitors could then see the various works, grouped by theme and the respective scale models next to them.

The work process

Carried out in the context of Equipment Design classes, these projects aim to raise students' awareness of the concept of Inclusive Design and about the importance of considering the specificities of all citizens in their syllabuses, particularly of people with special needs.

Based on case studies of real people with different types of disability, the students try to focus on a task in which they have noted problems or a mismatch with the existing equipment/solution level. The proposals have been developed to solve usage problems faced by people with the most difficulties but bearing in mind the possibility of making them suitable for everyone, so that those become products for as wide a market as possible.

Outcomes

Students' contact with the actual problems faced by people with disabilities makes them more sensitive and lets them see disability more naturally. Young designers' inspiration

is directed at solving the problems that have been equated and perfected through method and rigorous analysis. Since it is a programme of project work for Design, the solutions are both appealing and often truly innovative.

Scenarios proposed in the statement

Each work proposal presents students with a scenario that fits the problem to be tackled. This is explored by each student during the course of their research.

Here is an extract from the statement in one of the work proposals:

'We have a Design office and a new client comes in: a businessperson who wants to prepare new products to take to an international fair.' The target people are over 60 with some disabilities, fairly well educated and a good standard of living. As well as reflecting the lifestyle and needs of the 21st century,

these products must follow the principles of Inclusive Design, thus being user friendly and flexible in how they can be used, featuring alternatives or accessories that enable their adaptation for use by people with the most diversified capabilities, profiles or preferences' (statement from 2002-03, 'Gestures without hands').

78

Five themes in five years of inclusive design projects

For this exhibition, some works were selected from the five Design exercises carried out over five academic years, from 2001 to 2006. All of them focused on Inclusive Design and had a different theme each year:

2001-02: 'HANDYcap – Workstation for people with special needs'

Carried out in partnership with the company Handy[2], whose name ended up being transferred to the exercise, it was dedicated to designing furniture and equipment solutions related to the workstations (described in Story #4).

2002-03 'Hands-free gestures – household products on a hand scale' (described in Story #2).

An exercise that envisaged designing products to make everyday household tasks easier, such as cooking or performing one's personal hygiene, targeting people over 60.

2003-04 'Dreams for all – action and communication interfaces' TV controls, video intercom doorbells, alarm clocks, and home appliances control panels are some examples of the very varied interfaces that have been tackled in this exercise.

2004-05 'Domotics and accessibility – Interfaces for people with special needs'

Based on a field trip to a smart home[3], this exercise explored different ways of using home automation technology to promote autonomy in the homes of people with disabilities.

2005-06 'Pro-F-Use – mobilidade e transporte de objetos de uso pessoal' [mobility and transporting of personal belongings] (competition).

An international competition set the tone for that year's exercise: ways for people with disabilities to transport personal belongings. One of the EUAC students, J.P. Coimbra, won this award with his proposal 'Babyport': a baby carrier that could be attached to wheelchairs (Figure 40).

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2. Handy was a large manufacturer of office furniture made of metal, which has since closed down.

3. Field trip organised in partnership with the company JGDomótica (https://www.jgdomotica.com).

Figure 40. Panel depicting the winning entry in the Pro-F-Use competition with the proposal BabyPort: accessories for transporting babies in wheelchairs (author: J. P. Coimbra).

Opening and promotion of the exhibition

Casa do Futuro Inclusiva opened in May 2006. In one of the promotion leaflets (Figure 41) the exhibition was presented as follows:

(...) regarding the technological aspect (of the Fundação Portuguesa das Comunicações' mission), we highlight the strong social commitment visible in the Casa do Futuro Inclusiva (Inclusive House of the Future), which only became possible thanks to the efforts of 50 organisations that took on their participation in this project as an act of citizenship, setting up a platform to demonstrate technological solutions especially aimed at citizens with special needs.

In the same leaflet we find:

More than a contemporary expression, Inclusive Design is proof of the evolution of Western mentality (...).
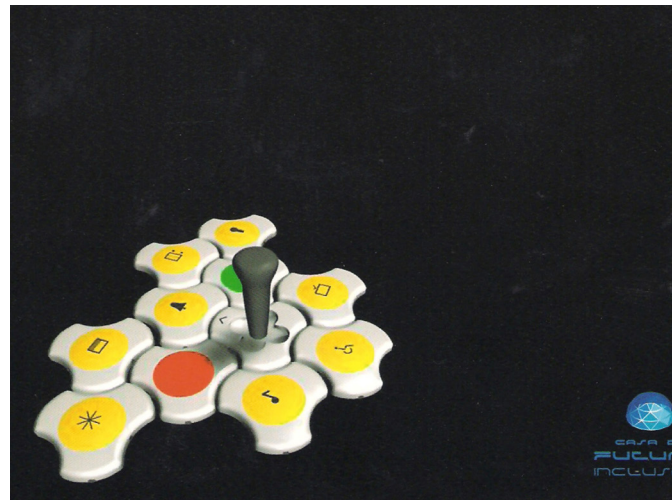
Figure 41. Leaflet promoting the exhibition with an image of the 'Smart Form' project – modular elements for multifunctional control (by A. Cristóvão and C. Tissier).

Considerations

After all these years, we are now able to draw some conclusions about the relevance of this event. One could say that exhibitions featuring academic works are common – which is true. However, this was no ordinary exhibition for a number of reasons:

- The national business context: because of the significance of Design being associated with the technologies and innovative solutions shown in the Casa do Futuro in Lisbon (away from Coimbra, the city where the school was located).

- The extensive duration: the works have been on show for over two years – and so has the implicit message.

- The focus on Inclusive Design: there were about two dozen works from various curricular years, grouped under the same banner: inclusion through Design.

Other considerations

To conclude this story, it's worth mentioning a few contextual considerations: at the time, Design degree programmes lasted five years and the curricular units were annual subjects. Compared to now, that timetable allowed more time for both the proposals and the students to develop and mature. It should also be said that training at that institution included a common year for all the courses taught, focused on an artistic and workshop-based work. This gave the students a very distinctive culture, conducive to active involvement and collaboration in these events. Furthermore, we were in the early days of developing imaging software, with rudimentary three-dimensional modelling processes. When we look at some of the images of the proposals, we must consider this historical and technical context. Even so, we can see how some of the solutions presented were particularly prescient and innovative – especially considering that the students in question were not tech-savvy.

Final note

A public exhibition of the works requires investment: initiative, a certain amount of discipline, rigour, and efficiency in communication. Sharing the work produced in the academic context with the community is essential. It helps to encourage innovation by presenting sketches and hypotheses for exploratory solutions that can influence companies and create opportunities for students. But this story is also about the synergies generated by the partnership between institutions – a Higher Education Design Institution and a large Portuguese company.

By presenting cutting-edge technologies alongside these embryonic projects, it illustrated the opportunity for the parallel development of these skills in the training of future designers.

Inclusion will only really happen if the solutions adopted by companies are comprehensive and broad enough to encompass a larger market, on a par with the rest, as options to be offered to general citizens. The visibility provided by initiatives from large companies (such as PT in this case) boosts the development of solutions born in an academic context, while simultaneously consolidating their social responsibility.

2. Problem identification: The Literature

2.1 Contributions of Inclusive Design to Design training
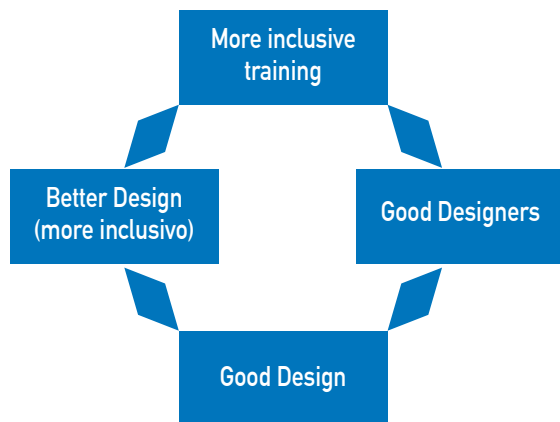
Figure 42. A scheme to invest in inclusive training for designers will result in better Design.

Much of what is written about Inclusive Design refers to the features and requirements needed to promote Design with people in mind. When we talk about people, we're usually referring to the target audience, the participants in a research project, or the users. But there are also people on the other side: on the side of those who are creating and developing.

It's the designers and the students who will themselves be future designers.

Despite the relevance of the arguments and opportunities, the commercial advantages and social benefits that can derive from Inclusive Design, it is clear that the public interested and involved in this issue are generally few, both in terms of research and in the development of inclusive solutions and accessible technologies. 'It's always the same people' is what we hear about those who take part in events and present papers at conferences on the subject of inclusion.

'It's difficult to recruit people, technicians and designers who are interested and competent in implementing

inclusive measures,' said Susanna Laurin, head of FUNKA (in an interview, Stockholm, April 2019).

Just like transforming a product is more complex when it comes to changing what has already been done poorly, the training of future designers must also be guided, from the outset, towards a broader sense of diversity, which is more tolerant and informed and, finally, aware of the social role of Design. As young people, students are absorbing a whole set of references that will influence their future professional behaviour and practices.

In addition to what designers can do to make products and services more inclusive, we are interested in thinking about what an inclusive approach to Design training can do for future designers (Figure 42). We have combined our experience with what we have gathered from references in the literature to list some of the contributions that we deem meaningful, as follows:
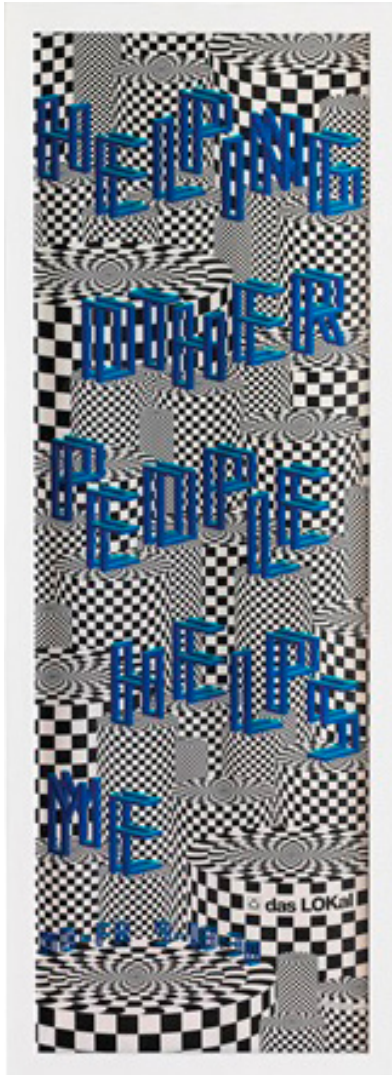
Figure 43. Sagmeisters' Pannel: "Helping other people helps me" (Sagmeister, 2005).

Self-esteem

'Everyone wants to be valued in one way or another. (...) They want to be valued by other people, but they also want to think of themselves as good people'[1] Femid Handy (edX, 2021).

A task with a significant contribution translates into a feeling of purpose that increases their self-esteem (edX, 2021). This cause-effect relationship of the phenomenon 'Do good and feel good'[2] confirms the positive impressions we have been noticing over more than twenty years of work on Inclusive Design.

In his book 'Things I have learnt in my life so far'[3], Stefan Sagmeister (2008) summarises one of his conclusions: 'helping others helps me'.[4]

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1. "Everyone wants to be valued in some way or another. They want to be valued by other people, but thay also want to think of themselves as good people" (edX, 2021).
2. "Do good, feel good" (edX, 2021).
3. *"Coisas que aprendi na minha vida até agora"* (Sagmeister, 2008).
4. "Helping other people, helps me" (Sagmeister, 2005).

(Figure 43). We deliberately chose this designer an example because he is in no way associated with the topic of inclusion through Design. As Pullin (2009) and Myerson (2017) did by including examples discussed by known designers into their publications, this is a deliberate move to break the boundaries of classification by labels in different fields and methods of doing Design. In one way or another, those reveal prejudices built up mainly by lack of knowledge about what can be considered inclusion through Design.

Impact of real and different people

Since the beginning of this journey, we have noted some striking effects that this approach leaves on higher Design education students. We noticed some changes, particularly in their motivation and commitment, when they discovered how much their skills were worth and their power to change the world for the real people with whom they interacted as they developed their work. Some processes and reflections have since been published (Trigueiros & Burrows, 2007); (Trigueiros, 2006).
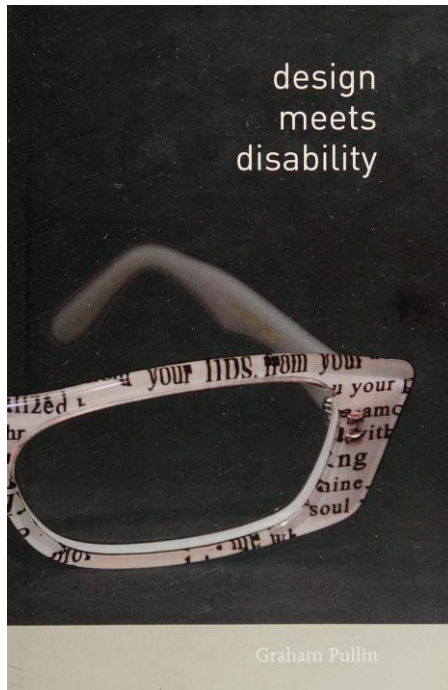
Figure 44. Pullin's book cover, 2009.

Identity and the role of masters

There is a broad consensus regarding the importance of the training stage for teaching Design, architecture and other related fields, in defining the attitudes and paradigms that people start from when they become professionals. Their role models and ambitions and, we dare to guess, the image they create of what they want for themselves, are clearly influenced by what they have seen and learned during their training, especially from those they accept as their masters – be they teachers, acclaimed professionals or some work colleagues.

Charismatic assignments

Heller and Talarico (2011) published a piece dedicated entirely to disseminating and discussing the 'extraordinary' role of some assignments created by Design educators. They discuss to what extent these proposals reveal the charisma of the authors and teachers themselves and emphasise the impact that some exercises have had on students, and the copies that many other teachers have made of them. (Heller & Talarico, 2011).

Advantages

Pullin's work (2009), (Figure 44), describes the mutual advantages that would emerge if the Design of solutions for people with disabilities were more influenced by the culture and 'fun' environment experienced in Design schools. He brought together a series of examples of what would happen if professional designers were inspired by situations of disability, in a narrative made up of encounters – as stated in the title itself: 'Design meets disability'[5] (Pullin, 2009).

Interaction with different and disabled people

Many initiatives, companies and innovations in the field of inclusion originated in personal stories, in response to the needs of family members or close situations of dependency, disability, illness, among others. This kind of experience triggers interest and a range of investments. Those cases didn't need other stimuli for inclusive solutions to emerge. However, most young students don't have this kind of experience (Choi, 2014). Their youthful nature and outlook lead them to look at the world with optimism, using personal experience and mobilise when designing, or 'in their own image' as Norman put it (1988). Some initiatives to raise awareness for inclusion provide a first experience of contact with people who are different and can leave a lasting

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5. "Design encontra a deficiência".

Raise awareness, inspire

impression on future designers. Several authors agree that these and other academic activities help students to appreciate inclusion and innovation through people-orientated Design (Clarkson & Coleman, 2015).

Realisation

What sets Design schools apart from many other areas of training is the fulfilment itself – from drawings to simulations of ideas in scale models or in digital format, they are more or less finished. In addition to research, Hersh and Johnson (2003) advocate the importance of working on and developing inclusive products in the course of training at universities (Barros, 2012). Even in very rough sketches, proposals for unusual situations in the students' daily lives can lead to a change of perspective about the problems, which is often very productive and inspiring.

Mission spirit

Referring to the beginning of his time at university, inspired by the writings of Tomás Maldonado[6], Joaquim Redig commented:

'For me in particular, it was very significant to have been introduced to the profession with that topic. It was as if, besides enjoyment, college was reminding us that the world exists and needs us, a reality that teenagers don't usually notice, being more self-centred.'(Redig, 2011, p. 91).

Raise awareness, inspire and mobilise

Raising awareness and inspiring is essential to triggering interest in inclusion and to the challenges we face today, in general. We believe that the strategies and tools that are usually developed to promote inclusion can also trigger changes in attitude to the work process and mobilise designers to become better professionals and citizens.

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6. Maldonado, T. – 'Design, Nature and Revolution – Towards a critical Ecology', New York, Harper and Row, 1972.

2.2 Tools for promoting inclusion by Design

'There is much to be said about Design methods, but what is most important here is that understanding methods and methodology became a way of thinking about the Design process itself as something separate from the designer, as something we can design – and therefore as something that can be designed in many different ways.'[7] (Redström, 2020, p. 90).

Advocates of the inclusive vocation of Design have long been concerned to promote operational tools that support designers in the development and dissemination of inclusive Design. Whether it's to deepen the study in order to properly analyse the human variables, or to anticipate opportunities for

innovation within the market and potential economic and social impacts.

More than two decades on, the concerns of Keates et al. (2000) about the need to disseminate practical tools based on an understanding of factors related to ageing and people's capacities to support the creation of more inclusive solutions remain valid. Maguire (2001) listed a set of tools to support Design and research, describing their role in each stage of the User-Centred Design process (UCD), as described in ISO 1999:

• Planning the user-centred process

• Understanding and specifying the context of use

• Specifying user and organisational requirements

• Producing solutions and prototypes

• Testing solutions with users

Dong et al. (2015) organised the main sources of basic knowledge for Inclusive Design in this way:

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7. "There is much to be said about Design methods, but what is most important here is that discerning methods and methodology became a way of thinking about the Design process itself as something separate from the designer, as something we can design—and therefore as something that can be designed in many different ways" (Redström, 2020, p. 90).

• Theoretical models (Design processes and knowledge transfer);

• Information on users (on the diversity of profiles, capacities and contexts);

• Examples of good practice (in Design, business and education);

• Methods and tools;

• Regulatory documents, standards and guidelines.

(Dong et al., 2015, p. 284)

Sam Waller et al. (2015) present a series of illustrated answers to the question:

'How to Design inclusively?'[8] These and other researchers from the same group have dedicated themselves to exploring the answers for this and developing tools to promote Inclusive Design. Clarkson et al. (2015) have endeavoured to quantify the factors related to different human capacities in order to highlight market niches and provide evidence to support the decisions and Design options related to the specificity of the identified niches. We have chosen a few examples from this group of researchers to illustrate this chapter.'

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8. *'How to Design inclusively?'*
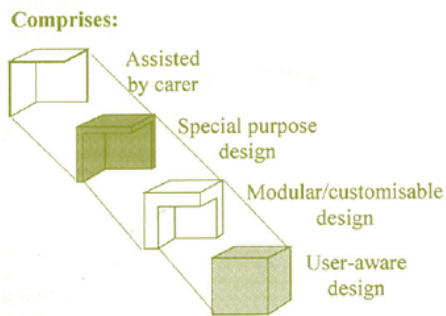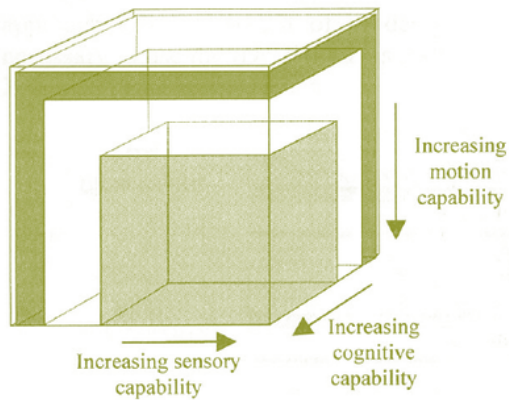
Figure 45. Illustration of the Inclusive Design Cube (Keates et al., 2000)

'Exclusion calculator'[9]

Among other tools, the exclusion calculator is a tool that can be found on the website (Inclusive Design Toolkit, 2017) along with plenty of other useful information about the various solutions for people with disabilities. As the name suggests, and taking into account existing data on British citizens, this tool is used to calculate the number of people who are likely to be excluded from a given developing solution – for example, people with impaired vision, or struggling with precise movements, etc.

'Inclusive Design Cube'[10] and the 'User Pyramid'[11]

The user (capability) pyramid perspective reflects the wide variety of capabilities and their impact on the Design process, establishing categories within the capabilities of the target audiences (Keates et al.,

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9. "Exclusion calculator"

10. "Inclusive Design Cube"

11. "User Pyramid"

2000). Using this, the authors argued that solutions that are aimed at the most demanding groups also serve those whose needs are less challenging.

The 'Inclusive Design Cube' (Keates et al., 2000) is based on the stratified structure of that pyramid and its purpose is to establish a relationship between the levels of capability and the profile of the target audience, in order to quantify the impact of the solutions that address the users' capabilities (Figure 45). each axis refers, respectively, to different types of capability – sensory, cognitive and motion – and the impact of each proposal is assessed by the size of the volume resulting from the values marked on each axis. The fuller this cube is, the better the proposal can be considered.

Figure 46. Illustration of a market positioning map (*Posicionamento de Mercado*, 2019).

This model resulted in four categories that successively cover the layers referring to the profiles of users with more disabilities.

It begins with a parallelepiped figure yielded by the highest levels of capacity, corresponding to 'User-aware Design'[12]; the next layer, 'Modular or customisable Design'[13], increases its scope to respond to higher levels of disability; this is followed by the third layer 'Special purpose Design'[14], and finally, solutions involving 'Assisted by carer'[15] (Keates et al, 2000, p. 47). Throughout the Design process, this cube can be used to monitor the implications of Design options in terms of the range of people they may suit.

Marketing tools

It is common to include information from the marketing field in the initial project research including, naturally, consumer preferences and behaviour, and benchmarking from solutions similar to those that are going to be developed. The market positioning map is a chart organised into quadrants, used in marketing (Figure 46).

At the ends of the axes we find two opposite values referring to features or attributes valued by consumers – such as price (high/low), performance (better/worse) or other product features, such as style (modern/traditional), etc. The resulting graphs make it possible to find and compare the positioning of various competing companies and products in the four quadrants, making it easier to spot opportunities and define marketing strategies for launching new products (Posicionamento de Mercado, 2019).

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12. "User-aware design"

13. "Modular/costumizable design"

14. "Special purposed design"

15. "Assisted by carer"

Figure 47. 'Picnic na quinta' [Picnic on the farm] – photo of the awareness phase in the scope of the workshop held at Quinta da Conraria (premises of the APCC in Coimbra) (photo by the author, 2008).

Getting people involved

We realise that these tools are associated with the type of processes in which the designer makes decisions on their own or within more or less specialised interdisciplinary teams.

But nowadays, new processes of participatory Design, co-design and other forms of getting people involved – as citizens, clients, companies, patients, etc. – in events to brainstorm and discuss ideas, to share or help solving problems are increasingly more common. These practices generally promote inclusion insofar as they help to give a voice to diverse people in the decision-making process,

increasing the quality and the effectiveness of the solutions.

As an example from our practice, we can mention the workshop entitled 'Picnic na quinta' [Picnic on the farm] (Figure 47), aimed at designing solutions for people with cerebral palsy. This was a very short

event, but definitely a memorable one for the participants. It was held in 2008 with EUAC Design students at the premises of the Central Regional Centre of APCC-Associação Portuguesa de Paralisia Cerebral [Portuguese Cerebral Palsy Association], in Quinta da Conraria. After an awareness-raising phase at a picnic, when they simulated some of the disabilities of people with functional diversity, the objectives and tasks for each stage of the groups' work were defined.

The results were discussed and shared with the technicians and some of the participants involved.

It isn't our purpose to into too much detail about these studies here. Yet, since we share Sleeswijk Visser's concerns and suggestions (2009), we just wanted to emphasise her concern in giving some practical and straightforward tips on how to promote the best environment and assertiveness to designers' contribution as participants in this type of activity.

2.3 Users 'R' us[16]

The abundance of relevant and necessary information for a design project to be more inclusive is faced with the difficulty or lack of inclination for the designers themselves to use it. The work of Dong et al. (2015) reflects upon this problem and has identified some difficulties that limit designers' interest in pursuing inclusive practices. In brief, the following statement collected by the authors conveys a whole set of barriers that keep designers away from inclusive Design practices:

'Few of us (designers) get inspired just by reading data on a page'[17] (Dong et al., 2015, p. 286).

Promoting inspiration is essential to trigger interest in inclusion. Only then can we hope to spark an appropriate attitude during the work process to mobilise the creativity and skills to overcome the

barriers it brings with. The same authors and their Inclusive Design Research Group (IDRG)[18] realised the importance of studying the need for information and requirements in terms of how to present these to the designers, to ensure greater adherence throughout the work processes. They focused on three aspects of this problem: i) Communicating information to designers; ii) Developing working tools for designers; and iii) Evaluating them with the designers (Dong et al., 2015).

To better understand this perception, they selected six existing tools to support and raise awareness about Inclusive Design.

They would include different ways of organising and presenting information about end users, to be considered during the design project development.

After gathering opinions from both professionals and Design students, they concluded that everyone tends to consider the ones that are more visually appealing and with little text to be more effective (Lafthouse, 2006 cited by (Dong et al., 2015).

Between the two groups of participants, they observed that the students appreciated the tools that gave them broader and more illustrative perspectives better, while the professionals made a correlation with the more specific context in which they worked, seeing the practical benefits as more directly related to their reality. Based on these observations, the authors suggest that the creation of working tools should also be tailored to and take into account the preferences of this particular group of recipients.

In short: to promote inclusion, the Design of the working tools must also be more inclusive.

In Stevenson's work (2013) we can understand in more detail the specific characteristics that define designers and what differentiates them from other professionals, with creativity being a key characteristic. But in addition to what we usually assign to the typical profile of a designer, it is interesting to assemble other attributes listed by various authors to make Inclusive Design.

Newell (2011) says that designers need to develop empathetic relationships with user groups and has proposed the concept of 'User Sensitive Inclusive Design'[1] which adds, to the very notion of Inclusive Design, sensitivity towards the user as an attribute that people responsible for the act of designing should have.

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1. *User sensitive inclusive design*

Participatory Design and co-design practices stress the role of the designer as a facilitator, capable of recognising that the participant can be an expert – more so than themselves (Visser, 2009). These practices assign designer a role of a certain modesty, a position of observer, thus someone that benefits from intellectual humility and open-mindedness so that they can accept contributions and ideas that may be very different from those that would have occurred to them. This type of activity is demanding and requires interpersonal communication skills that can be acquired and developed with some experience. It takes time for professionals to learn and adapt to each case the techniques they may have studied in the literature; it also takes time to gain maturity and confidence.

Working in multidisciplinary teams and the works that comprise partnerships between the academia and the companies also present challenges that we

are trying to understand better (Burrows et al., 2022, 2022 (a); Lima et al., 2022).

On the other hand, running activities with several people, with the general public, also highlights the importance of discipline and organisational skills (in preparing and monitoring and recording progress during participatory sessions). Finally, and no less relevant to the validity of processes and results, interacting with people implies a set of ethical requirements that need to be known and safeguarded.

In all, these attributes shape the profile of extraordinary people: sensitive, attentive, talented when it comes to communication and interpersonal relationships... who need to study information in order to compare their proposals with the pragmatic criteria of the business world.

It's not easy being a good inclusive designer!

'A GOOD DESIGNER

Is a good listener,
Has a sense of humour
Knows how to turn bad into good,
black into white and vice versa,
Feels desire,
Has an absolute sense of colour,
Has a quick sense of proportion,
Knows the material that they work with like the back of their hand
Excels technically,
Has good drawing skills and a good command of computers,
Is intuitive.
…
It is rare to find all of these qualities in one person.
So, my suggestion is that they work in teams; together they'll be a good designer.'

(Raman, 1996) [T. N.: back translated freely]

3. Proposal: The MID Referential Model

3.1 MID Referential Model: Mapping as a means to inspire Inclusion through Design

The starting point for this proposal is the belief that Design can be more inclusive when designers have a more informed perception of the problems, and hence of the opportunities available that enable them to push for a better world.

It is usually at an early stage in the creative process that significant decisions are made with the aim of promoting inclusion, by identifying the situation of certain minorities or people in circumstances unfamiliar to the creators as a problem. Or when searching for model solutions designers study less conventional tasks and processes, and products from contexts other than those they will be working on. Often the spark that triggers a good idea comes from looking at a broader horizon of factors, hence resulting in innovation.

Mapping as means to inspire Inclusion through Design (MID) seeks to enrich the analysis of Design problems by encouraging research based on the premise that user profiles that represent human diversity must be considered, predicting the resulting impacts on inclusion and the opportunities for innovation in market niches to be explored.

Inclusion:
solutions in all quadrants

● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

The natural desire of any consumer is to be able to find alternatives on the market, providing a choice. And, if they feel like it, to be able to change their minds over time and keep searching for various ways of satisfying their needs – practical, functional, emotional, symbolizing identity, and many others. Exclusion also means a lack of appropriate solutions for each person in their circumstances.

From the point of view of inclusion, the ideal would be when, for each problem or need, solutions can be found in all four quadrants of this framework; whether they are undifferentiated or customised proposals, with a wide market scope or specialised and adaptable to each individual, taking human diversity into account (Figure 48).
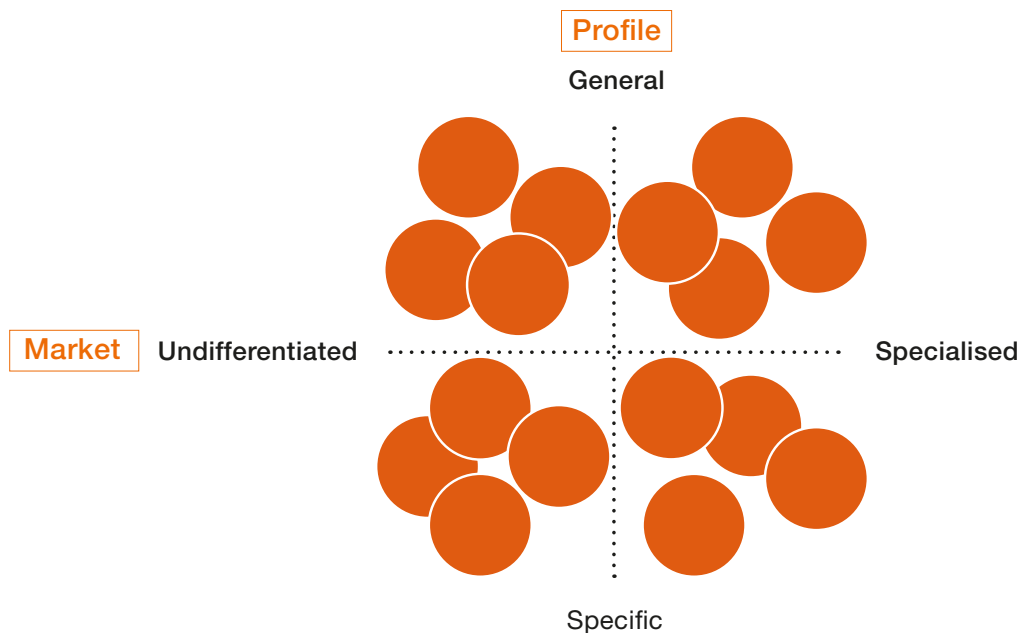
Figure 48. MID illustrating inclusion: when, for a given problem, there are solutions in all quadrants (author).

Purpose and method of use

● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

The aim of this referential framework is to inspire and promote Design and the development of inclusive solutions, helping to anticipate their potential. This is done by mapping out the initial research for a design project, organised along two axes. It aims to make it more comprehensive and operative, from the practical perspective of designers bringing together the communication and perception of other agents, entrepreneurs and manufacturers.

In the first stage of this mapping, there is a search for existing products and services on the market or for projects that have already been developed to solve a particular problem. In the second stage, by observing and comparing the solutions from the different quadrants, we can envisage the opportunities that arise regarding the positioning of new Design proposals to evolve towards a more inclusive resolution of that problem.

Therefore, we see that the main purpose of this tool is to help understanding the dynamics of transition between the different quadrants, supporting communication between the stakeholders in order to predict opportunities and promote more inclusive solutions.

Organisation of this chapter

In this chapter, we'll begin by describing the referential framework and illustrating with a few examples how we propose to distribute the existing products on a positioning map. Then, we will consider the dynamics that, if there are any, can promote inclusion through the Design of products and services. Finally, we will describe mapping dynamics that illustrate the promotion of inclusion through Design using some of the examples described in the five stories contained in this work. We then finish with a brief discussion of the proposal.

Structure of the MID referential model

Two orthogonal axes

This referential model consists of two orthogonal axes: the horizontal axis relates to the products and services distribution networks on the market; on the vertical axis we find the profile and requirements of the people for whom they are intended. These axes form four quadrants in which the products and services dedicated to each situation will be distributed (s. Figures 49-50, p. 104-105).

The market and distribution networks: horizontal axis

The horizontal axis categorises products and services according to the type of distribution and size of their respective markets.

From centre to left: general market and everyday use

On the left we would place the solutions and products for everyday use and permanent demand, made available through non-specialised distribution networks aimed at the general public. Typically, on this side of the horizontal axis we would place products sold in supermarkets or in general shops, as well as banking, communications, and insurance services for ordinary citizens.

From centre to right: specialised, professional or detailed market

On the right we would place specific or specialised markets, such as those dedicated to professional solutions, competitive sports, and health, for example. Temporary situations can also be taken into account, such as tourism or leisure experiences, but also particularly demanding specific contexts such as emergency situations, for example.

Larger markets, more competitive solutions

Larger markets and extensive distribution networks encourage the diversification of products and services on offer, with functional alternatives and prices highly regulated by competition. It should, therefore, be expected that on the left-hand side of this axis the offer will be more diversified and the prices more competitive than on the right-hand side of the same axis.

The same product can be placed in different positions or markets

We know how product pricing can vary, depending on whether the products are positioned on one side of this (same) axis or the other, but they don't differ with respect to their most relevant features.

Many products sold in pharmacies are an example of this. They may have higher prices than similar products found in undifferentiated distribution retailers, but they allow the consumer to have a certain amount of confidence thanks, among other things, to advice and support services. Another example to illustrate this notion is the type of products and services linked to travel or a tourist experience: a photo at the zoo or a drink on the airplane can imply significant variations in the way the service is provided and its corresponding price to the consumer. The quality of the experience in itself, as a whole, can override and render less relevant some aspects regarding the appraisal of the objects themselves. Emergency situations can also bring about quite significant variables in the positioning and distribution, resulting in an impact on the value of products and services.

The user profile: vertical axis

The vertical axis places variables from the profile of each solution's target audience as determining factors for the requirements and preferences for using the products and services. Its scale ranges from the profile of a given person (below) to a generic definition of requirements that apply to 'anyone' in an everyday situation (above).

From the centre upwards – general, usual, everyday use (anyone)

Moving upwards, we will have the most generic and comprehensive user profiles – customers for one-size-fits-all or standardised products, consumables, and services for regular, non-specialised use. At the upper end of this axis we can place anyone, in any situation.

From the centre down – particular, unique; specific (each person)

In the opposite direction, we can list the requirements to suit the constraints or preferences of people with disabilities in relation to the use of a given product or service. In this position we place some of the specific characteristics of people with functional diversity and others that might occur as a result of an accident or illness, for example. At the lower end of this scale, we can list the requirements that need customized solutions tailored to the needs of a particular person.

On the downward side of this axis, situations requiring, for example, increased lighting or larger sizes to support reading, help with balance and mobility, support for carrying weights or differentiated moulds for limbs or bodies that differ from standard measurements, etc., will be accommodated. Depending on whether the solutions are available on the general or specialised markets, they are positioned respectively in the quadrant to the left or right side of this axis.

Profile

General

General, common, daily profile (anyone)

1st Quadrant
Products/services aimed at general markets for a general public.
They are sold in department stores and meet everyday needs.

2nd Quadrant
Distributed products/services aimed at more specialised or technically demanding markets, not related to adaptation requirements for different users.

Market Undifferentiated .... Specialised

Permanent or global market
General distribution

Detailed market
Distribution for professional niches

3rd Quadrant
Products/services that can be found in mass distribution networks, but which are aimed at situations where the ability to carry out certain tasks is limited.

4th Quadrant
Customized or unique solutions, only available in specialised markets, assistive products and services tailored to each individual, particularly given the functional diversity.

Particular, unique; specific profile (each person).

Specific

Figure 49. Brief description of each of the four quadrants of the MID Referential Model (author).

103

Profile

General

Tap with contactless sensors

Tap extender accessory to bring closer and aim the water flow with more precision

Tap with handle controlled with the elbow for fishmonger's, hospitals, etc.

Mixer tap with handle
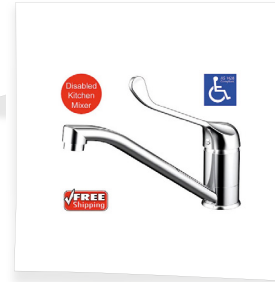
Kitchen tap without hose

Market Undifferentiated .... Specialised
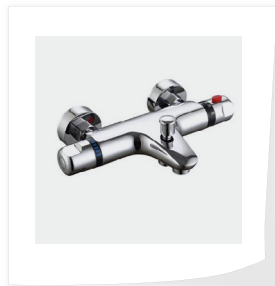
Thermal protection device to prevent burns
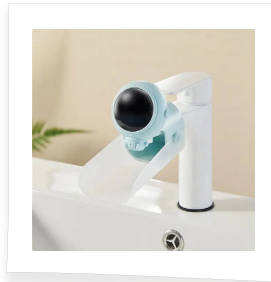
Tap extension/ protection for children
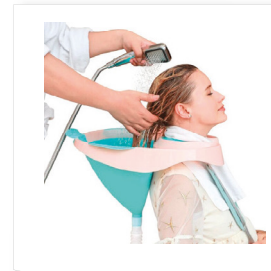
Basin for washing the head with a hose; Support services for personal hygiene

Specific

Figure 50. Explanation of the referential model with examples of the range of taps and fittings related to their use (author).

104

Four quadrants

The two orthogonal axes form four quadrants that will serve as a reference for positioning solutions or design project proposals. These are generically described in Figure 49 and illustrated with examples of taps in Figure 50.

Note: given the context and origin of this work, the following examples will mainly illustrate product-related solutions, but the text will also give examples of services and how the two complement one another.

1st Quadrant

In this quadrant we can list solutions and products aimed at general markets for a general public. They are sold in department stores and meet everyday needs.

There are often several versions of objects or services for the same purpose, with alternatives and accessories that allow them to be adapted to different ends and user profiles. Market diversity and competition can be identified when there are other offers, prices or purchasing terms, with advantages for the end consumer.

Illustration of taps in the 1st quadrant (Figure 50, top left).

From the examples of the available taps we have selected examples of mixer taps for domestic kitchens to illustrate products in this quadrant. Single lever mixers have made the task of mixing hot and cold water in the kitchen sink easier. Today, this is a type of product that benefits from the availability of many alternative options – in terms of ergonomics, technical aspects and also price.

Some mixers have recently been introduced to the domestic market with features taken from the more professional models. As well as gathering other motivations that have been better studied by marketing, they provided good functional arguments for enticing consumers.

Some common fittings used in other types of domestic taps can also be added to switch on or direct the water flow in the most convenient direction.

2ⁿᵈ Quadrant

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In the second quadrant we can list products aimed at specialised or professional markets. Some of the attributes that can distinguish them from general markets are related to responding to the technical or functional requirements of the specific situations they are intended for; the latter don't focus so much on adapting to the requirements and preferences of different users.

Illustration of taps in the 2ⁿᵈ quadrant (Figure 50, top right).

To illustrate this quadrant, we chose a type of tap used in the kitchens of restaurants or fishmongers. Focusing on just a few aspects related to user comfort that allow the tap to be operated with just one hand – with a handle and/or jet control on the end of the hose – it allows the water flow to be extended and directed where it is needed; it is suspended using a spring so that it does not weigh down during washing manoeuvres and returns to its position without any effort from the operator. Some so-called 'hospital' taps feature the same handle solution for easy and hygienic control and are sold as specialised for making toilets more accessible.

Taps equipped with sensors for contactless operation save water while meeting hygiene requirements. That's why they are widely used in restaurants. These solutions are perfectly usable by people with restricted movement or who have their hands full – which is why they are also among the solutions suitable for accessible installations.

3rd Quadrant

. . . .

In this quadrant we can list products marketed in mass distribution networks, which are aimed at situations related to care, protection or helping to overcome difficulties and limitations in carrying out certain tasks. This is the case for many products aimed at children or older people, as well as some accessories used for the safety or comfort of sick or disabled people. They are used for personal protection, to assist with eating, to help people see better, and to help with everyday tasks, etc.

With respect to technological products, there is a proliferation of solutions in this field, such as gadgets associated with sports and health, applications that help people to read, see, monitor their health and well-being, with the aim of assisting with problems or needs that arise in particular situations. This type of product is also readily available in other specialised markets, either in more elaborate versions or just differentiated by their marketing.

Illustration of taps in the 3rd quadrant (Figure 50, bottom left).

This quadrant is illustrated with various accessories that make using taps easier. For example, coloured silicone parts to lengthen the handle and direct the flow of water closer to the edge of the washbasin. Like these, there are countless solutions devised for children, based on the use of fun colours and designs. In this quadrant we've illustrated a technical detail from the description of a tap – the thermostat – which purpose is to prevent accidental burns; it's a useful feature for any situation and, particularly, when there are children or people with intellectual disabilities.

4ᵗʰ Quadrant

This quadrant lists solutions only available in specialised markets to help people with functional diversity and others in vulnerable or dependent situations. This includes assistive products as well as specialised services related to the specificities or circumstances of each person, particularly the disabled or handicapped.

We know that customised solutions, especially if they are unique, are typically more expensive given the added value provided by the services involved in their Design and production.

So this quadrant is home to some of the most exclusionary solutions and the most complex problems to solve when it comes to including people with functional diversity.

Illustration of taps in the 4ᵗʰ quadrant (Figure 50, bottom right).

In situations of greater dependence for independent living, home assistance services and personal care belong in this quadrant. Housing hygiene tasks and the provision of ready meals are common among the social support centres for dependant people.

To illustrate this quadrant, instead of single taps, we have shown other types of products and accessories here, such as those that provide assistance for head hygiene in a sitting or lying position. This example also shows us that, even when it comes to designing specific products (such as taps), considering the requirements in this quadrant can lead to new variables related to the arrangement of objects, spaces, and facilities needed for carers to provide these services.

Doubts about the distribution between quadrants: what now?

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The distribution of solutions between the various quadrants can cause doubts and present contradictions. Several solutions presented as suitable for accessibility requirements in sanitary facilities, such as hospital taps and sensor taps, are placed in different quadrants. Either they are sold in specialised distribution networks, being useful for any type of person (in the 2nd quadrant), or they facilitate things for people with disabilities and are available in general shops (in the 3rd quadrant). We have also seen that some (allegedly professional) features of mixers used in restaurant establishments have been incorporated into the Design of solutions for domestic kitchens (between the 1st and 2nd quadrants).

In short, it's not always clear where products stand in the quadrants, given that some factors are not objective and the respective information depends on the corresponding marketing, and on the perspective and depth of the analysis. However, these setbacks do not detract from a critical view of the whole; they can even contribute to positive questioning, stimulated by the dynamic exercise of this distribution.

This distribution exercise also emphasised the idea that promoting inclusive Design sometimes comprises looking at existing solutions for some characteristics or features that serve the desired purpose – which can be found in other contexts and markets. Taking the example of taps, this exercise made it clear that an appropriate intervention does not require the creation of new products or completely new solutions but can involve the creation of specific-purpose accessories or the organisation of processes and conditions for the provision of services. Finally, even if they are well designed from a functional point of view, we know that many solutions can produce adverse effects, such as the associated stigma. It may seem contradictory, but we have to consider positioning solutions that, even if they don't fulfil all the requirements at once, can somehow enhance the significance of products and other aspects of the singular or collective experience of products and services.

Dynamics to promote inclusion

Finding the products you need on the global market – in other words, buying the same kind of products in the same place as the 'other people' – is a natural ambition for people with functional diversity. From a general perspective, we can say that it is important to find most of the answers to our daily needs in the first quadrant (Figure 51).
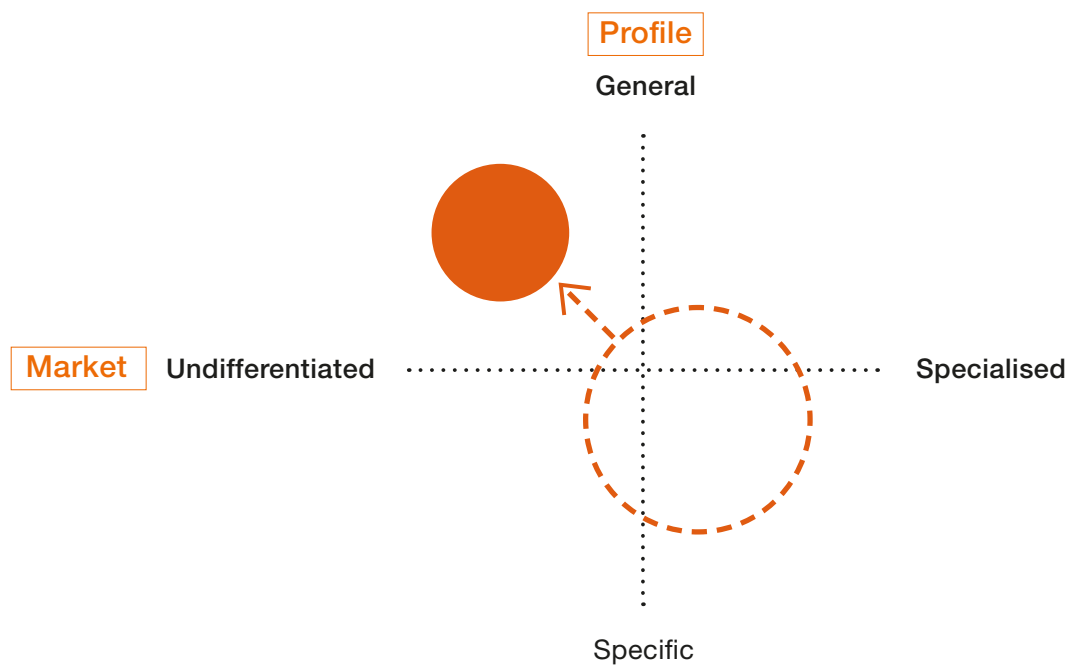
Figure 51. Increasing the variety of solutions in the first quadrant is encouraging inclusion (author).

Inclusion in the shift from specialised to more global markets

Inclusion is promoted when previously restricted and specialised solutions are generalised, creating or improving products so that they are easier for more people to use, distributing them on the undifferentiated market (Figure 52). Some inclusive proposals could involve designing accessories that allow people with disabilities to use existing products designed with the majority in mind.
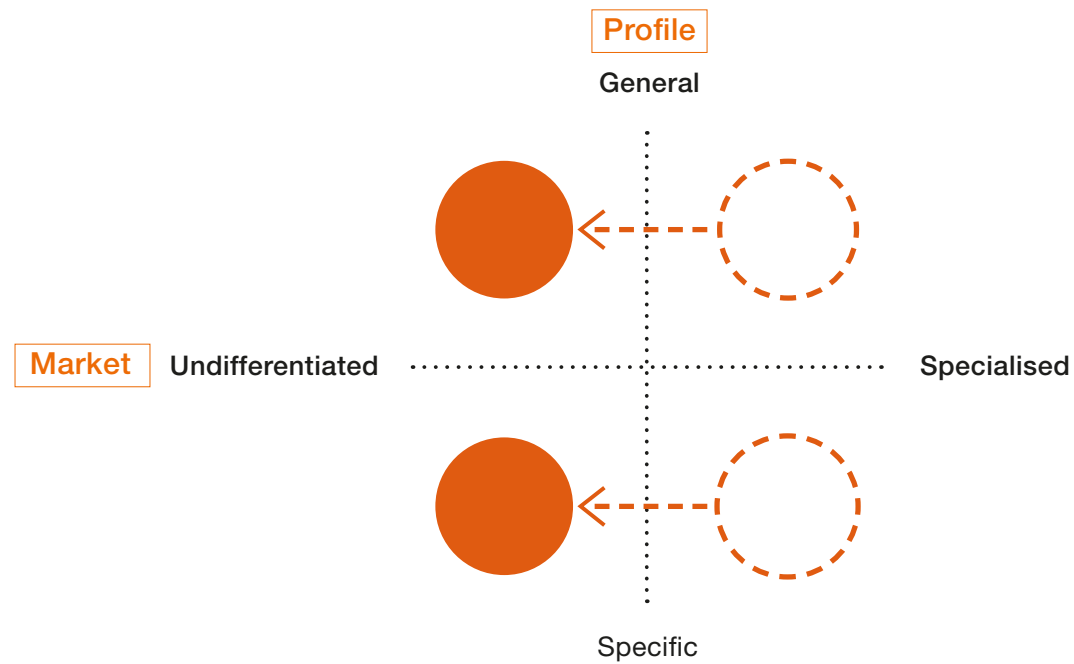
Figure 52. Shift from specialised to more global or undifferentiated markets (author).

112

Inclusion in the shift from generic solutions to more specialised alternatives

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Offering professional and specialised solutions can also benefit a wider range of audiences. The quality of the response to certain functional requirements also requires technical expertise and accredited suppliers – which is why the promotion and dissemination of knowledge about the specific profile of people with functional diversity is important for inclusion. On the other hand, it can be understood how services can complement the use of common products, increasing their value and the quality of the user experience, from the perspective of the end user (Figure 53).
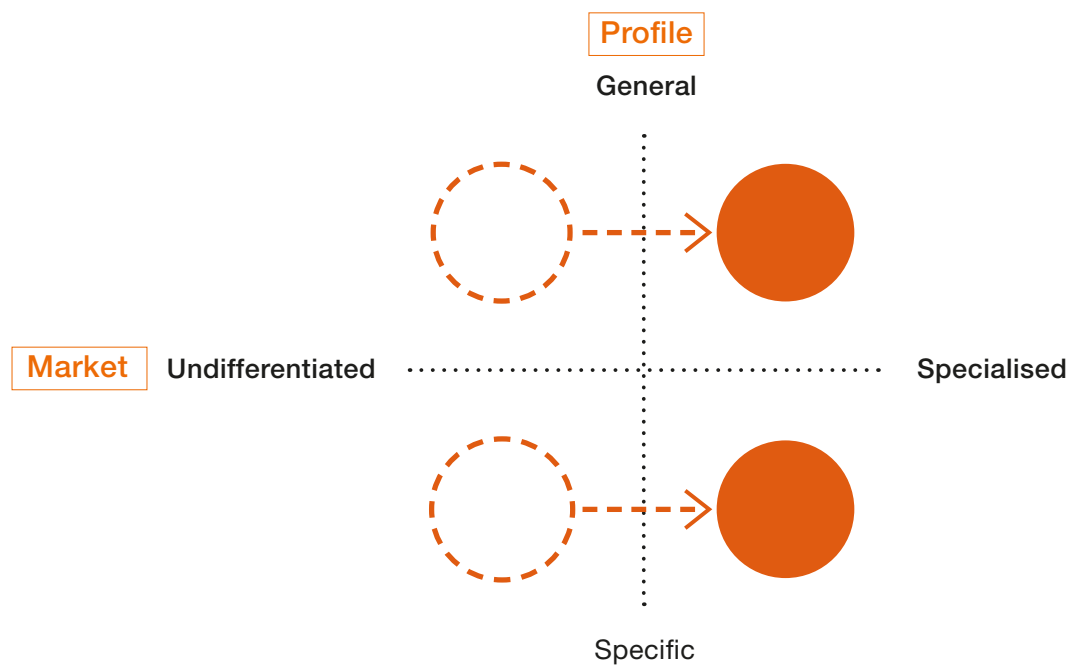
Figure 53. Shift from generic solutions to more specialised alternatives (author).

For people with disabilities, access to services is often an essential requirement. In this respect, in addition to focusing on objects, we can promote the Design of inclusive services and experiences. 'Enlarging the world' and promoting the possibilities of 'Contact' for those people are two of the principles set out by Renato Bispo (2018) for Design against Stigma, which is particularly meaningful here.

Many companies and designers commit their talents to niche markets of people with demanding profiles and temporary disabilities. The case of children's products illustrates how the study of their 'temporary disabilities' can be inspiring. On both sides of the market axis, solutions are multiplying for every moment of their lives – with children in mind, but also those who look after them and buy products for them...

By removing some of the childish attributes – especially the colours and references to fashion heroes – we find very interesting functional answers in the Design of these products, which can be applied to other types of public and disabilities. Take, for example, the whole range of products and accessories meant for children's meals – plates with non-slippery bases, flexible spoons with thicker, curved or flexible handles that are easier to grab – and we will find answers to many problems faced by people with temporary or permanent disabilities.

Inclusion in the upward shift

Increasing demands on the planning requirements of a given object makes it more complex and costly. On the other hand, as these indicators increase, the alternatives in the mass market decrease. This particularly penalises people with permanent disabilities who need functionally demanding responses and for whom there are often no alternatives to specialised assistive products and services (Figure 54).
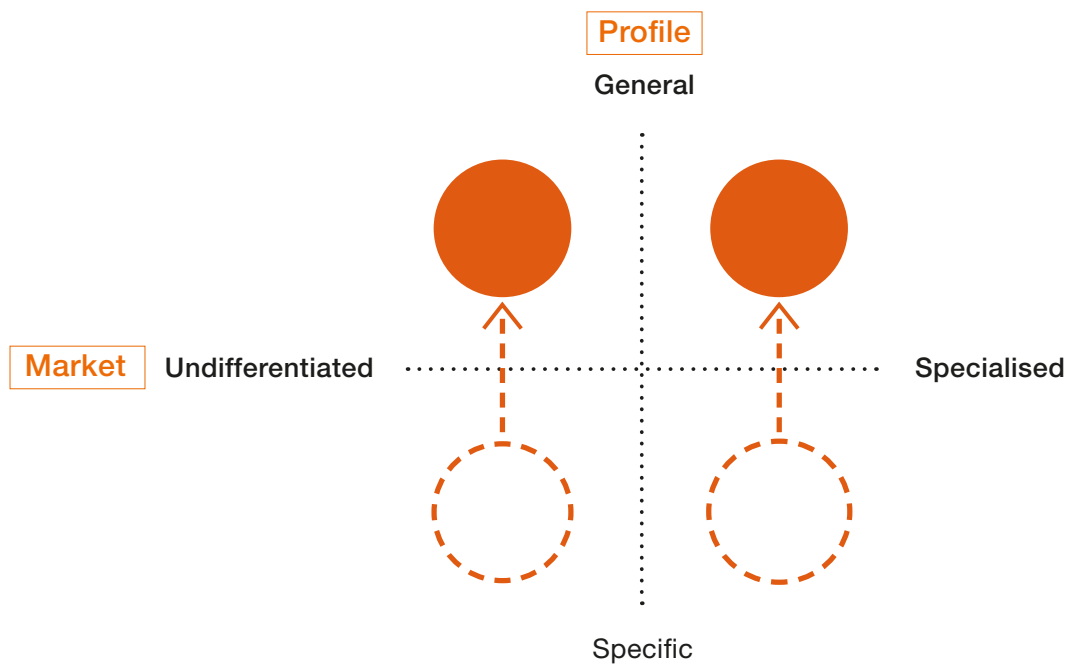
Figure 54. Shifting from solutions focused on particular requirements to more generic proposals favours the diversification of alternative choices (author).

When it comes to interacting with the functional aspects of objects, older people tend to move downwards on this scale, but maintain other preferences related to their identity and whatever else is characteristic of each person.

This evolution is complex and therefore it is not sufficiently reflected in the supply of suitable solutions on the market. In this context, offering accessories or additional versions of a given basic solution can limit and reduce the need for adaptations for the most critical usage profiles. At the same time, it allows a basic solution to be used in other situations by anyone, thus removing some of the stigma associated with a number of specialised products.

The digital games market has found, in healthy competition between the main operators, the stimulus for positive developments in the offer of solutions that meet the main accessibility requirements and are compatible with specialised peripherals, based on the use of standard consoles. Smartphones and computers are also equipped with numerous accessibility options, installed as standard. They need to be made known to and be used by all those who can benefit from them.

Inclusion in the downward shift

Improving knowledge about the specific needs and preferences of people with functional diversity increases the critical mass and thus the opportunities for enhancing solutions and innovation through Design (Figure 55). Developing the Design of products and assistive technologies is important for the evolution and improvement of the offer. Often these are the result of a combination of strictly medical and functional features, disregarding individual preferences and leading to their rejection and abandonment.
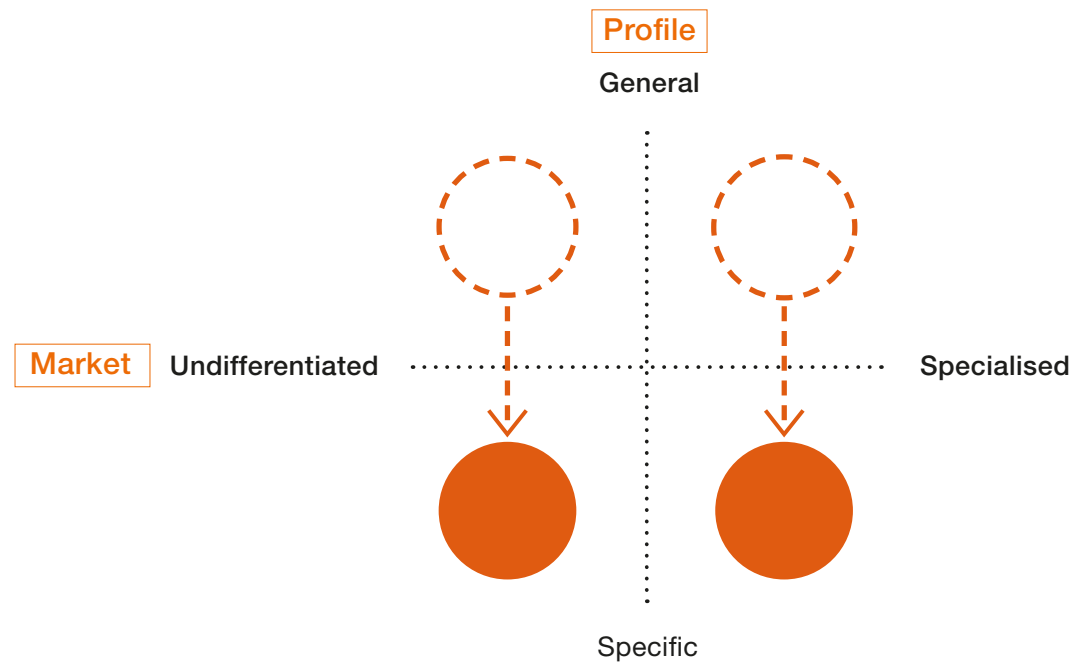
Figure 55. Shift from more comprehensive solutions to more specific usage requirements (author).

3.2 Application of the MID: illustration of inclusion dynamics with examples from the five stories

In order to illustrate the proposal, in the following pages we will describe the transition dynamics in the positioning between the quadrants, based on six examples taken from those mentioned in the first chapter.

Example 1: Cute'lery– accessories to facilitate the use of cutlery

(example taken from story #1 The Right to Design)

Cute'lery is a concept for adhesive accessories designed so that anyone can share the pleasure of using cutlery with slender handles such as Cutipol's Goa model. This is a product typically aimed at the general public and belonging to the 1st quadrant of this referential model (Figure 56). The proposal gives us a glimpse of how to enrich the market in the 3rd quadrant with accessories for the dining table. By extending the perimeter of the handle with a sticky, elastic material such as silicone, this butterfly would also help to keep it in position and improve the grip on the cutlery. Accessories of this kind are enablers of usability and also decorative; they enrich the market with solutions intended for people of all ages.
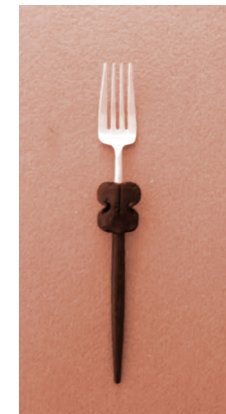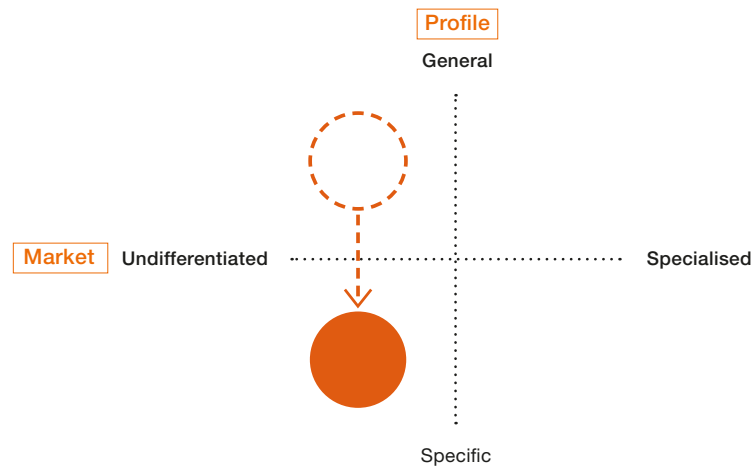
Figure 56. Dynamics between quadrants of the 'Cute'lery' proposal: accessories to facilitate the use of cutlery (author).

Example 2: 'One handle fits all' for contextualising the 'UrinALL' – a device for operating the tap of urinary catheters.

(example taken from story #1 The Right to Design)

The second example in this story stems from a position opposite to the previous one. Inserted in the 4th quadrant, UrinALL is a prototype designed after considering the problem a person might have in manipulating the tap of a urinary catheter autonomously. We realise that this problem affects many other people regardless of their disability – making it all the more relevant to extend solutions to other quadrants (Figure 57).

Thinking about more generic markets, the proposal falls into the 3rd quadrant. Inspired by a golf bag, which holds clubs for different purposes, 'One handle fits all' is a kit with a single handle plus tips for different purposes – one of which would be this mechanism for opening a tap. Looking at the 2nd quadrant, it would be worth exploring its relationship with products specialising in the comfort and privacy of people who are wearing urinary catheters – hospitalised, sick, or during post-operative care, for example.
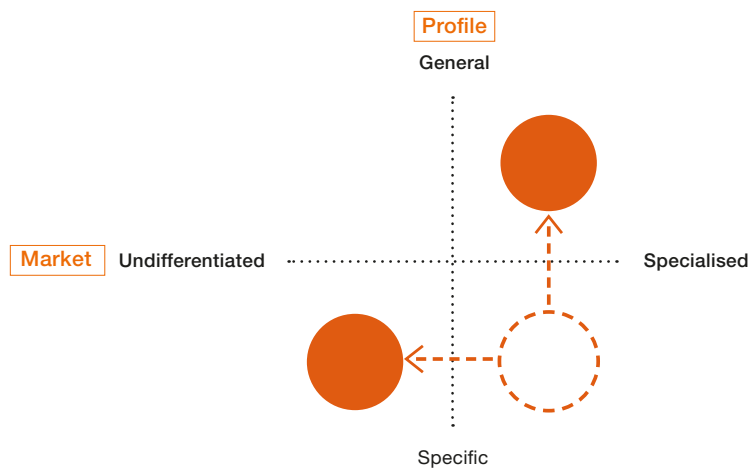
Figure 57. Dynamics between quadrants for the 'One handle fits all' proposal – concept for contextualizing 'UrinALL' (author).

Example 3: 'Dedeta' – accessory to make it easier for people with amputated fingers to use a pen

(example taken from story #2 The good problem)

Assistive products, located in the 4th quadrant, are solutions commonly prescribed for, and adopted by amputees. By thinking about them, 'Dedeta' enabled us to glimpse the possibilities of widening relevant markets for this proposal to extend what remained of the limbs (the fingers) with a given functionality (the tip of a pen).

Its spiral configuration resembles, by association, other similar objects with a playful purpose, foreshadowing its potential for generalisation and moving it into the 3rd quadrant (Figure 58).
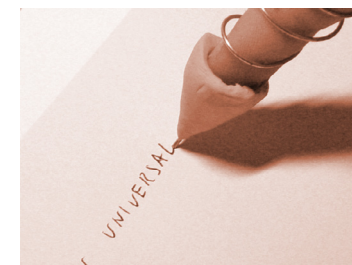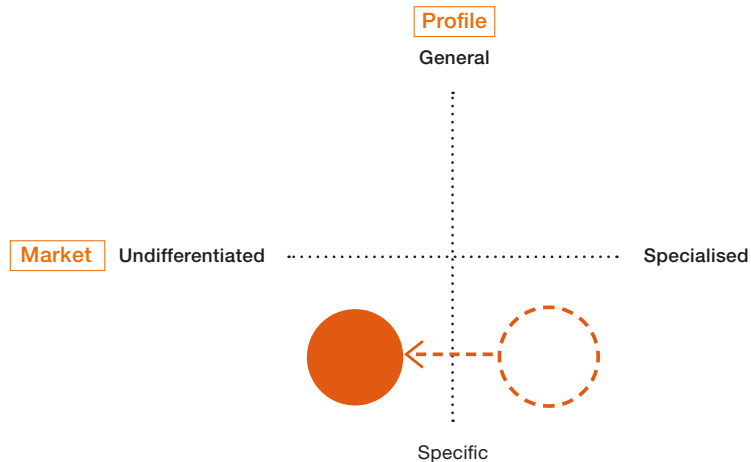
Figure 58. Dynamics between quadrants for the 'Dedeta' proposal: accessory to facilitate the use of a pen by people with amputated fingers (author).

121

Example 4 – Intervention proposals for interacting with TIP ticket vending machines – Metro do Porto.

(example taken from story #3 Small interventions with a big impact)

This story illustrates how small technical interventions inspired by solutions created for people with disabilities can bring about significant changes to the accessibility of public–use interfaces. As this is a very specialised and complex piece of equipment, the dynamics in the referential model start from the right–hand side of the model (2nd and 4th quadrants). In addition to the features aimed at the general public, this proposal includes technical solutions – such as swiping – specifically included in the software to assist people with disabilities, such as cerebral palsy (belonging to the 4th quadrant). The proposal promotes inclusion by facilitating the interaction and autonomy while using this type of interface for a wider audience – inexperienced and older people. Focusing the analysis on this perspective, between the 'before' and 'after', we can see the potential for inclusion in this mapping by moving the solutions from the quadrants with even numbers (2nd and 4th) to the odd ones (1st and 3rd), (Figure 59).
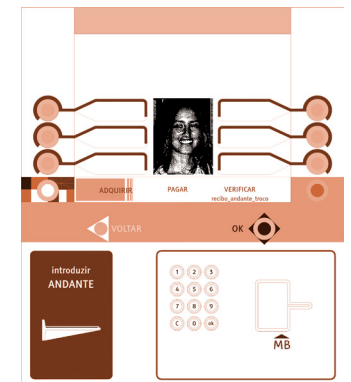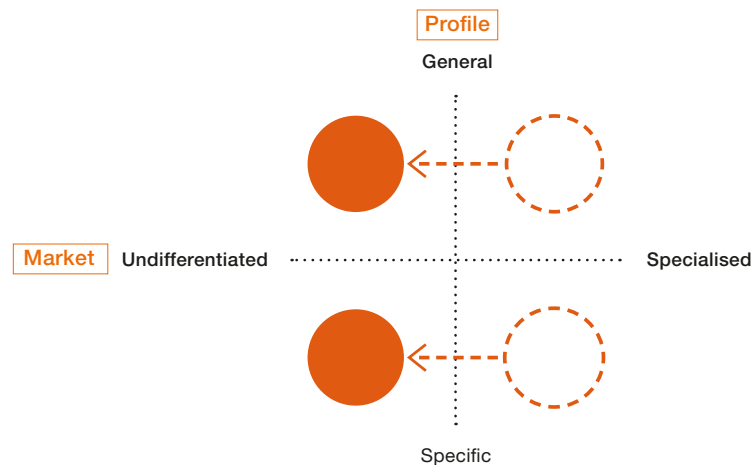
Figure 59. Dynamics between quadrants of the proposed intervention at Metro do Porto vending machines (author).

122

Example 5: Workstation for Alberto

(taken from story #4 'Workstation for Alberto')

The prototype conceived by the students for this Workstation was based on Alberto's specific requirements and wishes. This worktable is equipped with two movable elongations, made of common materials, with functions that we can include in both the 1st and 2nd quadrants (Figure 60).

Alberto's workstation illustrates the relevance of Design as a specialised service capable of creating solutions that include, in a harmonious and appealing way, the technical requirements and preferences of people with functional diversity. This capacity illustrates the power of inclusion by Design in solutions that we place in the 4th quadrant.
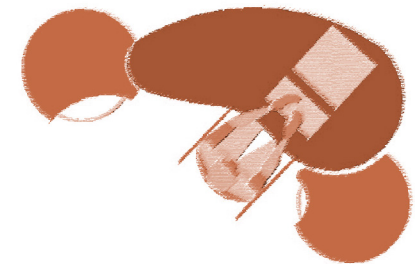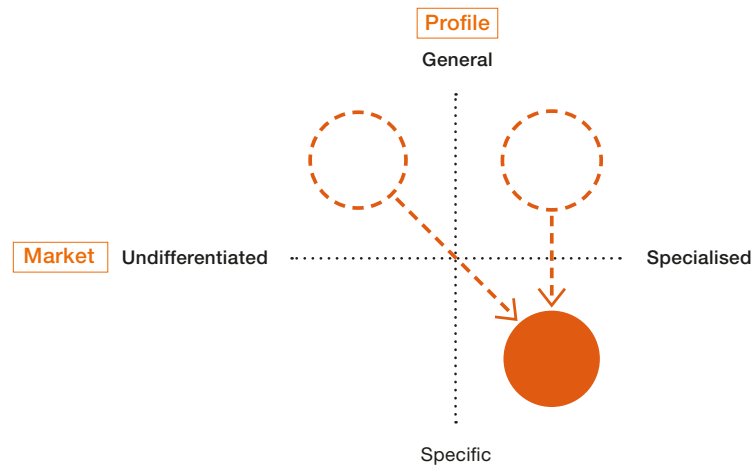
Figure 60. Dynamics between quadrants for the proposal for Alberto's workstation (author).

123

Example 6 – Exhibition of academic work on Inclusive Design at the Fundação Portuguesa das Comunicações
(Example described in story #5 Inclusive house of the future)

In the previous examples we looked at the role of this mapping during the Design process. In this case, the topic of this story is the actual initiative to exhibit and disseminate the results of these works.

In the course of this reflection, we have seen that this referential model for mapping solutions could play a significant role in confirming the diversity and range of the examples chosen for the exhibition itself. This all-encompassing viewpoint will allow us to identify any trends or issues in the response, borne out by their distribution in the MID itself, based on the assumption that inclusion by Design is about promoting solutions in all quadrants (Figure 61).
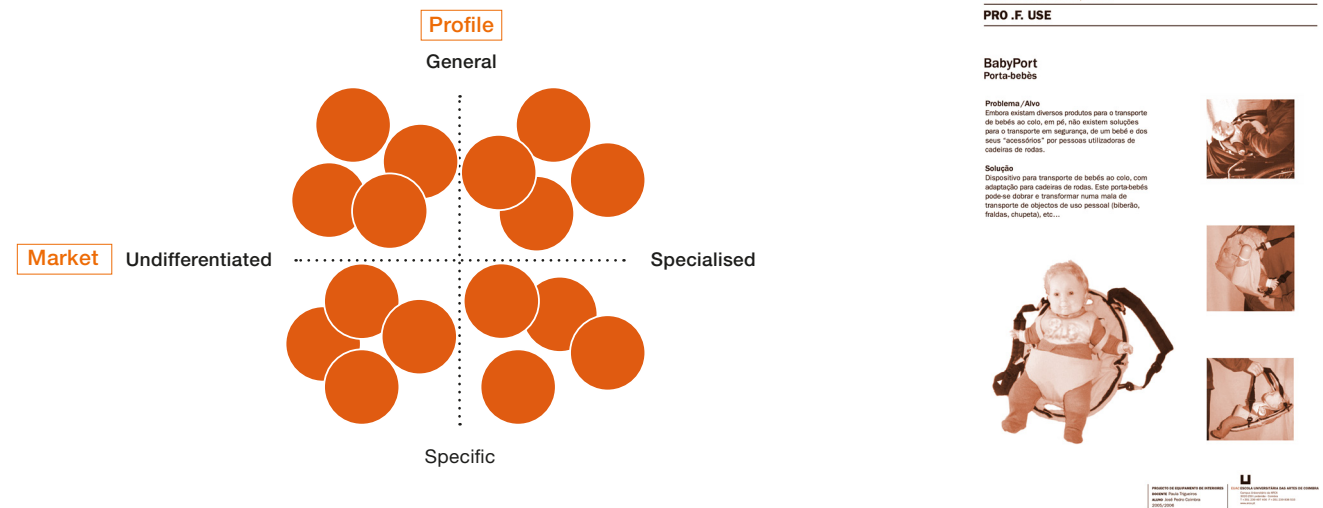
Figure 61. Diagram illustrating how dissemination can promote inclusion in all quadrants (author).

3.3 Discussion

MID and the market positioning maps

Although we have considered different variables and objectives and did not use this reference for the proposal, it is worth mentioning its similarities with the positioning maps used in Marketing (*Market Positioning*, 2019). In fact, regardless of the variables to be considered in the respective axes, they coincide in their role as a visualisation tool to support the establishment of future strategies and investments.

MID and other tools for Inclusive Design

It is possible to draw some parallels between the proposed quadrants and the Design Cube layer hierarchy (Keates et al., 2000). The first two layers ('User-aware Design' and 'Modular or customisable Design') would be associated with products in the 1st or 2nd quadrants, while 'Special purpose design' and 'Solutions involving assistance from carers' would be in the 3rd and 4th quadrants. This tool is designed for a more advanced stage of creation, combining statistical data to quantify impacts and so add information for decision making.

Mapping in this referential model is designed to act at an earlier, more exploratory and still divergent stage of the process – when opportunities are sought, placing existing solutions for different situations and market niches side by side. By leaving some of the research criteria open, it both allows contributions from very specialised knowledge and enables naive perspectives to be combined with more professional ones. Sometimes this participation adds very useful contributions, with fresh perspectives, not tainted by the experience and constraints of company dynamics.

Even before defining the Design brief itself, this mapping can still supplement other activities that seek to involve and inspire inexperienced designers. The possibility of illustrating the process dynamically and based on images directly collected from the research, also falls in line with some of the requirements identified by Dong et al. (2015), meeting the differentiating features of designers mentioned by Stevenson (2013).

MID in the fight against stigma

By enabling us to put solutions from unlikely origins and based on diverse reasonings side by side,

MID can also contribute to inclusion by promoting Design against Stigma, as we learnt from Renato Bispo's statement:

'The success of an anti-stigmatising product arises from the confrontation it creates with existing expectations and prejudices, expressed through a sensation composed of incongruity and possibility which, by challenging stigmatising stereotypes, allows them to be reconsidered' (Bispo, 2018, p. 119).

Evaluating the MID's potential

The same practical properties of the MID allow the participation of various discussion parties from different subject areas and with different levels of literacy or specialisation. We also envisage its usefulness in the context of different collaborative and participatory practices, such as those we have carried out and described in Burrows et al. (2022) and Lima et al. (2022) with companies and colleagues, some young and others more experienced, from different geographical and disciplinary backgrounds.

Concluding remarks and prospects for the future development of the MID

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In retrospect

In the introduction we have presented a current framework for the social function of Design, considering the transformations and paradigm shifts it has undergone, especially since the turn of the century. Increasingly focusing on complex and systemic approaches, based on processes and interactions with society, Design has also evolved in terms of perception of its value for companies and institutions, giving it greater responsibility.

We talked about the opportunity to address inclusion in all areas, as a synthesis of social, economic, and environmental concerns, translated into the UN's Sustainable Development Goals. Some concepts and understandings of the evolution of Design were presented, which also illustrate something of the current understanding of what we prefer to call Inclusive Design.

The practical section of this work begins with a series of stories based on the author's personal experience. In this part we revisited countless documents relating to education and Design practices concerning Inclusive Design, carried out over more than two decades. Once some of the important messages from this experience had been selected, they were conveyed in the form of short stories illustrated and contextualised in the reality of the facts, personalities and institutions involved – some of which have now disappeared.

A common structure has been created for the narratives, with an initial summary that introduces the central message to be conveyed. The five stories cover activities from the beginning of this century in various fields: educational, social, technical and research. Above all, they illustrate a way of seeing and doing Design.

The readings and references that support this work were in line with some questions that emerged: why are only a few designers mobilised for inclusion? If there's plenty of information and tools to help making Design more suitable for people's diversity, why aren't they more widely used? Indeed, what role can teaching play in preparing designers for today's challenges?

These questions led us to the crux of the problem: beyond the attributes and talent associated with the creativity for which designers are recognised, we realised that it is not easy to be a 'Good Inclusive Designer'. It is important to work on the Design of the actual tools for communicating the necessary information during the project so that they too are better suited to the profile of the designers themselves – in short, more inclusive. And in order to drive talent and motivation, especially among young students, it's important to promote inspiration right from the start of the project.

Throughout the previous stages of the work, we have gathered ideas and references for developing a practical tool to stimulate awareness-raising activities for students of Design and other subject areas. After a few iterations, we arrived at the configuration illustrated in the third chapter: a referential model for Mapping as a means to inspire Inclusion through Design – MID.

We described its organisation along two axes: markets (horizontal) and user profiles (vertical) and showed how it works using the example of a design project for taps. Finally, we commented on the dynamics of applying the same referential model with some of the examples used in the five stories. The mapping of the inclusion dynamics between quadrants complemented the narrative told in each story.

This discussion has enabled us to confirm some of the assumptions emerging from the problem identification, comparing the features of the proposed tool with those of other tools mentioned, according to the profile of the designers.

The very life of MID

We believe we are in a position to apply and study further developments of this proposed referential model to confirm its applicability, to raise awareness and inspire designers towards inclusion, to organise and enrich the initial phase of the creative process by making it possible to visualise and share ideas and possible options, with the help of other elements from other levels and subject areas. We also believe that the MID could become an important resource both for devising hypotheses and projects developed in the context of teaching and for research on Inclusive Design.

The success of a tool always depends on the skill of the person using it. We're looking forward to the next steps – when the MID Referential Model takes on a life of its own in the hands of other Inclusive Design enthusiasts.

THE END

Paula Trigueiros

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Índice de Figuras

Glossary

Inclusive Design

Inclusive Design can be defined as the development of products and environments that enable its use by people with all kinds of capabilities. Its main objective is to contribute to non-discrimination and the social inclusion of all people through the moulding of the surrounding environment (Falcato Simões & Bispo, 2006, p. 8).

Person with functional diversity and other expressions used in the text

'Pessoa com diversidade funcional' is a Portuguese expression currently considered appropriate and comprehensive for representing situations and people affected by various forms of disability, whether temporary or permanent. We will also use other common expressions when the context requires us to be more specific, such as 'person with a disability' or 'disabled person'. These are also still used by accredited institutions working in the context of rehabilitating people with disabilities. However, we know that understanding the acceptability of these words is neither simple nor consensual; and we also know that these concepts are evolving rapidly. Thank you for your tolerance and understanding.

Exclusive or Inclusive

In the text, the term 'exclusive' can be understood as something dedicated to a specific person or situation. The same meaning applies in the paragraphs about marketing.

Assistive products

Assistive products, assistive devices, technical aids, aids to daily living (ADLs), and assistive technologies are some of the expressions used to refer to different solutions, more or less technological, specifically created in the context of rehabilitation and assistance for disabled, older, or functionally diverse people. Other remarks.

Notes

Quotes translated freely

The original expressions and quotes in other languages have been translated freely by the author. The original version is available in the footnotes.

All the images belong to the author and the students

Many of them were retrieved from old files, from my own works and those of students. When no other source is mentioned, this is the origin of the images. Authors have been identified by their last name and

the initial of their first name. (Please note that the graphic quality of some images does not match today's technological specifications).

Images taken from the web

Some of the images used in the examples derive from online research. The respective links are listed at the end of the references associated with the corresponding figure.

Design with capital letters

We have decided that for this work the word Design will be written with an initial capital letter, to represent and stress the value of the discipline as a whole.

There are no disciplinary limits for inclusion. It's about looking at the world from a certain angle in order to see opportunities in everything we do. So, while this is a book about Design, it is not only for designers. It's a testimony and a manifesto. Its purpose is to help make Design more inclusive.

About the author

Paula Trigueiros is Assistant Professor at the School of Architecture, Art and Design at the University of Minho (Portugal). Her extensive teaching and research experience concerns the delivery of inclusive design solutions that specifically involve people with diverse characteristics and needs. She has a long-standing interest and track record of research focused on people and communities, social innovation, interaction design and user experience (UX). In 2022, she concluded a postdoctoral research degree on inspiring inclusion through design at Universidade de Lisboa. This work resulted in the publication of this book.