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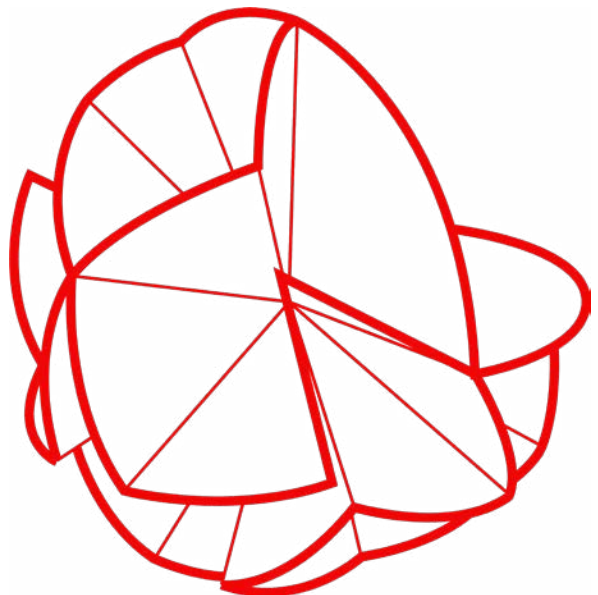
DIGITAL  
SPECIAL  
ISSUE  
1

# Disrupting Geographies in the Design World

Proceedings of the 8<sup>th</sup> International  
Forum of Design as a Process

Alma Mater Studiorum — Università di Bologna

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(Eds.)  
Erik Ciravegna  
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Michele Zannoni





# Colophon

**diid**  
**disegno industriale**  
**industrial design**  
**Digital Special Issue 1**  
— DSI 1

**Year**  
XXI

diid is an open access  
peer-reviewed scientific  
design journal

diid is published  
three times a year

Registration at Tribunale  
di Roma 86/2002  
(March 6, 2002)

www.diid.it

Print subscription  
(3 issues)  
Euro 60,00  
Subscription office  
ordini@buponline.it

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industrial design

**Publisher**  
Fondazione  
Bologna University Press  
Via Saragozza 10  
40123 Bologna  
Tel. (+39) 051 232 882  
Fax (+39) 051 221 019  
www.buponline.com  
info@buponline.com

**ISSN**  
1594-8528

**ISSN Online**  
2785-2245

**DOI**  
10.30682/diiddsi23

**ISBN Online**  
979-12-5477-329-1

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# Contents

14

**The Latin Network for the Development  
of Design Processes**

16

**8th Forum Main Partners**

18

**Disrupting Geographies  
in the Design World**

20

**People**

26

**Impact**

**Track 1**

# **There's No Plan(et) B: Sustainable Transitions to Systemic Planet-Centric Design**

30

**There's No Plan(et) B.  
Sustainable Transitions to  
Systemic Planet-Centric Design**  
Erik Ciravegna, Clara Giardina, Davide Pletto

40

**Beyond Collaboration: A Network Analysis  
of Local Stances and Global Frameworks  
in the Collective Design of the City**  
Francesca Sabatini, Martina Massari,  
Saveria Olga Murielle Boulanger

50

**Alter\_Azioni: Designing  
between Biological and Artifactual.  
Scenarios for a Short-Term Future**  
Pietro Costa, Raffaella Fagnoni

62

**(Systemic) Design for Sustainable  
Territorial Transition: A Literature  
Review of State of the Art**  
Asja Aulisio, Silvia Barbero, Amina Pereno

72

**Dasein ist Design:  
An Ontological Discussion of Design  
in the Ecological Crisis Time**  
Sabrina Lucibello, Carmen Rotondi

80

**The More-Than-Human Trend  
in Design Research: A Literature Review**  
Annapaola Vacanti, Francesco Burlando,  
Isabella Nevoso, Massimo Menichinelli

90

**Being and Nature.  
The Aesthetic Ecocentrism**  
Adriano Pinho, Francisco Providência

102

**Forward to the Primitive.  
New Sustainable Design Processes  
Characterized by Primitive Aesthetic**  
Jurji Filieri, Elisabetta Benelli

110  
**How Long Does It Take For a Paradigm Shift. A Design-based Critical Essay on Materials and Fabrication Processes**  
Guilherme Giantini, Lígia Lopes

118  
**Sustainability Needs Service Efficacy**  
Chiara Olivastri, Giovanna Tagliasco

126  
**Systemic Design Applied to Medtech. Guidelines for Corporate Training on Sustainable Healthcare**  
Enrica Ferrero, Giulia Ferrero

138  
**Reducing Waste in Healthcare: A Systemic Design Approach for Sustainable Disposables Manufacturers**  
Gabriele Maria Cito, Angela Giambattista

150  
**A Framework to Design Appliances for the Circular Economy Scenario**  
Chiara Battistoni

162  
**Digital Fashion Technologies & Practices: Design Driven Sustainable Transition in Fashion Industry**  
Ludovica Rosato, Alberto Calleo

170  
**Material Resources as a Contextual Complex System**  
Michele De Chirico

180  
**Diffuse Micro-Factory: Circular Distributed Production System for Microbial Nanocellulose**  
Lorena Trebbi

190  
**From Sea to Fashion. Seaweeds as Material for a Sustainable Transition**  
Paolo Franzo, Clizia Moradei

198  
**The Sound of Sustainability. Biomaterials and New Sensory Frontiers**  
Giovanni Inglese, Sabrina Lucibello, Carmen Rotondi

208  
**Unpacking Ceramic History in Asia and Europe: Contribution to New Reusable Packaging Design**  
Raquel Gomes, Cláudia Albino

## Track 2

# Intersectional Design for an Accessible and Empowering World

220  
**Intersectional Design for an Accessible and Empowering World: Views from the 8th Forum of Design as a Process**  
Valentina Gianfrate, Lígia Lopes, Margherita Ascari, Simona Colitti

226  
**Viva! Colinas. Service Design for Tourism and Reconciliation in Communities of Former Colombian Guerrilla**  
Beatriz Bonilla Berrocal

238  
**The Digital Archive as an Inclusive Tool for Knowledge Construction Through Design Practices**  
Alessandra Bosco, Fiorella Bulegato, Silvia Gasparotto

248  
**Intercultural Design Approach. Narrative Design for a Multicultural Society**  
Irene Caputo, Marco Bozzola, Claudia De Giorgi



258

**From Wayfinding to Placefinding.  
Orientation and Alterity in Urban Spaces**

Daniela D'Avanzo, Salvatore Zingale

268

**A Meta-Analysis for an Interactive,  
Intersectional and Inclusive  
Exhibition Based on the SDGs**

Sergio Degiacomi, Francesca Zoccarato,  
Simone De Pascalis, Pietro Crovari,  
Fabio Catania

278

**From Empathy to Inclusive Design:  
Multisensory Solutions for (Not Only)  
Socially Sustainable Projects**

Federica Delprino

288

**Etnography in Sever Do Vouga:  
Reality->Change First Step to Engage  
a Creative and Rural Community**

Pedro Fragoso Lopes, Gonçalo Gomes

298

**The Implementation of U.D. in a Metal  
Processing Plant of the Metropolitan  
Zone of Guadalajara (MZG)**

Luis Erik Hernández Sánchez, Enrique  
Herrera Lugo, Jaime Francisco Gómez  
Gómez, Francisco Javier González Madariaga

312

**Towards Better Public Sector Innovation.  
Co-designing Solutions to Improve  
Inclusion and Integration**

Ilaria Mariani, Francesca Rizzo, Grazia  
Concilio

322

**Creating Methodological  
Design Processes for Empowering  
Artisans of Cali, Colombia**

Edgar Andrés Martínez Muñoz,  
Diana Marcela Giraldo Pinedo

332

**Empowering Through Design:  
Regional Development Strategy  
of Los Lagos as an Intersectional Case**

Daniel Moreno, Katherine Mollenhauer,  
Arturo Orellana

344

**Inclusive Merchandising.  
A Storyteller for an Accessible University**

Monica Oddone, Marco Bozzola,  
Claudia De Giorgi

354

**Geopolitics of Fashion. Glocal Power  
Evidence and Design Activism for Leading  
Disrupting Textile Debris in Chile**

Bárbara Pino Ahumada

366

**Intersectional Design in Practice: A Critical  
Perspective on Sustainability for All**

Alessandro Pollini, Pilar Orero,  
Alessandro Caforio

374

**Empower to Care or Care to Empower?  
The Theory Behind the Practice  
That Transforms**

Marcia Santos da Silva, Gustavo Severo de  
Borba

384

**Perspectives of Sound: Promoting  
Social Inclusion Under the Principle  
of "Access for All" in Museums**

Yi Zhang, Raffaella Trocchianesi

# Design and Responsive Technologies for Human Wellbeing

396

## **Design and Responsive Technologies for Human Wellbeing**

Mirko Daneluzzo, Michele Zannoni, Giorgio Dall'Osso, Silvia Gasparotto

406

## **Counterpoint. Are We Sure That All These Data Are Good for Us?**

Antonella Valeria Penati, Carlo Emilio Standoli

418

## **Sustainable Data-Driven Strategies and Active Well-Being: A Case Study**

Giuseppe Mincolelli, Gian Andrea Giacobone, Michele Marchi

426

## **Are You Me? Re-Embodiment Process for Telepresence Robots**

Lorenza Abbate, Claudio Germak

440

## **From Applications to Implications: Design as a Process for Humanising Future Robotics**

Christiam Mendoza, Roberto Íñiguez Flores, Ruth León Morán

450

## **Data Driven Design: From Environment to the Human Body**

Elena Cavallin

458

## **IF THIS THAN THAT Broken Linear Logic. Rethinking and Representing the Design Process**

Margherita Ascari, Andrea Cattabriga, Simona Colitti, Ami Liçaj

468

## **Responsible Tech Innovation Through Design: A Participative, Reflective, and Systemic Approach**

Jane Vita, Tiina Mäkelä, Teemu Leinonen

478

## **(Re)Active Materials. Well-Being's Concept Evolution and Advanced Material Innovations**

Noemi Emidi

490

## **Mixed Reality as Activator of Collaborative Processes for Transcultural Future**

Alessandra Miano

500

## **Exhibitions as Hybrid Environments. Exploring Situated & Embodied Interaction in Cultural Heritage**

Letizia Bollini, Marco Borsotti

512

## **Ethnographic Study: Finger Food Systems, Contribution to a Project Program in Food Design**

Lígia Afreixo, Francisco Providência

522

## **PASSO Project: Design of a Smart System Using Biofeedback to Train People with Parkinson's Disease**

Silvia Imbesi, Giuseppe Mincolelli

532

## **Pathos: A digital service to improve women's hospital experience**

Elisa L'Angiocola, Angela Giambattista

544

## **Brain Training, Mindfulness, and Wearables: Empowering Employee Wellbeing Through Neurotechnologies**

Francesca Bonetti, Giorgio Casoni

554

## **The Augmented Body: Technological Contamination in the Fashion-Tech Paradigm**

Elisabetta Cianfanelli, Margherita Tufarelli, Elena Pucci

564

## **Health Communication as Apo-Mediation. The Impact of Communication Design on Health Prevention and Perception**

Daniela Anna Calabi, Alice Maturo

# Design Values Out of the Mainstream: New Geographies of Influence

578

**Design Values Out of the Mainstream:  
New Geographies of Influence**

Qassim Saad, Andreas Sicklinger,  
Lorela Mehmeti

588

**An Analytical study to develop  
the traditional craft in the field  
of creative industries in Egypt**

Hoda Aman

600

**Enhancing social well-being through  
social innovation approach and design  
expertise: a case study for social  
innovation in a local district in Turkey**

Yagmur Gizem Avci, Ece Cinar, Cigdem Kaya

610

**Cultural Factories: Conversion of Industrial  
Areas into Cultural Hubs**

Eva Vanessa Bruno, Beatrice Lerma,  
Doriana Dal Palù, Claudia De Giorgi

620

**Bahrain Knowledge Bay. Using Design  
Thinking to Establish an Infrastructure  
Towards Knowledge Economy**

Halim Choueiry

630

**Culture and creativity as assets  
for inclusive growth in small  
and remote places: a design-led process**

Annalinda De Rosa, Davide Fassi

640

**Culture-based Innovation:  
A Localized Approach for Designing**

Alaa El Anssary, Ahmed Wahby

650

**Burning approaches to tensing  
the present: a new political  
dimension of design**

Fabiana Marotta

658

**Design Resistance. Material  
Solutions for local remoteness**

Martina Taranto, Barbara Pollini,  
Valentina Rognoli

668

**How Should Technology Follower  
Companies of Developing Countries  
Innovate Through Design Capability?**

Bilgen Tuncer Manzakoglu

680

**Subjectivation and cities: relationships  
between local independent fashion  
and Possible Future Scenarios**

Paula Visoná, Mágda Rodrigues da Cunha,  
César Kieling

# New Education Pathways for Future Designers in a Changing World

696

## **New Education Pathways for Future Designers in a Changing World**

Valentina De Matteo, Elena Formia, Roberto Iñiguez Flores, Laura Succini

706

## **Decolonizing the Design Process: A Case Study in Authorship, Power, and Control**

Scot Geib

714

## **OpenMind Handbook. A System of Design Tools and Processes to Empower Democracy Culture in Primary Schools**

Valentina Facchetti, Laura Galluzzo, Ambra Borin

724

## **Architecture, Design and Community in Colombia. More Urban, More Rural, More Social: The Workshop Experience**

Sasha Londoño-Venegas, Adriana Jaramillo Botero

736

## **Creative Community for Generation Z Teachers in Brazil Through Strategic Design**

Lara Maria Luft, Debora Barauna, Gustavo Severo de Borba

746

## **Design Thinking and Career Development: A Comparative Study**

Clio Dosi, Eric Guerci, Jacek Jakięta, Joanna Świętoniowska, Eleni Vordou, Maria José Varadinov, Matteo Vignoli, Gastão de Jesus Marques, Joanna Wójcik

760

## **Design Processes: From the Historical Perspective to the Application in Startups Companies**

Isabela Moroni, Amilton Arruda

772

## **Design and Innovation: Where Do We Want to Play? Inquiry Into Some Design's Strengths and Weaknesses in Innovation**

Marco Limani

782

## **Design Ecosystem in Portugal. Education, Research and Entrepreneurship**

Marlene Ribeiro, Francisco Providência

790

## **The Design Posture: A Collaborative Learning-By-Doing Approach**

Rita Duina, Marco Berni, Andrea Del Bono

798

## **Advanced Manufacturing for Sustainable Fashion. Developing Interdisciplinary Educational Experiences**

Daria Casciani

810

## **Co-designing Contents With Situated Stakeholders: An In-Field Process in Nolo (Milan)**

Davide Fassi, Francesco Vergani

820

## **Creativity and Mirror Effect: Teaching Creative Skills Through Non-traditional Pedagogies**

Alejandra Amenábar Álamos

830

## **How Design Thinking Could Benefit Future Educational Environments in a Post-Pandemic Era?**

Yuqing Zhu, Yunyu Ouyang

840

## **How a Technology Identity Can Enhance the Diffusion of Good Design Practices in Product Sound Design**

Daphne Degiorgis, Marco D'Addario, Beatrice Lerma, Doriana Dal Palù

852

## **Learning and Teaching From and by Social Media. Instagram to Support Blended Learning Models**

Vittorio Linfante, Andrea Manciaracina

864

## **Education & Practice in Open Design. Improving the Learning Experience Through Knowledge Connections**

Fabrizio Valpreda

876

**You Can Never Solve Problems With  
the Same Mindset That Created Them.  
How Can We Change the How and the  
What We Teach to Enable Our Students  
to Become Truly “Terrestrial” Designers?  
A Proposition Following Bruno Latour’s  
“Terrestrial Manifesto”**

Angela Grosso Ciponte, Evelyne Roth

884

**Good for Good. Designing  
Packaging in the Era of Deliveries**

Loredana Di Lucchio, Ivo Caruso

896

**Onboarding Future Systemic  
Innovation Designers Through  
Informal and Collaborative Activities**

Leonardo Moiso, Sofia Cretaio,  
Cristina Marino, Chiara L. Remondino,  
Paolo Tamborrini

908

**Material Practices in Transition:  
From Analogue to Digital in Teaching  
Textile and Fashion Design**

Delia Dumitrescu, Martina Motta

918

**Designing for the Future of  
Education Through Cultural Heritage**

Nour Zreika, Daniele Fanzini

928

**We Need to Talk About Learning Design.  
A Proposal for Critical Conversation**

Suzanne E. Martin

938

**Collaborative Learning of Ph.D.  
Candidates in Design on Emerging  
Scenarios in Scientific Publication**

Eleonora Lupo, Sara Radice

948

**Scenarios, Networks and Systems:  
An Alternative to Dichotomous Patterns**

Liana Chiapinotto, Fernando Guimarães  
Horlle, Tássia Ruiz, Celso Carnos Scaletsky

# The Latin Network for the Development of Design Processes

The Latin Network for the Development of Design Processes is a group of researchers, academics, students and business professionals of Latin languages and cultures who study and operate in a particular field of design known as design processes. They meet in a Forum, conceived as an international specialised conference, to engage in lively discussions and debates about their studies and experiences.

The Network was founded in 2008 with the “Carta di Torino” manifesto. Since its very beginning, Professor Ph.D. Flaviano Celaschi has been leading a team that, over the years, guaranteed the cultural and scientific focus of the members of the Network, fostering inter-institutional cooperation. Since 2015, the Network has been hosted by the Alma Mater Studiorum – Università di Bologna, within the Advanced Design Unit (ADU) of the Department of Architecture, coordinated by Professor Ph.D. Elena Formia.



So far, the members organised eight Forums, covering the following thematic axes:

**Design Cultures as Models of Biodiversity**

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June 24-26, 2009

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2nd Edition

*Universidade de Aveiro, Aveiro, Portugal*

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3rd Edition

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5th Edition

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September 18-20, 2014

**Systems & Design. Beyond Processes and Thinking**

6th Edition

*Universitat Politècnica de València, València, Spain*

June 22-24, 2016

**Design & Territory: Emergencies and Conflicts**

7th Edition

*Universidad Nacional de Colombia, Sede Palmira, Colombia*

June 23, 2020

**Disrupting Geographies in the Design World**

8th Edition

*Alma Mater Studiorum — Università di Bologna, Bologna, Italy*

June 20-22, 2022

For more information about the Editions and related publications, see: <https://www.forumdesignprocess.org/dgdw22/past-editions/>

# 8<sup>th</sup> Forum Main Partners

## **Alma Mater Studiorum — Università di Bologna Advanced Design Unit Department of Architecture**

The Advanced Design Unit is a community of professors, researchers and experts who deal with design cultures and their continuous innovation. It operates in the University of Bologna through teaching activities, research, and the third mission.

<https://site.unibo.it/advanceddesignunit/it>

## **Tecnológico de Monterrey (TEC)**

Established in 1943, Tecnológico de Monterrey is a distinguished private nonprofit university dedicated to cultivating leaders with robust entrepreneurial acumen and a profound sense of humanity, making them globally competitive. With a presence in 26 cities across Mexico, the university boasts a student enrollment exceeding 65,000, encompassing both undergraduate and doctoral programs. Garnering recognition on the global stage, the QS World University Rankings (2021) position Tecnológico de Monterrey at an impressive 155th worldwide. Within its esteemed Escuela de Arquitectura, Arte y Diseño, the university nurtures talents in Architecture, Digital Art, Design, and Urbanism.

<https://tec.mx/es>



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*diid* is an open-access, peer-reviewed scientific design journal published three times a year. It was founded in 2002 to fill a gap concerning scientific journals in Italy related to industrial design and design studies. Over the last two decades, *diid* has investigated design disciplines and practices, recording their development thanks to the significant contribution of Italian and international scientific communities. The one inaugurated in 2021, with issue no. 73, is a new phase. The journal, while exploring advanced design cultures, delves into specific aspects such as anticipation, narratives of complex systems belonging to the evolving landscape of capitalism and relational dynamics, the front-end of innovation, the avant-garde of theoretical and applied design debates. The pivotal theme under the lens of analysis is transformation, aiming to comprehend its various impacts and meanings within the realms of innovation domains. With this approach, it aims at overpassing spatial, cultural, economic, and technological boundaries giving voice to design research coming from different areas.

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**8<sup>th</sup> International Forum of Design as a Process**

# **Disrupting Geographies in the Design World**

**Alma Mater Studiorum — Università di Bologna**

**Bologna, June 20-22, 2022**



**Responsible Innovation**

**Social Justice**

**Ecocentrism**

**Changing Education**

**[www.forumdesignprocess.org/dgdw22](http://www.forumdesignprocess.org/dgdw22)**

How design is evolving to respond to the urgent needs facing our environment and society at large? How to understand and design the dynamic relations between artefacts, human beings and the ecosphere? How might design principles and practices adapt their approaches to attend to the diversity that characterised the world?

In an increasingly globalized world, new geographies in and of design offer the stage for negotiating ecosystem's complexity. Design is positioned as a key driver for improving the living standards of many, where human and environmental capitals are pivotal in local economies, and also for the connection to the rest of the world.

The 8th International Forum of Design as a Process (Bologna, June 20-22, 2022) featured speakers from the Global Design community, expanding the original vocation of the Latin Network for the Development of Design as a Process to include researchers and designers of the Mediterranean Area, Middle East, IOR (Indian Ocean Region), and Global South regions. The aim was sharing new perspectives on design futures with responsibility and justice, at the forefront of change, establishing strategic partnerships, and creating accessible knowledge.

The Forum, spanning three-days of meetings, reflection opportunities and networking activities, involved designers, scholars, young researchers, design entrepreneurs, opinion leaders, in an experimental format. Grounded in three pillars – seminars, workshops, and exhibitions –, the event aimed to attract audiences to Bologna, consolidating the potentials of the design world as hub for thought and creative production for present and future generations.

Speakers' contributions inspired the designers' community of practices, and resonated with students and the wide community, to connect design to all aspects of culture and life. This interdisciplinary approach explored the intersections of materiality and culture, post-coloniality, decoloniality, gender studies, and other areas of human thought and action which seek to analyze, question and challenge the disruptive geographies in the world, today.

Five tracks were proposed to address the different dimensions of design futures centered on responsibility and justice.

The submitted papers were reviewed, and a selection is published in this Digital Special Issue of *diid. disegno industriale – industrial design*. Each track begins with a red page containing the original text used in 2022 for the call for papers, also indicating the names of Chairs, Co-Chairs, and Track Editors. Following this, an introductory paper outlines the contents published in the form of research articles for each track.

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**Tegan Bristow**  
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#### **Designing From Within**

**Paolo Cardini**  
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#### **Disrupting Geographies in the Design World**

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#### **Realists of a Larger Reality: Cities, Political Imagination and Social Creativity**

**Gabriella Gómez-Mont**  
Experimentalista



#### **The Single Issue Lie: Design and Intersectionality**

**Anoushka Khandwala**  
Freelance



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  - 10 National and International Chairs and Co-chairs**
  - 3 International Universities Involved in the Organization**
  - 7 National and International Endorsers and Partners in the Activities**
  - 138 Long Abstracts Submitted**



**24 Countries**

**150 Participants**

**17 Ph.D. Students and  
Research Fellow Involved**

**13 Master and Bachelor  
Degree Students Involved**

**13 National and International  
Students Involved  
in the Workshop  
“Strange Wonder”**

# Track 1

## There's No Plan(et) B: Sustainable Transitions to Systemic Planet- Centric Design

Along with the effects of climate change and the social unrest that has spread around the world in the past years, the recent health emergency for COVID-19 pandemic has exacerbated inequalities and injustices at different scales, and has severely tested the resilience of individuals, communities, institutions, and businesses. Current crises, in their multiple manifestations, have exposed the profound instability affecting the planet and brought to the surface many complex situations that require urgent intervention.

In this scenario, design is once again called to reconsider, as a discipline and as a practice, its traditional role towards society and the environment, and to redefine its methods, tools, and processes to offer better solutions for products and services that not only do not harm our surroundings, but also contribute to healing the conflicts that affect both humans and all other beings that inhabit the planet and interrelate as a single living system. The challenge is therefore to encourage and facilitate transitions towards more sustainable and circular patterns of production and consumption, adopting a systemic and planet-centric approach, reinforcing the ethical responsibilities of design, and reaffirming its mediating role in the resolution of the wicked problems that characterise the contemporaneity.

This track invited researchers, educators, practitioners, and students, to share their reflections and experiences concerning design-led processes that bring to the disruption with traditional practices and the transition to alternative forms of thinking and acting, aiming to address current crises and lay the foundations for more sustainable future.

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Sustainability

Transitions

Systemics

Planet-centricity

Ethics

30

**There's No Plan(et) B.  
Sustainable Transitions to  
Systemic Planet-Centric Design**

Erik Ciravegna, Clara Giardina, Davide Pletto

40

**Beyond Collaboration: A Network Analysis  
of Local Stances and Global Frameworks  
in the Collective Design of the City**

Francesca Sabatini, Martina Massari,  
Saveria Olga Murielle Boulanger

50

**Alter\_Azioni: Designing  
between Biological and Artifactual.  
Scenarios for a Short-Term Future**

Pietro Costa, Raffaella Fagnoni

62

**(Systemic) Design for Sustainable  
Territorial Transition: A Literature  
Review of State of the Art**

Asja Aulisio, Silvia Barbero, Amina Pereno

72

**Dasein ist Design:  
An Ontological Discussion of Design  
in the Ecological Crisis Time**

Sabrina Lucibello, Carmen Rotondi

80

**The More-Than-Human Trend  
in Design Research: A Literature Review**

Annapaola Vacanti, Francesco Burlando,  
Isabella Nevoso, Massimo Menichinelli

90

**Being and Nature.  
The Aesthetic Ecocentrism**

Adriano Pinho, Francisco Providência

102

**Forward to the Primitive.  
New Sustainable Design Processes  
Characterized by Primitive Aesthetic**

Jurji Filieri, Elisabetta Benelli

110

**How Long Does It Take For a Paradigm  
Shift. A Design-based Critical Essay  
on Materials and Fabrication Processes**

Guilherme Giantini, LÍgia Lopes

118

**Sustainability Needs Service Efficacy**

Chiara Olivastrì, Giovanna Tagliasco

126

**Systemic Design Applied to Medtech.  
Guidelines for Corporate Training  
on Sustainable Healthcare**

Enrica Ferrero, Giulia Ferrero

138

**Reducing Waste in Healthcare:  
A Systemic Design Approach for  
Sustainable Disposables Manufacturers**

Gabriele Maria Cito, Angela Giambattista

150

**A Framework to Design Appliances  
for the Circular Economy Scenario**

Chiara Battistoni

162

**Digital Fashion Technologies & Practices:  
Design Driven Sustainable Transition  
in Fashion Industry**

Ludovica Rosato, Alberto Calleo

170

**Material Resources  
as a Contextual Complex System**

Michele De Chirico

180

**Diffuse Micro-Factory: Circular Distributed  
Production System for Microbial  
Nanocellulose**

Lorena Trebbi

190

**From Sea to Fashion. Seaweeds  
as Material for a Sustainable Transition**

Paolo Franzo, Clizia Moradei

198

**The Sound of Sustainability.  
Biomaterials and New Sensory Frontiers**

Giovanni Inglese, Sabrina Lucibello,  
Carmen Rotondi

208

**Unpacking Ceramic History  
in Asia and Europe: Contribution  
to New Reusable Packaging Design**

Raquel Gomes, Cláudia Albino

# The Sound of Sustainability. Biomaterials and New Sensory Frontiers

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## Abstract

Sound is an inescapable part of perceptual experience and, interacting with other senses contributes to the synesthetic experience. The article investigates the possibilities that Design research can offer from the consistent use of new materials in terms of *sensory enhancement* and the construction of a *memory identity*. The sensoraesthetic qualities of these open up new *worlds of senses*. New biomaterials, in addition to guiding the development of a new sensitivity and towards the acceptance of the material's sincere identity, can help to communicate a new ethical consciousness, transforming sustainability into responsibility, i.e. into a dimension involving not only the objective aspects of matter but also the subjective ones based on pleasantness. The ultimate goal is the construction of a *sensory polyphony*. A new field of exploration that is recounted here through a design experience developed at Saperi&Co. for the realisation of drumsticks made from discarded peanut shells.

## Keywords

Material driven design  
Material design experience  
Sound experience  
Product sound design  
Material tinkering

## Sustainability and Design

Sustainability is an imperative that over the years has involved design at different levels, progressively asking it to communicate its value to establish an ethical attitude towards the Environment in the common consciousness. By Environment we refer to both the physical and socio-cultural surroundings according to the integral definition of Maldonado (1970), manifesting an awareness of the indissoluble link between anthropic and non-anthropic components. Therefore, as Jégou and Manzini (2003) state, the transition towards sustainability is first and foremost a process of ethical and social learning, for new ways of living better, consuming less and regenerating nature and things. By applying systems thinking, it is, therefore, possible to amplify the reference to the structural principles of natural ecosystems. Already Papanek (1971) was proposing a redefinition of product design in ethical terms by devoting himself to the 'biological principle of minimum effort', according to which the maximum variety should be obtained with the minimum of inventions, by recycling and reusing materials.

An approach that has evolved to the present day, passing through the watchwords of reparability, regeneration, but also eco-innovation; towards a more systemic and all-encompassing 'cradle-to-cradle' vision, which assimilates the industrial system to the biological cycles of production and consumption, elevating reuse and reintroduction practices to industrial scalability and production optimisation (McDonough & Braungart, 2002).

The focus shifts from the product and the simple application of sustainable technologies and materials to these to a radical and systemic innovation that takes into account the entire context with which these products are related, made up of people, behaviours, processes, values, mutual relations and material flows. In this sense, Design becomes a lens through which to analyse and address reality, a conceptual bridge between skills, industry and society, and an engine for new, more responsible and shared scenarios (Lucibello & La Rocca, 2015).

In this perspective, the union between design and research on materials is particularly active and fruitful: they do not simply represent the physical interface of production, and therefore the tangible weight in terms of consumption of primary resources (Pellizzari & Genovesi, 2017), but are also a point of discussion for reflecting on the way and the world we live in.

## Materials in Design

In the development of design research on materials, the limits of classification systems emerged, which exclusively considered transformation processes and physical-chemical and mechanical characteristics. These proved to be insufficient concerning the variety of aesthetic-sensory attributes offered by the new materials (Manzini, 1986), which played an increasingly important role in the design activity for defining the experience with artefacts, in sensory involvement. They are linked to style and symbolic associations, contribute to generating pleasure and give a product its personality (Ashby &

Johnson, 2013). The focus on materials has led to the emergence of materials libraries, physical and virtual places where designers can come into contact with materials. This database of knowledge, previously collected in catalogues, books and publications, has, since 1997, with the birth of Material Connection, begun to take possession of physical places where Designers can experience their properties. These continually developing research centres represent a potential hub for creative activity and, in addition to containing the set of characteristics relating to the structure and behaviour of materials, they represent the body of multidisciplinary knowledge related to them.

These continuously developing research centres represent a potential hub for creative activity and, in addition to containing the set of characteristics relating to the structure and behaviour of materials, they represent the set of multidisciplinary knowledge related to them. They represent the natural meeting point between the materials science community and the design community, which normally move in separate academic and social environments. Here, synergetic relationships can be established in which designers disseminate research results through the application of materials to everyday artefacts. Purposes that are not traditionally the focus of materials researchers.

### **Design in Materials**

With the advent of bottom-up phenomena such as the maker revolution, design has entered the gap between materials research and their applications. DIY-M (Do It Your Own Materials) represented an evolution in the discipline where experimentation with materials became a guided research practice (Rognoli et al., 2016). The designer relates to the project in a new, direct and empirical way, based on interdisciplinary cooperation and the exploration of alternative paths that make creativity the tool for disruptive innovations and materials the instrument to characterise the project. This opens up a new opportunity to continue investigating the nature-artifice relationship and the themes of sustainability, this time through natural, renewable, recycled, recodified and ennobled materials. Designers participate in the design phase of materials by contributing to the redevelopment of their semiotic environment, their recognisability and their meaning (Ceppi, 2016). They intervene upstream by reinventing through creative processes and *disruptive* and regenerative forms of industrialisation, through autarkic materials (Finessi, 2014) and transferring new materials that have no application. Downstream, by giving identity to new materials through applications of meaning.

### **Material Experience / Sound Experience**

Starting from direct manipulation and physical-sensory exploration of the intrinsic and extrinsic qualities of matter, we can thus define a world of sensory and emotional references for artefacts. The 'material experience' represents precisely the user's experience when interacting sensorially with the product through and because of the materials used (Karana et al., 2014). In designing this experience, not all senses have received equal attention. In particular, sound is



a frontier that is still little explored, both in its performative and playful valences (Del Curto et al., 2010). Attention has been paid to it much more frequently out of necessity (elimination of unwanted noise) rather than to enrich and characterise the sensory experience.

However, in the contemporary process of dematerialisation, it increasingly represents an important memory identity factor. This is why it is receiving increasing attention as a tool to implement and enrich the experience, in response to an increasingly complex reality. According to Lenzi et al. (2022), research areas that are contributing to an increased focus on sound in the field include Sonic Interaction Design, Auditory Display and Data Sonification, Sound branding and Sonic information design. Özcan & van Egmond (2008) define Product Sound Design as a way of approaching design in an interdisciplinary way, dialoguing with Acoustics, Engineering and Psychology. Designing the sound of a product, and associating a pleasant sound with an inert material, represents a new way of exploring the frontiers of polysensoriality, moving from listening to the sound of materials to giving them a voice.

## Methodology

The exploration of the synaesthetic value of biomaterials in the field of sound required the definition of a specific, deductive methodology based on Material Design Driven (Karana et al., 2015).

The experiment was carried out at Saperi&Co., the research and service centre of Sapienza University of Rome, involving a multidisciplinary team.

The research methodology adopted - with the material at the centre - was organised in 4 main phases:

- 1 Knowing (through research and selection of secondary raw materials).
  - Analysis: selection and study of food industry waste for the identification of possible secondary raw materials to be used as biomass for the development of new materials.
- 2 Understanding (through Material Experience).
  - *Material Tinkering*: development of samples from recipes and data on do-it-yourself materials available on open-source platforms (Materiom). Experiential survey to assess the quality of sensory perceptions through evaluation on a scale of -5 to 5, interviews and direct observation.
- 3 Know-how (through consistent application of material into a product).
  - Prototyping.
- 4 Testing (through aesthetic-perceptual and technical-scientific analysis).
  - Qualitative evaluation: evaluation of the user experience and sound perception of the prototype compared to wooden drumsticks.
  - Quantitative evaluation: Evaluation of the acoustic properties of *Peanut Butteria Sticks (PBS)* and comparison with wooden sticks using the method used by Laughlin et al. (2008).
  - Expert evaluation.

Qualitative evaluations were carried out on a sample consisted of 30 users, 12 women and 18 men of 6 different nationalities.

### Case History: *Peanut Butteria Sticks*

With the use of secondary raw materials as a premise, our attention turned to the waste, particularly the shell, of common peanuts. The choice was determined not only by the material's own characteristics - composite, woody, mouldable and self-hardening in nature - but also by its sensorial prerogatives that make it a material experience to smell, look at and touch.

The idea was to remove this material - commonly destined for incinerators — from the logic of disposal, charging it with a *principle of continuity* underlying the entire process from raw material to finished object. The shells, composed of cellulose and lignin (Bharthare et al, 2014; Bobet et al, 2020; Quaranta et al., 2018) exactly like the bark of trees, are therefore ideally a material extension of the tree itself. The manufacturing process identified follows very precise stages. Through consultation with Materiom — a digital platform run by a non-profit organisation working at the intersection of design, digital fabrication and material science — an attempt was made to identify 'recipes' using peanut shells to begin the Material Tinkering process.

The shells were kneaded by hand, using a binder-free of toxic substances, solvents and formaldehyde, or combined with different binders and additives: water, glycerol, vinegar and potato starch in different ratios. Different shell grain sizes were tested to experiment with different visual and tactile possibilities, but also to provide different levels of strength. It was possible to realise different colour gradients in the samples by varying the amount of inner and outer shells Fig. 1. As it is a self-hardening material, after being kneaded, it is poured into moulds designed and made from natural filaments using 3D printers. This results in a more or less porous material depending on the grain size of the shells and the type of polishing.



The learning process of material qualities continued even after the samples were made to evaluate possible treatments (colouring, texturing) and the material's resistance (to fire, water, pressure, impact). These analyses again triggered the iterative process that returned

Fig. 1  
G. Inglese, Peanut Butteria Stick, Colour variation of samples, credits G. Inglese 2022.

to the development of the material by reviewing, in an experiential learning approach, shapes, dimensions, type and ratio of ingredients, process time and temperature. Through benchmarking, the material was placed among similar materials to generate insights into potential areas of application. These were identified based on selection by synthesis, i.e. the combination of selection by analysis (study of the literature to understand the material's specific technical composition) with selection by analogy (in which the material's attributes were compared with those of possible alternatives and substituted for preconceived notions or simple experimentation) (Lucibello, 2005). At the same time, samples of various shapes were submitted to users for a perceptual evaluation of the material. According to an average of the evaluations, the characteristics with the highest scores were hardness (3), texture under the tactile and visual aspect (3) and sound (4). The worst ones were related to taste (-3) and smell (-2). The observation of the interrelationships between the expected and observed experiences and the formal properties of the samples showed that some of the samples were often considered 'natural' and 'cheap', but especially in the lighter and more elongated samples a 'resemblance to wood' was recognised. In order to compare the data for the different samples, they were compiled on a Cartesian diagram (based on the model of Mike Ashby's CES) in which the ordinates showed the pleasantness rating while the abscissae showed the performance rating on a 10-value scale (-5 to +5) Fig. 2. To these were added the considerations developed in the tinkering phase. All this guided the selection of the most promising samples (and recipes), to transfer the interrelationships between performance, meaning, and sensory qualities detected in the material to subsequent product development.

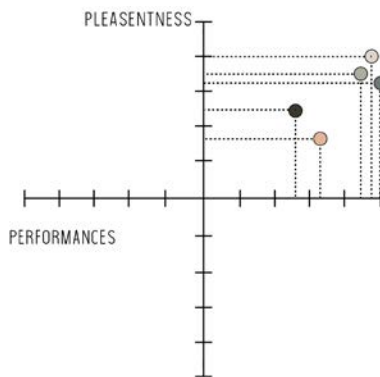


Fig. 2  
G. Inglese, Peanut Butteria Stick, Example of diagram for evaluating the pleasantness and performance of samples, credits G. Inglese 2022.

The choice of the application of the material for the manufacture of drumsticks was motivated not only by the connection to the noble material (which has long been used in the construction of musical instruments for its acoustic performance) but also by considerations regarding the state of the art. The intention was to bring a new contribution in the application of biomaterials to the audio field where the perceptive aspect, the sincere identity of new materials, is currently not emphasised. Drum sticks seemed the natural application for the material which:

- presented excellent qualities in terms of tactile, visual and acoustic senses;
- was combined with wood from a technical but also associative point of view;
- allowed for processing by moulding.

The tinkering process was resumed to further optimise the material for processing, to meet performance requirements and to implement the sensory experience of the product. *PBS* Fig. 3 were produced through moulds made based on the wooden sticks used for the subsequent comparison in order to assess the acoustic properties by keeping the shape constant and only varying the material. The main factors influencing sound production are in fact shape and material (density and elastic modulus).

Fig. 3  
G. Inglese, Peanut Butteria Stick, Representative image, credits G. Inglese 2022.



The two different types of sticks were supplied to the selected sample of users to qualitatively assess their sound experience. In the choice of different terms to define the acoustic attributes of the materials according to the list compiled by Ashby & Johnson (2013), the sound of the *PBS* was found to be more 'muffled', 'dull', and 'low pitched' than the wooden ones.

The quantitative evaluation of the acoustic characteristics was carried out by recording the two drumsticks striking each other through a microphone connected to a sound card. The recordings were normalised and subsequently analysed through the use of Matlab software under the supervision of Sound Engineer Giovanni Inglese. The study of the sound damping level showed that *PBS* had a lower amplitude ratio, being more damped than those wooden, confirming what was perceived by the sample. This behaviour was confirmed by the fact that peanut husks have a very good sound absorption coefficient (Jang, 2022) and therefore find application in the production of green sound-absorbing materials. In contrast, analysis of the frequency spectrum showed that they had a higher frequency fundamental Fig. 4, in contrast to the qualitative assessments that considered them to be more low-pitched.

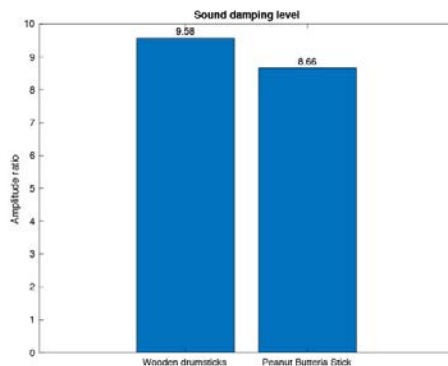
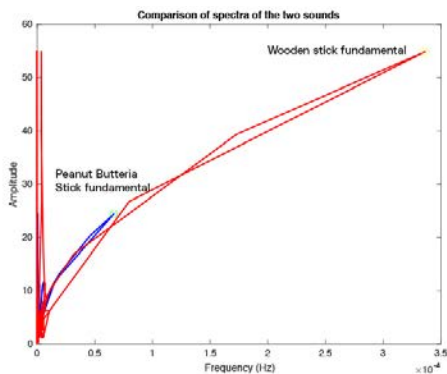


Fig. 4 G. Inglese, Peanut Butteria Stick, Comparison of spectra and damping level of the sound of the two drumsticks, credits G. Inglese 2022.

Finally, *PBS* were submitted for evaluation by Andrea Santarsiere, a percussionist at the Accademia Nazionale di Santa Cecilia and a member of the Orchestra Giovanile Italiana (2001-2002) and Orchestra Giovanile Europea (2002-2003). He stated that ‘although they present interesting features at this stage of development, they are not usable at a professional level. Rather, they could, with due improvements, prove to be excellent tools in teaching: they could replace drumsticks training and mutes’.

Previous experiments have already attempted to explore the application of biomaterials in the audio field. Silver Mountain used a hemp-based material, which appears to be an excellent substitute for plastic due to its excellent properties, for the production of guitars, ukuleles, speakers and other accessories. Tecnaro used Arboform, a natural polymer with the same properties as wood but which can be processed like plastic, to produce loudspeakers and flutes. In both examples, the materials used simply substituted those traditionally used in industrial production, with little regard for their sensorioaesthetic properties.

In our experiment, the comparison between the data obtained in the qualitative and quantitative analysis was particularly interesting: whether or not they matched up reveals the many possibilities of research in this field. We have limited ourselves to analysing the general behaviour of the sticks and when they strike each other to simplify experimentation and not to involve the effect of other materials in the measurements. Subsequent additions may concern the behaviour of the sticks when they strike other drum components such as the snare (leather) or hat (metal). Further experiments on the effect of materiality on the sound may instead concern the shape of the sticks or changes to the recipe. In the application of new materials to specific contexts of use, dialogue with practitioners in the field is important, from whom important feedback can be received to implement testing. In our case, the use of *PBS* in the field of education as a replacement for training rods or mutes was pointed out to us, due to their acoustic characteristics: the new material could represent an alternative to the plastic from which these are commonly made. This dialogue is crucial if we hope to truly design innovative instruments that open up experimentation. The exploratory terrain of sound and musical instrument design represents the ultimate expression of a civilisation’s materials and technologies

(Pinch & Trocco, 2004). As in the silicon age (Miodownik, 2007) where the production of electronic components led to synthesisers and electronic sounds that characterised the sensory experience of our everyday life. Musical sounds are not exhaustive of the wide range of sounds we normally listen to: most everyday sounds and their cultural resonances are the product of the materiality of the artefacts that surround us, of the dialectical relationship of sound with physical objects (Hug, 2008), thus largely the result of the practice of Design. If in defining the idea of a sustainable future the visions of this scenario are already quite clear to most, it is still difficult to hear the sound. 'Hearing modernity' must mean bringing out the social, cultural, economic, political and affective stakes involved in sound technologies, and we are still in the early stages of this project (Pinch, 2019). Materials research can provide an opportunity to design 'everyday listening' (Gaver, 1993), helping us to preserve or even improve our Environment.

## Conclusion

In the current panorama of research on materials, designers are confronted by the sensoaesthetic potential offered by biomaterials. In addition to providing a sustainable alternative to traditionally used materials, whose production or disposal processes are particularly *unsustainable*, they are opening up the field to new scenarios and unprecedented expressive possibilities, also concerning the auditory sphere. The use of biomaterial, removes the material from the logic of waste, establishing with the starting material, a relationship of *continuity* that extends to the entire process (from the raw material to the finished object).

The decision to use waste peanut shells, which are also composed of lignin just like tree bark, ideally places us in a relationship of material extension to the tree itself. From the sourcing of the raw (and second) material to its processing, the process described here involves a sustainable supply chain in which the material comes to shape the identity of the final object. *PBS's* experience, in its simplicity and narrowness, thus recounts a possible approach to the reuse of waste as a basis for building new materials through a *circular* route. It intends to manifest that the impact of new materials can go beyond their molecular structure, becoming in the hands of Design a tool to enrich our everyday listening: through artefacts capable of communicating different worlds of senses, education, meaning and hierarchical organisation of the same, one can make the culture of one's time perceptible.

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## References

- Asby, M. F., & Johnson, K. (2013). *Materials and design: the art and science of material selection in product design*. Butterworth-Heinemann.
- Bharthare, P., Shrivastava, P., Singh, P., & Ttiwari, A. (2014). Peanut shell as renewable energy source and their utility in production of ethanol. *Int. J. Adv. Res.*, 2, 1-12.
- Bobet, O., Nassio, S., Seynou, M., Remy, B., Zerbo, L., Sanou, I., Sawadogo, M., Millogo, Y. and Gilles, E. (2020) Characterization of peanut shells for their valorization in earth brick. *Journal of Minerals and Materials Characterization and Engineering*, 8(4), 301-315.
- Ceppi, G. (2016). *Nutirsi per immagini*. List Lab.
- Del Curto, B., Fiorani, E., Passaro, C. (2010). *La pelle del design*. Lupetti.
- Finessi, B. (2014). *Il design italiano oltre le crisi. Autarchia, austerità, autoproduzione*. Corraini.
- Gaver, W. W. (1993). What in the world do we hear?: An ecological approach to auditory event perception. *Ecological psychology*, 5(1), 1-29.
- Hug, D. (2008). Genie in a bottle: Object-sound reconfigurations for interactive commodities. *Proceedings of Audiomostly*, 56-63.
- Jang, E. S. (2022). Peanut shells as an environmentally beneficial sound-absorbing material. *Journal of the Korean Wood Science and Technology*, 50(3), 179-185.
- Jègou, E. & Manzini, E. (2003). *Quotidiano sostenibile. Scenari di vita urbana*. Edizioni Ambiente.
- Karana, E., Barati, B., Rognoli, V., & Zeeuw Van Der Laan, A. (2015). Material driven design (MDD): A method to design for material experiences.
- Karana, E., Pedgley, O. & Rognoli, V. (2014). *Materials Experience – Fundamentals of Materials and Design*. Butterworth-Heinemann.
- Laughlin, Z., Naumann, F., & Miodownik, M. (2008). Investigating the acoustic properties of materials with tuning forks. *Materials & Sensations*, 22-24.
- Lenzi, S., Sádaba, J., and Ciuccarelli, P. (2022) A designerly approach to the sonification of electric vehicles, in Lockton, D., Lenzi, S., Hekkert, P., Oak, A., Sádaba, J., Lloyd, P. (eds.), *DRS2022: Bilbao*, 25 June – 3 July, Bilbao, Spain
- Lucibello, S. & La Rocca, F. (2015). *Innovazione e utopia nel Design italiano*. Rdesignpress.
- Lucibello, S. (2005). *Materiali @ design*. Dedalo Librerie
- Maldonado, T. (1970). *La speranza progettuale: ambiente e società*. Einaudi.
- Manzini, E. (1986). *La materia dell'invenzione. Materiali e progetto*. Arcadia.
- McDonough, W. & Braungart, M. (2002). *Cradle to Cradle. Remaking the way we make things*. North Point Press.
- Miodownik, M. A. (2007). Toward designing new sensoaesthetic materials. *Pure and Applied Chemistry*, 79(10), 1635-1641.
- Özcan, E., and van Egmond, R. (2008) Product Sound Design: An Inter-Disciplinary Approach?, in Durling, D., Rust, C., Chen, L., Ashton, P. and Friedman, K. (eds.), *Undisciplined! - DRS International Conference 2008*, 16-19 July, Sheffield, United Kingdom.
- Papanek, V. (1971). *Design for the Real World. Human Ecology and Social Change*. Pantheon.
- Pellizzari, A. & Genovesi, E. (2017). *Neomateriali nell'economia circolare*. Edizioni Ambiente.
- Pinch, T. (2019). From technology Studies to sound Studies: how materiality matters. *Epistemology & Philosophy of Science*, 56(3), 123-137.
- Pinch, T., & Trocco, F. (2004). *Analog days: The invention and impact of the Moog synthesizer*. Harvard University Press.
- Quaranta, N., Caligaris, M., Pelozo, G., Cesari, A., & Cristobal, A. A. (2018). Use of wastes from the peanut industry in the manufacture of building materials. *Sustainability and the City*, 179.
- Rognoli, V., Garcia, C. A., & Parisi, S. (2016). The emotional value of Do-It-Yourself materials. In *Proceedings of the 10th International Conference on Design and Emotion 2016*, 633-641.

**Published online in September 2023**



The 8th International Forum of Design as a Process, themed “Disrupting Geographies in the Design World” was held in Bologna from 20 to 22 June 2022. The event was organised by the Advanced Design Unit of the Alma Mater Studiorum – Università di Bologna, Department of Architecture, in collaboration with two partner universities: Tecnológico de Monterrey (TEC) and Pontificia Universidad Católica de Chile.

The Forum engaged speakers from the Global Design community, expanding the original vocation of the Latin Network for the Development of Design as a Process to include researchers and designers of the Mediterranean Area, Middle East, IOR (Indian Ocean Region), and Global South regions. The goal was to share new perspectives on imagining design futures in a responsible and just perspective, at the forefront of change, while building strategic partnerships and creating accessible knowledge.

Structured around three pillars — seminars, workshops, and exhibitions — the Forum hosted meetings, reflection opportunities, networking activities. It involved designers, scholars, young researchers, design entrepreneurs, in an experimental format.

Speakers’ contributions not only inspired the practices of the designers’ community, but also resonated with students and the broad audiences. The presentations explored intersections of materiality and culture, post-coloniality, decoloniality, gender studies, and other areas of human thought and action which seek to analyse, question and challenge the disruptive geographies in the world, today.

The papers submitted to the five tracks proposed are published in the Digital Special Issue 1 of *diid. disegno industriale – industrial design*, celebrating during those days its 20<sup>th</sup> anniversary and serving as the fourth partner of the event.

## The Editors

Erik Ciravegna, Elena Formia, Valentina Gianfrate,  
Andreas Sicklinger, Michele Zannoni

DSI No. 1 — 2023

Year XXI

ISSN 1594-8528

ISSN Online 2785-2245

ISBN Online 979-12-5477-329-1

**DIGITAL  
SPECIAL  
ISSUE**  
1



**Bologna**  
University Press