

SYSTEMIC DESIGN DELIVERING POLICY FOR FLOURISHING CIRCULAR REGIONS

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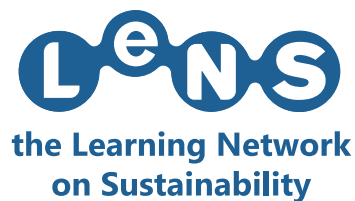
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Designing sustainability for all

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3-5 April 2019

Edited by **Marcelo Ambrosio** and **Carlo Vezzoli**

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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, Faiyqa 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 Ortíz	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, Liliane 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 Vigliani, 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, Giuseppe 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 Kozlowiski 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 Petruilaityte, 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 Petruilaityte, 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 Míriam 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. Sichert, 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 SUSTAINABILITY Jomy 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 Ceconello	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 CUAUHEMOC 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 Irlés, 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'rithaa	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.

4. SYSTEM AND CIRCULAR DESIGN FOR SUSTAINABILITY



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SYSTEMIC DESIGN DELIVERING POLICY FOR FLOURISHING CIRCULAR REGIONS

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ABSTRACT

Systemic Design expertise is rising as relevant on Policy Design fostering better governance towards Circular Economy. On that journey, a current coordinated work between universities, local authorities, associations and public administration where the Systemic Design is anticipating the future economy actions through policy design is RETRACE Interreg Europe project. The aim of this project is to drive regional policies towards a Circular Economy applying the Systemic Design approach developed by the research group of the Department of Architecture and Design at Politecnico di Torino. This paper describes the role of Systemic Design on the future challenges on Regional Governance towards a Circular Economy through the outcomes of the RETRACE and discusses the opportunities and wicked problems of this expertise on policymaking. Becoming a milestone on the way to a deeper awareness of the impact the implementation of Systemic Design on Policy Design processes in Europe.

Key Words: Systemic Design, Policy Design , Circular Economy , Territorial Development

1. INTRODUCTION

We live in a world that is in the midst of interconnected megatrends such as rapid urbanization, climate change, resource scarcity, changes in global economic power, technological breakthroughs and erratic demographic/social transformations, carrying out an unprecedented complex revolution (PWC, 2017). Consequently, this phenomenon has brought many increasingly pressing challenges threatening society's well-being and economic prosperity. Proving that today more than ever the world is rapidly going towards several tipping points as humanity is consuming the equivalent of 1.7 Earths (NGF, 2010). Such megatrends will have several implications on the ways mankind consumes, certainly shaping the types of products, services, and technologies that will be designed, developed and used in the future. This scenario represents a serious challenge for EU regions, which are dependent on most of the resource supply from raw materials from international markets.

Nowadays linear economy has raised the exposure of unpredictable hazards as resource prices, job instability, and supply disruptions. These situations are complex and interconnected, which means that addressing one could have positive implications towards the others. By 2030, tackling sustainability will be essential considerations in the design and development of products, services, and technologies. On that view, the transition to a Circular Economy (CE), is a chance to generate competitive advantages on a sustainable basis with the potential to generate an income benefit of EUR 1.8 trillion by 2030 (EMF, 2015) and over 1 million new jobs across at EU level by 2030 (EPRS, 2017). From a foresight perspective, applying CE principles across all sectors and industries could decrease environmental, social and economic pressures globally, and increase the EU regions strategic autonomy (EC, 2019).

These erratic shifts are underway on a vast scale with transforming economies, governments and societies in complex, interconnected in unpredictable ways. The nature of such global trends, claim to redesign the current public policy conditions in order to be more future-oriented on the way to sustainable development. The need for and the potential of innovation has never been greater.

Today is not possible to conceive or solve the so-called wicked problems individually (Jones, 2014). Mainly because the volume and complexity of such problems are growing so fast that governments are unable to catch up with them, failing with the citizen trust and business confidence. Indeed, these interconnected challenges require a structure of interconnected solutions and change-makers able to understand and visualize complexity. Given that the nature of design in encounter wicked problems, shifting an existing complex context into a new one. However, this doesn't mean that designers generate solutions to wicked problems. Instead, designers reformulate those scenarios to generate different possibilities and relationships (Rittel and Webber, 1973). From that point of view, designers could respond to this need on new anticipatory approaches on governance from a holistic and systemic point of view which fosters a cohesive transition to a CE.

To be able to conquer innovative approaches in governance, the aim of the design processes has turned into a key tool for the shaping of decisions. In the last decade, the design as a discipline has assumed an important role in the field of policy-making. Since that moment, it has been inevitable to compare both design and policy-making as they are considered problem-solving processes (Blair, Cunningham, 1999). Because of this, more and more design has been comprehended as an important and practical component in the formulation of better policies and governance strategies. So, in order to solve the current wicked problems: How design can innovate in policy planning for sustainable development and the growing of circular economies?

To the best of our knowledge, the Systemic Design (SD) methodology tackles the complex phenomena delivering new relations between the local actors, through specific design tools which highlight the hidden potentialities of a scenario boosting active collaboration among the components of a system (Bistagnino, 2011). The SD expertise is rising as relevant on Policy Design fostering better governance towards CE (Barbero & Giraldo Nohra, 2018). An exemplification of this is the RETRACE Interreg Europe project (A Systemic Approach for Transition towards a Circular Economy funded by the Interreg Europe, <https://www.interregeurope.eu/RETRACE/>) coordinated work between universities, local authorities, associations and public administration where the SD is anticipating the future economy actions through policy design. The aim of this project is to drive EU policies towards a CE applying the SD approach developed by the research group of the Department of Architecture and Design at Politecnico di Torino.

This paper describes the role of SD on the future challenges on Regional Governance towards a CE through the outcomes of the RETRACE project such as the CE Regional Action Plans (RAPs). Also, discusses the opportunities and wicked problems of this expertise on policymaking. Focusing on how the SD approach fosters interregional experiences towards an integrated territorial development through the promotion of future productive activities and effective policies to enhance CE. Proving that at European level this expertise for policymaking will be vital to support key policy instruments Smart Specialization strategy, Corporate Social Responsibility, and Cohesion Policy.

2. SYSTEMIC APPROACHES FOR POLICY DESIGN

The last decades have demonstrated that most of the methods and tools used traditionally for public policy have not kept up with the speed of shifting in economies and societies. Even though it is true that governments are clearly adapting, progress is often done from reactive measures and sporadic rather than fostering preventive policy systems. Also, it is undeniable that as wicked problems grow exponentially, it is vital to adopt the right fore-

sight actions on governance that take policy planning one step forward.

To approach this kind of policy planning it is essential that bottom-up and top-down approaches coexist with a common goal (Krauz, 2016). In this sense, all the actors involved in this process should be able to communicate and work together with the same clear objective. Design for sure has an increased capacity to facilitate and mediate different competencies (Celaschi, 2008).

Design for sustainability has gained momentum delivering a contrasting vision on the role of the design. The discipline has shifted from a product-oriented design process towards dematerialization designing approaching solutions for complex social, environmental, and even political problems (Papanek, et al., 1972). Making the designer an active role in the optimization of resources and minimizing political, social and cultural disruption ensuring a more resilient solution (Barbero & Giraldo Nohra, 2018).

The design applications on the field of policymaking is growing exponentially. There is an increasing recognition from the public sector in acknowledging the designer's approach as effective in improving the ability of governments to manage public issues (Bailey, 2017). Supporting it with a qualitatively different approach to the process of policymaking, delivering more effectiveness and innovation. On that view, design for policy addresses a different perspective on policy issues. This is due to the combination of different research methods from systems thinking; anthropological to scientific databases, generating transdisciplinary collaboration teams that through design elements can make policy-making processes more tangible (Bason, 2014).

To achieve this, the SD method recognizes territories to be acknowledged in a profound overview, through the creation of new relations between actors of a context enabling the visualization of the so-called "sleeping assets" (Bistagnino, 2011). Fostering horizontal dialogues among the actors of the territory enabling innovative and productive decision-making strategies. As a result, this will generate a new scenario of collaboration that can enhance future productive activities sustainably. This strategic thinking process leads to the definition and implementation of effective policy planning. Anticipating better governance for major local and regional development targeting environmental, social and economic benefits (Barbero, 2017).

Such situations the designer inside SD undertakes the role of "designer mediator", (Celaschi et al., 2011). On these active processes, the systemic designers have the key responsibility to enable the co-creation of strategies to foster territorial cohesion that can encourage relations between all the involved actors. Hence, the SD delivers tools that can achieve new scenarios of economic profit and cooperation in order to guarantee sustainable development (Barbero, 2017).

As SD is effective on the conceptualization of systems, it also demonstrates that is the more suitable expertise to deal with complexity at the scale of government, but also to comprehend on a wider scenario a particular policy or intervention. Furthermore, through tools like the Holistic Diagnosis (HD) through the process of problem finding by system mapping (Sevaldson, 2011), it is delivered a different starting point of analysis for the development of policy (Battistoni, Giraldo Nohra, 2017). From this detailed comprehension of systemic context, the HD delivers innovative opportunities for intervention, opening the spectrum of possibilities according to each territory.

These approaches on an EU governance scale could boost territorial cohesion and EU public policy planning process for sustainable development. On that perspective, the SD approach for territorial development includes actors from different sectors/backgrounds to co-create within a trans-disciplinary scenario from governments, civil society and the industry with the goal of creating effective policies for circular regions.

From that point of view in the case of RETRACE project, the SD enables a deeper comprehension of the complex industrial systems through the HD of each participant region. Focusing on identify potentialities to transform the system into a more circular one. It is true that within the design for policy field, the application SD has much more to explore as emergent expertise but the following will expose how it is turning in to a key element on the policymaking scenario.

3. RETRACE REGIONAL ACTION PLANS FOR CIRCULAR REGIONS

There are different paths in which the EU regions can transition to a CE these could be revolutionary or evolutionary. The EU has targeted that by 2030 most of the industry should have a transition towards a circular industrial model, so in that scenario, the current policies will have to promote a cohesive transition in EU regions (EC, 2017). A current example of this priority is the RETRACE Interreg Europe Project (2016-2020) which aims at promoting SD approach for local and regional policies to move towards a CE, according to which waste from one productive process becomes input in another, preventing waste to be released into the environment. This project includes 8 private and public partners and more than 70 stakeholders from Piedmont (IT), Basque Country (ES), Nouvelle Aquitaine (FR), North-East Romania (RO) and Slovenia (SL) to promote collaboration among EU regions towards a CE.

Cases like RETRACE a project lead by systemic designers, prove their ability to coordinate these transdisciplinary teams in order to tackle complex problems for designing innovative policies. The SD perspective enabled a wider overview of the regional systems and a profound comprehension of the complex phenomena through the HD executed for each region (Barbero, 2017). This evidence was featured through the results of the 5 Regional Action Plans (RAPs) in CE for each partner region one of the main milestones of the project (Barbero & Giral-

do Nohra, 2018). This document defines the regional priorities addressing a range of CE Policy Gaps in the 5 regions. Also, it includes planned measures and support actions the implementation period (2018-2020) and beyond. These future orientated vision actions are pointless if not followed by a real implementation. The success of them relies on the quality of the path that led to RAPs' definition which was defined by the SD.

In order to elaborate a RAPs for each region, there was an assessment of the regional context on relation to the CE. Therefore, each Region regarded their current Smart Specialisation Strategies (RIS3) and development goals, among them a low-carbon CE. This led to the identification of Policy Gaps to be overcome; a process defined by the HD and 7 Field Visits on best Good Practices CE across Europe. This analysis allowed regions to highlight their hidden assets and criticalities that could act as leverages to deliver more effective policies for CE (Battistoni & Giraldo Nohra, 2017). Despite the fact that certain potentialities and challenges are particular from each Region, the RAP approached 6 Policy Gap (PG) common to the partner regions. These ones emphasized the different aspects that implied the transition to a CE in such regions. Moreover, they explore the fields of intervention that could be tackled to support a CE (Pallaro & Pereno, 2018). The identify 6 PG where the following:

- Support collaboration between sectors: This gap was related to the eligibility rules for the open industrial calls which in many cases forbid actors from different sectors to participate. Preventing the generation of local value chains from the output-input principle and the technology transfer among actors.
- Raise and knowledge of operators concerning CE: There is a scarce amount of actions for operators to raise their participation, awareness, and knowledge on CE. This emerges as an important issue as it jeopardizes the development and success of CE related projects.
- Policy regulations on CE: The analysis delivers the unclear and disharmonized policy regulations on CE, specifically on by-products production conditions, at (regional, national and European).
- Tailored policy measures on CE: In the current European funding schemes it is clear that the CE is a transversal topic, however, it emerges from the analysis that there is required to create tailor-made policy measures and calls that address CE directly.
- Policy in support to business and market development for CE activities: At the side of executing CE projects, it is required to promote the creation of a business model for CE activities, in order to foster the market to the reuse of by-products. These actions are key to solve waste management issues towards the success of the CE.
- Policy focused on Small and Medium Enterprises (SMEs) and micro manufacturing: This aspect addressed two main issues; the one is the limited tailored support on CE for SMEs transition and the other is the scarce assistance for the generation of micro-manufacturing processes sized on the local context.

To achieve a successful outcome it was key the strong engagement of all actors of the territory in order to generate tailor-made policy measures. In that way the SD ensures the delivery of policies were all participant parties can oversee the progress of the multiple actions on CE within a short, mid and long term, where the short and medium ones are designed in order to foster future implementations. Specifically, on the long run, the execution of the RAPs aims to shift important policies instruments for regions as the EU regional operational programme, Smart Specialisation Strategies (RIS3), waste management plans, industrial development plans and Corporate Social Responsibility (CSR) (Barbero & Giraldo Nohra, 2018). Such process reveals the "actionable and proactive" mindset of designers that combine with a foresight vision, can deliver tangible outcomes in the short term while pointing to activate broader actions in the long term.

4. RETRACE SUPPORTING EU GOVERNANCE

There is a considerable part of EU policies towards a CE already ongoing as the Circular Economy Package, EU Bioeconomy Strategy and the EU Plastics Strategy (EC, 2019). Nevertheless, they still require to be put into practice in an integrated across all EU regions. On the view, it is to put in action these strategies it necessary holistic understanding of the territory that can activate systematically on the promotion of sustainable local value chains. An example of how to achieve such transition is the RETRACE's CE RAPs which deliver a systemic policy approach for an effective CE policy-making, including the combination of several policy interventions to stimulate the cooperation among different actors over networks (Barbero & Giraldo Nohra, 2018). To enable this EU strategy on CE, the SD expertise for policymaking will be vital to support key policy instruments on regions such as RIS3, CSR and Cohesion Policy (EC, 2017).

Considering the ambitious goals of the EU towards a CE implying tackling poor institutional management which diminishes the competitiveness and sustainable economic growth (EPSON, 2018). Therefore, it is necessary a cohesive regional development that achieves major environmental-economical-social advantages fostering a CE. In response to that, the SD creates strategies through a territorial thinking process for an effective decision-making process. In the case of RETRACE, such Policy Design processes lead by an SD approach can support Cohesion Policy or regional policies on CSR at different levels in EU regions through a holistic overview from regions enabling a better comprehension of the needs of the territory, to consequently deliver an effective implementation of innovative regional strategies.

Hence, the RETRACE's RAPs actions propose an effective way for regions to achieve productive invest-

ments on RIS3, CSR and Cohesion Policy, to avoid wasteful investments to foster CE. These actions clarify how CE strategies can be scaled up at the European level, fostering interregional cooperation. More specifically, the RAPs are aligned with the Cohesion Policy a policy instrument that considers a long-term vision to guarantee sustainable development over time. To reach this goal the SD delivers a deep systemic understanding of EU regions allowing an appropriate diagnosis of the gaps and potential assets that can impact a sustainable development towards a CE (Pereno & Pallaro, 2018).

5. CONCLUSIONS

Transitioning towards a CE is amidst the most pressing challenges Europe has to face. Given the current panorama, actions are needed at all levels from governments to all EU Member States and institutions will have to be on board. Tangible results will be only possible through key change drivers as cities, municipalities, and regions. At the same time, it will require multidisciplinary teams from citizens, businesses, social partners and the research community. The RETRACE project has exemplified that does dynamics are disruptive but truly transformative, contributing to this collective effort in promoting the implementation of an SD approach as a practical methodology to boost the CE transition.

In order to accelerate local development towards a CE, it is essential to set up a dialogue and common ground between all the stakeholders of the policymaking process, to reach a complementarity between bottom-up and top-down making them coexist with a common goal. Ultimately, the final purpose of embrace a synergetic approach is to strength strategies and policies towards a CE (Lambi et al., 2013). Inside the project framework of RETRACE, it was possible to experience these synergies within the first two years of the project (2016-2018) across the research process with policymakers, governments, communities, industry and many innovators across Europe. This journey involved different points of view from many actors who are fostering a CE in their regions, to eventually accomplish a common ground inside the regional context of policymaking. This outcome was clearly reflected on RAPs that reflects an inspiring path across Piedmont, Biscay, Nouvelle Aquitaine, Slovenia, and North-East Romania, also by all those collaborators who have contributed their experiences to foster effective and more sustainable governance.

Through this paper has been highlighted that RETRACE's outcomes contained several successful components that could be extended into other EU regions to transition towards a CE in EU regions. The RAPs explained above acknowledge that a transition towards CE will not be possible without essential changes in fields such as :

- multi-governance coordination: focusing in synergies across different administration levels (from regional and national governments).
- multi-stakeholder collaboration: reinforcing relations between different sectors in industries clusters and value chains .
- consumption and production patterns: emphasizing in the resource efficiency preventing the production of waste, to encourage secondary raw materials.

The EU strategies as the CE Package, EU Bioeconomy Strategy and EU Plastics Strategy, underlined the important role Regions play in achieving the European transition to a CE a reality. Nevertheless, Region's challenges in this process are similar, even if the answers are multiple still this transition will carry several implications in EU regions given the various economic, productive and social contexts that will have to be addressed. On this perspective for the RAPs are relevant to underline the role that interregional cooperation for policy planning, their goal is to spread and communicate the outcomes of RETRACE beyond the internal process of the project.

More and more SD is turning into key expertise to generate effective CE strategies promoting a cohesive territorial development for Europe. On that view, the RETRACE project outcomes should not be missed on the way. By the contrary, they should be valorized to spread deep awareness on how the SD is becoming a milestone in the implementation of Policy Design processes in Europe. Also delivering an overview of the disruptive character towards the traditional paradigms on governance and new ways for territorial cohesion and EU policymaking for sustainable development.

BIBLIOGRAPHY

1. Bailey, J. (2017). The RETRACE Holistic Diagnosis. In Barbero, S. (Ed.). 1.5 Elements of Novelty: Designer as Policy-Maker (pp. 43-49) Turin, Italy: Allemandi.
2. Bason, C. (ed). (2014). Design for Policy. Aldershot: Gower.
3. Barbero, S. (Ed.) (2017). Systemic Design Method Guide for Policymaking: A Circular Europe on the Way. Turin, Italy: Allemandi.
4. Barbero, S., Giraldo Nohra C. (Ed.) (2018). RETRACE Policy Road Map : A systemic approach for circular regions. Turin, Italy: Allemandi.
5. Battistoni, C., Giraldo Nohra C. (2017). The RETRACE Holistic Diagnosis. In Barbero, S. (Ed.). Systemic Design Method Guide for Policymaking: A Circular Europe on the Way. (pp. 112-120) Turin, Italy: Allemandi.

6. Bistagnino, L. (2011). *Systemic Design: Designing the Productive and Environmental Sustainability*. Bra (CN), Italy: Slow Food.
7. Blair, T., Cunningham, J. (1999). *Modernising Government*, Presented to Parliament by the Prime Minister and the Minister for the Cabinet Office by Command of Her Majesty.
8. Considine, M. (2012). Thinking outside the box? Applying design theory to public policy. *Politics & Policy*, 40(4), 704-724.
9. Celaschi, F., (2008). Il design come mediatore tra saperi, e, Il design come mediatore tra bisogni. AA. VV., *L'uomo al centro del progetto*, Allemandi editore, Torino.
10. Celaschi, F., Formia, L., Lupo, E. (2011). From Trans-disciplinary to Undisciplined Design Learning: Educating through/ to Disruption. In *Third International Forum of Design as a Process*, Torino, 2-5 November 2011, 370-88.
11. EMF, (2015). *Delivering the Circular Economy: A Toolkit for Policymakers*, Available at: <https://www.ellenmacarthur-foundation.org/publications> .
12. EPRS, European Parliamentary Research Service (2017) *Towards a circular economy - Waste management in the EU Science and Technology Options Assessment*. Available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2017/581913/EPRS_STU%282017%29581913_EN.pdf
13. European Commission (2017), *My Region, My Europe, Our Future*. Seventh report on economic, social and territorial cohesion. Publications Office of the European Union: Luxembourg.
14. European Commission (2019) *Reflection Paper Towards A Sustainable Europe By 2030*. Available at: https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf
15. ESPON EGTC (2018) *The territorial dimension of future policies*. Editorial: Ilona Raugze, Magdalena Zagrzejewska, ESPON EGTC.
16. Jones, P. H. (2014b). Systemic design principles for complex social systems. In G. Metcalf (Ed.), *Social systems and design* (pp. 91-128). Tokyo: Springer.
17. Krauz, A., (2016). Transition management in Montreuil: towards perspectives of hybridization between 'top-down' and 'bottom-up' transitions. In: Loorbach, D., Wittmayer, J., Shiroyama, H.,
18. Lambi, L., Lindemann, T., Morra, D. (2013). *Policy Brief 9. Top-Down and Bottom-Up Approaches*. Rome, Italy: Food and Agriculture Organization of the United Nations.
19. Network, G. F. (2010). *Ecological footprint*. Footprint Network web site: <http://www.footprintnetwork.org>.
20. Papanek, V., & Fuller, R. B. (1972). *Design for the real world* (p. 22). London: Thames and Hudson.
21. PwC (2017), *PwC Annual Report 2016/2017*. PricewaterhouseCoopers B.V. Available : <https://www.pwc.nl/nl/assets/documents/pwc-annualreport2016-2017-print-totaal.pdf>
22. Rittel and Weber. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155-169.
23. Sevaldson, B. (2011). *Gigamapping: Visualization for complexity and systems thinking in design*. Helsinki: Nordic Design Research Conference.



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