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Giuseppe Di Bucchianico *Editor*

Advances in Design for Inclusion

Proceedings of the AHFE 2019 International Conference on Design for Inclusion and the AHFE 2019 International Conference on Human Factors for Apparel and Textile Engineering, July 24–28, 2019, Washington D.C., USA

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Advances in Human Factors and Ergonomics 2019

AHFE 2019 Series Editors

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10th International Conference on Applied Human Factors and Ergonomics and the Affiliated Conferences

Proceedings of the AHFE 2019 International Conference on Design for Inclusion and the AHFE 2019 International Conference on Human Factors for Apparel and Textile Engineering, held on July 24–28, 2019, in Washington D.C., USA

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Preface

This book has two underlying messages, the emerging importance of the social issue of inclusion and human diversity in contemporary society and the increasing awareness that there is no such thing as a 'standard human being.' The first question has to do with inequality and social disparity as a necessary milestone toward economic revival, among other things, while a vital role in the strategies adopted by the European Union's Horizon2020 framework program is played by the ones that focus on strengthening equality, participation, and accessibility for all to goods, services and what Dahrendorf called 'life chances.' What this means is that the issue of social inclusion of diversity and for equality is firmly on political agendas all over the world, not least because of increasing awareness that new visions, new strategies, new tools and new approaches are needed, if we are to tackle the challenges arising from recent phenomena of economic and cultural globalization, demographic change; economic migration from poorer countries and an ageing population in wealthier countries, a phenomena that are destined to upset the entire planet's micro and macro-economic and social structures in years to come.

The second issue tackled in this book is more technical in nature, since the paradigm change from 'designing for standards' and 'inclusive products and service design' to the enlightened awareness that there are no such concepts to fit the standard human being, this has immediate, direct repercussions on the specialized dimension of designing. The realization is at last taking hold not only that those individuals are physically, psychologically and culturally 'diverse,' but they also have widely diversified skills, abilities, aspirations, and desires that make each one of us unique and not at all replicable. Since the diversity of individuals is the rule, not the exception, it makes sense to consider it as a resource, not as a limiting factor or a restriction on design, while equality between individuals, communities and peoples should be treated as fundamental strategic inputs to the sustainable development of contemporary society, where everybody should have the same opportunities to experience places, products and services. Numerous design approaches have been adopted to facilitate social and cultural inclusion in recent decades: Design for Disability, Universal Design, Inclusive Design, and Design for All. All of these philosophies, approaches, and methodologies aim to build value on

all aspects of human diversity, from psychophysical to cultural issues, and to offer equal opportunity to everyone in order to experience places, products, services and systems. With this in mind, this book sets out to forge a climate conducive to discussion and comparison between these approaches, without any prejudice in favor or against any one of them, but attempting to identify the elements they hold in common and to build each one's heritage of originality, because we are convinced that the true resource of Design for Inclusion may well be found in this very diversity of opinions.

In particular, this book describes the state of the art of recent research conducted in a variety of fields that share the focus on Design for Inclusion and was presented in the fourth international conference on Design for Inclusion (AHFE 2019, Washington D.C.). On this occasion, the numerous research papers presented were collected together into two different thematic areas, articulated in six sections of this book:

Part 1 Design for Inclusion
Section 1 Designing for Inclusion in Learning Experiences
Section 2 Industrial Design for Inclusion
Section 3 Designing for Inclusion in the Information Society
Section 4 Public Spaces, Building Environment and Communities
Section 5 Global Perspectives on People-Centered Design and Cultural Heritage

Part 2 Human Factors for Apparel and Textile Engineering
Section 6 Design for Inclusion for Apparel and Textile Design

Special thanks to Gianni Montagna and Cristina Carvalho from the Lisbon School of Architecture, CIAUD for their valuable contribution and for co-chairing the conference track on Human Factors for Apparel and Textile Engineering.

Each section contains research paper that has been reviewed by members of the International Editorial Board. Our sincere thanks and appreciation to the board members as listed below:

Design for Inclusion

Human Factors for Apparel and Textile Engineering

July 2019 Giuseppe Di Bucchianico

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Codesign of Public Spaces for Intercultural Communication, Diversity and Inclusion

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Abstract. The consistent phenomenon of immigration from countries with different cultures, that characterized the last decade, has changed the use of public spaces in European cities. The need to develop innovative solutions aimed at improving intercultural inclusion and mutual understanding of all citizens emerges, so that urban spaces become inclusive, safe and sustainable. This research project is focused on two main questions: (1) can design and technology enable the creation of a different way of living the public space to catalyze interpersonal interaction and to promote a shared sense of citizenship? (2) is it possible to support intercultural communication and to facilitate social inclusion through the design of innovative and interactive public spaces equipped with smart urban furniture? This paper presents three Design Orienting Scenarios as results of the research conducted by several experts, professionals and people with different cultural backgrounds during a focus groups and two different workshops where they made converge competences from design, business, engineering and social sciences to find innovative solutions for the social inclusion of migrants in urban areas.

Keywords: Social innovation · Design for inclusion · Public spaces · Smart technologies · Interculturalism

1 Introduction and Background

The current society is progressively becoming more and more complex. Indeed, the increasing number of businesses or other organizations developing international influence or starting to operate on an international scale changed how value is created and perceived while strengthening globalized economic relationships. At the same time, the bettering of international diplomatic relations and the raising of new policies for the free movement of people in widening geographical areas, such as the European

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Union, are changing the shape of our society. These changes of the global socio-economic scenario caused the emergence of the so-called post-multicultural era, which defines a society presenting intertwined effects of different phenomena: transnationalism, superdiversity, cosmopolitanism and solidarity [1]. Transnationalism indicates a social phenomenon due to the increased interconnectivity between people and the fading financial and cultural significance of boundaries among different countries. The term "superdiversity refers to the phenomenon of diversification of diversity, which consists of some current levels of population diversity that are significantly higher than before. Vertovec observed that superdiversity is distinguished by a dynamic interplay of variables among an increased number of new, small and scattered, multiple-origin, transnationally connected, socio-economically differentiated and legally stratified immigrants" [2]. It denotes increased diversity not only between immigrant and ethnic minority groups, but also within them. Cosmopolitanism refers to a shared feeling of belonging to a unique community based on an inclusive morality, a shared economic relationship, or a political structure that encompasses different nations. Solidarity refers to the ties in a society that bind people together as one based on kinship and shared values or other shared interests or goals.

The complex structure of contemporary society requires new policies able to recognize the inevitability of diversity in modern cities while supporting integration and inclusion. Such policies should adhere to the methodological interculturalism, which aims at incorporating diversity and difference into society's public culture rendering it object of affirmation. Methodological interculturalism indicates also the contact between people as the most important and appropriate way to drive integration [1].

Physical spaces can be designed to support such contact and, in the context of cities, public spaces can play a crucial role in catalyzing social encounter, also with strangers. Urban architecture already provided some examples of solutions for social inclusivity, e.g., public art interventions as shown in Sharp et al.'s paper [3]. Unfortunately, to our knowledge, there are not many examples of urban design dedicated to intercultural integration and inclusion. Although some research has already been conducted on the use of technology for the integration of migrants in new countries [4] and some preliminary work explored also the adoption of codesign techniques with immigrant teens [5], there is still an evident lack of work that focuses on intercultural integration in urban areas integrating digital technology.

As stated by De Lange et al., new technologies can enable smart cities to engage citizens and promote cocreation of new solutions [6]. We also believe that smart public spaces, i.e., public spaces augmented with new technologies, can be designed to foster intercultural integration and for this reason we started working directly with migrants to codesign novel concepts of smart spaces to respond to citizens' needs while valorizing diversity [7]. To this purpose, we started a project to explore the possibility to codesign smart public spaces for intercultural integration. The first phase was composed of two steps: a focus group and a "World Café" workshop. During the focus group, researchers and professionals working in different domains, mainly from design, political and social science and computer science, met operators and social workers in inclusion projects and integration of migrants, for analyzing together the current state of the art in urban architecture for multicultural integration, use of technology in public spaces, and design solutions for social inclusion. Thanks to this debate and exchange

between the participants, it was possible to generate the research questions to be answered during the following workshop. During this workshop, which adopted the World Café methodology, the participants (including researchers, migrants and cultural mediators) tried to identify the critical points of multicultural integration and inclusion for migrants and relative strategies to cope with these challenges (these results can be found in Rinaldi et al.'s paper [7]).

In this paper, we will present the second workshop, conducted after a few months, where researchers, migrants and cultural mediators tried to co-create different solutions to tackle the previously identified challenges to intercultural inclusion applying the strategies emerged during the previous workshops (Fig. 1). The result consists of three different concepts, depicted in Figs. 2, 3 and 4, which respectively present a nomadic gym, an itinerant escape room and a smart bus shelter. These concepts will be presented in detail in the remainder of this paper.

Fig. 1. One of the tables during the codesign workshop.

2 Methodological Approach

According to the codesign methodology the research questions were identified as a primary element of the research. The main questions were: (i) can design and technology be strategic factors in creating a different use of public spaces and facilitating citizens' interaction and sense of citizenship? (ii) is it possible to support intercultural communication and to facilitate social inclusion through the design of innovative and interactive public spaces by incorporating digital technologies in urban furnishings?

As already mentioned in the previous part, European cities are changing due the immigration of people from different countries bringing a variety of heterogeneous cultural backgrounds. There are many issues related to the integration and dialogue between cultures. Urban design plays a key role in how migrants participate in their host community and it is an important driver for the inclusion process. Promoting in

public spaces the interaction of different cultures becomes a crucial element to facilitate social cohesion and living together [8–10].

This codesign workshop aimed at investigating innovative solutions for facilitating migrants' integration and the dialogue between different cultures, through the design of innovative urban furniture and services, integrating smart technologies.

With this objective, researchers shared the design process with the other stakeholders, including users from different cultures, carrying out an activity of ideas' generation and of design concepts' development.

As Rizzo [11] and Sanders [12] wrote, this methodology have to be aimed more at identifying than at solving problems and focuses on the opportunities for innovation, emerging in the phase of ideas' generation, which will be used by designers to define innovative but plausible Design Orienting Scenarios.

The choice of codesign workshop derived from our desire to develop a project activity of a participatory nature together with the users by actively involving them, as this method allowed for designing products and services that are more useful and meaningful for people. For the development of the research, we decided to actively involve some immigrant citizens, coming from five different countries extra-UE, in the codesign workshop. In this way, researchers, expert of design, technology and social issues, were able to identify three different innovative scenarios of digital product-service systems for urban spaces, aimed at encouraging and supporting integration and intercultural dialogue.

Fifteen people participated in the codesign workshop, including designers, engineers, social scientists, professionals and operators working in the social field, educational scientists, immigrants and cultural mediators. During the co-design workshop, for understanding needs and expectations of all the stakeholders, involved and for stimulating the creativity of participants, the researchers exploited their skills and some of the tools normally used in the design discipline, such as design probes, storytelling, design orienting scenarios, prototypes, and design thinking models.

The development of project scenarios took into account the strategies, which were previously identified during the focus group, as fundamental to promote dialogue and intercultural inclusion.

The strategies we referred to are the following: (i) creating a network of interactions to stimulate intercultural exchanges between locals and migrants; (ii) educating for diversity; (iii) tackling of the gender differences in the provision of services or projects *(i.e., migrant women are wary of leaving their children in healthcare structures, and have problems of autonomy)*; (iv) working to maintain identity; (v) bringing of the different cultures closer together *(i.e., through themes such as school, work, food, dance, music and sport)*; (vi) use of catalysts, such as the linguistic tandem that allows two people of different cultures to confront each other and learn not only at a linguistic but also a cultural heritage level; (vii) creating of informal situations, which foster inclusion and direct human relationships [7].

The process adopted has been divided into three main steps: (i) the *"say"* phase, that means understanding needs and expectation of both local and immigrants; identifying the main factors of exclusion and/or inclusion in cultural heritage; exploring how different cultures use public spaces; (ii) the "*do*" phase: moving on to the discussion, collaboration, empathic relationship with the co-designers, for the generation

of ideas, concepts and possible solutions creative and summarizing insights; (iii) the *"make"* phase: discussing the insights and identifying a set of design domains for inclusive product-service systems in urban spaces, representing them through innovative and plausible Design Orienting Scenarios.

During the cognitive and exploratory activities, related to the "say" phase, participants told their experiences, documenting them through annotations, images, photographs, using different tools and methods that were made available by designers.

Once the previous phase was analyzed and the co-project brief was well identified, together with the participants, we moved on to the codesign activity: to the "do" phase.

Through discussion, collaboration, and empathic relationship with the co-designers, multiple ideas, concepts and possible creative solutions were generated. Finally, we arrived at the "make" phase, in which concepts of interactive urban place were developed and prototyped, represented by the designers in the form of three main Design Orienting Scenarios, better described in the following section.

3 Results

The workshop, which saw users involved as co-designers in the design process, led to defining and experimental prototyping some innovative, interesting and viable solutions concerning urban spaces and furnishings, in the form of product-service systems, for facilitating social inclusion of immigrants and intercultural communication among citizens.

Migrants have been given the position of 'experts in their own experience', playing an important role in developing knowledge, generating ideas and developing concepts of the products and services that they themselves will use. The ideas have been translated into three main Design Orienting Scenarios, which will play an important role in inspiration of design, as described below.

3.1 Scenario 1: Health and Wellness

The first solution is focused on sports and wellbeing (Fig. 2). Promoting good health and well-being is one of the key research areas promoted by the EU [13] as well as one of the sustainable development goals of the World Health organization [14]. In a superdiverse society, promoting health might imply additional challenges that cannot be solved through traditional interventions. This first scenario tries to address this challenge through the identification and the design of a public space installation for promoting and supporting fitness activities. Such solution could consist in a set of gym equipment to be installed outdoor in parks, squares and neighborhoods or indoor, in schools. As sport in public space could be an opportunity for socialization, this scenario aimed at identifying a common playground for younger people, both millennials and kids ac-companied by their parents. For the first target user group of this wellness installation, technology was identified as an opportunity both for socialization and for increasing motivation in engaging in physical activity, giving an opportunity to the youngest generation to track their physical performance, to compare it with other users and to challenge each other. Dance and music were also seen as an opportunity to foster

engagement in physical activity while also valorizing cultural heritage. While the opportunity to have fun and enjoy dance was considered as appealing also for parents with their kids, a possible barrier was individuated for a part of female migrants, whenever their culture would hinder them from enjoying physical activity in fitness outfits. To facilitate their participation to such activities, the identified design solution was a capsule to be installed in the public space, close to the other fitness installations. The proposed capsule would allow female migrants enjoying in fitness activities in a discreet space, with their kids and/or with other female migrants.

A digital platform will augment the capabilities of this nomadic gym providing information, about fitness classes and their schedules, and allowing registration for a selected class. At the same time, this platform can enable facilitated sharing of these events in order to motivate other people in the participants' social network and to catalyze the establishment of new relationships through the social media.

3.2 Scenario 2: Learning and Cultural Heritage

Promoting interculturalism and social inclusion implies a reciprocal understanding of cultural habits and traditions, as well as a good knowledge of local policies and bureaucratic processes of the hosting country (Fig. 3). As both locals and migrants might have difficulties to find (and often little interest in looking for) such information, the challenge of this scenario was to identify a solution to motivate people to get interested in and retain information about different cultures and about local policies. Indeed, policies and bureaucratic processes are often provided by institutions in a format that is complicated and difficult to understand even for locals, while little information is often provided about the culture of the different communities inhabiting an urban space. The solution identified for this scenario is an escape room, a social game that is particularly popular among millennials, but that is also enjoyable by people of all ages. The escape room could be realized in an itinerant format, to be moved from time to time in different public spaces of the city, such as parks, squares, neighborhood, schools and shopping centers. The content of the escape room should be varied and should be targeted at acquiring knowledge about uses and traditions of the different communities living in the surrounding of the public space where the escape room is installed. At the same time, the content should also facilitate learning of the bureaucratic processes that citizens of all communities might encounter during their daily life in the city. As entering the escape room with a multicultural team might facilitate the solution of the riddles required to win the game; socialization between different communities and learning through problem solving will be particularly facilitated. Some challenges have been identified for the sustainability of such solution: rich and varied content is required to raise the engagement of participants and a moderator is required to ensure the best experience during the game. Moreover, such installation should be easy to move to different places of the cities in order to reach the maximum number of citizens.

3.3 Scenario 3: Free Time, Work, Movement

The third scenario was intended to address a more practical need of people with different backgrounds to exchange ideas, services and skills (Fig. 4). In this case, the urban space is transformed in order to allow everyone to easily share information with other citizens, in an accessible and decentralized manner. This sharing info point could be physically materialized into either a multi-ethnic interactive totem, or a table where people can sit with real and virtual guests (for example, with chairs that integrate interactive screens in the backrest), or a smart interactive glass (for example, integrated in a shelter). In all these cases, video-messages can be shared by any citizen looking for particular skills or support or offering particular services or help. Users looking for a job or skill offer could browse the content and listen to messages left by other users, eventually meeting in person with other people sharing ideas at the info point. This solution might foster synergies among citizens and promote the inclusion of people with different needs and backgrounds. Challenges that should be taken into consideration in this scenario are a secured authentication of the users leaving video-messages, as well as a moderation of the contents left by the users. A risk to be avoided is transforming the public space into a ghetto of migrants, where locals would be afraid to gather. To this purpose, such info points should be installed in strategic places where all citizens are already gathering, for example in a park where kids can play together, in a bus stop, in a shopping center or in a school. At the same time, accessible and attractive interactive systems may lower the barriers for citizens to approach the service and to share and access such information.

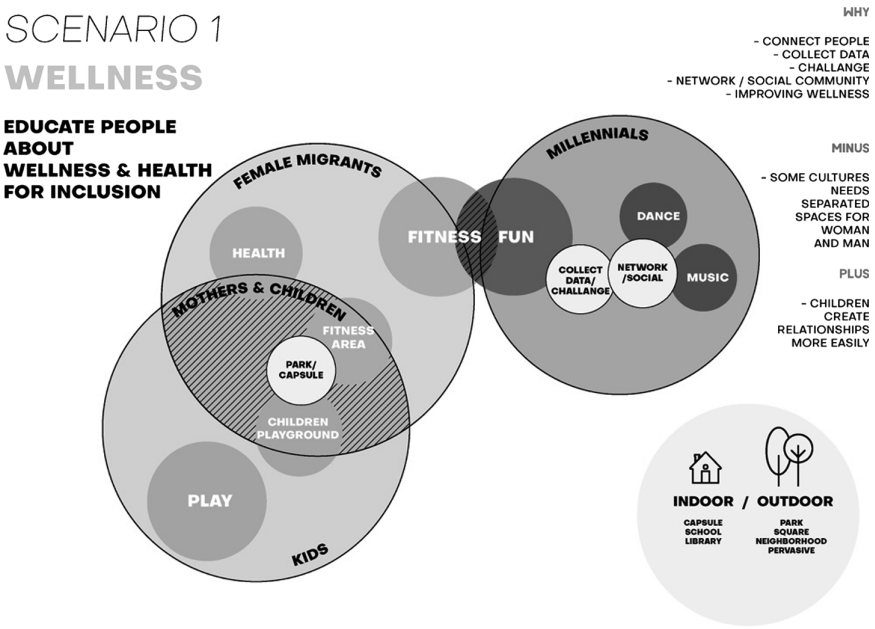

Fig. 2. Design Orienting Scenario to present the concept of nomadic gym

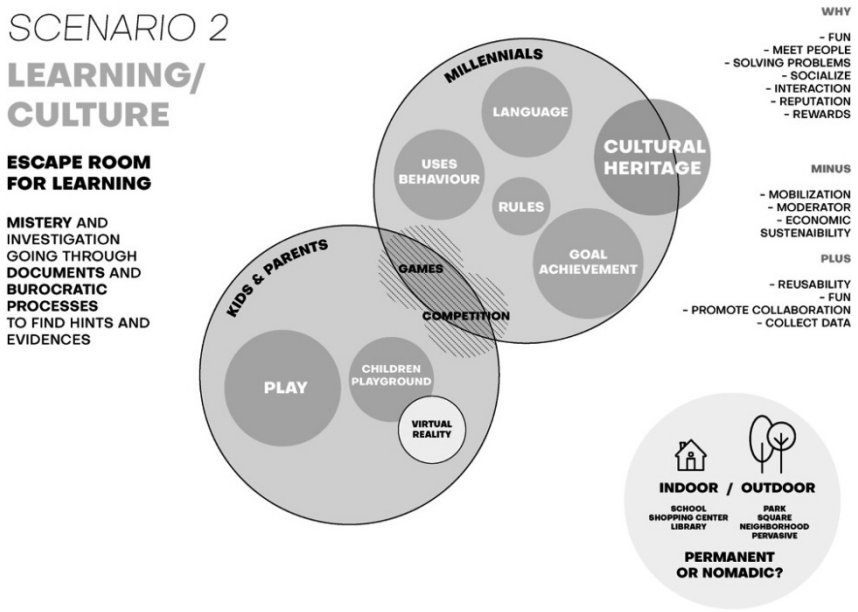

Fig. 3. Design Orienting Scenario to present the concept of itinerant escape room.

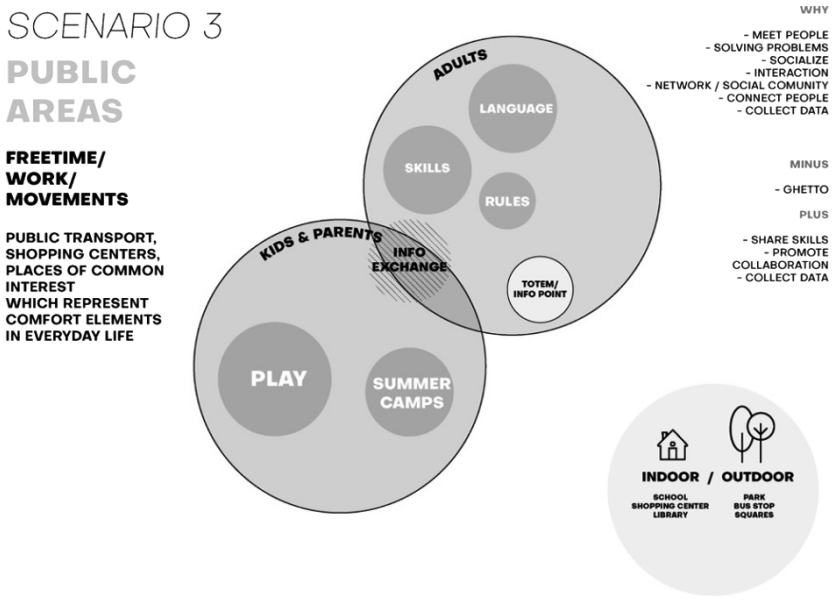

Fig. 4. Design Orienting Scenario to present the concept of smart bus shelter

4 Conclusions

In this paper, we presented the results of the second workshop adopting the codesign approach for the participatory creation of solutions that leverage smart public spaces as a catalyst for intercultural communication, diversity and inclusion.

This research has opened a reflection on the factors of exclusion that may compromise the use of and the access to urban spaces and services by all citizens, highlighting the need of a systemic and transdisciplinary design approach, which considers the intercultural factor, characterizing the contemporary cities. The use of, the access to, and the participation in the activities and services provided in urban areas may be affected by cultural, social and political factors, by economic status and linguistic difficulties of the users. Due to the complexity of the relations and the interactions of these aspects, a multi-domain and systemic design attitude is required in applying social inclusion and cohesion approaches in these contexts.

The barriers identified as the main causes of exclusion, discrimination and lack of cohesion between different cultures, even among the second young generations, are mainly four:

- Cultural barriers
- Social barriers
- Economical barriers
- Legal and political barriers

These barriers must be considered within the usability assessment and the design process of public spaces for intercultural communication, diversity and inclusion, where the main objective should be to prevent any kind of potential exclusion.

Furthermore, this means that it is necessary to adopt a systemic approach where the product-service design is a dynamic, under changeable, human-centered, open and codesigned part of the system [15].

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DECLARE

that the scientific contents of the publication "**Co-design of Public Spaces for Intercultural Communication, Diversity and Inclusion**", presented during the International Conference AHFE 2019 - International Conference on Design for Inclusion - held in Washington, Washington D.C. USA, July 24-28, 2019 and published by Springer, ISBN 978-3-030-20443-3, are the result of a joint research activity by the authors.

Despite this, paragraph ***1. Introduction and Background*** is to be attributed to **Maurizio Caon**, and paragraphs ***2. Methodological Approach, 3. Results and 4. Conclusions*** are to be attributed to **Alessandra Rinaldi.**

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Maurizio Caon