

MILANO | MEXICO CITY | BANGALORE | CAPE TOWN | CURITIBA | BEIJING

3-5 April 2019

DESIGNING SUSTAINABILITY FOR ALL

Edited by Marcelo Ambrosio and Carlo Vezzoli

Proceedings of the

3rd LeNS world distributed conference
VOL. 2

ISBN 978-88-95651-26-2

EDIZIONI
POLI.DESIGN



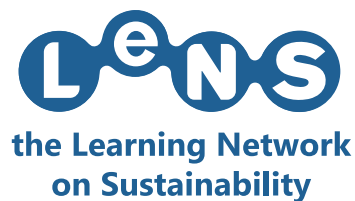
With the support of the
Erasmus+ Programme
of the European Union

Designing sustainability for all

Proceedings of the 3rd LeNS World Distributed Conference,
Milano, Mexico City, Beijing, Bangalore, Curitiba, Cape Town,
3-5 April 2019

Edited by Marcelo Ambrosio and Carlo Vezzoli

LeNS - the Learning Network on Sustainability - is a project funded by LeNSin Erasmus+ Programme of the European Union



Edited by Marcelo Ambrosio and Carlo Vezzoli

Double-Blind Peer Review.

Scientific Commetee:

Carlo Vezzoli, Politecnico di Milano, Italy
Aguinaldo dos Santos, Federal University of Paraná, Brazil
Leonardo Castillo, Universidad Federal de Pernambuco
Claudio Pereira Sampaio, Londrina State University
Ranjani Balasubramanian, Srishti Institute of Art Design and Technology
Ravi Mokashi, Indian Institute of technology Guwahati
Brenda Garcia, Universidad Autonoma Metropolitana, Mexico
Rodrigo Lepez Vela, Universidad dela Valle de México
Ephias Ruhode, Cape Peninsula University of Technology
Elmarie Costandius, Stellenbosch University, South Africa
Xin Liu, Tsinghua University, China
Jun Zhang, Hunan University, China
Fabrizio Ceschin, Brunel University, United Kingdom
Cindy Kohtala, Aalto University, Finland
Jan Carel Diehl, Delft University of Technology, Netherlands

Graphic project by:

Roman Maranov, Politecnico di Milano, Italy
Xinrui Wang, Politecnico di Milano, Italy
Yuting Zhang, Politecnico di Milano, Italy
Giacomo Bevacqua, Politecnico di Milano, Italy



This Work is Licensed under Creative Commons Attribution-NonCommercial-ShareAlike CC BY-NC-SA
For full details on the license, go to: <https://creativecommons.org/licenses/by-nc-sa/4.0/5>

The proceedings are also available at: www.lensconference3.org

Endorsment:



ISBN: 978-88-95651-26-2

Published by © 2019 Edizioni POLI.design
Address: via Durando 38/A – 20158 Milano
Tel. 02-2399.7206 Fax 02-2399.5970
e-mail: segreteria@polidesign.net
website: www.polidesign.net

First Edition

CONTENTS

VOLUME 2 (*paper in this volume*)

4. SYSTEM AND CIRCULAR DESIGN FOR SUSTAINABILITY

SYSTEM DESIGN FOR TERRITORIAL CYCLE TOURISM Alessio D'Onofrio	291
DESIGN TOOLKIT FOR SUSTAINABLE IDEATION Ameya Dabholkar, Shivangi Pande, Puneet Tandon	296
THE SUSTAINABILITY OF PACKAGING FOR E-COMMERCE: FROM SYSTEM TO PRODUCT. Amina Pereno, Silvia Barbero	301
SUSTAINABLE INTERACTION FOR MOBILITY SYSTEM Andrea Arcoraci, Andrea Di Salvo, Paolo Marco Tamborrini.	308
DESIGN AND AGRIFOOD FOR NEW SUSTAINABLE LOCAL DEVELOPMENT C. Anna Catania , Aurora Modica	313
ZERO KILOMETRE PLANTS PRODUCTION. AN INTEGRATED DESIGN APPLICATION Attilio Nebuloni, Giorgio Buratti, Matteo Meraviglia	319
DESIGN FOR CIRCULAR ECONOMY - A RE-THINKING PROGRESS IN THE WAY WE MAKE, BUY AND USE THINGS Barbara Wong	325
DESIGNING SUSTAINABLE AND HEALTHY FOOD SYSTEMS THROUGH CATERING: THE ROLE OF DESIGNERS Berill Takacs	333
SYSTEMIC DESIGN DELIVERING POLICY FOR FLOURISHING CIRCULAR REGIONS Carolina Giraldo Nohra	339
SUSTAINABLE CYCLE DESIGN AND EXPLORATION BASED ON TRADITIONAL GARBAGE COLLECTION MODEL Cheng Lin He	345
WHAT REALLY MATTERS? SYSTEMIC DESIGN, MOTIVATIONS AND VALUES OF THE CIRCULAR ECONOMY COMPANIES IN ITALY Chiara Battistoni, Silvia Barbero	351
IS DESIGN PLAYING A ROLE IN THE REALISATION OF CIRCULAR ECONOMY PROJECTS IN EUROPE? A CASE STUDY ANALYSIS.	356
“THE SEVEN TREES SIGNIFICANCE”. THE BENEDICTINE MONKS’ AGROSILVOPASTORAL PRODUCTIVE SYSTEM Prof. arch. Claudio Gambardella, Dott. Raoul Romano	362
ECOLOGICAL DESIGN THINKING FOR THE 21 ST CENTURY David Sánchez Ruano, PhD	366
DESIGN FOR SUSTAINABILITY TRANSITIONS AND SUFFICIENT CONSUMPTION SCENARIOS:A SYSTEMATIC REVIEW Iana Uliana Perez, Mônica Moura, Suzana Barreto Martins, Jacob Mathew, Fayiq Halim	371

DESIGN FOR A SUSTAINABLE INNOVATION OF THE ITALIAN COMPANIES: THE ECODESIGNLAB EXPERIENCE Jacopo Mascitti, Daniele Galloppo	384
DESIGN AND TRANSITION MANAGEMENT: VALUE OF SYNERGY FOR SUSTAINABILITY Jotte de Koning	390
DESIGN AND NATURE: NEW WAYS OF KNOWING FOR SUSTAINABILITY Kate Fletcher, Louise St Pierre, Mathilda Tham	396
CO-DESIGNING A COMMUNITY CENTRE IN USING MULTI-MODAL INTERVENTIONS Kim Berman (Visual Art), Boitumelo Kembo-Tolo (Multi-Media)	401
CRAFTING SUSTAINABILITY THROUGH SMALL, LOCAL, OPEN AND CONNECTED ENTERPRISES ON THE CANADIAN PRAIRIES: THE CASE OF MANITOBAN CRAFT BREWERIES Iain Davidson-Hunt, Kurtis Ulrich, Hannah Muhajarine	406
CASULO VERDE PROJECT: A SYSTEMIC APPROACH TO DESIGN MANAGEMENT. Larissa Fontoura Berlatto, Isabel Cristina Moreira Victoria, Luiz Fernando Gonçalves de Figueiredo,	412
MAPPING & CLASSIFYING BUSINESS MODELS TO REPLACE SINGLE-USE PACKAGING IN THE FOOD & BEVERAGE INDUSTRY: A STRATEGIC DESIGN TOOL Noha Mansour, Fabrizio Ceschin, David Harrison, Yuan Long	418
CLIMATE SWITCH: DESIGN LED SYSTEM RESPONSE TO CLIMATE CHANGE INDUCED BY CONSUMPTION Palash Ghawde, Bindiya Mutum, Praveen Nahar	424
FARM ONTOLOGY: A SYSTEM THINKING APPROACH FOR PLANNING AND MONITORING FARM ACTIVITIES Pasqualina Sacco, Raimondo Gallo, Fabrizio Mazzetto	429
INCLUSIVE CIRCULAR ECONOMY: AN APPROACH FOR EMERGING ECONOMIES Priscilla R. Lepre, Leonardo Castillo	435
PARTICIPATORY AND SUSTAINABLE STRATEGY-MAKING FOR COMMUNITY RENEWAL: THE CASE OF IAO HON IN MACAO Yan Xiaoyi, Zhou Long, Guoqiang Shen	441
5. DESIGN FOR SOCIAL EQUITY, INCLUSION AND COHESION	
TRANSDISCIPLINARY AND INTERCULTURAL FIELD STUDY AS A NEW APPROACH TO ADDRESS CLIMATE CHANGE DESIGNERLY Yue Zou, Zhiyuan Ou,	448
CERNE PROJECT AND REMEXE COLLECTION: ACTIONS IN SOCIAL DESIGN IN SEARCH OF SOCIAL INNOVATIONS OF SYSTEMIC CHARACTER Juliana Pontes Ribeiro, Adriana Tonani Mazzeiro, Gabriel Julian Wendling	454
TOWARDS INCLUSIVITY: EXPLORING THE IMPLICATIONS OF MULTI-SENSORY AND PARTICIPATORY DESIGN APPROACHES IN A SOUTH AFRICAN CONTEXT Alexis Wellman, Karolien Perold-Bull,	459
THE OPPORTUNITIES OF SUSTAINABLE HOUSING TO PROMOTE GENDER EQUALITY Anahí Ramírez Ortiz	467
DESIGN FOR ALL TO SUSTAINABILITY FOR ALL SOCIETY Antonio Marano, Giuseppe Di Bucchianico	473

INTILANGA: THE HUMAN-CENTRED DESIGN OF AN OFF-GRID FOOD PROCESSING SYSTEM FOR MICRO-ENTERPRISES WITHIN JOHANNESBURG Antonio Marin, Martin Bolton	478
SOCIAL SUSTAINABILITY AND VIRTUAL REALITY HEAD-MOUNTED DISPLAYS: A REVIEW OF THE USE OF IMMERSIVE SYSTEMS IN THE AID OF WELL-BEING Antônio Roberto Miranda de Oliveira, Amilton José Vieira de Arruda	484
RESEARCH ON DESIGN EMPOWERMENT OPPORTUNITIES FOR THE ELDERLY IN COMMUNITY Binbin Zheng, Miaosen Gong, Zi Yang	490
FRAMEWORK OF ANALYTICAL DIMENSIONS AND DESIGN APPROACHES FOR SOCIAL INNOVATION Camila Ferrari Krassuski, Liliâne Iten Chaves	496
COLLECTIVIZATION OF DESIGN AND DIGITAL MANUFACTURING: SOCIAL LABORATORIES Daniel Llermaly Larraín	502
FOSTERING SOCIAL INNOVATION THROUGH SOCIAL INCUBATORS AND CORPORATE SOCIAL INCUBATORS: EVIDENCE FROM ITALY Davide Viglialoro, Paolo Landoni	507
UN-NUANCES OF CO-DESIGNING AND CO-CREATING: A DESIGN THINKING APPROACH WITHIN A ‘ZONGO’ COMMUNITY IN GHANA Patrick Gyamfi, Edward Appiah, Ralitsa Debrah	513
THE DESIGN OF BANYANKOLE TRADITIONAL HOUSE: POWER DIMENSIONS, HOSPITALITY AND BEDROOM DYNAMICS Emmanuel Mutungi	518
CHALLENGE BASED INNOVATION FOR HUMANITARIAN PURPOSES:DESIGNING A WEB-APP TO FIGHT OBESITY. RESULTS OF THEPORT_2018 PIER 32 Eveline Wandl-Vogt, Amelie Dorn, Enric Senabre Hidalgo, James Jennings,eGiuseppe Reale,	
KAROLOS POTAMIANOS	524
USER EXPERIENCE IN DESIGN TARGETING POVERTY ALLEVIATION: A CASE STUDY OF “SHANJU RENOVATION” ACTIVITY IN MAGANG VILLAGE FEI HU, JIXING SHI,	529
DESIGNING SUSTAINABLE MOBILITY FOR PEOPLE AT RISK OF SOCIAL ISOLATION – TWO CULTURAL PERSPECTIVES FROM SINGAPORE AND FRANCE Henriette Cornet, Penny Kong, Flore Vallet, Anna Lane, Yin Leng Theng	535
RESEARCH ON THE DESIGN OF SUSTAINABLE BATH EQUIPMENT IN POOR RURAL AREAS OF HEBEI HuHong, Li Heng	541
MAKING A COMIC ABOUT WESTBURY’S ANTI-APARTHEID ACTIVIST, FLORRIE DANIELS Florrie Daniels, Jean Bollweg	546
FROM ROBOTS TO HUMANS: PROSTHETICS FOR ALL Maria Rosanna Fossati, Manuel Giuseppe Catalano, Giorgio Grioli, Antonio Bicchi	552
DESIGNING SUSTAINABILITY FOR ALL OR CO-DESIGNING SUSTAINABILITY WITH ALL? Marie Davidová	558

DESIGN FOR SOCIAL INNOVATION WITHIN A VULNERABLE GROUP. LESSONS LEARNT FROM THE EXPERIMENTATION VIVICALUSCA IN ITALY Daniela Selloni, Martina Rossi	564
SUSTAINABLE DESIGN IDEA FOR ALL PEOPLE Dong Meihui	570
THE FUTURE IS FRUGAL Naga Nandini Dasgupta, Sudipto Dasgupta	574
#ECOTERACY, DESIGNING AN INFO INCLUSIVE AND UNIVERSAL LANGUAGE OF SUSTAINABILITY Nina Costa, Alexandra Duborjal Cabral, Cristóvão Gonçalves, Andreia Duborjal Cabral, Isabel Vasconcelos, Dânia Ascensão, Adriana Duarte	580
CULTURAL AND NATURAL HERITAGE FOR ALL: SUSTAINABLE FRUITION OF SITES BEYOND PHYSICAL ACCESSIBILITY Paola Barcarolo, Emilio Rossi	585
ADOPTION OF BIO-BASED ECONOMIES IN RURAL KENYA FOR IMPROVED LIVELIHOODS Pauline N. Mutura, WairimuMaina, Peter Kamau	591
DESIGN DISCRIMINATION–REFLECTION FOR CRITICAL THINKING Ravi Mani	597
ORGANIC FARMING AS A LIVELIHOOD OPPORTUNITY AND WELL BEING FOR SUNDARBAN FARMERS Sanjukta Ghosh	602
ERSILIALAB IN MILAN. A PARTICIPATORY EXPERIENCE TO DESIGN NEW WAYS FOR ROMA’S SOCIAL INCLUSION Silvia Nessi, Beatrice Galimberti	608
REVITALIZING MARGINALIZED COMMUNITIES FOR SUSTAINABLE DEVELOPMENT BY DESIGN Tao Huang, Eric Anderson	614
THE CONTRIBUTION OF COMMUNICATION DESIGN TO ENCOURAGE GENDER EQUALITY Valeria Bucchetti, Francesca Casnati	619
APPLYING HUMAN-CENTERED TECHNOLOGICAL APPROACH FOR SUSTAINABLE BUSINESSES IN INDIAN INFORMAL ECONOMIES Vivek Chondagar	624
STUDY ON SUSTAINABILITY OF WATER MANAGEMENT SYSTEM IN TRADITIONAL VILLAGES IN WESTERN ZHEJIANG PROVINCE - TAKING SHEN’AO VILLAGE IN ZHEJIANG PROVINCE AS AN EXAMPLE Zhang Yao, Zhou Haoming	629
SUSTAINABLE RURAL TOURISM SERVICE SYSTEM DESIGN THAT BALANCES LOCAL REVITALIZATION AND EXTERNAL INVOLVEMENT—TAKING THE AKEKE AS AN EXAMPLE Yiting Zhao, Jun Zhang	634

VOLUME 1

FOREWORD	I
LENSIN PROJECT	II
THE LENS CONFERENCE	III
LENS MANIFESTO	IV

1.KEY NOTE PAPERS

TOWARDS SUSTAINABLE DESIGN VALUES: EVOLUTIONARY CONCEPTS AND PRACTICES Xiaobo Lu	001
CIRCULAR ECONOMY, SYSTEMIC DESIGN AND SOCIAL DEVELOPMENT GUIDELINES FOR EMERGING ECONOMIES Leonardo Castillo	005
DESIGNING TO CREATE A SHARED UNDERSTANDING OF OUR COLLECTIVE CONCERNS Poonam Bir Kasturi	012
DESIGNERS FACING GLOBAL CHALLENGES Julio Frías Peña	015
SOUTH AFRICAN KEYNOTE SPEECH FOR LENS WORLD DISTRIBUTED CONFERENCE DESIGNING SUSTAINABILITY FOR ALL Angus Donald Campbell	019
THE CIRCULAR INDUSTRIAL ECONOMY IN A NUTSHELL Walter R. Stahel	024

2. PRODUCT-SERVICE SYSTEM DESIGN FOR SUSTAINABILITY

SUSTAINABLE PRODUCT-SERVICE SYSTEM REQUIREMENTS IN FASHION RETAIL Alana Emily Dorigon, Maria Auxiliadora Cannarozzo Tinoco, Jonatas Ost Scherer, Arthur Marcon	1
1TRASTOCAR. INTERACTIVE ART-DESIGN TO MAKE VISIBLE ENVIRONMENTAL IMPACT Ana Carolina Robles Salvador, Rodrigo Rosales González	6
PRODUCT-SERVICE SYSTEMS DEVELOPMENT PROCESS: SYSTEMATIC LITERATURE REVIEW Barbara Tokarz, Bruno Tokarz, Délcio Pereira, Alexandre Borges Fagundes, Fernanda Hänsch Beuren	12
INTRODUCING SYSTEMIC SOLUTIONS FOR SUSTAINABILITY AT THE DESIGN COURSES IN UAM CUAJIMALPA. STUDY CASE: BOOK CLUB IN MEXICO CITY Leonel Sagahon, Brenda García	16
IMPLEMENTATION OF THE LENS PROJECT AT THE UNIVERSIDADE DO ESTADO DO PARÁ (UEPA) Camilla Dandara Pereira Leite, Alayna de Cássia Moreira Navegantes, Antonio Erlindo Braga Jr	20
INITIAL PROPOSALS FOR THE IMPLEMENTATION OF THE PRODUCT-SERVICE SYSTEM AT THE UNIVERSIDADE DO ESTADO DO PARÁ (UEPA) Camilla Dandara Pereira Leite, Jamille Santos dos Santos, Alayna de Cássia Moreira Navegantes, Vinícius Lopes	

Braga, Agatha Cristina Nogueira de Oliveira da Silva, Antonio Erlindo Braga Jr.	24
ASPECTS OF THE PRODUCT-SERVICE SYSTEM IN BRAZILIAN LITERATURE Camilla Dandara Pereira Leite, Antonio Erlindo Braga Jr.	27
“LIBRARY OF STUFF”: A CASE OF PRODUCT SHARING SYSTEM PRACTICE IN TURKEY Can Uckan Yuksel, Cigdem Kaya Pazarbas	31
RESEARCH ON SERVICE SYSTEM DESIGN BASED ON VISUALIZATION OF SUSTAINABLE PRODUCT CARBON FOOTPRINT Chenyang Sun, Jun Zhang	37
INNOVATIVE SCHEME RESEARCH OF SHIMEN CITRUS’ LIFE CYCLE BASED ON PRODUCT-SERVICE DESIGN THINKING Chuyao Zhou, Jixing Shi, Jeff Lai, Amber Tan, Yuan Luo, Yongshi Liu, Shaohua Han	42
PRODUCT-SERVICE SYSTEMS (PSS): THE USE OF PRINCIPLES IN THE CREATIVE PROCESS OF PSS Emanuela Lima Silveira, Aguinaldo dos Santos	47
STUDY ON THE SERVICE DESIGN OF URBAN YOUNG DRIFTERS COMMUNITY Fei Hu, Yimeng Jin , Xing Xu	53
URBAN AGRICULTURE STARTUP CASE STUDY FOR SERVICE DESIGN IN BRAZIL Gabriela Garcez Duarte, Elenice Lopes, Lucas Lobato da Costa, Mariana Schmitz Gonçalves, Aguinaldo dos Santos	59
DEVELOPMENT MECHANISM ON CHINA’S INDUSTRIAL DESIGN PARKS THEMED DESIGN ENTREPRENEURSHIP Hongbin Jiang, Qiao Zhang	65
RESEARCH OF SUSTAINABLE PRODUCT SERVICE SYSTEMS ON CHINESE MINORITY BRAND CONTEXT Hong Hu, Feiran Bai, Daitao Hao, Jie Zhou	69
CHILDREN’S TOY SHARING SYSTEM FROM THE PERSPECTIVE OF SUSTAINABLE COMMUNITY CONCEPT Zhong Huixian, He Yi, Chen Chaojie	75
PRODUCT SERVICE SYSTEM APPLIED TO AIR-ENERGY PRODUCT BUSINESS MODEL INNOVATION Jiahuan Qiu, Jun Zhang	81
DESIGN AND RESEARCH OF RESOURCE RECYCLING SERVICE SYSTEM IN TOURIST ATTRACTIONS: TAKING INTERNATIONAL CRUISES AS AN EXAMPLE Jingrui Shen, Jun Zhang	85
RESEARCH AND PRACTICE ON INTELLIGENT AGRICULTURAL MACHINERY PRODUCTS AND SUSTAINABLE BUSINESS MODEL DESIGN Jun Zhang, Caizhi Zhou	90
THE CORPORATE SOCIAL RESPONSIBILITY (CSR) AND STRATEGIC MANAGEMENT FOR THE MEXICAN SPECIALIZED PUBLISHING SMES Lupita Guillén Mandujano, Bertha Palomino Villavicencio, Gerardo Francisco Kloss Fernández del Castillo	96
SLOC MODEL BASED SERVICE DESIGN STRATEGIES AND PRACTICE ON ECOLOGICAL AGRICULTURE Lyu Ji, Miaosen Gong	101
APPLICATION OF THE CARD SORTING TECHNIQUE ASSOCIATED WITH THE STORYTELLING APPROACH IN A PSS FOR SUSTAINABILITY Manuela Gortz, Alison Alfred Klein, Evelyne Pretti Rodrigues, Félix Vieira Varejão Neto, Henrique Kozłowski Buzatto, Aguinaldo dos Santos	106

EMOTIONAL DESIGN IN FUNCTIONAL ECONOMY AND PSS TOWARDS BEHAVIOR CHANGE Manuela Gortz, Décio Estevão do Nascimento	111
SOUTH-TO-SOUTH SOLUTIONS: AN EXCHANGE OF AUSTRALIAN AND LATIN AMERICAN DESIGN APPROACHES TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS Mariano Ramirez	117
DESIGN AND SUSTAINABILITY: SYSTEMATIC REVIEW OF LITERATURE IN BRAZILIAN PHD THESES Marina Arakaki, Conrado Renan da Silva, Tomas Queiroz Ferreira Barata, Olímpio José Pinheiro, Mariano Lopes de Andrade Neto	123
COMPARATIVE STUDY OF PRODUCT SERVICE SYSTEM BASED ON LIFE CYCLE ANALYSIS— INNOVATIVE LUNCH TAKEAWAY SERVICE SYSTEM DESIGN Nan Xia	129
SERVICE DESIGN FOR INNOVATION: THE STRATEGIC ROLE OF SERVICE DESIGN IN INNOVATION FOR MANUFACTURING COMPANIES Naotake Fukushima, Aguinaldo dos Santos	135
WICKED PROBLEMS AND DESIGN IN EMERGING ECONOMIES: REFLECTIONS ABOUT THE DESIGN OF SYSTEMIC APPROACHES FOCUSED ON FOOD AND TERRITORY Priscilla R. Lepre, Leonardo Castillo, Lia Krucken	141
HORTALIÇÁRIO: GARDEN FOR ANY SPACE Rita de Castro Engler, Thalita Vanessa Barbalho, Letícia Hilário Guimarães, Ana Carolina Lacerda	147
A DESIGN TOOLKIT TO INTEGRATE DISTRIBUTED MANUFACTURING INTO PRODUCT-SERVICE SYSTEMS DEVELOPMENT Aine Petrulaityte, Fabrizio Ceschin, Eujin Pei, David Harrison	154
DESIGN FOR SUSTAINABILITY APPLIED TO WORKSPACES Susana Soto Bustamante, Elena Elgani, Francesco Scullica, Ricardo Marques Sastre, Marcia Elisa Echeveste, Maria Auxiliadora Cannarozzo Tinoco, Fabiane Tubino Garcia, Arthur Marcon	160
MECHANISM ANALYSIS AND APPLICATION STUDY OF SUSTAINABILITY EVALUATION TOOL FOR FURNITURE E-COMMERCE(ICSFE) Chuyao Zhou, Fang Liu, Suqin Tan, Tianwei Sun, Guixian Li, Shaohua Han	174
SUSTAINABLE PRODUCT SERVICE SYSTEMS: A NEW APPROACH TO SUSTAINABLE FASHION Yaone Rapitsenyane, Sophia Njeru, Richie Moalosi	180
PRODUCT-SERVICE SYSTEM DESIGN OF HOUSEHOLD MEDICAL WASTE MANAGEMENT FOR DIABETICS Yiting Zhang, Miaosen Gong, Dongjuan Xiao, Yuan Hu	185
BUSINESS MODEL DESIGN BASED ON THE CONCEPT OF SUSTAINABLE DEVELOPMENT—A SERVICE DESIGN OF THE PHYSICAL IDLE MALL AS AN EXAMPLE Luo Yuqing	190
3. DISTRIBUTED ECONOMIES DESIGN FOR SUSTAINABILITY	
DISTRIBUTED MANUFACTURING APPLIED TO PRODUCT-SERVICE SYSTEMS: A SET OF NEAR-FUTURE SCENARIOS Aine Petrulaityte, Fabrizio Ceschin, Eujin Pei, David Harrison	196
METHODS AND TOOLS FOR COMMUNITY BASED RESEARCH PROJECTS: DISTRIBUTED DESIGN AND DISTRIBUTED INFORMATION FOR VOLUNTEER ORGANISATIONS IN SOUTH AFRICA Arnaud Nzawou, Ephias Ruhode	202

RECOVERY AND RECYCLING OF A BIOPOLYMER AS AN ALTERNATIVE OF SUSTAINABILITY FOR 3D PRINTING Camilla Dandara Pereira Leite, Leticia Faria Teixeira, Lauro Arthur Farias Paiva Cohen, Nubia Suely Silva Santos	207
EXPLORING SCENARIOS TO FACILITATE THE ACCESS TO 3D PRINTING TECHNOLOGY IN EGYPT THROUGH SUSTAINABLE PSS APPLIED TO DISTRIBUTED MANUFACTURING Doaa Mohamed	211
INVESTIGATION OF THE IMPACT OF SUSTAINABILITY ON 3D PRINTING TECHNOLOGIES Emilio Rossi, Massimo Di Nicolantonio, Paola Barcarolo, Jessica Lagatta, Alessio D'Onofrio Design of abandoned vegetable and fruit transportation system based on sustainable distributed economy Haiwei Yan, Ruolin Gao, Yuanbo Sun, Ke Jiang	218
DESIGN OF ABANDONED VEGETABLE AND FRUIT TRANSPORTATION SYSTEM BASED ON SUSTAINABLE DISTRIBUTED ECONOMY Haiwei Yan	224
DISTRIBUTED PRODUCTION AND SUSTAINABILITY STRATEGIES FOR FASHION Alba Cappellieri, Livia Tenuta, Susanna Testa,	228
SUSTAINABLE PRODUCT SERVICE SYSTEMS: CASES FROM OCEANIA Mariano Ramirez	233
VISUALISING STAKEHOLDER CONFIGURATIONS IN DESIGNING SUSTAINABLE PRODUCT-SERVICE SYSTEMS APPLIED TO DISTRIBUTED ECONOMIES Meng Gao, Carlo Vezzoli	239
LAMPS - 'DESIGNERLY WAYS' FOR SUSTAINABLE DISTRIBUTED ECONOMY Prarthana Majumdar, Sharmistha Banerjee, Jan-Carel Diehl, J.M.L.van Engelen	245
THE THIRD SECTOR AS A VECTOR TO FOSTER DISTRIBUTED DESIGN AND DISTRIBUTED ECONOMY INITIATIVES: A CASE STUDY Priscilla Ramalho Lepre, Leonardo Castillo	251
'SHKEN' NATURALLY YOURS – SOCIAL DIMENSIONS OF SUSTAINING RURAL DISTRIBUTED BAMBOO CRAFT ENTERPRISES OF NORTH EAST INDIA Punekar Ravi Mokashi, Avinash Shende, Mandar Rane	257
DISTRIBUTED SUSTAINABLE MARKET DESIGN BASED ON COMMUNITY Ruolin Gao, Haiwei Yan, Ke Jiang, Yuanbo Sun	261
PURA FRAMEWORK - A MODEL FOR DISTRIBUTED ECONOMY FOR INDIA Sharmistha Banerjee	265
CONTEXTUALIZING SUSTAINABLE PRODUCT-SERVICE SYSTEM DESIGN METHODS FOR DISTRIBUTED ECONOMIES OF INDIA Sharmistha Banerjee, Pankaj Upadhyay, Ravi Mokashi Punekar	270
DISTRIBUTED ELECTRIC VEHICLE CHARGING SERVICE SYSTEM DESIGN BASED ON BLOCKCHAIN TECHNOLOGY Wandong Cheng, Jun Zhang	276
MODEL FOR THE DEVELOPMENT OF OPEN SOURCE PRODUCTS MOD+RE+CO+DE Willmar Ricardo Rugeles Joya, Sandra Gomez Puertas, Nataly Guataquira Sarmiento	280
RESEARCH AND TEACHING PRACTICE OF PRODUCT SERVICE SYSTEM APPLIED TO DISTRIBUTED ECONOMY Yao Wang, Jun Zhang	285

VOLUME 3

6. DESIGN FOR SUSTAINABLE CULTURAL AND BEHAVIORAL CHANGE

ARTISTIC CRAFTSMANSHIP VS DEGRADATION RISK OF HISTORICAL AREAS Adriano Magliocco, Maria Canepa	639
STRATEGIES FOR ECO-SOCIAL TRANSFORMATION: COMPARING EFFICIENCY, SUFFICIENCY AND CONSISTENCY Andreas Metzner-Szigeth	644
SYNTHESIZING SOLUTIONS: EXPLORING SOCIALIST DESIGN AND ITS MODERN RELEVANCE THROUGH THE MEDIUM OF PLASTICS Aniruddha Gupte	650
MOTHERS FROM INOSEL: AN EXERCISE IN COLLABORATION TOWARDS A MORE SUSTAINABLE SOCIETY Bárbara de Oliveira e Cruz, Rita Maria de Souza Couto, Roberta Portas Gonçalves Rodrigues	655
THE ECOLOGICAL AESTHETIC CONNOTATIONS IN CHINESE TRADITIONAL ENVIRONMENT CONSTRUCTION SKILLS Changliang Tan	661
UPCYCLING IN COMMUNITIES: LOW CARBON DESIGN PROMOTES PUBLIC ENVIRONMENTAL AWARENESS AND OPTIMIZES SOCIAL Qiu Dengke, Peng Jinqi, David Bramston, Qiu Zhiyun, Chen Danrong	667
FASHION DESIGN FOR SUSTAINABILITY: A FRAMEWORK FOR PARTICIPATORY PRACTICE Dilys Williams	672
A DIFFERENT DEFINITION OF GENERATIVE DESIGN Erika Marlene Cortés López	678
SUSTAINABILITY AND DEMOCRACY WIDESPREAD COLLABORATIVE DESIGN INTELLIGENCE Ezio Manzini	682
UTSTAL: HEADING HEARTS AND JOINING COMMUNITIES Fernando Rafael Calzadilla Sánchez, Francisco Emanuel Pérez Mejía	687
SUSTAINABLE DESIGN AND AESTHETICS IN THE SOFT SCIENCE AGE Francesca La Rocca, Chiara Scarpitti	690
THE SOCIAL CONSTRUCTION OF ENVIRONMENTAL CRISIS AND REFLECTIONS ON THE SUSTAINABILITY DEBATE Gabriela Sandoval Andrade	696
DESIGN FOR HUMAN FLOURISHING: PERCEPTUAL MAPPING OF DIFFERENT DESIGN APPROACHES TOWARDS HAPPINESS AND WELL-BEING Guilherme Toledo	700
USING EMOTIONAL DURABILITY FOR SUSTAINABLE PACKAGING DESIGN PRACTICE BASED ON USAGE SCENARIO Jifa Zhang	706
THE VALORIZATION OF INDIGENOUS CULTURE THROUGH UPCYCLING Jordana de Oliveira Bennemann, Eduarda Regina da Veiga, Ana Luisa Boavista Lustosa Cavalcante	711

CLOTHING LANDSCAPES: INTERDISCIPLINARY MAPMAKING METHODS FOR A RELATIONAL UNDERSTANDING OF FASHION BEHAVIOURS AND PLACE Katelyn Toth-Fejel	715
INTEGRATION OF ART OF HOSTING METHODOLOGIES AND PRINCIPLES INTO THE SOCIAL INNOVATION LAB PRACTICE: Lewis Muirhead, Rosamund Mosse	720
DESIGN AS DEMOCRACY: THE DEMOCRATIC POTENTIAL OF DESIGN Luiz Lagares Izidio, Dijon De Moraes	727
REGENERATIVE FOOD SERVING SYSTEM FOR A SUSTAINABLE UNIVERSITY CAMPUS LIFESTYLE: A SOCIAL AND BEHAVIOURAL STUDY Nariman G. Lotfi, Sara Khedre	732
DESIGNING FURNITURE BASED ON STUDENT’S LIFESTYLE AND MERGING WITH A SUSTAINABLE CAMPUS Neha Priolkar, Franklin Kristi	737
PERIOD. A CARD GAME ON SOCIAL TABOOS AROUND MENSTRUATION Devika Saraogi, Gayatri Chudekar, Nikita Pathak, Sreya Majumdar	742
ESTABLISHING A QUANTITATIVE EVALUATION MODEL FOR CULTURE-BASED PRODUCT DESIGN Pan Li, Baosheng Wang	748
SUSTAINING CULTURAL HERITAGE : DERIVING THE CONTEMPORARY FROM THE IDIOM OF TRADITIONAL CRAFTS Puja Anand, Alok Bhasin	753
EMPATHY SQUARE: AN AID FOR SERVICE DESIGN FOR BEHAVIOUR CHANGE TO SUPPORT SUSTAINABILITY Ravi Mahamuni, Anna Meroni, Pramod Khambete, Ravi Mokashi Puneekar	759
ECOMUSEUM AS A DESIGN TOOL FOR SUSTAINABLE SOCIAL INNOVATION Rita de Castro Engler, Gabrielle Lana Linhares	764
MISLEADING IDENTITIES: DO PERCEPTUAL ATTRIBUTES OF MATERIALS DRIVE THE DISPOSAL OF SINGLE-USE PACKAGING IN THE CORRECT WASTE STREAM? Romina Santi, Agnese Piselli, Graziano Elegir, Barbara Del Curto	770
I TAKE CARE OF MY PLACES—PROJECT BY ALESSANDRO MANZONI HIGH SCHOOL, LECCO Rossana Papagni, Anna Niccolai, Eugenia Chiara, Laura Todde	776
THE ESPERANÇA COMMUNITY GARDEN AND THE CHALLENGES OF INTEGRAL SUSTAINABILITY Samantha de Oliveira Nery, Ediméia Maria Ribeiro de Mello, Rosângela Miriam Lemos Oliveira Mendonça	780
SPIRAL DYNAMICS: A VISIONARY SET OF VALUES FOR HUMANITY’S SUSTAINABLE DEVELOPMENT Sergio Dávila Urrutia	785
CRAFT CHANGE: BEHAVIOUR PROGRESSION FRAMEWORK – EVALUATION IN QUASI PARTICIPATORY DESIGN SETTING Shivani Sharma, Ravi Mahamuni, Sylvan Lobo, Bhaskarjyoti Das, Ulemba Hirom, Radhika Verma, Malay Dhamelia	791
FOR AN AESTHETICS FOCUSED ON SUSTAINABILITY: STUDIES FOR THE CONFIGURATION OF ECOLOGICALLY ORIENTED PACKAGING Thamyres Oliveira Clementino, Amilton José Vieira de Arruda, Itamar Ferreira da Silva	796

CRITICAL ZONE: THE EARTH BELOW OUR FEET Vasanthi Mariadass	800
SERIOUS GAME AS A NEW WAY OF HANDICRAFT INHERITANCE—A CASE STUDY ON “HUAYAO CROSS-STITCH MASTER GROWTH RECORD” Xile Wang, Duoduo Zhang, Yuanyuan Yang	807
7. PRODUCT DESIGN FOR SUSTAINABILITY	
PROPOSAL OF RECOMMENDATIONS FOR DESIGN UNDER A SUSTAINABLE APPROACH: LCA CASE. Bonifaz Ramírez Adonis Wenceslao, González Leopoldo Adrián	812
CIRCULAR DESIGN AND HOUSEHOLD MEDICATION: A STUDY ON THE VOLUNTARY DRUG DISPOSAL PROGRAM OF THE CITY OF BETIM MUNICIPALITY Aline Rodrigues Fonseca, Rita de Castro Engler, Armindo de Souza Teodósio, Luiz Fernando de Freitas Júnior, Mariana Costa Laktim, Travis Higgins	817
DESIGN FOR SUSTAINABLE FASHION: A SUSTAINABILITY DESIGN-ORIENTING TOOL FOR FASHION Barbara Azzi, Carlo Vezzoli, Giovanni Maria Conti	823
DESIGN PRACTICE FOR SUSTAINABILITY: DEVELOPMENT OF A LOW-COST ORTHOSIS Caelen Teger, Isabella de Souza Sierra, Dominique Leite Adam, Maria Lúcia Leite Ribeiro Okimoto, José Aguiomar Foggiatto	831
MECHANISM ANALYSIS AND APPLICATION STUDY OF SUSTAINABILITY EVALUATION TOOL FOR FURNITURE E-COMMERCE(ICSFE) Chuyao Zhou, Fang Liu, Suqin Tan, Tianwei Sun, Guixian Li, Shaohua Han*	837
ANUVAD: CREATING SUSTAINABLE SMART TEXTILES THROUGH THE MEDIUM OF TRADITIONAL CRAFTS Chhail Khalsa	843
DESIGN FOR SUSTAINABILITY FRAMEWORK APPLIED TO THE PROBLEM OF GARMENT WASTE: A BRAZILIAN STUDY Cláudio Pereira de Sampaio, Suzana Barreto Martins	848
LIFE CYCLE DESIGN (LCD) GUIDELINES FOR ENVIRONMENTALLY SUSTAINABLE CLOTHING CARE SYSTEMS: AN OPEN AND OPERATIVE TOOL FOR DESIGNERS Carlo Vezzoli, Giovanni Maria Conti	854
THE RESEARCH OF YI ETHNICITY FURNITURE DESIGN BASED ON ARCHITECTURAL SPACE Ding Yang	860
DESIGN FOR SUSTAINABILITY AND ICT: A HOUSEHOLD PROTOTYPE FOR WASTE WATER RECYCLING Fiammetta Costa, Marco Aureggi, Luciana Migliore, Paolo Perego, Margherita Pillan, Carlo Emilio Standoli, Giorgio Vignati	864
OPEN-ENDED DESIGN. LOCAL RE-APPROPRIATIONS THROUGH IMPERFECTION Francesca Ostuzzi, Valentina Rognoli, Francesco Fittipaldi, Patrizia Ranzo, Rosanna Veneziano, Gustavo R. P. Nascimento, Victor J.D. S. Baldan, T. M. Ponciano, Janaina M. H. Costa, Eduvaldo P. Sichieri, Javier M. Pablos	868
ANALYSIS OF THE POTENTIAL APPLICATION OF RECYCLED THERMOFIX INDUSTRIAL POLYURETHANE RESIDUE IN SCHOOL DESKS Gustavo Ribeiro Palma Nascimento, Victor José Dos Santos Baldan, Thales Martins Ponciano, Janaina M. H. Costa	

Eduvaldo Paulo Sichieri, Javier Mazariegos Pablos	880
RE-DESIGNING RECOVERED MATERIALS. CASE STUDY: FIBERGLASS IN THE NAUTICAL SECTOR Helga Aversa, Valentina Rognoli, Carla Langella	884
UNFINISHEDISM Huanhuan Peng	890
CRITICAL FUTURES TODAY: BACK-CASTING SPECULATIVE PRODUCT DESIGN TOWARDS LONG-TERM SUSTAINABILITYJomy Joseph Jomy Joseph, Mariana Costa Laktim, Larissa Duarte Oliveira, Rita de Castro Engler, Aline Fonseca, Camilla Borelli, Julia Baruque-Ramos	899
HOME TEXTILE: AN ANALYSIS OF ENVIRONMENTAL AND ECONOMICAL IMPACTS IN BRAZIL Mariana Costa Laktim, Larissa Duarte Oliveira, Rita de Castro Engler, Aline Fonseca, Camilla Borelli, Julia Baruque-Ramos	905
PRODUCT DESIGN FOR SUSTAINABILITY – GUIDELINES FOR THE LIFE CYCLE DESIGN OF OFFICE FURNITURE Lena Plaschke, Carlo Vezzoli, Francesco Scullica	910
ON THE COLLABORATIVE MODELS FOR DESIGN SCHOOLS ENGAGING IN THE SUSTAINABLE DEVELOPMENT OF TRADITIONAL BAMBOO CRAFTS Li Zhang, Hai Fang	915
EXPERIMENTAL MATERIAL DEVELOPMENT LEADING TO SUSTAINABLE PRODUCT DESIGN Martin Bolton	921
AUTOMATIC COMPOSTER FOR HOME USE Maycon Manoel Sagaz, Paulo Cesar Machado Ferroli	926
SUSTAINABILITY IN THE PRODUCT LIFE CYCLE OF PAPER Qian Yang	932
BIOINSPIRED STRUCTURES IN LIGHTWEIGHT PRODUCT DESIGN WITH ADDITIVE MANUFACTURING Owen Gagnon, Brenton Whanger, Hao Zhang, Ji Xu	936
SMART HOME GRID: TOWARDS INTERCONNECTED AND INTEROPERABLE ELECTRICAL MODEL TO IMPROVE THE USAGE AWARENESS Paolo Perego, Gregorio Stano	941
ZERO WASTE: EXPLORING ALTERNATIVES THROUGH FOLDING Pragya Sharma	946
ENVIRONMENTAL PRODUCT OPTIMISATION: AN INTEGRAL APPROACH Reino Veenstra, Henri C. Moll	953
SUSTAINABLE DESIGN 4.0: METHODS AND TECHNIQUES OF THE CONTEMPORARY DESIGNER IN THE KNOWLEDGE SOCIETY Roberta Angari, Gabriele Pontillo	959
NEM, NEAPOLITAN EVOLUTION MEN’S WEAR: A BIO PROJECT OF MEN’S TAILORING Roberto Liberti	965
NEW SUSTAINABLE COSMETIC PRODUCTS FROM FOOD WASTE: A JOINED-UP APPROACH BETWEEN DESIGN AND FOOD CHEMISTRY Severina Pacifico, Simona Piccolella, Rosanna Veneziano	970

CHILDREN FURNITURE DESIGN FOR SUSTAINABILITY Xiang Wang, Lulu Chai, Ren Fu	975
STUDY ON THE DESIGN OF TENON AND MORTISE JOINTS FOR NEW TYPE SUSTAINABLE EXPRESS PACKAGING BASED ON THE CONCEPT OF INTEGRATED CYCLING Xue-ying Wang, Jiao Yi	981
8. DESIGN FOR SUSTAINABLE TECHNOLOGIES AND RESOURCES	
INTERACTIVE DESIGN STRATEGY FOR SUSTAINABLE BEHAVIOR CHANGE BASED ON OPEN SOURCE HARDWARE Yongshi Liu, Jing Ou, Yunshuang Zheng, Jun Zhang	988
DESIGN-DRIVEN STRATEGY FOR THE SUSTAINABLE TEXTILE HERITAGE COMMUNITY IN CHINA Yuxin Yang, Eleonora Lupo	994
EXPLORING THE DESIGN ETHICS OF THE FUTURE INFORMATION SOCIETY: A BRIEF DESIGN ETHICS STUDY OF “DIDI GLOBAL” AS A SOCIALITY INTERNET PRODUCT Zhilong Luan, Xiaobo Lu	1000
GLEBANITE® FOR MODELS AND MOULDS IN SHIPYARDS APPLICATIONS RATHER RESORTING TO MONOMATERIC SOLUTIONS Andrea Ratti, Mauro Ceconello, Cristian Ferretti, Carlo Proserpio, Giacomo Bonaiti, Enrico Benco	1006
PROJECT REMA: THE REGIONAL ECO-MATERIALS ARCHIVE Y.H. Brian Lee, Ding Benny Leong	1010
MATERIALS CLASSIFICATION IN FURNITURE DESIGN – FOCUS ON SUSTAINABILITY Paulo Cesar Machado Ferroli, Emanuele de Castro Nascimento, Lisiane Ilha Librelotto, Franchesca Medina, Luana Torralles Carbonari	1015
THE SUSTAINABILITY OF BIOMIMETIC SYSTEM DESIGN: FROM ORGANISM TO ECOLOGY Fan Wu, Jun Zhang	1021
SUSTAINABILITY DESIGNED WITH(OUT) PEOPLE? UNDERSTANDING FOR WHAT ENERGY IS (OVER-)USED BY TENANTS IN AN ENERGY EFFICIENT PUBLIC HOUSING IN MILAN Giuseppe Salvia, Federica Rotondo, Eugenio Morello, Andrea Sangalli, Lorenzo Pagliano, Francesco Causone	1027
RESEARCH ON BIOMASS ENERGY UTILIZATION IN RURAL AREAS BASED ON SUSTAINABLE DESIGN CONCEPT Haiwei Yan, Ruolin Gao, Ke Jiang, Yuanbo Sun	1032
LIFE THE TOUGH GET GOING PROJECT: IMPROVING THE EFFICIENCY OF THE PDO CHEESE PRODUCTION CHAINS BY A DEDICATED SOFTWARE Jacopo Famiglietti, Carlo Proserpio, Pieter Ravaglia, Mauro Cecconello	1035
RETHINKING AND RECONSTITUTED MATERIALS FOR A SUSTAINABLE FUTURE — “RECONSTITUTING-PLAN” PROJECT AS AN EXAMPLE Jiajia Song	1040
BAMBOO SUPPLY CHAIN: OPPORTUNITY FOR CIRCULAR AND CREATIVE ECONOMY Lisiane Ilha Librelotto, Franchesca Medina, Paulo Cesar Ferroli, Emanuele de Castro Nascimento, Luana Torralles Carbonari	1046
ALTERNATIVE MATERIALS TO IMPROVE THE ASSEMBLY PROCESS OF FURNITURE FOCUSED ON SUSTAINABILITY DESIGN Paulo Cesar Machado Ferroli, Lisiane Ilha Librelotto, Natália Geraldo	1051

SUSTAINABLE DESIGN PRINCIPLES FOR USING BAMBOO STEMS Ping Wu, Tao Huang	1056
SUSTAINABLE MATERIALS AND PROCESSES DESIGN: THE CASE STUDY OF POLY-PAPER Romina Santi, Silvia Farè, Barbara Del Curto, Alberto Cigada	1061
ENABLING USER KNOWLEDGE TO SUPPORT THE DECISION-MAKING PROCESS IN ENERGY RETROFITTING OF PUBLIC HOUSING: A CASE STUDY IN MILAN Giuseppe Salvia, Federica Rotondo, Eugenio Morello	1067
EFFECTS OF COLOURED AMBIENT LIGHT ON PERCEIVED TEMPERATURE FOR ENERGY EFFICIENCY: A PRELIMINARY STUDY IN VIRTUAL REALITY Siyuan Huang, Giulia W. Scurati, Roberta Etzi, Francesco Ferrise, Serena Graziosi, Lavinia C. Tagliabue, Alberto Gallace, Monica Bordegoni	1073
BUILDING INTEGRATED PHOTOVOLTAICS (BIPV): SYSTEM APPLICATION GUIDELINES AND ALBEDO ASPECTS Sofia Hinckel Dias, Flávia Silveira, Aloísio Schmid	1079

VOLUME 4

9. ARCHITECTURAL AND INTERIOR DESIGN FOR SUSTAINABILITY

SUSTAINABLE-ORIENTED CHANGE MANAGEMENT FOR ALL BUILDING DESIGN PRACTICE Anna Dalla Valle, Monica Lavagna, Andrea Campioli,	1083
RELIGIOUS BUILDINGS AND SUSTAINABLE BEHAVIOUR: UNDERSTANDING IMPACT OF DESIGN ELEMENTS ON HUMAN BEHAVIOUR Ashish Saxena	1088
RESTRICTING FACTORS IN THE SELECTION AND SPECIFICATION OF SUSTAINABLE MATERIALS: AN INTERIOR DESIGN PERSPECTIVE. Emmerencia Petronella Marisca Deminey, Amanda Breytenbach	1094
OPTIMIZATION AND LCSA-BASED DESIGN METHOD FOR ENERGY RETROFITTING OF EXISTING BUILDINGS Hashem Amini Toosi, Monica Lavagna	1101
INDOOR ENVIRONMENTAL QUALITY DESIGN OF HOTELS IN THE UNITED STATES AND EUROPE Ivan Alvarez Leon, Elena Elgani, Francesco Scullica	1106
SUSTAINABLE TECHNIQUES TO IMPROVE THE INDOOR AIR QUALITY (IAQ) AND THERMAL COMFORT IN HOT AND ARID CLIMATE. Laura Dominici, Sanam Ilkhanlar, Sara Etminan, Elena Comino	1112
DEVELOPMENT AND PROPOSITION OF A TOOL TO EVALUATE THE ECOLOGICAL IDENTITY OF PRODUCTS: FURNITURE CASE Onur Y. Demiröz, Meltem Özkaraman Sen	1117
INTERVENING ON 'BUILDING AS A PRODUCT' AND 'HABITATION AS A SERVICE' IN CONTEMPORARY URBAN SETTINGS FOR ADAPTIVE MICRO HABITATION DESIGN Shiva Ji, Ravi Mokashi Puneekar	1123
RESEARCH ON THE SUSTAINABLE DESIGN OF TRADITIONAL ARCHITECTURAL NARRATIVE CULTURE OF BEIJING HUTONG BLOCKS: A CASE STUDY OF NANLUOGUXIANG STREET Xin Wen, Fan Zhang	1129

SUSTAINABILITY INVOLVES EMOTION: AN INTERPRETATION ON THE EMOTIONAL CHARACTERISTICS OF SUSTAINABLE ARCHITECTURE Yun-Ting Gao	1134
10. LANDSCAPE AND URBAN DESIGN FOR SUSTAINABILITY	
TOWARD SUSTAINABLE CITIES THROUGH FUTURISTIC DESIGN MODEL: A CONSUMERISTIC SOCIETY PERSPECTIVE Azadeh Razzagh Shoar, Hassan Sadeghi Naeini	1141
STUDY ON SUSTAINABLE DESIGN OF RAINWATER LANDSCAPE IN EXISTING URBAN RESIDENTIAL COMMUNITY Di Gao, Xuerong Teng	1145
DESIGN FOR PUBLIC TOILETS: CHALLENGES AND CONTRIBUTION TO THE REESTABLISHMENT OF PUBLIC VALUE Fang Zhong, Xin Liu, Nan Xia	1151
DESIGNING COMMUNITY THROUGH URBAN GARDENING Gloria Elena Matiella Castro,	1157
EXPLORING FOG HARVESTING IN EUROPE: CHARACTERISTICS AND GUIDELINES FOR A SUSTAINABLE CITY MODEL Gloria Morichi, Dr. Gabriela Fernandez, Lucas B. Calixto	1161
CHARACTERIZATION OF TWO URBAN FARMS IN THE CUAUHTEMOC BOROUGH OF MEXICO CITY Iskar Jasmani Waluyo Moreno	1166
THE CHALLENGES OF USING PUBLIC LAND SUSTAINABLY IN MEXICO FOR OUTDOORS RECREATION: CAN SERVICE DESIGN HELP BRIDGE THE GAP? Ivan Osorio Avila	1171
INTERCITY RELATIONSHIPS WITHIN URBAN AGGLOMERATION AND THEIR IMPACTS ON URBAN ECONOMIC DEVELOPMENT Jianhua Zhang	1177
URBAN-RURAL NETWORK TOOL FOR DESIGNING SYSTEMS THAT SUCCESSFULLY INTEGRATE COMPANIES AND COMMUNITIES TOWARDS SUSTAINABILITY AND RESILIENCE Juan Montalván, Akie Manrique, Santiago Velasquez, Lucia Rivera, Helen Jara, Luis Quispe	1183
SOCIAL INEQUITY IN PUBLIC TRANSPORT INFRASTRUCTURE & ITS IMPACT ON A CITY'S SUSTAINABILITY Lakshmi Srinivasan	1188
A TOOLKIT: FOSTERING A PARTICIPATORY STUDY OF SUSTAINABLE PAVEMENT DEVELOPMENT Lulu Yin, Eujin Pei	1194
THE LOGIC OF PLACE-MAKING TOWARDS SUSTAINABLE NEW URBAN AREAS IN HANOI: FROM ZERO TO HERO? Minh Tung Tran, Ngoc Huyen Chu, Pham Thuy Linh	1200
MATI- FINDING SELF AND COMMUNITY THROUGH LAND RECLAMATION Srishti Srivastava, Shivangi Pant, Sahil Raina	1206
THE PATTERN AND METHODS CONCERNING THE MICRO-RENEWAL OF THE URBAN ENVIRONMENT Tingting Liu	1211
RITICAL ZONE: THE EARTH BELOW OUR FEET Vasanthi Mariadass	1216

STUDY ON THE LANDSCAPE POLICY AND USAGE SITUATION : A CASE OF XIADU PARK IN YANQING COUNTY, BEIJING Yuanyuan Zhang	1223
AN ANALYSIS AND APPLICATION OF AFFORDANCE THEORY IN DESIGN OF URBAN RAIL TRANSIT Yu-Feng Zhang	1228
DISCUSSION ON THE SUSTAINABLE MODE OF NEW RURAL CONSTRUCTION IN CHINA FROM THE PERSPECTIVE OF ENVIRONMENTAL CONSTRUCTION Zhong Zhen	1234
11. EDUCATION AND DIFFUSION OF DESIGN FOR SUSTAINABILITY	
DSXC: TOOLKIT TO SUPPORT DESIGN EDUCATION PROCESSES FOR SUSTAINABILITY Adolfo Vargas Espitia, Álvarez Quintero, Willmar Ricardo Rugeles Joya	1239
UPSCALING LOCAL AND NATIONAL EXPERIENCES ON EDUCATION FOR SOCIAL DESIGN AND SUSTAINABILITY FOR ALL TO A WIDER INTERNATIONAL ARENA: CONSIDERATIONS AND CHALLENGES Ana Margarida Ferreira, Nicos Souleles, Stefania Savva	1244
INTERDISCIPLINARY HIGH EDUCATION IN PLACE BASED SOCIAL-TECH: THE EXPERIENCE OF THE TAMBALI FII PROJECT IN DAKAR Andrea Ratti, Francesco Gerli, Arianna Bionda, Irene Bengo	1248
EDUCATION STRATEGIES AND BEHAVIORAL ACTIONS TO MITIGATE ENERGY POVERTY Anna Realini, Simone Maggiore, Marina Varvesi, Valentina Castello, Corrado Milito	1254
DESIGNING FOR CLIMATE CHANGE FOR ALL—A MEDIA AND COMMUNICATION DESIGN COURSE TO INCREASE PUBLIC AWARENESS Bo Gao, Glenda Drew, Jesse Drew,	1260
DESIGN PEDAGOGY FOR SUSTAINABILITY: DEVELOPING QUALITIES OF TRANSFORMATIVE AGENTIVE LEARNING. Bruce Snaddon, Andrea Grant Broom	1265
ENVIRONMENTAL ASPECTS IN THE UEL DESIGN COURSE: LEGAL CONCEPTIONS AND REALITY Camila Santos Doubek Lopes, Gabriela Namie Komatsu Yoshida	1270
EDUCATION FOR SUSTAINABLE DEVELOPMENT. CASE OF AN INDUSTRIAL ENGINEERING PROGRAM IN COLOMBIA. Carolina Montoya-Rodríguez	1275
USING DESIGN THINKING AND FACEBOOK TO HELP MOROCCAN WOMEN ADAPT TO CLIMATE CHANGE IMPACTS Diane Pruneau, Abdellatif Khattabi, Boutaina El Jai, Maroua Mahjoub	1281
DESIGN FOR SOCIAL SUSTAINABILITY: DECOLONISING DESIGN EDUCATION Elmarie Costandius, Neeske Alexander	1286
A SUSTAINABLE DESIGN-ORIENTED PROCESS FOR CONVERTING AND SHARING KNOW-HOW Emilio Rossi	1292
FASHION DESIGN EDUCATION AND SUSTAINABILITY. A CHALLENGE ACCEPTED. Erminia D'Itria	1297
TRANSITION DESIGN – PRESENTATION AND EDUCATIONAL APPROACH Erwan Geffroy, Manuel Irles, Xavier Moulin	1303
SOCIAL INNOVATION THROUGH DESIGN IN THE TRAINING OF YOUNG APPRENTICES: EXPERIENCING SOCIO-EDUCATIONAL PROJECTS Karina Pereira Weber, Isabel Cristina Moreira Victoria, Marco Antonio Weiss, Luiz Fernando Gonçalves De Figueiredo	1309

INSPIRING STUDENTS TO BE AGENTS OF CHANGE: A SOUTH AFRICAN PERSPECTIVE Laskarina Yiannakaris	1314
THE TECHNOLOGICAL MEDIATION OF SUSTAINABILITY: DESIGN AS A MODE OF INQUIRY Lisa Thomas, Stuart Walker, Lynne Blair	1320
DESIGN FOR SUSTAINABILITY. STATE OF THE ART IN BRAZILIAN UNDERGRADUATE COURSES Marcelo Ambrósio, Maria Cecília Loschiavo dos Santos	1326
SUSTAINABLE DESIGN TRENDS WITHIN CREATIVE LEARNING ENVIRONMENTS Mireille Anja Oberholster, Francesco Scullica	1331
MODEL-MAKING COURSES AND APPROACHES IN TERMS OF SUSTAINABILITY: EXAMINATION OF INDUSTRIAL DESIGN SCHOOLS IN TURKEY Necla Ilknur Sevinc Gokmen	1336
SUSTAINABILITY IN UNDERGRADUATE ARCHITECTURAL EDUCATION: A CASE STUDY FROM KAZGASA, KAZAKHSTAN Nurgul Nsanbayeva	1342
ENCOURAGING DFE IN DESIGN EDUCATION TO PROMOTE SUSTAINABLE MEDICAL PRODUCT DESIGN Pranay Arun Kumar, Stephen Jia Wang	1348
INCORPORATING SUSTAINABILITY INTO RESEARCH PROJECTS Rosana Aparecida Vasques, Maria Cecilia Loschiavo dos Santos	1354
TEACHING DESIGN FOR SUSTAINABILITY BEYOND THE ENVIRONMENTAL DIMENSION: A TOOLKIT AND TEACHING STRATEGIES Rosana Aparecida Vasques	1359
ROLE OF DESIGN EDUCATION IN IMPARTING VALUES OF SUSTAINABILITY AS SOCIAL RESPONSIBILITY OF DESIGNERS Sanjeev Bothra	1365
SPREADING GOOD SUSTAINABILITY PRACTICES THROUGH TEMPORARY RETAIL SHOPS Silvia Piardi	1370
FASHION DESIGN-RELATED DOCTORAL STUDIES IN SELECTED KENYAN UNIVERSITIES: ADVANCING APPLIED RESEARCH IN SUSTAINABILITY Sophia N. Njeru, Mugendi K. M'ritaa	1375
TRANSDISCIPLINARY FUTURES: WHERE DO EMBODIMENT, ETHICS AND EDUCATION MEET FOR SUSTAINABILITY LEADERSHIP? Srisrividhiya Kalyanasundaram, Sandhiya Kalyanasundaram,	1382
DESIGN: A REFLEXIVE, REFLECTIVE AND PEDAGOGICAL INQUIRY INTO SUSTAINABILITY Sudebi Thakurata	1388
URBAN MINE REDESIGN COURSE: RESEARCH AND TEACHING PRACTICE Xin Liu, Fang Zhong	1394
TRANSFORMING FOOD SYSTEMS IN CHINA: THE ROLES OF FOOD LITERACY EDUCATION IN ALTERNATIVE FOOD MOVEMENTS Yanxia Li, Hongyi Tao	1400
SUSTAINABILITY AND CREATIVE EDUCATION: DEVELOPING A SUSTAINABILITY CULTURE OF HIGHER EDUCATION IN CHINA Dr Yan Yan Lam, Sheng Feng Duan,	1406

FOREWORD

Designing sustainability for All was a call for contributions and actions to the whole world design community, which is not limited to design researchers, design educators, and design practitioners but also unites other disciplines such as architecture, engineering, economy, policy-making, and sociology.

The Conference has been a unique event hosted simultaneously in Mexico City (Mexico), Curitiba (Brazil), Cape Town (South Africa), Bangalore (India), Beijing (China) and Milan (Italy), on 3rd-5th April 2019. In fact, in each of the 6 venues, it has been possible to listen to any of the presentations happening in the other ones.

LENSIN PROJECT

LeNSin, the International Learning Network of networks on Sustainability (2015-2018), is an EU-supported (ERASMUS+) project involving 36 universities from Europe, Asia, Africa, South America and Central America, aiming at the promotion of a new generation of designers (and design educators) capable to effectively contribute to the transition towards a sustainable society for all.

LeNSin ambitions to improve the internationalisation, intercultural cross-fertilisation and accessibility of higher education on Design for Sustainability (DfS). The project focuses on Sustainable Product-Service Systems (S.PSS) and Distributed Economies (DE) – considering both as promising models to couple environmental protection with social equity, cohesion and economic prosperity – applied in different contexts around the world. LeNSin connects a multi-polar network of Higher Education Institutions adopting and promoting a learning-by-sharing knowledge generation and dissemination, with an open and copyleft ethos.

During the three years of operation, LeNSin project activities involve five seminars, ten pilot courses, the setting up of ten regional LeNS Labs, and of a (decentralised) open web platform, any students/designers and any teachers can access to download, modify/remix and reuse an articulated set of open and copyleft learning resources, i.e. courses/lectures, tools, cases, criteria, projects.

LeNSin will also promote a series of diffusion activities targeting the design community worldwide. The final event will be a decentralised conference in 2018, based simultaneously in six partner universities, organised together by the 36 project partners from four continents.

THE LENS CONFERENCE

The Conference is the 3rd edition of one of the largest design international conferences for lecturers, researchers, professionals, and relevant institutions and organizations. It has become a reference event where experts from all over the world get together to present and share their knowledge, projects, tools, and visions to diffuse sustainability for all.

The Conference is organized as a part of the LeNSin, the International Learning Network of networks on Sustainability project (2015-2019, EU funded Erasmus+ program) that aims to be both visionary and pragmatic, and to stimulate new ways of thinking.

The scope is to share the latest knowledge and experiences around the concept of sustainability for all.

This will be achieved through cross-fertilizing a wide range of disciplines: predominantly design, but also engineering, economy, policy-making, and sociology.

LENS MANIFESTO

A new ethos for a design community: towards an open source and copy left learning-by-sharing attitude/action.

We, the undersigned, aware of both the urgent changes required by sustainable development, the potential role of design (and design thinking) in promoting system innovation in the way we produce, consume and interact, as well as the opportunities offered by the ever more interconnected society, propose the adoption and diffusion of a new ethos within a worldwide design community:

To view design as a unique multi-polar learning community promoting, enabling and activating any possible learning-by-sharing process aiming at effective knowledge osmosis and cross-fertilisation in design for sustainability in an open and copy left ethos.

We, the undersigned, commit our selves in such an ethos, trying our best to apply this in our daily life as individuals or representatives of institutions in the design community.

In relation to our competencies and possibilities we will make our acquired knowledge to be, as far as possible, freely and easily accessible in a copy left and open source modality (while safeguarding our authorship and scientific recognised publication activity), that enable others in the design community to acquire them free of charge, with the possibility to replicate, modify, remix and reuse, through e.g. adopting creative commons licences.

As researchers, this knowledge includes our acquired research knowledge base (e.g. papers, books, etc.) and knowhow (e.g. methods and tools).

As educators, this knowledge includes our educational resources (slideshows, texts, video of lecture, educational support tools, etc.)

As designers and design thinkers, this knowledge includes the design for sustainability concept proposal of products, services, systems and scenarios, as well as a knowhow they used to design them.

We commit our selves to seek the commitment of other individuals or institutions in such an ethos within the design community. In relation to our competencies and possibilities we will:

do our best to commit individuals such as researchers, educators, professional designers and design thinkers as well as institutions such as research institutions, design schools, and designer's associations to adopt the same ethos

do our best to generate and/or enable open learning networking of sustainability of design researchers, design educators, professional designers and design thinkers.



This work is licensed under
a Creative Commons Attribution-Non Commercial-
ShareAlike 4.0 International License.

DESIGN FOR A SUSTAINABLE INNOVATION OF THE ITALIAN COMPANIES: THE ECODESIGNLAB EXPERIENCE

Jacopo Mascitti

Scuola Ateneo di Architettura e Design - Università di Camerino, jacopo.mascitti@unicam.it

Daniele Galloppo

Scuola Ateneo di Architettura e Design - Università di Camerino, daniele.galloppo@unicam.it

ABSTRACT

Since its foundation, the “School of Architecture and Design of Unicam” has been characterised by a particular sensitivity towards the environmental character of the project. This allowed the development of specific skills in the field of environmental sustainability, which led, in 2013, to the foundation of the spin-off “EcodesignLab srl”. Its mission is to increase the capacity for innovation, and the competitiveness of companies in the direction of environmental sustainability, through the application of the criteria and methodologies that characterize the design for sustainability. The results of these five years of activity are represented by the development of new eco-innovative product concepts for small and medium-sized companies belonging to different business areas. The paper presents, through the case studies developed by the spin-off, the methodologies, the good practices but also the difficulties of the commercial implementation of design for environmental sustainability within the national industrial network.

Key Words: design for sustainability, eco-innovative products, transferable research results

1. INTRODUCTION

The design for environmental sustainability is one of the main areas of research of the School of Architecture and Design of the University of Camerino, which has produced numerous projects and research into products and systems with reduced environmental impact; this has allowed to mature a wide range of specific skills, further strengthened by the creation, in 2007, of the Master in “Eco-design e Eco-innovazione di prodotto”.¹

The purpose of this specific training path is to generate new professional figures who are able to manage the life cycle of a product, in order to reduce its environmental impact from the early design stages.

First master on eco-design in the Italian university system, foresees a development methodology which is characterized by the use of intensive design workshops as a participatory process between universities, companies and designers. Nowadays, the Master has produced 23 workshops with 13 partner companies, 40 graduate students and around 160 projects of eco-sustainable products, which were developed during the workshops and master's theses. It is from this cultural background and human resources that in May 2013 the university spin-off “EcodesignLab Srl”² was born, which offers integrated eco-design and eco-innovation services for the development of products that are both innovative and environmentally sustainable.

Founded on the technical-scientific skills of researchers of the School of Architecture and Design of Unicam, eco-designers grown within the Master and a network of external expert consultants, EcodesignLab aims to increase the capacity for innovation and competitiveness of Italian companies, especially SMEs, supporting business strategies and good practices in the direction of environmental sustainability, through the application of the criteria and methodologies that are typical of the eco-design. Today, EcodesignLab is a strategic actor in the transfer of research results - developed in the School of Architecture and Design of Unicam - to the business world through specific design services tailored to each individual customer and, at the same time, always aimed at tangible innovation, in the short, medium and long term.

2. ECO-DESIGN IN ITALIAN COMPANIES: VERY APPRECIATED BUT LITTLE REQUESTED

That design can represent an instrument for the improvement and qualification of the industrial product, - not exclusively in terms of aesthetics - has now become a more or less consolidated acquisition in the Italian entrepreneurial culture and the designer is commonly called to make his own contribution to improve products already on the market, under the influence of economic and cultural factors, and to make their production more profitable.

Among these, it happens rarely (unless it is imposed by national or international regulations) that it is the theme of environmental sustainability that motivates an entrepreneur to improve his product. The phenomenon is determined by an incorrect perception of eco-design, considered a specialized, expensive tool, which can only be used in niche marketing and commercial contexts or suitable only for large companies. In reality this is not true and the need to innovate products in a sustainable key, although not clearly expressed, is often easily deduced from the demands of a company, but still commonly latent nowadays, in the awareness of the national entrepreneurial average.

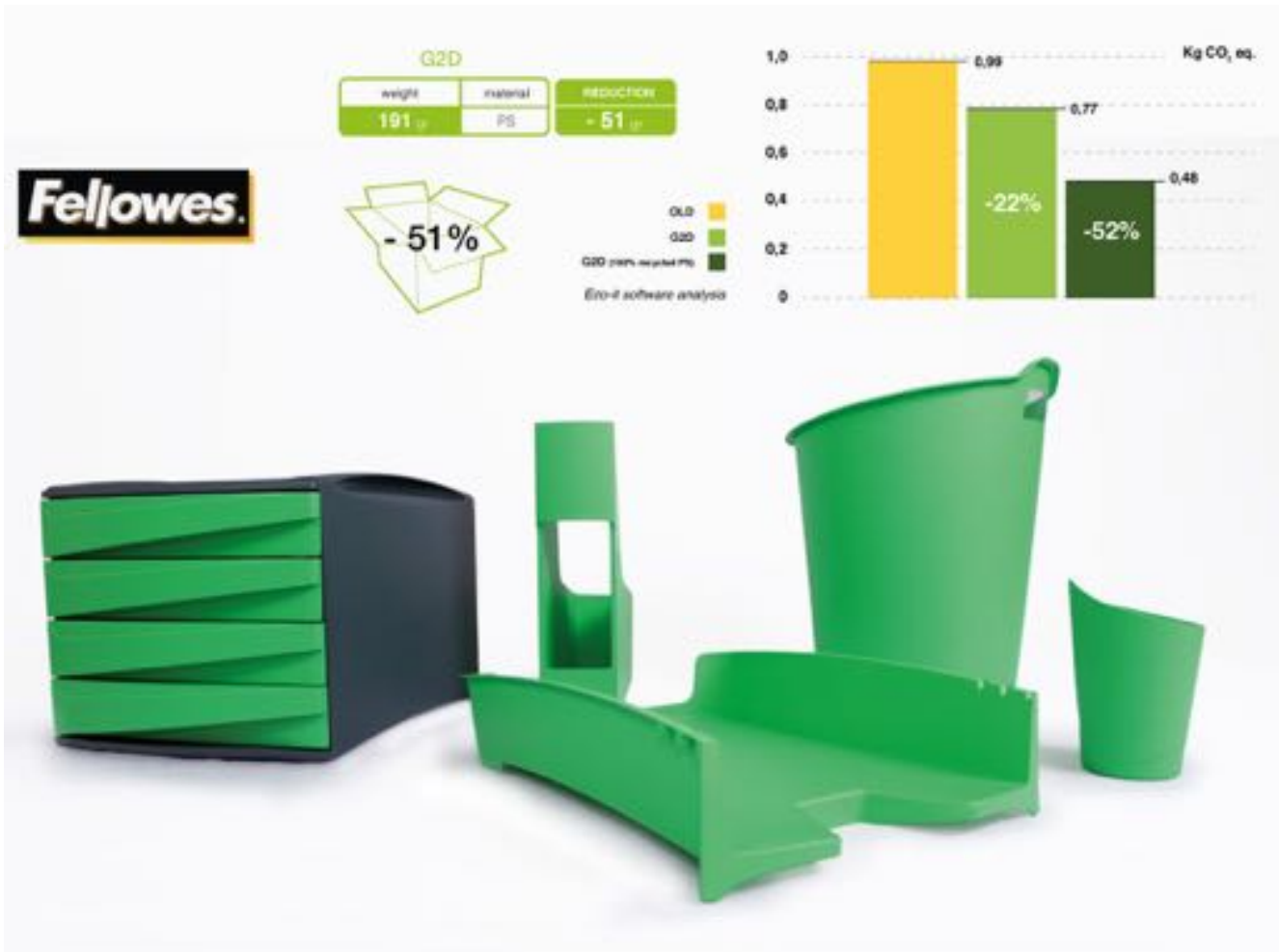
The “Green2Desk”³ line of office accessories, with reduced environmental impact, is an effective example of this statement. The line consists of five products, each of which is developed according to the criteria of eco-design: desk drawer, letter tray, magazine rack, pen holder and waste basket. Starting from the company needs to drastically reduce the amount of material used to contain the costs of production and management of each individual product, to maintain production in Italy and to create a recognizable and identifiable family line, the project has come to the ideation development of five accessories that innovate - for functionality and aesthetics - the type of reference product, achieving, at the same time, a significant improvement from an environmental point of view of the entire line compared to the previous collection (considerable reduction in the amount of material used for each type of product). All the strategies of Life Cycle Design and reduction of the environmental impact implemented in the design of the “Green2Desk” line, have substantially contributed to a general containment of production costs and product management.

Starting from the finding of the raw material in production, to packaging and distribution, the environmental benefits have generated parallel economic benefits, as required and clarified by the client, allowing to keep the Made in Italy brand production and to safeguard the jobs. At the same time they have produced tangible and quantifiable results, with regard to the environmental profile of new products, which have allowed the company to focus its communication and marketing strategy on the need strongly felt by the market (provided the economic convenience of the product) of new and performing green products, which, moreover, fully respond to the Green Public Procurement policies by type and characteristics.

¹ The Master is now in its fifth edition, more information is available on the website www.masterecodesign.com.

² EcodesignLab Srl is a spin-off of the University of Camerino established in Ascoli Piceno, Marche Region (Italy). More information on the company's activities is available on the website www.ecodesignlab.it.

³ Green2Desk office accessories, developed by EcodesignLab Srl, is produced and marketed in the national and international market by the Fellowes Leonardi SpA company in Camerano (AN), Italy. For further information, visit the websites www.fellowes.com or www.ecodesignlab.it



[Figure 1] The Green2Desk accessories collection designed by EcodesignLab and manufactured by the Fellowes Leonardi SpA Company. Above you can see specific data about the reduction in consumption of materials and transport volumes and storage thanks to the design strategies adopted for the letter tray.

Through design strategies, aimed at optimizing the use of materials, the reduction of transport and storage volumes and the correct disposal of individual products at the end of their life, it was also possible to obtain reductions in CO₂ emissions equivalent to values between 9% and 62%, in addition to a total recyclability of the materials used. Finally, the line of black products was entirely made of 100% recycled polypropylene and polystyrene.

To ensure that the environmental communication of the new products could not be subject to interpretation or distortion, the Green2Desk line was subsequently validated by an LCA analysis according to the UNI EN ISO14040 standard, considering the system boundaries, starting from the production of the raw material up to the distribution of the finished product, with the aim of certifying the results achieved through an Environmental Product Declaration (EPD).

Currently, these mass market products, made exclusively in Italy and marketed in Europe, allow an excellent profit margin and a clear commercial recognition to the client company, which is now also characterized by the sustainable nature of this green product line.

3. A STRATEGIC INNOVATION LEVER STILL TO DISCOVER

The world of clothing is a universe of constantly changing artifacts, subject to rapid and programmed obsolescence. To this dictat still escapes the merchandise sector of professional clothing, whose products must meet specific technical and functional needs and must represent, often more than for other items of clothing, the image of a brand or simply of a trade.

Starting from these assumptions and identifying in the theme of environmental sustainability a strategic lever of innovation and marketing for the reference market, the "Apron Design"⁴ project had the objective of devising and developing new professional aprons with reduced environmental impact, for a catering context evolved and qualitative, which did not express the concept of green through the simplistic - and often overestimated in environmental terms - use of organic cotton.

4. The project was conducted in collaboration with the professional clothing company Toma Srl in Appignano (MC), Italy - www.tomayouniform.it



[Figure 2] One of the concepts developed in the Apron Design project context and designed in collaboration with the company Toma Srl, characterized by the use of cork, hemp and linen fabrics.

Instead, the project began with a thorough analysis of the performance requirements, the use contexts, the formal constraints and the environmental profile of the product, and then finally defined the design development parameters. Based on the research conducted, two scenarios of project development were constructed, polarized between the dichotomous approaches of a long-lasting product and a short-term product, defined for different types of clientele, from the professional to the amateur, and for different use contexts (hall, kitchen, cooking show, etc.), but all characterized by the driver of environmental sustainability innovation.

For each scenario, we have identified and grouped - using consistency and respect towards established criteria - sets of materials that are suitable for use and which allow a correct management especially of the end of life of the product. Of the more than fifty materials identified, the main national suppliers were identified and the samples required for the subsequent analysis phases, for the tests and for a further selection made by the company were requested. Through the strategies of modular composition, substitutability of parts and / or components and the total monomateriality of the product, 11 concepts have been developed of new aprons with reduced environmental impact, which consciously use materials, both natural and artificial, to respond to the better to the technical, aesthetic and expressive needs of this product in relation to the different defined user and use targets.

The use of this approach in this specific project context, not yet sensitized on the issue of environmental sustainability, is still today a unicum from which the company can gain a real competitive advantage, compared to its direct competitors, demonstrating once again how the eco-design can play a fundamental role in the process of developing new products, real innovation and differentiation on the business market, even and above all where this has never been taken into consideration.

4. A STRATEGIC INNOVATION LEVER STILL TO DISCOVER

Roland is a Japanese company whose division DG is specialized in the production of peripherals for visual communication such as plotters for cutting and printing of large format, engravers, modeling cutters and three-dimensional scanners, mainly addressed to the world of digitalized craftsmanship and of design.

The project "Refreshing Design Workshop" ⁵ developed for this company by EcodesignLab was aimed at stimulating and encouraging the birth of new creative enterprises through the design and implementation of an innovation platform characterized by a multi-stakeholder approach that allowed a process of cross fertilization between design, craftsmanship and Roland DG technologies. With an intensive two-week design workshop carried out in a two thousand square meters industrial context and with all the machines produced by the company available, 32 designers, 6 makers, 11 technological craftsmen and 4 traditional artisans were called upon to devise and develop new

5. The term Refreshing Design indicates a design activity that refreshes, reinterprets, reactivates and regenerates a manual craftsmanship that is innovated with the use of low cost digital technologies and with the facilitated sharing of intellectual resources and innovative contents through the web 2.0.

products and services able to renew the concept of “craftsmanship” through the use of Roland DG technologies and waste materials and products to be regenerated.



[Figure 3] Some images of the Refreshing Design Workshop held on 27 October to 7 November 2014 at the Roland DG Mid Europe in Acquaviva Picena (AP), Italy.

During the workshop, the working groups have given life to 13 product and service ideas, resulting from the merger of the various sectors of expertise, the manual skills of craftsmen and the use of low-cost production technologies available for the transformation and reuse of waste materials and components. In order for the process to produce results in such a short time, the cultural alignment of all the participants regarding the themes of the reuse project but also the desktop personalization and modification technologies present in the workspaces was fundamental. The coordination group made up of the EcodesignLab team, then developed a full-bodied and detailed dossier, distributed one month before the start of the work, to all the participants, in which the fundamental themes of self-production, reuse techniques and services offered from the individual machines they were made explicit.

The result of the intense planning activity has seen the selection by the company of the three ideas considered to be the best and able to move on to the subsequent phases of business incubation and support to the commercial launch as a start-up. At the base of the methodological and scientific success of the project, as strongly believed by the company, there is certainly a critical reading of the process that uses the theme of environmental sustainability as a strategic lever for the birth of new entrepreneurial reality, further amplified to the use of by now pervasive rapid production technologies, that allow the further approach of the design theme to the one of handicraft production and small series in general.

5. CONCLUSIONS

The phenomenon of “greenwashing” and the advertising campaigns of companies that have declared “green” their products without having the objective and verified characteristics, have proved to be heavy boomerangs, because the theme of environmental sustainability does not admit the character of subjectivity, but makes use of specific and transparent tools and methodologies. Every action that is carried out and every design choice has a precise consequence, quantifiable numerically and verifiable by anyone.

This has been a deterrent for many companies to take actions aimed at the sustainable development of their products, citing the motivation of not being able to afford the investments necessary to change their production activity in the direction of environmental sustainability. The innovative approach that EcodesignLab proposes is to adapt to the potentials, expectations and real capabilities of the companies that address them, strategies and design actions for environmental sustainability, developed and tailored ad hoc for each specific business reality and for every design challenge.

This means not proposing a standardized methodological design process, through the offer of service packages or the use of predefined tools, but rather: dynamically analyzing company needs and the real motivations behind a new green product or service and developing innovative solutions that combine the highest environmental performance with the best opportunities for economic and social growth.

BIBLIOGRAPHY

1. Brezet H. and van Hemel C. (1997), Ecodesign. A promising approach to sustainable production and consumption, UNEP, Paris, France.
2. Enel and Fondazione Symbola (2018), 100 Italian Circular Economy Stories, book available at the Internet address <http://www.symbola.net/html/article/100italiancirculareconomy> [24 February 2018].
3. Fiksel J. (1996), Design for Environment. Creating eco-efficient products and processes, McGraw Hill, US.
4. Lewis H. and Gertsakis J. (2001), design + environment: a global guide to designing greener goods, Greenleaf Publishing Limited, Sheffield, UK.
5. McDonough W. and Braungart M. (2003), Dalla culla alla culla, BLU Edizioni, Milano.
6. Pietroni L. (2013), EcodesignLab Srl. Uno spin off universitario al servizio delle imprese, in “Mappe. Luoghi percorsi progetti nelle Marche” n. 2/2013, Gagliardini Editore, Ancona, Italy.
7. Tamborrini P. and Vezzoli C. (eds) (2007), Design per la sostenibilità. Strategie e strumenti per la Decade, United Nations (2005-2014), Libreria CLUP, Milano, Italy.
8. Valentino P. A. (ed.) (2014), L'arte di produrre arte. Imprese italiane del design a lavoro, Marsilio Editore, Venezia, Italy.
9. Vezzoli C. And Manzini E. (2006), Design per la sostenibilità ambientale, Zanichelli, Milano, Italy.



the Learning Network
on Sustainability

The proceedings are also available at www.lensconference3.org

This work is Licensed under Creative Common Attribution-NonCommercial-ShareAlike CC BY-NC-SA

The conference was organized by:

Politecnico di Milano
Aalto University
Brunel University London
Cape Peninsula University of Technology
Hunan University
Indian Institute of Technology Guwahati
Srishti Institute of Art, Design and Technology

Technische Universiteit Delft
Tsinghua University
Universidad Autónoma Metropolitana
Universidad del Valle de México
Universidade Federal de Pernambuco
Universidade Federal do Paraná
Universiteit Stellenbosch

Other LeNSin associate partners cooperating with the organization are

- Londrina State University, Fluminense Federal University, Federal University of Alagoas, Federal University of Uberlândia, Federal University of Santa Catarina (**Brasil**)
- C.A.R.E. School of Architecture, Pandit Dwarka Prasad Mishra Indian Institute of Information Technology, Indian Institute Of Technology Gandhinagar, Goa College of Architecture, Hunnarshala Foundation for Building Technology & Innovations, Vastu Shilpa Foundation (**India**)
- Wuhan University of Technology, Jiangnan University, The University of Science and Technology Beijing, Beijing Information Science and Technology University, The Hong Kong Polytechnic University, Guangzhou academy of fine arts, Tongji University (**China**)
- Farm and Garden National Trust, Cape Craft and Design Institute NPC (**South Africa**)
- Univesidad Nacional Autónoma Metropolitana, Instituto Tecnológico de Monterrey Campus Ciudad de México (**Mexico**)

Scientific Commetee:

Carlo Vezzoli
Aguiñaldo dos Santos
Leonardo Castillo
Claudio Pereira Sampaio

Ranjani Balasubramanian
Ravi Mokashi
Brenda Garcia
Rodrigo Lepez Vela
Ephias Ruhode
Elmarie Costandius

Xin Liu
Jun Zhang
Fabrizio Ceschin
Cindy Kohtala,
Jan Carel Diehl

LeNSin main partners:

