Data Visualization Collection. How graphical representation can inspect and communicate sustainability through systemic design.

Original
Data Visualization Collection. How graphical representation can inspect and communicate sustainability through systemic design. / Stabellini, Barbara; Remondino, CHIARA LORENZA; Tamborrini, PAOLO MARCO. - In: THE DESIGN JOURNAL. - ISSN 1756-3062. - ELETTRONICO. - 20(2017), pp. 1673-1681.

Availability:
This version is available at: 11583/2679162 since: 2018-09-26T11:03:57Z

Publisher:
Taylor & Francis Group

Published
DOI:10.1080/14606925.2017.1352690

Terms of use:
openAccess
This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

(Article begins on next page)
DESIGN FOR NEXT

Proceedings of the 12th European Academy of Design Conference. Sapienza University of Rome, 12-14 April 2017
supplement of The Design Journal

edited by
Loredana Di Lucchio, Lorenzo Imbesi, Paul Atkinson
Contents

EDITORIAL

SV  Conference track contents
SXXV  Foreword  Paul Atkinson
SXXVI  Introduction: Designing a Design Conference  Loredana Di Lucchio, Lorenzo Imbesi
SXXVIII  Keynote speakers
SXXIX  About
SXXX  People
SXXXII  Conference Tracks & Track Chairs
S1  Design for Next Challenges  Loredana Di Lucchio
S9  Design for Next Design  Lorenzo Imbesi

CONFERENCE TRACK CONTRIBUTIONS

S16  Design for Next Aesthetics
S411  Design for Next Economy
S732  Design for Next Education
S1558  Design for Next Environment
S1978  Design for Next Health
S2592  Design for Next Industry
S2858  Design for Next Society
S3643  Design for Next Technology
S4171  Design for Next Thinking
S4671  Workshops
S4726  Posters
Conference Track contributions

DESIGN FOR NEXT AESTHETICS


S28 A Semiotic Rosetta Stone: Developing a Designer-centric Meta-language of Pragmatic Semiotics  Dave Wood

S38 Aesthetic Justice. Design for a blind-spot culture  Peter Buwert

S49 Aesthetics in Design Semiotics Research. Developing foundations to better comprehend cultural habits and codes in bottom-up design processes  Felipe Domingues, Salvatore Zingale, Dijon De Moraes

S63 Aesthetics of futures. Shaping shared visions of tomorrow  Manuela Celi, Elena Formia

S77 An Art-based research laboratory translated into a Critical Design strategy  Raphaëlle Bidault-Waddington

S89 Beautiful interfaces. From user experience to user interface design  Letizia Bollini

S102 Building networks for knowledge exchange, and design strategies for climate futures.  Henry Mainsah, Andrew Morrison, Håkan Edeholt

S110 Can Timelessness through Prototypicality Support Sustainability? A Strategy for Product Designers  Rachel Flood Heaton, Deana McDonagh

S122 Contested Surfaces. Aesthetics of Colonization for Urban Coexistence  Adriana Cuéllar, Marcel Sanchez Prieto

S134 Creative Interpretation in Web Design Experience  Johanna Silvennoinen, Rebekah Rousi, Laura Mononen

S146 Design fiction, culture and climate change. Weaving together personas, collaboration and fabulous futures  Andrew Morrison, Alittea Chisin

S160 Design for Next... Year. The Challenge of Designing for Material Change  Ben Bridgens, Debra Lilley

S172 Entropy: Unpacking the form through post digital making  Evelina Kourteva, Dermott Mc Meel

S184 Exploring aesthetics through digital jewellery  Maarten Versteeg, Johanna Kint

S196 Future Aesthetics of Technology; context specific theories from design and philosophy of technology  Wouter Eggink, Jeroen Snippert

S209 House and Yacht: the Aesthetics of the Interior as a Link between Different Sectors  Mariateresa Campolongo

S219 Living on the Edge: design artefacts as boundary objects  Michael Pierre Johnson, Jen Ballie, Tine Thorup, Elizabeth Brooks

S236 “Make it beautiful”. An old request with difficult academic answers  Silvia D. Ferraris, Lucia Rampino, Venere Ferraro

S249 Metamorphosis of design. The aesthetics of the dark side  Francesca La Rocca, Chiara Scarpitti
Metaphorical spaces. The art used by designers to explore, experiment and express concepts of Interiors  
Raffaella Trochianesi, Matteo Pirola

Micronarratives as the form of contemporary communication  
Simona Venditti, Francesca Piredda, Walter Mattana

Network Time Where it Counts. Temporality and Critical Approaches to Infrastructure  
Tom Schofield, Gabriella Arrigoni

Reimagining cinema: searching for an aesthetic of interaction design through cinema  
Nicolas Marechal, Joel Karamath

Returning the aesthetics to the heart of the design process. On the conflict between social design and product beauty  
Mario de Liguori

Self-organized matter: design and primitive future of the eidetic categories  
Fabrizio Gay, Irene Cazzaro

Semiotics and design: Towards an aesthetics of the artificial  
Matthew Holt

Smart Solutions, “Smart Aesthetics”?  
Anna Cecilia Russo, Marinella Ferrara

The Aesthetics of The Artificial – Critical Design’s Lost Dominion  
John Knight

The design of surfaces, between empathy and new figuration  
Spartaco Paris

The New Aesthetic of DIY-Materials  
Camilo Ayala-Garcia, Valentina Rognoli

Who’s in charge? End-users challenge graphic designers’ intuition through visual verbal co-design  
Simone Taffe

Wrapping Cultural Values: using Social Embodiment as Stimulus in Designs  
Lizette Reitsma, Elise van den Hoven

---

Adding plus value to development aid projects through design strategy: experiences from Pakistan  
Gwendolyn Kulick

Beyond customer satisfaction. Supporting organisational change through Service Design. A case study in the insurance industry  
Ion Iriarte, Alazne Alberdi, Elisabeth Urrutia, Daniel Justel

Big Data: Understanding how Creative Organisations Create and Sustain their Networks  
Fraser Bruce, Jackie Malcolm, Shaleph O’Neill

Co-creating finances. A new perspective on designing for the financial world.  
Santiago de Francisco Vela

Design and Academic Entrepreneurship. The Role of Design in Spin-off Processes  
Anna Sinell, Franziska Brodack, Sebastian Denef

Design and design management in the incubation phase of high-tech start-ups  
Claudia Acklin, Andres Wanner

Design-driven innovation: Making meaning for whom?  
Heleen de Goey, Per Hilletoft, Lars Eriksson

Designing for the next (Circular) Economy. An appeal to renew the Curricula of Design Schools  
Michael Leube, Dominik Walcher
Discussing a New Direction for Design Management through a New Design Management Audit Framework  
Fulden Topaloglu, Ozlem Er

Hacking the organization: Organizational Transformation by Design  
Hans Kaspar Hugentobler

Involving stakeholders towards service implementation. Co-designing change of practices using a visual language  
Tim Overkamp, Freya Ruijs

Materiality Matters: Exploring the use of design tools in innovation workshops with the craft and creative sector in the Northern Isles of Scotland  
Cara Broadley, Katherine Champion, Lynn-Sayers McHattie

New Design Thinking Tools for the Next Generation of Designer-Entrepreneurs  
Sara Colombo, Cabirio Cautela, Lucia Rampino

Raising new opportunities for the Next Economy by exploring variable user needs for Computational Co-Design  
Viktor Malakuci

Rethinking the Fashion Collection as a Design Strategic Tool in a Circular Economy  
Ulla Raebilda, Anne Louise Bang

Service Design as a Cultural Intermediary. Translating cultural phenomena into services  
Claire Dennington

Service design as the ground for alternative social and economic scenarios  
Maria Antonietta Sbordone, Nicola Morelli

Setting-up a Design Factory within a Creative Science Park @Aveiro Region  
Teresa Franqueira, Cátia Pereira, Raul Pinto, Gonçalo Gomes

The choice of design. From businesses’ conditions to businesses’ attitudes  
Mariana Fonseca Braga

The Commodity of Trade in Contemporary Design  
Giovanni Innella, Paul Anthony Rodgers

THE FUTURE OF DESIGN SUPPORT: What Can We Learn From Design Support Experience in the UK, Estonia and Turkey?  
Melehat Nil Gulari, Ruth-Helene Melioranski, Ozlem Er, Chris Fremantle

The Value of Agile Methods in Designing for Behavioural Change: A Case Study  
Dirk Ploos van Amstel, Martine Heemskerk, Reint Jan Renes, Sander Hermsen

The Value of Design in Innovation: results from a survey within the UK Industry  
Ricardo J Hernandez, Rachel Cooper, Bruce Tether, Emma Murphy

Universities’ experience with brand. The role of design in managing university communication and branding.  
Veronica Dal Buono, Fulvio Fortezza

Why do I love you Vaatelainaamo? Analysis of motivations, barriers and opportunities in a Finnish service for sharing clothes  
Rosana Aparecida Vasques, Mikko Koria, Maria Cecilia Loschiavo dos Santos

DEVELOPMENT FOR NEXT EDUCATION

A contemporary didactics of innovation in product design. Grip Factors identification and evaluation  
Marco Mancini

A conversation with material  
Nicolai de Gier

A Design Thinking approach to introduce entrepreneurship education in European school curricula  
Ester Val, Itsaso Gonzalez, Ion Iriarte, Amaia Belizia, Ganix Lasa, Maite Elkoro
| S767 | A design-relevant mindfulness device  
Fernando Rojas, Stuart English, Robert Young, Nicholas Spencer |
| S781 | A dialogical model for studio critiques in Design Education  
Gaia Scagnetti |
| S792 | A Future Scenario for a Methodological Approach applied to PhD Design Research. Development of an Analytical Canvas  
Violeta Clemente, Katja Tschimmel, Fátima Pombo |
| S803 | A Multilevel Approach for Social Transformations and its Implications on Service Design Education.  
Nicola Morelli, Amalia De Götzen |
| S814 | Advanced Design as a paradigm for design education: learning systems within its platforms and practices  
Roberto Ilíñiguez Flores, Ruth León Morán |
| S822 | Algorithmic Futures. The Analog Beginnings of Advanced Parametric Design in First Year Studios  
Patrick Sean Rhodes |
| S835 | An Interdisciplinary Design Education Framework  
Hye-Jin Nae |
| S848 | Best Practices in Design Education Leads to a New Curriculum  
Ana Thudichum Vasconcelos |
| S859 | Creative puzzlement: how deconstructing elements of object facilitates industrial design student’s imagination  
Neil Smith, Shiro Inoue, Nick Spencer, Andy Tennant |
| S875 | Culture as a design “next”: Theoretical frameworks to guide new design, development, and research of learning environments  
Tutaleni I. Asino, Lisa A. Giacuma, Victoria Chen |
| S886 | Dealing with wicked problems, in messy contexts, through prototyping  
Bo Westerlund, Katarina Wetter-Edman |
| S900 | Design as a process tool of collaborative and multidisciplinary learning in society  
João Bernarda, Ana M. Ferreira, Carlos Silva, Inês Queiroz |
| S915 | Design Culture in school. Experiences of design workshops with children  
Fabrizio Pierandrei, Elena Marengoni |
| S927 | Design for social change and design education: Social challenges versus teacher-centred pedagogies  
Nicos Souleles |
| S937 | Design for Social Sustainability. An educational approach for insular communities  
Valentina Vezzani, Susana Gonzaga |
| S952 | Design ResearchScape. A visual exploration of Design Research publications  
Stefano Perna |
| S964 | Design Thinking for Textiles: let’s make it meaningful  
Louise Valentine, Jen Ballie, Joanna Bletcher, Sara Robertson, Frances Stevenson |
| S977 | Design Thinking: A New Road Map In Business Education  
Gözde Çeviker-Çınar, Gökhan Mura, Melike Demirbağ-Kaplan |
| S988 | Designing a cultural event as an inclusive educational activity  
Davide Fassi, Agnese Rebaglio, Annalinda De Rosa |
| S1000 | Designing Design Education. An articulated programme of collective open design activities  
Luisa Collina, Laura Galluzzo, Stefano Maffei, Vanessa Manna |
| S1014 | Designing more responsible behaviours through Design Education: Reflections on a Brazilian pilot experience in Social Innovation for Sustainability  
Viviane G. A. Nunes |
| S1026 | E-LEARNING AND DESIGN PRACTICE. Tools and methods for professional learning of strategic design approach  
Arianna Vignati, Luca Fois, Michele Melazzini, Xue Pei, Francesco Zurlo |
Facebook as a Boundary Object in Industrial Design Studio. A SoTL Study
İşıl Oygür, Selen Devrim Ulkebaş

Flourishing in graphic design education: incorporating Ubuntu as a curricular strategy.
K.A. Chmela-Jones

From a master of crafts to a facilitator of innovation. How the increasing importance of creative collaboration requires new ways of teaching design.
Andrea Augsten, Moritz Gekeler

Getting Creative Again. Getting Creative Again
Josiena Gotzsch

Human and Technological Dimensions of Making in FabLab
Iván Sánchez Milara, Georgi V. Georgiev, Jukka Riekki, Jani Ylioja, Mikko Pyykkönen

Ikebana: A Collaborative Design Pedagogy
Rachel Kelly

Infusing management education with design to foster resilience, adaptability and flexibility
Noemi Sadowska, Lorna Dallas-Conte

Interrogating Futures in Industrial Design Education
Saliha Türkmenoğlu Berkan, Özlem Er, Wolfgang Jonas

Is Design a Plus? A dilemma of disciplines when implementing design into academic education
Søren Bolvig Poulsen, Peter Vistisen, Sune Klok Gudiksen

Learning Architectural Design. Material and Immaterial Aspects.
Gerlinde Verhaeghe

Making Sense: Harnessing Communication through Prototyping
Giovanni Innella, Paul A. Rodgers

Material Tinkering. An inspirational approach for experiential learning and envisioning in product design education
Stefano Parisi, Valentina Rognoli, Marieke Sonneveld

Materials & Manufacturing Methods selection in product design: Experiences in undergraduate programs
Aline Souza, Rita Almendro, Lia Krucken

On Context, Concepts and Research: An Approach in Basic Design
Dilek Akbulut, Hatice Kesdi

On The Teachers Role in Interactive Prototyping
Jussi Mikkonen

PBL 2.0. Interdisciplinary, multicultural transformative sustainable education for design students
Elad Persov, Rochni Udyavar Yehuda, Ruti Kantor, Barak Pelman

Preparing design students for the market: an initial investigation on the required knowledge and skills for graphic designers in Brazil
Paulo Roberto Nicoletti Dziobczenski, Anamaria Amaral Rezende Galeotti

Reconstructing the critique. Using inclusive formative feedback in face-to-face and online communities of practice to improve knowledge acquisition in design education
Lucia Miceli, Lynette Zeeng

Reflexive Practices for the Future of Design Education: An Exercise in Ethno-Empathy
Manu J. Brueggemann, Angelika Strohmayer, Matthew Marshall, Nataly Birbeck, Vanessa Thomas

Rethinking the Design Studio-Centered Architectural Education. A Case Study at Schools of Architecture in Turkey
Burkay Pasin

Rethinking the education of retail design. What are the competences a retail designer needs in this fast evolving discipline?
Katelijn Quartier, Stephanie Claes, Jan Vanrie

Semiotics in Design Education. Semiotics by Design
Michela Deni, Salvatore Zingale
Service Design pedagogy and effective student engagement: Generative Tools and Methods
Hena Ali, Silvia Grimaldi, Monica Biagioli

‘Sketching’ the new designers - going wide, going deep and doing it together
Rita Assoreira Almendra, Gonçalo Falcão

Systemic Design, from the content to the structure of education: new educational model.
Chiara Battistoni, Silvia Barbero

Systemic Food Design.it A website that narrates food supply chains from a systemic perspective
Franco Fassio

The Anatomy of a Multi-Sensory Design Course: Happy Sound Object
Yasemin Soylu, Berrak Karaca Şalgamçoğlu, Pelin Efilti, Oki Kasajim

The design brief: inquiry into the starting point in a learning journey
Noemi Sadowska, Dominic Laffy

The Digital Corbeled Wall. A Pedagogical Approach to Digital Infrastructure and Traditional Craft
James Stevens, Ayodh Kamath, Komal Sharma

The end of the “briefing” and “the client” in graphic design.
Gonçalo Falcão, Rita Almendra

The Reflection of Experiential Knowledge Into Professional Practice: Case of Industrial Design Education
Enver Tatlısu, Çiğdem Kaya

The street as teaching space. A case study
Paul Woodruffe, Mandy Patmore

Theoretical studies and practical tools for a systemic design educational paradigm.
Applications of Systems Thinking principles to design education
Laura Dominici

Towards a University Design School. Restoring the value of tacit knowledge through assessment
Lynne Whelan, Carmel Maher, Colin Deevy

Using Design Methods to Improve Design Quality: Verbalizers vs Visualizers
Younjoon Lee, Jaewoo Joo

Vulnerable children as change-agents within their communities: an educational methodology co-designed in Namibia
Valentina Salvi

Wearable Words: A case study applying Jewellery theory and practice to the education of Fine Art, Textiles Innovation and Design, Graphic Communication and Illustration students
Roberta Bernabei

What students say about their work and what it says about their work. Toward the development of rhetorical practice in the educational design studio
Myra Thiessen, Veronica Kelly

What’s Next in Design Education? Transforming role of a designer and its implications in preparing youth for an ambiguous and volatile future
Ramneek Kaur Majithia

Why a Logbook? A backpack journey as a metaphor for product design education
Violeta Clemente, Katja Tschimmel, Rui Vieira

World design. Educational approach for a new experience of sharing.
Maria Antonietta Sbordone, Rosanna Veneziano
A second life for Contemporary Ruins. Temporary Adaptive Reuse strategies of Interior Design to reinterpret vacant spaces  
Barbara Camocini, Oxana Nosova

An Integral Design Framework —designing a global village  
Fenja Sepers

Architecture for Regenerating Living Ecosystems: Designing a clay module for a vaulted dome structure  
Miruna Sladescu, Caitilin de Bérginy, Glen Hill

Bioplastics made from upcycled food waste. Prospects for their use in the field of design  
Cecilia Cecchini

Circular Material Library. An Innovative Tool to Design Circular Economy  
Maarit Virtanen, Kati Manskinen, Sauli Eerola

Circular Product Design. A Multiple Loops Life Cycle Design Approach for the Circular Economy  
Ana Mestre, Tim Cooper

Climate Change. Design Teaching for a New Reality  
Paul Micklethwaite, Robert Knifton

Creating 21st Century Global Citizens. A design-led systems approach to transformative secondary education for sustainability  
Nikolas Winter-Simat, Natalie Wright, Jaz Hee-jeong Choi

Creating a Tool for Measuring the Social Value of Design  
Jea Hoo Naa, Youngok Choi, Andrew Walters, Busayawan Lam, Stephen Green

Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design  
Barbara Stabellini, Chiara L. Remondino, Paolo Tamborlini

DEMOCRATIC CARDBOARD. Materials and design for a sustainable society  
Davide Turrini

Design for Leftovers. From Food Waste to Social Responsibility  
Marco Bozzola, Dorianna Dal Palù, Claudia De Giorgi

Design for social sustainability. A reflection on the role of the physical realm in facilitating community co-design.  
Mirian Calvo, Annalinda De Rosa

Design Process and Sustainability. Method and Tools  
Marco Marseglia

Designing material interaction to promote water saving. An exploration of sensory language  
Sara Bergamaschi, Lucia Rampino

Designing on the Spot: Learning from the Social Design Projects in Gökçeada/Imbros Island  
Alayça Erăşçelik, Burak Taşdizen

Energy Performance Development of Non-regulated Retrofit Mass Housing Estates in Northern Cyprus  
Bertug Ozarisoy, Hasim Altan

Envisioning the future of public lighting with citizens for upcoming technologies  
Olli Heiskanen, Karthikeya Acharya

From Science to Design: the Design4Materials virtuous cycle  
Rossana Carullo, Cecilia Cecchini, Marinella Ferrara, Carla Langella, Sabrina Lucibello

GreenTeam. A new educative approach to sustainable design  
Andrea Di Salvo, Silvia Barbero, Andrea Gaiero, Giada Rivella

Lizette Reitsma, Stina Wessman, Elin Önnevall

Information design as a tool for promoting renewable energy  
Susanna Vanhamäki, Antti Heinonen, Kati Manskinen, Mirja Kälviäinen
Make the environment the (Next) Economy
Vanessa Monna

Material Resignification in the Amazon. A way to construct sustainability scenarios
Fernanda Sarmento, Monica Moura

Pocket Park: Product Urban design
Francesco Armato

REPEAT – Textile Design for PV Modules! Design-driven Strategies for Photovoltaic Modules
Tina Moor, Brigitt Egloff, Tina Tomovic, Stephen Wittkopf

Resilient Design: Mitigating Trepidation About Environmental Disasters
Tonya Sweet, Catherine Caudwell

Rethinking Water: A CAAS (City As A Spaceship) design approach
Susan Fairburn, Barbara Imhof, Susmita Mohanty

Shifting Conversations for Sustainability Transitions Using Participatory Design Visioning
A. İdil Gaziulusoy, Chris Ryan

Space4Inspiration: Survival Lab. Designing Countermeasures for Natural Disasters
Annalisa Dominoni, Benedetto Quaquaro, Susan Fairburn

Sustainable Design Futures: An open design vision for the circular economy in fashion and textiles
Paul Smith, Jen Baille, Lynn-Sayers McHattie

Sustainable Design: Circular Economy in Fashion and Textiles
Debbie Moorhouse, Danielle Moorhouse

The Speedcycle: a design-led framework for fast and slow circular fashion lifecycles
Kate Goldsworthy

VEG-HIVE. An easy to grow veg-kit for urban farmers
Erminia D’Ittria, Loredana Di Lucchio

A Healthcare Wearable for Chronic Pain Management. Design of a Smart Glove for Rheumatoid Arthritis
Gozde Goncu-Berk, Nese Topcuoglu

A Multidisciplinary inspection of Dental Photography: What Do Dentist Think and What Can Designer Do?
Yener Altıparmakogulları, Muhsin Cifter, Abdusselam Selami Cifter

A Review on Future Directions in Hospital Spatial Designs with a Focus on Patient Experience
Abdusselam Selami Cifter, Muhsin Cifter

Co-designing co-design. Shifting the culture of practice in healthcare
Paul Chamberlain, Rebecca Partridge

Design and Disability. Developing New Opportunities for the Design Curriculum
Emma Gieben-Gamal, Sónia Matos

Design and Usability of the Next Medical Devices for the Home Care
Francesca Tosi, Alessandra Rinaldi

Design Experiments. Identifying areas for intervention and designing medical technology for adolescents and young adults with type 1 diabetes
Gillian M. McCarthy, Edgar R. Rodríguez Ramirez, Brian J. Robinson

Design facilitators’ journeys through the jungle of Co- in healthcare
Remko van der Lugt, Tanja van der Laan

DESIGN FOR DUCHENNE. Guidelines for dwellings’ construction or renovation for Muscular Dystrophy-Affected Families
Michele Marchi, Giuseppe Mincolelli
<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2078</td>
<td>Design for Dysphagia: a new hardware-and-software mobile system to monitor patients' swallowing</td>
<td>Niccolo Casiddu, Claudia Porfirione</td>
</tr>
<tr>
<td>S2090</td>
<td>Design for the ambient assisted living</td>
<td>Giuseppe Losco, Andrea Lupacchini, Luca Bradini, Davide Paciotti</td>
</tr>
<tr>
<td>S2109</td>
<td>Design of non-speech sounds for human interaction. A conjunction between industrial design and psychology</td>
<td>Eduardo Tapia Olmos</td>
</tr>
<tr>
<td>S2120</td>
<td>Design probes and toolkits for healthcare: Identifying information needs in African communities through service design</td>
<td>Ralitsa D. Debrah, Retha de la Harpe, Mugendi K. M'Rithaa</td>
</tr>
<tr>
<td>S2135</td>
<td>Design research for the development of a Medical Emergency Ambulance. Design as a symbolic qualifier in the design of complex systems/products</td>
<td>Augusto de Sousa Coelho, Vasco Branco</td>
</tr>
<tr>
<td>S2158</td>
<td>Designing Care. How Design can improve medical products for a therapeutic wellbeing</td>
<td>Angela Giambattista</td>
</tr>
<tr>
<td>S2168</td>
<td>Designing for Aesthetic Disruption: Altering Mental Models in Social Systems through Designerly Practices</td>
<td>Josina Vink, Katarina Wetter-Edman, Manuela Aguirre</td>
</tr>
<tr>
<td>S2178</td>
<td>Designing for an ageing society: products and services</td>
<td>Silvia Pericu</td>
</tr>
<tr>
<td>S2190</td>
<td>Designing Industrial Design in the Highly Regulated Medical Device Development Process. Defining our valuable contribution towards usability</td>
<td>MaryBeth Privitera</td>
</tr>
<tr>
<td>S2207</td>
<td>Designing Interactive Music Systems with and for People with Dementia</td>
<td>Alexander Müller-Rakow, Rahel Flechtner</td>
</tr>
<tr>
<td>S2215</td>
<td>Designing Schools for Students on the Spectrum</td>
<td>Ulrike Altenmüller-Lewis</td>
</tr>
<tr>
<td>S2230</td>
<td>Designing Therapeutic Support for the People with Alzheimer’s disease. A designerly way of Investigation</td>
<td>Beril Imamogullari, Alessandro Biamonti</td>
</tr>
<tr>
<td>S2238</td>
<td>Designing with Dignity: Social determinants of health and design research</td>
<td>Diana Nicholas, Kiera Townsend, Yvonne Michael</td>
</tr>
<tr>
<td>S2247</td>
<td>Discovering Service Variations through Service Prototyping</td>
<td>Vanessa Rodrigues, Stefan Holmild</td>
</tr>
<tr>
<td>S2258</td>
<td>Emerging Trends and the Way Forward in Design in Healthcare: An Expert’s Perspective</td>
<td>Emmanuel Tsekleves, Rachel Cooper</td>
</tr>
<tr>
<td>S2273</td>
<td>Enhancing co-responsibility for patient engagement</td>
<td>Ineke Neutelings, Pierre Levy, Tom Djajadiningrat, Caroline Hummels</td>
</tr>
<tr>
<td>S2284</td>
<td>Environment as non pharmacological intervention in the care of Alzheimer’s disease</td>
<td>Silvia Maria Gramegna, Alessandro Biamonti</td>
</tr>
<tr>
<td>S2293</td>
<td>Health Co-Creation in Social Innovation: Design Service for Health-Empowered Society in China</td>
<td>Liang Yin, Davide Fassi, Hang Cheng, Han Han, Shushu He</td>
</tr>
<tr>
<td>S2304</td>
<td>Health Design: Mapping current situations, envisioning next steps</td>
<td>Guillermina Noël</td>
</tr>
<tr>
<td>S2315</td>
<td>How can constraint-induced movement therapy for stroke patients be incorporated into the design of a tangible interface?The case study of the ‘Biggest Hit’</td>
<td>Mailin Lemke, Edgar Rodriguez Ramirez, Brian Robinson</td>
</tr>
<tr>
<td>S2336</td>
<td>Imagined futures: designing future environments for the care of older people</td>
<td>Claire Craig</td>
</tr>
<tr>
<td>S2348</td>
<td>Improving the Pelvic Exam Experience: A Human-Centered Design Study</td>
<td>Gina A Taylor, Deana McDonagh, Michael J Hansen</td>
</tr>
</tbody>
</table>
Improving the Visualisation of Renal Blood Test Results to Enhance Patient – Clinician Communication  Adrian Gradinar, Jeremy Davenport, Heather Hill, Paul Coulton

Incremental and Radical Innovation: Design in Robotics for Autism. Teo and Riby robots. Evolutionary Development  Maximiliano Romero, Andrea Bonarini, Andrea Brivio, Ksenia Rogacheva

Informing hospital design through research on patient experience  Margo Annemans, Liesbeth Stam, Jorgos Coenen, Ann Heylighen

Limited use only. How can the design of an everyday object help chronic stroke patients to overcome the learned nonuse of the upper limb?  Mailin Lemke, Edgar Rodríguez Ramírez, Brian Robinson

Multisensory design of pocket gardens for reducing stress and improving well-being, performance and satisfaction  Noemi Bitterman, Ella Simonov

Participant Observation in Cognitive Gameplay as a Rehabilitation Tool for Living Alone Elderly with Dementia in Hong Kong: A Pilot Study  Alex Pui-yuk King, Kin Wai Michael Siu

Persuasive Technology as key to increase Working Health Condition. The Case study of a Wearable System to prevent Respiratory Disease  Venere Ferraro, Mila Stepanivic, Silvia Ferraris

SAM - Simulation Airways Models  Elisabetta Cianfanelli, Lorenzo Corbetta, Gabriele Gorette, Lorenzo Pelosini, Maria Luisa Malpelo

Sense and movement. Design of a system for sensorimotor rehabilitation after stroke.  Francesca Toso

Systemic Design for Sustainable Healthcare  Silvia Barbero, Agnese Pallaro

Systemic innovation in sustainable design of medical devices  Silvia Barbero, Amina Pereno, Paolo Tamborini

The Effectiveness of Environmental Design for Physical Activities Promotion: Review  Aline Gonzalez-Moreno, Aldo Valencia-Hernandez, Omar Valencia-Hernandez

The fuzzy front-end and the forgotten back-end: User involvement in later development phases  Frida Almqvist

User-Designed Dementia Care Pathways. A disruptive approach to mapping dementia support services  Daniel Carey, Andy Tennant, Paul Rodgers, Katie Dodd

Wayfinding for health seeking: Exploring how hospital wayfinding can employ communication design to improve the outpatient experience  Eden Jayne Short, Stephen Reay, Peter Gilderdale

Well Connected. What does design offer in the complexity of blood donation management  Tine Thorup, Jen Ballie, Marjan Angoshari

Will smart homes improve our lives? A design perspective towards effective wellbeing at home  Margherita Pillan, Sara Colombo

A Design perspective for IoT products. A case study of the Design of a Smart Product and a Smart Company following a crowdfunding campaign.  Ilaria Vitali, Venanzio Arquilla, Umberto Tolino

Changing roles. Role theoretical approach to customer involvement in industrial service development  Sanna Peltonen
Design Absorption and Learning Processes: a study on designers’ perceptions about companies.  
Ivna Ravanello, Fabiane Wolff, Andréa Capra

Design and the Fourth Industrial Revolution. Dangers and opportunities for a mutating discipline.  
Tomás García Ferrari

Design for Next Connected Appliances  
Eleonora Fiore, Paolo Tamborrini, Silvia Barbero

Designing Fast & Slow. Exploring fashion textile product lifecycle speeds with industry designers  
Rebecca Earley

Digital Maker Networks. Benefits, barriers and opportunities for re-localised UK manufacturing for the future  
Paul Smith

Emotional service experience toolkit for servitization  
Miia Lammi

Fashion Design for Short Male Consumers  
Osmud Rahman, Henry Navarro

Footwear design. The paradox of “tailored shoe” in the contemporary digital manufacturing systems  
Annalisa Di Roma

Go with the Flow: Accelerated digital design in the age of Post-agility  
John Knight

Hospital of Objects. Recycling plastic from the small electronic devices to redesign old objects by the 3d printers  
Chiara Petruzz, Loredana Di Lucchio, Lorenzo Mario Cafiero, Riccardo Tuffi, Alessio Ubertini, Flavio Caretto

Industry 4.0, Innovation and Design. A new approach for ergonomic analysis in manufacturing system  
Elena Laudante

Industry 4.0: Is It Time for Interaction Design Craftsmanship?  
Daniela Petrelli

Networked production and outsourced design. A comparison of three case studies  
Silvia Gasparotto

New vision on Knitwear design. How the traditional craft methodologies are evolving into fashion international scenarios.  
Laura Affinito, Giovanni Maria Conti, Martina Motta

Next generation of tools for industry to evaluate the user emotional perception: the biometric-based multimethod tools  
Ganix Lasa, Daniel Justel, Itsaso Gonzalez, Ion Iriarte, Ester Val

Scenarios for design and craft  
Manuel Martinez Torán, Chele Esteve Sendra, Ricardo Moreno Cuesta

Strategic innovation tools enabling nautical stakeholders to shape a next level port  
Garmt Nieuwsma, Ingrid Mulder

The Relation of Influence between Leadership Style and Team Creativity of Integrated Design Companie  
Yueh Hsiu Giffen Cheng, Teng-Jung Wang

The Role of Design Concepts in the Development of Digitalized Industrial Services  
Janne Pekkala, Salu Ylirisku

The understanding and use of design in the UK industry: reflecting on the future of design and designing in industry and beyond  
Riccardo J Hernandez, Rachel Cooper, Jeyon Jung

What does Product Design Mean Tomorrow? Example Middle East  
Andreas Sicklinger

Why the Internet of Things needs Object Orientated Ontology  
Joseph Lindley, Paul Coulton, Rachel Cooper
DESIGN FOR NEXT SOCIETY

S2858 Anamorphosis and Contemporaneity
Tommaso Empler

S2873 Built territories. Innovative regeneration processes for a participatory and sustainable design
Marco Borsotti, Sonia Pistidda, Giulietta Fassino

S2883 Call of Survival: Stigmergy for Matters of Concern
Shanu Sharma, Koumudi Patil

S2894 Con[temporary]. Design for social innovation
Chiara Olivastri

S2906 Containers of Stories: using co-design and digital augmentation to empower the museum community and create novel experiences of heritage at a house museum
Caroline Claisse, Luigina Ciolfi, Daniela Petrelli

S2919 Craft and Sustainability: Potential for Design Intervention in Crafts in the Yangtze River Delta, China
Xiaofang Zhan, Stuart Walker, Ricardo Hernandez-Pardo, Martyn Evans

S2935 Crafting Sustainable Futures. The Value of the Service Designer in Activating Meaningful Social Innovation from within Textile Artisan Communities
Francesco Mazzarella, Val Mitchell, Carolina Escobar-Tello

S2951 Decentralising Design. Raising the Question of Agency in Emerging Design Practice
Paola Pierri

S2960 Design and Innovation in Brazil. Reflections on a local experience within the furniture industry sector
Viviane G. A. Nunes

S2973 Design by means of citizen activism: three cases illustrated by the action of Coletivo Maré, Rio de Janeiro, Brazil
Bruna Montuori, Marcos Rosa, Maria Cecilia Santos

S2991 Design for Grassroots Production in Eastern Turkey through the Revival of Traditional Handicrafts
Hazal Gumus Ciftci, Stuart Walker

S3005 Design for social enterprises. Co-designing an organizational and cultural change
Daniela Selloni, Marta Corubolo

S3020 Design for Society: Analysis of the adoption of Design practices by Early-Stage Social Entrepreneurs
David Pérez, David Hands, Edward McKeever

S3035 Design for Socio-technical Innovation: A Proposed Model to Design the Change
Pablo Marcel de Arruda Torres

S3047 Design for Territories as Practice and Theoretical Field of Study
Marina Parente, Carla Sedini

S3059 Design Paradox. The next chapter in the design process
Daria Ayvazova

S3068 Designing for the next generation. Children urban design as a strategic method to improve the future in the cities
Laura Giraldi, Elisabetta Benelli, Roberta Vita, Isabella Patti, Juri Filieri, Francesca Filippi

S3079 Designing local food systems in everyday life through service design strategies
Emily Ballantyne-Brodie, Ida Telalbasic

S3096 Designing Trust: the importance of relationships in social contexts
Dr Laura Warwick

S3106 Digital commons, urban struggles and the role of Design
Andreas Unteiged, Blanca Dominguez Cobreros, Elizabeth Calderon-Lüning, Gesche Joost
Engaged by Design: The Role of Emerging Collaborative Infrastructures for Social Development. Roma Makers as A Case Study  
Alessandra Fasoli, Silvio Tassinari

Enhancing textile enterprises for a more sustainable society, through design research and website development  
Disaya Chudasri, Krittiya Saksrisathaporn

Fab Labs. New hubs for socialization and innovation  
Annalisa Di Roma, Vincenzo Minenna, Alessandra Scarcelli

Fair by design. Addressing the paradox of inclusive design approaches  
Matteo Bianchin, Ann Heylighen

Framing Design to support Social Innovation: The Open4Citizens Project  
Nicola Morelli, Marc Aguilar, Grazia Concilio, Amalia De Götzen, Ingrid Mulder, Janice Pedersen, Louise Klitgaard Torntoft

Freedome smart mobile office-home. The bio-logic design adaptation to the dynamic evolution of living  
Serena Fiorelli

From Cork Labour Activities to Co-design Production. Azauruja Case Study  
António Gorgel Pinto, Paula Reaes Pinto

Future Tense: Alternative Futures as a Design Method for Sustainability Transitions  
Corina Angheloiu, Goldie Chaudhuri, Leila Sheldrick

Harmonics: Towards Enlightened Evaluation  
Katherine Champion, George Jaramillo

Having a voice, having a choice: Children’s Participation in Educational Space Design  
Eda Can, Gökşenin İnalhan

Human movement in Public spaces: The use and development of motion-oriented design strategies  
Liselotte Vroman, Thierry Lagrange

Information Design for Supporting Collaborative Communities  
María de los Ángeles Briones

Infrastructuring Place. Citizen-led Placemaking and the Commons  
Maria Frangos, Thomas Garvey, Irena Knezevic

Libraries of Things as a new form of sharing. Pushing the Sharing Economy  
Najine Ameli

Living mobility transitions towards bicycling. Designing practices through co-creation and socially influencing systems  
Tobias Barnes Hofmeister, Agnis Stibe

Makers’ ambitions to do socially valuable things  
Elisabeth Unterfrauner, Christian Voigt

Making Visible: Valuating the Impacts of Design Intervention for Social Cooperative  
Xue Pei, Francesco Zurlo, Arianna Vignati, Luca Fois, Michele Melazzini

Masters of Cerimonies. A design approach to participatory video  
Francesca Piredda, Elisa Bertolotti, Simona Venditti

No Man is an Island. Situated Design Research and Wicked Impact  
Jeroen Peeters, Nigel Papworth, Pernilla Glaser, Carla Collevecchio, Ana Betancour, Ambra Trotto

Participatory Design for Public Services. Innovation in Public Administration  
Gianni Sinni

People’s Republic of Bolzano or how digital artifacts can be adversarial to misinformation  
Matteo Moretti, Maurizio Teli, Antonella De Angeli

Places, Communities and Knowledge. You’ll be part of an upcoming exhibition  
Alfredo Calosci

Providing Fast Flowing Calm Waters. The role of the Design Manager in mid-large scale Public Sector Co-Design Projects  
Gemma Coupe, Leon Cruickshank
REAGENTE. A label for social innovation.
Raffaella Fagnoni, Silvia Pericu, Chiara Olivastri

Research on Service Blueprint of Food Banks
Pin Hsuan Kuang, Wen Hui Chou

Sacred design. Immaterial values, material culture
Luisa Chimenz

Sharing Economy for Tourism and Hospitality: new ways of living and new trends in interior design
Luísa Collina, Laura Galluzzo, Giulia Gerosa, Maddalena Bellè, Maria Lidia Maiorino

Social Design for Service. Building a Framework for Designers Working in the Development Context
Essi Kuure, Satu Miettinen

Socially Engaged Transmedia Practice. Three Co-Creative Interventions in Portuguese Neighbourhoods
António Gorgel Pinto

Storytelling in design for social innovation and politics: a reading through the lenses of Hannah Arendt
Virginia Tassinari, Francesca Piredda, Elisa Bertolotti

Systemic Design approach in policy-making for sustainable territorial development
Silvia Barbero, Miriam Bicocca

Tackling local problems by embedding design in local administrative offices: A case study of the ‘Design Consultant’ program
Eun Ji Cho

THE CHALLENGE OF BEING ACTIVIST-DESIGNER. An attempt to understand the New Role of Designer in the Social change based on current experiences
Maziar Rezai, Mitra Khazaei

The emerging challenge of brand design and brand management in social innovations
Tamami Komatsu Cipriani

The growth of digital social innovation in Europe. An Open Design approach to support innovation for the societal good
Serena Cangiano, Zoe Romano, Matteo Loglio

The Museum of the Future: a sedimentary cloud
Craig Bremner, Laura Bernadet

The role of design in supporting the continual emergence of hybrid spaces of interaction within the city
Valentina Volpi, Antonio Oepromolla

The Social Purpose of Design Activity
Xuesong Wu

Towards a new “urban sensitivity”. The role of design as support to social innovation
Barbara Di Prete, Martina Mazzarello

Unearth Hidden Assets through Community Co-design and Co-production
Busayawan Lam, Theodore Zamenopoulos, Mihaela Kelemen, Jea Hoo Na

UTOPIA_an Italian way to practice transdisciplinarity. Educating alterity
Valentina Frosini

Working with young people at the margins of society to design hybrid physical/digital objects to portray their experiences of support services
Daniel Burnett, Paul Coulton

You say you want a revolution? Non-normative foundations of Transformation Design
Peter Friedrich Stephan
| S3643 | A data-driven approach for understanding Open Design. Mapping social interactions in collaborative processes on GitHub  
Massimo Menichinelli |
| S3659 | A Framework for Capturing Creativity in Digital Fabrication  
Georgi V. Georgiev, Iván Sánchez Milara, Denzil Ferreira |
| S3669 | A Heuristic for Improving Transmedia Exhibition Experience  
Vashanth Selvadurai, Claus Andreas Foss Rosenstand |
| S3683 | A study of the relationship between personalised 3D printed ‘Souvenirs of Place’ and public perception of modern architectural heritage.  
Samantha Forster, Katherina Vones, Constantia Anastasiadou |
| S3696 | Adopting the Unknown through the Known Supporting user interaction of non-idiomatic technologies in exhibitions through known idioms of conventional technologies  
Peter Vistisen, Claus Pertou Østergaard, Rameshnath Kala Krishnasamy |
| S3707 | :Blackbox: A Design Fiction research project  
Alfonso Tiberio, Lorenzo Imbesi |
| S3713 | Collaboration and exchange between “Craftsman” and “Designer”: Symbiosis towards Product Innovation.  
Handan Temeltas |
| S3724 | Conceptualising Kinaesthesia – Making Movement Palpable  
Lise Amy Hansen, Wendy Keay-Bright, Damian Milton |
| S3735 | Crafting the Digital: Developing expression and materiality within digital design and manufacture  
David Grimshaw |
| S3749 | Design and Planned Obsolescence. Theories and Approaches for Designing Enabling Technologies.  
Matteo Zallio, Damon Berry |
| S3762 | Design problem analysis and process. A case of technology-augmented problem decomposition in analysis and understanding of public space  
Awoniyi Stephen |
| S3776 | Design Thinking Applied to Data Storage Innovation: A Case Study  
Malieheh Ghajargar, Giulio Mangano, Alberto De Marco, Roberta Giannantonio |
| S3789 | Designing The “Next” Smart Objects Together With Children  
Seçil Uğur Yavuz, Nitzan Cohen, Roberta Bonetti |
| S3801 | Designing the Next Generation of Connected Devices in the Era of Artificial Intelligence  
Alexander Schurig, Colin George Thomas |
| S3811 | DIY: polar fleece as a new material for handmade artefacts.  
Beatrice Lerma |
| S3824 | Effect of Digital Age on the Transmission of Cultural Values in Product Design  
Betül Aybala Çakmakçıoğlu |
| S3837 | Empathy Workshop: When Project team and Pilot Users Exchange Experiences  
Malieheh Ghajargar, Lucia Longo, Eleonora Gargiulo, Roberta Giannantonio |
| S3849 | Fiction and Physicality: a designerly approach towards complexities of emerging technologies  
Yeup Hur, Miriam Sturdee, Migeul Bruns Alonso, Panos Markopoulos, Jason Alexander |
| S3863 | Flying with data: Openness, forms and understanding.  
Nick Dulake, Ian Gwilt |
| S3873 | From Design for One to Open-ended Design. Experiments on understanding how to open-up contextual design solutions  
Francesca Ostuzzi, Lieven De Couvreur, Jan Detand, Jelle Saldien |
| S3884 | From respect to change user behaviour. Research on how to design a next generation of smart home objects from User Experience and Interaction Design  
Yichen Wu, Margherita Pillan |

Interaction design applications for museum spaces. New exhibit paths driven by a Bluetooth sensor’s system  Claudio Germak, Sara Khan

Interaction design for cultural heritage. A robotic cultural game for visiting the museum’s inaccessible areas.  Germak Claudia, Giuliana Luca, Lupetti Maria Luce

Interface and Data Biopolitics in the Age of Hyperconnectivity. Implications for Design  Salvatore Iaconesi

Jamming as a design approach. Power of jamming for creative iteration  A. Tece Bayrak

Lifelogging in User Experience Research: Supporting Recall and Improving Data Richness  Mattias Arvola, Johan Blomkvist, Fredrik Wahlman

Making and Unfinishedness: Designing Toolkits for Negotiation  Michael Smyth, Ingi Helgason

Museum Experience Design: A Modern Storytelling Methodology  Federica Dal Falco, Stavros Vassos

My Boy Builds Coffins  Gianni Denaro, Lorenzo Imbesi

Research through provocation: a structured prototyping tool using interaction attributes of time, space and information.  Jaime Rivera, Tom MacTavish

Rethinking the Role of Design within the Technological Advancements in Biomimetics and SynBio  Toufic Haidamous

Silk Road: A Reference. Creating public architectural intervention in the context of education & technology.  Marcus M. Farr

Speculating the Possibilities for Remote Collaborative Design Research. The Experimentations of a Drawing Robot  Catherine Normoyle, Rebecca Tegtmeyer

Technological Research and Invention In The Industrial Design  Mario Buono, Sonia Capece

Textile Connections E-textiles to enhance connectedness for older adults experiencing loneliness  Sara Nevay, Christopher S.C. Lim, Gary Gowans

The cocktail party effect. An inclusive vision of conversational interactions  Isabella Loddo, Dario Martini

The future of print design relies on interaction  Marco Neves

The Map As An Object of Service Design  Qian Sun, Hyunyim Park

‘The Robots are Coming!’: Perennial problems with technological progress  Paul Atkinson

TXD. From Traceability to Experience Design in Fashion Accessories Production.  Elisabetta Cianfanelli, Gabriele Goretti

Using Design Fiction to Inform Shape-Changing Interface Design and Use  Miriam Sturdee, Paul Coulton, Jason Alexander

When Your Toaster is a Client, how do you design? Going Beyond Human Centred Design  Leon Cruickshank, Nina Trivedi
A case of values conflict in the video game design field. A critique of Schön’s appreciative system. Laureline Chiapello

Adaptive Thinking for Design Leadership. Coaching adaptive capabilities to empower next visionary leaders Francesco Galli, Barbara Pino A., Irina Suteu

Analysing the Digital Transformations, Territories, Frames and Uses Mario Gagliardi

Cause and Effect of Design Features and Brand Value: Consumer Interpretation of Design and Value of Long- and Short-Term Products Kana Sugimoto, Shin’ya Nagasawa

Channelizing Thinking for Practical Innovations and Measurable Impact Kayani Khodke, Sagar Behere

CO/DEsign: building a shared dialogue around analysis within co-design Michael Pierre Johnson, Jen Ballie, Tine Thorup, Elizabeth Brooks, Emma Brooks

Critical design as approach to next thinking Liene Jakobsone

Design Education at the Boundary Robert Potts

Design for Next Thinking. Using Transformation Consequence Mapping to Improve Responsible Innovation Practices Ashleigh Bentham

Design for Subjective Wellbeing: Towards a Design Framework for Constructing Narrative Patrick W. Jordan, Andy Bardill, Kate Herd, Silvia Grimaldi

Design in the Middle: A New Approach to Collaborative Socio-political Design in Conflict Areas Merav Perez, Ezri Tarazi

Designing for Violence. And its undoing Stahl Stenslie

Design-led Approach to Co-production of Values for Collective Decision-Making Sneha Raman, Tara French, Angela Tulloch

Driverless Governance. Designing Narratives Toward Democratic Technology Melika Alipour Leili, Winnie Tsai Chang, Corey Chao

Empathy and Design. A new perspective Alice Devecchi, Luca Guerrini

Envisioning urban futures: from narratives to composites. Serena Pollastri, Christopher Boyko, Rachel Cooper, Nick Dunn, Stephen Clune, Claire Coulton

Foucault and the smart city Ding Wang

Grounding Evidence in Design: Framing Next Practices Altuğ Kasalı, Nancy J. Nersessian

Idea Management. Identifying the factors that contribute to uncertainty in idea generation practices within front end NPD Se Ryeong Kim

Implementation during design Developing understanding about service realisation before implementation Tim Overkamp, Stefan Holmild

Meaning, knowledge and artifacts, giving a voice to tacit knowledge Spyros Bofylatos, Thomas Spyrou

Outside the “Comfort Zone”. Designing the Unknown in a Multidisciplinary Setting Kirsi Niinimäki, Marjaana Tanttu, Cindy Kohtala
| S4444 | Paradoxes in Design Thinking  
Paul A. Rodgers, Giovanni Innella, Craig Bremner |
| S4459 | Potentiality: the ethical foundation of design  
Peter Buwert |
| S4468 | Prototyping the non-existent as a way to research and innovate: a proposal for a possible framework for design research and innovation  
Juan De la Rosa |
| S4477 | Rethinking the Roles of Fashion Designers. The Case of Pre Helsinki  
Namkyu Chun, Olga Gurova, Kirsi Niinimäki |
| S4487 | Scalable Interactive Modular Systems (SIMS): sustainability for digital interfaces  
Luigi Ferrara, Nastaran Dadashi, Robert Giusti |
| S4497 | Scientific Craftsmanship: The changing role of product designers in the digital era  
Muhammet Ramoğlu, Aykut Coşkun |
| S4509 | Stimulating Thinking at the Design Pitch. Storytelling Approach and Impact  
David Parkinson, Laura Warwick |
| S4519 | Synesthetic Approach in the Design Process for Enhanced Creativity and Multisensory Experiences  
Sevi Merter |
| S4529 | Systems thinking and its contribution to understanding future designer thinking  
Laura Mononen |
| S4539 | Terms and meanings of “participation” in product design: From “user involvement” to “co-design”  
Lucía Sánchez de la Guía, Marina Puyuelo Cazorla, Blanca de-Miguel-Molina |
| S4552 | The Constellation: A framework for conceptualising design as a process of innovation.  
Joanna Bletcher |
| S4565 | The design movement: Two case studies from the edge of the discipline  
Rebecca Price, Karla Straker |
| S4575 | The use of intuition during scenario building activities in design projects  
Priscilla Ferronato, Stan Ruecker, Celso Scaletsky |
| S4584 | To the new methodology of design consciousness for the futures  
Galina Lola, Tatiana Aleksandrova |
| S4591 | Towards prospective design  
Bridgette Engeler |
| S4600 | Ubiquitous Design. Ethnographic glances toward syncretisms, polyphonies, meta-fetishisms  
Massimo Canevacci |
| S4611 | Understanding Collaborative Design Through Activity Theory  
Mithra Zahedi, Virginie Tessier, Dave Hawey |
| S4621 | User, Research, and Practice. Learning from Design Consultancies  
İşıl Oygür |
| S4632 | Vapourworlds and Design Fiction: The Role of Intentionality  
Paul Coulton, Joseph Lindley |
| S4643 | What counts when counting gets complicated?  
Elizabeth Wright, Simon Fraser, Thomas Eugene Wright Jr. |
| S4652 | Yellow as “Non-Black”: Prosthetics, Semiotics, Hermeneutics, Freedom and Function  
Jonathan Ventura, Galit Shvo |
WORKSHOPS

Discussing about “Inclusion in Sharing-Based Services”. A design workshop using an analytic tool  
Daniele Busciantella Ricci, Hua Dong, Alessandra Rinaldi, Francesca Tosi

Eco-social design: who pays for it?  
Bianca Elzenbaumer, Fabio Franz, Kris Krois, Alvise Mattozzi

Experiencing Technology Enabled Empathy Mapping  
Daniel Neubauer, Verena Paepcke-Hjeltness, Pete Evans, Betsy Barnhart, Tor Finseth

Model and Mobilise Imaginary for Innovative Experience Design  
Estelle Berger, Frédérique Pain

Pablo Escobar: Zoomania in the narco imperium. The glorification of the cocaine network  
Catalina M Jaramillo

Perspectives on socially and politically oriented practices in design  
Bianca Herlo, Andreas Unteidig, Wolfgang Jonas, Idil Gaziulusoy

Spirit of ‘68. The ‘next’ role of the art/design school?  
Jo Turney, Alex Franklin

Strategies for synergies. Working in interdisciplinary teams  
Hannah Glatte, Marie Heidingsfelder, Franziska Bradack

POSTERS

A contribution for Jewelry Design Teaching  
Claudia Regina Batista

Analysis of Available Design Implementation Methods. A Study About Scarcity of Implementation Methods  
Ricardo Martins

Anatomy of local government/design education collaboration.  
Adam Thorpe, Alison Prendiville, Lara Salinas, Sarah Rhodes

Breathing Games: Promoting Respiratory Health Through Co-creation  
Maria Frangos, Fabio Balli

Co–designing with plants. Degrading as an overlooked potential for interior aesthetics based on textile structures  
Svenja Keune

Contemporary design. Variables and categories  
Vincenzo Maselli

Design for the Smart Cities. Investigation about citizen’s needs and products to improve public places  
Lola Merino Sanjuan, Marina Puyuelo Cazorla, Monica Val Fiel

Design Lab: For Future Research  
Ahmet Basakan, Füsun Curaoğlu

Designing for additive manufacturing technologies: a design research methodology  
Silvina Félix, Nuno Dias, Violeta Clemente

Desirability in design for safety: Developing life jacket through creative problem solving method of TRIZ  
Shahin Matin, Mohammad hossein Namayandegi

Exploring the Next Urban Condition  
Adam Framme, Jeff Haase

From Co-Working Places to New Education Places  
Füsun Curaoğlu, Duysal Demirbaş
Image Management: The Contribution of Design
Emílio Távora Vilar

Modes. A Multi-sensory Media Experience for Stress Reduction
Emily Verba Fischer, John Hebbeler

MU.SA Method. Multimodal System Approach to the learning of the History of Design
Isabella Patti, Roberta Vita

Multidisciplinary approach for a new vision of urban requalification. Multi-scale strategies of social innovation, economic improvement and environmental sustainability practices. Multi-scale strategies of social innovation, economic improvement and envir Annamaria Bagaini, Zoe Balmas, Anna Koryakina, Anna Mangiatordi, Beatrice Jlenia Pesce, Caterina Reccia

Resolving the OcuCheck: A Human-Centered Design Approach
Matthew L. Bowman, Gina A. Taylor, Deana McDonagh, Leanne T. Labriola, Dipanjan Pan

The “T” shaped designer expertise. The “reverse-T” shaped designer horizon
Daniele Baratta

The interface design for the application “Price My Job”
Karolina Nunes Tolentino Costa, Claudia Regina Batista, Adhemar Maria do Valle Filho

The Preemie Pod: A Wearable Incubator Designed for Premature Infants to Engage in Kangaroo Care
Amanda Henderson, Deana McDonagh

Threeing: Incorporating “Relational Circuits” into the Research Encounter
Karl Julius Mendonca, Morgan Russell

What is Next for Design Semiotics Research? Searching for epistemological answers in design outcomes
Felipe Domingues, Salvatore Zingale, Dijon De Moraes
Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design

Barbara Stabellini, Chiara L. Remondino & Paolo Tamborrini

To cite this article: Barbara Stabellini, Chiara L. Remondino & Paolo Tamborrini (2017) Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design, The Design Journal, 20:sup1, S1673-S1681

To link to this article: http://dx.doi.org/10.1080/14606925.2017.1352690
Data Visualization Collection. How graphical representation can inspect and communicate sustainability through Systemic Design

Barbara Stabellini, Chiara L. Remondino, Paolo Tamborrini

Abstract: Big data are totally changing the business rules, the society, as well as the perception of ourself. The need of a big data oriented culture is becoming essential for everything that has an informative assets. Furthermore, technological innovation offers products and features unique that can help to convey values and meanings, for the purpose of communication based on increasingly strong interaction between people. In a world where everything is consumed in a short time, it is important to turn information as visual as possible, making simple what is complex. The visualization becomes a medium for increasing cognitive perception of the beholder, easing reasoning and storing of the information represented, showing patterns and relationships, known or not, maybe not easily visible without the aid of a visual representation of information.

Keywords: sustainability, systemic design, data visualization, complexity

1. Introduction

We are living in an era of exponential increase in data production, collection and usage in different sector and in everyday life moments; for this reason the ability to collect, understand, communicate and make sense of information is going to be a very important skill. In terms of sustainability, data produced by environment, both infrastructures and individuals become tools for reading the society, quantifying its sustainable and unsustainable aspects; the study and the analysis of such data is fundamental to better understand what may be the future action strategies in order to improve environmental, economic and social sustainability.

The growing interconnection due to the digitalization of information and relations, as well as the exponential spread of data generated by things, people and organizations, represent a challenge and an opportunity to design new tools suitable to complex and changing environment in which we live. Therefore, it is essential to understand how it is possible to extract the most value from information, emphasizing the communicative potential contained in them (Cukier, 2013).
In a world where everything is consumed in a short time, it is important to turn information as visual as possible, making simple what is complex. Data visualization becomes a fundamental medium to explore phenomena, encouraging thinking, information memorization and interpretation; in other words make complex phenomena accessible through visual tool. The transformation from data to information, anyway, is not that simple, but is a continuous improvement path where data are collected, categorized and contextualized in a specific ecosystem.

Because of the importance of this transformation, the discipline and the role of the design become essential. Nevertheless, today many works that can be included within the topic of visualization of the data is often the result of the lack of design or of a design that does not take into account an overview. For this topic, design is often considered a surplus, but the discipline should find space right here, by filling this gap, positioning itself at the beginning of within the design whole process, not just at the end, so as to be able to offer a complete design in all its stages, and not a simple and common add-on.

Specifically, the purpose of our research is find positioning in the beginning of the decision procedure, offering an important contribution in the selection of the correct type of visualization graphics, adapting and shaping to better define guidelines to analyze and broadcast informations with a sustainable point of view.

In order to achieve the best result in term of comprehension and communication, it becomes essential the creation of a multidisciplinary team; indeed, data visualization cannot simply be defined as the representation of information in visual form, but it is a complex multidisciplinary field (Card, 1999), ranging from data mining to visual art, from psychology of perception to graphic and systemic design.

2. Collection

The use of charts, graphs, maps, diagrams, and tables is not new; this kind of representation accompanied us in the course of human evolution in dealing with the history and the socio-cultural contexts, the spaces and the organization of our knowledge based on models more and more suited to our way of life and the way in which we feed of information.

2.1 Environment as a context

Always, the greatest experimentations and monitoring has been conducted into the environment. For this reasons it becomes of fundamental importance to keep track of all that surround us and being able to understand data that environment offers.

This scenario allows to assume that environment is the context. The environment, in fact, produces data from space to people, both analogic and digital as well as the intersection of them and their correlation. This data become raw material, on one hand enabling a continuous transformation, and on the other hand encouraging always more new projects and visions, shared only if make visible.

Always, the weather conditions monitoring interest people, scientists, amateurs and national or international institutes. The meteorological data, be they collected by professionals, citizens or sensors and other technologies, has been, and currently is, fundamental in an attempt to forecast meteo and global climate changes. The sailor observation has been of vital importance to develop the first ocean current and wind maps. It is possible to see a particular and interesting series of data in the captains on board diaries of the East India Company ship. In 1709, the Rochester ship sailed away from Great Britain to China and its captain kept a detailed diary with ship sketch, wild animal
drawings and particular locations pictures, recording also all the information about position, path and meteor forecast. Today, the availability of huge amount of data, allows scientists to complete this work. Their images aren’t only static maps, but are able to capture the dynamic nature of our global system. For example, the NASA visualization, shows oceanic currents thought satellite data collected between 2005 July and 2007 December, offering a dynamic overview, with significance and impact.

Also the healthcare field is strongly interested and involved in the data visualization; in fact, the graphic representation of the information is integral part for the healthcare improvement and the society well-being. History shows how sometimes the representation of harvested data could help to find causes and therapy diseases, as well as the tracking of infection rate and geographic distribution allow to monitor the epidemics diffusion or the identification of the local environmental factor that contribute to it. The most known and influential visualization in this topic is made by Dr. John Snow who tracked Soho deaths due to cholera in 1853 highlighting in a ghost map the water pumps of the area and crossing these data with the close deaths; in this way he could prove how epidemics didn’t spread out by Thames, but by the water contaminated with human waste, thus strongly linking the healthcare question to the environmental one. Today, the healthcare data mapping continues to be very important, especially if connected with other demographic dataset: significative contribution in this regard is the work by the UK Chief Medical Officer that every year publishes an annual report in which there are mapped a huge number of mortality and morbidity, with the goal of offer a clear and objective overview on the national clinic situation.

Maps are a topic widely linked to mobility research, not only for what that concern path, travel indication and signs. The analysis and the visualization of tracked data by individuals, as by companies, can offer a particular reading of the around society. Since 1980, curious is the use of data from the UPS delivery company, which, through the initiative called ORION (On-Road Integrated Optimization and Navigation), started to track its vehicles, monitoring speed, direction, braking, and drive train performance. These data are not only used to monitor daily performance, but to redesign the route structures: this approach allows to reorganize the delivery path optimizing fuel consumption and, consequently, environmental carbon emission.

In the end, if we consider environment as the context, we can not refer to the energy issue, which is today one of the hottest topic, including consumption, discovery and implementation. The growing availability of energy data allows people to determines how they use them defining what is their impact on the environment, also linking these information with other dataset as public transport, technology, production.

2.2 Data visualization collection

In order to better collect, visualize and communicate data, for example as above mentioned, but not only limited at it, the literature reveals a lot of types of graphical representation from specific sectors (such as finance, economics, science or meteorology), but in terms of innovation and experimentation, all those forms can be applied in areas for which they were not designed, offering the expansion of the domains and purposes to which these practices are applied.

There are a lot of research which try to find the best way to classify graphics. One of the first characteristic of the existing taxonomies of graphs and images is the difference between functional or structural. Functional taxonomies focus on the intended use and purpose of the graphic material. In contrast, structural ones are derived from exemplar learning and focus on the form of the image placing more emphasis on emotions, rather than its content. In general this tendency arise from the distinction between the different experts’s background, the firsts typically focused on statistics, computer science and engineering, while the second ones much more into graphic design and arts.
One of the most common and known example of functional classifications can be found in Edward Tufte. He identify four specific category in which classify graphics: the geographic representation through maps, the time-series, the graphic representation of events and phenomena which develop in space-time and the visualization of relations. (Tufte, 1983)

Also Heer, Bostock and Ogievetesky have put the emphasis on functionality in 2012; they proposed an articulated classification of graphics focusing on the experience of our times, and then paying attention on big data. Specifically, they identified four categories: time series, statistical distributions, maps, hierarchies and networks. (Heer, Bostock e Ogievetesky, 2013).

Different from a functional classification, Lohse et al. (Lohse, 1990; Lohse, 1994) classify visual representations using meaning and similarity between them. They identified six basic categories of visual representations: graphs, tables & time charts, maps & cartograms, diagram, networks, and icons.

In addition to taxonomies, there are a lot of catalog and table that collect the visualization methods. One of the most known book that collected and explain the use of each single type of representation is the manual of Harris (Harris, 1996). Another example is the Periodic Table of Visualization Methods (Lengler, 2007). This kind of classification aims to be less academic and draws on fields such as chemistry for his famous periodic table of elements. The periodic table is an interactive and prototypical example of Ben Shneiderman’s visualization mantra of Overview first, zoom and filter, then details on demand. (Shneiderman, 1996). The visualization methods are categorized in data visualization, information visualization, concept visualization, metaphor visualization, strategy visualization and compound visualization. All graphics are then specified according task and interaction (overview, detail, overview and detail), the cognitive processes (convergent thinking, divergent thinking), and the represented information (structure, process).

Starting from the fundamental taxonomy defined by Tufte and the most common basic classification by Lohse et al., we collected 96 visualization graphics trying to offer a comprehensive collection. As it is possible to see in figure 1, there are many type of graphics, some of these unknown to many people, due to their specific field of use.
Figure 1. Collection of the types of representation and their functions.

Except for particular type of representations, the other ones can be used for different kind of data; nevertheless, it remains essential the right choice of the graphics in order to achieve the graphical excellence which consists of complex ideas communicated with clarity, precision, and efficiency. (Tufte, 1983; Cairo, 2013).

However, the importance of communication and the message that visualization itself should convey bring attention to move on the functions that these representations can perform. In order to allow this process, we identified twelve function to which a visualization have to perform, and we tried to relate each chart to each function defined: text analysis, comparison, timeline, distribution, flows, operation/process, hierarchy, location, probability/choice, proportion, range, relationship.

It’s important to specify that each representation can be generally used to perform many functions, both in different projects and at simultaneously in an only-one visualization. An example can be the word cloud, a representation in which words that appear most frequently are larger and words that appear less frequently smaller, this is normally used for the text analysis, but at the same time it can highlight concepts by using dimension of the words, or put them in relation by space disposition.

### 3. Context and relations

Nevertheless, the identification of the right representation is only a part of the process. Data on their own do not say anything, they should be placed in context, correlated with each other or with other datasets to identify distributions, sizes and correlations; they have to be sorted and aggregated according to designed criteria.

To do so it becomes essential the analysis of the initial data and their inclusion in the context, properly related to each other and/or with other datasets to identify distributions, sizes and correlations, sorted and aggregated according to criteria to the search.
As Tufte wrote, context is essential to reply to the question “Compared to what?”. In fact, graphics must not quote data out of context and context is essential for graphical integrity. (Tufte, 1983)

Speaking of which, Wurman suggest that one of the main purpose of information representation is to help users avoid “the black hole between data and knowledge”; thanks to the relation with the context, unstructured information (reality and complexity), can be encoded in structured information and then knowledge and insights for a more conscious data driven decision making process, according to the DYKW hierarchies model (Data, Information, Knowledge, Wisdom).

Take into account context means also analyze users interested to the visualization, in order to offer a representation with a complexity level suitable to them and to answer the question “Do you know what it all means?”. In fact, basically there are two factors that influence the process of communication between the designer and the reference users: how the visualization used is well adapted to encode information on the nature of the story that you want to tell, and the background and knowledge of the reader about the argument represented. (Cairo, 2013).

Thus, information visualization is used to clarify and simplify information. It enables exploration of complex data, and can be used as a tool to persuade and convince observers of an idea by making information visible, highlighting the causes and effects of specific choices, comparing the different values and situations, showing the flow of a system and how it changes, analyzing the relations, distributing chaotic data into an ordered structure (Cairo, 2013; Shneiderman, 1996).

The design model used, known as Systemic Design (Bistagnino, 2011), pays attention to the organization, optimization and understanding of every single factor at play focusing at first on user requirements, then highlighting the best conditions and the most interesting facets to work on, while keeping an eye on their mutual relations. The focus moves from the simple sum of many elements towards a better understanding of the links between them and their strength, trying to balance functionality and aesthetics.

### 4. The role of design

To many people, information graphics are the images used in presentations throughout formal meetings or the graphs used in reports or newspaper articles. Many are used for these purposes; however, for each chart, graph, map, diagram, or table used in a presentation, there are others that are used for what that are called operational purposes. Representations for operational purposes are used by millions of people everyday for improving their efficiency and effectiveness, improving quality, solving problems, planning, teaching, training, monitoring processes, studying the geographic distribution of data, looking for trends and relationships, reviewing the status of projects, developing ideas, writing reports, analyzing census data, studying sales results, and tracking home finances. (Harris, 1996)

However, because of its historical roots in scientific reasoning, in academic research advanced information visualizations is often interpreted and characterized as scientific tools; the focus is therefore directed only to the functional requirements, not paying any attention to the aspects of user experience and graphic aesthetic.

In recent years, given the accessibility to the public of a great number of data sources as open data and environmental report, and the impact of that argument on the communication, the number of designers involved has increased, heavily impacting on the data visualization features. Information visualization is becoming more than a set of scientific tools to understand large data sets, but it is
emerging as a medium in its own right, with a wide range of expressive potential and its goal is to transform data into information and information into insight (Fiorina, 2004).

As in most other design-related fields, information visualization seeks to achieve a balance between the requirements of utility, soundness and attractiveness. Utility corresponds to the classic notions of functionality, usability, usefulness and other quantitative performance measures; these aspects generally define the effectiveness and the efficiency of the visualization. Soundness is concerned with reliability and robustness. Attractiveness refers to the aesthetics aspect: the appeal or beauty of a given solution; aesthetics does not limit itself to the visual form, but also includes aspects such as originality, innovation and user experience. (Moere, 2011)

If we take into account this requirements, the relation between design and information visualization become clear, and also become clear the importance of the design discipline during all the process: in fact, it is not an activity that can be added later.

But we want to underline the importance of the key background focused on sustainability. The goal of any data visualization design is rethink constantly both the workflow and the language in order to increase knowledge and understanding to enabling always more conscious behavior. It follows the importance of a network of actors involved in the project; networking is, in fact, considered essential for the growth of an ecosystem because of cooperation and inclusion processes help optimally managing the project and the goal pursuit.

5. Conclusions

Today, an increasing number of organization and corporation, as well as single users or public administrations, are realizing that volume, velocity and variety of data require always more new application. More than technology, though, they should adopt a different mind-set based upon data discovery and exploration; the visualization itself should be seen as a technology (Cairo, 2013) as an extension of ourselves. A good project has two main goals: it present informations and it allows user to explore and discover them; in other words data visualization is a tool for the designer to communicate with users and an instrument for users to analyze the reality presented.

In this way the role of the data visualization is to activate the attention and analysis process and generate order before people’s brain try to do it. Thus, the visualization becomes a medium for increasing cognitive perception of the beholder, easing reasoning and storing of the information represented, showing patterns and relationships, known or not, maybe not easily visible without the aid of a visual representation of information.

On the role of the design is important to remember that the function constraints the form and that the graphical elegance is often found in simplicity of design and complexity of data; graphics should not simplify message. They should clarify them, highlight trend, discover pattern and show hidden reality.

The postmodern personality is fluid, complex and dynamic, and the needs of the people are always new; the different identities have different approaches to technology, communication and information. For these reasons, it becomes highly interesting to give the possibility of obtaining results by ensuring the personalization experience, with the aim of satisfying the different needs and driving the user to repeat his behavior.

In this context, information visualization can be a valuable tool to improve communication, to offer a higher level of information, but even to allow users a personalized path. All this can be applied to different contexts coming to assume the role of cultural analysis tool for discovering and
understanding data, decoding the complexity of contemporary society and abilitate always more new sustainable and innovative practices.

References


Heer J., Bostock M. and Ogievetesky V. (2013). A tour through the visualization zoo. Queue ACM


About the Authors:

**Barbara Stabellini** is an ecodesigner interested in data visualization and innovation design, with a particular attention of the sustainability point of view. She is a PhD Candidate at Politecnico di Torino and co-founder of the Innovation Design Lab.

**Chiara L. Remondino** holds a MS in Ecodesign and is currently pursuing her PhD at the Politecnico di Torino. Her research is focused on big data, data visualization and sustainability. She obtained a Lagrange ISI Foundation fellowship on interaction in complex system. She co-founded the Innovation Design Lab.

**Paolo Tamborrini** is architect and Associate Professor of Design. Head of the Design School at Politecnico di Torino (Italy); founder and scientific coordinator of the Systemic Innovation Design Network (SyInDe). Editor about innovation design, eco-design and sustainability for the major design magazines.