

Adaptive refurbishment for aging in place: design scenarios of case studies in Turin, Italy

Original

Adaptive refurbishment for aging in place: design scenarios of case studies in Turin, Italy / Montacchini, Elena; Tedesco, Silvia; Savio, Lorenzo. - STAMPA. - (2022), pp. 93-100. (Universal Design 2022 Brescia (Italy) September 7-9, 2022) [10.3233/SHTI220825].

Availability:

This version is available at: 11583/2969163 since: 2023-01-25T11:10:19Z

Publisher:

IOS Press

Published

DOI:10.3233/SHTI220825

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

Transforming our World through Universal Design for Human Development

*Proceedings of the Sixth International Conference
on Universal Design (UD2022)*



Editors: Ilaria Garofolo
Giulia Bencini
Alberto Arenghi



An environment, or any building product or service in it, should ideally be designed to meet the needs of all those who wish to use it. Universal Design is the design and composition of environments, products, and services so that they can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability. It creates products, services and environments that meet people's needs. In short, Universal Design is good design.

This book presents the proceedings of UD2022, the 6th International Conference on Universal Design, held from 7 - 9 September 2022 in Brescia, Italy. The conference is targeted at professionals and academics interested in the theme of universal design as related to the built environment and the wellbeing of users, but also covers mobility and urban environments, knowledge, and information transfer, bringing together research knowledge and best practice from all over the world. The book contains 72 papers from 13 countries, grouped into 8 sections and covering topics including the design of inclusive natural environments and urban spaces, communities, neighborhoods and cities; housing; healthcare; mobility and transport systems; and universally-designed learning environments, work places, cultural and recreational spaces. One section is devoted to universal design and cultural heritage, which had a particular focus at this edition of the conference.

The book reflects the professional and disciplinary diversity represented in the UD movement, and will be of interest to all those whose work involves inclusive design.



ISBN 978-1-64368-304-1 (print)

ISBN 978-1-64368-305-8 (online)

ISSN 0926-9630 (print)

ISSN 1879-8365 (online)

TRANSFORMING OUR WORLD THROUGH
UNIVERSAL DESIGN FOR HUMAN DEVELOPMENT

Studies in Health Technology and Informatics

International health informatics is driven by developments in biomedical technologies and medical informatics research that are advancing in parallel and form one integrated world of information and communication media and result in massive amounts of health data. These components include genomics and precision medicine, machine learning, translational informatics, intelligent systems for clinicians and patients, mobile health applications, data-driven telecommunication and rehabilitative technology, sensors, intelligent home technology, EHR and patient-controlled data, and Internet of Things.

Studies in Health Technology and Informatics (HTI) series was started in 1990 in collaboration with EU programmes that preceded the Horizon 2020 to promote biomedical and health informatics research. It has developed into a highly visible global platform for the dissemination of original research in this field, containing more than 250 volumes of high-quality works from all over the world.

The international Editorial Board selects publications with relevance and quality for the field. All contributions to the volumes in the series are peer reviewed.

Volumes in the HTI series are submitted for indexing by MEDLINE/PubMed; Web of Science: Conference Proceedings Citation Index – Science (CPCI-S) and Book Citation Index – Science (BKCI-S); Google Scholar; Scopus; EMCare.

Series Editors:

B. Blobel, O. Bodenreider, E. Borycki, M. Braunstein, C. Bühler, J.P. Christensen, R. Cooper, R. Cornet, J. Dewen, O. Le Dour, P.C. Dykes, A. Famili, M. González-Sancho, E.J.S. Hovenga, J.W. Jutai, Z. Kolitsi, C.U. Lehmann, J. Mantas, V. Maojo, A. Moen, J.F.M. Molenbroek, G. de Moor, M.A. Musen, P.F. Niederer, C. Nøhr, A. Pedotti, N. Peek, O. Rienhoff, G. Riva, W. Rouse, K. Saranto, M.J. Scherer, S. Schürer, E.R. Siegel, C. Safran, N. Sarkar, T. Solomonides, E. Tam, J. Tenenbaum, B. Wiederhold, P. Wilson and L.H.W. van der Woude

Volume 297

Recently published in this series

- Vol. 296 R. Röhrig, N. Grabe, V.S. Hoffmann, U. Hübner, J. König, U. Sax, B. Schreiweis and M. Sedlmayr (Eds.), German Medical Data Sciences 2022 – Future Medicine: More Precise, More Integrative, More Sustainable! – Proceedings of the Joint Conference of the 67th Annual Meeting of the German Association of Medical Informatics, Biometry, and Epidemiology e.V. (gmds) and the 14th Annual Meeting of the TMF – Technology, Methods, and Infrastructure for Networked Medical Research e.V. 2022 online in Kiel, Germany
- Vol. 295 J. Mantas, P. Gallos, E. Zoulias, A. Hasman, M.S. Househ, M. Diomidous, J. Liaskos and M. Charalampidou (Eds.), Advances in Informatics, Management and Technology in Healthcare

ISSN 0926-9630 (print)
ISSN 1879-8365 (online)

Transforming our World through Universal Design for Human Development

Proceedings of the Sixth International Conference on Universal
Design (UD2022)

Edited by

Ilaria Garofolo

University of Trieste, Italy

Giulia Bencini

Ca' Foscari University of Venice, Italy

and

Alberto Arenghi

University of Brescia, Italy



IOS Press

Amsterdam • Berlin • Washington, DC

© 2022 The authors and IOS Press.

This book is published online with Open Access and distributed under the terms of the Creative Commons Attribution Non-Commercial License 4.0 (CC BY-NC 4.0).

ISBN 978-1-64368-304-1 (print)

ISBN 978-1-64368-305-8 (online)

Library of Congress Control Number: 2022943405

doi: 10.3233/SHTI297

The image on the front cover represents the Winged Victory of Brescia, a bronze statue from the first century CE. The statue is preserved in the Roman Archaeological Park in Brescia.

Publisher

IOS Press BV

Nieuwe Hemweg 6B

1013 BG Amsterdam

Netherlands

fax: +31 20 687 0019

e-mail: order@iospress.nl

For book sales in the USA and Canada:

IOS Press, Inc.

6751 Tepper Drive

Clifton, VA 20124

USA

Tel.: +1 703 830 6300

Fax: +1 703 830 2300

sales@iospress.com

LEGAL NOTICE

The publisher is not responsible for the use which might be made of the following information.

PRINTED IN THE NETHERLANDS

Preface

“All over the world, people are struggling for a life that is fully human, a life worthy of human dignity. Countries and states are often focused on economic growth alone, but their people, meanwhile, are striving for something different: they want meaningful human lives.” (Martha C. Nussbaum, 2012. *Creating Capabilities*, p. 1, Cambridge, Massachusetts and London, UK, Harvard University Press)

From its first edition in 2012, the journey of the international conference on Universal Design has been the story of an expanding intellectual and practical movement. The aim of this movement is to put into practice the aspirations and goals of human-centred approaches to sustainable development founded on human rights, human development and equality for all, such as those encoded in the United Nations Sustainable Development Goals and the Convention on the rights of Persons with Disabilities (UNCRPD).

After the first meeting in Norway (Oslo, 2012), which was organised by several enlightened governmental bodies in the Scandinavian region as a forum for the exchange of views and sharing of good practice in Universal Design, the second edition in Lund in 2014 saw the entry of academia, with wide participation from across academic disciplines, setting the stage for UD practitioners, researchers and educators to connect directly and to share ideas, research and practice.

The role of academic institutions in organising the UD conference (York, 2016, Dublin, 2018 and Helsinki, 2021) has persisted across successive editions, strengthening over time, as universities have increasingly recognised and taken on board their responsibility as primary actors in working towards societies that are founded on equity, justice and sustainable development for all human beings through their research, educational and outreach activities.

The 2022 edition, held in the historic town of Brescia, Italy, marks another landmark in the journey of the UD movement, as it crosses the alps to be hosted in southern Europe for the first time. Three Italian Universities – the Universities of Brescia, Trieste, and Ca’ Foscari University of Venice – have joined forces to make this edition possible, opening up a space for conversations between researchers, educators and policy-makers in a truly multi-disciplinary vision for UD.

The title: *Transforming our World for Human Development* is intentionally aimed at realising broad sustainable development goals from a person-centred UD perspective by engaging delegates in a conversation across cultural, geographical, and disciplinary boundaries about what sustainable development really means. This was eloquently put by our dear colleague and friend Elio Borgonovi:

“There is much talk about renewable energies, resources and circular economies. Most of the time, however, we forget that human beings, with their characteristics and capabilities, provide the most precious renewable energy of all. Human capabilities develop with age and grow through education and experience. People flourish when they are given the chance to exercise their potential. This potential is exercised in social and natural environments when human beings can contribute

with their physical, intellectual, rational and emotional participation, by people, with people and for people.” (Address delivered at the University of Brescia, December 17th, 2020).

The sessions of the 2022 edition are characterised by their multi-disciplinary and multi-perspective nature, with sessions aimed at the design of inclusive natural environments and urban spaces, communities, neighbourhoods and cities, housing, healthcare, and educational facilities, mobility and transport systems, moving on to universally-designed learning environments, work places, cultural and recreational spaces. Contributions come from 13 different countries and various continents (Africa, Australia, Central America, East Asia, Europe, North America, South Asia) once again demonstrating that this is a growing international movement.

Our special thematic session is dedicated to Universal Design and Cultural Heritage. We believe that cultural heritage is part of what makes our lives human and meaningful. Providing full access for all human beings to cultural heritage combines two fundamental values crucial for human development and flourishing: cultural heritage provides each and every person with the possibility to engage meaningfully with their cultural and historical past, and at the same time it develops the awareness in each human being of the value of conserving the past so that we can better live in and understand the present.

A distinctive characteristic of the UD conference is the coming together of academic, governmental and professional communities under one roof. Our wish and invitation for the conference is for openness to others and to perspectives and experiences that may be different from our own, letting go of professional and disciplinary barriers, engaging with each other with empathy and curiosity. The experience of being so long deprived of face-to-face interaction due to the Covid-19 pandemic has made everyone more aware of the value of coming together during live conferences, in formal and informal ways.

The professional and disciplinary diversity represented in the UD movement is what allows us to transcend current existing separations between communities of knowledge and communities of practice, as well as existing separations between academic disciplines. Only when knowledge, practice and research from different disciplines are allowed to engage meaningfully and to feed into each other in a virtuous circle, can the power of ideas and actions become truly transformational.

Brescia, September 2022

Ilaria Garofolo, University of Trieste
Giulia Bencini, Ca' Foscari University of Venice
Alberto Arengi, University of Brescia

About the Conference

Conference Co-chairs

Alberto Arenghi	Department of Civil, Environmental, Architectural Engineering and Mathematics, University of Brescia
Giulia Bencini	Department of Linguistics and Comparative Cultural Studies, Ca' Foscari University of Venice
Ilaria Garofolo	Department of Engineering and Architecture, University of Trieste

Conference Organisation

Barbara Rita Barricelli	University of Brescia
Mariachiara Bonetti	University of Brescia
Elena Bortolotti	University of Trieste
Elisa Cacciaguerra	University of Trieste
Barbara Chiarelli	University of Trieste
Carlotta Coccoli	University of Brescia
Simone Fanti	RCS MediaGroup, Milan
Daniela Fogli	University of Brescia
Michaela Mae Vann	Ca' Foscari University of Venice
Martina Pucci	Ca' Foscari University of Venice

Scientific Committee

Francesc Aragall	President Foundation Design for All, Barcelona, Spain
Giuseppe Arconzo	Associate Professor of Constitutional Law, University of Milan, Italy
Alberto Arenghi	Associate Professor of Building Technology, University of Brescia, Italy
Luca Baraldi	Head of Corporate Identity & Public Affairs Ammagamma, Modena, Italy
Giulia Bencini	Associate Professor of English Language and Linguistics, Ca' Foscari University of Venice, Italy
Elio Borgonovi	Senior Professor of Economics and Management of Public Administration, Bocconi University, Milan, Italy
Jane Bringolf	Chair of Centre for Universal Design Australia, Sydney
Anna Cardinaletti	Professor of Linguistics, Ca' Foscari University of Venice, Italy

Tiziano Cattaneo	Researcher and Professor of Architectural and Urban Design, University of Pavia, Italy and Tongji University, Shanghai, China
Carlotta Coccoli	Associate Professor of Architectural Restoration, University of Brescia, Italy
Gerald Craddock	Chief Officer of Centre for Excellence in Universal Design – National Disability Authority, Dublin, Ireland
Stefano Della Torre	Professor of Architectural Restoration, President of Società Italiana per il Restauro dell’Architettura, Polytechnic University of Milan, Italy
Giuseppe Di Bucchianico	President EIDD - Design for All Europe, Italy
Oana Diaconescu	Associate Professor of Architectural and Urban Design, Ion Mincu University of Architecture and Urbanism, Bucharest, Romania
Onny Eikhaug	Former President EIDD - Design for All Europe, member of the Board IAUD, Chair of Selection Committee for the IAUD International Design Award Founder Innovation for All AS, Norway
Simone Fanti	Journalist RCS MediaGroup, Milan, Italy
Fabio Ferrucci	Professor of Sociology of Culture, University of Molise, Campobasso, Italy
Alenka Fikfak	Associate Professor, Head of the Chair of Urbanism, University of Ljubljana, Slovenia
Daniela Fogli	Professor of Computer Science and Engineering, University of Brescia, Italy
Ilaria Garofolo	Professor of Building Technology, University of Trieste, Italy
Emanuele Giorgi	Professor of Architectural and Urban Design, Tecnológico de Monterrey, Mexico
Per-Olof Hedvall	Certec Director, Lund University, Sweden
Pete Kercher	Ambassador EIDD - Design for All Europe, Italy
Antonio Lauria	Professor of Technology of Architecture, Head of the Interdepartmental Laboratory Florence Accessibility Lab, University of Florence, Italy
Inger Marie Lid	Professor of Rehabilitation and Public Health, VID Specialized University, Oslo, Norway
Elena Marchigiani	Associate Professor of Urban Planning, University of Trieste, Italy
Iva Mrak	Head of the Department for Transportation Engineering, Construction Management and Technology and Architecture, Representative at EIDD – Design for All Europe, University of Rijeka, Croatia

Laura Nota	Professor in Psychology of Inclusion and Psychology of Career Counseling, University of Padova, Italy
Gisella Paoletti	Professor of Experimental Pedagogy, University of Trieste, Italy
Marisa Rosalba Pavone	Professor of Special Education and Didactics, University of Torino, Italy
Marcello Pelillo	Professor of Computer Science, Ca' Foscari University of Venice, Italy
Helen Petrie	Professor Emerita of Human Computer Interaction, University of York, UK
Michèle Pezzagno	Associate Professor of Town and Regional Planning, University of Brescia, Italy
Giovanni Ramponi	Professor of Electronics, University of Trieste, Italy
Camilla Ryhł	Research Director, BEVICA Fonden, Denmark
Oddbjørn Sørmoen	Senior Adviser for Cultural Heritage, Church of Norway, Oslo
Ira Verma	Researcher in Architecture, Aalto University, Helsinki, Finland

Contents

Preface	v
<i>Ilaria Garofolo, Giulia Bencini and Alberto Arenghi</i>	
About the Conference	vii
Section 1. Ethical and Philosophical Perspectives in Universal Design	
The Emancipatory Design Manifesto: Let's Suppose That Disability Does Not Exist	3
<i>Jon Dag Rasmussen and Anne Britt Torkildsby</i>	
Understanding Person-Environment Relationships as Criteria to Support the Operationalization of Universal Designing	12
<i>Oskar Jonsson</i>	
State of Art and Perspectives of Universal Design: The Libyan Approach	20
<i>Ahmed El Rida Al Sharif</i>	
'Frontrunners" Understanding of Universal Design in Architecture	28
<i>Sidse Grangaard and Victoria Linn Lygum</i>	
User Insights for Better and More Inclusive Online Public Services: A Survey Study	36
<i>Till Halbach, Kristin Skeide Fuglerud and Mikael Snaprud</i>	
Methodologies for the Design of University Teaching Spaces in Covid/19 Regime. A BIM Oriented Approach, Defined for the Case Study of the Buildings of the Department of Architecture of the University of Florence (DiDA)	44
<i>Luca Marzi and Shirin Amini</i>	
Understanding the Quality of Life of Indian Elderly During COVID-19 Pandemic from Universal Design Perspective	53
<i>Iram and Gaurav Raheja</i>	
Public Space Accessibility in Vulnerable Areas in Post-Covid Times	61
<i>Deborah Guadalupe Garay Gutiérrez, Emanuele Giorgi and Virginia del Socorro Aceves Tarango</i>	
The Missing Voices of Disabled People	69
<i>Masashi Kajita and Emil Ballegaard</i>	
Making Research More Inclusive: Is Universal Design of Research the Answer?	77
<i>Gerd Berget and Birgit Kvikne</i>	
Towards 3rd Generation Universal Design: Exploring Nonclusive Design	85
<i>Per-Olof Hedvall, Margaret Price, Johnna Keller and Stina Ericsson</i>	
Adaptive Refurbishment for Aging in Place: Design Scenarios of Case Studies in Turin, Italy	93
<i>Elena Montacchini, Silvia Tedesco and Lorenzo Savio</i>	

Section 2. System and Standards for Universal Design

Can I Get There? Can I Play? Can I Stay? Creating an Inclusive Playspace Guide in Australia	103
<i>Jane Bringolf and Phillipa Carnemolla</i>	
Accessible-to-All Cities. A Project of Networking Italian Experiences to Raise Awareness and Promote Universal Design	111
<i>Francesco Alberti and Barbara Chiarelli</i>	
Universal Design in Exhibit	120
<i>Mark Trieglaff</i>	
360-Degree Films for Cognitive Inclusion at Workplaces	127
<i>Håkan Efring and Sara Kjellstrand</i>	
Mapping Accessibility in Norway – A Tool and Method to Register and Survey the Status of Accessibility in Urban Areas and Recreational Areas	135
<i>Sven Michaelis and Kathrin Bögelsack</i>	
Personalised Solutions for Universal Goals. A Home Adaptation Project for Disabled People in Italy	143
<i>Antonio Laurià, Paolo Costa and Leonardo Chiesi</i>	
Universal Design in Housing in Australia: An Example of People Power	151
<i>Margaret Ward and Jane Bringolf</i>	
Housing Development for All? Learnings from the Ars Longa Case	159
<i>Antti Pirinen</i>	
Perspectives on Accessibility and Its Users Amongst Practicing Danish Landscape Architects	167
<i>Marcus Tang Merit and Marie Christoffersen Gramkow</i>	

Section 3. Universal Design for Inclusive Communities and Urban Spaces

Systemic Approach to Universal Design of Urban Spaces – Case Study of Trbovlje, Slovenia	177
<i>Kristijan Lavtižar, Janez Grom, Neli Zajc and Alenka Fikfak</i>	
SMARTAGING in Venice. Toward a Definition of Age-Friendly Neighbourhood	185
<i>Rosaria Revellini</i>	
Aging Neighborhood and Social Inclusion – A Case Study	193
<i>Ira Verma</i>	
«Progetto di Vita» and Universal Design for Persons with Disabilities	201
<i>Cristiana Perego, Ilaria Oberti and Angela Silvia Pavesi</i>	
Communities, Sport, Inclusion. Strategies for Parish Complexes — Social Reactivation Through Sport Practice Promotion	209
<i>Francesca Daprà, Erica Isa Mosca, Marco Gola, Andrea Rebecchi, Maddalena Buffoli, Marika Fior, Maria Pilar Vettori and Stefano Capolongo</i>	

Rethinking Play Environments for Social Inclusion in Our Communities <i>Michela Dalpra</i>	218
A “Best Practice” for Inclusive Art Cities: The Case Study of the I-Access Project <i>Aldo R.D. Accardi and Renata Prescia</i>	226
Everyone Inside. Transformation of an Inaccessible Heterotopy. The Case of Buoncammino’s Prison <i>Francesca Musanti</i>	235
Section 4. Urban Scale, Mobility and Service Planning in a Universal Design Perspective	
Policies and Processes for Accessibility from a UD Perspective: The Integrated Approach Supported by the Friuli Venezia Giulia Region (IT) <i>Amanda Burelli and Consuelo Simone</i>	247
Beyond the Norm, the PEBA to Live in Udine <i>Christina Conti, Silvia Cioci and Teresa Sambrotta</i>	255
The City of Lecce (ITA) Accessibility Plan. The Innovative Experience of the Municipal Accessibility Lab <i>Francesca Raimondi, Monica Bercigli, Dora Uricchio and Giuseppe Gaballo</i>	263
Plans for the Removal of Architectural Barriers (PEBAs) from a UD Perspective. An Interdisciplinary Process in the Italian Region Friuli Venezia Giulia <i>Elena Marchigiani, Barbara Chiarelli, Valentina Novak and Andrea Peraz</i>	271
Improving Accessibility and Usability in the Built Environment. Case Study: Guide Lines by the Lombardy Region, Italy <i>Isabella Tiziana Steffan, Armando De Salvatore and Fulvio Matone</i>	280
The Level of Inclusiveness of Current 15-Minute City Models. A Qualitative Analysis on How Far City of Proximity Strategies and Design for All Are Merging <i>Alba Ramirez Saiz, Delfin Jiménez Martín, Patxi Lamiquiz and Andrea Alonso</i>	288
Inclusive Path Through Pavia: A Study to Link the Langobardic Heritage <i>Alessandro Greco, Valentina Giacometti and Elisa Bifano</i>	296
Metropolitan MaaS and DRT Schemes: Are They Paving the Way Towards a More Inclusive and Resilient Urban Environment? <i>Ilaria Delponte and Valentina Costa</i>	304
Section 5. Universal Design for Healthcare	
Interpreting Inclusion for Sanitation Perspectives from India: A Contextual Approach to Universal Design <i>Divyang Purkayastha and Gaurav Raheja</i>	315

Healthcare Facilities and Dementia Development of a Framework to Assess Design Quality	323
<i>Silvia Mangili and Stefano Capolongo</i>	
Designing Hospitals Through the Lens of Universal Design. An Evaluation Tool to Enhance Inclusive Healthcare Facilities	331
<i>Erica Isa Mosca, Jonathan White, Edward Steinfeld and Stefano Capolongo</i>	
Developing Innovative Solutions for Universal Design in Healthcare and Other Sectors	340
<i>Jonathan White and Erica Isa Mosca</i>	
Home-Based Primary Care: Adaptability Criteria for the Bedroom Layout and the Furnitures/Technological Equipments	348
<i>Cristiana Cellucci</i>	
Section 6. Universal Design in Products and Information and Communication Technologies	
Developed an Innovative Handbike Fork Made of Composite Material	359
<i>Luigi Solazzi, Giuseppe Schinetti and Riccardo Adamini</i>	
A Pattern Language for Inclusive Design: A Set of Patterns for Designing Reusable Accessible Solutions	367
<i>Stefano Valtolina and Alessandro Vivian Sisto</i>	
Unidirectional Tactile Paving: Circulation for the Visually Impaired	375
<i>Juan Fernández González and Ankit Gongal</i>	
Toward an Inclusive and Independent Fruition of Architecture: The Use of Scale Models and Augmented Reality	383
<i>Federico Cavalieri, Marianna Rotilio and Pierluigi De Berardinis</i>	
Towards eXtended Universal Design	391
<i>Joschua Thomas Simon-Liedtke and Rigmor Baraas</i>	
Technology Use and Familiarity as an Indicator of Its Adoption in Museum by People with Intellectual Disabilities	400
<i>Marilina Mastrogiuseppe, Leandro Soares Guedes, Monica Landoni, Stefania Span and Elena Bortolotti</i>	
A Multisensorial Storytelling Design Strategy to Build Empathy and a Culture of Inclusion	408
<i>Janice Rieger and Marianella Chamorro-Koc</i>	
Section 7. Universal Design and Cultural Heritage	
Does Pure Contemplation Belong to Architecture? The Denied Ramps at the Church of San Salvatore in the Santa Giulia Museum in Brescia	419
<i>Alberto Arengi and Carlotta Coccoli</i>	

World Heritage-Universal Heritage. The Commitment of Brescia Museums Foundation and Brescia Council to Enhance Museums and Public Archaeological Areas	427
<i>Francesca Morandini</i>	
How Can We Ensure Accessibility of Cultural Heritage? Toward Better Utilization of Existing Assets in Japanese Context	435
<i>Satoshi Kose</i>	
The Accessibility of Cultural Heritage. A New Perspective Between Relational Gaze and the Philosophy of Gesture	443
<i>Fabio Ferrucci</i>	
Outside, Around, Inside. New Paths to Discover San Michele Castle (Cagliari, Sardinia)	451
<i>Raffaele Argiolas, Elisabetta Mannai and Valentina Pintus</i>	
Universal Design and Interoperable Digital Platforms Between Conservation and New Fruition Opportunities. The Case Study of Arianna's Domus in Pompeii	459
<i>Renata Picone</i>	
NEAR PROJECT – Accessibility Plan for the Monumental Complex of the Opera di S. Maria del Fiore in Florence. Accessibility as an Element of Social	467
<i>Luigi Vessella</i>	
Values-Based Conservation in Practice – Accessibility at Akershus Castle	475
<i>Christian Ebbesen and Marianne Brenna</i>	
Usability of Visiting Routes in Heritage: The Case Study of Mercati di Traiano	483
<i>Luigi Biocca, Teresa Villani and Federica Romagnoli</i>	
The Economic Impact of Universal Design on Cultural Heritage Contribution to SDGs: Evidence from Italian Museums	491
<i>Renato Camodeca, Alex Almici and M. Cristina Vannini</i>	
Urban Accessibility in World Heritage Cities. Accessibility Considerations in Pedestrian Routes in Historic City Centres	499
<i>Delfín Jiménez Martín, Alba Ramírez Saiz and Miguel Angel Ajuriaguerra Escudero</i>	
Improving the Accessibility of Cultural Sites During Pandemic Through Microclimate Control. The Case of CapsulART Applied to the MANN Museum in Naples	507
<i>Marco Pretelli, Leila Signorelli and Maria Antonietta De Vivo</i>	
Innovative Accessibility Data Inventory Tools for Urban Environments in Historic Sites	515
<i>Daniele Treccani and Sebastiano Marconcini</i>	

Section 8. Universal Design to Create Inclusive Educational Environments

Universal Design in Primary Schools <i>Karine Denizou</i>	525
Towards a More Inclusive Learning Environment: The Importance of Providing Captions That Are Suited to Learners' Language Proficiency in the UDL Classroom <i>Shamira Venturini, Michaela Mae Vann, Martina Pucci and Giulia M. L. Bencini</i>	533
Universal Design for Learning at University: Technologies, Blended Learning and Teaching Methods <i>Federica Baroni and Marco Lazzari</i>	541
The Future of eXtended Reality in Primary and Secondary Education <i>Joschua Thomas Simon-Liedtke and Rigmor Baraas</i>	549
Challenges in Implementing Universal Design of ICT Among Teachers in Higher Education in Norway <i>Adil Hussain and Norun Christine Sanderson</i>	557
Accessible University: Architectural Design for Special Needs Users Integration. Design Proposals for Politecnico di Torino <i>Angela Lacirignola, Cristina Azzolino and Lorenzo Savio</i>	565
Higher Education and Universal Design in Tanzania. A New Model of Inclusion and Sustainable Development <i>Mariachiara Bonetti and Martin Noel</i>	573
UNIVERCITY. The University as a Metaphor for the City. Processes, Methods, and Tools for Contemporary Design <i>Cognigni Marta, Faroldi Emilio and Vettori Maria Pilar</i>	581
Accessibility Improvement of Public Schools Through User Involvement in JAPAN <i>Maiko Sugawara</i>	589
Evaluation Methodology for Inclusive Schools Environments. A Comparative Analysis Towards Goals and Strategies for Urban Design <i>Maddalena Buffoli, Marika Fior, Federica Delogu, Chiara Donato and Erica Isa Mosca</i>	597
Subject Index	605
Author Index	609

Adaptive Refurbishment for Aging in Place: Design Scenarios of Case Studies in Turin, Italy

Elena MONTACCHINI^a, Silvia TEDESCO^a, Lorenzo SAVIO^{a1}
^a*DAD Dipartimento di Architettura e Design, Politecnico di Torino*

Abstract. The "aging" world implies a rethinking of housing models, to meet the needs of the elderly for physical and mental well-being, independence, social interaction, safety, and accessibility. "Aging in place" is recognized by experts and international literature as a fundamental strategy for maintaining conditions of well-being and reducing public spending on health care. However, often the houses do not have the requirements to easily adapt to the needs that change with aging and possible downsizing of the family unit. For the elderly, maintaining their own home can become unsustainable due to problems of costs, oversizing, physical and perceptual accessibility, and safety. The contribution, taking as a case study the residential building heritage of Turin (Italy), illustrates and critically compares scenarios of adaptive recovery of homes to make them suitable for the needs of the elderly, intending to promote "aging in place" and housing adaptive refurbishment as a sustainable strategy.

Keywords. Aging in place, adaptive refurbishment, residential building stock, circular strategies

1. Introduction

The "aging" world implies a rethinking of housing models, to meet the needs of the elderly for physical and mental well-being, independence, social interaction, safety, and accessibility.

Instead of hospitalization or institutionalization, the elderly should stay in their own environment as long as possible. "Aging in place" is recognized by experts and international literature as a fundamental strategy for maintaining conditions of well-being and reducing public spending on health care. Hence the importance of the home, the main context of the elderly people's life, in which they generally wish to remain as long as possible in conditions of security, independence and comfort [1].

However, often the houses do not have the requirements to easily adapt to the needs that change with aging and possible downsizing of the family unit. For the elderly, maintaining their own home can become unsustainable due to problems of costs, oversizing, physical and perceptual accessibility, and safety.

Italy, in particular, has a rapidly aging population and has an old residential building-stock, built mainly before the adoption of accessibility and energy efficiency regulations.

¹ Corresponding author; lorenzo.savio@polito.it

On the other hand, the recovery of existing assets rather than the construction of new housing interprets the concepts underlying the circular economy and it drastically reduces the negative impacts on the environment.

In particular, flexibility and adaptability are key-strategies in the frame of design for circular economy, aimed at prolonging the lifespan of the building and accommodating changes in requiring modifications. As defined by Addis and Schouten [2] a flexible building is “a building that has been designed to allow easy rearrangement of its internal fit-out and arrangement to suit the changing needs of occupants”. Moffatt and Russel included flexibility and convertibility as sub-strategies to design for adaptability: according to the authors, adaptable buildings should be maintainable, versatile, and capable of responding to changing circumstances, for example, with a more efficient use of space, with minimum quality loss and environmental impacts [3].

Moreover, a circular approach to the refurbishment of existing residential buildings can extend their useful life and generate multiple benefits by contributing to economic and social development, considering several variables (such as the context and the changing needs of users [4]).

2. Objective and methodological approach

Starting from the World Health Organisation guidelines [5], several researches have focused on adapting of housing units to favour aging in place. However, the proposed solutions are linked to country-specific characteristics, which are difficult to adapt in a 'universal' way [6].

From these considerations, the research “Circular approach to aging in place in existing buildings”, taking as a case study the residential building heritage of Turin (Italy), illustrates and critically compares scenarios of adaptive recovery of homes to make them suitable for the needs of the elderly, intending to promote "aging in place" and housing adaptive refurbishment as a sustainable strategy.

The adaptive refurbishment scenarios of housing, to make them suitable for "aging in place", are built based on an analysis of the residential building stock of the city. Based on the information available from the national housing census and the Real Estate Observatory, some representative dwelling typologies are defined, different in size, construction period, level of physical accessibility. Circular refurbishment interventions are simulated, taking into account the obstacles (e.g. identification of the most efficient interventions, costs) and opportunities (grants for the recovery of assets) and associating the typologies with different kinds of elderly users (e.g. alone, in couples, with the need for partial assistance, with physical disabilities, owners, tenants, with different income levels). Figure 1 summarizes the methodological approach.

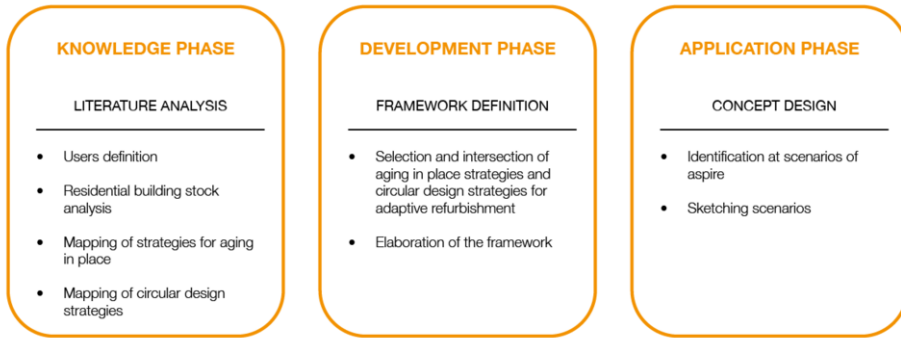


Figure 1. Synthetic scheme of the Research Methodology.

2.1. Italian residential building stock

Aging in place refers to the possibility for individuals to live as long as possible in their own home and community in a safe, independent and comfortable way regardless of their age, economic status and level of habitability [7]. The provision of new housing options is crucial to enable older people to "age in place". Despite the fact that there is a trend in the housing market to offer new housing solutions for the elderly who are still independent, designed with good levels of accessibility and security, the possibility of buying a new home remains an option for a few and implies a removal from the social context of origin.

However, the option of adapting housing to the new needs and changes in the households of the elderly comes up against as many difficulties, which are in part due to the characteristics of housing in our country. The Italian residential building heritage is largely made of historic buildings, which have undergone deep transformations and adaptations over time. 74% of residential buildings were built before 1980 and therefore before the laws and regulations that established minimum requirements for safety, energy efficiency and accessibility.

In addition, about 30% of the buildings constructed before 1945 are in a state of conservation considered of low-quality or very poor, and the percentage drops to only 25% for buildings constructed between 1946 and 1970.

The houses built in response to the housing emergency after the Second World War have been designed for large families, but the contemporary family models have radically changed.

The introduction of minimum requirements for the accessibility of houses dates back to the late 1980s, as well as the obligation to provide a parking space. Most of the residential buildings in urban contexts are currently without the minimum accessibility features of parking the car and getting to the house by a lift.

However, there are some opportunities provided by state incentives and tax deductions for building renovation, both on individual residential units and on the common parts of buildings. Incentives concern not only the improvement of energy performance, in line with the objectives of the European green deal, but also accessibility, with specific measures for disabled users, and the purchase of new furniture. The research on age-friendly assessment of housing [9] by University Federico II of Naples

gives a complete picture of the problems related to the adaptation of homes to the needs of the elderly user and, analyzing the main obstacles to the adaptation of homes, highlights not only the costs but also the difficulty in understanding how to carry out the work and the difficulty in finding honest and responsible professionals to whom to entrust the work.

2.2. Housing situation of older people in Turin

The research took into account different kinds of elderly users. On the one hand, the family unit was specifically analyzed (e.g. alone, in couples, with the need for partial assistance, with physical disabilities). These characteristics are linked to the need for accessibility and security with a view to making the elderly person's life autonomous in their own home. A survey carried out on a sample of 1118 people with an average age of 74 years reveals that 34% of the users live alone while 61% live with one or more family members. 74% of the sample are homeowners; about 50% of their homes are between 80 and 120 m², with an average size of 90 m² [8].

As regards the income, at national level ISTAT data show that the average amount of the pension is 1,616 euros which is the only source of income for 92% of the users over 65 years old [9]. House maintenance commits 11.3% of income for users over 65. The percentage drops considerably for the lower age groups.

2.3. Identification of a reference framework

Based on the analysis of scientific literature, the research linked circular economy strategies for adaptive reuse of residential buildings with the specific needs of adaptive-refurbishment scenarios in relation to elderly users.

As regards the circular approach, the analysis of the relevant publications on circular economy strategies for building design suggests several ways of action. In particular, the framework suggested by BAMB [10] identifies guidelines based on the main reuse and transformation criteria and their interactions, interdependencies and importance. Four key design criteria define spatial reversibility (dimension, position of core elements, building disassembly level, capacity of the core) and eight key design criteria define technical reversibility (functional decomposition, systematization and clustering, hierarchical relations between elements, base element specification, assembly sequences, interface geometry, type of the connections, life cycle coordination in assembly/disassembly). These criteria can guide the adaptation of a home to the new needs of the elderly. Interventions according to spatial and technical reversibility by adapting the existing apartments to new housing options are necessary to enable older people to "age in place".

3. Intervention scenarios on a representative case study

With the aim of outlining different possible scenarios on the recovery of a house that become unsuitable for the needs of an elderly user, an example, representative of the housing stock in the city of Turin, is illustrated. It is a flat of about 90 m² in a house with balcony access. The building is constructed in load-bearing masonry and has already undergone some interventions to improve accessibility, while the flat is in its original state with the insertion of the lift in the stairwell.

We assume an elderly user, over 75, owner, still self-sufficient and alone, for whom the size of the flat and the costs related to its maintenance and management are not compatible with his needs. In the hypothesis it is considered that the flat has reached the end of its life cycle and needs a complete renovation of the internal finishes and systems and that there is a general condition of unsustainability and incompatibility between the elderly person's life needs and the characteristics of the flat. Several scenarios can be considered:

- A, new dwelling;
- B1, minimal adaptation of the existing flat;
- B2, adaptive refurbishment;
- C, social care facility.

In scenario A, the user sells the flat and moves into a new home designed to suit his or her needs. Figure 2 illustrates a layout of a dwelling designed for ageing people that ensures complete accessibility, use and safety. First of all, it presents an optimal orientation and distribution through a large balcony conceived to be also a space of aggregation and meeting with other users. There is a large living area that allows use without physical obstacles (open space) connected to a terrace and the toilets are also accessible by a disabled user in a wheelchair. The strength of scenario A is the guarantee of maximum accessibility and usability for the user, the risks are the economic unsustainability of the operation (the original unrestored flat could be sold at a minimum price) and the separation from the original urban and social context.

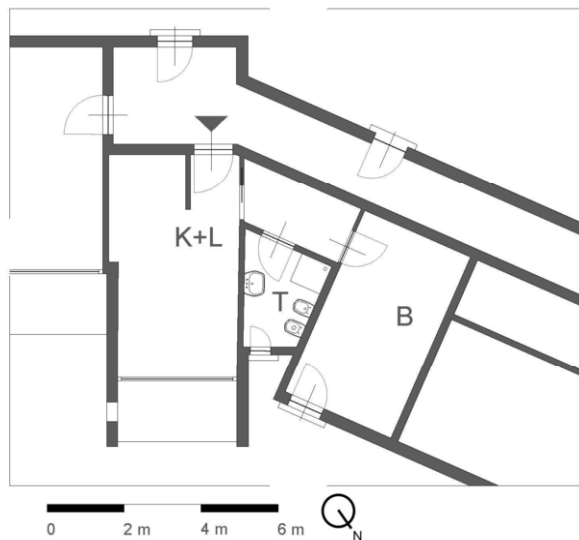


Figure 2 Scheme of a new age-friendly house based on the project of Bianchetti Greppi - dwellings and services for ageing people, Collebeato, Brescia, 2008.

In B1, the user keeps the flat by adapting it with minimal interventions, such as the replacement of furniture (safer and more functional and minimal adaptations of plants) without modifying the internal distribution or carrying out masonry works. Figure 3a shows the original state, with an interior layout characteristic of this type of building very common in the historic urban context: three rooms and a bathroom and kitchen facing the inner courtyard. In this case the problems of internal accessibility (e.g. of the toilet)

are not solved and the problem of the expenses for maintaining the flat, which is too large for the user, is not solved too.

In scenario B2, the user transforms his home (fig. 3b), dividing it into two units. The elderly user keeps one, while the other can be sold or rented. In this scenario, which is more complex to implement than the others, the elderly person could remain "in place" and find a financial balance that allows him to live in a fully accessible, safe, usable and circular home. The constraints to the transformation are multiple: the structure with load-bearing masonry does not allow a free redefinition of the layout, just as the external openings cannot be modified, it is difficult to suppose a free relocation of bathrooms and kitchen far from the drainage stacks, the user must in any case adapt his living habits to a smaller surface giving up part of his goods and furniture. In addition, the house is unusable during the adaptation work. It should be taken into account that the current legislation on home accessibility prescribes that renovations of private dwellings must guarantee accessibility for users with physical disabilities or demonstrate adaptability with simple adaptation measures for the full use of the toilets and living areas of the dwelling.

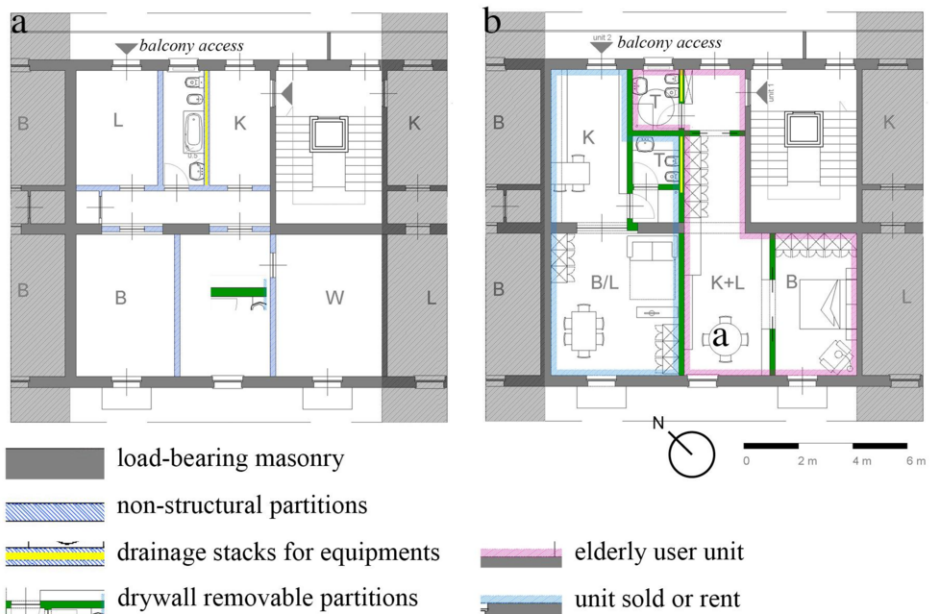


Figure 3. Figure 3a shows the 90 m² dwelling in the original state, while 3b shows a possible transformation in scenario B2.

However, the benefits are manifold, environmentally, economically and socially. The renovation of the existing building reduces the environmental impact, the consumption of new resources and the use of land. Retrofitting is carried out with light reversible technologies, allowing the restoration of the original dwelling unit or further modifications that may become necessary over time. From an economic point of view, the conversion of the dwelling is sustainable through the sale or rental of the additional dwelling unit. From the point of view of social well-being, the independence and familiar setting and routine is maintained.

In C the user, even if still with a good level of self-sufficiency, is transferred to an assisted structure. This scenario, besides being often not very sustainable from an economic point of view, not only for the user, but also for the burden on the public social-welfare system, leads to a radical change of the living conditions, which can be in some cases traumatic, and to a considerable reduction of the autonomy of life.

4. Results

The comparison of possible intervention scenarios allows pointing out problems, opportunities, strengths, and weaknesses of "aging in place" with particular reference to the national context. The scenarios are compared with each other and with the opposite scenario of transfer to a care facility.

Scenario B2 is probably the least frequent, not only because of the complexity of the architectural intervention, but also because it requires determination and commitment on the part of the user and in a certain sense a capacity for vision and planning (fig. 4). However, it represents an interesting perspective that can be facilitated by a proactive attitude of a series of subjects supporting the elderly person. Support from relatives in helping to encourage and assist the elderly person in a complex intervention is crucial. The professional is required to make a greater commitment to design solutions that are compatible with the many architectural constraints and knowledge of appropriate technologies, often different from traditional ones, to meet the requirements of reversibility. It is also required to focus more attention on project management and effective coordination of contractors.

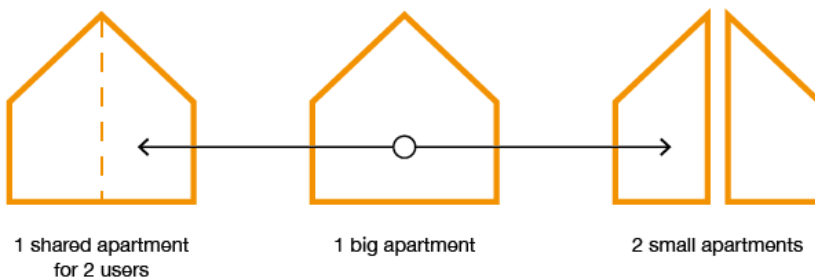


Figure 4. Adaptive refurbishment for aging in place.

5. Conclusion

According to the World Health Organization, cities should develop new housing options, to allow citizens to "age in their home". The contribution illustrates the scenario of a typical and recurrent condition, with the awareness that the problem is very complex and that the most effective solutions must be developed on a case-by-case analysis, taking into account the specific needs of the user. The advantages are individual and collective: the overall well-being of users, the decrease in public spending on health care, the

recovery and continuous maintenance of the building stock in a circular economy perspective. However, in the national context, there are numerous problems related to the characteristics of the buildings (accessibility, safety, poor state of conservation, poor energy performance, comfort), to the burden of costs for refurbishment interventions, but also to a lack of attention in architectural design and the difficulty in establishing the priority of interventions. However, "aging in place", by adapting homes, is a sustainable strategy, for which it is necessary to build the necessary conditions (regulations, technical support, grant opportunities) towards a new horizon of social housing.

References

- [1] Luciano, A., Pascale, F., Polverino, F., & Pooley. Measuring age-friendly housing: A framework. *Sustainability*. 2020, 12(3), 848.
- [2] Addis, W.; Schouten, J. *Principles of Design for Deconstruction to Facilitate Reuse and Recycling*; Ciria: London, UK, 2004.
- [3] Moffatt, S.; Russell, P. Assessing the Adaptability of Buildings. IEA Annex 31. 2001. Available online: https://www.researchgate.net/profile/Amir_Causevic/post/Is_there_any_scientific_method_for_assessing_the_flexibility_and_adaptability_of_buildings/attachment/59d61f2dc49f478072e97900/AS%3A271749810196482%401441801611675/download/APS-CA+Assessing+the+Adaptability+of+Buildings.pdf (accessed on 04 April 2022).
- [4] Cellucci, C.. Circular economy strategies for adaptive reuse of residential building. *VITRUVIO-International Journal of Architectural Technology and Sustainability*. 2021, 6(1), 110-121, Available online: <https://polipapers.upv.es/index.php/vitruvio/article/view/15404> (accessed on 04 April 2022).
- [5] World Health Organization, *Global Age-Friendly Cities: A Guide*, World Health Organization, Geneva, Switzerland, 2007. Available online: <https://apps.who.int/iris/handle/10665/43755> (accessed on 04 April 2022).
- [6] Van Hoof, J., Marston, H. R., Kazak, J. K., & Buffel, T. Ten questions concerning age-friendly cities and communities and the built environment. *Building and Environment*, 2021, 199: 107922.
- [7] Lux, M., Sunega, P. The impact of housing tenure in supporting ageing in place: exploring the links between housing systems and housing options for the elderly. *International Journal of Housing Policy*, 2014, 14.1: 30-55.
- [8] Luciano, A. La valutazione dell' "age-friendliness" delle abitazioni. *Abitare Anziani informa*, Associazione AeA. 2020. Available online: https://www.abitareanziani.it/wp-content/uploads/2020/01/AeA_Magazine_01-2020_completo.pdf (accessed on 04 April 2022).
- [9] ISTAT, Istituto Nazionale di Statistica, <https://www.istat.it>
- [10] BAMB - Buildings As Materials Banks, *Design Strategies for Reversible Buildings*, Available online: <https://www.bamb2020.eu/wp-content/uploads/2019/05/Reversible-Building-Design-Strateges.pdf>.
- [11] https://www.abitareanziani.it/wp-content/uploads/2020/01/AeA_Magazine_01-2020_completo.pdf (accessed on 04 April 2022).