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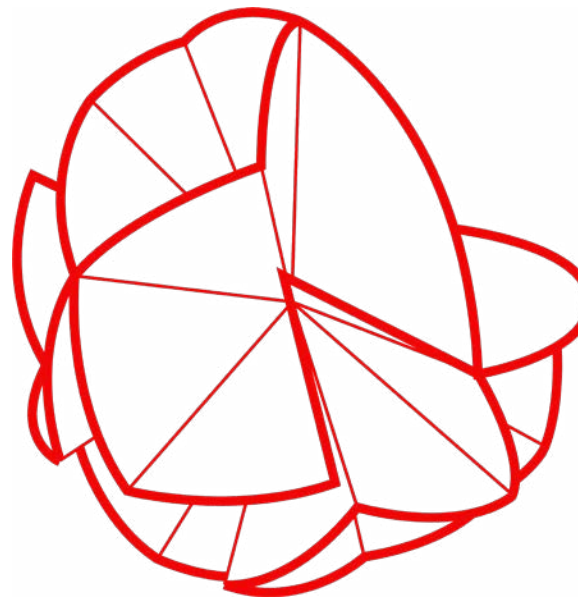
Disrupting Geographies in the Design World

Proceedings of the 8th International Forum of Design as a Process

Alma Mater Studiorum — Università di Bologna



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The Latin Network for the Development of Design Processes

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

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

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

Design Cultures as Models of Biodiversity
1st Edition
Universidade do Vale do Rio dos Sinos, Porto Alegre, Brazil
June 24-26, 2009

Design, Art, Craft: Cross-fertilizations and Experiences
2nd Edition
Universidade de Aveiro, Aveiro, Portugal
October 28-30, 2010

Innovation in Design Education
3rd Edition
Politecnico di Torino, Torino, Italy
November 3-5, 2011

Diversity: Design/Humanities
4th Edition
Universidade do Estado de Minas Gerais – UEMG, Belo Horizonte, Brazil
September 19-22, 2012

Advanced Design Cultures. The Shapes of the Future as the Front End of Design-Driven Innovation
5th Edition
Tecnológico de Monterrey, Campus Guadalajara, Mexico
September 18-20, 2014

Systems & Design. Beyond Processes and Thinking
6th Edition
Universitat Politècnica de València, València, Spain
June 22-24, 2016

Design & Territory: Emergencies and Conflicts
7th Edition
Universidad Nacional de Colombia, Sede Palmira, Colombia
June 23, 2020

Disrupting Geographies in the Design World
8th Edition
Alma Mater Studiorum — Università di Bologna, Bologna, Italy
June 20-22, 2022

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

8th Forum Main Partners

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

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

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

Tecnológico de Monterrey (TEC)

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

https://tec.mx/es

Pontificia Universidad Católica de Chile School of Design

The UC School of Design equips professionals to navigate intricate scenarios, addressing challenges stemming from the ever-evolving landscape of scientific and technological advancements and the socioeconomic and cultural intricacies of the contemporary world. Rooted in the ethical principles of the University, this educational endeavour places particular emphasis on fostering creative intelligence, nurturing critical thinking, and cultivating social sensitivity.

www.diseno.uc.cl

diid disegno industriale industrial design

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

https://www.diid.it/diid/index.php/diid

8th International Forum of Design as a Process

Disrupting Geographies in the Design World

Alma Mater Studiorum — Università di Bologna
Bologna, June 20-22, 2022

Responsible Innovation
Social Justice
Ecocentrism
Changing Education

www.forumdesignprocess.org/dgdw22

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

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

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

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

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

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

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

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3 International Universities Involved in the Organization

7 National and International Endorsers and Partners in the Activities

138 Long Abstracts Submitted

24 Countries

150 Participants

17 Ph.D. Students and Research Fellow Involved

13 Master and Bachelor Degree Students Involved

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

Track 1

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

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

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

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

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A Framework to Design Appliances for the Circular Economy Scenario

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Abstract
Should the appliances change to adapt to new conditions in the current scenario of a compromised environmental situation? The human needs to cook food, wash dishes and do laundry are the same, but society and our relationship with mother nature have changed radically. Although many contributions to the design for sustainability, the changes in the design sector and the market are not always visible.

This paper is part of a research project on the design of appliances for the circular economy scenario and intends to understand *Is there the need to re-design the current one, design new ones, or invent something else? How to decide? Are we considering all the aspects?* The problem was tackled using a systemic design approach.

The result is a framework that contains the data collected by the research steps, maps all the implications that the design of appliances in the circular economy scenario should consider in the process, and visualises the complexity of the topic.

Keywords
Appliance
Circular economy
Systemic design
Ecodesign
Framework

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Introduction

As experts are claiming, we need to invert the road of the current way of producing and consuming soon, otherwise 2050 will be the year of non-return with +1,5° (IPCC, 2018) due to the compromised environmental situation. In this scenario, can the appliances be similar to the one in the 1950s when they came up in the market? The human needs to cook food, wash dishes and do laundry are the same, but society and our relationship with mother nature have changed radically. Sustainability has become one of the primary goals of our actions (UN, n.d.) and the design discipline was not blind concerning this situation, embracing its ethical responsibilities as demonstrated by various movements as the *Design for sustainability* in the review by Ceschin and Gaziulusoy (2016), taking for example the publication by Vezzoli and Manzini (2007) and Bistagnino (2008; 2011) in the Italian context. Berwald et al. (2021) in their research delineated guidelines to design circularity for the Electrical and Electronic Equipment (EEE) sector and cited other strategies in the *Design for the environment* as *Design for Multiple Life Cycles, Design for Disassembly and Reassembly, Design for Remanufacturing, Design for Recycling, Design for End-of-Life*, etc. They referred to the review by Sassanelli et al. (2020) about the *Design for X* strategies. Considering these works, the indication of guidelines seems to be the most common method to indicate the road to follow in the design process. Although these many publications, the changes in the market are not yet always visible. However, it should be no more a personal inclination by just a few scholars, but it is becoming a requirement. The European Union has clearly stated the mission for the year 2050 with the European Green Deal (EC, 2021): being climate-neutral with an economy with net-zero greenhouse gas emissions. One of its building blocks is that the economy needs to shift from a linear to a Circular Economy (CE) (EC, 2020). In 2022 for example the European Commission reviewed and published in March the Working Plan 2022–2024 about Ecodesign and Energy Labelling (EC, 2022), thinking of including also some professional appliances. Moreover many scholars focused on the definition of circular business models as the review by Lüdeke-Freun (2019).

This research is focuses on the sector of the big appliances (dishwasher, washing machine, dryer, oven, hob, hood, fridge, freezer) both for domestic and commercial use. In this research the author will refer to them with the term *appliance* even if in the commercial sector the word *equipment* is more used. If taking for example the domestic segment which is the closest to everyone life and experience, the market seems blocked considering the functionality of these appliances: boxes of sixty cm to be filled perfectly in the space of our kitchen or laundry rooms which use a large quantity of resources as water, energy, detergents and at the end of the cycle throw out them with a lower quality as grey water or the heat dissipated. For an example see the image of a comparison of a washing machine in year '50s and in '2000s in Electrolux website (n.d. a). The main changes can be seen considering the energy (and water and noise) efficiency, thanks mainly to the energy label (EC, n.d.); the shift from electric to electronic equipment; the materials of the boxes, from metals to plastics. Considering the aesthetics, it is focused

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mainly on the front door, where displays were added, and the old style is still considered fashion, for example, for the iconic SMEG 50's style collection (Smeg, n.d.). In recent times they have become smart devices with digital touch screens that can be controlled remotely and in some versions, they can collect data about resource consumption and product condition, however this innovation is inserted only in the most expensive versions.

Even if these appliances are part of the system kitchen or laundry room, the interactions between them are not really considered, except in particular cases of smaller systems as the one to cook - hob-oven-hood -, to preserve food - fridge-freezer - or to clean clothes - washing machine-dryer -. However, the relationships are only aesthetic ones (they look good next to each other) or technological (e.g. they can be controlled by the same applications if produced by the same producer). In some cases they share components as the LG WashTower™ (LG, n.d.) but never resources such as water.

This paper is part of a research project that wants to understand how to design appliances for the CE scenario - a current problem than a future one - with the application of a systemic design (SD) approach (Battistoni et al., 2019) to tackle the complexity of the topic and consider the potential relationships among them and with other systems.

Methodology

The traditional role of designers has changed over the years according to Sanders and Stappers (2014), from exploring *how to design* to *what to design* and to "*work to help ensure that what is designed makes sense in the future lives of people"*(p.25). As today the role should also be to ensure *to not harm the natural environment*. For this reason, this research wants to understand how to design appliances in the CE scenario with the following research questions: *If the task is to design an appliance, is there the need to re-design the current one, design new ones, or invent something else?; How to decide what to design in the context of appliances for a CE scenario?; Are we considering all the aspects of the question?* An inductive and deductive research approach was used to find the answers. The problem was tackled using a SD approach and the tools of the Holistic Diagnosis (Battistoni et al., 2019). The first step of the research was to consider the topic as a complex system where multiple aspects need to be considered to add more content for the design process. The personal research experience was helpful in creating the background. A literature review was conducted to understand recent contributions from the design for the CE to the design of appliances and the EEE sector, to other aspects related. It was also chosen to include more inclusive databases, such as *Google scholar* and *Research gate*, to intercept contributions outside academia. This review was integrated with research on design projects/products to understand better the state-of-the-art.

Examples of Disruptive Solutions

The path towards becoming boxes with standard dimensions and functions wasn't straight. One example is the dishwasher 1959 *D10* known as *The Round Jar* by Electrolux (Electrolux, n.d. b) a model to put on the top of the kitchen that could wash dishes for five people in eight minutes. Another example is the *W20* by Electrolux (n.d. a) which included a dryer and a washing machine with a floating wing "*..allowing users to start the next load in the washing machine while drying the first at the same time*" (Electrolux n.d. c). They required more effort by the householder than pushing only a button as we do today, but they were answering other requirements that today are not addressed as, for *D10*, the lack of spaces in some kitchens for a dishwasher or the lack of enough daily dishes for singles in comparison to families.

Considering more recent times, a first scouting of recent solutions found interesting projects, although most remained concepts. They were grouped into three categories: a) product; b) system *kitchen/home*; c) product as a service - a CE business model (Tukker, 2015).

Product:

- project (washing machine) *BioLogic* by Whirpool (Behance, 2012) by designer Patrizio Cionfoli, which uses plants to filter the water;
- project (dishwasher) *kitchen sink dishwasher* by Electrolux (Fiore, 2018) a sink that can become a small dishwasher with a lid;
- project (fridge) *Oltu* by Fabio Molinas (Molinas, n.d.; Fiore, 2018) that uses heat dissipated by the fridge to cool the vegetable container;
- project (fridge) by Dominique Perrault for Fagor (Domus, 2001) which uses the heat produced by the fridge to create a greenhouse for aromatic plants.

System Kitchen:

- project (kitchen) *Flow* 2 by studio Gorm (Studio Gorm, n.d.; Fiore, 2018) which considers the entire kitchen and uses some innovative solutions as the evaporative cooling fridge box;
- project (kitchen) *Green kitchen* by Whirpool Design (2013) that through the connections among the elements permits saving up to 70% on energy bills;
- project (kitchen) *Larder* part of the microbial home system by J.&W. Arndt for Philips where there is an evaporative cooler and a vegetable storage on the dining table (Domus, 2011; Fiore, 2018).

Product as a service:

- *Wash Bar* (Tripadvisor, n.d.), is a self-laundry bar where people can wait during the washing cycles. In this case the clients buy the service of *washing clothes* and not the washing machine.

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Literature Review

A brief literature review revealed many different connections to the world of appliances with:

- energy as technologies for energy efficiency (e.g. Bansal et al., 2011);
- market, as in specific context the Netherlands by van't Klooster (1985);
- smart as the use of sensors (Lahrmann & Tschulena, 2005);
- health as problem of the production of magnetic field (Gauger, 1985);
- safety as in the use for all from children to older (Russell, 2010);
- use and management of resources as on-site grey water treatment with wetland (Patki et al., 2022);
- manufacture as the use of particular materials (glass ceramics by Willhauk & Harikantha , 2005);
- life-cycle as related to the Rs like Remanufacturing (Kang et al., 2021);
- related to Design field as:
    - design practice as the configuration of domestic practices by Chabaud-Rychter (2018);
    - relation to SD (Fiore, 2018);
    - packaging as Landi & Cicconi (2021).

Considering the design strategies and guidelines definition presented in the introduction, the research which shares more similar characteristics with this, the EEE sector and the circularity, is the one by Berwald et al. (2021). They identified five main guidelines that work at product Level - from start to concept - and at part Level - from concept to production.

In the field of CE it is valuable to mention the definition of circular business models specifically applied to product design as the review by Lüdeke-Freund et al. (2019) and the study by Bocken et al. (2016): narrowing (using less), slowing (using products longer), and closing resource loops (using materials again). The Ellen MacArthur Foundation (2019) identified the following strategies to close the technical cycle in the CE, highlighted in the *butterfly diagram*: share, maintain/prolong, reuse/redistribute, refurbish/remanufacture, recycle. A CE is a restorative and regenerative economy, in this context not only *Design for sustainability* is recommended to follow but also the *regenerative design* which looks to renew and revitalise the energy and materials used in product design often reached by biomimicry (Cole, 2012, cited by Geisendorf & Pietrulla, 2018).

Also the work by the European Commission about the ecodesign and the electronics is important to cite: from the work in 2012 (EC, 2012), the new rules for more sustainable household appliances published in 2019 (EC, 2019), the new Ecodesign and Energy Labelling working plan 2022-2024 by EC (2022) that will take in consideration also professional dishwashers and washing machines, and moreover the repair score system in order to incentivise the repairability just initiated by the EN 45554.

Result: The Framework

The amount of data collected by the previous research steps has highlighted the necessity of creating a framework that can contain all the information, not only like a written database, but that can visualise the complexity of the topic. Indeed, if a systemic thinking approach is applied to this category of products, multiple relations can be found with multiple sectors and research topics/fields. Therefore, if the increase in complexity becomes challenging to manage by the designer/researcher, one way is to visualise it and use a tool from the SD field, the *giga-maps* (Sevaldson, 2018). The framework created can be categorised as a system mapping and has roots in the Holistic Diagnosis method of SD, also sharing common features with the ecosystem mapping.

The framework started as a concept map and was developed with the open platform *Miro*. This platform was chosen to make this work, not just a private tool for the researcher, but collaborative and remotely accessible that can effortlessly include external contributions to help researchers/designers to map all the implications that the design of appliances in the CE scenario should consider in the process.

The framework is accessible at this link:

In the creation, the first step was to put at the centre the focus point (big appliances) and then adding around connections with all the main phases of their life cycle (Design, production/manufacturing, sell/distribution, use/consumption, post-use/end of life). Another first connection was created with the activities strictly connected to their use, and the context where they are used: domestic or professional. A box below is dedicated to inserting the information about the case studies Fig. 1.

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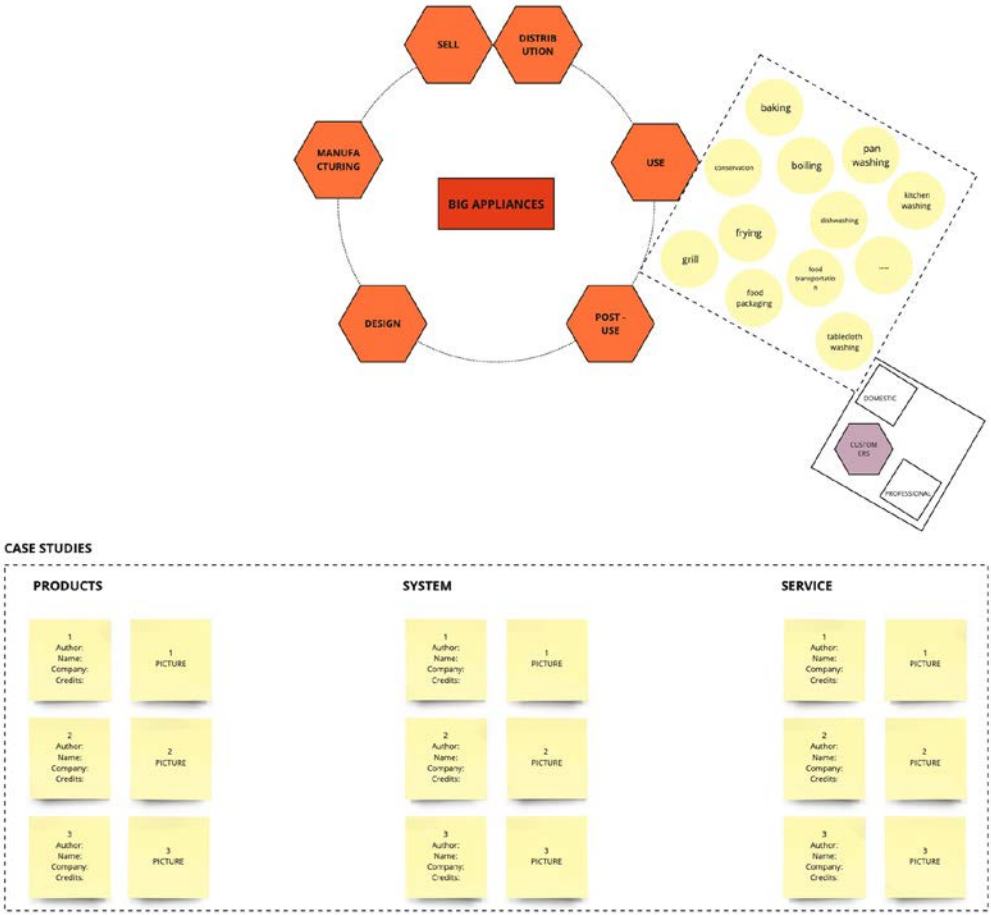
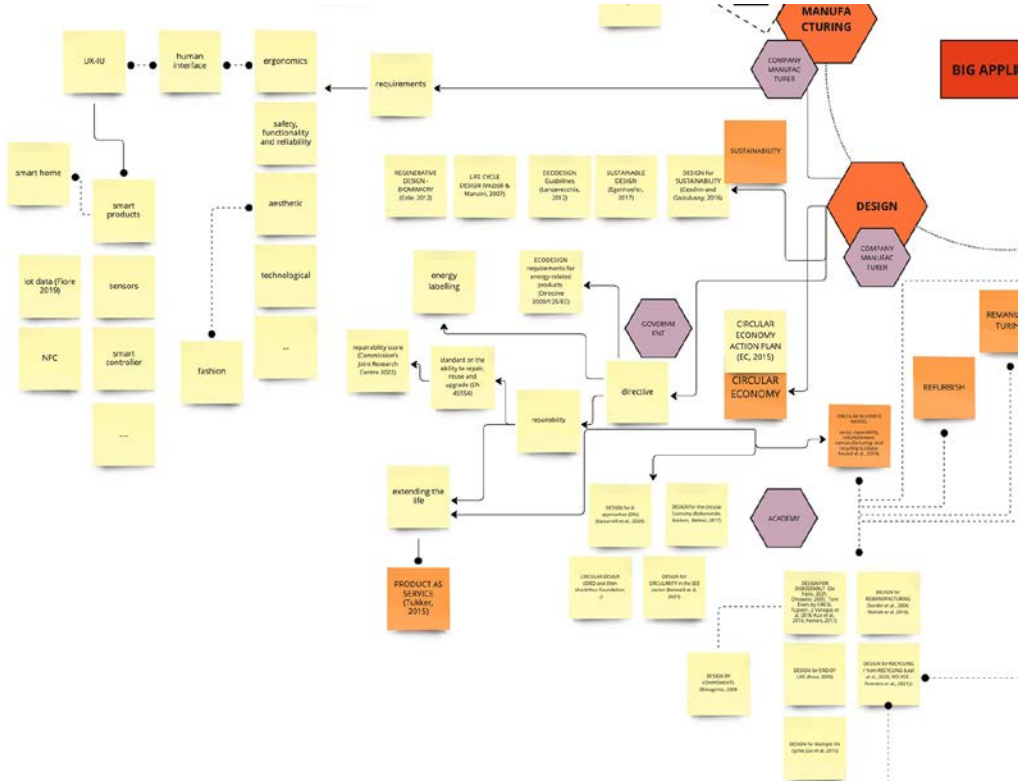


Starting from these phases, the chain was reconstructed, adding the CE business models (orange) and connecting, for example, the manufacturing with the typical elements of the supply chain, and the design phase with the elements found in the literature review Fig. 2. A box on the left was created to insert the design strategies found and their specific guidelines.

Fig. 1
The starting point of the framework. Image created by the author with Miro.



In many cases, information about the flow of resources used in input and output was added. Along with the resources such as energy and water used to work the appliances, also food is considered as an input for the function of some appliances Fig. 3. In this case for example it was added the connection with the research by Fassio & Tecco (2018) on the circularity of the food system.

Fig. 2
Focus of the framework on the design phase. Image created by the author with Miro.

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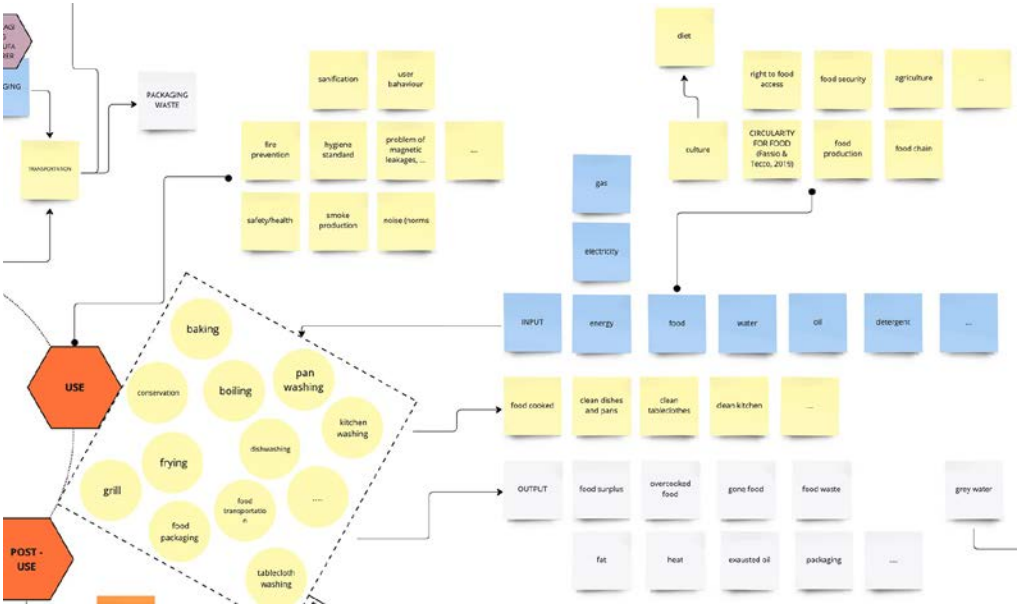

A certain logic and hierarchy was used to insert the different elements, distinguishing from concepts, resources, actors and relationships Fig. 4.

Fig. 3
Focus of the framework on the connection with the food sector. Image created by the author with Miro.

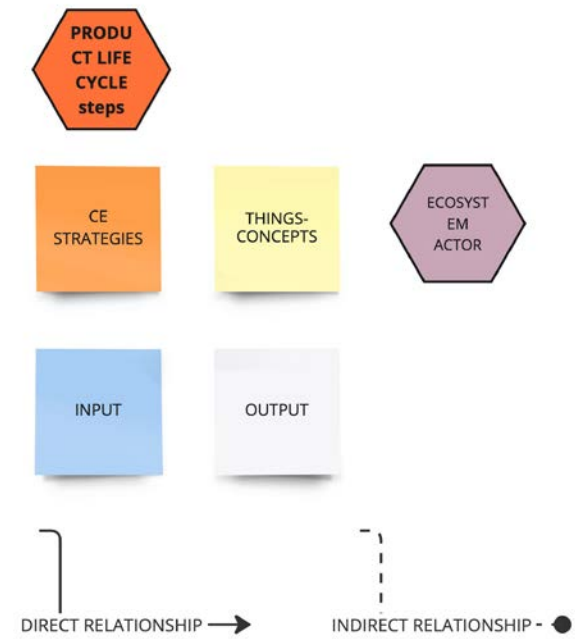

Fig. 4
The logic used to insert the elements and their hierarchy. Image created by the author with Miro.

Moreover, a layer about *ecosystem mapping* was inserted to complete the analysis - actors in hexagons in purple - that comes from the definition of the *business ecosystem* by Scaringella & Radziwon (2018) and from the *circular economy ecosystem* defined by Aarikka-Stenroos et al. (2021).

The complete result is shown in Fig. 5.

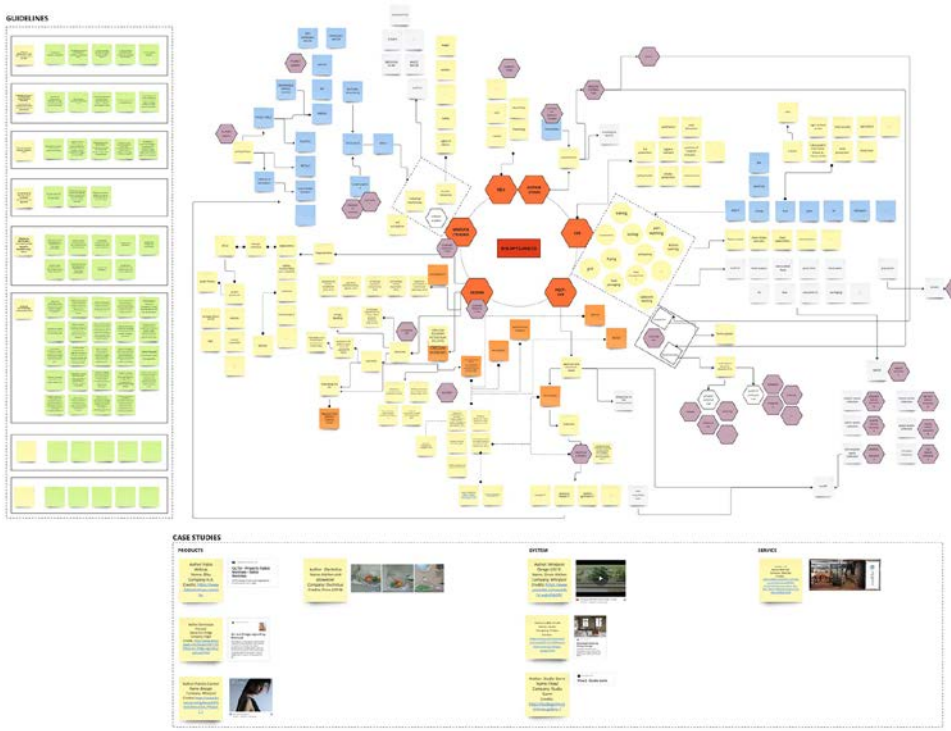

Fig. 5
The complete framework with data inserted in September 2022. Image created by the author with Miro.

Discussion and Conclusions

As reminded by this conference's track, design needs urgently to move from human-centred to a systemic planet-centric vision. This means to design for a CE scenario, and for complex systems where more aspects need to be considered in the design process and where the leverage points for the change can be identified. This research and its result, the framework, wants to implement and facilitate this phase. The result is in progress and wants to be the start of a co-designed process with the contribution of external workers in the field to become a useful tool for the design phase. The next steps of the research will be to do the demonstration phase with data collection (observation, feedback forms, interviews, discussions, brainstorming, expert evaluation, field notes), to test the tool's utility through workshops, to communicate the tool and invite collaboration.

This research and the tool can contribute to the theory about sustainability tools that are developed for the CE scenario, but also to practice because it supports early and quick visualisation of prob-

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lems and opportunities to these kinds of products but also of the researches in the field.

A future work can be to add another layer about the consequences that some resources and their management have on the natural environment and to insert specific data of the resources used (input-output) regarding the quantitative and qualitative level (learning from the SD approach).

The tool can be easily adapted to different contexts (as different categories of products, domestic or professional,...) because some relations can be changed easily, improving the replicability and scalability of the tool.

Chiara Battistoni
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References

Aarikka-Stenroos, L., Ritala, P. and L.D.W. Thomas (2021). *Circular economy ecosystems: A typology, definitions, and implications*. In Teerikangas, S., Onkila, T., Koistinen, K. and M. Mäkelä (Eds.). *Handbook of Sustainability Agency*. Cheltenham, UK: Edgar Elgar.

Bansal, P., Vineyard, E., & Abdelaziz, O. (2011). Advances in household appliances - A review. *Applied Thermal Engineering, 31(17-18),* 3748-3760.

Battistoni, C., Giraldo Nohra, C., & Barbero, S. (2019). A Systemic Design Method to Approach Future Complex Scenarios and Research Towards Sustainability: A Holistic Diagnosis Tool. *Sustainability, 11(16),* 4458. https://doi.org/10.3390/su11164458

Behance (2012). Patrizio Cionfoli projects. Retrieved February 9, 2022, from https://www.behance.net/gallery/5370869/BIOLOGIC_PROJECT_F

Berwald, A., Dimitrova, G., Feenstra, T., Onnekink, J., Peters, H., Vyncke, G., & Ragaert, K. (2021). Design for circularity guidelines for the EEE sector. *Sustainability, 13(7),* 3923.

Bistagnino, L. (Ed.). (2008). *The outside shell seen from the inside*. Milano: CEA.

Bistagnino, L. (Ed.). (2011). *Systemic Design. Design the production and environmental sustainability.* (2th edition). Slow Food. https://www.ibs.it/systemic-design-designing-productive-environmental-ebook-inglese-luigi-bistagnino/e/9788884992710

Bocken, N. M., De Pauw, I., Bakker, C., & Van Der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of industrial and production engineering*, *33*(5), 308-320.

Ceschin, F., & Gaziulusoy, I. (2016). Evolution of design for sustainability: From product design to design for system innovations and transitions. *Design Studies, 47,* 118–163.

Chabaud-Rychter, D. (2018). The configuration of domestic practices in the designing of household appliances. In Grint, K., & Gill, R. (Eds.). (1995). *The Gender-Technology Relation: Contemporary Theory and Research* (1st ed.). Taylor & Francis.

Domus (2001 a). An ecofridge signed by Perrault. https://www.domusweb.it/en/design/2001/10/29/an-eco-fridge-signed-by-perrault.html

Domus (2011 b). Microbial home by Philips Design. https://www.domusweb.it/en/news/2011/11/08/microbial-home-by-philips-design.html

Electrolux (n.d. a). 100 years of better living. https://www.electrolux.ch/it-ch/about-us/better-living/#702708

Electrolux (n.d. b). 100 years of better living. https://www.electrolux.ch/it-ch/about-us/better-living/#706415

Electrolux (n.d. c). First home washing machine. https://www.electroluxgroup.com/en/first-home-washing-machine-gets-the-influencer-marketing-treatment-26752/)

Ellen MacArthur Foundation (2019). Circular economy systems diagrams. https://ellenmacarthurfoundation.org/articles/the-technical-cycle-of-the-butterfly-diagram.

European Commission (n.d.). Energy labelling and ecodesign legislation. https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_it

European Commission (2012). Ecodesign Your Future - How Ecodesign Can Help the Environment by Making Products Smarter. https://op.europa.eu/de/publication-detail/-/publication/4d42d597-4f92-4498-8e1d-857cc157e6db

European Commission (2019). The new ecodesign measures explained. https://ec.europa.eu/commission/presscorner/detail/en/qanda_19_5889

European Commission (2020). A new Circular Economy Action Plan for a cleaner and more competitive Europe. https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

European Commission (2021). European Green Deal. https://ec.europa.eu/info/strategy/priorities-2019-2024/europan-green-deal_en

European Commission (2022). Communication from the Commission Ecodesign and Energy Labelling Working Plan 2022-2024 2022/C 182/01. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022XC0504%2801%29&qid=1651649049970

Fassio, F., and Tecco, N. (2018). *Circular economy for food. Materia, energia e conoscenza, in circolo*. Milano: Edizioni Ambiente.

Fiore, E. (2018). *Systemic Design for the Innovation of Home Appliances*. [Doctoral dissertation, Politecnico di Torino].

Gauger, J. R. (1985). Household appliance magnetic field survey. *IEEE Transactions on Power apparatus and systems, (9)*, 2435-2444.

Geisendorf, S., & Pietrulla, F. (2018). The circular economy and circular economic concepts—a literature analysis and redefinition. *Thunderbird International Business Review*, *60*(5), 771-782.

Intergovernmental Panel on Climate Change (IPCC) (2018). *Special report: global warming of 1.5 ºC*. https://www.ipcc.ch/sr15/chapter/spm/

Kang, H. Y., Jun, Y. S., Park, J. H., & Yang, E. H. (2021). Design of Household Appliances Considering Remanufac-turing: A Case Study. In *EcoDesign and Sustainability I* (pp. 33-43). Springer, Singapore.

Lahrmann, A., & Tschulena, G. R. (2005). The increasing importance of sensors in household appliances. *Sensors Applications (5)*, 1-8.

Landi, D., & Cicconi, P. (2021). An Approach for the Responsible Design of the Packaging Employed in Household Appliances. In *International Conference on Design, Simulation, Manufacturing: The Innovation Exchange* (pp. 381-389). Springer, Cham.

Lg (n.d.). Washer dryer combos. https://www.lg.com/us/washer-dryer-combos/lg-wkgx201hba-washtower

Lüdeke-Freund, F., Gold, S., & Bocken, N. M. (2019). A review and typology of circular economy business model patterns. *Journal of Industrial Ecology, 23(1),* 36-61.

Molinas, F. (n.d.). Oltu. https://www.fabiomolinas.com/oltu

Patki, V. K., Vijay Babu, P. V., & Palase, A. (2022). On-Site Grey Water Treatment Integrated with Constructed Wetland for Household Appliance. In S. Kolathayar, A. Mondal, & S. C. Chian (Eds.), *Climate Change and Water Security* (Vol. 178, pp. 401–422). Springer Singapore.

Russell, S. (2010). Safety of household appliances for all. *Injury Prevention, 16(*Suppl 1), A102-A103.

Sanders, L., & Stappers, P. J. (2014). From designing to co-designing to collective dreaming: Three slices in time. *Interactions, 21(6),* 24–33. https://doi.org/10.1145/2670616

Sassanelli, C., Urbinati, A., Rosa, P., Chiaroni, D., & Terzi, S. (2020). Addressing circular economy through design for X approaches: A systematic literature review. *Computers in industry, 120,* 103245.

Scaringella, L., & Radziwon, A. (2018). Innovation, entrepreneurial, knowledge, and business ecosystems: Old wine in new bottles? *Technological Forecasting and Social Change,* 136, 59–87.

Sevaldson, B. (2018). Visualising Complex Design: The Evolution of Gigamaps. In Jones, P.H. *Systemic Design* (pp. 243–269). Springer.

Smeg (n.d.). https://www.smeg.it/estetiche/50-s-retro-style

Studio Gorm (n.d.). http://studiogorm.com/new-gallery-1

Tripadvisor (n.d.) https://www.tripadvisor.com/Restaurant_Review-g188052-d10815930-Reviews-Wash_Bar-Bern_Bern_Mittelland_District_Canton_of_Bern.html

Tukker, A. (2015). Product services for a resource-efficient and circular economy–a review. *Journal of cleaner production,* 97, 76-91.

United Nations (UN). (n.d.). Sustainable Development Goals. https://sdgs.un.org/goals

Van't Klooster-van Wingerden, C. M. (1985). Use of household appliances in rural households in The Netherlands. In *Abstr. Research Supplement, Home Economics Congress Report XVth IFHE*, Oslo, Norway (pp. 37).

Vezzoli, C., & Manzini, E. (2007). *Design per la sostenibilità ambientale [design for environmental sustainability]*. Zanichelli.

Whirpool Design (August 28, 2013). Whirlpool GREENKITCHEN Design Concept. [Video]. YouTube. https://www.youtube.com/watch?v=auJolfab5RY

Willhauk, E., & Harikantha, R. (2005). *Glass ceramics for household appliances. Low thermal expansion glass-ceramics, 2nd edn.* Springer Verlag, Heidelberg, 51-58.

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DIGITAL SPECIAL ISSUE 1

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

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

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

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

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

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

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