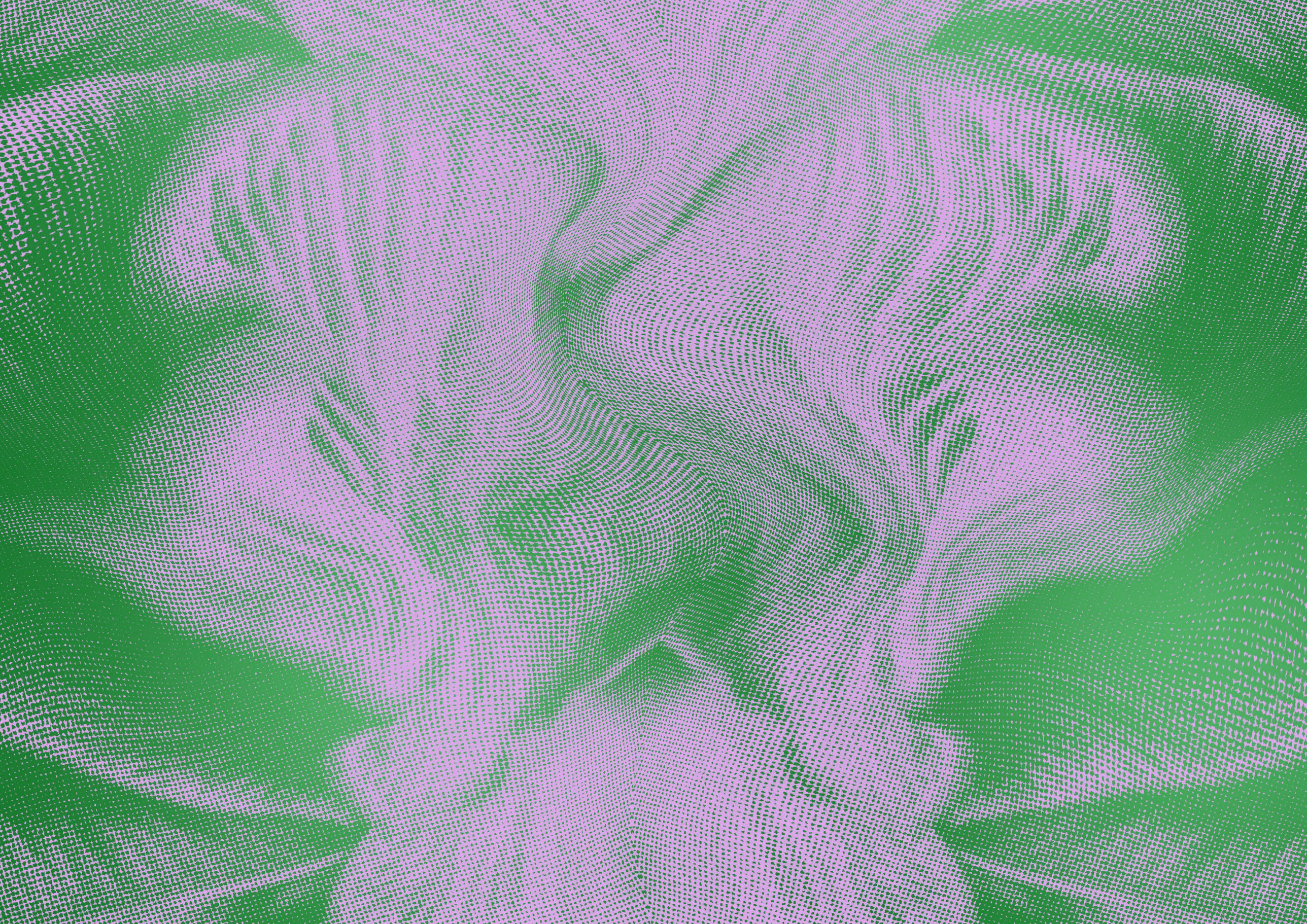
Driving Design

VOLUME 3.

Collective approaches enriching design principles

Edited by Distributed Design Platform



CHAPTER 01 **The Redistribution of Making**

Cap

CHAPTER 02 **The Redistribution of Knowledge**

Spores

CHAPTER 03 **The Redistribution of Values**

Stem

CHAPTER 04 **The Redistribution of Power**

Mycelium

Distributed Design is a journey of learning and unlearning — rethinking not just how we produce and consume products, but how we approach design as a whole. Each year we document our failures, challenges, and achievements, offering a moment to reflect on the Distributed Design practices in a time capsule — a publication.

Introduction

While Distributed Design began with a single idea, the way our practice takes shape today is plural, multifaceted and complex. We need this complexity because complex challenges—such as extractivism, neoliberal doctrines, ecological degradation, mass extinction, and biodiversity loss—demand equally complex responses. Our community has grown from a group of curious individuals to more than 25 member organisations across and beyond Europe. Through distributing funding, knowledge, and spaces to explore, members support an ecosystem of over 2,000 creatives — makers and designers. From rural Hungary, to the jungles of Mexico, to bustling streets in Accra Ghana, our community has flourished like a wildflower field. Each individual flower, mushroom, insect, grass, stone, and patch of earth strengthens the whole, contributing to the diversity of what Distributed Design can be.

This year, our edition goes beyond topics to explore the systems that drive design: the (re)distribution of making, knowledge, value, and power. Our community actively proposes alternatives, exploring mutable and relational practices of redistribution based on collaboration and co-creation, as opposed to hierarchical concepts. We intentionally leave the interpretation of redistribution open, recognizing it carries diverse meanings for each community given their contexts and understandings. Similarly, contributors were invited to experiment with the format of their work.

This book is a mushroom in our wildflower field. This anthology — what is made — is the mushroom top, the tangible, the "outcome." A manifestation of nutrients, decomposition and time, it is a process not just a product. Within the book, we can find knowledge shared by our community. Knowledge shapes this book, asking what information we use and who produces it. Just like fungal spores spreading from one spot to the next, adapting to a new context and influencing this ecosystem. The stem of the mushroom holds it up. This is value, our positionality and "how" we practice. Our values -- open, collaborative, regenerative, and ecosystemic approaches -- shaped each step of the publication process.

Finally, there is everything we cannot see. Mycelial networks expand, engaging with the roots of our wildflowers along with billions of other organisms. Cycling nutrients that allow their fellow organisms to thrive, facilitating exchange, giving structure to the soil ecosystem, mushrooms transform the very fabric of the earth. Power weaves all of these elements together, promoting or restricting our ability to engage in making, knowledge, and value. Redistributing power is the reason why this book was made: to enable, reflect, and embrace a plurality of mindsets from across our network.

Over the last eight years, we have had the opportunity to evolve into a thriving ecosystem thanks to our network of members, creatives, and the European Union's Creative Europe program. While our funding may be ending, it creates a moment for us to reflect on and imagine constellations for Distribution Design's continued evolution. With that in mind, we have taken special care to reflect on the Platform's impact, from those working with our community daily to global activities. Here, we can find collective reflections on the past, present, and future(s) of Distributed Design.

Each exploration begins not with truths but with questions—questions our community engages with, contributors pose to readers, and we as curators have asked ourselves. These questions invite all of us to stay open, challenge our assumptions, and embrace the ongoing process of unlearning and relearning what it means to practice Distributed Design.

Sharing this journey with gratitude,

The Driving Design Editorial Team
Jessica Guy
Julia Bertolaso
Sally Bourdon

Many practitioners and researchers are exploring the redistribution of these structures. In particular, we've drawn inspiration from explorations by Nat Hunter, Gareth Owen, and James Tooze through conversations and their publication in Driving Design Vol. I. They have proposed an adaptation of Leyla Acaroglu's 'Mushroom Model', melding concepts from Kate Raworth's Distributive by Design concept, as well as work from the fields of Distributed and Systemic Design. See the reference section for more.

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CHAPTER 01

The Redistribution of Making

What is made? Who does - and does not - have access to making? And whose forms of making are legitimised? When do we make from scratch and when can we remake, remold or repair? What tools and materials can be combined when making? How can we reconnect with heritage or cultural making practices? How can making be an act of social regeneration?

Industrial production has long concentrated making in the hands of the few, prioritizing efficiency, scalability, and ownership. Mass production and technological standardization actively displace heritage and community-based practices while patents and intellectual property laws reinforce corporate control. Dictating what is made, how, and by whom, this erasure is not incidental but systemic: it is a conscientious design to prioritize profit over collective knowledge and regeneration.

From the few to the many, the maker and Distributed Design movements were founded on the premise of redistributing making and the means of production, enabling anyone anywhere to build (almost) anything. Since its inception, our embodiment of this mindset has morphed. Our community recognises making is more than an act of production—it is both a process and manifestation of broader systems of knowledge, value, and power.

From Bolivia to Pakistan, Kenya to Hungary, contributors share diverse approaches embracing the redistribution of making. Acts of making transcend boundaries, offering insight into how we begin to challenge, reshape, and reclaim the ways in which knowledge is shared, value is generated, and power is held.

Building an Open-Source Initiative Layer by Layer

JaPi Contonente (JetClay) &
David Pap (FabLab Budapest)

In 2019, at the General Assembly of the Distributed Design Platform in Barcelona, I first encountered JetClay. The project caught my attention as I noticed an increasing number of ceramicists and traditional artisans looking to experiment with new knowledge and technologies. During our discussions, we also learnt from these creators about the intricacies of working with traditional materials and manufacturing techniques. Fascinated by JetClay's approach, I decided to reach out and invite them to Budapest to collaborate and explore the intersections of ceramics and digital fabrication together. This marked the beginning of an inspiring journey.

This article takes the form of an interview, as I believe it is important to let the personal story of JaPi Contonente reach the audience. Through his experiences, we gain deeper insights into the journey behind JetClay and the values it represents. By hearing directly from JaPi, we can understand not only the technical achievements but also the human inspiration driving this open-source initiative. The interview took place in Vienna, right after our workshop together at Design Week.

David Pap

JetClay has been making waves in the design and maker communities. Could you briefly introduce JetClay and its mission?

JaPi Contonente

JetClay isn't just a clay 3D printer; it's a statement about the possibilities of blending tradition with technology. At its core, JetClay embodies an open-source ethos, a commitment to democratising access to digital fabrication tools, and a respect for one of the oldest materials known to humanity: clay. Our mission is to break the technology black box and make these tools accessible to everyone, fostering creativity and collaboration.

From Architecture to Open-Source Innovation

David Pap

Can you tell us about your personal journey? What inspired the creation of JetClay?

JaPi Contonente

JetClay's story begins in 2017, but its seeds were sown years earlier. I was working as an architect when the 2008 financial crisis hit, and the subsequent construction downturn pushed me to explore new creative outlets. In 2013, I joined the Fab Academy, where I discovered the power of digital fabrication and open-source tools. Two years later, at Maker Faire Madrid, I encountered ceramic 3D printing for the first time. That moment sparked an idea that would take years to materialise. By 2017, we had built the first JetClay prototype, driven by a desire to explore clay's potential as a medium for digital design and fabrication.

From our beginnings back in 2017 we were sure about 3D printing large ceramic pieces. At that time you couldn't find in the market a system able to print ceramics larger than 40cms high, therefore our approach to technical developments has been purely necessity driven. As active members of the maker community, we have learnt from the shared knowledge this community offers to develop our own tools—both 3D printers and extrusion systems. These are developments that we give back to humanity's technological heritage, because we believe in open-source and are convinced that the more you give, the more you receive. You can find our developments and contribute on Wikifactory, where the community of product designers, engineers, and enterprises come together to design, prototype, and manufacture hardware products.

Image 1 A bright studio space with a person standing near a table, holding a laptop. The space has a high ceiling with exposed beams, large windows letting in natural light, and cozy furniture like armchairs and lamps scattered around. In the front there is a 3D printer waiting to assemble.

JetClay's commitment to open-source principles was further bolstered when we applied for and received support from the OpenMaker fund. This initiative, detailed on their platform, enabled us to advance our mission of creating accessible and innovative tools for ceramic 3D printing.

JetClay also aligns deeply with the principles of sustainability. Our use of natural materials like clay and biomaterials ensures an environmentally friendly life cycle. These materials release no harmful chemicals and can be recycled indefinitely without losing their mechanical properties. By sharing knowledge and tools openly, we promote technological sustainability, enabling repair, customisation, and improvement by anyone—thus extending the life cycle of our machines and reducing environmental impact.

Clay captivated me for its beauty, texture, and tactile connection to heritage. Unlike plastic, it is a living material—organic and timeless. I was inspired by innovators like Olivier van Herpt, but I wanted to take this innovation further: to make large-scale clay printing accessible to anyone willing to learn.

Breaking the Black Box

David Pap

Why was it important for JetClay to be an open-source project?

JaPi Contonente

As someone from the design field, I've always sought to demystify technology. Too often, tools are treated as black boxes, inaccessible to the average designer or maker. JetClay's mission is to break this paradigm. By embracing an open-source philosophy, we invite others to learn, adapt, and innovate. The principle is simple: when you learn, you teach. And when you teach, you create a ripple effect that empowers entire communities.

JetClay wasn't initially intended to be a product. It began as a personal experiment—a quest to print on a larger scale than existing machines allowed. Yet, this necessity became the mother of invention. The maker culture and Fab Academy ethos guided the development process, and support from projects like OpenMaker, funded by the EU, provided the resources to bring JetClay to life. With €20,000 in funding and a partnership with Espacio Open, JetClay emerged as a functional, accessible, and impactful tool.

Distributed Design: A Core Connection

David Pap

Tell the readers about our recent collaboration at Vienna Design Week 2024.

JaPi Contonente

One of the highlights of our journey this year was participating in Vienna Design Week 2024 in October, where we collaborated again with you and FabLab Budapest under the Distributed Design framework. For this workshop, we transported FabLab Budapest's printer Viktória, which we have been collaborating on since 2022, from Budapest to Vienna. Together with several attendees, we created a column inspired by the works of HUNDERTWASSER, with individual pieces contributed by participants. This collaboration was a perfect example of blending traditional design inspirations with digital fabrication tools, showcasing the communal and creative spirit that Distributed Design embodies; still in an effortless and funny way. JaPi style.

How does JetClay embody the values of Distributed Design?

Distributed Design is at the heart of JetClay. The platform fosters openness, collaboration, and regeneration—all values that guide our work. By sharing our developments through open-source platforms like Wikifactory, we not only invite the global maker community to improve our tools but also encourage a decentralised approach to design and manufacturing.

Collaboration has been essential to our journey. I deeply admire the work FabLab Budapest is doing, and it has been inspiring to cooperate with them and Espacio Open through the Distributed Design platform. This partnership has fostered a culture of mutual learning and creativity. Together, we've created a space where traditional artisans and modern designers can come together. This dialogue allows us to blend age-old ceramic techniques with digital fabrication, fostering a local and European innovation ecosystem that respects heritage while embracing the future.

Our vision for JetClay aligns seamlessly with the broader goals of Distributed Design—creating solutions that are thoughtful, sustainable, and inclusive.

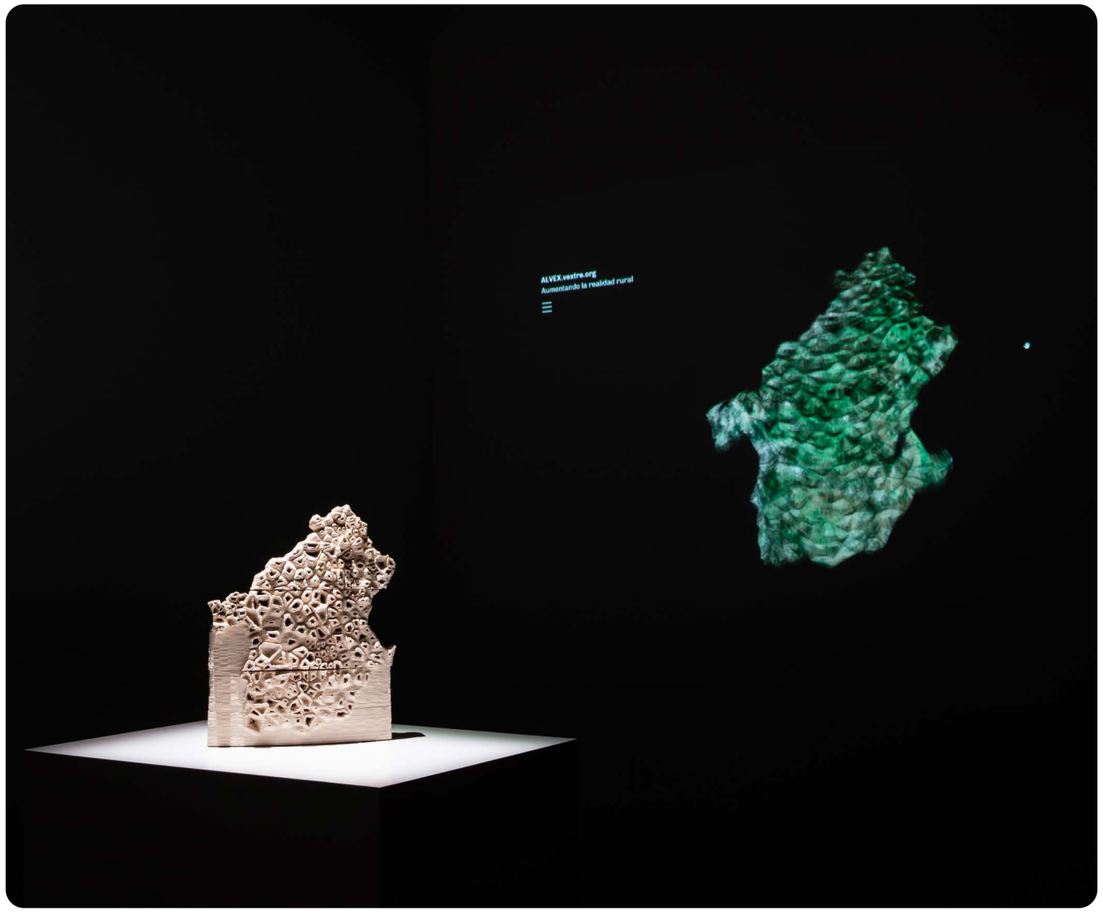


Image 2 3D-printed sculpture from clay with intricate, organic patterns resembling coral or geological formations is displayed on a pedestal in a dark exhibition space.

Clay: A Material With Soul

David Pap

Why clay? What makes it unique for you?

JaPi Contonente

Clay is unlike any other material; literally it's alive in the way it moves, reacts, and responds to the touch. It carries with it a heritage that spans millennia, connecting us to ancient traditions even as we shape it with modern tools. For JetClay, working with clay is both a technical challenge and a creative opportunity. The material's unpredictability requires a respect for its natural properties, reminding us that innovation must harmonise with tradition rather than overshadow it.

JaPi Contonente

I am acutely aware of the cultural significance of clay and ceramics in Hungary, and this inspires our work. Hungary's rich traditions in ceramic craftsmanship continue to influence JetClay for sure! We have also succeeded in creating pieces that blend the precision of digital technology with the organic nature of clay, ensuring each object is unique. This aesthetic celebrates the fusion of machine and human input, countering the homogenisation of industrial production.

Image 3 A clay 3D-printed sculpture resembling organic, flowing forms stands in an outdoor natural setting.

Vision for the Future

In Hungary, ceramics and clay have long been deeply rooted in the country's cultural heritage. The ancient traditions of pottery and ceramic craftsmanship have not only shaped artistic expression but have also played an integral role in Hungarian everyday life. JetClay draws inspiration from this rich legacy, embracing the cultural significance of clay while reimagining its possibilities through modern technology. By combining Hungary's storied past in ceramics with digital fabrication, JetClay builds a bridge that connects tradition to the future.

In 10 years, we envision JetClay and Distributed Design as integral parts of global and local innovation ecosystems: to inspire and support the next generation of makers and designers to create meaningful, sustainable, and thoughtful designs. JetClay aspires to become the equivalent of NAGAMI DESIGN for clay—a pioneering hub that redefines craftsmanship through digital tools.

FabLab Budapest, will remain a welcoming space for learning and collaboration. We strive to uphold the values of openness, collaboration, regeneration, and ecosystemic thinking. Beyond just teaching how and when things should be made, we also aim to educate on when they shouldn't be made—fostering a thoughtful and sustainable approach to design. We, at FabLab Budapest see ourselves as a hub for sustainable fabrication, blending the traditional techniques with the possibilities of digital tools.

By continuing to integrate traditional knowledge with modern innovation, JetClay hopes to leave a lasting impact, serving as a bridge between the past and the future and proving that heritage and progress can coexist harmoniously.

JaPi and David in JaPi style

Note from the author:
Working together in digital design and fabrication often leads to surprising and fun experiences when stepping out into the real world. JaPi's "quick and dirty" approach, which he humorously calls the "JaPi style," contrasts my extremely precise and meticulous way of working. This contrast sparked an engaging learning curve, where collaboration became a challenging but rewarding experience. For this interview, we embraced the JaPi style—proving that there's always something to learn from one another, no matter our professional differences. :)

QR 1
The open-source repository of the printer

QR 2
Milestone workshop at Bilbao with Espacio Open

QR 3
Second edition workshop at FabLab Budapest

QR 4
Nagami Design

From Distributed Design to Distributed Production

Rebecca Matthew & Jessica Nguema,
Internet of Production Alliance

The Distributed Manufacturing Trials

Re-Distributing Production

Anyone, anywhere should be able to participate in production. Often, we tend to celebrate those who design something for the first time – a new product, a new way of doing something – while neglecting the much larger problem of distributing what already exists. Today's mass-centralised production works well for getting mass produced items to mass markets. But they are ineffective at getting exactly the products people want, when and where they want them, across the globe.

The Internet of Production Alliance envisions a world where everyone, everywhere can benefit from resilient, sustainable production systems; re-distributing production and demonopolising access to economies, networks and products.

The open infrastructures of the internet (protocols, data standards and data systems) rapidly gave the power to create digital content to anyone almost everywhere. However, the open infrastructures needed to distribute the power to create physical products have been slower to appear.

The Distributed Manufacturing Trials tested new, innovative, open infrastructures that would inform the development of a distributed manufacturing system. A system that would allow makers and makerspaces to participate in shares of large orders of identical products. No one maker or makerspace can make as many products as mass production can achieve, but perhaps networks of makers each producing a share can be competitive.

This paradigm of production can empower local economies, promote sustainable economic growth to benefit businesses, people and the planet through redistributed value creation.

The Distributed Manufacturing Trials were a core component of the project; testing innovative infrastructures developed by the Internet of Production Alliance that would enable distributed production.

The Innovative Manufacturing in Africa Project

The Innovative Manufacturing in Africa project was a twelve-month project implemented by Distributed Manufacturing Limited in Kenya with funding from the Research and Innovation Systems for Africa (RISA) fund.

Image 1

Maker working with a 3D printer at I.O.Me 254, Kenya

Why Makerspaces?

Makerspaces are hubs of hardware innovation - spaces where anyone can make almost anything. They are hubs for a new emerging innovation ecosystem on the African continent. This ecosystem supports innovative local manufacturing using techniques such as digital fabrication through 3D printing or laser cutting, human-centred design process and rapid prototyping. Makerspaces have become educational hubs for training the next generation of engineers and craftspeople. They support start-ups in design, prototyping and batch manufacturing. They support local factories that seek to develop new products and laboratories that seek to conduct research. They act as places where young innovators can make a livelihood by making devices using open hardware and develop new designs and solutions to solve local challenges. The potential socio-political, societal and economic benefits provided by makerspaces and by makers are very promising. Despite this, these spaces are grossly underfunded and not supported by local research, innovation or market systems. They remain under-researched but demands for evidence of their impact are increasing, particularly from policymakers and donors.

Purpose

The Innovative Manufacturing in Africa Project was a twelve-month project to strengthen the maker innovation ecosystem and its research capacity in Ghana, Kenya and South Africa through:

- The development of makerspace impact indicators;
- The adoption of innovative infrastructures for distributed production;
- The development of business models accessible to makerspaces, and
- Increasing makerspace research capacity.

The Distributed Manufacturing Trials were a core component of the project; testing innovative infrastructures developed by the Internet of Production Alliance that would enable distributed production. Specifically, a system that would allow many makers to participate in one contract to make products for local consumption.
This system would empower makers as local manufactures, increase the available economic opportunities and improve financial stability of makers and their makerspaces with more earned income. This distributed production is the first where innovative infrastructures have been used across national borders – with makers in the three countries making the same products at the same time.

The Trials

The project selected nine makerspaces across Ghana, Kenya and South Africa to participate in the Trials. The selected awardees demonstrated leadership, spaces and programs focused on supporting women and girls in STEM/STEAM and other underrepresented groups.The three trials produced a total of 1,125 products for use

in the medical sector – writing aids, test tube racks and tibial fracture fixations. The decision of the specific items to be produced was made following discussions and feedback with the makerspaces.
125 items were produced in each makerspace in the three rounds of trials:

- **For the first trial**, 100 simple devices with a maximum cost of $2 USD were produced in each of the nine selected makerspaces. The simple device recommended by our expert was a child's writing aid. Designed to help children with motor skills issues (typically cerebral palsy), so they can hold a pen or pencil.

- **For the second trial**, 20 simple products with a maximum cost of $10 USD were produced in each of the selected makerspaces. The simple product selected by our experts was one of the products proposed by a few of the participating makers, the test tube rack.

- **For the third trial**, five complicated products with a maximum cost of $80 USD were produced. The complicated product recommended by our expert was the tibial fracture fixation. It is designed to offer medical officers and surgeons a training model of a leg bone for fixation procedures on open tibial shaft fractures.

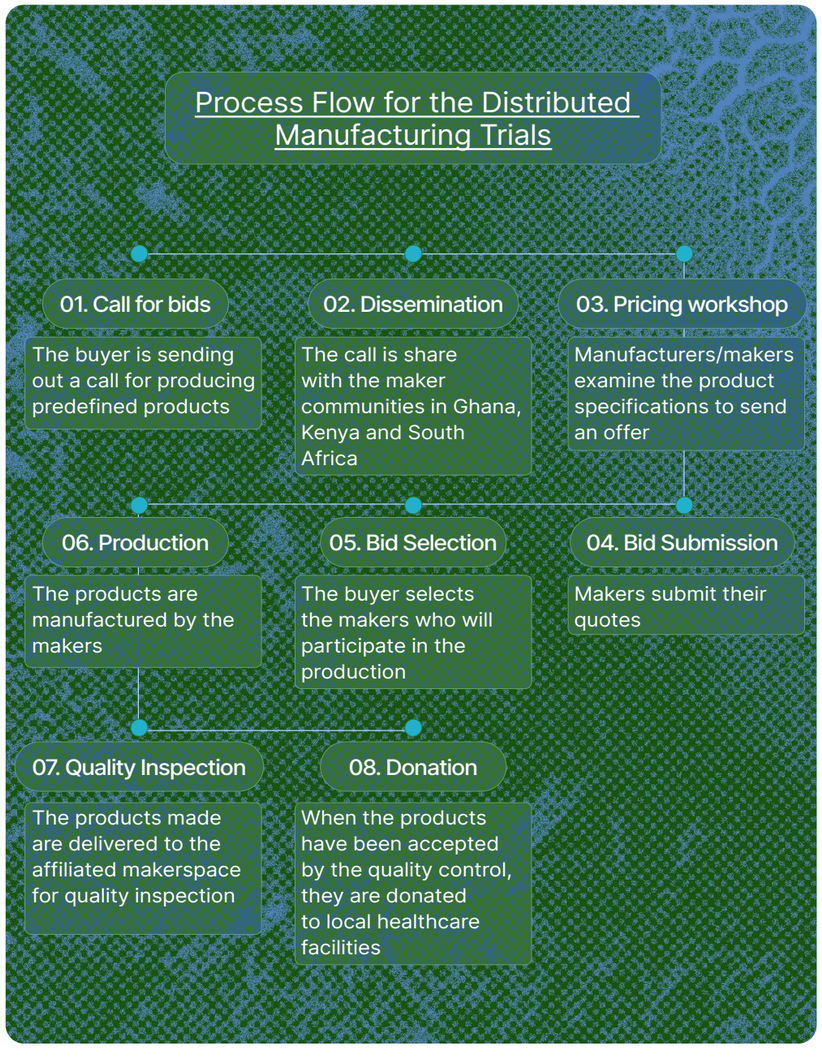


Figure 1

Writing aids produced in trail one by a maker affiliated to I.O.Me 254, Kenya

Image 2

Writing aids produced in trail one by a maker affiliated to I.O.Me 254, Kenya

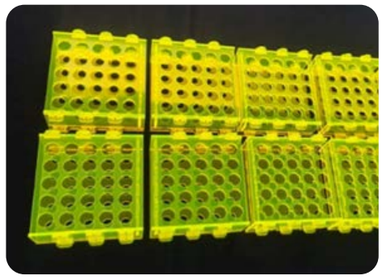


Image 3

Test tube racks produced in trial two by a maker affiliated to The Makerspace Durban, South Africa

Image 4

Quality inspection photos of the tibial fracture fixations produced in trial three from the Makerspace Durban, South Africa

The process

The process for the Distributed Manufacturing Trials involved:

1. A buyer: here Distributed Manufacturing Ltd Kenya
2. Multiple makers: producing the items
3. Makerspaces: for use of machines and space, quality inspection and collection
4. A receiver: health care facilities

The process of the Trials can be shown in eight key steps, as summarised in Figure 1.

A distributed manufacturing process map workflow was designed to identify the roles of each entity in the Trials. Each streamline corresponds to an entity and the actions they will have to take in the process. The participating makerspaces had to evaluate the cost for quality control they agreed to endorse when receiving the production from the makers.

The Innovative Manufacturing in Africa Project

The innovative infrastructures referred to in this review are further detailed in 'Data for the Internet of Production' by Antonio Anaya.[1]

The Distributed Manufacturing Trials tested a distributed contracting system and involved two further technical innovations for distributed manufacturing. The Map of Machinery[2] provides data for all makers, makerspaces and SMEs to be part of the distributed manufacturing ecosystem. Based on the Open Know-Where standard[3], the objective is to provide the tools necessary to participate in production. One can look for machines, makerspaces and/or projects around the world, to make things locally. The People and Skills Specification (PSS) data standard[4] collects location, skills and experience in various aspects of making. As part of the Trials, makerspaces were required to register every machine used in manufacturing the products in line with the Open-Know-Where standard and that each individual manufacturing the products had a Maker Passport in line with the PSS.

Learnings

The Trials provided valuable insights into the potential of local manufacturing, particularly in serving niche markets through connections with local ministries and organisations. Through the process, makerspaces played a pivotal role in coordinating production, maintaining quality control and supporting local makers. The feedback provided by makerspaces demonstrated the transformative potential of distributed manufacturing while also identifying key areas for improvement. The learnings can be summarised as:

- **Revenue Generation and Community Impact:** Multiple makerspaces reported positive financial outcomes from the Trials, showcasing the direct economic benefits to communities and individual makers.

- **Technical and Material Challenges:** The availability of materials, machines, and technology was not homogenous. These challenges underscored the need for local adaptations in the distributed manufacturing model and highlighted the importance of an iterative, co-learning approach to address potential challenges and streamline production using locally available materials.

- **Quality Assurance and the Role of Makerspaces:** Quality control emerged as crucial, with makerspaces ensuring product standards through technical guidance and support. This role not only improved product quality but also generated revenue for the spaces, enhancing their financial sustainability and providing valuable learning experiences for the makers.

- **Collaboration and Network Building:** The Trials facilitated greater collaboration and networking among makerspaces, fostering partnerships and expanding operational capacities through shared resources and expertise.

Makerspaces – Redistributing the Future

The Distributed Manufacturing Trials demonstrated that makerspaces are not only for prototyping and training, but that they can serve as the hubs for a new paradigm of production. Production that redistributes manufacturing locally, bringing value to makers, communities, economies, innovation and sustainable production systems. This proof of concept for distributed production showed the ability of makerspaces to efficiently address local market needs – essential in a move away from global, mass manufacturing. Recommendations from the Trials include:

- **Makerspaces as Integral to the Research and Innovation Ecosystem:** Organizations like FCDO, RISA, and the aid sector should continue to consider makerspaces as vital components of the research and innovation ecosystem, particularly those community-based or independent spaces that provide access to innovation for harder-to-reach individuals and organizations.

- **Collaboration and Growth of Innovation Networks:** Makerspaces should connect with local research and innovation ecosystems through formal partnerships with universities, regulatory systems, and innovation hubs. Participation in national and international events should be encouraged to foster collaboration and knowledge exchange.

- **Formation of Makerspace Networks:** ational and African makerspace networks should be encouraged to advocate for the ecosystem and engage in policy. These networks offer valuable support for makerspaces, helping to raise awareness and share learning.

- **Sustainability:** The project will have a lasting impact as makerspaces utilise their strengthened research capacity, innovative infrastructures, common impact indicators, and business models. Engagement with health and care facilities, governments, and networks will drive further manufacturing contracts and funding opportunities, contributing to the financial sustainability and growth of the makerspace ecosystem.

Image 5

Makers at the Gearbox Europlacer manufacturing facility, Kenya

Image 6

Makers working with a laser cutter at Design & Technology Institute, Ghana

Continuing Impact

The Trials continue to have an impact. The Innovative Manufacturing Project is now in its second year and continues to support the research and innovation capabilities of makerspaces through iteratively designed capacity building packages. The makerspaces that participated in the Trials have been integral to the formation (still in process) of a pan-African maker network.

Following the project, external feedback from the wider innovation community was established through virtual trials held at the African Makerspace Ecosystem Gathering and the Vulca seminar. Feedback emphasised the potential for mass production, market access, and efficiency through automation, while also addressing trust, quality control, and logistical challenges. Key considerations include mechanisms to ensure product quality and reliability, certification, manufacturer ratings, and accountability systems. The readiness of makerspaces for large-scale production, particularly university-based ones, requires attention to machine availability, licensing, and material access. Quality control remains critical, with suggestions for inspector involvement and setting quality standards. Integrating smaller organizations, addressing cross-border logistics, and fostering transparency and trust are essential for the system's success.

With great thanks to the participating makerspaces, without whom the Distributed Manufacturing Trials wouldn't have been possible:

Kumasi Hive Makerspace, Kumasi (Ghana)

Design and Technology Institute, Accra (Ghana)

Triple Dimension, Kumasi (Ghana)

FabLab Winam, Kisumu (Kenya)

Gearbox, Nairobi (Kenya)

I.O.Me254, Lamu (Kenya)

The Makerspace Durban, Durban (South Africa)

TMG Makerspace, Johannesburg (South Africa)

QR 1

The Map of Machines

QR 2

Open Know-Where Initiative

QR 3

People and Skills Specification Framework

Jugaad - South Asian Practice of Making

Huzefah Haroon

Image 1 A motor-bike fit and installed to a pull-cart to make transportation more efficient. Documented on the streets of Karachi, Pakistan. Photography by Taher Hunaid Ghatila.

***Jugaad* is a word that describes South Asian's practice of adaptive innovation. It stems from limitations in the availability of certain resources and/or skills which pushes people to come up with creative, yet unconventional ways to solve a problem.**

With increasing awareness about re-use, recycle, and up-cycle, it has become extremely crucial for us as designers, thinkers, and innovators, to ingrain the raw, free-spirited creative process of *Jugaad*, so we are able to observe, question, and explore new ways to create everyday mundane objects.

This is an ongoing investigation into the culture and practices of *Jugaad*, as a way to explore possibilities of absorbing similar adaptations within our own methodologies of design. Through visual documentation and analysis, this study investigates the non-design community's way of creative problem-solving.

Inculcating the free creative spirit of *Jugaad*, by looking at it through three lenses, *Jugaad* as Action, *Jugaad* as Object, and *Jugaad* as Space, this research intends to inspire questioning the idea of designing from scratch, and finding already existing practises within our built environment that can be enhanced, supported, and encouraged, so we may move towards a more sustainable way of making and creating.

"The Hindi word '*Jugaad*' describes an improvised or makeshift solution using scarce resources. It's a way of life in India, where washing machines are used for whipping up yogurt drinks."
— *Jugaad* Innovation: How to Disrupt-it-Yourself, Think with Google[1]

Image 2 A traffic barrier newly installed and held by a wooden ladder as a make-shift approach to avoid traffic disruption during the process of installation. Documented on the streets of Karachi, Pakistan. Photography by Huzefah Haroon.

Jugaad as Action

Jugaad as an action comprises instances and scenarios where existing or found objects are used to perform a function. These may often be temporary in nature and the durability of problem-solving can be deemed as time-sensitive. An example of such an occurrence is where a newly installed barrier in a street in Karachi, Pakistan, has been held by a wooden ladder until its installation is complete. The ladder makes up for the absence of a counterweight allowing a continuous flow of traffic while fabrication is under process.

Image 3

Parking posts made with recycling plastic paint buckets with cement, and adding iron rods and metal plates for signage. Documented on the streets of Karachi, Pakistan.
Photography by Taher Hunaid Ghatila.

Image 4

Recycled paper, cement and sand, mixed and blended into a new material to make papercrete lights. This light was designed by Huzefah Haroon, hand moulded, as part of the Unfinished exhibition, a collaboration between Anomaly Lab and Open Door Workshop, showcasing papercrete lights.

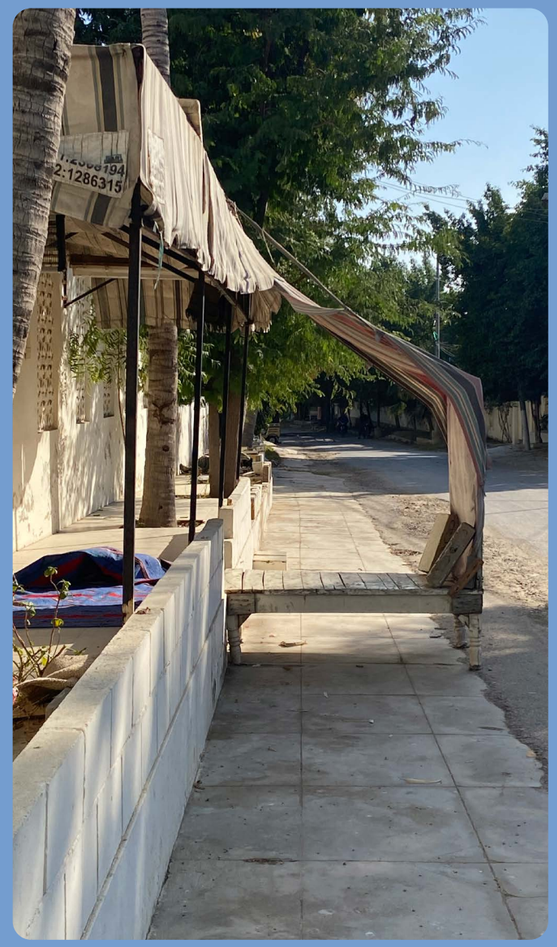


Image 5 & 6

Showing different angles of a sidewalk covered with striped pattern tent made in fabric to shade the raised passageway which has an extended wooden platform extending on to the street, with the fabric overlapping it making it an extension of the passageway. This is done to make a temporal prayer space.

Jugaad as Object

Objects recycled, repurposed, and upcycled are categorised under the lens of *Jugaad* as an object. This practice inculcates reimagining the use of an element or a material after its primary purpose is served. The parameters for this category can also be stretched into rethinking an object or material's intended function and giving it an entirely new meaning.

Jugaad as Space

Jugaad within and around spatial boundaries, configurations, and interventions, is a diverse and varied practice within the subcontinent. It varies from the scale of a bicycle, Thela (cart) to large-scale, makeshift weekly bazaars (markets). These interventions are multilayered, often reimagining a function of an existing space, both temporarily for an event, or much prolonged use, as a shed for a watchman.

Oftentimes a certain architectural intervention in the form of recycled fabric shade can act as a space maker for a street vendor or an entire array of these recycled fabric shades can protect a market of sellers from the scorching heat of the sun during Karachi summers.

Jugaad as space is understood as urban interventions varying in scale and its impact on the experiential qualities of a place.

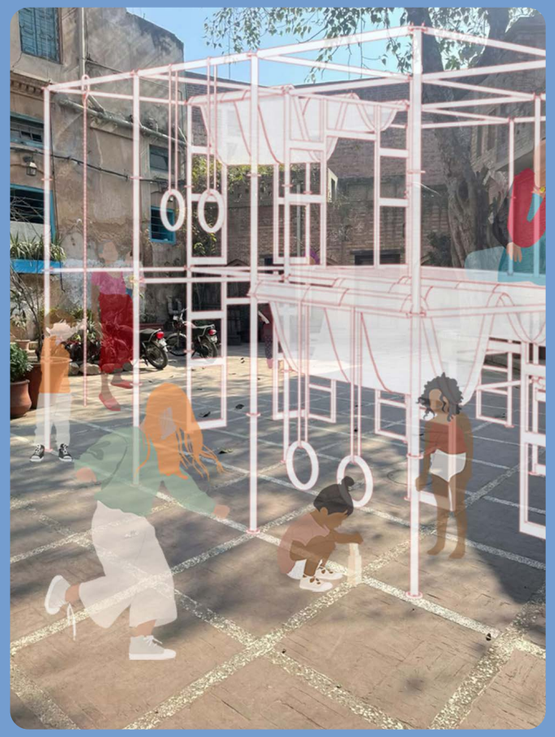


Image 7

Jugaad Gym being used by children in multiple ways of play.
Project by Anomaly Lab.

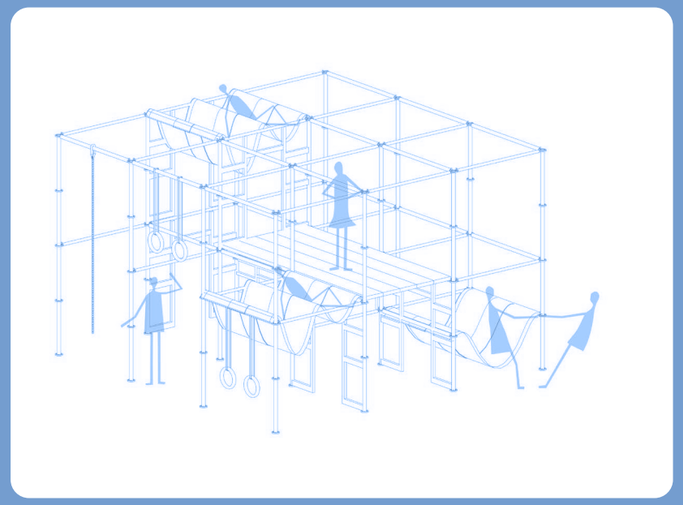


Figure 1

Illustration depicting initial concepts of *Jugaad* Gym imagined at the Sabeel Wali Courtyard, Lahore, Pakistan. Project by Anomaly Lab.
Illustrations by Huzefah Haroon.

Jugaad Gym

by Anomaly Lab (Design Team – Huzefah Haroon and Sara Bhaty)

Jugaad Gym is a series of platforms built from the materials found, and skills borrowed. Reviving and reliving ways to build inspired by local concepts within the Walled City of Lahore, this installation became a means to explore possibilities of spatial creation by understanding the practices of *Jugaad*.

Scaffolding was borrowed and used as a primary modular structure for the installation. The functions within the grid were inspired by activities witnessed within the streets and bazaars, where children adapted empty spaces to
create moments of play, adults and elderly to entertain, socialise, and unwind.

These functions were created by using borrowed materials from and within the market. Recycled wood, jute fabric, nylon, and cotton ropes both flat and round, served multiple roles and functions within the spatial narrative of the neighbourhood. Upon observing these instances, it was noticed that a few materials created entire worlds for this community.

Inspired by these ways of being, the installation aimed to question the nuances around makeshift inventions and design. It became a catalyst to question the need to design from scratch, and whether creating with existing materials and craft becomes a sustainable approach to spatial design.

This installation was designed by Anomaly Lab (Design Team: Huzefah Haroon and Sara Bhaty), for Lahore Design Summit 01, held 07th-13th March 2024 in Lahore, Pakistan. It was located within Sabeel Wali Gali Courtyard, Delhi Gate, Walled City Lahore.

Image 8

An overview of the *Jugaad* Gym from one of the rooftops at the Sabeel Wali Gali Courtyard, Delhi Gate, Walled City Lahore, Pakistan. Designed by Anomaly Lab (Design Team – Huzefah Haroon and Sara Bhaty) Photography Huzefah Haroon.

New Design Craft

Elia Maniscalco

A new design paradigm blending local craft practices and emerging technologies for more just and sustainable futures

Industrial design has traditionally mirrored the Western industrial model[1] by adopting the same principles guiding the First Industrial Revolution as its own founding ideas. In doing so, it has been both a catalyst for global development but also a driver of cultural homogenisation. If it is true that it has been a propellant for the advancement of global economies, it has also made local traditional craft practices and regional identities extremely vulnerable[2] by centralising the places of power and decision-making and moving them towards the Industrialised Global North.

However, as the Distributed Design movement demonstrates, the increase in sustainability concerns has pushed contemporary designers towards alternative paradigms that prioritise a more just distribution of power and agency.

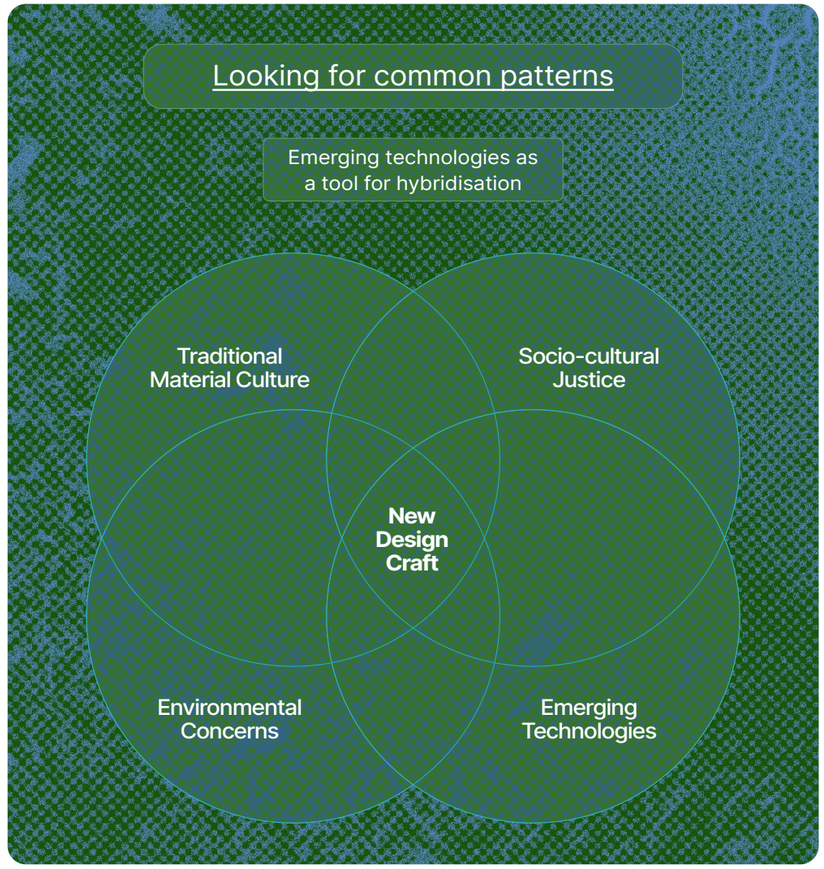


Figure 1

The four pillars of New Design Craft as a methodology blending tradition and innovation. Author's original design.

In this scenario, portable technologies and self-production tools have blurred the boundaries between design and craft, fostering a new hybrid approach that defies the traditional contraposition between mass production and artisanal practices[3]. This movement, which we have defined as New Design Craft, embraces experimental approaches rooted in the identities and heritage of smaller, culturally rich communities[4] exemplifying the idea of redistribution of making and knowledge.

Breaking the chains of co-dependency between their practices and the Industry, New Design Craft practitioners focus on small technical series, direct relationships with local crafts workshops, and a deep awareness of local resources and material culture. As a result, New Design Craft offers a framework for socio-environmental sustainability that challenges conventional industrial design paradigms and goes beyond aesthetics and production methods[5].

Embracing diverse cultural languages and valuing localised, participatory design processes over standardised, product-centric approaches[6], these practitioners become facilitators, fostering cultural empowerment and ecological stewardship through collaborative practices.[7]

We position New Design Craft as a subset of the Distributed Design movement, embracing its core values— being open, collaborative, regenerative, and ecosystemic— but zooming in on the unique challenges that hybrid practitioners face while navigating the intersections between traditional craftsmanship, design thinking, and emerging technologies. New Design Craft's values also include inclusivity and empowerment through technology, as low-tech and high-tech strategies are used to promote cultural diversity and identity. Additionally, adopting a specific nomenclature for New Design Craft practitioners establishes a shared identity, and enhances its visibility, while enabling its study and advocacy.

> "Designers reclaim their identities and break the chains of co-dependence between their practices and the Industry."

While the Distributed Design movement offers a broad framework for rejecting Western colonised and industrialised paradigms, New Design Craft embodies a design sub-movement whose main applications gravitate around six main topics[5]:

- New Bio-Materials Design;
- Re-Use of Waste;
- Emerging Technologies for Crafts;
- New Applications for Traditional Crafts;
- Social Design;
- Promotion of Ecological Culture.

This review explores six case studies—one for each research area— extracted from a curated database of 150 designers and studios displaying methodological traits aligned with New Design Craft's tenets.

By presenting one case per category, this review aims to highlight key themes, outcomes, and the transformative potential of New Design Craft within the Distributed Design movement.

Methodology

The presented case studies are part of a broader PhD research that starts with the acknowledgement of the existence of a plurality of cultural truths often overlooked by Western bias, especially in the predominant Design scene where designers often unintentionally design for users reflecting dominant social groups—typically cisgender, white, heterosexual, able-bodied, college-educated men with access to tech and wealth—resulting in products that cater to this narrow yet profitable audience, leaving out the social value of culturally diverse minorities and communities[8]. The research adopts both deskwork and fieldwork to provide a holistic understanding of the dynamics at the intersection of design, crafts, and societal evolution.

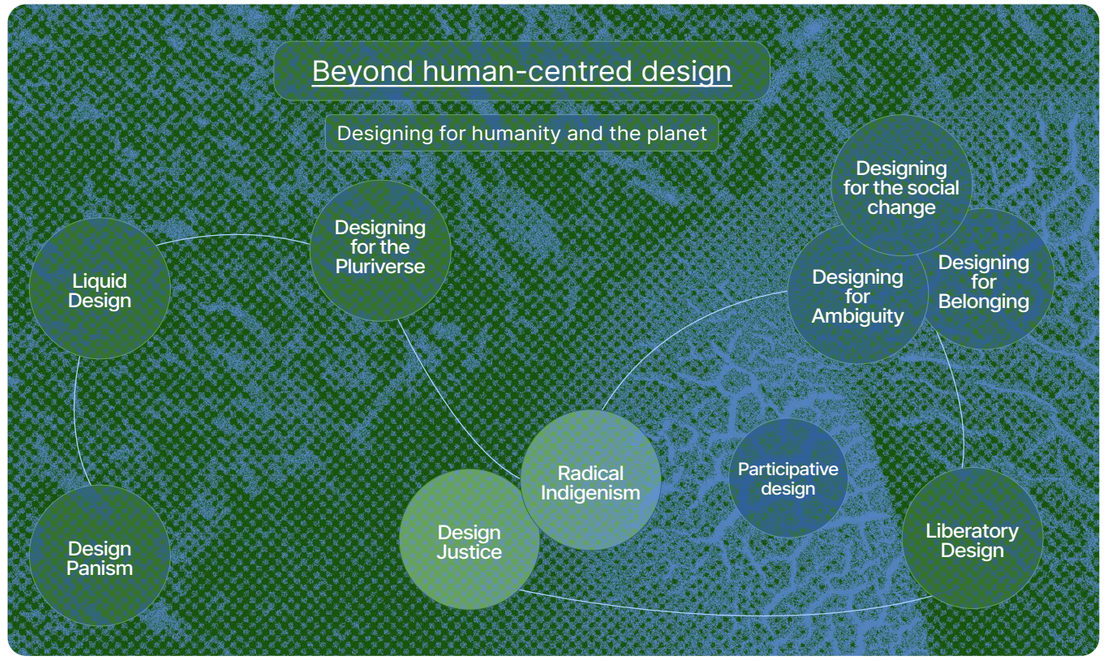


Figure 2

Visual mapping of the thematic literature review. Author's original design.

We carried out a literature review to investigate a network of connected topics around the role of design in today's complexity, exploring the concepts of Designing for the Pluriverse[9], Liquid Design[10], Design Panism[11], Liberatory Design[12], Design For Social Change[13], Design For Belonging[14], and Design For Ambiguity[1].

The fieldwork involved the identification and curation of 150 case studies. Inclusion and exclusion criteria were used to choose case studies relevant to the study objectives: specifically, the research included contemporary European and Ukrainian Design studios and independent designers actively involved in the areas of Self-production, Bio-materials, Local Identities and Material Culture. This last criterion ensured that the selected cases fell outside of the hegemonic structures of Western Design even if geographically located within its boundaries. On the contrary, we excluded projects falling outside of the geo-historical coordinates and/or involving initiatives of feigned promotion, mass production and distribution, and/or disregarding the Sustainable Development Goals defined by the UN Agenda 2030[16].

The channels utilised for the selection of the case studies included both academic and non-academic channels such as direct networking via social media and specialised events. Screening questionnaires were distributed to the selected sample, with the double goal of further filtering the case studies and kicking off the collection of quantitative and qualitative demographic data.

This phase culminated with 50 in-depth sync/async interviews with the most relevant cases to extract factual information, tacit knowledge and experiential wisdom from their narratives. The main topics explored in the interviews were:

- Design Mission;
- Design Values;
- Design Process;
- The studio/designer's Social/ Political Sphere of Influence;
- Design Outputs;

The construction of an organised database supported the consecutive phase of data analysis and visualisation that allowed the identification of recurrent patterns and trends, objects of this review.

Results

Six research areas emerged from the analysis of the case studies. These constitute an initial attempt to map and systematise the corpus of work of New Design Craft practitioners. While these areas specifically represent the core research of New Design Craft, they can provide a stepping stone for the broader characterisation of Distributed Design practices. In this review, we present each category, by defining its main characteristics followed by an example.

New Bio-Materials for Design

This area focuses on the creation and application of biomaterials derived from natural, renewable, or waste resources. To reduce the design's environmental impact, designers innovate with materials such as algae, and agricultural and industrial by-products to develop biodegradable and regenerative alternatives for traditional and contemporary uses.

- **Alara Ertenü**

Alara Ertenü, based in Izmir, Türkiye, is a designer focusing on integrating bio-based materials and zero-waste principles into product design. Her material-focused methodology transforms local agricultural and food waste into valuable products, blending material testing, prototyping, and traditional design methods like sketching and modelling with innovative technologies such as 3D printing.

Looking for patterns

Affinities in design interventions on a EU Scale

Bio-Materials Design

New Technology of crafts

New applications for traditional crafts

Re-use of waste

Social design

Ecologic Culture Promotion

Figure 3

The six recurrent research areas derived from the analysis of 150 case studies selected on a European Scale. Author's original design

Engaging with local farmers and manufacturers to ensure the contextual relevance of her projects, Alara pursues sustainability utilising raw materials like corn husks and pea pods. Projects like Packioli–a water-resistant and biodegradable packaging material and Lampunto–a lamp made utilising the same bioplastic developed for Packioli– are illustrative of her approach that blends biodegradable solutions with craftsmanship to address environmental and industrial challenges.

Image 1

Packioli by Alara Ertenü. A biodegradable packaging material innovatively crafted from agricultural waste. © Alara Ertenü.

Re-Use of Waste

This area examines how industrial or post-industrial scraps can be transformed into design components to promote circular systems and minimise environmental harm.

- **Chiara Pellicano and Edoardo Giammarioli (Millim Studio)**

Millim Studio is a design studio led by Chiara Pellicano and Edoardo Giammarioli and based in Rome, Italy. In its practice, the Studio explores the aesthetic and functional potential of scrap materials derived from industrial and post-industrial processes. With a mission to reimagine scraps as beginnings, Millim Studio follows a research-driven methodology that prioritises the exploration of material history and workability. Pellicano and Giammarioli have developed a process that starts with the scouting of local scrap materials, a dialogue with the material itself leading to the conceptual development of their project, followed by a moment of precise execution using tools like CNC machines. Projects like Miscellaneous and Cutout transform marble and metal waste into unique pieces, showcasing the potential of discarded materials through innovative design.

Image 2

Cutout Tables by Millim Studio. A modular furniture piece crafted from repurposed industrial metal offcuts. © Millim Studio.

Emerging Technologies for Crafts

This research explores how emerging technologies—such as 3D printing, CNC machining, generative software, and parametric modelling— can be blended into traditional craft practices to innovate them while enhancing precision and scalability, and preserving the local material culture.

- **Gina Nadal (Woven Memories)**

Gina Nadal, a Catalan designer based in Manchester since 2015, is the ideator of Woven Memories, a project blending traditional weaving with digital coding. Focused on emotional connections and minimal environmental impact, Gina creates personalised, made-to-order textiles. Customers act as co-designers, encoding personal messages into patterns via generative software which translates them into a binary code interpreted by computerised dobby looms. Sustainability is central, with materials sourced locally and waste minimised. The Woven Memory project exemplifies the integration of tradition, innovation, and co-creation.

Image 3

Woven Memories by Gina Nadal. A personalised textile design integrating binary-coded patterns provided by customers.© Gina Nadal.

New Applications for Traditional Crafts

This research area explores how traditional crafts can be revitalised through the redefinition of their traditional methods, languages and applications. The goal is to align crafts to contemporary contexts and needs by exploring how these techniques could be reimagined in light of the adoption of modern materials or concepts.

- **Michela D'Alessandro (MiDA-lab)**

MiDA-lab is a design studio founded by Italian designer Michela D'Angelo and based in Eindhoven. The studio specialises in material design and traditional crafts, focusing on the interaction of diverse materials such as ceramics, glass, rattan, bronze, textiles, plastics, and biomaterials to create a dialogue between different sensory perceptions, drawing inspiration from Mediterranean and Nordic cultures.

D'Angelo's process starts with intuitive exploration and preparation, followed by the assembly of various materials, often involving traditional artisanal techniques like pottery, which she has practised for over five years. The studio blends these techniques with emerging technologies, including 3D printing, 3D scanning, and animation, to enhance its practice.

Sustainability is a core principle, with a focus on sourcing materials locally and exploring biomaterials to minimise environmental impact. Projects like Bodies Jungle– a collection of figurines that challenge anthropocentric views– and Tentacular Algae– vases inspired by oceanic ecosystems– exemplify this hybrid approach that reflects a blend of traditional craftsmanship and emerging technologies.

Image 4

Bodies Jungle by Mida Lab. A series of terracotta vases exploring non-anthropocentric design. © Mida lab.

Promotion of Ecological Culture

This research area explores how design can be used to raise awareness of sustainability issues and promote the adoption of sustainable practices. These projects are often rooted in storytelling and community engagement to inspire behavioural changes and disseminate ecological culture to foster a deeper connection with the environment.

- **Markos Georgiou**

Markos Georgiou is a designer based in Limassol, Greece, who focuses on Responsible Design exploring the potential of sustainable projects in inspiring behavioural change. He combines traditional crafts with advanced technologies to develop products and tools that address environmental and societal challenges. In his most illustrative project, Biogun, Markos develops a distributed design device in the form of a handheld extruder that offers new ways of making with biomaterials. It democratises making and minimises production energy by hacking the function of existing drills, using digital fabrication tools and standard universal materials. By offering the practicality of mass-production machines into a handheld product, new forms of self-expression and creative exploration become possible. Compared to 3D printing, Biogun is handheld and artisanal, meaning that agency is given back to the maker.

Image 5

Biogun by Markos Georgiou. A handheld extruder designed to allow designers to experiment with sustainable alternative materials. © Markos Georgiou.

Social Design

This research area explores how design can be used as a tool to address socio-economic challenges. It sees the collaboration with local communities, artisans, and stakeholders as a means to create culturally sensitive solutions that promote inclusivity, and community empowerment.

- **Paula Camina Eiras**

Paula Camina Eiras is a designer based in London, UK, specialising in regenerative design. Her practice blends traditional Galician basketry with biodesign to tackle socio-environmental challenges. With a focus on local materials, sustainability, and technology, Paula creates biomaterials from seashell waste and algae, to address the topics of deforestation and ecological imbalance. Her projects, such as Co-Obradoiro Galego and the Arousa's Algae Weaving Project, highlight her commitment to preserving heritage by embracing a systematic process that involves artisans and the evolution of Galician artisanal traditions through the use of evocative biomaterials that ignite conversations on socio-environmental issues.

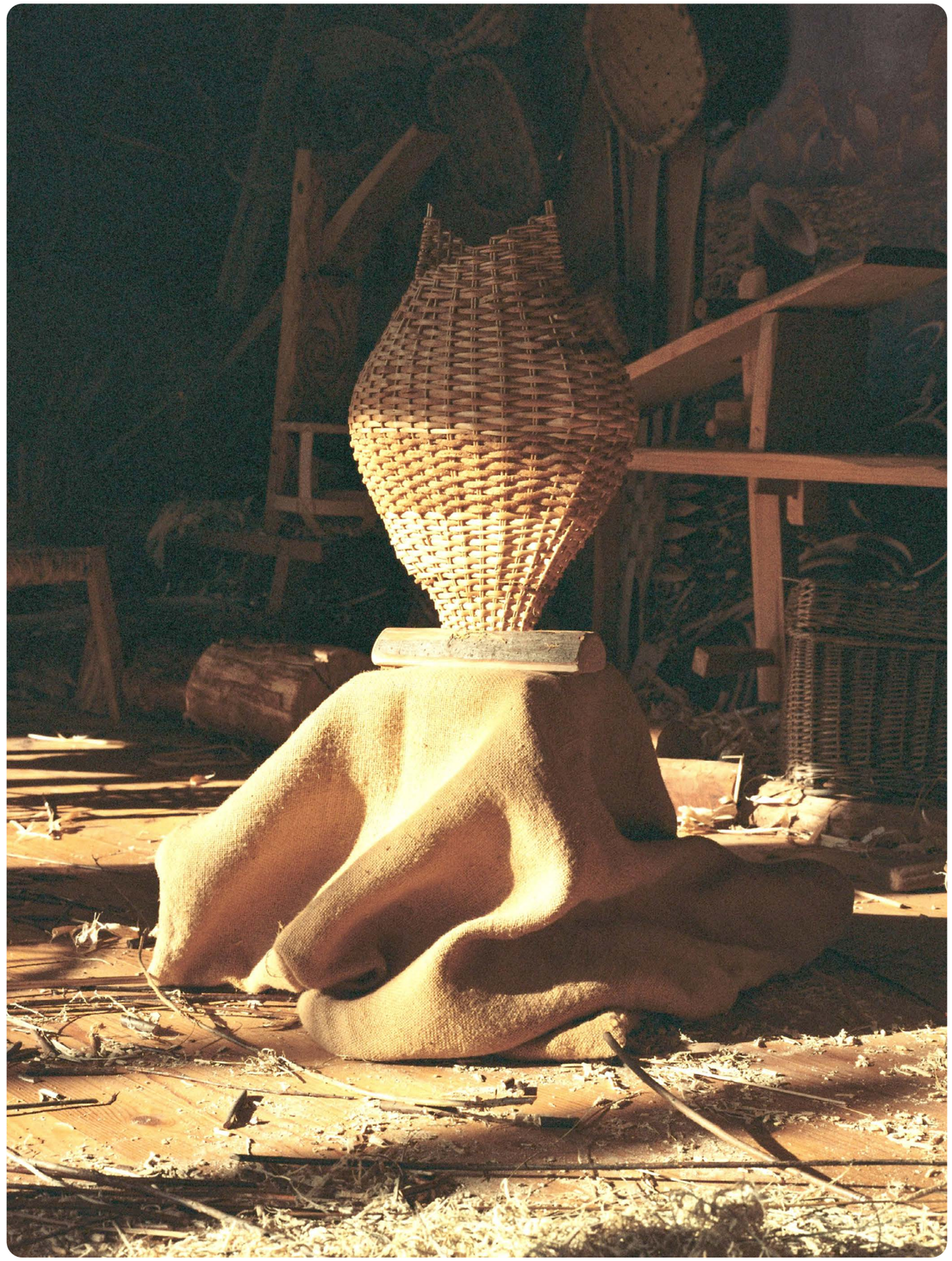


Image 6

Co-Obradoiro Galego by Paula Camiña Eiras. A biomaterial basket weaving project that revitalises Galician craft traditions using seashell waste.© Paula Camiña Eiras | Photography Sabela Andrés.

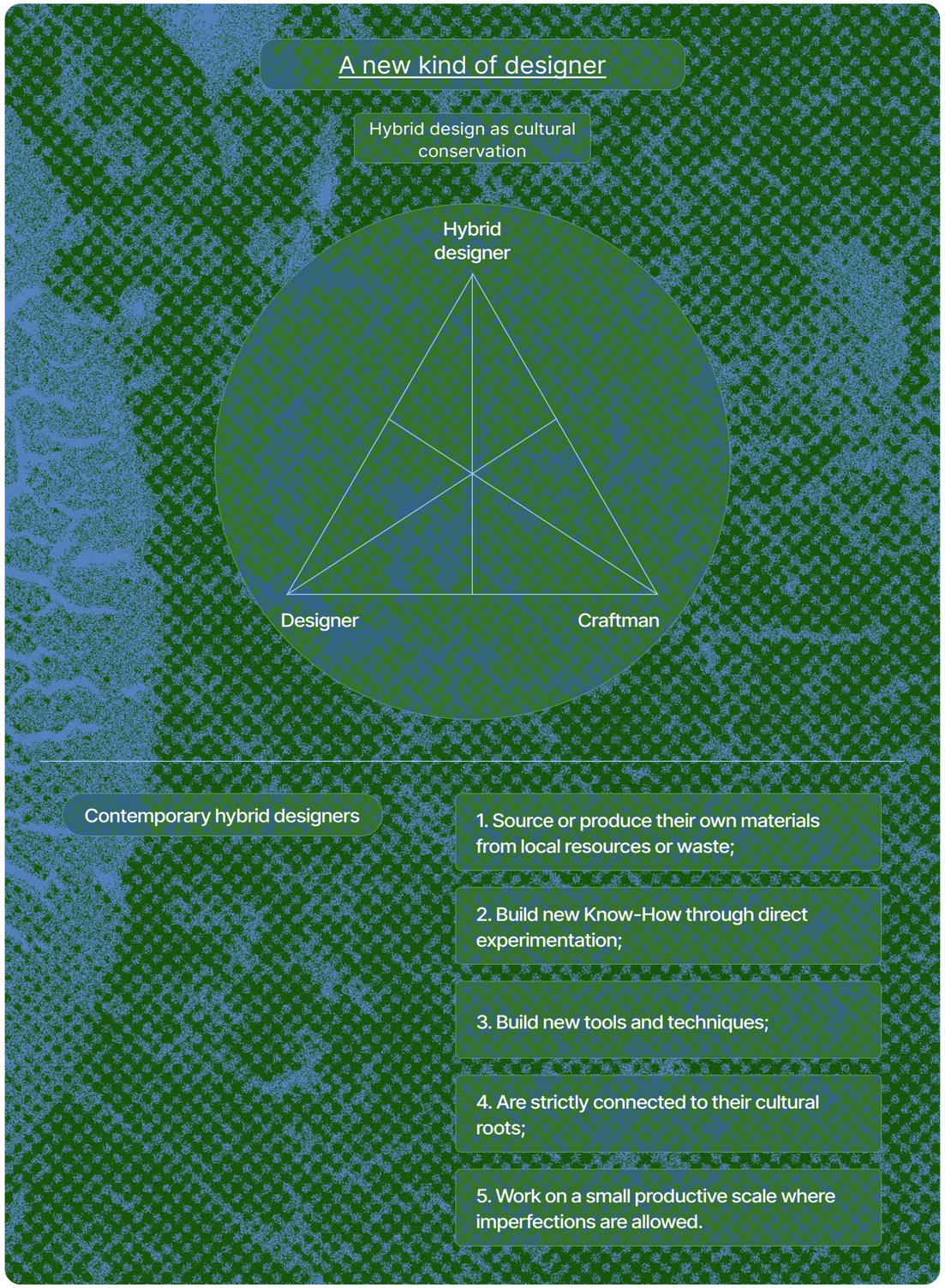


Figure 4

A visualisation of the relationships between designers and artisans in the New Design Craft Model.

New Design Craft shifts design paradigms from centralised, industrialised systems to decentralised, community-driven frameworks to dismantle the hierarchies of power and knowledge.

Conclusions

As a subset of Distributed Design, New Design Craft can be considered an emerging movement, albeit one that is not yet fully organised. This movement is characterised by its focus on artisanal designers who embrace craft values and practices, and neo-artisans who integrate emerging technologies into traditional methods. By analysing their practices and identifying their values, this review positions New Design Craft as both a legitimate reality within Distributed Design and a distinct contribution to its framework.

This contribution is twofold. First, by focusing on the intersection of contemporary design and traditional crafts, it redefines the hybrid practitioner, bridging the gap between artisanal designers and neo-artisans to broaden the scope of Distributed Design and now formally considering artisans as part of the movement's framework. Second, building on Distributed Design's values by adding considerations on the importance of inclusivity and empowerment through technology, New Design Craft provides a specific conceptual framework that fosters new forms of collaboration among diverse practitioners, enhancing the movement's potential for impact.

Arakuaa Machine That Converts Plastic Bottles Into Textile Fibers

Grecia Bello Segovia, Ruddel Callisaya & Edwin Yuco from Fab Lab Barcelona, FabLab Santa Cruz, Unifranz

Bridging traditional wisdom and technological innovation

The escalating crisis of plastic waste poses severe environmental threats, necessitating innovative recycling solutions that not only address waste management but also foster sustainable production methods. Arakuaa emerged as a pioneering solution, a machine designed to convert plastic bottles into textile fibers. This groundbreaking project combines digital fabrication technologies with cultural heritage, meticulously tailored to ensure efficiency, scalability, and community accessibility.

Arakuaa's design is deeply inspired by the Guarani-Isoseña culture, an Indigenous group from Santa Cruz de la Sierra, Bolivia. This influence is reflected not only in the machine's architecture and functional dynamics but also in its philosophical ethos, honoring traditional practices of fiber work and the spiritual significance attributed to them. By integrating cultural preservation with technological advancement, Arakuaa exemplifies how modern innovation can respect and uplift ancestral wisdom.

Technologically, the machine utilizes mechanisms to process plastic bottles into fine, durable textile fibers, employing digital fabrication techniques such as 3D printing, laser cutting, electronics, and CNC cutting. These methods ensure high-quality components, making the machine both reliable and accessible for production in Fab Labs and community workshops worldwide. Experimental results demonstrate that the fibers produced by Arakuaa meet the quality standards of conventional textiles.

Efforts are ongoing to enhance the machine's capabilities, allowing these fibers to be woven into fabrics using traditional Guarani techniques. This innovative approach not only contributes to environmental sustainability but also creates opportunities for cultural and economic empowerment within Indigenous communities. Arakuaa embodies a holistic vision: addressing urgent environmental challenges while fostering cultural enrichment. By bridging modern technology with traditional wisdom, it represents a transformative step forward in sustainable and culturally conscious manufacturing practices.

Inspiration Landtowns Ethnies – Guarani Isoseño

The word to know or to know in Guarani is Arakuaa, a compound word that means: the clarity to understand life, which implies growth in a time and space from which one perceives and feels. It goes beyond just knowing the world through the senses of the body. In a study conducted with indigenous sages from lowland Bolivia Enrique Camargo states that there is a distinction between knowing and wisdom, since knowing refers to knowledge through experience or cognition, however, wisdom is the ability to understand life, it implies a higher level of reflection and attitude[1]. The ways of access to knowledge are: prayer, rituals, dreams, observation and conversation. The

Image 1

Guarani Isoseño men. PUEBLOS DEL GRAN CHACO (III), Mercedes Gonzales

knowledge can be expressed, donated in an elaborate ritual or in an everyday event full of meaning.

Another of the ways of access to knowledge are dreams, where the soul receives the word "soul" and lodges it in order to know more about a specific occupation or understanding of life when waking up.[2]

Technical Foundations: Designing Arakuaa

The design process for Arakuaa began with an essential step: understanding the intricate process required to transform plastic bottles into textile fibers. This initial exploration served as a foundation, not only for the technical functionality, but also for the aesthetic design of the machine.

Understanding the Process

The process of converting plastic bottles into textile fibers can be broken down into four primary stages, each contributing to the transformation from waste to usable material:

- Collection: The process begins with the collection of plastic bottles. This stage involves ensuring a constant and adequate supply of raw materials. The bottles are carefully sorted to remove any impurities, such as labels or caps, that may interfere with subsequent steps.
- Shredding: Once collected, the bottles go through a shredding phase. This involves breaking the bottles into smaller pieces to facilitate their handling and preparation for the next stage. The appropriate size of the final bottle pieces is five to eight mm.
- Fiber production: The final stage involves feeding the prepared plastic pellet into the machine's fiber production mechanism. This step represents the heart of Arakuaa, where the pellets are transformed into fine, durable textile fibers. The mechanism combines mechanical engineering and digital manufacturing technologies, such as custom-designed extruders and heated nozzles, to achieve optimal results.

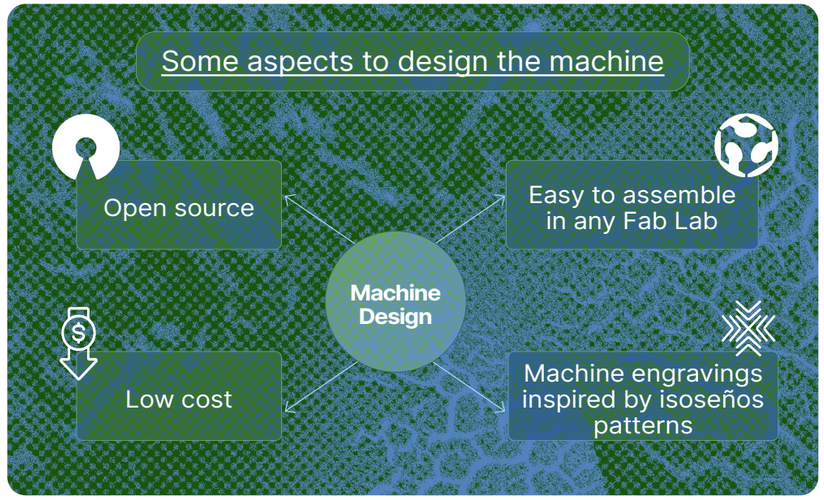


Figure 1

Machine design features

Engineering the Fiber: The Centrifugal Spinning Process

Arakuaa employs a rotational system that harnesses centrifugal force to create textile fibers from recycled plastic bottles. The process involves injecting air into the molten plastic resin, causing it to extrude through tiny orifices. As the resin is spun at high speeds, the centrifugal force draws out the material into fine, continuous filaments, much like the formation of cotton candy.

Prior to machine assembly, a preliminary test was conducted to assess the feasibility of the mechanical method. A CNC milling machine, readily available in the laboratory, was repurposed for this experiment. The process involved sectioning a paint container in half and securing it to the CNC spindle using a bolt. Subsequently, approximately ten orifices with one mm diameter were drilled into the container, encircling the plate formed from it.

The CNC was then configured to rotate its spindle at the desired speed.
Two trials were conducted at varying rotational speeds:

- 3000 rpm
- 7000 rpm

Image 2

Experiments with the CNC router

Image 3

Guaraní pattern designs on the machine

Image 4

Experiments and construction completed.
Fablab Santa Cruz - Unifranz

The results indicated that a rotational speed of 7000 rpm yielded fibers of superior quality. Consequently, a single-phase motor was selected, and pulley calculations were performed to further increase the rotational speed. In a supplementary trial using a different milling machine at 1500 rpm, thicker fibers were produced. While these fibers may have potential applications, they were deemed unsuitable for the primary objective. Based on the findings of these experiments, the optimal rotational speed range for mass production was determined to be between 6000 and 7000 rpm.

Aesthetic and Functional Design

As the development of Arakuaa progressed, the design evolved beyond a mere functional tool, becoming a cultural expression. Drawing inspiration from Guarani-Isoseña aesthetics, traditional patterns, and symbolic motifs were seamlessly integrated into the machine's architecture. This design choice honors the culture's deep-rooted connection to fibers and textiles, imbuing the machine with cultural significance.

The machine's components were meticulously engineered using digital fabrication technologies, including 3D printing, laser cutting, and CNC machining. This approach ensured precision and facilitated iterative improvements, resulting in a design that balanced efficiency, scalability, and cultural relevance. Beyond addressing the technical challenges, the design of Arakuaa presented an opportunity to reimagine waste management and sustainable production. By integrating these stages into the machine, the project aims to not only address the pressing issue of plastic waste but also to foster a broader discourse on the potential of culturally inspired technological solutions. Arakuaa stands as a testament to the power of merging tradition and innovation to create meaningful and sustainable change.

Fiber Production and properties

Arakuaa produces a variety of fiber types based on the rotational speed of its rotor. A pulley system incorporated into the design allows for the adjustment of this speed to three distinct levels: 1500 RPM, 6000 RPM and 7000 RPM.

1500 RPM production	
Characteristic	Comment
Fiber Tickness	0.5 mm
Color	Light brown
Flexibility	Low-Medium
Texture	Smooth and grainy
Endurance	Medium

Image 5

Fibers produced with 1500 rpm speed

6000 RPM & 7000 RPM production	
Characteristic	Comment
Fiber Tickness	1.5 mm
Color	Transparent
Flexibility	Medium - High
Texture	Smooth and soft
Endurance	Medium

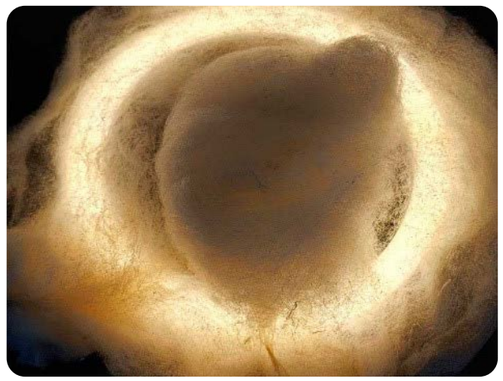


Image 6

Fibers produced with 6000 rpm speed

Experimenting mixing PLA plastic with PE

One experiment sought to combine PLA and PET to both dye the fibers and potentially improve other characteristics in this experiment use.

- 100 grams of PLA
- 200 grams of PET

6000 RPM & 7000 RPM production	
Characteristic	Comment
Fiber Tickness	0.15 mm
Color	Yellow
Flexibility	High
Texture	Smooth and soft
Endurance	Medium

Image 7

Fibers produced with 6000 rpm speed

Image 8

Plastic fibers

By integrating cultural preservation with technological advancement, Arakuaa exemplifies how modern innovation can respect and uplift ancestral wisdom

Indigenous Communities Adapt Plastic to Their Traditions

Between 2023 and 2024, devastating wildfires ravaged over 10.1 million hectares of the Bolivian Amazon, including regions traditionally inhabited by the Guarani-Isoseña and other lowland indigenous communities. These communities rely heavily on a diverse range of plant-based materials, such as cotton, for their traditional textiles and cultural expressions. The fires significantly reduced their access to these essential resources.

To address this challenge, experiments were conducted using fibers derived from recycled PET bottles to create new yarn for weaving. Feedback from artisans at the Museo Artecampo in Santa Cruz, Bolivia, indicated a need for increased flexibility in the fibers to enhance comfort and usability. Successful production of yarn from these recycled fibers has opened new possibilities for indigenous communities. Collaborations with young students from UNIBOL the Indigenous Guarani and Lowlands University have revealed a versatile range of applications for these fibers, including jewelry, construction materials, and textiles. This innovation has the potential to diversify income streams for communities whose economies primarily rely on traditional textile production, while preserving their cultural heritage.

Cultural and Environmental Impact

The development of Arakuaa was conducted with a deep respect for the cultural values of the Guarani-Isoseña community, particularly their traditional methods of fiber work and their spiritual significance. From an environmental perspective, Arakuaa contributes to sustainable practices by repurposing plastic waste, addressing both waste reduction and resource reuse.

Future Enhancements and Applications

While the current iteration of Arakuaa is effective, ongoing efforts aim to further enhance the machine's efficiency and the durability of the produced fibers. Future developments will focus on optimizing machine settings to yield even finer and more durable fibers, as well as exploring the application of these fibers in textiles using traditional Guarani weaving techniques.

Kalotrofa

Giannis Zgeras, Hara Kouki,
Sofia Nikolaidou, Theodosia Anthopoulou

A gamified journey to food sovereignty

Project type
Educational toolbox, Training of Trainers & Serious Game Design

Location
Athens, Greece, Europe

Project description

Kalotrofa[1] was a two-year research project[2] that led to the creation of a Social and Solidarity Economy (SSE) Hub for food sovereignty and sustainability (Kalotrofa Hub). Its goal was to raise awareness and educate both school students and adult consumer-citizens about food justice across the supply chain.
Drawing from global social movements and the rise of social and solidarity initiatives in crisis-affected Greece, which aim to reclaim local and autonomous food systems, the research team (RT) focused on three key concepts to foster knowledge co-creation: food sovereignty as the universal right to food, food commoning practices, and participatory research processes for food sustainability. The research aimed to co-develop an educational toolbox for students and adults, a process that unfolded through the formation of a 'Training of Trainers' (ToT) team. This team, consisting of instructors from both formal and non-formal education sectors in Greece, collaboratively designed a game-based educational tool on food sovereignty through serious game design workshops.

The two-year collaboration between the RT and the ToT team resulted in the development and testing of three educational tools, which together formed a strategy to nurture a community of practice focused on food justice. The outputs include:

- An Alternative Glossary with terms and definitions that address key challenges of food sovereignty and sustainability through ethical production and consumption models. The content was shaped during the workshops through the development of a shared language on food, which challenged power inequalities;
- A serious game titled The Kalotrofi Effect, a cooperative game set on an imaginary Mediterranean island facing the challenge of transforming its food production system and consumption culture after a mysterious loss of connection to the mainland. The narrative, gameplay, elements, and the educational and political implications of the rules were co-designed by both the RT and TT teams, reflecting the discussions and shared vision that emerged.
- AA DIY Guide for reproducing the game in school classrooms using easily accessible materials. The guide incorporates a sequence of socio-technical processes within the STEAM framework, allowing teachers and students to practically engage with food culture, explore diverse knowledge areas—such as sustainable food production, collective food rituals, cooperativism, raw material processing, sustainable energy production, circular economies, fair trade—and experiment with basic steps toward community food sovereignty.

Context and history

The main inspiration for starting this project was rooted in the solidarity movement initiatives that emerged in neighborhoods across Athens and other Greek cities following the imposition of austerity measures (2008-2020) and were designed to address urgent social needs resulting from market and state failures. In particular, food initiatives aimed at prefiguring alternatives to the neoliberal food model, emphasizing self-organization, direct democracy, and mutual support. These local experiences intersected with similar food crises and grassroots initiatives worldwide, forming a central argument for food sovereignty rooted in the concept of the commons. This approach serves as both a form of creative political resistance[1][2][3] and a strategy to respond to the successive crises challenging the resilience of food systems.

Kalotrofa officially began in November 2021, building on the extensive research on food sovereignty conducted by the Lab of Social Policy at Panteion University. The core team included members from the Lab at Panteion, OpenLab Athens (an expert in participatory and game design) and representatives from three partner organizations: a non-profit social cooperative supporting SSE, a regional educational support structure for primary and secondary education, and an agency for local development and local government. The cross-sectoral and transdisciplinary team focused on analyzing best practices and case studies of communities engaged in food-related experiences, both locally and globally. This analysis led to the creation of diverse materials, which were then translated into educational processes and tools.

Image 1 Pilot testing workshop and co-design session on the first prototype of the game (15.12.2022, School of Fine Arts, Athens, Kalotrofa, CC0)

Considering both the global food crisis and the various grassroots movements addressing it, we understand food sovereignty as a relational process negotiated and constructed by communities themselves. Our approach was designed to foster collaboration and encourage participants to contribute their knowledge, skills, ideas, and feedback. Consequently, the vision of the RT was to create a commoning process and develop collective narratives, aiming to promote equitable discussions[4] and, in turn, produce a shared understanding of food justice.

By integrating these ideas and values into alternative socio-technical learning processes—'learning with and through others'—Kalotrofa helped create a core group of people from various sectors, connected through networks that provided access to diverse social groups. A central element of the research approach was to explore the educational potential of collectively designing a game. The act of playing (a serious game) creates a safe space where thought and expression intersect, fostering learning experiences that extend beyond traditional teaching methods. In this context, play can be seen as a "ritual" that contributes to the formation of community identities and enhances social interaction.

What is the need it tackles?

Kalotrofa represents an effort to shift educational paradigms, aiming to foster a culture of sustainability, justice, and resilience in food production, distribution, consumption, and waste management. This research initiative responds to the urgent need for alternative educational models that address the interconnected crises of environmental degradation, social inequality, and food insecurity.

What was the development process of the project like?

The development process followed the methodology of Training of Trainers and Game Design Machine[5]. Lasting nearly two years, it comprised three consecutive phases **[FIGURE 1 & 2]** each building on the previous in terms of content: preparatory design, the design of the game environment and narratives, and pilot game testing.
During the first phase, through collective meetings and

focus groups, we captured and visualized participants' initial reactions to key concepts such as food sovereignty, agroecology, SSE, fair production and consumption, food governance, and related policies. This approach also enabled us to explore participants' experiences, identify educational gaps, and better understand the needs most relevant to each target group's interests, ultimately helping to build a shared vision and set key goals.

In the second phase, the research team expanded the working group to 15 participants by adding additional 'trainees' recommended by the main partners. These trainees came from a variety of sectors, including SSE initiatives in education, food, and agriculture, as well as municipalities and formal education (ages 28-62). Building on the insights gained in the first phase, through post-analysis of the collected data, the primary goal of this phase was to co-design the game environment and prototype an educational tool based on game-based learning.

The third stage involved internal reviews and four pilot group tests of the board game. Two of these tests were conducted with adults who had participated in the previous workshops, each accompanied by an external peer. The remaining two tests were carried out with pupils aged 11-13 years old. These efforts culminated in the final output, which included the educational board game and a glossary on food sovereignty.

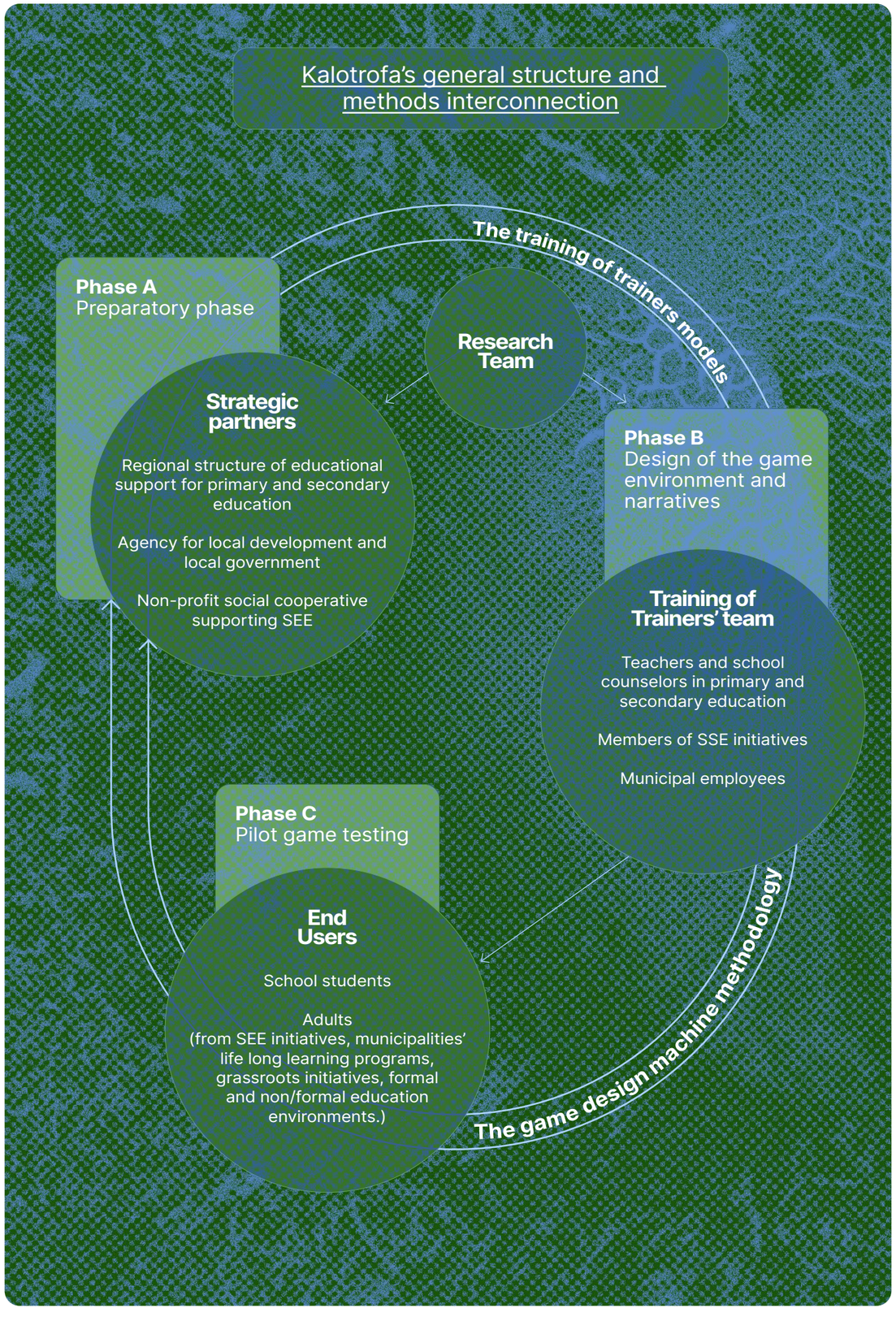
Image 2 & 3 People around a table discussing and interacting with the the draft version of board game Kalotrofi Effect

What impact does your project currently have?

The main impact of Kalotrofa is the educational community formed through its workshops and activities. Over the two years of research implementation, approximately 45 participants—adults and youth—took part in workshops, representing more than 15 different organizations across Athens. In producing the project's outputs (educational game, alternative glossary, DIY guide), a community was formed that engaged in dynamic interactions and collective reflection. Together, they developed and shared knowledge, reimagining local food systems and creating actionable approaches to promote social and environmental sustainability.

What is the global-local relationship of the project?

The global-local relationship of the Kalotrofa project lies at the intersection of local grassroots movements and global food sovereignty efforts. Locally, the project draws from solidarity initiatives and community practices in Greece that developed sustainable food systems to address urgent needs. Based on self-organization and mutual support, these initiatives responded to austerity and inequalities shaping alternatives to the neoliberal



food model. Globally, the project takes into account the systemic inequalities and power imbalances within the global food system, which contribute to ongoing crises.

At the same time, it aligns with worldwide movements advocating for food sovereignty as a fundamental right, promoting food sustainability, justice, and local autonomy. By co-developing educational tools that merge local knowledge with global principles, Kalotrofa transcends the asymmetry between the local and global, promoting the convergence of community-driven practices with broad frameworks and values to address food challenges.

Why is Kalotrofa distributed design?

Kalotrofa can be seen as a distributed design project in two ways. The first relates to its development process. Both the Alternative Glossary and the Kalotrofi Effect game are the result of collaboration between the research team (RT) and more than 40 contributors, who shared their knowledge, experiences, ideas, and concerns throughout the project. This collaborative process laid the foundation for a shared vision and demonstrated how a community can co-design a strategy for disseminating local knowledge, sustainable practices, community-driven solutions that contribute to an ethical/ caring food system.

The second level refers to the future path we want to take with the initiative. During the development of the board game, we became aware of the barriers to reaching schools that are in remote areas or outside of our direct network. As the design phase of the game concluded, we began creating a DIY guide to help teachers replicate the game in classrooms (for children aged 11 and older). This guide, available on the project's website, provides educators with essential steps, descriptions, and guidance to facilitate a learning process that is adaptable to the needs and skills of the students. As Kalotrofa moves forward, we aim to gather feedback from teachers and students using the DIY guide to expand the community and build shared ownership of the educational tools.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

We'd invite a whole group of folks (instead of just one person), from the students who participated in our workshops to time travelers and talking vegetables, and we'd cook the meal together. The dinner table would be full of noise, stories, debates, laughter, shared dishes and plenty of affect.

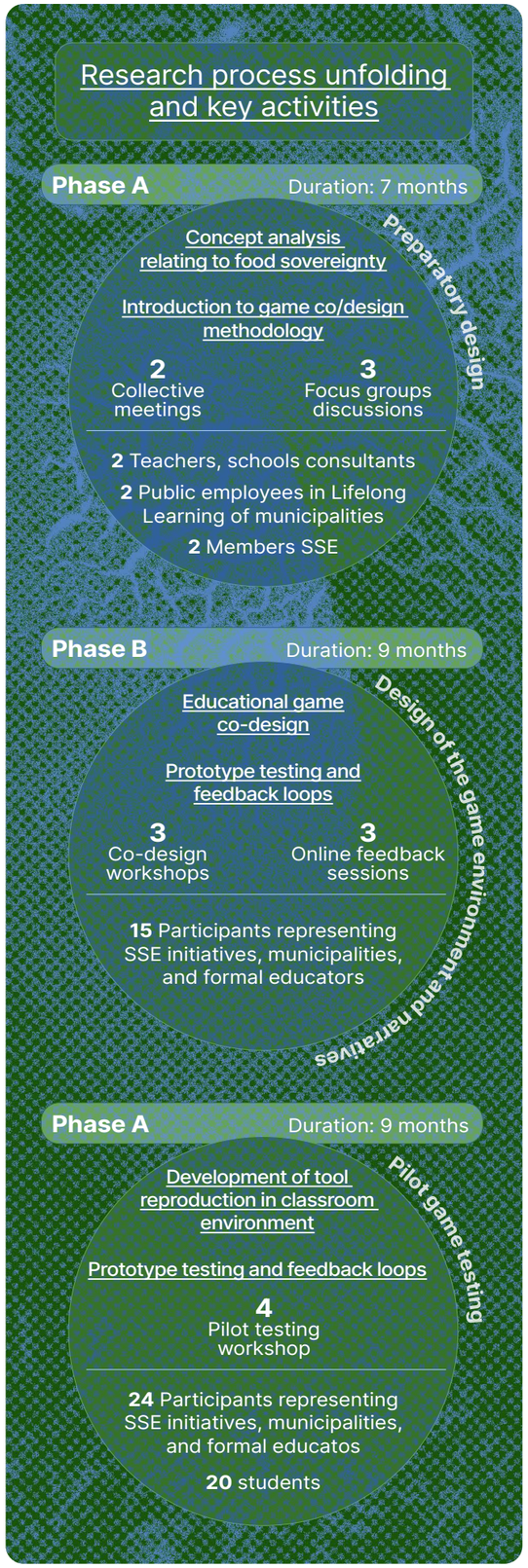


Image 4 The community of Kalotrofa in the final public event of the project (27.02.2024, Greek Company of Public Authorities, Athens, Kalotrofa, CC0)

QR 1
Learn more about Kalotrofa

QR 2
Any question on food sovereignty?

QR 3
Let's make and play!

Shaping Future Agriculture Through Digital Innovation

Matteo Mojoli, Lorenzo Silvestri, Valentino Stella

Leveraging distributed design for sustainable and inclusive farming practices

Contemporary agriculture stands at a crucial crossroads, where global social, economic, and environmental pressures demand a profound rethinking of food systems[1]. The growing world population, projected to surpass 10 billion by 2050[2], brings with it complex challenges: meeting rapidly expanding food demand, ensuring access to food for all, reducing rural poverty, and mitigating the environmental impacts associated with traditional farming practices[3]. These objectives are further complicated by the urgency of adapting to the effects of climate change, which is already disrupting agricultural cycles, reducing water resource availability, and increasing crop vulnerability worldwide.

During the first half of the 20th century, agriculture was mainly tied to methods based on crop sequence diversity, biological process management, and the richness of organic matter in the soil. Towards the middle of the century, a new paradigm took hold, based on using industrially manufactured fertilisers and pesticides that replaced diversified rotations to achieve high yields [4]; [5]; [6].

Towards the middle of the century, a new paradigm known as Industrial Agriculture or the Green Revolution, brought significant increases in the productivity of agricultural crops, contributing to solving the food security problems of the time while limiting the transformation of natural ecosystems into agricultural ones [7]; [8].

The main technologies and resources that enabled this paradigm shift were the availability of cheap fossil fuels combined with production factors based on these, new, more efficient irrigation systems, mechanisation of agricultural inputs, and the emergence of genetically modified breeds and cultivars in order to achieve higher yields[9], [5], [10]. In recent decades industrialization and the intensification of agriculture have been recognized as causing significant negative environmental impacts[1].

Technological innovation and related challenges

In this context, agriculture cannot simply focus on producing more; it must do so in a sustainable, intelligent, and inclusive manner, addressing social disparities and fostering the resilience of rural communities. Optimizing the use of natural resources, preserving biodiversity, and reducing waste are no longer optional but essential imperatives. However, achieving these goals requires more than incremental change: a radical transformation is needed, supported by technological and organizational innovations that reimagine the entire agricultural ecosystem[11].

The demand for more sustainable agriculture that meets the future challenges presented in the previous line, requires sophisticated and innovative tools to achieve the subsequent increase in productivity. The introduction of these has brought agriculture to the threshold of another revolution, driven mainly by three technological forces: data analysis, connectivity, and automation[12].

The introduction of these three driving technologies into the agricultural sector has allowed innovations such as artificial intelligence, drones and robotics, satellite visualisation tools, connected sensors, and other technologies to change the agri-food landscape[12] profoundly. These technologies help in this regard, helping to increase yields, improve efficiency and implement greater sustainability and resilience in crops[12].

Particularly in the field of data analysis, the evolution of technology has led to a considerable increase in the availability and quality of data collected on farms. By tracking, collecting, and analysing different types of data, farmers can make more informed decisions, improving decision-making[12].

At the heart of this revolution lies connectivity: wireless networks allow the transmission of information or data to participants, enabling a constant flow of data between different objects and actors and enabling remote sensing and monitoring, and consequently, more real-time interaction[12].

The final key technological force is automation. Through the replacement of human labour with computerised equipment with a form of autonomous control, it can help lighten the workload of farm operators while ensuring increased efficiency, management capacity, and productivity[12].

These technologies do not merely represent a technical and economical advantage: they have the potential to profoundly transform the social dynamics of rural communities. They create new opportunities for skilled employment, improve farmers' living conditions through increased productivity, and provide tools to reduce social inequalities, promoting access to food. They thus represent the means for the implementation of fair and resilient communities.

According to the Institute for Agriculture and Trade Policy, "a Community Food System is one in which sustainable food production, processing, distribution and consumption are integrated to enhance the environmental, economic, and social and nutritional health of a particular place"[13]. Their guidelines place particular emphasis on the importance of supporting production practices that rely less on chemicals and energy while prioritizing the use and optimization of local inputs.

Simultaneously, the emphasis on minimizing agricultural inputs to increase outputs is a key element among the four key levers through which digital agriculture can help reduce farm emissions, as identified by Boston Consulting Group.

On one hand, the concept of Community Food Systems offers a localized framework that fosters self-sufficiency and ecological balance. On the other, digital agriculture provides tools and strategies to enhance efficiency and reduce emissions, making these systems sustainable, scalable, and adaptable to contemporary challenges. By combining local sustainability principles with advanced technological innovations, this integration bridges the gap between tradition and innovation, establishing circular food systems as a cornerstone of future agricultural practices. Together, these approaches form a critical foundation for transforming agrifood systems into models that are both environmentally and economically viable while being socially equitable.

Optimization of agronomic practices

To fully exploit the potential of technological applications in agriculture, one must begin to consider the construction of an integrated ecosystem that allows for the optimization of agricultural practices in their entirety, providing higher yields for less input. Using fewer resources to increase food products can lead to other benefits than those described above, such as higher plant density, plant cover, and greater biodiversity.

Agricultural decisions are traditionally made on the basis of the farmer's experience and critical sense, so choices such as when to sow, irrigate and distribute fertilisers may be subject to errors of judgment. In addition to the aforementioned issues, wrong choices can lead to inefficient land use and, in the most severe cases, to a reduction in quality. Through the introduction of smart farming platforms, farmers can arrive at more informed decisions. These adopt end-to-end systems that rely on IoT sensors, robots, drones, and AI to lead the farmer to practice better agronomic practices throughout the crop cycle. An ecosystem is created in which all hardware and software devices are integrated and connected to each other so that large amounts of information can be monitored and collected. The data collected is analyzed by software applications and algorithms, which generate solutions that can help farmers make optimal decisions to make their operations more efficient.

This platform helps the farmer monitor three main aspects of the production cycle. The first is the natural environment, thus tracking parameters such as temperature, wind, light, humidity, and rainfall. The second aspect is monitoring farmland conditions, thus water content, temperature, pH, and fertility. The last aspect is crop monitoring, collecting and analyzing data such as height, density, budding, health, and any diseases or pests. By tracking and analyzing this data, the platform can provide the farmer with accurate information on the best time for sowing, watering, and fertilising. Farmers can control soil degradation and adopt preventive tillage techniques; they can promote water storage and increase soil carbon sequestration capacity by restoring vegetation and reducing soil disturbance. All this leads to reducing the carbon footprint of agriculture[12].

Another revolution, driven mainly by three technological forces: data analysis, connectivity, and automation

Main technologies involved in digital agriculture

In this section, the main technologies that enable this new agricultural revolution, leading to its digitization, will be identified and briefly presented.

- **Biotechnology.** Biotechnology involves modifying living organisms or their parts through genetic engineering to improve products, plants, animals, or microorganisms[14]. In agriculture, it helps enhance crop yields, reduce environmental vulnerability, and decrease fertilizer dependence[14].

- **Mobile Phones.** Essential for wireless communication, mobile phones are increasingly used by small farmers for accessing financial services, weather forecasts, and real-time market prices, thus improving field management and connecting remote farming communities[14].

- **Connectivity.** Connectivity refers to various ways of linking devices to the Internet, enabling data exchange. Technologies like 5G, LEO, and LPWAN provide high bandwidth and low latency, unlocking digital agriculture's potential through IoT, autonomous systems, and global coverage, even in remote areas[14,15].

- **Data Analysis.** Data analysis involves processing data to extract insights for decision-making. With AI and machine learning, it helps farmers make informed predictions, improving decision-making and operational efficiency[16,14].

- **Internet of Things (IoT).** The IoT connects devices with sensors to monitor and improve agricultural processes. It enables real-time monitoring of factors like soil moisture and crop health, automating responses to environmental changes[14].

- **Blockchain**. Blockchain is a secure, distributed ledger technology applied to digital transactions and record-keeping, improving transparency and traceability in agriculture. It enhances food safety, reduces inefficiencies, and ensures fairer pricing for small farmers[14, 17].

In the next sections, we will explore two case studies that exemplify innovative approaches to integrating technology into agriculture: HiveDock and Open Farmer Kit. HiveDock demonstrates how modular and distributed systems can support autonomous drone networks for agricultural applications, emphasizing accessibility and adaptability. Open Farmer Kit, on the other hand, adapts advanced agricultural technologies for urban micro-farming, promoting sustainability and democratizing access to smart farming tools. These cases highlight how design and technology can address diverse agricultural challenges while fostering more inclusive and resilient systems.

> "Today the use of UAVs and UGVs in agriculture allows to improve agricultural practices, allowing for the monitoring of crops, land mapping and resources optimization."

Automation and UVs in agriculture

As mentioned in the previous section, one of the most prominent smart farming technologies that enables farmers to make more informed decisions and addresses the growing demand for sustainable agricultural practices is automation.

Unmanned Vehicles (UV) are among the many platforms in this category, defined by their ability to operate without a human onboard. UVs may be remotely controlled by a human operator or function independently, guided by pre-programmed instructions, onboard sensors, or AI systems[18]. UVs with pre-defined operational patterns are referred to as automatic UVs, while those utilizing AI to make real-time decisions and act autonomously based on received inputs are classified as autonomous UVs[19].

Autonomous UVs open up new opportunities and scenarios but face significant regulatory constraints, particularly in Europe. A key concept in the realm of autonomous drones is collaborative swarms: groups of UVs that work together to execute complex operations. UVs are a broad category that includes unmanned aerial vehicles (UAVs, or drones), as well as other types of unmanned vehicles, such as unmanned ground vehicles (UGVs). The miniaturisation of components and the development of smart technologies led to a parallel increase in the use of drones for consumer and general aviation activities in the 2000s[20]. Indeed, remotely piloted platforms, typically affordable, lightweight drones equipped with cameras and other sensors, have become increasingly accessible and widespread.

The advantages of the use of UVs in agriculture

Today the use of UAVs and UGVs in agriculture allows to improve agricultural practices, allowing for the monitoring of crops, land mapping and resources optimization. For this reason, both historical manufacturers and new start-ups are heavily investing both in aerial and ground platforms.

Indeed, the use of autonomous UVs in agriculture offers significant advantages and considerable potential. Robotic platforms reduce the need for human involvement, cutting costs in the medium to long term despite their high initial setup expenses.

These vehicles excel in efficiency, handling tasks more effectively than human operators and performing actions that might otherwise be impossible or highly demanding. For instance, long-term monitoring can be consistently managed by autonomous systems, eliminating the need for dedicated personnel.

Operating 24/7, UVs surpass human capabilities constrained by rest and breaks, covering more ground faster and boosting overall farm efficiency by automating repetitive, time-intensive tasks.

Autonomous UVs also present disadvantages. Their complexity often results in high initial costs and maintenance expenses, alongside a certain degree of unreliability. Furthermore, their performance tends to depend heavily on the degree of control and predictability within their operating environment. This reliance on controlled settings is a significant limitation, as real-world agricultural conditions are often dynamic and variable[21].

Therefore, the benefits offered by using unmanned platforms relate to various aspects of the agricultural frame, resulting in positive outcomes and effects across the entire production chain.

- **Accessibility:** UVs, particularly UAVs, are often more cost-effective and accessible than traditional manned platforms. They enable tasks that are otherwise challenging or too expensive using conventional methods. Additionally, most commercial UV platforms require minimal maintenance, do not demand large storage spaces, and need fewer supplementary resources.

- **Increased efficiency:** UAVs and UGVs streamline operations by saving time and reducing labor costs. They can efficiently cover larger areas faster than humans or traditional machinery. Tasks like surveillance and mapping can be performed remotely with high-quality outputs, effectively replacing teams of operators.

- **Safety:** Unmanned platforms reduce the risks faced by workers in hazardous conditions, such as handling heavy machinery or operating on difficult terrain. This minimizes the likelihood of workplace accidents.

- **Precision agriculture:** UVs play a vital role in precision agriculture by facilitating data exchange networks and enabling tasks with exceptional accuracy. Integration with satellite navigation systems and other technologies helps optimize resources, reducing water, chemical, and input use while boosting yields[22].

Tasks and operations

The operations that can be performed by UGVs vary according to platform design, configuration, equipment, size and usage. Intuitively, UAVs are primarily employed in monitoring and mapping roles due to their aerial view, while UGVs can perform contact tasks.

- Crop monitoring and classification: UAVs excel in aerial data collection, delivering rapid and high-resolution insights, while, UGVs provide valuable ground-level data, such as soil moisture and nutrient content, complementing the aerial perspective. Accurate crop-type classification, essential for yield estimation and resource optimization, benefits from the integration of diverse sensors, including Synthetic Aperture Radar (SAR) and RGB cameras. These technologies also allow early detection of health issues or diseases[17,23].

- **Water monitoring:** UVs equipped with thermal or multispectral cameras and LiDAR detect water levels and assess irrigation systems. They measure parameters like temperature, quality, and depth, creating 3D models of waterways for effective water management.

- **Input release:** UVs can ensure precise application of fertilizers and pesticides, minimizing resource waste and enhancing plant growth. UAVs and UGVs carry out this task efficiently, with aerial platforms suited for wide coverage and terrestrial platforms for precise applications. The main limitation is container capacity.

- **Soil analysis:** UGVs are capable of collecting soil samples, providing detailed data on composition and chemical content. This information supports efficient resource use and improves farm productivity.

- **Planting and seeding:** UVs can automate planting processes, enhancing efficiency and precision. Direct seeding by UGVs uses drills or planters to place seeds at specific densities and depths. UAVs perform aerial seeding for large or hard-to-reach areas, accelerating the process while maintaining accuracy.

- **Harvesting:** ground unmanned platforms can assist in harvesting through mechanical tools or by guiding operators, increasing efficiency on challenging terrains. These vehicles can also control weeds by moving soil around plants to inhibit invasive growth.

Case study: HiveDock

The following section examines HiveDock, a system developed as a thesis project in Integrated Product Design at Politecnico di Milano in 2023 by Matteo Mojoli. HiveDock offers a modular, highly customizable, and flexible system for agricultural drones, designed to enhance the efficiency and sustainability of farming practices. At its core is a docking station network that enables agricultural enterprises to autonomously perform

operations using unmanned platforms, addressing both current and future challenges.

This integrated system automates operational cycles, optimizes resource consumption, and boosts agricultural productivity. It is tailored to fit the fragmented agricultural landscape of Italy, employing a digital fabrication and distributed production model.

This approach guarantees high levels of adaptability and scalability, ensuring that the platforms and network can be customized to meet the specific needs of diverse agricultural contexts. By incorporating standardized components and leveraging digital fabrication techniques, the docking stations can be easily upgraded or tailored to address local requirements.

The HiveDock system consists of several integrated elements. The basic element is the functional unit. The functional unit comprises the minimum functional components necessary for managing UV operations autonomously: the docking station, the unmanned vehicle, and the power source.

Thanks to a modular design, these docking stations can be assembled differently depending on the type of UV used either for UAVs or UGVs.

A modular customisation aspect also allows each station to be equipped with specific subsystems and components depending on the necessities.

The integration of 2 or more units leads to the definition of a HiveDock network, within which an exchange of information, data and commands takes place.

A network is an adaptable system that can be modulated and parameterized to suit different operational contexts. The modifiable elements include parameters like distances, base densities, and mounted modules. The integration of this network within an agricultural production environment completes the system.

Therefore, the HiveDock network is part of a broader ecosystem, interfacing with various elements and actors that inhabit these contexts. The system operates on a three-level layering model consisting of hardware platforms operating in three domains: terrestrial, aerial, and orbit. The UVs collect data and information that can be analyzed on a dashboard, allowing more centralized resource and instrumentation management. This data can actively be used to manage the irrigation water network, locate specific interventions, and optimize processes.

Image 1 Two HiveDock stations: the one on the left is designed for aerial platforms, while the one on the right has been adapted for ground platforms.

The docking stations' design was guided by two main principles: ensuring a high level of flexibility and modularity, and adopting an open manufacturing approach. Functionally, the docking stations are built to fulfill three key roles:

1. **Sheltering:** The stations feature an internal compartment primarily designed to house and protect the UV when it is not in operation or undergoing recharging.

2. **Support operations**: They are equipped to recharge vehicles and efficiently manage charging and operational cycles across all stages.

3. **Integration:** The stations facilitate data collection, enable communication, and enhance positioning accuracy through the use of Real Time Kinematic (RTK) positioning systems.

Stations can communicate with each other, exchanging data related to weather or ongoing operations. The data collected by the stations and UVs can be managed centrally.

Each docking station is equipped with a single board computer (SBC) that receives information from four sources: docking station sensors (rain sensors, anemometers, thermometers), digital platform (user interface and direct user inputs), unmanned Vehicles (though specific sensors and instruments) and other docking stations.

Image 2. Image showing the relationship between a commercial UAV and an aerial docking station.

UVs and Distributed Design

The development of the Hivedock project is not solely technical or technology-driven. Instead, it explores the interplay between design, automation, and people.

The rapid inclusion of unmanned vehicles in civil contexts brought together two initially distinct realities: UVs and humans. This relation is embedded within the framework of human-robot interaction, which can be defined as a field of study dedicated to understanding, designing, and evaluating robotic systems for use by or with humans[24]. Comprehending and evaluating UV systems for use by or with human users is essential for understanding the role that design can assume in the field of unmanned platforms.

In the field of human-robot interaction, there is one concept particularly relevant to this analysis, that of social drones, autonomous platforms which operate in close proximity to human users or bystanders[25].

Recently, research on social drones has followed a trend of rapid growth. Indeed, the spread of UVs and the emergence of increasingly autonomous platforms is becoming a significant phenomenon. Typically, three categories of individuals interact with a robotic platform: operators, recipients and observers. These three categories present great differences in needs, demands and approaches.

Design, therefore, must intervene at various levels, addressing aspects and factors related to each category. For example, operators denote a certain sensitivity to technical aspects such as physical and digital ergonomics, interface and user-friendliness, while the recipients focus on the perceptive aspect. Indeed, these individuals may have different levels of acceptance towards driverless platforms.

These aspects include the concept of perceived social role. Studies most commonly suggest that people are inclined to and comfortable using a “pet” metaphor for interacting with drones, using gestures and voice-based interactions[26]. Also in this field are several perceptive factors and elements that influence an individual’s perception, such as aesthetics, flight patterns or noise.

It is relevant to emphasise that there is a big difference in the perception of the different types of UGVs. Indeed, the use of UGVs may be perceived as less intrusive and more socially acceptable than UAVs, which may be seen as more invasive and threatening.

Within this framework, two types of design approaches can be distinguished. The first consists of a targeted and localised intervention on individual technical or product solutions, according to a classic technology-driven design approach. A different approach, which is the one envisaged within this article, consists of a systemic approach, where UV becomes a component of an integrated system in which the individual is positioned at the centre and in which they are the primary beneficiary. In this case, the design focuses not only on technology but also considers the social, environmental, cultural and regulatory aspects that influence the use of social drones.

This systemic approach requires a more comprehensive view of design based on empathising with users and understanding their needs, desires and expectations. In this way, design can help create innovative and sustainable solutions that enhance the user experience and respond to the needs of the broader context. Design can contribute to creating solutions that improve people’s quality of life and promote the sustainable development of the social drone sector.

Within this framework, an open and distributed design approach emerges as particularly relevant, especially given its suitability for the agricultural UV context. Digital fabrication, along with distributed and open-source models, enables high levels of adaptability, a critical feature in fragmented agricultural landscapes, such as Italy’s.

By leveraging these models, the use of UVs becomes significantly more accessible at both individual and consortium levels. The costs and complexities of the network are distributed across a broader user base, facilitating adoption and integration.

This diffusion throughout the territory, combined with integration with local manufacturers, has encouraged the adoption of open-source methodologies for several components of these systems. The ability to produce and customize parts through distributed manufacturing models is among the most noteworthy and impactful aspects of this approach.

Thanks to its modular nature, a network like HiveDock can undergo continuous improvements and substantial upgrades. This evolutionary process positions HiveDock as a ‘primordial’ template, one capable of adapting to local needs, specific requirements, and technical advancements. Modularity, customization, and digital manufacturing capabilities are pivotal elements that allow the system to evolve and respond effectively to diverse agricultural contexts.

Case study: Open Farmer Kit

Open Farmer Kit originated as part of an Integrated Product Design thesis at Politecnico di Milano in 2023, conducted by Valentino Stella. In 2024, the project was further developed in collaboration with Davide Formenti, Matteo Mojoli, and Lorenzo Silvestri as part of the Distributed Food Factory initiative, supported by Polifactory and the Distributed Design Platform.

The starting point of the project

The project addresses three key trends. The first involves the advancements and innovative technical solutions introduced in contemporary agriculture by three technological forces covered previously: data analysis, connectivity, and automation[12].

The second trend focuses on agricultural models that leverage biodiversity to develop ecosystem services while minimizing reliance on mechanical and chemical interventions. This approach involves increasing species diversity and using cover crops to enhance ecosystem resilience and functionality[27]. To effectively manage these systems, among others, three fundamental properties of agricultural ecosystems must be addressed:

1. **Diversity-redundancy:** Managing planned biodiversity within agricultural fields, including utilizing edge areas for floral strips, can enhance ecosystem services such as biological control of weeds and pests[28] [10] [29] [30].

2. **Connectivity:** Connectivity among biophysical entities influences the flow of matter, organisms, and energy, impacting overall system performance. It facilitates species dispersion, habitat connectivity, and life cycle completion[31].

3. **Slow variables:** Managing slow variables, such as soil organic matter and trophic networks, is critical for influencing associated fast variables like nutrient and water cycling. Effective management of slow variables supports short-term dynamics (e.g., nutrient availability), medium-term dynamics (e.g., soil structure), and long-term system functions (e.g., organic matter accumulation and trophic network dynamics)[32].

The third centers on the emerging concept of resourceful cities, where local food production is increasingly seen as a critical component of urban sustainability. Cities are evolving toward more sustainable, efficient, and integrated models, where incorporating nature and green spaces into the urban landscape provides opportunities to address future challenges in urban living[33] [34]. Food production in urban areas, particularly horticultural crops, is increasingly recognized in local, national, and transnational governance as an important contributor to food security[34].

However, the benefits produced by the presence of urban agriculture within cities do not stop only at contributing to local food security; it provides other important ecosystem services in other areas. This form of urban greenery is important in climate and pollution mitigation and environmental restoration. Cities are typically simplified ecosystems that are intensively developed, presenting low rates of native biodiversity. Dedicated urban agriculture spaces can bring diversified green infrastructure back into cities[35]. They thus contribute indirectly to the quality of urban life and the redevelopment of urban spaces through actions such as regulating the microclimate, regulating the water cycle, and reducing urban pollution.

However, this integration faces significant obstacles, as urban environments are often less hospitable to agriculture compared to rural areas. High levels of pollution, intensive human activity, and limited available space complicate agricultural endeavors, potentially leading to outcomes detrimental to human health and the environment[36].

Open Farmer Kit seeks to address these challenges through a dual approach. First, it aims to adapt the principles and technologies of Agriculture 4.0—typically designed for large-scale, intensive farming—to the context of urban micro-farming to reduce chemical inputs and maximize biodiversity services. By readjusting advanced technologies from agricultural machinery and robotic platforms, the project enables the automation of specific processes and the collection of comprehensive data on soils and crops. This allows urban agriculture to achieve similar resource optimization and product quality improvements as in large-scale agricultural systems.

Second, the project aspires to equip cities with tools for monitoring the health of their urban ecosystems. This supports more informed decision-making regarding urban activities that may negatively impact public health and environmental quality. By integrating tools for environmental monitoring and biodiversity management, the project promotes a model of urban agriculture that optimizes the local ecosystem while minimizing dependency on external inputs. By focusing on soil biodiversity and the management of long-term variables, Open Farmer Kit aims to establish a resilient and sustainable agricultural system within the urban context.

The structure

Open Farmer Kit is a semi-automated, open-source, modular station powered by renewable energy sources. It is designed to operate with flexibility, enabling data sampling across various areas of interest. Built using readily available electronic components and technologies commonly found in maker spaces—such as 3D printing and laser cutting—it maintains a low production cost of approximately €1000 per kit. This affordability enhances its accessibility and adoption by a wide range of end-users.

Open Farmer Kit consists of five modular components and an integrated energy harvesting system. Four of the modules are dedicated to collecting data critical for urban cultivation and microclimate monitoring, while the fifth is responsible for data and energy management.

- Air Monitoring Module: Measures parameters such as temperature, humidity, and levels of atmospheric particulate matter (PM 2.5 and PM 10).

- Soil Monitoring Module: Deals with the monitoring of soil health and fertility. It is equipped with the HI3895 soil test kit from Hanna Instruments. The kit reliably measures the most important elements for plant growth, namely pH, nitrogen (N), potassium (K), and phosphorus (P). The module contains the essential materials for analysis, such as testers, pipettes, test tubes and result comparison cards.

- Moisture Monitoring Module: Measures soil moisture. It is equipped with a moisture sensor, a GPS to geolocate the measurement, and a LoRa module to send the data to the Operational module. A slider allows the farmer to slide the sensor into the ground, while a stake on the side helps secure the module and stabilize it during the testing phase.

- Bio Monitoring Module: Observes pollinator activity and diversity in the surrounding area. It is equipped with a PIR motion sensor, a camera, and an SD card. On the front of the module is a flip-top with colored stickers that act as an attractor for pollinators. When it detects motion, the PIR sensor gives input to the camera to take a picture, which is saved on the SD card. A Velcro strap allows the module to be placed in different places by attaching it to poles, trees, branches, or various supports.

These four modules are designed to be mobile and detachable from the main station, allowing flexible deployment. The collected data is transmitted to the Operational Module, which is fixed to the station. This module is responsible for data storage. It is equipped with a LoRa module for receiving data, an SD card for temporary data storage, and a WiFi shield for uploading data to the server, ensuring centralized and accessible information management. It also oversees the system's energy management, including charging the mobile modules and storing energy harvested via the solar panel. The energy harvesting system supports the station's autonomous operation, enabling sustainable use in urban agricultural contexts. The entire structure is designed to be compatible with Arduino, as the sensors chosen can all be operated with Arduino boards.

Image 3 Open Farmer Kit (2023, Politecnico di Milano, Davide Formenti).

A distributed approach for democratizing agricultural innovation

Open Farmer Kit exemplifies how design can serve as a tool for redistributing knowledge, value, and technologies. Its development was guided by two central objectives, both rooted in the principle of redistribution. First, the kit aims to democratize access to technologies that have driven the latest agricultural revolution, particularly connectivity and smart sensing. While these technologies have shown transformative potential in large-scale agriculture, they remain challenging to implement in small-scale contexts due to high costs and barriers to accessibility. By adapting these innovations for urban micro-farming, Open Farmer Kit makes advanced agricultural tools more accessible to a broader audience.

Second, the project seeks to disseminate critical information about the health of urban ecosystems. By providing tools for environmental monitoring, the kit empowers citizens to make informed decisions, enables municipalities to design policies that protect land, biodiversity, and public health, and helps farmers optimize resource use.

Building on its foundational principles, Open Farmer Kit adheres to an open-source philosophy in both its production and distribution. The kit is entirely producible using 3D printing, laser cutting, and readily available components (e.g., fasteners and electronic parts) that can be sourced from the market. Production files, including 3D models for the modules, Arduino programming scripts, and electronic connection diagrams, are freely accessible online, enabling fabrication in any well-equipped fab lab.

This open-source approach not only fosters a more equitable and sustainable integration of technology and knowledge in urban agriculture but also ensures the project remains adaptable to future advancements. Potential developments include the integration of more precise sensors, improved IoT communication systems for greater reliability and efficiency, and PCB-based electronic systems. These advancements could further optimize the kit in terms of spatial requirements, cost efficiency, and energy consumption, enhancing its usability and impact.

Agriculture is facing immense global challenges, and meeting them requires a fresh approach that combines technology, sustainability, and community-driven solutions. Digital agriculture, powered by tools like data analysis, connectivity, and automation, has the potential to completely transform how we grow, share, and consume food. These innovations can help farmers work smarter, produce more efficiently, and significantly cut down on environmental harm, setting the stage for a future where agriculture is both sustainable and inclusive.

Projects like HiveDock and Open Farmer Kit show how technology and design can tackle these challenges in meaningful ways. HiveDock demonstrates how modular systems and unmanned vehicles can make farming more efficient and adaptable, especially in rural areas with fragmented landscapes. Open Farmer Kit, on the other hand, aims to adapt the principles and technologies of Agriculture 4.0 to urban agriculture, helping city dwellers grow food sustainably while improving their local ecosystems. Both examples highlight the power of integrating local needs with advanced technologies to deliver broad social, environmental, and economic benefits.

As agriculture evolves, the key lies in striking a balance between technological innovation, environmental care, and social fairness. Open-source and distributed design principles are making advanced tools and knowledge more accessible, empowering rural and urban communities alike to actively participate in this transformation. By fostering collaboration and prioritizing sustainability, agriculture can become a driving force for global resilience, feeding people today while safeguarding the planet for tomorrow.

Image 4 & 5 Moisture module in the foreground with the Air module attached to the charging station.

Bio module (2023, Politecnico di Milano, Davide Formenti).

Critical Access Primer

Aimi Hamraie & Paul DeFazio,
Vanderbilt University

A compilation of writing and other media exploring, defining, and responding to the emerging vocabularies of critical access

Project type
Encyclopedia-style writing project

Location
Nashville, Tennessee United States - North America

Project description

The Critical Access Primer is a repository of ideas about access from disability culture that can better inform design practice. Since fall 2021, members of the Critical Design Lab have been working on exploring, defining, and responding to the emerging vocabularies of critical access and the field of critical access studies. We are interested in how terms such as "collective access"[1], "disability dongle"[2], "access fatigue"[3] and others are not only pushing disability theory further than the social model, but also providing new directions for design. Beginning in early 2025, content related to this project will be released via our blog, social media, and podcast, and will later be compiled into a textbook or toolkit.

Context and history

Since the 1990s, the idea of "access" has often meant "compliance with the ADA," at least amongst non-disabled communities and practitioners. But in disability communities, there has always been a notion of going "beyond the code," and even critiquing the ADA standards for not going far enough. Alongside these critiques, members of the disability community have offered new terms and ideas for thinking about access critically, for questioning the assumptions about disabled people and forms of access that pervade discussions of compliance-based accessibility.

The field of Critical Access Studies emerged in the last twenty years to discuss approaches to access that both desire a better future for disabled people and question the typical ways of trying to get there. Aimi Hamraie wrote about this field in Building Access, their critical history of the Universal Design movement. This history was built on earlier work in critical access from Tanya Titchkosky, Jay Dolmage, Margaret Price, Remi Yergeau, and others. While this scholarship has been circulating within the field of disability studies for a long time, there are very few practitioners and members of the non-academic public that have access to them. Likewise, academic disability studies has only begun to take seriously the theories of access that emerge from disabled artists and activists.

In 2021, the Critical Design Lab set out to create an index of emerging ideas about critical access. The project began as recorded conversations in the lab, the members of which included disabled designers, academics, artists, and activists. Then, the lab started to create summaries and plain language translations of various works of critical access theory. Some members produced critical responses in the form of essays, blog posts, podcast episodes, design charrettes, poetry, and other creative forms.

What is the need it tackles?

The Critical Access Primer creates an accessible repository of critical ideas about access, filling the gap left by discussions of accessibility that focus on codes and standards.

"Needs" are a central topic of critical access studies. Traditional theories of access address basic needs for sustaining life and enabling public participation. Much of the Americans with Disabilities Act (ADA) is centered around the basic needs of being able to enter into and comfortably use public spaces. Critical Access Studies is also about going beyond these basic needs (which most advocates for accessibility also envisioned as important.) What does it mean when we think about access as an act of hospitality, as articulated by Alice Wong's hashtag #AccessIsLove or Mia Mingus's concept of "Access Intimacy"? What does it mean to question the way people and bodies are represented in typical anthropometric diagrams used to inform accessibility research? When are the moments when standardized and regulatory forms of access emerging out of disability rights actually fail to produce the forms of access that disabled people desire and appreciate? The project addresses a need for a larger vocabulary and set of ideas that we can use in conversations around disability and access.

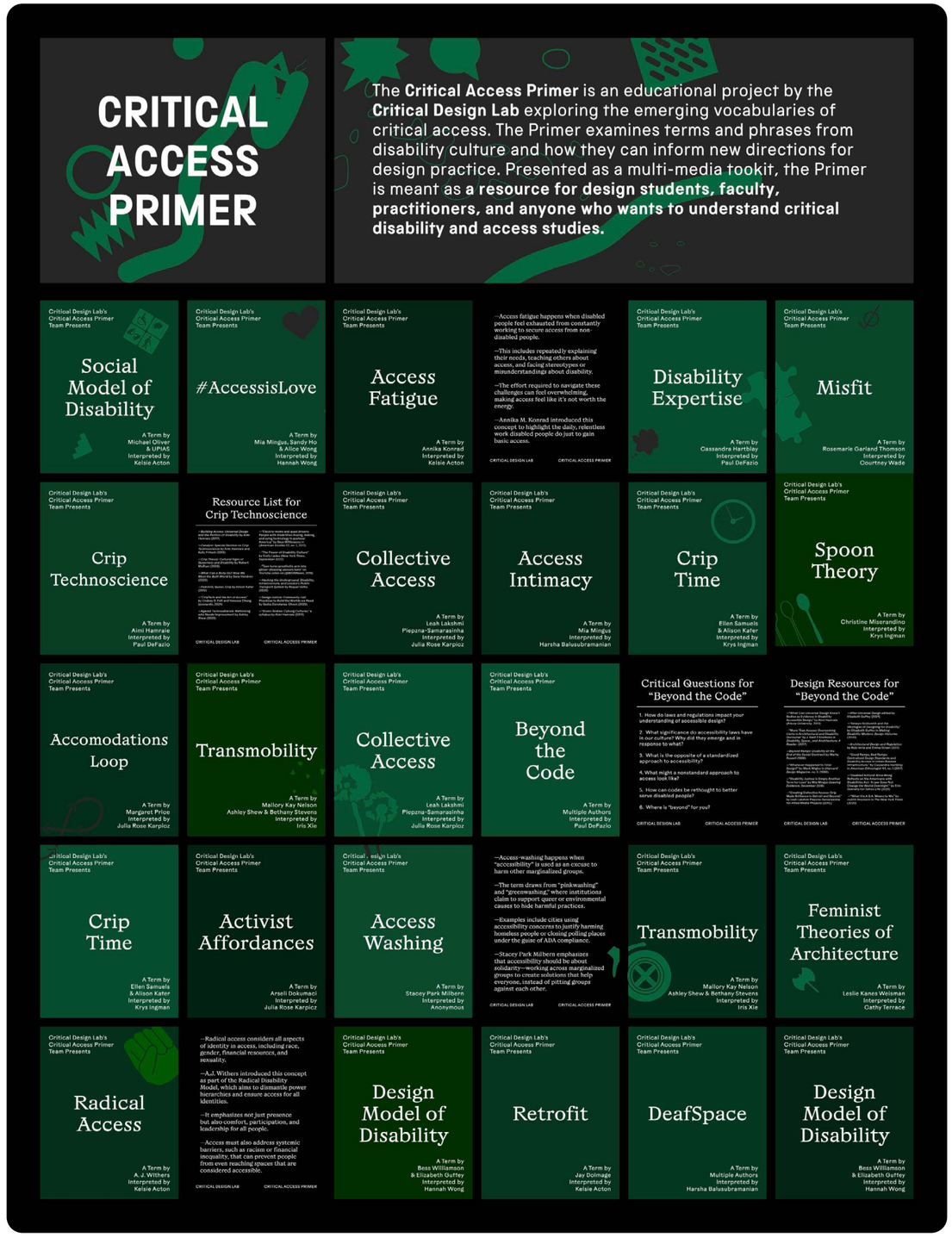


Figure 1 A gridded image of social media slides for the Critical Access Primer. They are laid out in a grid in multiple shades of green. Small icons of things like the universal design logo, a set of puzzle pieces, and other icons connected to the terms are scattered across the composition, as well as abstract shapes

What was the development process of the project like?

The project has been implemented by members of the Critical Design Lab through a process of research, co-authorship, podcast recording, and creative or critical responses to the terms. Most of the members of the Lab are disabled and so for many of us the terms have personal relevance in our lives and this is one way that we engage with them. Some of us make zines, write poetry, or make paintings as a critical response. Others have focused on how the materials can be brought into the context of contemporary design education and practice to think about how these ideas might impact the way we think about design.

Our early work on this project involved recording and transcribing conversations that we were having about access that exemplified critical approaches that were developing through our projects. From there, we moved out into the broader literature and projects surrounding critical access. We also developed several other projects under the umbrella of critical access, including creating protocols for crip podcasting, art curation, and digital archiving.

What impact does your project currently have?

One of the goals of the Critical Access Primer is to enable cross-disciplinary conversations between disability justice, critical disability studies, and contemporary design practice. The project has had several outgrowths: from public education on social media, to curricular materials, to podcast episodes and conversations that help to bring disability perspectives into contemporary design practice. Most recent ideas coming out of critical disability studies have only been of peripheral concern or interest in fields design education and practice, and the Critical Access Primer seeks to address this gap while mapping out a field of knowledge that offers rich terminologies and novel ways to practice design, transforming the ways that we understand why access matters. Through these outputs, the project proposes new ways of thinking about and doing accessible design.

What is the global-local relationship of the project?

ritical Design Lab is a collaborative of disabled artists, designers, and researchers who collaborate remotely across four countries and many time zones. Although we primarily work in English, much of our work troubles and renegotiates the idea of “access,” which has often been a universalizing concept, originating in western disability rights models and then being exported globally. Many of the concepts in the Critical Access Primer challenge the disability rights model and U.S. legal system’s approach to access. A section of the primer also focuses on decolonial access studies, an emerging field that challenges ideas of nation, access to land, and desired able-embodiment in settler colonial contexts.

Why is the Critical Access Primer distributed design?

The Critical Access Primer gathers knowledge from disability communities into a central repository, and then translates it into multiple formats including plain language summaries, audio, and visuals. The audiences of the project include designers, activists, artists, and members of the general public who want to learn more about the knowledge coming out of disabled communities.

If you could have dinner with anyone (human, plant, fungi, or otherwise) living or dead, who would you dine with?

We dine with lichen on a regular basis.

Figure 2,3,4 & 5 Slide for Radical Access. Critical Design Lab. 2024

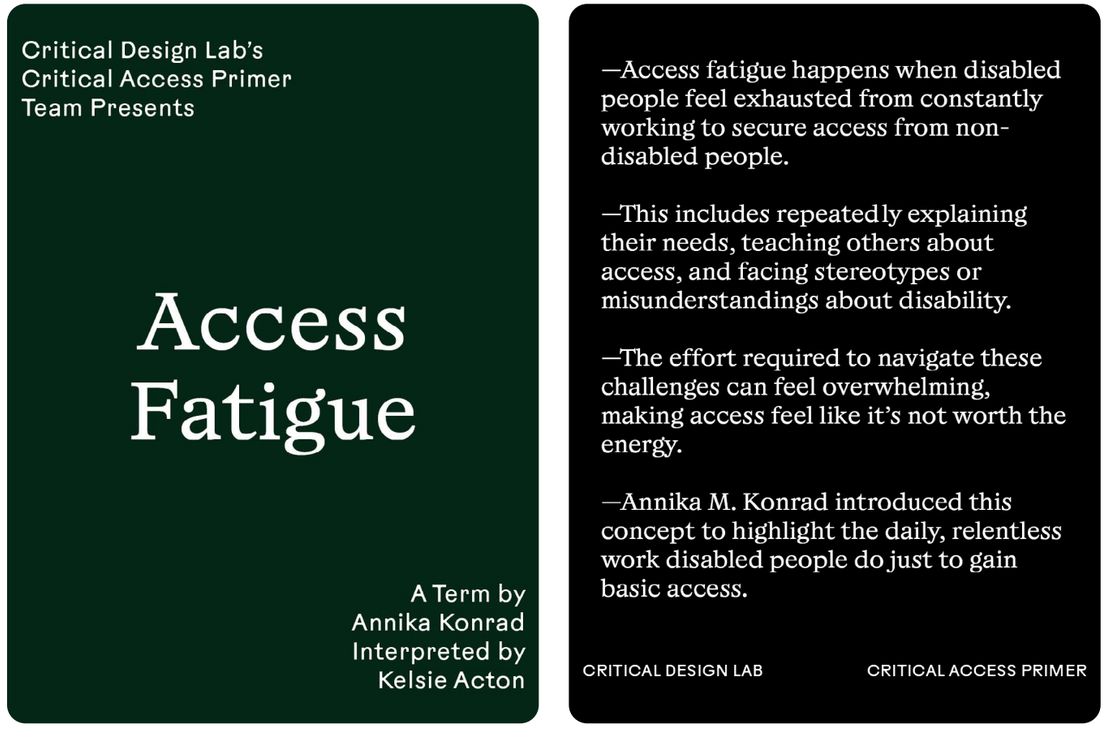


Figure 6,7,8 & 9 Slide for Radical Access. Critical Design Lab. 2024

CHAPTER 02

The Redistribution of Knowledge

How has knowledge shaped us? Who has access to it? And whose knowledge do we have access to? What are the implications of discarding knowledge? How does knowledge transcend? How do we nourish our collective intelligence(s), care for knowledge as a commoning practice?

We might be hard pressed to see knowledge. Whether it is because we don’t know the design process and plan for the chair we’re sitting on while we read these words, or because we don’t know who made it or what their background was. Nevertheless, that knowledge lives within the chair, within each of the objects, processes and systems we encounter.

Traditionally, only certain kinds of knowledge—and the people who possess them— are deemed legitimate in design. Western-centric, Global North perspectives continue to dominate, upheld by institutions that reinforce narrow definitions of expertise. Those outside these structures are positioned as “other,” perpetuating a binary of who designs, how they design, and what is designed.

Knowledge can be concentrated and withheld. Or it can come from diverse sources, be shared and remixed.

For our community, redistributing knowledge is sharing information from local contexts to global networks and more. It is adapting both attitudes and approaches. It is embracing those that have been discarded. At its heart, it is commoning and worlding. Throughout this chapter, contributors challenge the construct of knowledge, creating place for alternative translations.

Growing Sideways

Réka Sára Mezei;
Aalto University, Aalborg University

Embracing queer negativity and failure in design education

Inherent futurity in Western society

Futurity is ingrained in historically dominant Western cultures. Whether in our private or professional lives, there is an inherent future-oriented thinking tied to our ordinary experiences. As Annie sings to us, we should "bet [our] bottom dollar that tomorrow there'll be sun."[1] As designers, we are both often seen and perceive ourselves as contributors to a sunny tomorrow. This optimism animates our ways of working and, with its teleological narrative, paints our collective experience as a journey in constant progress. Indeed, this logic has the power to "[clear] away the cobwebs and the sorrow 'til there's none." However, in doing so, it can erase or exclude those who do not fit into the curated tale, making them other.

In the past decades, the dominant historical narratives of progress have gained critical attention, including criticality towards the influences they pose on our thinking. What is more, academics and practitioners articulate a critique around placing responsibility solely on the individuals too; rather, they advocate to open up this narrow focus and to view the ways in which we define design practice as something structurally influenced and shaped.[2] These structural influences are evident within the field of design itself; they are determining who are more likely to become designers, the paths towards the profession, what we perceive as a successful career, and how we think the designer should relate in their work and who they care for and how. In other words, it defines who we imagine when we think of the "Designer" and how this figure takes up its position in society.

To break away from historically dominant and oppressive ideas and practices in the field of design, new approaches are emerging to pluralise our notion of a predetermined future and broaden the ways a designer can contribute to a better tomorrow. Additionally, we slowly learn to shift from an understanding that design's role is merely about providing solutions towards an immensely more complicated one, animated by a care ethic.[3] Movements like speculative design, co-design, and ecocentric design open up new possibilities in how we understand our interconnected, relational nature of working and being.[4]

However, without careful attention to the histories that shape our understanding of design and without the commitment to unlearn dominant logics, we limit our capacity to what is possible to imagine in a "sunny tomorrow." In this work, I am arguing that it is indeed the cobwebs Annie is so eager to escape from, which require attention. Indeed, it is our "thick present"[5] that requires "murky modes of undoing, unbecoming, and violating".[6] Discussing the responsibility around practice-determining factors is not new; my approach to it is neither. Rather, it serves only as an example of how to revisit individual and institutional practice and, in this way, reflect on what informs our understandings of practice.

Learning about the histories of the places that "make the designer" is an important setting to start at. Design education is, for many, the entry into how we get familiar with what makes design practice in a Western context. It is during design education that we learn about the basic principles, which then greatly influence ethical understanding around practice and form our perceived duty and ways in which we relate to one another when working. What is more, we are educated to assume a role and duty of practice and tie our design tools to it. Understandably, once departed from the educational institutions, we rarely look back to critically reflect on the knowledge it narrates to us. We utilise the skills learnt and further educate ourselves by taking formal or informal paths; if we graduate, we might attend alumni events or visit back on similar occasions.

It might be commonplace to state: to explore new ways of design practice and to challenge the position and relation designers are so often raised into in a Western context. However, this approach is necessary, that is, deconstructing dominant ideas in design practice, if we are to define new ways for practice. With it, we are asked to turn from the so often future-orientated discipline to its roots and understand what makes the Designer a figure. In other words, what are the assumed, seemingly unquestionable building blocks that make the designer? As said, it is not a novel suggestion that I am making to invite you to a closer examination of the past by turning our backs to the future. However, it is, as always, a timely one, which is true to the illiberal shifts in our current day that aim to solidify certain ways of being and relating and labelling it as the right way, casting outside what is thinkable all othered.

With this text, I invite you to explore what makes our knowledge as designers. While my approach is site-specific, tied to my alma mater, it serves as an example and a way to exercise a kind of "tracing practice" and reckon with what builds the frame of our understandings. For this exploration, I use a queer theory lens, which provides a way-in to explore "growing sideways" and operates as a tool to challenge the dominant figures in this historical narrative, this way to start unlearning. In all institutions' operations there are values engraved, which shape our understanding of how it is possible to practice. With it, certain ways of relating, practices, themes, and topics are unthinkable to work with. Consequently, other(ed) ways of being and practicing are cast unthinkable; it is after all how figures like the Designer are constructed.

Progress through a queer theory lens

In this work, I use Lee Edelman's No Future as a queer, pessimist lens that critiques the reproductive futurism engraved in all politics.[7] That is, a collective consensus around what is worth striving for, an idea placed into the future towards which all politics must work.
Edelman uses the Lacanian symbolic order as a framework in which humans exist as unfree.[8] Through this understanding, we are "not the willful agents we think we are but subjects of the drive, [casting] us as subjects bound by desire,"[9] always striving for a symbol placed in the future. It is this lack of freedom that also places us in constant motion, always driven by the motivation to reach our object of desire (for example, a "better future," however we define it), while such pursuits are inaccessible by principle of being only idealised imaginaries. What is more, the constant urge to reach the inaccessible idea of a "better future" makes our present expandable and sacrifices everything that does not fit into our idealised picture of tomorrow.

For Edelman, queerness through a Lacanian reading entails a form of nonidentity, always shifting and having a diacritical function that is animated by challenging normativity (the queer is always what is cast as Other and a threat to the "better future"). Therefore, within normative frameworks, queerness is viewed as inherently negative. It is illegible or viewed as failure in a capitalist context. But as Halberstam points out, it is "the negative thinker [who] can use the experience of failure to confront the gross inequalities of everyday life."[10] In this work, I use failure both as a hole punctured into the narrative of success and as a potential to utilise it to dissect such dominant narratives. This way it is less about giving space for feeling sorry for those who failed, but rather reading it as a symptom of structures that claim their wholeness. I am focusing on a failure that carries the potentiality to contribute to a "better future" but instead is inoperative (capable but refuses to operate as expected), threatening the normative consent around working for a better future.[11] A killjoy of everything viewed joyous within normativity [12] Here, I dedicate space for negativity, through which the queer can challenge the coming of a "better future." An Edelmanian queer lens means the challenging of everything solidified into a normative identity that works towards a collective "better future."

Understandably, such a position sounds negative, even antisocial. However, in context, for design and its education, this is a relevant lens to approach the topic of futurity, even if one wishes to view their profession through a more optimist lens than what Edelman can offer. Edelman's queer lens can help us to trace back the dominant logics that drive design practice; this way opening the possibility for more cognisant ways for practice, one that, instead of catering to dominant logics by taking a position of a builder and creator, is able to grow conscious about them and undo the expectations through which their identity is defined.

Turning towards the past

In the following section, I present a context-specific attempt to unearth and unlearn the condensed history that formed the foundation of my understanding as a designer. For this work, I use digitised archival materials between 1899 and 1971. I selected a few passages that speak of the figure of the Designer and outline the tasks and duties of the profession. Naturally the materials speak of a time that long passed; however, what I find in need of attention is some overarching constant that, as a skeleton, seems to be the frame, an essential part of who the designer is. On a personal level, these insights support me in growing more attentive to what I believe the designer must do in a certain way. Additionally, it supports me to become more informed of what needs to be questioned if we are to depart from dominant narratives around design practice. While for me personally these materials are greatly exciting, I hope those rooted in or engaged with the Hungarian context can view it as an example that can be adjusted to their needs.

The Moholy-Nagy University of Art and Design has a fascinating history, spanning over 145 years. Established in 1880, the Hungarian Royal National School of Arts and Crafts (HRNSAC) was originally a sculpture workshop. In its early years, the school aimed to contribute to the country's "centuries-long flourishing and upwardly fruitful development".[13] At the time, such pursuit was seen through goods production, ones that support economic advancement. In early publications, the school's director stated, "it would be impossible to thrive without such helping institutions [like the HRNSAC]".[14]

Therefore, from its conception in the school's history, there is a clear tie between goods production that advance the nation's position in the economic race, with it justifying the need for both the institution and the trained students within its walls. Such justification was an overarching theme at the time. As Edelman states, we are only able to make sense of ourselves if we define our role, naming and excluding all others. Such effort can also be seen in the attempts to distinguish the school's educational offers and it's students, the industrial artist students, from those in similar professions:

> We do not stray into the area of industrial vocational schools, keeping in mind that we are not an apprentice or vocational training institute but an art education institute.[15]

These remarks, in my reading, make an effort to establish a clear place for the designer students at the time, who, through their artistry, are different from apprentice students or those trained in vocational schools; what is more, by the school's own definition, they are necessary for the nation. Therefore, these efforts both create a designated professional space for the designers of the time and distinguish it from related fields.

Despite the clear marking of the industrial artist students' territory at the time, by 1910 the school faced its first comprehensive revitalization. Once again, the needs for these measures were argued through industry needs. In Szablya-Frischauf's work, the changes in the institution's operation were argued through the need to "correct and modify the mistakes in the spirit of the goals of development" so that "nothing [will] hinder the quick and effective results of practical training." This objective to "further the competition of the nations" is largely unchanged compared to 1899. Advancement is materialised in adjusting educational curriculum and technological equipment, and the motivation around such change was less, if at all, connected to a need to redefine the school's principles, but rather was motivated by the need to match economic demands.[16]

An important shift in attention can be seen in 1940, which led to a school reform by 1945, where the person of the designer gained prominence. As a basis for the reform, the manifesto of Csaba, Juhász, and Szűcs is seen as an important document in which the writers critiqued the status quo of applied arts, claiming that the school educated for "decorative arts."[17] In their manifesto, titled Towards a New Hungarian Applied Art, they call for a revitalisation of applied art education's "spirit, curriculum, and teaching methods".[18] The document articulates a desired role and position for the designer:

> The applied artist is an independent creative subject . . . [they have] a fundamental role in culture because they instruct and guide life practice . . . the 7 branches of [the applied artist's] art encompass all the cultural needs of the people and all the conditions of their cultural life[19].

While a shift can be seen from earlier documents, manifesting in a growing interest towards the designer's person, the justification of the designer's usefulness is still defined through its contribution to a national cause. Furthermore, the manifesto has an overly individualistic picture of the designer, resembling a figure of a Vitruvian Man, someone who is a central essential figure for the progress of the nation. What is more, the manifesto names this figure as the shaper of society and aesthetic sense, with it demanding a seat at the table:

> From this also follows the social role of applied art . . . Social transformation builds layers on primitive human destiny . . . the applied artist is the shaper and director of Hungarian taste. Therefore, they must be given a role in every place where there is an opportunity to cultivate Hungarian taste (p. xx; own translation).

The historical changes in Hungary led to an opening up to the tasks required from designers during the 1950's, largely influenced by the Soviet regime. Here, the objectives of education spanned beyond industrial ones:

> [S]ocialist realism gives the artist the task of designing useful, good, and beautiful objects for the workers building socialism. Raising the material and cultural well-being of the workers places increased demands on the applied artist, the art technologist. The art technologist is an active participant in quality production. The [academy] educates new types of professionals, socialist design artists, and art technologists, to solve these tasks.[20]

Unchallenged in its principles, applied art remained subordinate to the nation's demands and the instrument of its politics. By 1958, who could become a student was also decided on merit and class origin "50% of those hired [had to be] of worker-peasant origin, 10% should be someone who has worked in a factory for 1-2 years after graduation. [The faculty decided, that they] should not hire class-alien (bourgeois) people".[21] By 1968, the expectations around what the designer role is became more nuanced and required a deeper commitment to the socialist vision:

> The task of the [academy] is to educate design artists who, based on the socialist approach to art, consciously shape the human environment, the material world realised in the social production process, creating the unity of industrial production and artistic creative activity. The task of the design artist is also to educate society, on the one hand through the consciousness-forming effect of objects, and on the other hand through active participation in the aesthetic and artistic education of society. [22]

By this age, the designer is seen as a person fulfilling industrial requirements while enriching them with their artistry. Moreover, they have to comply with both (socialist) political and socially responsible instructional functions in the "aesthetic and artistic education of society."

In 1971, the institution received its College title, and the objective became to "develop a modern, dialectical historical and aesthetic perspective, as well as the correct relationship and balance between science, technology, and art theory and creative practice."[23] To meet such aims, the college needed to implement pedagogical ways to nurture this objective. In other words, it was necessary to consider how the constellation of requirements translates individually in students. Therefore, consideration around the student's person emerges with the college rank as an aspect to consider. This agency tied to the design student is atypical compared to previous decades:

> [Education should] not limit artistic imagination and the development of individual creative paths. Social and, within this, individual needs must always be interpreted in a complex way, as a unity of practice and ideological (emotional, aesthetic, and ethical inseparable from these) factors. Every human creation is a component that grows out of the soil of natural reality, is shaped, but is embedded in it, and creates a result, the environment of man. Objects and realities in the environment are related to humans and to each other. Due to the complexity of these relationships and connections, we strive to ensure that education also covers the entirety of environmental design.[27]

The passage clearly marks a humanistic turn in the school's history, one that balances on the edge of a constellational understanding of the position of the designer both within society and nature. Naturally, this sentiment also reflects the zeitgeist and is the result of a philosophical movement still resonating in many design movements today. From such constellational understanding, by 2006, the MOME arguably returned to its humanistic, human-centred approach. As a signifier, it took its name after László Moholy-Nagy. In an interview titled "The name is binding," Gábor Kopek, the rector of the university in the early 2000s, gave the reasons for the decision as follows:

> Is important that the university can present a person whose behaviour and life philosophy are inspiring for a creative person. In this sense, the world did not move away from Moholy-Nagy's legacy but rather got closer to it. However, paradoxically, it seems that it still does not fully understand it. If it did, it would not be satisfied with the current state of culture. After all, [Moholy-Nagy] tried to initiate a process of searching for connections from the architectural space to the visual world that pointed towards integration. This attitude has not lost its validity to this day in a country where the imprints of culture are quite difficult to follow. The worst situation is in visual culture, into which even ideas from sixty, eighty, or a hundred years ago could not be integrated. The fundamental question is why, even after all these years, no viable paths have been set off from the ideas formulated by Moholy-Nagy? [2]

Interestingly, here a "better future" is articulated through a critique of the past and how it has been in design and the arts. The Designer, the ideal figure who design students should be, is encapsulated in the figure of Moholy-Nagy. The task of the future becomes to fold, on one hand, to merge the fields in search of more appropriate solutions, on the other, to progress backward

fields, as we should not be "satisfied with the current state of culture." This passage affirms what Edelman points towards in his work. Indeed, in the pursuit of a "better future" when tomorrow arrives, it will always be seen as a cheap replica of how we dreamt of it yesterday

Learning to pay attention to the structures that make us

Seeing through the changes made to the publications of the university paints a homogenous picture of design education and its progress. It seems that design's purpose is strongly tied to economic needs and shaping the social masses, their taste, environment, or ways of living. Design's purpose in the dominant institutional narratives is always embedded in state politics, always aligning with a well-formulated agenda of its time tied around progress that leads to an imagined "better future."

Motivations and key focuses are reflecting the values of the current time, with it always designating an opponent whom the school has to race against to make its progress tangible. The figure of this opponent takes many shapes; at times it is the abstract figure of the other nations, other times vocational schools with similar educational offers or art institutions, and sometimes it is simply the older version of the school with its claimed backward educational offer, workshops, or ideas. While many years have passed since its foundation and even the passages selected for this text, it is an exciting task to recover what principles and decisions became the school's heritage and, with it, became a seemingly stable approach to design education.

In my reading, the strong political and economic influence and the figure of the designer as the shaper of the social world and contributor to progress, always aligning with contemporary politics, are a noteworthy constant. With it, the rewarding systems of legibility awarded to those who successfully fit into the agenda of the zeitgeist. Unearthing what makes the heritage of institutions and, with it, understanding the constructed definitions of what design means is an invaluable practice. What is more, being able to critically reflect on such histories can help us reason for or against the design practice we were thought to claim as ours.

Working with archival materials from my alma mater taught me to examine the narrative's intricacies through the lens of queer theory. This lens led me to linger on two passages found in the materials, as I believe they have the power to bring about counter hegemonic reflections. The first insight is from 1930:

> Unfortunately, alongside those who have achieved success, there are also a large number of those who, after graduating, have disappeared anonymously into the waves of life. They have left no trace behind, but we nevertheless honour their memory as the unsung heroes of artistic work [26].

While the second one can be found in Bundev-Todorov's work:

> We are not sufficiently aware of the work of our graduates. We are aware of the [successes] of several of our students . . . but we have not yet established adequate contact with [them] in an organised manner.[27]

These passages are an exciting juxtaposition of the previous section that narrates an always progressing history of the school, one insisting on being better than yesterday, this way building a teleological narrative. While through a normative lens, in which the above two passages are written, failure of students themselves and failure to follow successful students on behalf of the school are surrounded with pity, I think they offer something exciting to reflect on, namely, for my eyes there is a tangible queerness in its Edelmanian definition surrounding the unsuccessfully educated designer who, for some reason, "disappeared anonymously into the waves of life." Such remarks make an interesting logic around disappearance present; for one, in 1930, they erase the structural and historical causes around reasons of disappearance reinforcing individual responsibility and meritocratic views in design, and for two, in 1979, they clearly favour the successful alumni whose work the school fails to follow, as it only cares for the successful students (those contributing to the imaginary "better future"). So, the attempt to "establis[h] adequate contact" is solely for those deemed successful.

While student and institutional failure here is likely to point to a variety of reasons, I am aiming less at unveiling what these reasons are but rather to pay attention to the very concept of failure through a queer theory lens. Namely, through what Halberstam views as failure in a capitalist context.[28] While through a normative lens, failure is a sorrowful, even cringeworthy occurrence, it

also offers a queer path to “grow sideways,” resisting the always othering notion of progress. A critique around disappearance in its many forms is a normative way of grieving the failure of contributing to a national cause in legible ways.

In the intersection of Edelman’s queer and Halberstam’s queer failure I believe there is something exciting for design to grow sideways, challenging the normativity of success and exploring the potential for design practice to be non-operative. A practice that challenges the tug of war politics that always utilizes and reads design as a tool for its own political means. Rather, the concept of failure and a queer non-identity pushes us to explore what is cast outside the present structures. It helps us to undo the tools, methods, and causes worth working for. Additionally, to explore unlikely connections and paths, ones that are done in the name of those who are illegible for the nation, who are stripped from their identity (as identity is something through which rights are possible to be given).

I believe exploring design as inoperative on an institutional level carries immense importance in our present, when illiberal shifts gain prominence and once again devour what is possible to see as a social cause through a normative lens. Think this way: historically, politics (at least through the Hungarian example) seem to always determine the causes worth and necessary to work towards as designers; by aligning with such causes, design gains its “place at the table.” However, one must wonder if the table is worth sitting at.

With the political shifts present and gaining more prominence in the past decade, sitting at the table of so-called progress is tied to the preservation and reproduction of imaginary heritage. What is more, those who are cast out of the normative experience a backsliding of their rights or must hide their identities and kinship, through which they are left outside of what can be designed for. In other words, if one is to pursue the normative path towards success in design (and many other) contexts, it entails to only cater to legible ways of living and develop solutions to those acknowledged and favoured by illiberal regimes, policies, or environments.

With Halberstam’s failure, one can frame design practice beyond, even outside the dominant perspectives, by failing to cater to the legible needs and desires. In addition, through Edelman’s work, for whom the queer is always a non-identity and diacritical in nature, shifting to a place outside the normative, design practice would mean the continuous unearthing of ways of living, kinship, needs, and desires that are forbidden and viewed as against the national Cause, to be more precise, against any Cause in general. This calls for a reimagining to whom design is dutiful, with it asking for a radical reframing of its tools and processes so as to be able to shift from a catering, serving figure to state and economic needs. Instead, the focus places the Haraway coined “oddkin” in the centre, the chosen, unlikely companion who pushes us to explore new paths for design.[29]

Naturally, an endeavour to explore how to push design work into inoperativeness cannot rely on the individual only; rather, it asks us to view it as a structural and institutional issue and grapple with the complex mess it exists in. What is more, to bring about a shift in the designer’s position, the always tomorrow gazing, futurity bathing practice to critically reflect on how historically dominant narratives and positions (of the designer and others) are reproduced if we are not aware of the past that builds our knowledge. No matter the number of institutional revitalisations, if it keeps the design school’s walls unchanged, the assumed figure and duty of the designer are taken as a set-in-stone role. Treats the designer as a figure of essence; it is inevitable to fail to view designers as a socially and historically constructed figure, and with it, fails to (re)orient its state-serving, economy-first function.

For practice and education itself, a keen attention and dedication towards unlikely processes can bring about new visions for what design can be; however, this approach requires a willingness and aims to undo and dissect the narratives that will continuously position the designer as the contractor of state agenda. This undoing work cannot happen through ignoring the past, nor can it be done by refusing it. Rather, it has to emerge through the desire to understand and the ability to examine closely the past and its influence on both the present and the ideas we wish to project into the future. It asks us to recognise the rigidity of the designer figure if we keep insisting that our work, as is, will bring about a sunny tomorrow.

Failure and queerness, then, in this work are less about placing alternatives into the future but paying close attention to Annie’s cobwebs and the narratives that aim to convince us of what is sorrowful. Staying with the past and the present opens up paths to work sideways; they offer the potentiality to explore what working inoperatively might mean, not debilitated by negativity, pessimism, and failure, but inspired by it.

No one maker or makerspace can make as many products as mass production can achieve, but perhaps networks of makers each producing a share can be competitive.

Gentler Futures: Towards Urban Self-Sufficiency

André Trindade & Davide Onestini
from BY THE END OF MAY

A celebration of design as an agent of change

As a society, we are captivated by the idea of Future. Corporations, tech startups, and industry leaders tirelessly try to foresee it, shape it, or claim to revolutionise it. Their promise is always the same: embracing their products or services translates into building a "better" future. Yet, rarely do they clarify better than what or better for whom. What they focus on instead is promoting the vision of a future that is unequivocally smarter, faster, more productive, and more automated.

If you search "futuristic city" online, you will find a very uniform aesthetic: towering skyscrapers, flying cars, sleek metal, and a lot of glass. The imagery looks straight out of the typical sci-fi movie, implying that the future is already written. But who wrote it? Who got to decide what progress looks like? And, what if we don't want it?

Not better, gentler

While everyone is looking forward to a "brighter" and "better" future, we believe in a gentler one—or many actually. To be gentle means there is a relationship going on: between you and me, between us and other communities, between humans and non-human species, between the human-made world and Nature.

What would a future based on respectful relationships look like? What would it mean for humankind to become gentler? And how can we design gentler cities, gentler worlds, gentler futures?

As believers that design goes beyond aesthetics, for a long time we have wanted to create a space that sparks conversations about alternative futures—ones that place local-communities and the planet at the heart of production, value creation, and decision-making. A space where designers, makers, architects, researchers, students, policymakers and other curious minds could gather to question the mainstream vision of the future and collectively examine what it means to "design for tomorrow". By delving into diverse aspects of design—from materials to architecture, from energy to food production—the goal is to celebrate people, projects and initiatives shaping a type of future we would like to live in: local, non-linear, planet-centred, and post-consumerist.

Far from focusing on one singular vision, Gentler Futures embraces the multiplicity of possible tomorrows, creating a space for new stories, new perspectives, and new possibilities.

Image 1 Edible Landscape: art and food" by Inês Coelho da Silva at Gentler Futures Festival (Ph. Bruno Condeixa)

Locally productive, self-sufficient

Held in May 2024, the inaugural edition of Gentler Futures Festival transformed the historic Mouraria neighbourhood in Lisbon into a space for critical dialogue, hands-on learning, and artistic expression. Organised in collaboration with Mouraria Creative Hub, Distributed Design, the Polytechnic of Lisbon, and the Municipality of Lisbon, and with the support of DGArtes, the event was rooted in the city's current context, advocating that systemic change must begin with local communities working together to answer a pressing question: how can design help cities shift from being passive consumers to active producers?

Under the theme Towards Urban Self-sufficiency, the festival explored the urgent need to rethink how cities function in response to today's global challenges, looking into pathways for cities to become resilient and capable of sustaining their communities through equitable practices for people and the planet. In particular, how they can become locally productive and self-sufficient (once again) in terms of materials, food and energy. In fact, we see these three shaping the way we act, consume and live.

The program featured a diverse mix of activities all meant to reconnect cities to their local resources, on a path towards independence from far-away centralised systems: from talks and screenings that encouraged critical thinking, to workshops and performances that showcased practical skills, to exhibitions and installations providing tangible proofs-of-concept that these futures are possible.

Overall, what made Gentler Futures Festival unique was its focus on concrete bottom-up initiatives rather than superficial sustainability rhetoric. For those who attended, the festival was both a challenge and an invitation—to rethink entrenched systems, to reimagine the role of design, and to participate actively in building more resilient, conscious, and respectful futures.

Image 2 Natura Matéria's hempcrete workshop (Ph. Bruno Condeixa)

Image 3 MaTierras's rammed earth workshop (Ph. Bruno Condeixa)

Rethinking materials

Materials shape the world around us. While we may not be aware, they tell stories of how society has evolved and behaves—stories of extraction, transformation, and often, waste. Gentler Futures embraced the challenge of rethinking these stories by shedding light on new design approaches that go beyond the so-called "take-make-waste" model.

How can we design with what has already been designed—and used, and discarded? What if waste could become the building block of design, architecture, construction and many other practices? Can a city become self-sufficient by taking advantage of its own waste?

Part of the festival's line-up consisted of people and projects who are not only questioning the very definition of waste but also pushing its boundaries. From industrial by-products to organic waste, participants witnessed materials typically destined for landfills being transformed into valuable resources for design, interiors, and construction.

Projects like BY THE END OF MAY's own Post Paper Studio provided a glimpse into a future in which neighbourhoods can become self-reliant in the recycling of their own waste, and where paper waste is transformed into a long-lasting material that can be used in place of wood. Matterpieces showcased how beauty and utility can coexist in upcycled designs, by transforming demolition waste into terrazzo-like materials for architectural applications. Workshops like "Exploring the reuse of residues in ceramics" by Prima Matters, "The light of marble" by Novonovo, or "Upcycling organic waste for the built environment" by The Bagaceira Project invited participants to engage directly with material flows. From recycling ceramic waste into new materials, to exploring marble's lesser-known qualities to create functional lamps, to crafting biomaterials from bagasse and using hemp for insulation in architecture, these hands-on activities were meant to demonstrate how accessible circular design practices can be. And keynotes such as "Reuse in construction: mapping the 'mines' for our future" by NADA NOVO, inspired everyone to reframe construction waste not as a burden but as a resource to be "mined", encouraging a shift towards repurposing in architecture and an opportunity for creativity and innovation.

Overall, the goal was to question the wastefulness of extractive industries and explore the potential of circular approaches. Across the festival's activities, participants were encouraged to see discarded materials not as end-points but as beginnings of new cycles of use, imbued with cultural, ecological, and aesthetic significance.

Growing food

Food is something that everyone, everywhere, needs every day. The act of growing food represents more than just sustenance—it's a profound reconnection to the land and a reclaiming of agency in the face of globalised food systems. The way we do agriculture on a large scale relies heavily on fossil fuels, chemicals, vast amounts of clean water and global supply chains. Its side effects turned the current food system into one of the major contributors to the environmental emergency.

How can we produce and distribute food inside the city without compromising what's around us—the environment, the non-human species, the wellbeing of the farmers? Which skills are designers and architects able to bring to the table (and to the farm)? And how can we close the gap between production and consumption?

By addressing these questions, the festival created a space for imagining food systems that are not just sustainable but restorative, and that can reconnect the urban context with the cycles of nature.

Among those who helped us bring this theme to life were Upfarming who, through the workshop "Elevate and cultivate: growing food together through vertical farming workshop", introduced participants to hydroponic farming. Attendees assembled vertical farming towers, planted crops, and explored how vertical farming can produce food efficiently within urban settings. And, by returning weeks later to harvest and share their crops, participants experienced the full cycle of what local food production could look like.

The Hacko Open-Source Kit, showcased in the exhibition, presented another perspective on local food production: design that blends vernacular knowledge with waste repurpose, transforming rice bran, a by-product of grain cultivation, into nukazuke pickles. On the other hand, experiences like Rodrigo Borralho's "Food literacy projects", and Inês Coelho da Silva's "Edible landscapes: art and food" and "Edible ecosystem: the wetland of my roots", offered a deeper immersion into agroforestry, community-led farming, harvesting wild herbs and plants within cityscapes, and slow food practices.

The discussions didn't shy away from hard truths: the environmental cost of industrial farming, the gap between food producers and consumers, and the barriers to making localised food systems equitable and accessible. But these challenges only deepened the urgency of the conversations. By addressing food production as both a practical and systemic issue, these sessions provided actionable insights while sparking hope for a more resilient urban future.

What would a future based on respectful relationships look like? What would it mean for humankind to become gentler? And how do we design gentler cities, gentler worlds, gentler futures?

Challenging tech

Technology is often synonymous with progress. But many recent innovations have been created to solve problems caused by earlier technologies and earlier inventions. This means that they are not really solutions, they are temporary bandaids. We tend to look at past technologies as outdated and obsolete, because each new tool and device that comes out makes our lives easier, and helps us complete tasks faster.

In western countries, common everyday activities are now high-tech: from doing the laundry to cooking, from cleaning to shaving. And the more high-tech our lifestyles become, the more energy we need to produce and power all of these devices. Most of the time, the easy, convenient choices are only possible because of systems and infrastructures that we never think about, and which usually rely on resource-intensive global systems and on fossil fuels.

How do we transition our lifestyles to exist without them? Is technology part of the solution or part of the problem?

Driven by these questions, the festival explored the potential of low-tech tools and decentralised energy production in preparing the design practice for a post-fossil fuel world. In "Slow Kitchen: cooking with solar and human energy", participants experimented with solar ovens and bike generators, cooking only with sunlight and human power. Led by Audrey Belliot (Slow Lab) and Marie Verdeil (Low-tech Magazine), the session demonstrated how low-tech tools can substitute high-tech modern devices and provide practical alternatives for food preparation. Other projects exhibited during the festival, such as Biosphere Solar, an open source tool-kit of DIY, repairable solar panels, and SOS Heater, a community-developed low-energy spot heater built using only easy-to-find materials, presented complementary perspectives on the discourse of decentralised energy systems. By fostering a community of makers, both projects illustrated the importance of accessible, low-impact technologies in fostering the larger energy transition.

Discussions encouraged participants to rethink the role of technology in society—not as dictating humanity's path or an end in itself, but as a tool to support resilience, inclusion, and ecological balance. Even sessions like Megan Ammari's "Lisbon's futures in VR", a hands-on workshop using AI and XR tools, were meant to inspire a reevaluation of how technological innovation and tools can serve the transition to a more planet-centred future. By challenging the dominance of the current design of high-tech, extractive systems, Gentler Futures reimagined a future where technology, rather than extractivist, serves as an enabler of more balanced ways of living.

Image 4 The Slow Kitchen by Audrey Belliot and Marie Verdeil (Ph. Bruno Condeixa)

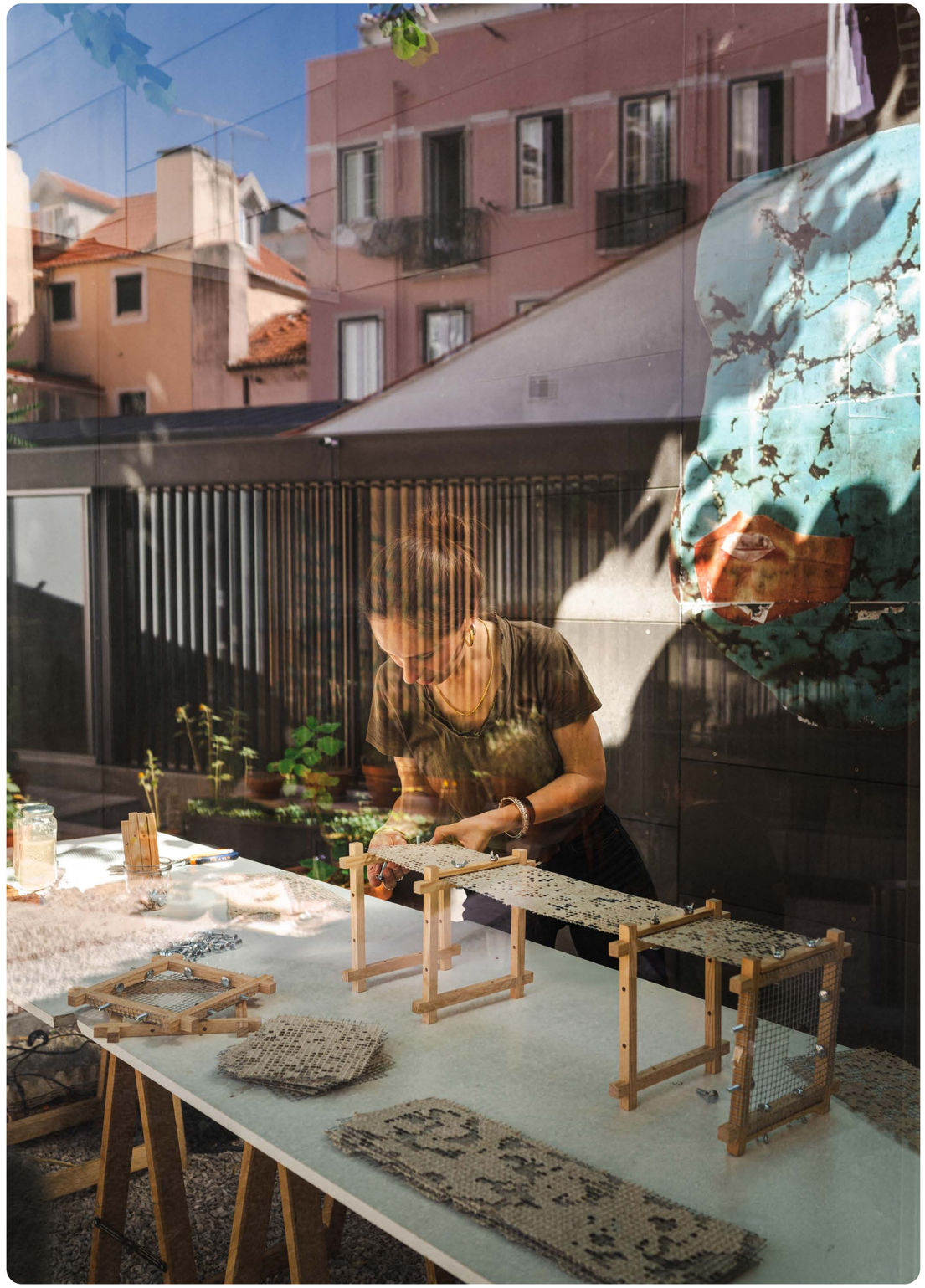


Image 5 Sofia DeFrancesco's paper upcycling performance (Ph. Bruno Condeixa)

A vision in unfolding

The first edition of Gentler Futures Festival posed an essential question about the future of cities: *how can we design systems that prioritise community and ecological well-being over profit and growth?*

The festival left the over 700 participants with a deeper understanding of design as a tool for resilience and agency. Whether through the exploration of low-tech tools, decentralised energy systems, circular materials, or urban farming, attendees walked away inspired to rethink the role of design in addressing today's global challenges and in shaping a new approach to urban living—one that is locally productive, self-sufficient, and community-driven. Yet, this is just the beginning.

The festival's long-term goal is to build a platform for both inquiry and action. To create a legacy of meaningful change that continues to grow in the coming years. We see Gentler Futures as a medium to cultivate emerging practices in systemic and regenerative design, with values rooted in sustainability, resilience, and community empowerment. We believe in the transformative power of design in addressing complex challenges facing society, to foster a culture of innovation and collaboration. Our emphasis on sustainability extends beyond environmental considerations to encompass social and economic dimensions, recognising the interconnectedness of all aspects of community well-being.

The second edition of Gentler Futures Festival, planned for May 2026, will take a deeper dive into design's relationship with Nature. Under the upcoming theme, Towards Ecosystem Regeneration, we envision design as a form of advocacy for nature itself—a means to collaborate with natural systems, rather than simply drawing from them. To imagine a world where humans and nature thrive in mutual harmony. Honouring the countless other beings that have thrived and adapted long before us, and drawing on indigenous knowledge that has long emphasised the interconnectedness of all life forms, people are invited to listen, learn, and find inspiration in their intelligence and wisdom.

QR 1
Gentler Futures for yourself

QR 2
BY THE END OF MAY's website

QR 3
Find us on Instagram

The Green Finger Initiative

Tanushree Kedia,
Nazli Terzioglu

A gamified farming education for children that inspires, educates and involves children in agriculture

Project type
Product as a Service

Location
London, UK, Europe

Project description

The Green Finger Initiative (GFI) tackles the disconnect between urban children and natural food systems, aiming to reintroduce children aged 8-12 to nature and agriculture. In a world where urban lifestyles often lack outdoor and agricultural experiences, GFI fosters a deeper understanding of food production, ecosystems, and sustainability— offering key knowledge for addressing future environmental challenges caused by the current food system.

The initiative adopts a “phygital” approach, blending physical kits (British seasonal seeds as an advent calendar, IoT sensors and interactive tools) with a digital app that allows children to track plant growth, share updates, and build a community of young growers. This model integrates traditional gardening with modern technology, offering children an accessible, hands-on learning experience relevant to their urban lives.

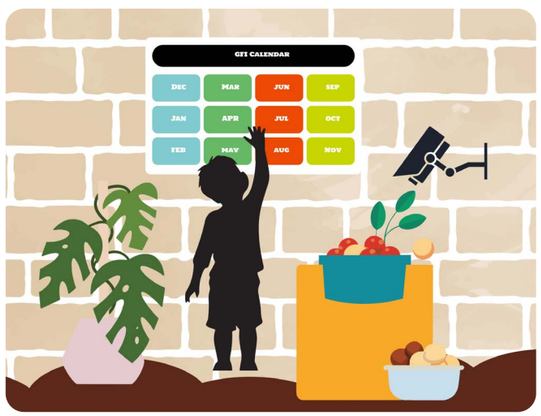


Image 1 Curiosity, Intrigue and playfulness for children (2024, London, Tanushree Kedia)

Context and history

GFI was born from a deep reflection on the disconnection between urban life and nature, sparked by an article that highlighted the inherent injustice of our current food system. A quote particularly resonated with me: “The work undertaken to produce food is one of the most fundamental and ancient forms of labour human beings must engage in to survive and flourish”[1]. This statement made me realize how far removed many of us, especially as urban dwellers, have become from the very act of farming—something that is not only vital for survival but also deeply rooted in the human experience. It set me on a path to explore how we can re-nature people, beginning with children, reconnecting them with the land and the food they consume.

The project’s origin can also be traced back to another project I had been working on, which envisioned “London as a walking grocery store.” While that project imagined a future where food could be grown and harvested in the heart of urban spaces, The Green Finger Initiative takes that vision further by creating a tangible pathway to making it a reality. At its core, the initiative is grounded in the belief that future generations will face challenges unique to their time. As designers and creatives, it is our responsibility to not only imagine solutions for them but to actively involve them in reshaping the future of food systems, ensuring that they inherit a world they can sustain and nurture.

What is the need it tackles?

The need to grow food is fundamental to human survival, yet the systems supporting this necessity have become both a blessing and a disaster. As highlighted in the National Food Strategy, “the current food system feeds 9.7 billion people but also causes soil erosion, food

Image 2 Giving autonomy and tools to children to build better futures (2024, London, Tanushre Kedia)

inequality, pollution from shipping and transportation, and illnesses from rising pesticide and chemical use, affecting both the planet and its people”[2]. This unsustainable model continues to harm biodiversity, ecosystems, and human well-being. It is evident that neither the planet’s flora and fauna nor its people can sustain this ongoing abuse.

The Green Finger Initiative addresses this need by aiming to re-wild, re-connect, and re-nature individuals, fostering a sense of responsibility for their environmental impact. Through regenerative and more-than-human practices, the initiative bridges the technological and industrial human world with the green, natural world using interactive experience design.

At its core, the project decentralizes traditional learning models and redistributes learning and play through making. Children receive a seed advent kit containing seeds, a camera, and access to an app. The app becomes their guide, encouraging them to explore the growing process creatively and collaboratively. Children might ask guardians for help gathering tools to grow their seeds, consult budget-friendly suggestions on the app, or innovate with available materials.
The app also gamifies the experience by prompting activities or questions like, “Where do tomatoes come from?” or “How much do they cost at your local grocery store?” It encourages tasks such as creating diagrams, mapping local farms, visiting friends’ home gardens, or exploring community farming spaces.

By integrating technology with hands-on learning, the initiative fosters environmental awareness and sustainable practices, empowering children to engage actively in their local ecosystems while developing vital skills for a regenerative future.

Image 3 The Green Finger Initiative Kit (2024, London, Tanushree Kedia.)

Image 4 Conversations with visitors about the potential of the initiative (2024, London, Charles)

What was the development process of the project like?

I began with speculative design, envisioning a future rooted in ecological citizenship and sustainable food systems. This process involved imagining alternative futures and creating a vision of London in 2050, where food production and consumption are re-prioritized. The visual language was intentionally playful and childlike, reflecting the target audience—children—while emphasizing their role as future leaders and changemakers. This approach not only captured the curiosity of its participants but also communicated the initiative's ethos of fostering a deep connection between people and nature.

The project followed a structured approach, starting with research and interviews to identify food system challenges. Speculative mapping and backcasting highlighted intervention points to bridge the present and envisioned future. Insights from parents shaped the design, ensuring practicality. Prototyping refined packaging, materials, and implementation strategies, while horizon scanning ensured adaptability and long-term impact. Supported by interdisciplinary input at Royal College of Art (RCA), the project combined futures thinking with actionable design to reimagine the food system and spark curiosity. Displaying it at the RCA graduate show provided valuable feedback from parents, farmers, educators, and venturists, helping create a cohesive outcome.

What impact does your project currently have?

GFI transforms food education by fostering collaboration among parents, teachers, children, and local farmers, bridging the gap between knowledge and practice to nurture sustainable habits. It empowers schools to adopt hands-on farming practices, creating equitable access to gardening and integrating deeply with school systems. Feedback from the show emphasized making gardening more affordable, involving local farming visits, and enhancing inclusivity across socio-economic backgrounds. By driving systemic change and promoting sustainability, GFI serves as a scalable model for global food education, inspiring resilient and food-secure communities.

What is the global-local relationship of the project?

The initiative envisions a future where decentralized, self-sustaining communities flourish globally, creating a "vocal for local" narrative that respects the food sovereignty and unique ecologies of every region. This approach prioritizes local food systems, empowering communities to grow their own food while reducing reliance on exploitative global supply chains. By deconstructing the existing system—where some

Image 5 A myriad of activities in a truth and dare game format to keep kids active and curious. (2024, London, Tanushree Kedia)

Image 6 The simple intervention point is integrating an "advent calendar" with seasonal seeds (2024, London, Tanushree Kedia)

countries disproportionately feed others at the cost of their own health, resources, and well-being—this initiative fosters a more equitable and meaningful global connection.

At its core, the Green Finger Initiative promotes the practice of growing food and learning about sustainability from a young age. Children who engage with this initiative develop not only practical skills but also a deep respect for local ecosystems. As they grow into adults, they can leverage global communication tools to share knowledge, techniques, and insights with others worldwide. By 2050–2055, the vision is to have a world where communities and individuals are largely self-reliant in meeting their food needs. This decentralized, regenerative approach to food production connects people globally in a collaborative and non-transactional manner, creating a network of empowered communities working toward a healthier, more sustainable future for all.

Why is the Green Finger Initiative distributed design?

GFI embodies the principles of distributed design by fostering a collaborative ecosystem where parents, children, teachers, and local farmers come together to share knowledge and practices around sustainable food systems. By redistributing learning and making at the grassroots level, it transforms food education into a communal and interactive experience. This decentralization enhances opportunities for collaboration and shared experiences, fostering a sense of ownership and agency within local communities.

Through its integration with schools and support for food education, the initiative bridges the gap between theory and practice, making sustainable practices accessible and engaging for children]. This redistribution of knowledge and participation not only educates but also renatures youth, inspiring them to view food systems as regenerative and interconnected. Over time, this approach has the potential to catalyze systemic change, redefining how food education is perceived and implemented globally while contributing to a more sustainable and food-secure future.

Additionally, the Green Finger Initiative is not just a research project but also a scalable and consumable business model. By combining educational goals with a practical, market-ready framework, the initiative aligns with distributed design's values of openness, regeneration, and collaboration, leaving a legacy for the discipline as a model of how design can address global challenges through local, participatory solutions.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

For me, the answer is obvious: the soil! I often find myself wishing it could talk—imagine the stories it could tell. What does it need? How does it feel? What does it think of its complicated relationship with us humans? I like to imagine the conversation unfolding like a session in a therapist's office. As designers, we're so used to creating "user personas," "empathy maps," or "day-in-the-life journeys," yet when it comes to soil, beyond scientific data, we know so little.

Understanding soil as more than just a resource—as an entity in its own right—feels crucial for fostering a more cohesive, more-than-human existence. Personifying the non-human isn't just a creative exercise; it's a way to shift focus and bring attention to things we often overlook or undervalue in design. Sure, there are anthropocentric limits to what we can know about soil's "feelings," but imagining its stories—especially from a multispecies perspective rather than a purely human-centric one—opens up exciting possibilities. Thinking beyond current technological boundaries, who knows? Maybe one day we'll be able to truly understand and design with soil as a collaborator, not just as a grower.

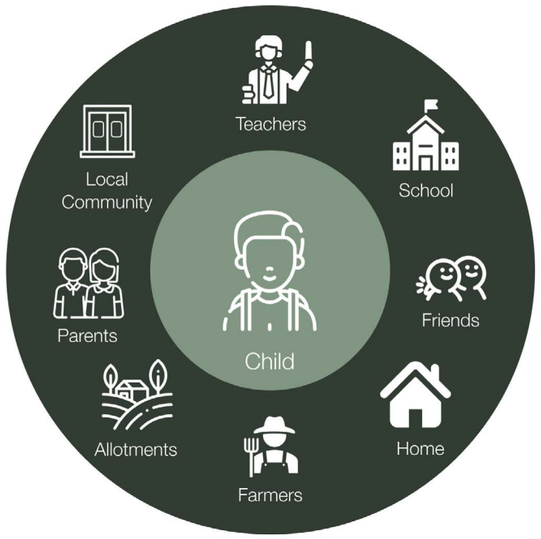


Figure 1 Pooling together people and places that a child is naturally surrounded by to create free play spaces and time (2024, London, Tanushree Kedia)

Image 7 London 2050 if it self-sustaining agriculture was at its core (2024, London, Tanushree Kedia)

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Developing Data for an Open Internet of Production

Antonio de Jesus Anaya Hernandez,
Internet of Production and National
Online Open University of Mexico

A journey of data analysis and mapping distributed manufacturing networks

In 2024, I had the opportunity of leading the development of the Map of Machinery, a project within the Maker African European Innovation Ecosystem[1]. Funded by the European Union's Horizon 2020 programme[2], this project was designed to foster collaboration among hardware innovators across Africa, Europe, and beyond, driving hardware innovation and creating meaningful global connections. What I initially thought would be a straightforward series of tasks quickly transformed into a journey of discovery. Along the way, I deepened my understanding of data design fundamentals, explored strategies for effective data collection, tackled the complexities of privacy regulations, and developed tools to streamline data processing.

My motivation for writing this article is to share the thought process, technical development, and outputs at each milestone of the project. I've aimed to present this in a clear and accessible way, making it easy for general readers to follow while inspiring others who are passionate about shaping the future of digital tools for the maker movement. I hope this encourages contributions to this or similar initiatives that promote open innovation.

Through a detailed review of the project scope and interviews with key stakeholders, the Map of Machinery was created with the goal of mapping and analyzing the geographical distribution of maker-related machinery. By doing so, it aims to enable an open network of collaborative innovation and manufacturing, empowering makers and innovators worldwide.

Project examination

The journey began with a moment of reflection—stepping back to consider the meaning behind the project name, "The Map of Machinery." This process was essential for understanding the scope, limitations, and expectations for the deliverables. It also provided an opportunity to envision the project's growth and explore its potential applications on a global scale.

From the outset, I focused on building strong foundations that would not only ensure a lasting impact but also allow the project to adapt to evolving needs over time.

To guide this journey, I relied on a set of seemingly simple but fundamental questions. These questions were crucial in shaping the project's scope and direction, serving as guiding principles that brought clarity and purpose to its development.

Core Concepts

What is a Map?

"A map is a graphic representation of the environment. It is a tool designed to convey spatial relationships, whether they be physical, social, economic, or cultural, through a simplified depiction of the features of the Earth or other surfaces."[4]

With this definition in place, it becomes clear that the map of machinery will provide insights of the spatial distribution of machinery and its relationship with other information sources. The next question is: what type of representation best suits this purpose?

I chose to use a Mercator projection map[5] for this project—a familiar and technically efficient way to represent the world. Compared to 3D representations, it offers a simpler solution that requires fewer computational resources, making it more accessible for the end-user.

At this stage, the exact scale of the data remains uncertain. However, it's crucial to plan for an infrastructure that can scale efficiently as demand grows. This ensures that both time and budget are allocated effectively, allowing the project to remain sustainable while meeting future needs.

What is a Machinery?

"Machinery refers to devices or systems composed of interrelated parts that work together to perform a specific task, particularly in industrial or manufacturing processes. They may be manually operated, semi-automated, or fully automated, and are designed to transform raw materials into usable components or products."[6]

Based on my FabAcademy[7] formation and maker experience, I've pre-classified machines by Digital and Traditional operation. This also serves the purpose of mapping a wider social-economical range of manufacturing workshop spaces and processes, as for example, digital manufacturing machinery is tied to specialised training, modern energy infrastructure, internet access and higher economic resources.

Moving forward, the objective is to map both digital and traditional manufacturing machinery using a Mercator projection. This involves pinpointing their locations and cross-referencing them with additional data to create a more comprehensive and insightful understanding of their distribution.

The foundational components of the project have now been outlined, providing a clear starting point. The next steps will focus on setting the direction and establishing the limitations and expectations to guide the project's progress.

Limitations

Conducting an initial search for information sources with similar purposes is a crucial step in understanding the technical requirements of the project. Since the project will be an online resource, this search will focus on publicly available digital data accessed via the web. To ensure reliability and accessibility, the data collection will be limited to resources that are not subject to censorship policies in specific regions.[8]

The first step is to identify the locations where machines are actively operating and accessible, ensuring alignment with the project's core mission. I'll begin by pre-classifying spaces into physical and digital categories, similarly to the previous machinery classification.

Physical spaces

Makerspaces, Hackerspaces, Fab Labs, Biohacking spaces, and prototyping innovation hubs each play unique yet connected roles in the maker movement[9]. Makerspaces encourage creativity and learning through DIY projects, offering diverse tools and materials. Hackerspaces are community-driven hubs for collaboration in areas like coding, hardware hacking, and digital art. Fab Labs, part of a global network, focus on digital fabrication with tools like 3D printers and CNC machines, enabling local and personal production. Biohacking spaces democratize biotechnology, providing labs for open science and grassroots innovation in fields like genetics and synthetic biology.

Manufacturing machines are often found in metal and wood machining workshops within Small-Medium Manufacturing Enterprises[10] (SMMEs). These spaces play an important role in economic activity, supporting skilled professionals, and contributing data on specialized expertise for continuous production.

Each of these types of facility have both Digital and Traditional machinery, FabLabs are known to require a specific list of machinery, and SMMEs would have a more or less digital inventory based on their financial and technology access level.

Digital spaces

On-demand manufacturing platforms are digital services designed to make creating custom products simple and efficient. Using technologies like 3D printing, CNC machining, and injection molding, these platforms handle everything from small-scale prototypes to large production runs. Customers can upload their own designs or select from pre-made templates, and the platform connects them with a network of manufacturers to bring their ideas to life. Examples of such services include Wikifactory[11], Shapeways[12], SeekMake[13], and Xometry[14]. While these platforms provide convenience and flexibility, their proprietary systems and restricted access to data often make them less compatible with open-source or collaborative projects.

Unlike these platforms, networks such as Makerspaces, Biohacking spaces, and Hackerspaces operate on open-access principles. They encourage sharing knowledge and resources under licenses that allow proper acknowledgment and fair use, especially for non-commercial purposes. These networks embody the spirit of collaboration and openness, aligning more closely with the goals of projects that prioritise shared innovation and accessibility.

Exploring data from open networks is an essential first step in understanding data models and defining the project's key requirements. However, processing this information is a complex and time-intensive task, with much of the effort focused on data extraction and organization. To streamline these processes, prioritizing the use of automation tools and optimized map rendering services is crucial to handle the workload efficiently and effectively.

To ensure compliance with privacy licenses and policies, the project will prioritize sourcing data from members of the African European Maker Innovation Ecosystem consortium. These trusted sources provide secure and reliable information, offering a strong foundation for the project's development.

Expectations

The map of machinery will serve to visualise the distribution and manufacturing capabilities and machinery, and their relationship with other geographical, economic and demographic information. Aiming to provide valuable insight for makers, policy makers, NGOs and Government agencies supporting innovation, distributed/decentralised manufacturing and economic development.

The initial assessment of existing information sources using open licenses, and including manufacturing equipment and geo-location is necessary due to the limited timeframe of the project, finding ways of independent data collection is also required to ensure the quality and veracity of the data directly.

The creation of a unified database of locations, coupled with data extraction and processing workflows, is detailed in the following pages. Due to the potential scale of the information, defining clear milestones and incorporating automation is essential. Automation will prepare the project to handle large volumes of data efficiently, reducing the human and financial resources required for manual processing. To maximize the use of available resources and minimize data bias, it is critical to process all collected data, regardless of its origin or format[15]. This involves transforming diverse data types—such as documents, maps, or spreadsheets—into structured formats that can be analyzed and integrated seamlessly. As the project grows and the right infrastructure is established, manufacturing organizations might be more willing to share and collaborate within limited commercial or non-commercial frameworks. This could support local economies and help solve supply chain issues, creating a more connected and innovative manufacturing network.

Organization	ID	Records	Attributes	Size	Null Values	Sparcity
Fab Foundation, Fab Lab Network and partners	2	2587	23	59501	9038	0.85
Bay Area Makerspaces Upbeetlabs	3	58	8	464	36	0.92
University of Michigan 3DLab	4	116	5	580	0	0.85
MakerTour	5	156	7	1092	1	1
Make Works, Fab Lab Barcelona and partners	6	362	52	18824	5526	1
Offene Werkstaetten, and partners	7	515	15	7725	962	0.71
Bay Area Makerspaces UC Berkeley	8	36	5	180	61	0.88
Hackerspace.org	9	699	6	4188	1396	0.66
Makery	10	548	4	2192	12	0.67
Makezine, Makerspace.com	11	783	17	13311	869	0.99
Field Ready Inc. Needslist and partners	12	9493	67	636031	176062	0.93
IoP Data Awards R1 & R2	13	400	40	16000	1304	0.72
IoP IMA	14	9	6	56	0	1
sphere.diybio.org	15	63	5	315	0	1

Figure 1

Initial data assessment

Organisations around the world, such as the FabLab Network[16], Make Works[17], and Makezine Makerspaces[18], have mapped and cataloged their facilities with the mission of enhancing accessibility and visibility of their communities. These efforts have been impactful during the COVID-19 pandemic, serving as key resources for making products like facemasks, face shields and ventilator devices.[19]

The identification of the initial sources, prioritised consortium members and data from Africa and Europe.

The initial data extraction process relied on Jupyter Notebooks[32], selected for their ease of use and quick implementation. Each data source required a customised script, as the methods for collecting information varied depending on the source. This flexible approach allowed for tailored solutions to meet specific data requirements. One of the most straightforward methods involved using HTTP requests[33] to retrieve data from endpoints serving JSON files. However, when APIs or endpoints were unavailable, web scraping[34] was necessary. This approach involved downloading the HTML content of web pages and parsing it to extract relevant information displayed on the site.

For platforms leveraging Geographic Information System[35] (GIS) files, KML (Keyhole Markup Language) data from Google Maps[36] was used to gain valuable insights into the geographical distribution of resources. Similarly, geospatial data embedded in online mapping tools like Leaflet.JS[37] was parsed and processed to extract precise location-based information. Additionally, data stored in relational databases required the use of structured queries to retrieve and organise the relevant details effectively.

This process not only served as a proof-of-concept for data extraction but also provided critical insights into the challenges and opportunities of working with diverse data sources. These initial efforts proved invaluable as the scripts developed during this stage were later refined and integrated into a more sophisticated automation system, which is detailed in the following sections.

Data analysis

Each organisation brings unique priorities and specialisations to their data collection efforts, resulting in highly varied datasets. Some focus on detailed machine information, while others emphasise the broader context of their work. This diversity leads to heterogeneous data, presenting both opportunities and challenges for meaningful analysis.

A key factor influencing data quality is sparsity—the proportion of empty or irrelevant values within a dataset.[38] High sparsity indicates significant gaps, making it more difficult to extract meaningful insights and limiting the dataset's usability.

The chart below provides a comparative overview of data size, record counts, and sparsity across different organisations. The grey bars represent the total size of each dataset, while the darker sections show the number of records (rows). The line with dots tracks sparsity, illustrating how much of the data is empty or incomplete—higher sparsity indicates more gaps in the dataset.

Numbers inside the bars detail the total record counts and dataset sizes. For instance, larger datasets like those from Field Ready Inc.[28] contain a significant volume of data but also exhibit high sparsity, suggesting inefficiencies in data management. Conversely, smaller datasets like IoP IMA[30] are denser, with fewer gaps, indicating more efficient data collection practices.

This analysis highlights not only the strengths and weaknesses of each organisation's dataset but also underscores the need for better validation and collection processes. The reliability of the data varies greatly between organisations, influenced by the methods they use to gather, validate, and maintain their information.

This chart offers a clear visual representation of how organisations handle their data, making it easier to identify areas for improvement and opportunities for collaboration in future projects.

Machines identification

During this analysis, a detailed list of machines and their classifications was created to streamline data collection and improve efficiency. By having technical specifications readily available, this approach saves time during validation and ensures smooth processing.

For machines already catalogued, only the name and brand are required. For new entries, additional details such as machine type and build bed dimensions are necessary to classify machines accurately. For example, distinguishing between CNC milling machines used for furniture production and those for PCB manufacturing requires these additional attributes. The full machine catalog is available on Github[39].

In cases where only limited information is available, a flexible classification system is employed. Machines are generically labeled, such as "Generic 3D Printer," allowing incomplete but still valuable data to be included.

Another approach, as seen in the FabLab Network, categorises machines by their capabilities instead of their specific attributes. For instance, capabilities like

"3D printing" or "PCB manufacturing" are recorded rather than individual machine details. While this method is broader and less precise, it ensures useful data is not excluded. However, this approach has trade-offs, such as an inability to determine the exact number of machines or assess production rates. Despite these limitations, it provides a foundation for future refinement as more data becomes available.

Approaches to Data Collection

In-Person Validation

Organisations like MakerTour achieve high data reliability by sending team members to manufacturing locations to conduct in-person interviews. This method offers valuable context and insights into the capabilities of each site. However, as the geographic scope of data collection grows, this approach becomes increasingly expensive and resource-intensive.

Peer Validation

The FabLab Network employs a peer validation system, requiring confirmation from at least two active members. This process ensures a reasonable level of accuracy but heavily depends on the expertise and consistency of the validators. Adherence to established guidelines is key to maintaining data quality with this approach.

Web-Based Self-Submission

Some organisations use self-submission systems where users upload records directly online. While this method encourages participation and enables faster data collection, it often lacks robust validation, resulting in data with lower confidence levels. This approach may also miss the nuanced contextual understanding that in-person interviews or peer validation provide.

Each of these methods has its own trade-offs, balancing cost, accuracy, and participation. By understanding these variations, the project can identify best practices and areas for improvement, ultimately building more reliable and meaningful datasets for future use.

Data development process

Modeling

After reviewing the assessment data and reflecting on the insights gathered, it became clear that establishing a core set of essential data attributes was a crucial step. For the Map of Machinery to work effectively, it needs key information to unify and organize data into a single, cohesive database. The minimum required data includes:

- The facility's name
- A list of its machinery inventory
- Its geographical location
- Metadata
- Unique identification

These basic attributes are the building blocks that ensure the dataset is both functional and reliable for the project's goals.

To comply with General Data Privacy Regulation from the European Union (GDPR)[40], the project ensures users can update or delete their data upon request. A clear policy was established to prioritise user control and data security during publishing, fostering trust through transparency and accountability.

Data is retained for 48 months, balancing relevance with GDPR's data minimisation principles. After this period, data is reviewed or securely deleted to maintain regulation compliance.

To protect sensitive information, location and contact data are classified into three access levels, ensuring appropriate handling and privacy while aligning with regulatory standards:

- Highly Safe: Data such as regional references and web handlers (e.g., URLs) are considered the least sensitive. These can be shared openly with minimal privacy concerns, as they pose little risk of misuse.

- Moderately Sensitive: GPS coordinates and physical addresses provide more specific locational information and require careful handling to prevent potential misuse or unauthorized access.

- Highly Sensitive: Contact details like emails and phone numbers are deemed critical data points. These require the highest level of protection to ensure confidentiality and prevent unauthorized use.

Source metadata includes: source name, description, license, url origin, updated date, and name of publisher. This data is required for tracking, license compliance, quality assurance, and the compliance with the Findatable, Accessible, Interoperable, Reusable (F.A.I.R. Scientific data principles)[41]

With the minimum dataset defined and modeled to meet GDPR and other essential requirements, we're now ready to move forward with setting up the Data Processing system.

Processing

After defining the required data, the next challenge was determining how to handle incomplete, inaccurate, or missing information.

During the initial data assessment, we observed significant differences in data volume across sources—some datasets were rich with extensive attributes, while others took a minimal approach.

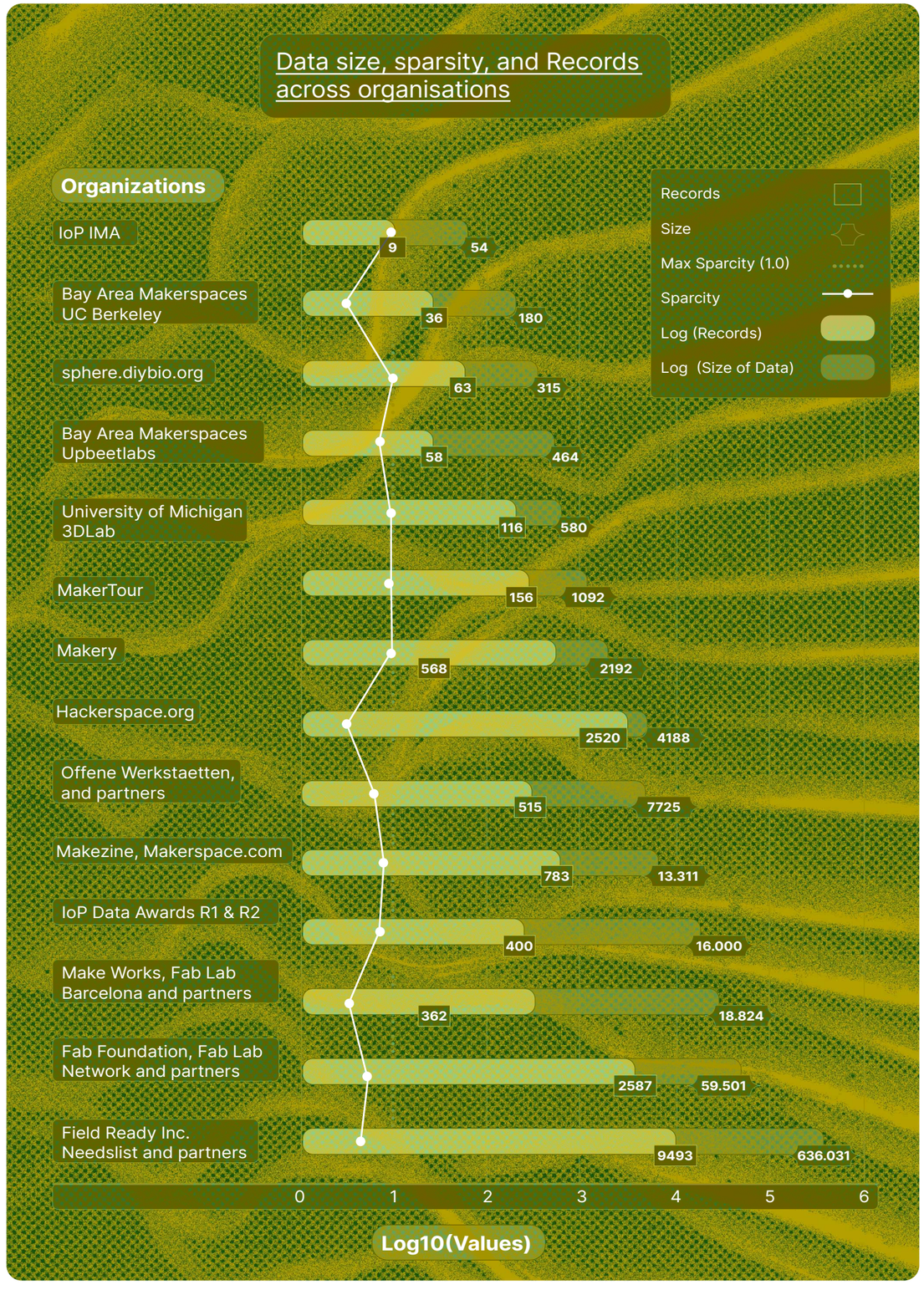

Figure 2 Data Sparsity Analysis. Author: Antonio de Jesús Anaya Hernández, 2024, Computer-generated graphic, Creative Commons CC BY 4.0

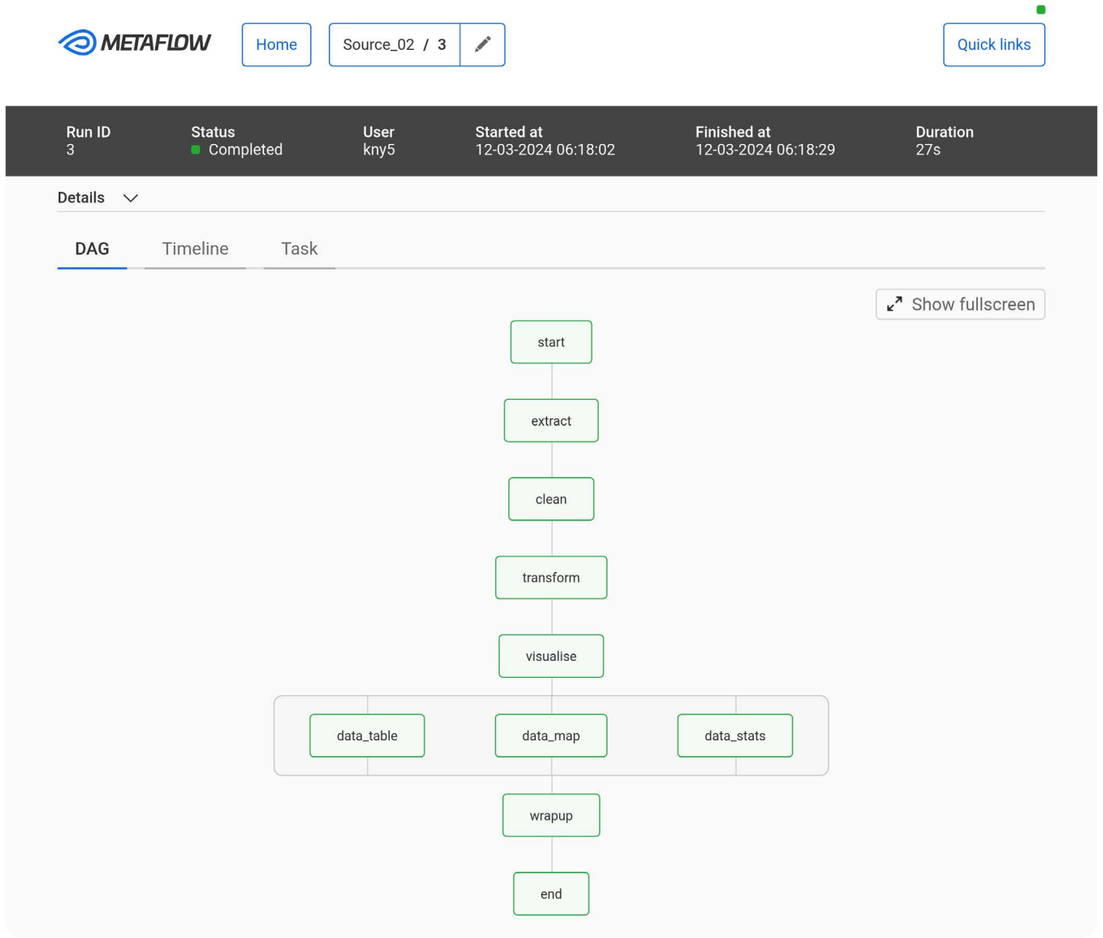

Image 1 ETL Process Diagram. Author: Antonio de Jesús Anaya Hernández, Date: 2024, Place: Computer-generated graphic License: Creative Commons CC BY 4.0

Despite these variations, all data could contribute to the initial unification process, helping validate machinery locations by cross-referencing multiple sources. This approach acknowledges that some locations might have more detailed or complementary data than others. To address this variability, a robust data processing system needed to be developed.

To tackle this, I drew inspiration from how massive datasets are handled in recommendation systems[42]. While keeping the project's smaller scale in mind, I adapted key concepts to design a streamlined data processing tailored to our needs.

An Extraction-Transformation-Load process (ETL)[43] approach was adopted with the objective of efficiently managing the collection and merge of all the data found into a single database; this process is defined as Data Aggregation[44].

The ETL is a flow based data processing system, where the data passes from different transformations, until taking the form of a database, table representation and Map visualisation. As previously analysed some information misses data, and this in some cases needs to be calculated, for example convert an address to a latitude and longitude location, and vice versa.

This system was set using Metaflow[45] an Open-Source Licensed library for Python to orchestrate data source extraction automation. Metaflow core concepts are:

- Flows: A flow represents a collection of tasks that define the entire pipeline. It is implemented as a Python class inheriting from FlowSpec.
- Steps: Each method in a FlowSpec class, annotated with the @step decorator, represents an individual task within the flow. These tasks can be executed sequentially or in parallel.
- Data Passing: Metaflow allows easy passing of data between steps. Data is stored in class attributes, and the framework manages the movement of data between steps.
- Parallelism and Scalability: Metaflow offers built-in support for parallel execution and scaling across distributed environments using decorators like @ batch for resource allocation and @foreach for parallel processing.
- Versioning and Lineage: Metaflow automatically tracks the history and lineage of data, ensuring reproducibility and easier debugging.

To implement this system, a series of Python programs[46] were developed, building on the proofs of concept created during the initial data assessment. These programs form the backbone of the processing system, enabling efficient extraction and handling of data while ensuring the process is both scalable and reliable.

The steps follow a logical structure, every single data source requires a pipeline Python program, the pipelines were defined following the ETL design:

- Start: Loads required libraries and establishes connections to PostgreSQL database, Artifact repository, and Server-side services.
- Extract: Performs data extraction through HTTP requests, database connections, or file downloads. Stores raw data and creates a Pandas DataFrame artifact with the extracted and formatted values.
- Clean: Parses the extracted data into the desired structure (columns and rows). Applies filtering criteria to remove irrelevant or invalid entries. Produces a cleaned output DataFrame for further processing.
- Visualize: Processes the cleaned DataFrame, splits the process into: Rendering a tabular data representation, and an interactive Mercator projection web map.
- Join and End: Merges outputs from the parallel visualization tasks into a unified result Returns True if all steps are completed without errors. Flags the pipeline task as failed if any step encounters an issue.

The ETL pipelines are available on the public repository[39].

By running the ETL system we obtain three static generated documents, a tabular set of data in CSV format with a web dynamic visualisation, a folium map, and a data analysis document.

Aggregation

The data aggregation process is designed to ensure consistency and reliability across all sources. Each dataset, regardless of its original format, is transformed into a DataFrame, a structured data format commonly used in Python's Pandas library[47]. This transformation standardizes essential fields, including latitude, longitude, name, and a unique identifier generated for each record. By creating a cohesive and uniform structure, this approach simplifies analysis and ensures the data is ready for integration and further processing.

The identifier is generated for every record using a SHA1 function[48]. Data types are carefully enforced: floats for numerical values and strings for text and identifiers, ensuring consistency across the dataset. This to avoid value type errors while aggregating the data.

For records containing only address details, such as city, country, and/or zip code, a reverse geocoding algorithm is used to estimate their proximity to any known location. This process leverages the "500 inhabitants city database" from the countries-states-cities-database project, an open-source dataset available on GitHub[49]. Using this resource avoids the high costs associated with geocoding platforms, making it a more efficient option given the current data volume. While the precision is approximate, within a range of 500 meters, this level of accuracy is acceptable thanks to the fast calculations enabled by K-means clustering[50].

This approach strikes a balance between resource efficiency and the practical needs of the project.

This is a special step as finally we can aggregate all data into a single dataframe, using the format function for concatenation. And finally, a first raw data source is created.

Validation

Once the concatenation process is completed, the next step is to clean the dataset—a task that often requires trial and error. Many locations in the dataset include "noise" caused by issues such as input errors during data collection, errors during data transformation, language variations, typos, and inconsistencies in naming locations.

To address this, we begin by clustering all locations within a 5-kilometer radius and comparing their names phonetically. This process uses a nearest neighbor (KNN) technique[51] inspired by OpenRefine[52], a widely used data wrangling tool. For this project, the functionality was studied and implemented in Python to ensure all processes are seamlessly managed within the ETL system, and no external tools are required.

Clustered locations with name matches exceeding 50% similarity within the specified radius are merged into a single record, retaining the latest process record. For example, spaces like "FabLab Agrilab," "Agrilab," "Hacedores," and "Hacedores Makerspace"—all referring to the same or nearby locations within a 500-meter radius—are merged into their corresponding duplicate records.

However, the absence of reliable timestamp references in most data sources poses a challenge when identifying the most recent location for an organization. While this method offers a functional solution for now, it will need to be revisited and refined in the future to improve precision and ensure greater data accuracy as the project evolves.

The ultimate goal of this process is now achieved as a streamlined controlled aggregation process is in place, merging information from multiple sources into a single dataset. More steps are required for the formation of an inventory of machinery. By using the previously created Machines Catalogue, we aim to use nearest neighbor (KNN) processing to identify machines by brand and complete their missing technical information if necessary.

This data aggregation serves as the foundation for identifying and resolving duplicates, incomplete entries, or outdated records, ensuring the dataset is clean, accurate, and ready for deeper analysis.

The map of machinery

The Map of Machinery was developed with a focus on clarity, usability, and innovation. It provides an intuitive way to explore the global distribution of manufacturing capabilities while balancing functionality, efficiency, and data protection.

Tool Selection

The visualisation system required a GIS capable of plotting manufacturing locations derived from the data processing pipeline. Licensing and cost constraints excluded commercial GIS solutions, despite their user-friendly features.

Among free tools, Folium (a Python library and wrapper for LeafletJS) was selected for its compatibility with the project's technical requirements. While Folium's default configurations offered basic functionality, they lacked the customisation options needed to meet the project's specific goals.

To address these limitations, a custom clustering function was developed in JavaScript. This algorithm dynamically adjusts marker size and colour based on the number of points within a cluster, enhancing both the visual clarity and usability of the map.

Design and Functionality

A standout feature of the map is its custom cluster markers, which change in size and colour based on the density of facilities within a given area. Using a logarithmic base-5 scale, this clustering system ensures a scalable and visually intuitive representation of varying densities.

The interface is designed to be clean and user-friendly. Each marker displays only the location name, with a clickable link redirecting users to the corresponding data source. This streamlined approach enhances usability while keeping the map lightweight and responsive.

At its current scale, the map displays over 11,000 markers yet maintains a compact file size of just 483 KB. Rendering performance was a key priority, ensuring that even with large datasets, the map remains efficient and accessible.

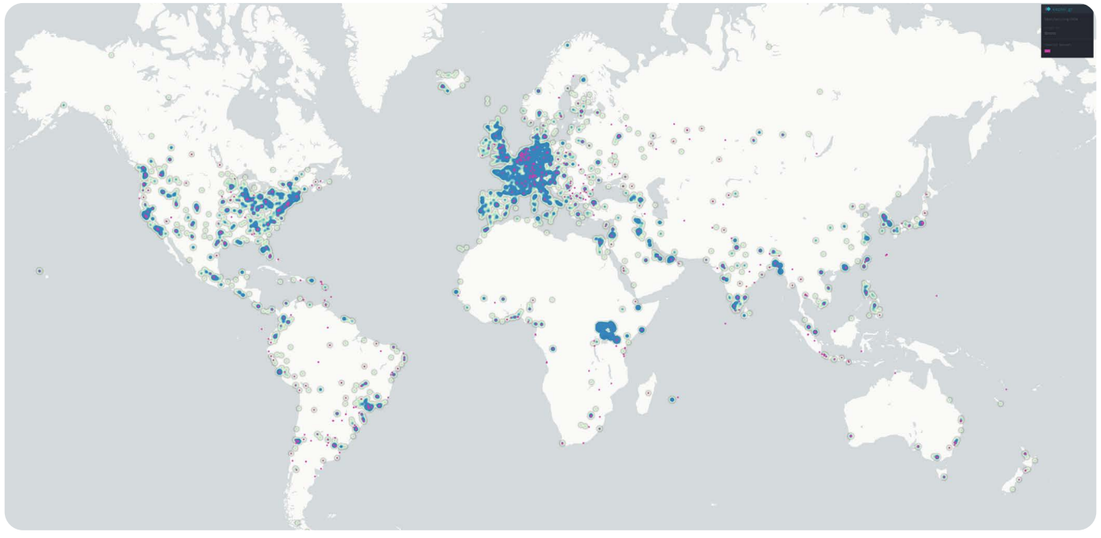

Image 2 IXBD EURO and Map of Machinery Data. Author: Antonio de Jesús Anaya Hernández, Date: 2024 Place: Computer-generated graphic. License: Creative Commons CC BY 4.0"

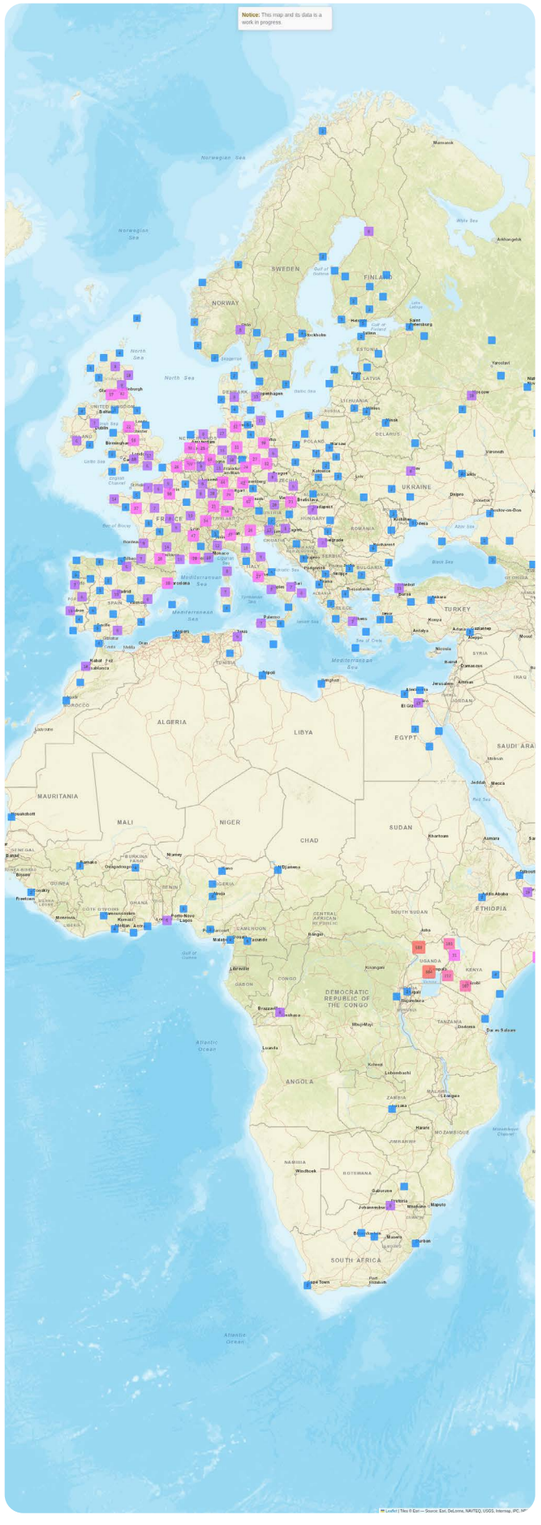

Image 3 IXBD EURO and Map of Machinery Data.Antonio de Jesús Anaya Hernández, 2024, Computer-generated graphic, Creative Commons CC BY 4.0

Interactive Features

The map includes a range of tools designed to improve user interaction:

- Near Me Search: Centers the map on the user's current location (requires geolocation permission).
- Search Bar: Locates cities, countries, or specific addresses and zooms to the desired location.
- Ruler: Measures linear Euclidean distances between two points.
- Full Screen Mode: Expands the map to fit the user's display.
- Notification Panel: Displays messages, such as disclaimers, in a floating panel.

Data Privacy and Compliance

To comply with GDPR regulations, the map incorporates multiple layers of data protection. Sensitive information is accessible only with proper consent, ensuring user privacy while maintaining functionality. This balance reflects the project's commitment to regulated data handling while delivering a seamless user experience.

Development Process

The map's development followed an iterative process, focused on creating a user-friendly interface and clear data representation. A key challenge was addressing overlapping data points, which was resolved through the implementation of point clustering as a core feature.

By combining thoughtful tool selection, innovative design, and robust technical implementation, the Map of Machinery transforms complex data into actionable insights. It stands as a powerful tool for visualising global manufacturing networks.

Relationship between Internet Access and the Distribution of Manufacturing locations.

The map illustrates a data cross-analysis between the Internet Exchange Points (sourced from the IXBD EURO database[53]) and the Map of Machinery locations.

By overlaying these datasets, a clear relationship emerges between internet infrastructure availability and the geographical distribution of makerspaces.

The visual highlights how areas with a strong concentration of internet provider infrastructure often coincide with dense clusters of makerspaces. This suggests a strong link between internet access and the establishment of collaborative innovation hubs, such as FabLabs, Hackerspaces, and other maker-related facilities.

Such insights underscore the critical role of reliable digital infrastructure in supporting decentralised manufacturing networks, fostering innovation, and enabling access to shared resources.

The map underscores a strong correlation between internet infrastructure and the development of makerspaces:

- Enabling Connectivity
  Reliable and affordable internet is critical for collaborative innovation. Makerspaces depend on digital tools, remote learning, and open-source platforms to operate effectively. The presence of IXPs facilitates this access.
- Regional Disparities
  Areas with limited internet infrastructure, particularly in Africa and parts of Eastern Europe, show lower densities of makerspaces. These disparities highlight the need for improved connectivity to foster innovation and support distributed manufacturing.
- Growth Potential
  Regions where IXPs exist but makerspaces remain sparse—such as parts of Africa—represent opportunities for strategic investment in innovation hubs. Enhanced internet access in these areas could unlock local talent, encourage distributed production, and strengthen economic resilience.

This analysis demonstrates the vital role of internet availability in supporting and enabling the growth of makerspaces and distributed manufacturing networks. The strong correlation seen in Central Europe serves as a model for regions with emerging infrastructure. By addressing gaps in connectivity, particularly in underserved areas, there is immense potential to expand innovation ecosystems, empowering makers and fostering economic development on a global scale.

An Open Internet of Production

This approach touches only the surface of what distributed manufacturing truly encompasses, but it lays the foundation for something greater. I envision a platform where organisations come together to openly share their knowledge and insights, fostering collaboration and mutual growth.

As part of this journey, we hosted workshops, delivered talks, and created videos to better understand the global landscape and the needs of the maker community. These efforts shed light on four promising use cases[39]:

- Disaster response, where distributed manufacturing can provide rapid solutions in times of crisis.
- Economic development data, offering insights to strengthen local economies through shared resources.
- Learning for makerspaces, creating tools and resources to support skill-building and knowledge-sharing within the maker community.
- Data tools for hardware designers, enabling more efficient and collaborative product development.

Much more remains to be explored to fully realise the vision of an Open Internet of Production and a vibrant Distributed Manufacturing Network.

Acknowledgments

This project would not be the same without the invaluable support of the mAkE Project consortium. I am especially grateful to my mentors—Ricardo Ruiz, Barbara Schack, and Nathan Parker—whose supportive advice shaped my journey.

Big thanks to Andrew Lamb for giving me the opportunity to be part of this endeavor at the Internet of Production Alliance, and to my amazing Global Innovation Gathering network: Dodji Honou, Eric Nitzsche, Fabienne Kirchhof, Fadhia Elgharib, Julian Stirling, Kersti Wissenbach, Kirstin Wiedow, and Melanie Chan. Your kindness and support have been invaluable.

To my family in Mexico and India, your unwavering encouragement sustained me through countless late nights. To my Chapati, for being my constant companion. And to my late father, whose memory inspires me every day—Carpe Diem.

This project was developed between January and November 2024 by Antonio de Jesus Anaya Hernandez, DevOps at the Internet of Production Alliance. The author, and presents this original work in its entirety. This work is licensed under the CC BY 4.0 Creative Commons license.[3]

The Map of Machinery empowers collaboration by mapping small-scale manufacturing capabilities, fostering innovation across Africa and Europe's maker communities.

QR 1
Find the notebooks used for this phase of data collection here.

QR 2
Find out about the raw data used for this analysis here.

QR 3
Global Map of Production Resources

QR 4
Internet of Production Alliance homepage

QR 5
African Maker Innovation Ecosystem

Barduino

Josep Martí, Santi Fuentemilla, Xavi Dominguez,
Julia Leirado & Adai Suriñach

Designing electronics for (distributed) learning

Project type
Learning tool/ Product

Location
Barcelona, Spain tEurope

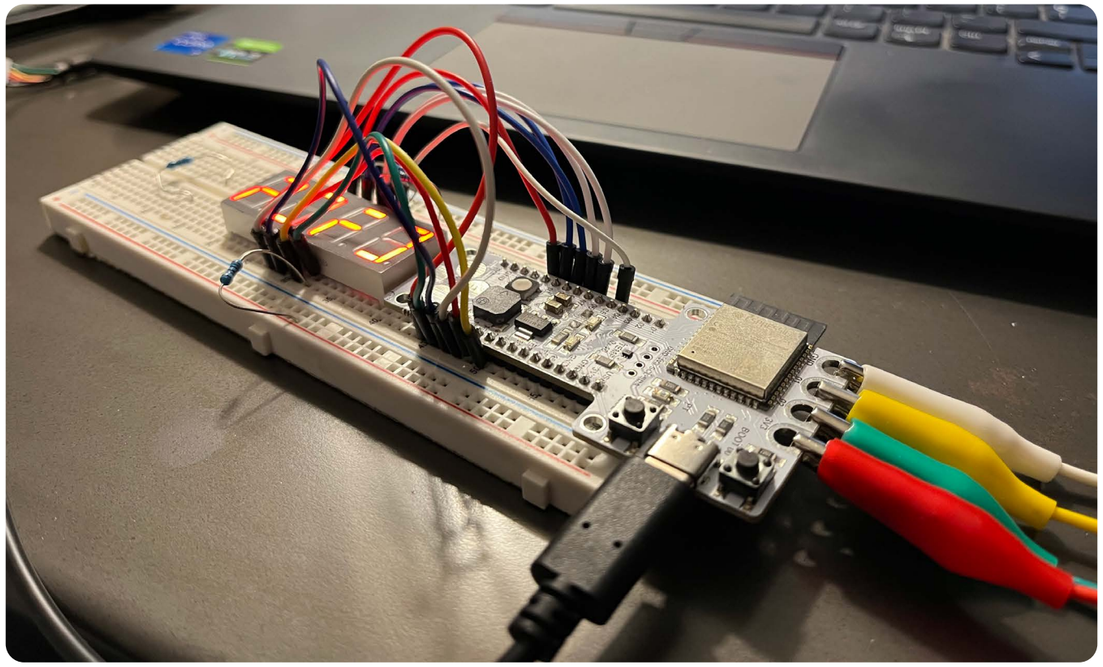

Image 1 The Barduino in use (15-12-2024, Barcelona, Josep Martí, CC0 license)

Project description

The Barduino is an electronic board developed by Fab Academy[1] instructors at Fab Lab Barcelona. Its primary purpose is to simplify learning electronics and coding by reducing hardware barriers, making it an ideal tool for beginners and distributed classes. Over more than a decade, the Barduino has evolved significantly. The project started with a basic design in 2011 and culminated in the latest iteration, Barduino 4.0.2, launched in 2024.

What sets the Barduino apart is its ability to combine simplicity and flexibility. It can be used by both newcomers and advanced users by offering a reliable, easy-to-use electronics board while supporting advanced functionalities like wireless communication and integration with other devices. Its Open Source nature ensures that it can be fabricated locally or sourced globally, making it accessible to a broad audience.

Context and history

The Barduino's journey began in 2011 when Luciano Betoldi created the first version in Barcelona. It was built using the ATMEGA328P microcontroller, a popular choice in educational electronics for its simplicity and compatibility with the Arduino ecosystem. Inspired by Arduino's philosophy of accessibility and openness, the Barduino was designed as a fabricatable development board, making it an ideal choice for Fab Academy students learning to design and fabricate electronics. Its name, a blend of "Barcelona" and "Arduino," reflects its roots and its connection to the Open Source hardware movement.

For nearly a decade, the Barduino was widely used by Fab Academy students, allowing them to complete assignments and final projects with a generic board they could fabricate or adapt themselves. However, its trajectory changed dramatically in 2020. As the world stopped with the COVID-19 pandemic, the need for distributed learning tools became urgent.

Just one week before Spain's lockdown, the Barduino 2 was born. This version replaced the ATMEGA328P with the more advanced ESP32 microcontroller, which added wireless connectivity making it ideal for remote classes. Instructors at Fab Lab Barcelona (featuring Eduard Chamorro, Oscar Gonzalez and Josep Martí) quickly produced and distributed the Barduino 2 to students, ensuring they could continue their coursework despite the sudden shift to online classes. This development not only allowed students to program electronics remotely but also inspired them to design and fabricate their own boards, getting a deeper understanding of electronics.

With the success of the Barduino 2, the team behind the project also developed the SPML machine[2], a low-cost, open-source, 3-axis machine controlled by the Barduino. This tool allowed students to explore the mechanics and behaviours of digital fabrication tools, further expanding the educational impact of the Barduino.

By 2022, the third version of the Barduino was introduced. This iteration incorporated dual microcontrollers, allowing students to work with multiple types of processors on a single board. While maintaining its focus on Fab Academy, the Barduino 3 aimed to make programming and connecting components even more straightforward by giving the students more tools to learn with the second microcontroller on board.

The release of the Barduino 4 in 2023 marked a significant turning point. This version expanded the board's purpose beyond Fab Academy, opening it to a wider network of users. By integrating sensors and actuators directly onto the board, it became a comprehensive tool for distributed learning, addressing common hardware challenges in remote education.

What is the need it tackles?

The Barduino addresses different needs in electronics education, particularly in distributed and remote learning environments. For beginners, it simplifies the steep learning curve of understanding hardware. For instructors, it reduces the complexity of troubleshooting hardware issues, especially in distributed settings where hands-on assistance is limited.

One of the biggest challenges in distributed electronics education is ensuring consistency. Students often struggle with sourcing components, assembling circuits, and debugging hardware issues. These problems can be amplified in remote learning, where instructors cannot physically inspect or fix a student's setup. The Barduino solves this by integrating essential components as sensors and actuators directly onto the board. This ensures that every student starts with a reliable, uniform hardware setup, minimizing variability and potential points of failure.

At the same time, the Barduino remains flexible. Students can connect external components to expand its capabilities, encouraging creativity and exploration. This balance of simplicity and expandability makes the Barduino an invaluable tool for electronics education.

What was the development process of the project like?

The Barduino's journey began in 2011 and it was always very related to the Fab Academy program. Over the years, each version responded to evolving needs, from adding wireless connectivity with the ESP32 in Barduino 2 during the pandemic to introducing dual microcontrollers in Barduino 3. These iterations established the Barduino as an essential tool for electronic classes in Fab Lab Barcelona.

The development of Barduino 4 in 2023 marked a significant evolution. While earlier versions prioritized fabrication and flexibility, this version addressed the unique challenges of distributed learning head-on. The integration of sensors and actuators directly onto the PCB simplified hardware setups for students, minimizing the common issues of sourcing components and troubleshooting remotely.

Feedback from instructors and students shaped its design, ensuring user-friendliness and reliability. Incorporating different sensors and actuators allowed students to learn the basics of digital and analog components and communication protocols like I2C or SPI, making it a perfect tool that simplifies learning, empowers creativity, and builds a global community following the Open Source principles.

What impact does your project currently have?

Today, the Barduino is the main tool for electronics education at Fab Lab Barcelona. It is used in a variety of programs, including Fab Academy, Fabricademy, and Fab Lab Barcelona's Master in Design for Emergent Futures[3], supporting students at all levels of expertise. Its role extends beyond the classroom, inspiring students to create their own boards and tools while fostering a deeper understanding of electronics.

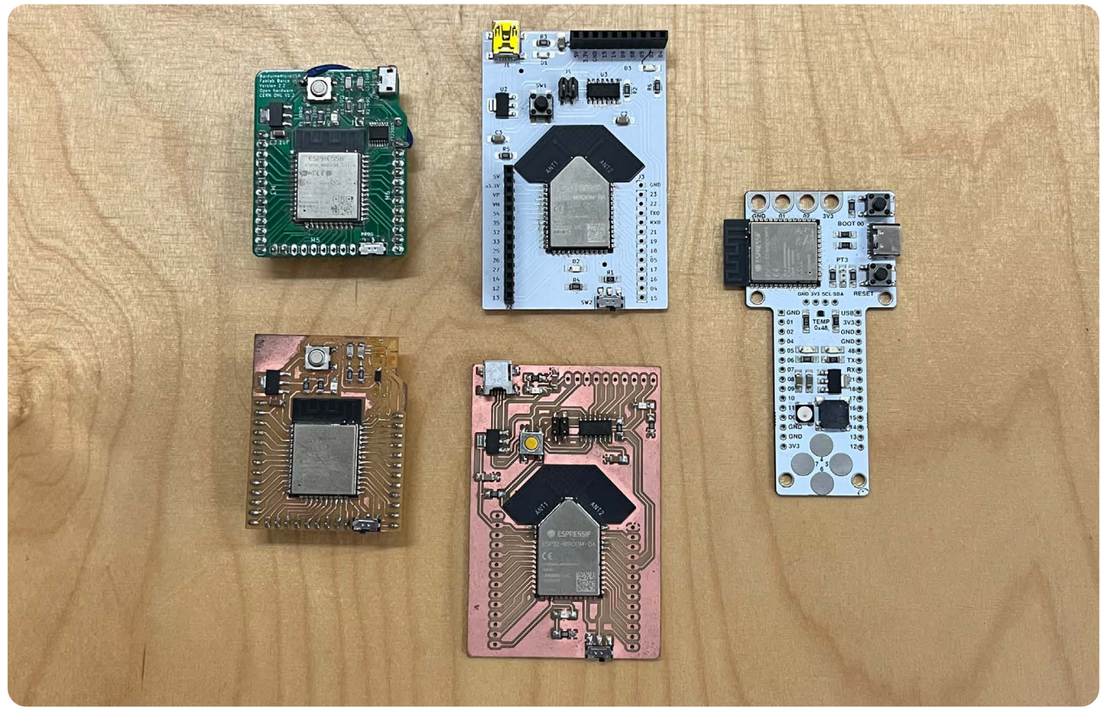

Image 2 History of the Barduino (10-12-2024, Barcelona, Josep Martí, CC0 license)

The Barduino's impact isn't limited to formal education. In 2023, it was featured in the Adventronics Calendar Challenge, a month-long initiative that engaged the global community in daily electronics challenges. Participants used the Barduino to solve problems, share solutions, and collaborate through platforms like Telegram and Miro. This event highlighted the Barduino's potential as a tool for community-driven learning and innovation.

What is the global-local relationship of the project?

The Barduino exemplifies the principles of distributed design. Its open source nature ensures that it can be fabricated locally in Fab Labs or sourced globally from PCB manufacturers. By using general-purpose components, the Barduino remains accessible to a wide audience, regardless of geographic location.

This global-local relationship is at the heart of the Barduino's success. It empowers local communities to create and adapt the board to their needs while benefiting from the shared knowledge and resources of a global network. This approach not only makes electronics education more accessible but also fosters collaboration and innovation across borders.

Why is the Barduino distributed design?

The Barduino embodies the core values of distributed design. It is a tool designed by educators for educators, addressing the specific challenges of teaching electronics in distributed settings. Its simplicity and reliability ensure that students can focus on learning, rather than troubleshooting hardware issues.

At the same time, the Barduino's open source nature and flexibility encourage creativity and experimentation. Students can customize and expand the board to suit their needs, making it a powerful platform for innovation. This combination of accessibility, adaptability, and global collaboration makes the Barduino a good example of distributed design.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

With no doubt, it would be the first Arduino UNO board. This iconic piece of hardware revolutionized electronics education, making it accessible to hobbyists, students,

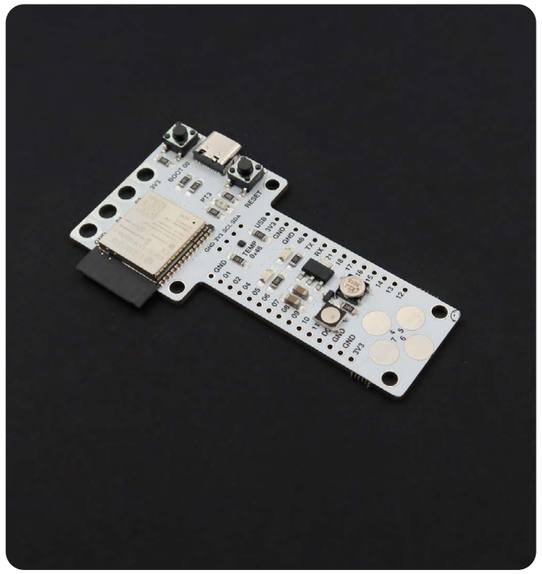

Image 3 The Barduino 4.0.2. (20-09-2024, Barcelona, Josep Martí, CC0 license)

and enthusiasts worldwide. The Arduino's success as an open source platform and its fantastic community continue to inspire projects like the Barduino. Sharing a "meal" with the Arduino UNO would be an opportunity to celebrate its legacy and explore the future of electronics education.

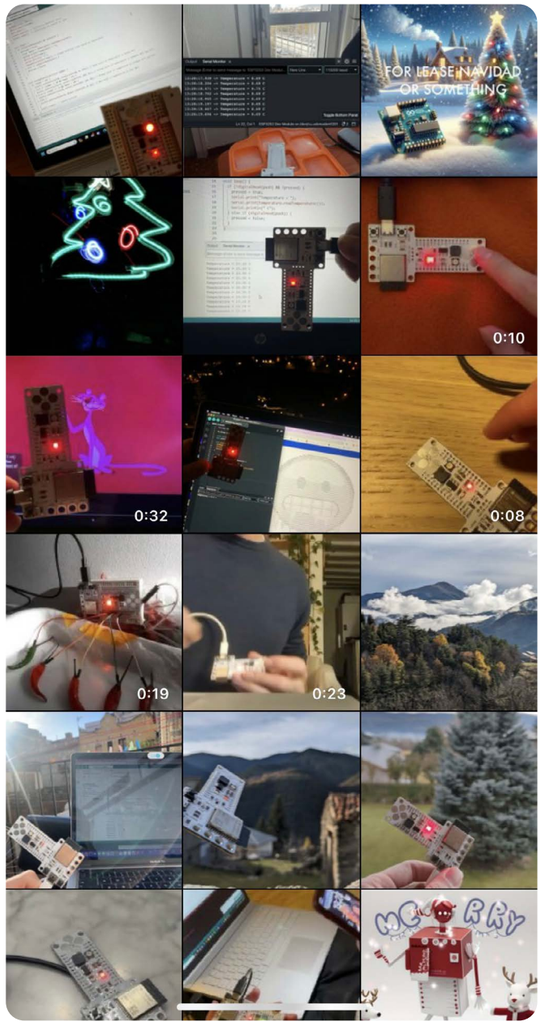

Image 4 Telegram screenshot of the photos of the Adventronics group (10-12-2024, Barcelona, Josep Martí, CC0 license)

QR 1
Barduino 4 documentation

QR 2
Barduino Legacy

QR 3
Adventronics Calendar Challenge

Queering the (Re) Distribution of Knowledge and Power Through a Neurodiverse Lens

Lars Petrova Taylor

In a world where systems prioritise uniformity over diversity, distributed design offers a radical opportunity to celebrate difference, decentralise power, and embrace collective knowledge. Much like the interconnected mycelium networks beneath a forest floor, distributed design thrives on collaboration, mutual exchange, and diversity.

By viewing distributed design through the lenses of neurodiversity, queer theory, and ecological systems, mainly mycology (the study of fungi) we uncover pathways to reimagine how we collaborate, share knowledge, and design environments where all contributors thrive. These perspectives are not simply additions to existing systems, they are transformative forces that can reshape design for the future.

In today's world, exclusionary systems often dominate, leaving underrepresented human and non-human voices unheard. Creating spaces where these voices are celebrated is essential as we face challenges such as climate change, inequitable production systems, and an uncertain future. Fer Walüng makes the point "If you observe the sexuality of plants, animals, mushrooms, insects, you will see that gender is imposed by us, by the system, by the ideology of capitalism. This deprives us of liberties. As with our own preferences; as soon as you are born things are already fixed".[1]

From adaptation to adoption

While many spaces aim for inclusion, they often fall short. Traditional spaces, whether educational, industrial, or technological, frequently fail to accommodate diverse ways of thinking and knowledge sharing.

Too often, systems are adjusted to accommodate diverse voices only after they are built. True inclusivity requires us to reimagine design from the outset by centering underrepresented voices and recognising difference as a source of strength. By recognising these voices, distributed design can challenge these power structures and create innovative solutions that rethink conventional ways of designing and making.

> Inclusion must be approached as a collaborative process, not a performative gesture

Real-world initiatives such as Dancefloor Intimacy[2] are already leading this power shift. Founded by Ali Wagner, the project transforms nightclubs and music venues to prioritise accessibility for disabled, neurodivergent, d/Deaf and chronically ill individuals. Through open dialogue between venue operators and patrons, as well as focus groups with disabled, neurodivergent, d/Deaf and chronically ill individuals, it identifies barriers, co-creates solutions, and reimagines nightlife as an environment where everyone feels safe, seen, and able to thrive.

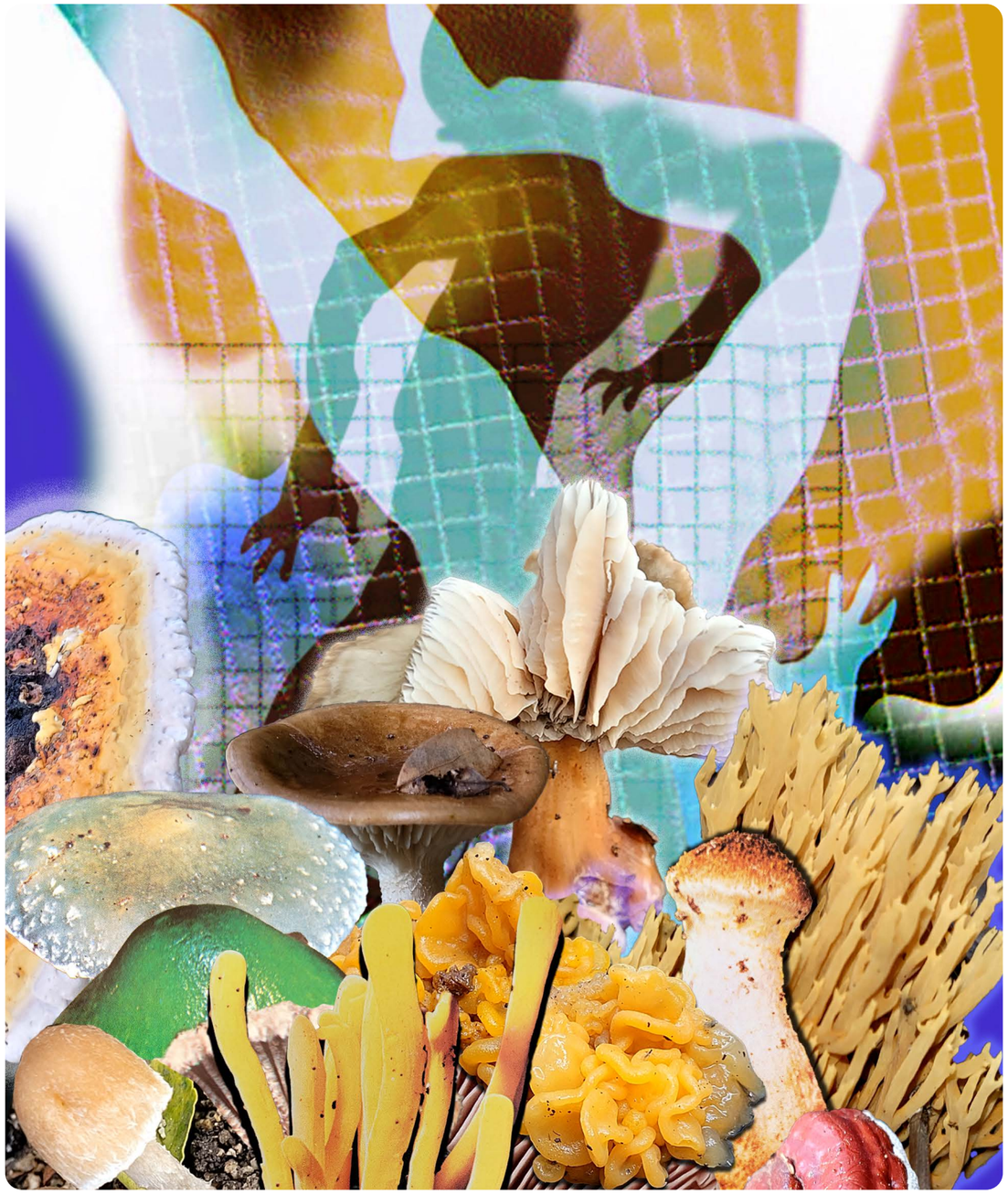

Image 1 By Elisaveta Petrova Taylor https://www.elliepetrova.co.uk/ & Lars Petrova Taylor www.maker-community.org

Space can also be physically mobile, appearing where it is needed most. Uhaul Dyke Rescue[3] exemplifies this form of distributed design. Created by Lucy Nurnberg, it is a movable pop-up housed inside two vans, bringing the concept of dyke bars—once safe havens for queer women, trans, and non-binary individuals—back to life. “This project brings the dyke bar to the masses,” Nurnberg explains, “making a fantasy futuristic utopia for dykes of all genders and their friends to let loose with the friendly Uhaul Dyke Rescue Service team.” By creating adaptable, community-driven spaces, projects like Uhaul Dyke Rescue re-empower the scene and demonstrate how design can respond dynamically to exclusion, and cultural needs. The project is already expanding to building club furniture available to hire, part of a circular sharing of resources.

Similarly, Queeriosities,[4] a travelling platform founded by curator Davy Pittoors, elevates LGBTQIA+ creatives expressing their identities through art, craft, and design. From intimate pop-up dinners to full-scale art and makers’ fairs, Queeriosities highlights those who have been historically sidelined, connecting communities and audiences. By blurring the lines between art and craft, museum and home, and archive and collection, the project opens up space for queer perspectives to flourish and knowledge to be shared.

Fab Labs and local production hubs also hold immense potential to intentionally design environments that empower underrepresented contributors, including LGBTQIA+ and neurodivergent makers. By integrating flexibility, collaboration, and decentralised structures, these spaces foster conditions where diverse voices are not only included but central to reimagining how we create and innovate.

Beyond performative inclusion

Too often, inclusion becomes a surface-level gesture. Systems are retrofitted to include neurodivergent and queer individuals rather than being designed with their strengths at the centre. Neuroqueer perspectives challenge this mindset by showing us that nonlinear processes, sensory-driven approaches, and fluid identities are powerful tools for innovation.

Audre Lorde reminds us that, “Difference is that raw and powerful connection from which our personal power is forged”[5]. By embracing difference as a source of strength, we move beyond performative inclusion and create systems that empower individuals to engage on their own terms.

Fay Nass, an Iranian-Canadian non-binary artistic director of the Frank Theatre Company, shares a powerful example of this approach: “Queering spaces in my work is often a process of de-familiarising what is considered ‘norm.’ Not only by queer bodies that are occupying the space but actually redefining the space. Queering to me is a way in which I bring Eastern practices and decolonising protocols as a way of resisting white supremacy”[6].

In their play, Aphotic Dream, Nass invites the audience into a pitch-black, undefined space where seats are sporadically placed, and actors speak in Farsi while audio recordings play. “The space becomes undefined, therefore it can be anywhere. It loses its geographical rigidness. It’s just a space. Forming a transcultural space by re-designing a physical space to an imagined one”[6]. This approach redefines spatial norms, stripping them of oppressive legacies and creating possibilities for belonging and transformation.

The example of Dancefloor Intimacy highlights how inclusion can transform culture when it is approached as a collaborative process. This same principle applies to distributed design and the spaces it shapes. By recognising and centring underrepresented voices, design becomes a pathway to creativity, connection, and shared power and knowledge.

Fungi teaches us that nature is queer indeed. They challenge narratives about binaries and resist against being boxed and categorized

Underrepresented communities

Queerness and in particular non binary is nothing new, many indigenous cultures have people of two spirits referring to a type of spirit that is a higher entity than a human not only moving between genders but also with earth. The tradition of epupillan beings in Mapushe society emphasizes the importance of shared knowledge (Kimün) and reciprocity (Reciprocar) reflecting our current principle of open source. The belief and actions to protect their land (Territorio) and to see it more than a physical space but that it is alive and holds cultural, spiritual, and practical knowledge is now our way of designing for local contexts.

Within the distributed design network, we hold the power to challenge and break the system of exclusion. Both individually and collectively, we can take initiative to seek out the unseen and unheard, connecting quite literally across the globe through accessible online platforms. Projects like the African European Maker Innovation Ecosystem (mAkE)[7] exemplify this potential. By connecting European and African Digital Innovation Hubs, mAkE maximises opportunities for digital innovation, skill-building, job creation, and global collaboration. Through its recommendations for policymakers, mAkE advocates for supportive policies that enable makerspaces to thrive as hubs for equity and inclusion.

The future for distributed design

Distributed design must move beyond ideals and embed actionable steps into its processes. Maker spaces and collaborative hubs evolve into centres of connection, hubs of diversity, and banks of shared knowledge. These approaches, inspired by neuroqueer principles and projects like Dancefloor Intimacy and Queeriosities, offer a blueprint for creating spaces where all contributors thrive.

Queer and neurodivergent perspectives challenge norms through fluid, nonlinear, and relational thinking, unlocking new design possibilities. Rather than adapting existing systems, they demonstrate how to redesign them—redistributing knowledge and power. These voices are not exceptions but leaders at the forefront of innovation.

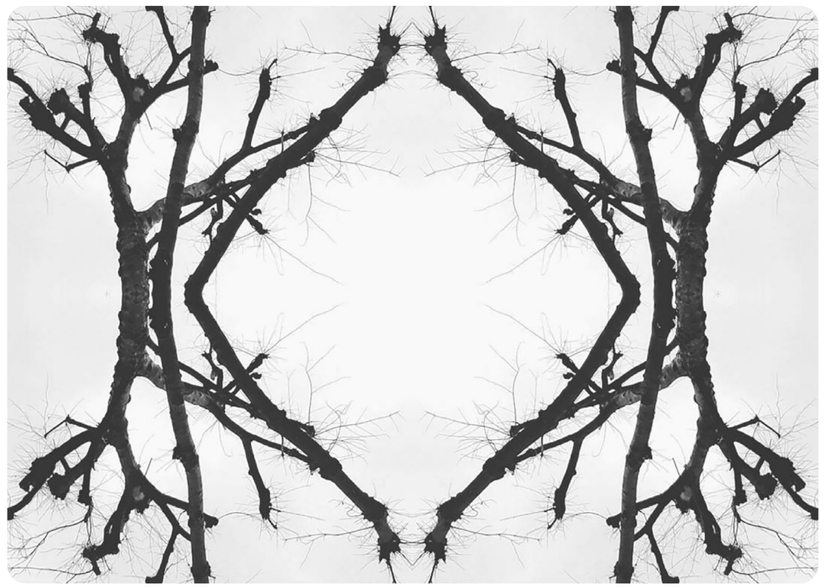

Image 2 By Lars Petrova Taylor @multiplywhy

Adoptive Design Toolkit

The Adoptive Design Toolkit reimagines how we create, collaborate, and innovate. Rooted in the principles of neuroqueer thinking and inclusive practices, this toolkit invites you to step into a space where difference is not just tolerated, it is celebrated as the key to unlocking untapped creativity and new problem-solving pathways.

This toolkit is about embracing the fluidity of human interaction, the richness of sensory experiences, and the dynamic, nonlinear nature of creativity. It challenges traditional norms and invites everyone, especially those whose voices have been historically underrepresented, to shape the outcomes of design processes.

1. Fluid collaboration

- Run collaborative focus groups with underrepresented contributors. Neuroqueer thinking reveals the value of asynchronous, sensory, and non-social modes of working together.
- Collaboration is not about conformity; it is about creating relational ecosystems that embrace difference as a source of creativity.

Why it works?
Fluidity transforms collaboration into an open, adaptive process that welcomes unexpected creativity and collective ownership.

2. Nonlinear and sensory-driven design

- **Sight:** Dimmable lighting, clear visual prompts, and colour-coded tools.
- **Sound:** Quiet zones, noise-cancelling headphones, and voice-to-text options.
- **Touch:** Tactile tools, material interaction, and spaces for sensory exploration.
- **Pace:** Flexible time structures that allow for different working rhythms, such as asynchronous contribution.

Why it works?
Nonlinear approaches allow distributed design to grow organically, adapting to complexity and generating solutions that wouldn't emerge through rigid structures.
Difference as a design catalyst

3. Difference as a design catalyst

- Showcase and celebrate benchmark projects from neurodivergent, queer, and other underrepresented makers
- Redefine success to value process over completion. Contributions, exploration, and collaboration become key indicators of progress, creating space for diverse approaches to problem-solving.

Why it works?
When difference is centred as a fundamental design principle, distributed systems unlock untapped creativity and new ways of solving problems.

4. Regenerative rhythms of creativity

- Incorporate "regenerative time slots" into collaborative workflows. These moments allow for rest, stimming, or unstructured creativity, recognising them as essential parts of the design process.
- Recognising rest and play as legitimate tools for innovation

Why it works?
Mirroring nature's regenerative cycles, where periods of rest and renewal drive growth, this teaches us that innovation thrives when we allow space for fluid, unstructured creativity, as neuroqueer thinking advocates.

5. Embedding inclusivity as a foundation

- Develop community guidelines and policies that centre inclusivity, ensuring facilitators are trained in equity, accessibility, and anti-bias practices.

Queer and neurodivergent perspectives challenge norms through fluid, nonlinear, and relational thinking, unlocking new design possibilities.

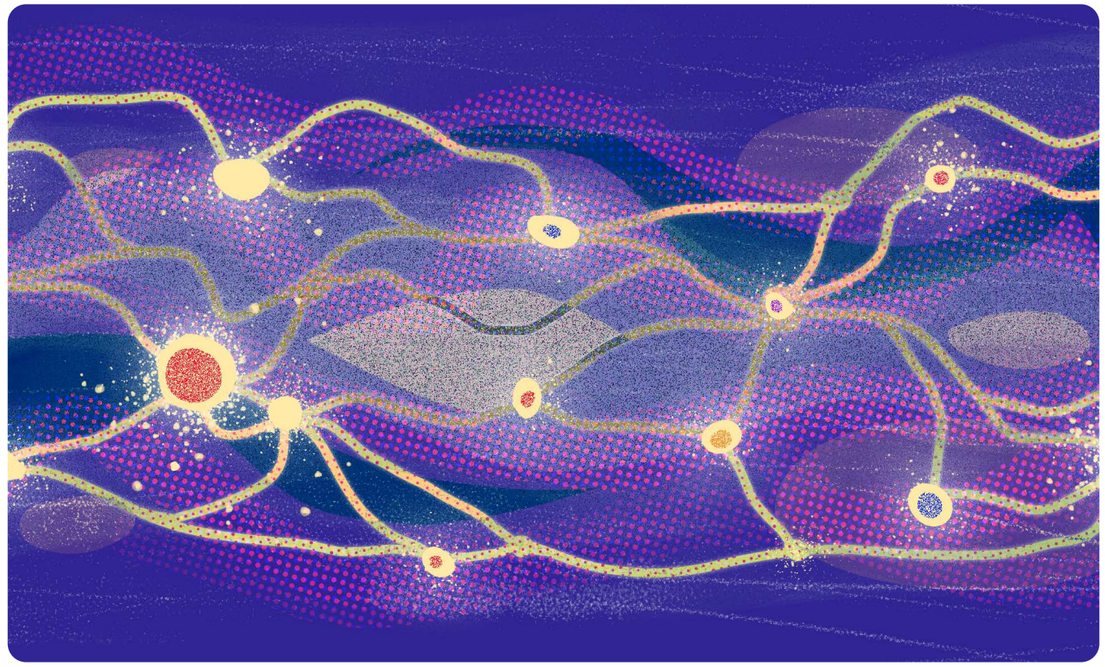

Image 3 Elisaveta Petrova Taylor
Website: elliepetrova.co.uk/

- Integrate representation at all levels, from leadership to execution, so that underrepresented voices shape both the process and the outcomes.

Why it works?
By centring relationality, distributed design reflects the interconnected, regenerative systems found in nature and diverse human collaboration.

Design futures: Queerness, neurodiversity, and mycology

Distributed design thrives when power is decentralised and difference is embraced. By looking at neurodiverse and queer perspectives, we gain tools to create systems that are not just accessible but truly transformative. Queer and neurodivergent ways of thinking challenge established norms and systems in ways that unlock new design possibilities in redistributing knowledge and power. To embody fluidity, nonlinearity, relational empathy, and innovation, offers a powerful blueprint for the future of distributed design.

Likewise in nature, "Fungi teaches us that nature is queer indeed. They challenge narratives about binaries and resist against being boxed and categorized"[1]. They teach us that mutability and adaptation are essential for survival in times of instability.

As the mycelium network that redistributes resources beneath the forest floor, distributed design has the power to create interconnected systems of mutual support and growth. "It's the mutability and adaptation that we see in fungi that are the crucial survival skills for the instability ahead. By being and thinking less binary, we prepare ourselves to trans-form"[1]. When we centre nature, neurodivergent thinking and queer voices, we redefine what success looks like and move towards a future where design is not about survival but about celebration and adaptation becomes global adoption.

The Other

Carolina De Lara,
Emma van Gerven

Future body perspectives on design methods

When we close our eyes we know exactly what they look like and their situated expressions. Yet the word is similarly used for organic and artefact interactions.

The skin like a garment, once soft leather encasing all human facets sees its definition dimmed with speculated futures reaching for what lies beyond the anthropocentric ether.

‘Fashion’, ‘human’ and ‘identity’ have historically been inextricably linked, almost exclusively, in the whimsical fantasy cobbled from imagination and into the realm of fashion. However, with beyond-human designerly agency becoming increasingly visible in design, this fantastic dimension ceases to be governed solely by humans. If others can directly design agency towards specific goals, what is their claim to the once human-dominated fashion realm? As the body of ‘the other’ is construed and defined, their entities emerge maturing identities impacting the anthropocentric soul of fashion and its ascribed principles, through interdisciplinary, collaborative and interactive design speculative practices.

Beyond the human

Emerging post-human approaches to design blur the lines distinguishing humans, technologies and their embodied significance[1], displacing the human from the limelight of a purely anthropocentric realm; fashion. The possibility of decentering the human from human-centric conventions purports a wealth of potential to innovate the aesthetic expression of wearable artefacts, as well as questioning who, what and how is being worn.

‘Wearing’ as an act of fashion demands an entity - a body - to be intentionally dressed. But the ways and actors of wearing are becoming increasingly entangled, prompting new conventions for design acts, methods and processes. This inevitably transfigures the dressed entity, simultaneously questioning the materiality of worn objects.

Recognising the role of artifacts shaping practice, the non-human rises as a design subject, delivering a m o r e - t h a n - h u m a n outlook in the purpose of design subject and object.

Rooted in mimicry, simulacra and augmenting the aesthetics of human subject and body in fashion contexts, technologies have developed such depth of character as to be differentiated from their maker in their agentic capabilities; especially from biological and digital spheres.

Biodesign[2] refers to the inclusion of living organisms in the design process enhancing its product output function. Livingness[3] is increasingly recognised as a material property and potential anchor for intra-/interspecies interaction. Bacterial Brickbats[4] [5]forays into aesthetic expressions of Bacterial Cellulose through knit-cellulose composites challenging agential design anthropocentrism.

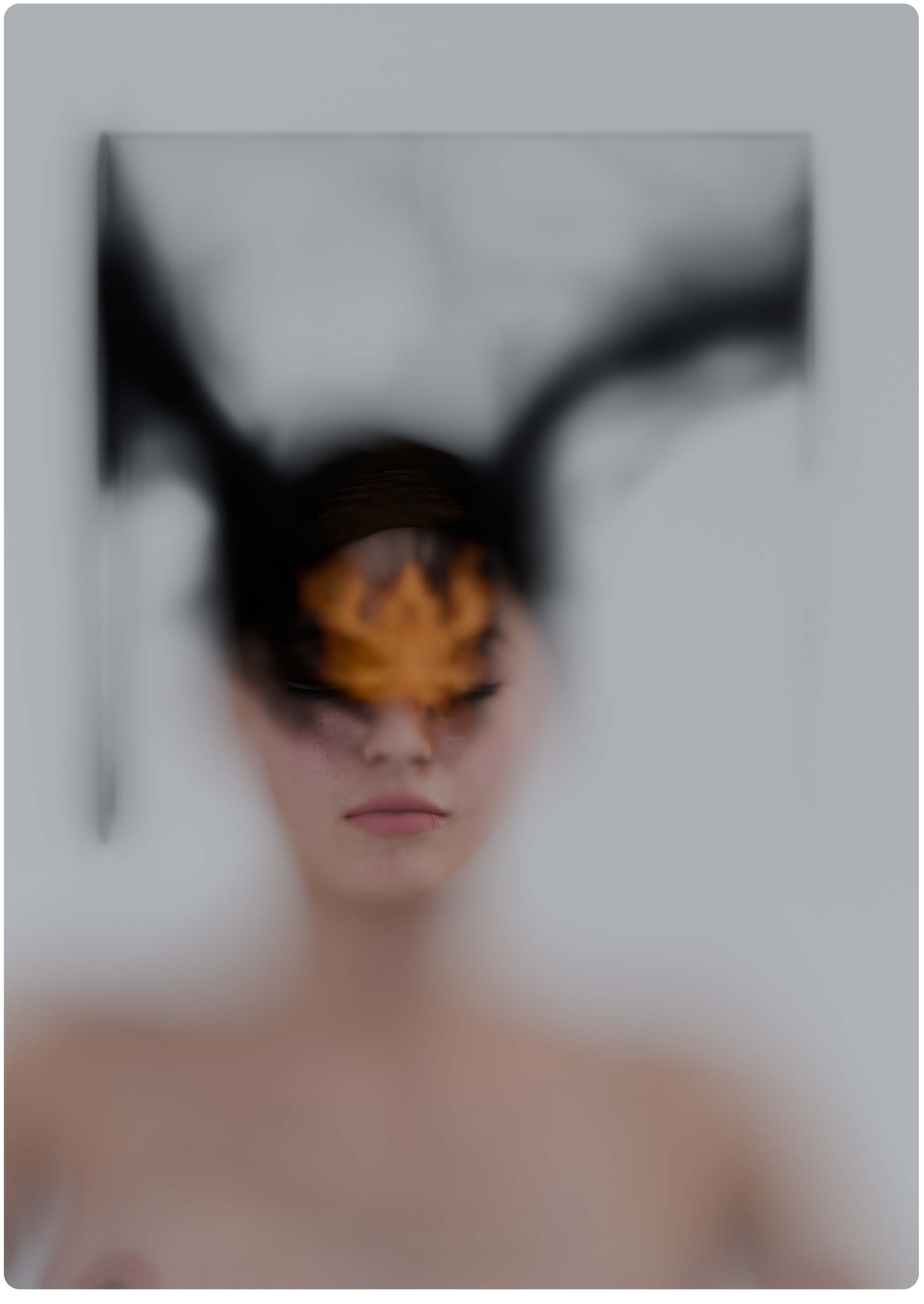

Image 1 Abstract smoke body as a mask (2024, Blender. van Gerven, Emma)

Image 2 Knit Meets SCOBY Blue Spiral.Studio photograph of prototype Blue Spiral in category Holistic

The ‘other’ body is none other than the tangible perception of bacteria-human interaction. Each species proffers the material it has to offer. Through entanglement, concordance and growth, these integrate veiling what can be designed in a layer of sensuous capriciousness; one yet shrouded in the fickle ephemerality of the unknown.

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Humans design, create the base knits and inoculate bacteria

Bacteria grow, altering the human’s plans

Results, unpredictable as the invisible connections that enable them, hinge on non-verbal interspecies dialogue and the context where this occurs

Image 3, 4 & 5

SCOBY pellicle
Reassembling cellulose
Finalised reassembly activated by light

Image 6 Texture Light Activation

Wearable artefacts originate from cooperative efforts toeing the line between beauty by human standards, and plentiful growth from non-human perspectives.

An “Other” dissipating by design

Designing to not be the final product but to open the conversation on the body. To create something beyond the designer self as a living medium to inhabit and cohabit.

In digital spheres, the concept of “garment” broadens considerably; it may be one’s garb, a skin, or an avatar, visualised through the tools that don’t distinguish between the human body and not. The garment is, thus, as much the body as the avatar is, freeing the body to be essentially anything. The ‘other’ body is a mirror and an altar that offers a habitat outside of one’s own skin.

A body that exists to be given away and, like a garment, to be taken out of its known concepts. To mod existing digital bodies, and be modded in return.

Skeletal curves are set up for guidance away from the body.

Wearing’ as an act of fashion demands an entity - a body - to be intentionally dressed.

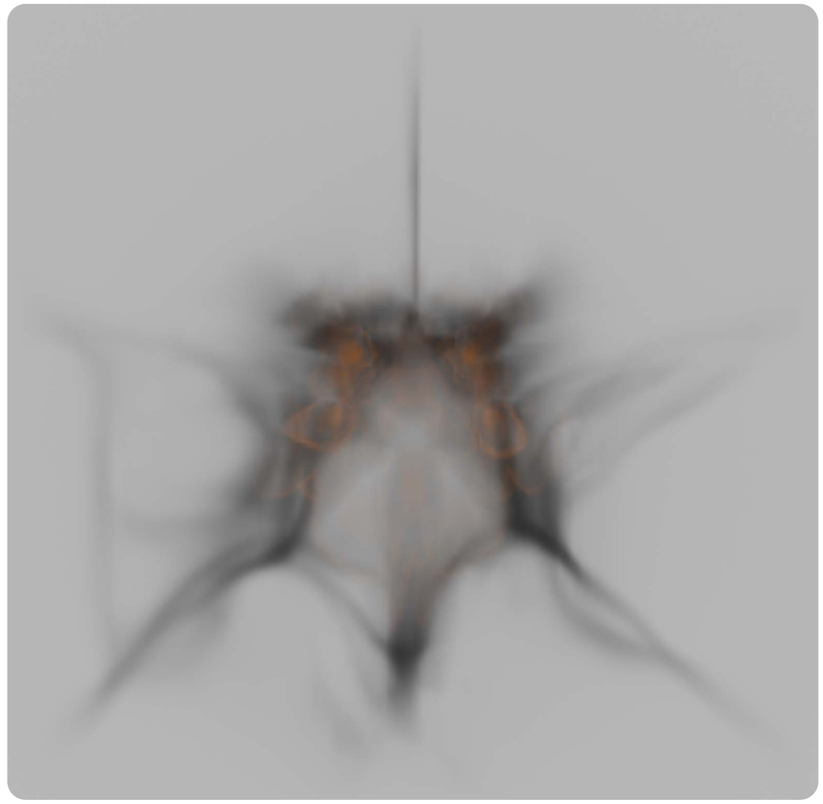


Image 7 Abstract smoke body (2024, Blender. van Gerven, Emma)

Smoke or fluids are emitted, generating new volumes and forms. Its interaction is curated, but uncontrolled in outcome. Motions and expressions derived from this provide opportunities for others to engage with. Inhabit the shape as you please.

NHABIT[6] depicts the process and perspectives around inhabiting the digital and the process creating a series of bodies/garments/objects.

Bodies take inspiration from other existing, recognisable forms of bodies, such as bodies of water and smoke, guiding the design process and taking in from the existing motions for bodily design and expression.

Oxman's last of three Death Mask series, Vespers III[8], the almost colourless artefacts function as habitats for living microorganisms to reinterpret colour.

Future Wardrobe[7] creates garments designed to host algae as their main 'client', while the human fades into the background.

Working with the non-human to support its growth cycles proposes a novel approach to aesthetics and Design. Break design down to its basic elements for the 'Other' to rebuild it in its own image.

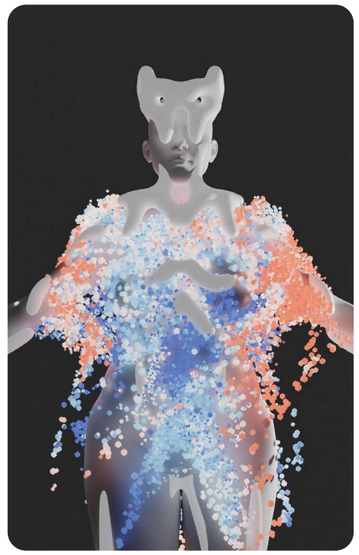


Image 8 Marked avatar with particle top (2024, Blender. van Gerven, Emma).
Digital render of an woman wearing an exoskeleton with a mask and a top made out of emissive, multi colour particles

Image 9 Future Wardrobe Collective: Cape. Cropped photograph of "waterproof hooded cape with asymmetric high-low hemline and colour gradient detail ·algae dyed" artefact. This object illustrates collaborative design results of algae-human codesign. CREDIT: Future Wardrobe Collective, 2020. Photo: Francesca Wallace. Model: Nina Orjonikidze

Image 10 Marked avatar with particle top (2024, Blender. van Gerven, Emma).
Digital render of an woman wearing an exoskeleton with a mask and a top made out of emissive, multi colour particles

These elements surpass the designer, the wearer and the essence of each individual element. The slow growth of spaces probing for the compounded elemental expression rests on notions of acting and situated interaction to produce a complete identity through fine-tuned conveyance.

An infinite reinterpretation of avatar-player dichotomies through dimensions of embodiment
The game Flower[9] allows play as a gust of wind moving petals through the air. Devoid of form, the player's body is constantly in flux. This idea of the limitless body; a dynamic body that changes with the Wearer.

The skin like a garment, once soft leather encasing all human facets sees its definition dimmed with speculated futures reaching for what lays beyond anthropocentric ethe

The movie Belle[10] by Mamoru Hosoda dives into the relationship between the avatar and its player within Metaverse spaces and the influence of the physical self onto the digital self and its appearance.

And what would happen when you stop looking at the body as something that has to be flesh, but can instead also be a splash of water or a billow of smoke.

Is there an expression to be found in this?

Surging new technologies blur the confines limiting design, fabrication and forms of wear, glimpsing how these acts are embodied through cohabitation. Enmeshing digital and biological technologies denote identities rooted in symbiosis, challenging the significance of bodies and fashion as independent actors. New definitions of body, artefacts and the nature of their interaction brought forth by forays into 'more-than-human' identities relinquishes human form as central to the designed subject. Linear narratives morph into dynamic dimensionalities embedded in context and interaction.

The link between 'who' and 'what' is designed creates a reciprocal connection between body and artefact, leveraging its retroactive relationality as creative method, expanding on the depth of potential artistic expression of fashion relative to the human decentered in favour of 'the other'. In this space, design material acquires the capacity to design itself based on its situated performance; whether responding to survival cues from a non-human set of needs, or billowing in the limitlessness of release to its most fundamental form within intangible digital realms.

Both are attuned to and surpass the human in their changing materiality: bodies equally as expressive as a person with mutable identity conveying what words cannot.

A (digital) body not bound by form but one that can be in flux and move beyond the human. A body that anyone can find identity in, but does not exclude anyone from accessing it in other ways, be it garment or object.

Technical breakthroughs remain to be conquered before such bodies can outpace avant garde, speculative futuring. Simulations and social complexities in intangible spaces weigh down existing hardware. On biological sides, non-human living conditions often diverge from their human counterparts, in addition to interspecies amity.

Although these speculations tinker with the possibilities of design, notions of what should be designed loom in the horizons of future design directions; ethical implications of body and technology must stand the test of time, especially considering holistic perspectives of sustainability in all its facets.

Companion to the human, weathering the vicissitudes of daily living. Two entities co-living in harmony, each achieving its peculiar goals in symbiotic relationship with its 'Other'.

Landscape of Possibilities

Maialen Argoitia Paredes

Exploration of an invasive alien plant through material, place and body

Project type
Material design and research

Location
Barcelona, Spain Europe

Project description

The project researches the assemblages and perceptions of an invasive plant, *Canyis Carrizo*, commonly known as reed. It is committed to a reflection on trying to understand the invasive and, in this case, the discarded matter through the practice based on material experimentation with reed. It seeks to bring together the perceptions and dialogues that are generated around matter from a posthumanist and multispecies perspective. To go beyond human-non-human dichotomies and anthropocentric epistemologies, to understand the interconnected society in which we live. Iterating with various manufacturing processes that have already been used with the material, searching through intuition for new ways of making and creating a language. Moreover, through a more holistic perspective, generating a more immaterial perception for the innovation of the practice.

The result is a knowledge and map of new material possibilities. A constellation of learnings, discoveries, and sensitivities encountered during the practice, with which to change the perception of the material and to be able to dialogue with the different ways of resignifying it.

Context and history

This research started from a vital and personal perspective as a designer and part of the Master's Thesis on Design Research at BAU University. In this regard, the concerns focus on the exploration of materials and processes, along with the analysis of public spaces and urban movements. Through ecological practices focused on environmental, social and circular economy development.

The case study element, dry reed, was collected during the months of May and June 2024 on the beach of Sant Adrià de Besòs (Barcelona), which is currently closed due to contamination, in relation to its industrial past. In the 1980s, the river Besòs, the river passing by the beach, became extremely polluted by urban and industrial discharges, listing it as one of the most polluted rivers in Europe. It is remarkable to note that the area around the Besòs river is one of the most depressed in terms of income level, lack of infrastructure and green areas in the metropolitan area of the city of Barcelona[1].

Consequently, the project flourished from two premises. On one hand, the abundance and abandonment of the reed, among other materials. How to seek a solution for the use of it. Could it become part of regenerative economical processes in the material industry, rather than becoming discarded? And on the other hand, the reflection on the aspect of how this abundance as an invasion is treated. In this sense, the common thread in both aspects of the research was the reconsideration of the material itself.

What is the need it tackles?

Assemblages and interconnectivity

The climate and social crisis, which includes natural catastrophes, wars, epidemics, losses, lack of empathy, running out of resources and waste generation, demand a rethinking of our relationship with natural systems. Looking at everything that inhabits it, human-non-human, to be aware of the interconnectivity.

Agencies, materials and production

In this context, from the practice of design, it is proposed to be an agent of change, an agent that can change the industry, production and consumption process. Every object around is made of something, but how often do we think about or value the agency that these materials play in the current system? It is not only about their manufacture or disposal, but also about the links and actions that the design of a new artefact generates in the built environment. Hence, from there, not only the possibilities of the material itself are considered, but also the social and environmental possibilities in which it inhabits.

Image 1 Transportation of dry reeds after collecting them on the beach in Sant Adrià de Besòs

Based on ecology and the climate crisis, together with circular and regenerative practices in design, the project tackles waste and how it becomes a resource for material innovation. By understanding local possibilities and addressing the broader consequences of our disconnection from nature.

What was the development process of the project like?

Research question
The research question that sustains the practice asked how it is possible to resignify an invasive alien plant through material experimentation. From the point of view of hybrid design, it is a practice intertwined with the material experimentation and self production knowledge[2].

Methodology
Drawing on situated knowledge and the goal of fostering a close dialogue with matter, the methodology combines material experimentation to rethink resources and an experiential and sensorial ethnographic approach. As well as trying to iterate, diagram, photograph, read, observe, map the field, and explore material possibilities through hands-on engagement [IMAGE 3]. These methods have facilitated the understanding and questioning of the subject matter.

Framework
Primarily, the focus was on the specific social context and its connection to global perspectives, exploring the biological and scientific characteristics of the reed alongside its manufacturing potential.

This was complemented by an iterative process of embodied dialogue with the material [IMAGE 4]. The project reflects on ecology through the posthumanist view of nature and society, agencies, vibrant matter, assemblages and the discarded. The actions, implications and attitudes that exist towards naming a species as invasive.

This is translated into working with design as a tool to change perceptions, from the material to the immaterial. Connecting situated intelligences, transformation processes and resource flows, through practices more related to traditional crafts and others with more experimental techniques, with an ecosystemic approach.

Value proposition
The project exposes the combination of the sensibility of working holistically and sensorially with the matter of the reed. Taking into account the different trades and practices that are developed around it, as well as the intuition, attention to detail and aesthetics.

Image 2 May 2024, Sant Adrià de Besòs, Maialen Argoitia
Sant Adrià de Besòs beach, the waste on the beach and an old abandoned factory at the background, known as The Three Chimneys

What impact does your project currently have?

The research behind Landscape of Possibilities explores the spectrum of complexity in assemblages, resulting in valuable discoveries while raising critical questions. The economics of design are not necessarily limited to the production of consumer goods. From an ecological critique of the harmful effects of market-driven design economies, the life cycles of materials have been expanded and incorporate circular and post-consumer logics linked to the cultures of waste, care and maintenance. This approach recognizes as innovative design practices a whole series of unplanned and discarded matters.

Situated research results
The practice has been the guide itself as well as the results, a research full of intuitions and dialogues with the material. It has been a space for sensitivity, reformulating epistemologies, decentring the gaze, experimenting with aesthetics and playing with materiality. Therefore, different subjects have often been approached from situated subjectivism, trying to contribute to a common knowledge, even though sometimes they have been addressed from a personal expression and contextualised background.

Situated knowledge reveals the relationship between material and place, with which it is understood, why the reed remains abandoned on a closed beach that now faces decontamination due to its industrial past. Also, how human-non-human connections treat the nature we all inhabit with superior agency, imposing rules of discarding.

Regarding the material experimentation, the result of the project offers the design of a landscape of aesthetic and functional possibilities, of imaginations and speculations, of treating the material from different perspectives to understand its potential. Treating it as something more than a discarded element and changing the material perception.

What is the global-local relationship of the project?

The project is framed in a specific place, Barcelona and its metropolitan area, to deeply understand local dynamics and translate these insights into global knowledge and thereby see the effects on the local. It explores the role of this invasive species within its local environment while linking it to global discourses and biological, scientific and manufacturing knowledge about the plant. Being able to bring it to the local ecosystemic knowledge.

Image 3 June 2024, Barcelona, Maialen Argoitia
Mentoring session with Cris Noguer, mapping and creating through images of the places, material and experiments

This project highlights how addressing local challenges and using materials can spark global conversations about production, consumption, and ecological design. Moreover, it showcases how local ecological practices can drive broader systemic transformations toward regenerative and distributed design.

Why is Landscape of Possibilities distributed design?

In line with the creation of new models of production and consumption, the practice in Landscape of Possibilities includes and develops knowledge from an ecosystemic perspective of materials and processes. Where there is a specific ecosystem, with material flows and transformation processes, which they can be understood as situated intelligences.

Working within and beyond the ecosystem in which we are, acknowledging the interconnectedness and complexity of the systems, creates relationships for environmental regeneration. As well, the resignification of the material leads to a value regeneration about the social perception of the reed, nature and built environment around.

Image 4 Still life compositions through the artefacts created in the experimentations, for the creation of new imaginaries around the reed

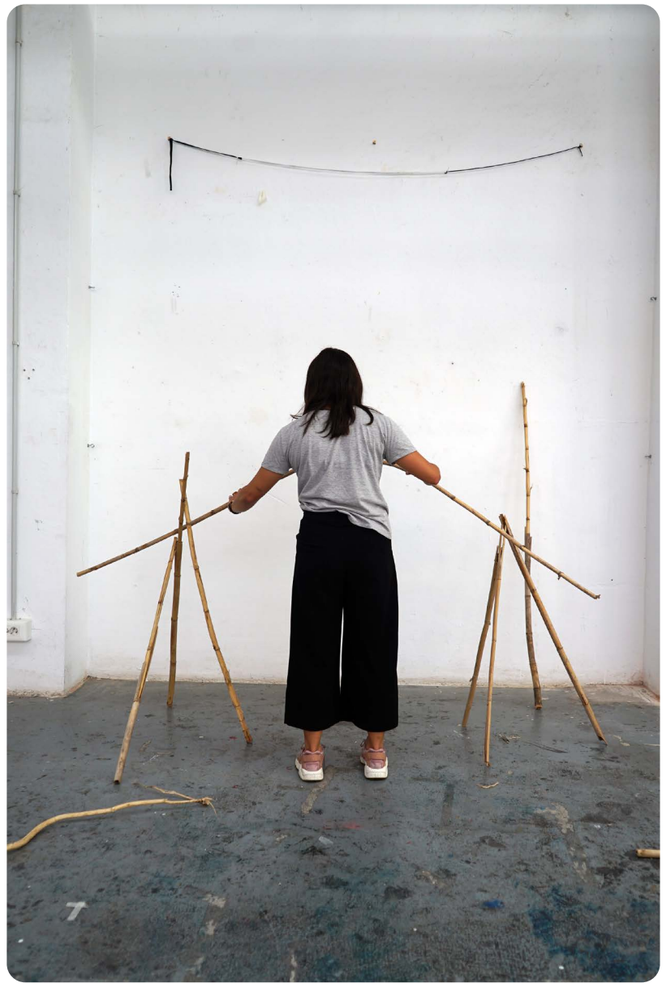


Image 5 First embodied approach to the material, in order to understand the physical behaviour of the collected reeds

QR 1
Access the project report here.

QR 2
Transport yourself through the video.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

I recently discovered what was the main motivation behind the plastic bag, created by Sten Gustaf Thulin. And unlike our current relationship to this material, his premises were durability and reusability, with the aim to improve upon paper bags, which tear easily underweight. I would therefore like to share with him insights about the materials that surround us, the perceptions and knowledge. But above all, how we relate and how we engage with the landscape of diverse material possibilities.

Image 6 Laser cutting of reed to achieve the bending through patterns

Image 7 & 8 Articulation mechanism with the possibility of adjusting two different positions.Experimentation of the behaviour of grinded reed together with different binders, additive and water.

In the recipes, the binders used were gelatine, corn starch, alginate and agar agar

CHAPTER 03

The Redistribution of Values

What makes something valuable - and whose contributions are valued? How do our design interventions reproduce value systems and whose systems are they? Do we recognise multiple forms of value, or does one dominant system eclipse others? What value(s) is meaningful for our communities? How do our interventions extend value beyond our own contexts? And how does all of this change when communities of care and spaces of inquiry are created?

In our current paradigm, value is often equated with money. Design, historically intertwined with the creation and distribution of value, has been positioned as a tool for maximising profit—shaping strategies, products, and services to meet market demands. Executives take the largest share, while designers, makers, and those within supply and distribution chains receive progressively less.

While through Distributed Design we seek to redistribute economic value — equitable remuneration to makers and creatives, to folx at different stages of the supply and production process, and to communities — we know that monetary worth tells only a fraction of the story. It fails to capture the complex, interwoven systems of value that inform design interventions and shape our relationships, histories, and ways of being.

Throughout this chapter, contributors explore how designing with diverse value systems can reshape our thinking, making, and being. Just like with knowledge and making, contributors showcase how value is dynamic, context-dependent, and relational emerging from the ways we interact with materials, traditions, ecologies, and each other. Value is cultivated and regenerated through mutual exchange, transcending geographic and temporal boundaries to multiply across communities.

Here, design does not allocate and extract value: it renews the vitality of the ecosystem it is embedded within.

If the Land Could Speak

Mariana Quintero Vecchiato

Weaving cognitive ecologies for IA literacy and regeneration

Toward an Embodied Ethos for AI Literacy

For over a decade, my professional and personal life has revolved around a singular question: How can technology serve as a tool for regeneration, connection, and understanding?

From my beginnings in Colombia[1] —where the immense social challenges of inequity and violence made the digital divide glaringly evident—this inquiry has guided my work in digital literacy and, more recently, in AI literacy, where technology meets ecology, psychology, and spirituality. What began as a search for equitable access to tools and skills evolved into a deeper reflection on the cultural, ethical, and epistemic dimensions of technology itself.

In the years during and after the pandemic, this inquiry took shape as a broader research journey—one that would lead to unique projects like If the Land Could Speak. This effort sought to prototype a holistic, embodied approach to integrating AI into our research agendas as technologists committed to redistributing tools, knowledge, and value. Supported by Fab Lab Barcelona, the Institute for Advanced Architecture of Catalonia, and the Artists + Machine Intelligence Research Award from Google AI, the project became a pivotal moment in my career. It offered a concentrated opportunity to test these ideas within a longer arc of inquiry that continues to evolve.

The project aimed to ground technological research in the plural, intricate webs of intelligences expressed through the land and its ecosystems. I embraced this challenge by creating an embodied one-week research retreat where the territory itself—its rocks, trees, produce, smells, and histories—became active participants in reflection. Traditional academic formats—papers, reports, and presentations—felt inadequate for conveying the ethos I wanted to prototype. Instead, I developed an integral experience to engage diverse intelligences and methodologies.

Central to the retreat's methodology was a collective repository where participants logged dreams, reflections, and generative exchanges with ChatGPT-4. This corpus of impressions, combined with the insights of local collaborators, formed the basis for a Zine co-designed with Manuela Reyes Guerrero—a research notebook of the project's ideas and conversations.

The retreat revealed the potential to bridge seemingly opposing worlds: deeply rooted ecological stewardship and the conceptual possibilities of technology. This approach transcended polarities, offering a space to explore fears and resistances with warmth and openness. In doing so, it uncovered for me new ways for technology to serve as a mirror, a catalyst, and even an ally in rethinking our humanity.

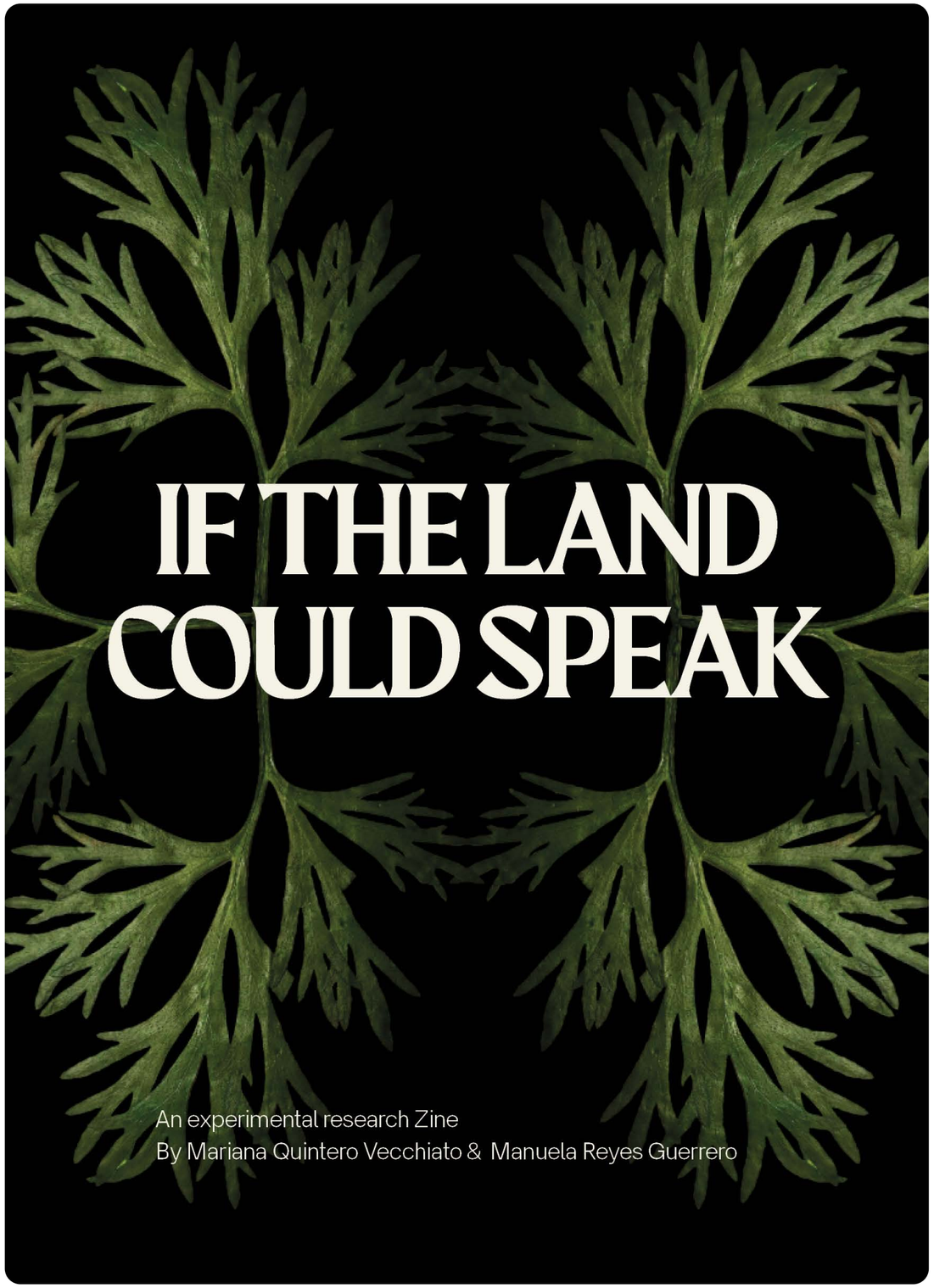


Image 1 Cover print-out from the *If The Land Could Speak* Zine depicting leaves over a black background, the booklet's title and authors' names

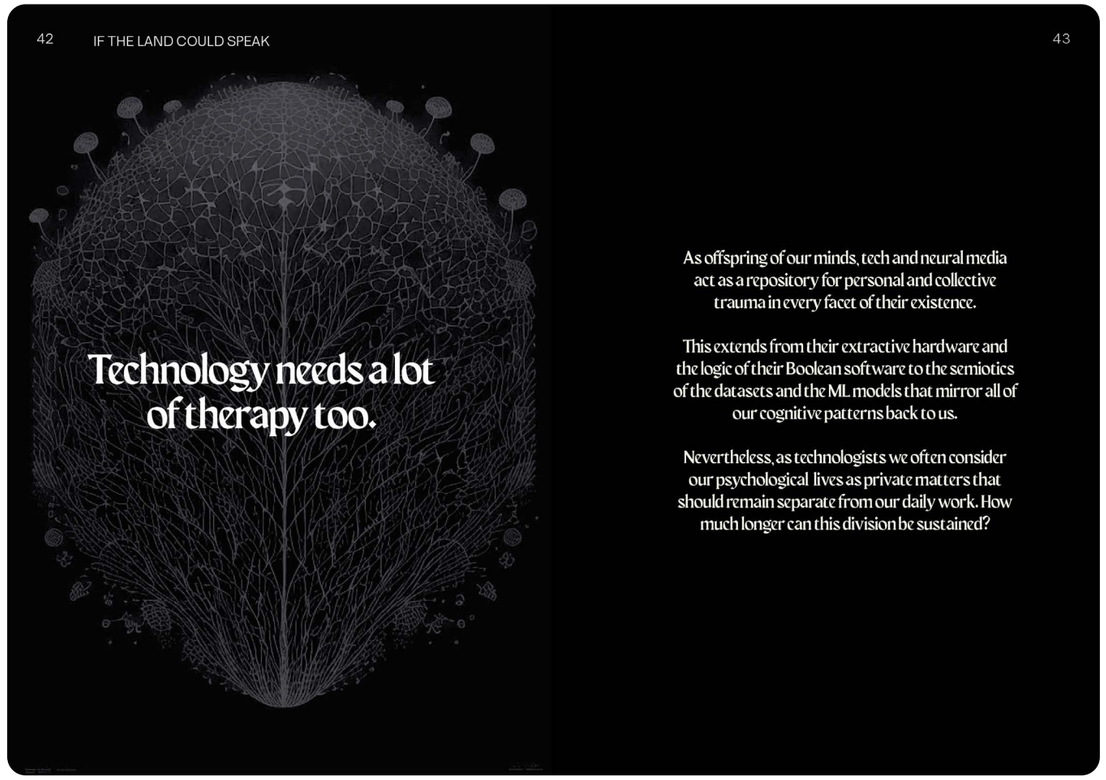


Image 2 Double Spread from *If The Land Could Speak* Zine depicting the traditional palmito braiding workshop accompanied by text that explains the key learnings extracted from that activity

Image 3 Double Spread from *If The Land Could Speak* Zine depicting text over an AI generated image of an abstract interconnected mycelium structure

Foundations of Inquiry

My journey into digital literacy began with a revelation: I had studied media for five years, yet I knew almost nothing about how technology actually worked. How could I, someone with the privilege of higher education in Colombia, contribute meaningfully to addressing the growing digital divide if I didn't understand the tools shaping our world? This realization propelled me to educate myself in computational thinking, coding, electronics, and the material realities of technology.

This was more than a technical endeavor. Early on, I became fascinated by how technology often arrived in pre-packaged forms from global innovation hubs, bearing the imprint of homogenizing cultural narratives. Yet I saw its potential to be reimagined—to work in harmony with personal, communal, or hyperlocal realities while engaging in global conversations. This question of how technology could be reshaped to reflect local needs and values became a central thread in my work.[2] [3]
In this pursuit, I found an unexpected ally: art. While educating myself in computational basics, I discovered media and software artists who were using creative practice to critically dismantle technology. Their work inspired me to gut it—to strip it down, rebuild it, and question its logics, aesthetics, and assumptions. Art gave me the tools to interrogate technology's cultural and material realities, shaping a critical lens that has remained central to my practice.

This path eventually led me to Fab Lab Barcelona and the global Fab Lab Network, a distributed community of over 2,000 laboratories working to decentralize production and innovation[4] [5]. There, I found a space where my questions about hyperlocal and global technology could evolve into actionable experiments. As a Research Lead, I

The psychological, ecological, and technological dimensions of human experience felt indivisible, and my research had to reflect this complexity.

helped design the Masters in Design for Emergent Futures (MDEF), an interdisciplinary program that became a testing ground for new ways of thinking about design, technology, and regenerative systems[6].

Simultaneously, my personal struggles with chronic depression and my growing interest in psychological and spiritual practices added another dimension to my work. While these aspects of my life initially felt personal and separate, they began to intersect as I delved deeper into questions of cognition, trauma, and collective accountability. As AI entered my field of inquiry, everything came together: the psychological, ecological, and technological dimensions of human experience felt indivisible, and my research had to reflect this complexity.

The Event: An Experimental Prototype for AI Literacy

In 2023, If the Land Could Speak came to life as a week-long research retreat held in Mallorca. It gathered a diverse group of thinkers, makers, AI mentors, and local knowledge ambassadors to engage in a collective exploration of how to bridge cutting-edge technological inquiry with ancestral and ecosystemic wisdom.

Each day of the retreat was carefully co-designed with local representatives to engage participants with the land and its intelligences. Beyond serving as sites of ecological and technological reflection, the landscapes and environments were intentionally framed as catalysts for psychological insight, offering participants an opportunity to explore the interplay between their surroundings and their inner cognitive and

emotional processes. This approach underscored the reciprocity between lived environments and the psyche, revealing how landscapes can act as mirrors that reflect, amplify, and challenge our deeply held beliefs, fears, and aspirations.

From immersive workshops with plant alchemists to dialogues with landscape stewards, every activity underscored the interconnectedness of human and non-human systems. Local ambassadors introduced participants to Mallorca's food systems, craft traditions, and biocultural landscapes, offering a tangible context for reflecting on AI's ethical and relational dimensions.

Image 4 Double Spread from *If The Land Could Speak Zine* depicting the visit to the Miramar Monastery

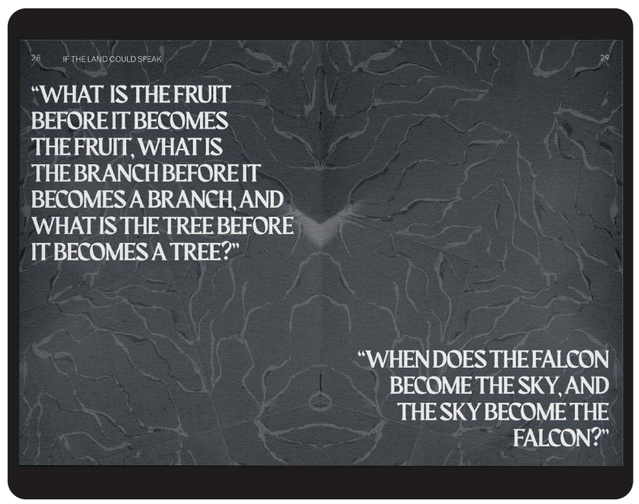


Image 5 Double Spread from *If The Land Could Speak Zine* depicting quote

Post-Retreat Developments: Expanding the Practice

The retreat's insights are encapsulated in seven guiding dimensions for exploring the intersection of AI, design, and distributed intelligence. These dimensions serve as a framework for advancing ethical and regenerative AI practices:

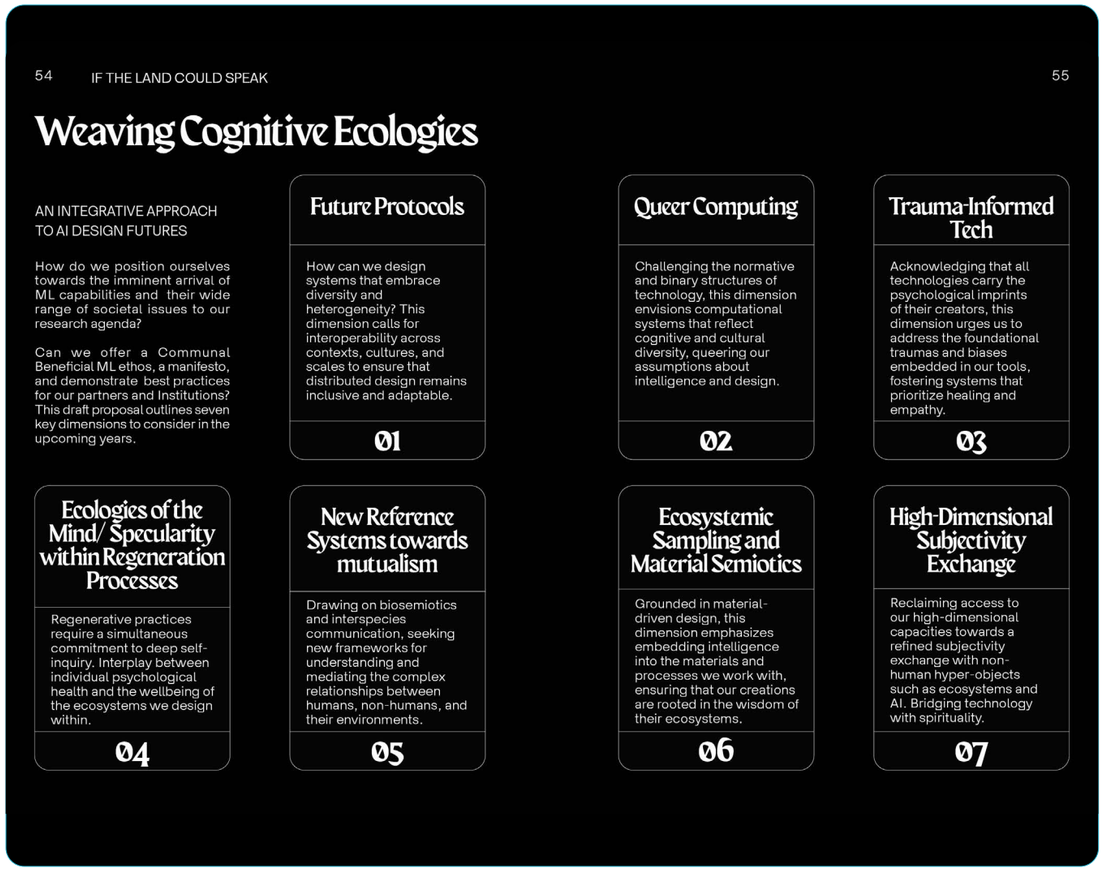


Image 6 Double Spread print-out from *If The Land Could Speak* Zine, depicting the seven dimensions for grounding an integral AI research practice. The. (March 2023, Mallorca, Mariana Quintero Vecchiato & Manuela Reyes Guerrero, All rights reserved)

If The Land Could Speak was a milestone, but far from the culmination of my work. It acted as a prototype, helping me refine ideas that have continued to evolve since. After leaving Fab Lab Barcelona in mid-2023, I stepped further into uncharted territory, expanding my research practice beyond institutional frameworks to explore new ways of fostering AI literacy in local and global contexts.

One of the most significant outcomes of this shift was the creation of a platform I named Lucid School, a community-based initiative dedicated to exploring the intersections of technology, psychology, and spirituality. Inspired by the retreat's ethos, it seeks to integrate AI literacy with practices like dreamwork, embodied inquiry, and collective dialogue. The aim is to demystify artificial intelligence while situating it within broader questions about what it means to be human in an era of technological and ecological upheaval.

“We don’t really have spaces like this to discuss the implications of everything that is coming. What we’ve experienced this week with all of you coming from Barcelona is the first opportunity we’ve ever had to engage with this topic without feeling completely illiterate, suspicious, fearful, or outright threatened by AI.”

SHAUL SHAHAN, PERMACULTURE AMBASSADOR

On our last day, we gathered at Shaul and Gulnur Shahan’s Permaculture in Mallorca‘s farmlands. We dedicated this day to give back to the island by assisting them in preparing the farm for summer. During lunch, we convened with representatives from the communities that joined us on this journey throughout the week and emphasized the importance of providing transparent, mindful, and collaborative spaces for engaging with AI research within local communities. **Their sentiment was clear: there is a lack of AI literacy strategies within the communities that protect the land, and they feel completely alien, excluded, or mostly unfamiliar with it. Nevertheless, most of them do look forward to a more inclusive future where the potential of AI is harnessed for the benefit of all.**

“ARE WE AFRAID OF AI? MAYBE NOT AFRAID, BUT DEEPLY CONCERNED ABOUT THE UNCONSCIOUS BIASES AND BELIEF SYSTEMS OF THE PEOPLE IN THE TECH INDUSTRY.

WE WOULDN’T BE, IF AI RESEARCH WERE ANYTHING LIKE WHAT WE ARE DOING HERE ALL TOGETHER TODAY, AND THIS WEEK.”

Image 7 Double Spread from *If The Land Could Speak* Zine depicting participants working on a permaculture and text-based reflections on the retreat’s outcomes

Lucid School prioritizes depth and nuance over oversimplification. Citizen circles, retreats, and workshops weave together AI literacy, dreamwork, and embodied exploration, inviting participants to transform abstract fears into relational experiences. These gatherings incorporate elements of place, touch, movement, sound, and shared meals, creating more inclusive and transformative learning environments.

Globally, I have continued to share the insights from this journey through occasional talks, online gatherings, and collaborations. As the world grapples with increasingly existential questions about technology, I find myself returning to the principles that guided the retreat: relationality, plurality, and the power of embodied learning. This ongoing journey is not about providing definitive answers but about creating spaces where new questions can emerge—spaces that honor the complexity of our time and the interconnectedness of all life.

This approach transcended polarities, offering a space to explore fears and resistances with warmth and openness.

The Challenges: Facing Fear with Compassion

Initially, many of the land stewards I worked with in Mallorca were skeptical, even fearful, of technology. Conversations about AI and its most divisive topics, like transhumanism, felt alien or threatening to their grounded perspectives. Over time, however, a shared space of inquiry emerged.

These discussions were not about resolving tensions or taking sides but about holding them with compassion and curiosity. Joan, a plant ambassador initially resistant to technology, gradually transformed his perspective through shared dialogues rooted in spirituality and place. What began as a polarized debate evolved into a collective exploration, showcasing the power of compassionate, relational inquiry to bridge divides.

When I began working closely with local communities, a recurring theme emerged: many felt deeply disconnected from the global mainstream narratives surrounding AI. Some expressed feeling excluded from these conversations entirely, while others rejected any association with them, perceiving AI as a distant and alien force. In some cases, this disconnection left people vulnerable to conspiracy-driven communication channels that deepened mistrust and fear. If the Land Could Speak opened a space where these fears could be voiced and explored with empathy, offering a foundation for meaningful dialogue. Since then, I have continued to expand this approach through citizen circles & talks —fostering opportunities for shared understanding and collective inquiry.

Lessons Learned and Paths Forward

For me, the journey from digital literacy to AI literacy has revealed that the most pressing questions about technology are rarely technical. Instead, they are deeply existential, rooted in how we understand ourselves, our relationships, and the living systems that sustain us.

Through If the Land Could Speak, my work with Lucid School, and ongoing collaborations, I've come to see technology as an extension of human thought and intention—a mirror of our fears, hopes, and desires. This lens has also allowed me to revisit the philosophical and spiritual legacies embedded in Western thought and explore them with the community, particularly those that intersect with questions about virtuality, causality, and the nature of reality.

During this process, I have become fascinated by how digging into our Western wisdom traditions suddenly feels so current to our most pressing questions about technology and reality. Yet, this recovery must be approached with an ethos of accountability—acknowledging the shadow side of these traditions, the violences and exclusions perpetuated in their name, and recognizing how these legacies persist, albeit in masked, secular forms. For me, this is not about romanticizing the past but about engaging critically and compassionately with these traditions to uncover their

timeless wisdom while holding space for the wounds they have caused. Central to this inquiry is addressing the practice of epistemic violence—a foundational shadow in the development of Western scientific research practices[7].

I approach this work not as an advocate for a singular truth, but as a facilitator of lived inquiry. The questions I explore remain open-ended: How do we navigate a world where the boundaries between real and virtual, human and machine, are dissolving? How can we draw from the wisdom of our spiritual and philosophical legacies to guide us into this uncertain future?

Looking ahead, I aim to expand Lucid School as a platform for exploring the intersections of AI and spirituality, creating spaces where people can engage with the profound ethical and existential questions of our time. The questions driving this work remain open and urgent: How can AI reflect the diversity and relationality of the world it operates within? What role can ancestral practices and spiritual traditions play in shaping our approach to technology? And how can we, as a global community, navigate the challenges of AI with humility, compassion, and courage?

The answers to these questions are not fixed, but the process of exploring them—through dialogue, experimentation, and collective reflection—feels vital. As we stand on the threshold of profound technological change, the path forward lies not in certainty but in our capacity to remain curious, relational, and open to the unknown.

QR 1
Download the Zine

Queering Red Sleeping Bed

Rising Lai

Reimagining traditional Taiwanese artefact through a queer lens, challenging entrenched gender norms and fostering inclusivity within cultural heritage

Project type
Discursive Design, Research, Collaboration

Location
Multiple regions, Taiwan - Asia
The Hague, The Netherlands - Europe

Project description

Queering Red Sleeping Bed blends traditional Taiwanese craftsmanship with contemporary queer perspectives to reinterpret and transform cultural narratives.

By integrating these elements, the project challenges long-held norms and invites a broader dialogue on the complexities of personal and cultural identity. This queering approach has the potential to expand societal understanding of gender and identity materially, paving the way for a more inclusive and diverse cultural heritage.

Context and history

Queering Red Sleeping Bed is inspired by my personal experiences and seeks to challenge and redefine the cultural narratives embedded within traditional Taiwanese artefacts. From an early age, I felt a profound discomfort with the societal expectations placed upon me, often symbolised by traditional objects such as the Red Sleeping Bed. Red Sleeping Bed is a Taiwanese traditional dowry that has been intertwined with marriage. As a wedding gift from the family, the wooden pieces and drawings are inlaid, emphasising the importance of reproduction and filial piety, making this artefact consolidate the unequal heaviness of family duty. As a queer individual, I felt judged and criticised not only by the society I belonged to but also within the domestic sphere, where these expectations deeply permeated.

As I grew older and eventually relocated to Europe, this transition afforded me the freedom to explore and embrace my queer identity in a more accepting environment. This newfound sense of liberty inspired a vision of a world that recognises and celebrates the full spectrum of gender identities and sexual orientations. Reflecting on my journey, I began to wonder how this shift in perspective could influence the creation of artefacts while still respecting the traditions of craftsmanship. Queering Red Sleeping Bed was conceived as an effort to craft a new cultural legacy—one that authentically embodies my experiences and joyfully celebrates my queerness.

What is the need it tackles?

This project addresses the societal need for greater gender diversity and queer inclusion in the design and interpretation of cultural artefacts. It challenges normative ideologies, particularly those reflected in material culture, which has historically been shaped by patriarchal and heteronormative frameworks. Queering Red Sleeping Bed approached the queering process by understanding artefacts as cultural vessels that transmit ideologies. It identified and removed elements deemed inappropriate by contemporary perspectives, replacing them with queer fiction and (hi)stories. In doing so, the project addresses the queer community's need for visibility and representation within material culture.

The decision to make Queering Red Sleeping Bed tangible and materially realised enhances the project's impact and strengthens audiences' ability to connect with it—whether through exhibitions, catalogues, or direct dialogue with me as the maker. Furthermore, the project underscores the necessity of re-evaluating societal values, advocating for a shift towards more inclusive, non-binary, and fluid identities. In doing so, it promotes cultural sustainability by fostering a more equitable and diverse understanding of heritage and identity. In addition to these impacts, Queering Red Sleeping Bed visually embodies a queer wedding bed, symbolising and representing diverse desires.

Image 1 & 2 Queering Red Sleeping Bed
(03/07/2022, The Hague, Helena Roig)

Image 3 Two miniature beds are displayed on a shelf against a red gradient background: the original Red Sleeping Bed and the Queering Red Sleeping Bed.

What was the development process of the project like?

Queering Red Sleeping Bed emerged from a desire to introduce gender diversity and queer inclusion into the material culture of traditional Taiwanese dowries, which have shaped the lives of generations. The redesign of the Red Sleeping Bed offered a critical reinterpretation of this traditional artefact, utilising the queering process to transform the perception of cultural norms.

Collaborating with woodcraft masters and queer communities to incorporate a variety of perspectives—woodcraft masters contributed insights into the fundamental techniques and forms of making, while queer communities shared personal stories of their struggles and love as queer individuals.

This collective effort provided a platform to redefine and diversify material culture. The queering process in this project transformed perceptions of cultural norms by demonstrating a harmonious coexistence of tradition and queerness. Through the inclusion of diverse perspectives, Queering Red Sleeping Bed became aesthetically and materially distinct from the original, utilising symbolism to reflect its reimagined purpose.

What impact does your project currently have?

The Red Sleeping Bed was initially designed to symbolise an ideal marriage, which in the past was deeply rooted in Confucianism, where marriage was considered the cornerstone of society and strict gender roles were enforced. However, society has evolved, and these rigid notions have gradually loosened. Today, diversity and inclusion have become the new consensus.

At an individual level, the project of Queering the Red Sleeping Bed nurtures a sense of belonging, acceptance, and validation. It enables individuals to see their unique identities honoured and represented within the fabric of their culture.

At a community level, it acts as a form of catharsis, empowering the queer community to redefine identities and desires within a world that often fails to fully acknowledge or celebrate its existence.

At a societal level, the project contributes to a wider conversation around acceptance, diversity, and the dismantling of traditional barriers. This interaction not only promotes greater inclusivity but also challenges and redefines societal norms, paving the way for a more equitable future.

What is the global-local relationship of the project?

Rooted in the local context of Taiwanese cultural heritage, from the traditional meanings associated with the Red Sleeping Bed to the relevance of traditional crafts in contemporary society, Queering Red Sleeping Bed operates within interconnected spheres.

	Tradition	Queer Making
Attitude	Modest Studious	Celebration Innovate
Belief	Awe of Deities Taoism	Diversity
Measurement and structure	Standardized	Ally-ship Non-binary
Literature sourcing	Folklore Classical Symbolism	Mutation LGBTQ + History Fictions
Expression	Artistic Subtle Resonance	Contemporary Feminine Activism

Table 1 A table compares attributes across five categories between tradition and queer making: attitude, belief, measurement and structure, literature sourcing, and expression.

Queering breaks the imaginative limit affected by gender binary or heteronormativity.

Image 4 A series of framed artworks with four traditional wood carvings depicting cultural myths and five photo collages showcasing historical and personal photographs.

It impacts both local and global contexts by transforming traditional cultural artefacts into symbols of diversity and inclusion. This project challenges and reshapes societal attitudes towards gender and identity, fostering change on both a local and global scale.

Additionally, the methodology of queer-making developed in this project is accessible and adaptable, offering a valuable framework for others to engage with and build upon.

Why is Queering Red Sleeping Bed distributed design?

This project is redefining values in design and establishing new precedents for the future of the field. It illustrates how traditional methods can be preserved and reinterpreted to both honour the past and adapt it for the future, creating artefacts that transcend their original uses to embody new, inclusive meanings. Furthermore, it highlights how the reimagining of artefacts can serve as a tool for emotional healing.

The project was realised through collaboration with the queer community and master woodcraft artisans. It draws on interdisciplinary research, blending material culture studies, queer theory, design, and traditional Taiwanese craftsmanship. The cultural significance of the Red Sleeping Bed has been regenerated, with new life breathed into its meanings through reinterpretation. This regenerative design approach strikes a balance between respecting heritage and ensuring future relevance.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

If I could have dinner with anyone, it would be Qiu Miaojin. Their seminal work, Notes of a Crocodile, poignantly captures the turbulence of queer identities in post-martial law Taipei, resonating profoundly with my own youthful struggles to find belonging in a world that often felt unyielding. Miaojin's novel and self-autobiographical writings, which reflect both the societal attitudes of the 1990s and the personal trials of those living on the margins, have left an enduring impact on literary and queer communities alike. Over dinner, I would express my deepest gratitude for the solace and understanding their work provided me during a time when such connection was rare and profoundly needed.

QR 1
Crafting Desire: Queering the Artefacts.

QR 2
Queering Red Sleeping Bed.

QR 3
The Queering Guide.

Sur-le-Champ

Considering flax as a common good for sustainable design

Soumaya Nader &
Thomas Naville

Figure 1 Map of the Pays de Caux, Normandy, France

Image 1 Cauchoise farmhouse in thatch and wood, from L'univers du paysan cauchois aux XVIIIe et XIXe siècles : 1750-1900 : catalogue de l'exposition, 1977, Archives de la région de Haute-Normandie et du département de la Seine-Maritime.

Terroir

In Normandy's Pays de Caux, a region where sea and land converge, flax is more than an agricultural crop; it embodies local identity. Ubiquitous in the fields, its presence in everyday objects and furniture remains limited despite its importance as a local emblem. The Sur-le-Champ project rethinks flax, from harvest to fibre transformation, to explore its potential beyond traditional uses for crafting body-scale objects and imagining new applications. This comprehensive approach enables reflection on sustainable creation that is deeply tied to the local landscape and industry.

Image 2 Interior of a flax grower. A flax crown above a photograph showing the drying of bundles of flax in the form of 'chapels.

Image 3 Flax oven, Royville, France

Image 4, 5 & 6 Haute-Normandie & Seine-Maritime Archives. Pierre Barray, Flax Grower

The project began with an investigation driven by serendipity, including meetings with local archivists, and flax growers and learn about their work. The project fosters cross-sectional relationships among various stakeholders to promote vernacular know-how and the agricultural traditions of the region.

Image 7 Agricultural equipment, Le Hanouard, France

Image 8 Bunch of flax, agricultural cooperative, Terre de Lin, Saint-Pierre-le-viger, France

Agriculture & industry

One of the stages in the production of flax fiber is retting, and it serves as the foundation for the design of Sur-le-Champ furniture. It is the retting that allows the fibre to separate from the wood. As the flax grows, the force of the wind solidifies the stalk, making it stronger. After flowering, the flax stalks are pulled up and put on the ground to be moistened by the rain: During retting, the wind helps to dry the flax between two rains, to facilitate the separation of the fibre from the straw. This produces the shives, which are the woody residue of the stalk. Shives, often used as mulch or bedding, are a co-product of interest to us. It is little used, under-exploited, and is on the verge of becoming just another waste product from flax production.

An ephemeral furniture made exclusively of linen shives that can dissolve with the weather.

Image 9, 10 & 11 Shape research and experiments using flax shives
Axonometries of the first furniture prototypes
Research sketches

Fragility as a response to a high consumption of furniture

he Sur-le-Champ furniture installed in the field is subjected to climatic conditions and evolves with the seasons. Its lifespan therefore depends on humidity and sunlight, making each piece unique and specific to a particular location. This process of creation and disintegration echoes the techniques used in the cultivation of flax at different stages. It introduces the idea of ephemerality as a quality. Organic elements break away from aseptic design, using the material without hiding its primary aspects. The Sur-le-Champ project questions the constructive characteristics and potential evolution of linen, but also our relationship with objects, with creation and destruction: what is the value of furniture that, at some point, will no longer exist?

why NUT

Evelin Murczin,
Veronika Róza Háló

Transformation of walnut tree leaves—often burned as waste—into a natural composite material

Project type
Research, material development

Location
Budapest, Hungary Europe

Project description

why NUT is a research project based on the awareness of the toxic effects of burning leaves, especially those of walnut trees, which release toxic fumes that are particularly harmful to our environment. The burning of organic waste is still a common phenomenon in rural areas of Central Europe. The collaboration aims to give value to these leaves, initially seen as a problematic issue, a useless waste to be disposed of, by transforming them into a 100% natural composite material designed for multiple scaled applications.

Context and history

One of the challenges of rural life is that we often burn things we don't necessarily need without fully considering the consequences. Unfortunately, this polluting activity is still frequent in rural areas. Moreover, of all the organic materials burned, leaf litter is one of the most difficult to manage. Owing to its abundance, the decomposition process is slow, animals do not consume it, and the task of bagging it is quite laborious.

Over the past years, the project has refined a process for creating a composite material by combining walnut leaf particles of varying sizes with natural binders and pressing them. So far, the material has been developed for small-scale applications, allowing for testing of its durability, aesthetics, and practicality. Subsequently, the objective is to scale up the dimensions of the composite, exploring its potential for larger applications and assessing its workability on a broader scale.

What is the need it tackles?

The project not only captures the sense of fulfilment that comes from meaningful work, such as gardening and spending time in nature, but also encourages a shift in perspective. It invites us to reconsider the leaf, not as waste, but as a valuable raw material with new potential, thereby demonstrating a possibility for a sustainable approach to waste management.

Image 1 Chopped walnut leaves for composite creation (2019, Budapest - Máriahalom, photo by Evelin Murczin)

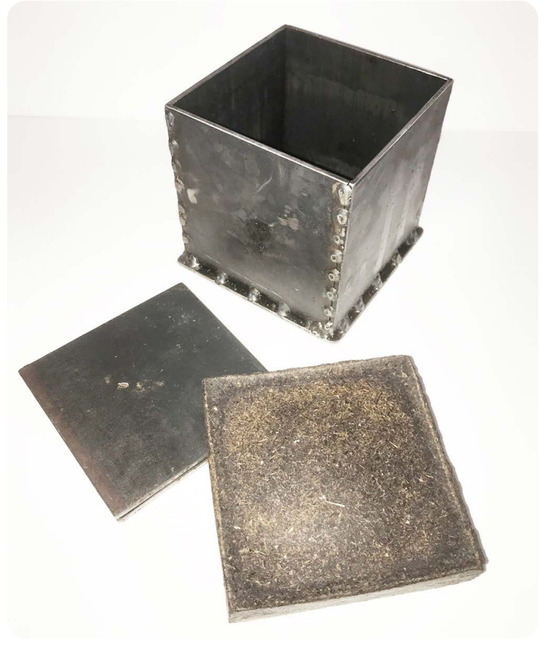


Image 2, 3 & 4 The press mould and an experiment sample (2019, Budapest - Máriahalom, photo by Evelin Murczin)
Experiment results (2019, Budapest - MOME, photo by

What was the development process of the project like?

The project originated from a personal and urgent experience of rural life, specifically the practice of burning leaves. This initial insight sparked the question of whether there were alternative uses for this “waste” beyond burning or discarding it.

The initial phase of the project involved the collection and sourcing of the material, followed by the fabrication of moulds from a range of readily available household items and the investigation of natural binders. Fortunately, a local metal workshop was available to assist in the development of a prototype mould, which enabled the experimentation process to remain closely aligned with the resource’s origin. The project was selected for the Distributed Design Challenge 2020 edition held in Fab Lab, Budapest, where the design of a specific press mould suitable for the material began.

Image 5 A piece from the experimentation samples (2019, Budapest - MOME-)

What impact does your project currently have?

The why NUT project, prompts reflection and raises awareness by reimagining green waste (such as leaves) and investigating its potential as a regenerative material. It challenges the status quo of conventional design by offering alternatives to traditional materials, with the intention of integrating these innovative solutions into the fabric of everyday objects and design practices.

What is the global-local relationship of the project?

The project’s concept is scalable, with the potential for application in a variety of contexts, from small-scale initiatives to large-scale projects. The abundance of leaves almost anywhere in the world, provides opportunities for the utilisation of local resources. Moreover, it has the potential to serve as a catalyst for the creation of workplaces in rural areas experiencing depopulation due to a lack of local opportunities to make ends meet. Additionally, it can provide an alternative solution for the management of urban and rural green waste. On a smaller scale, the project could be showcased in a demonstration space or workshop, while also paving the way for material development research and participation in material labs, both locally and internationally.

Why is why NUT distributed design?

The why NUT project relies on a local material that can be found in a multitude of locations, much like the annual production of leaves by a tree as part of the natural cycle. Similarly, the leaves that fall each autumn are taken for granted, yet this material continuously regenerates through natural processes.

By sourcing materials locally and exploring innovative ways to process and repurpose them, the project encourages a broader, community-focused approach to design.

The innovative processing techniques enable us to view this material as a resource with potential, rather than as waste.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

If natural binders could speak...

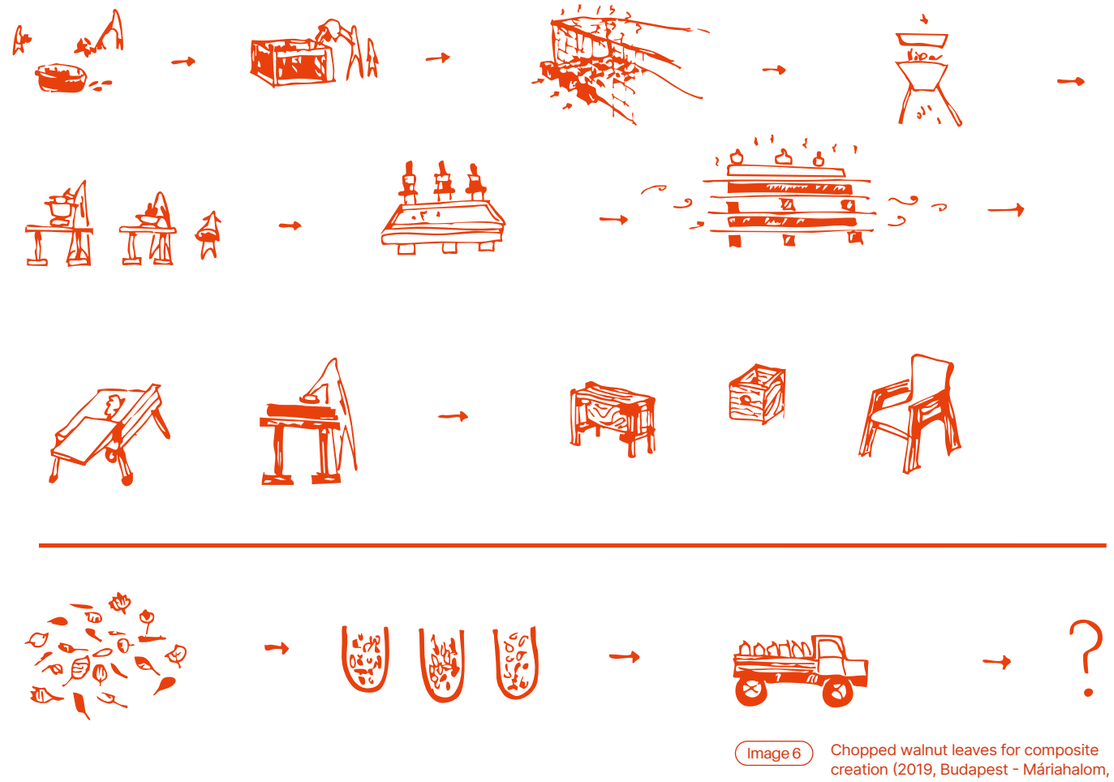


Image 6 Chopped walnut leaves for composite creation (2019, Budapest - Máriahalom, photo by Evelin Murczin

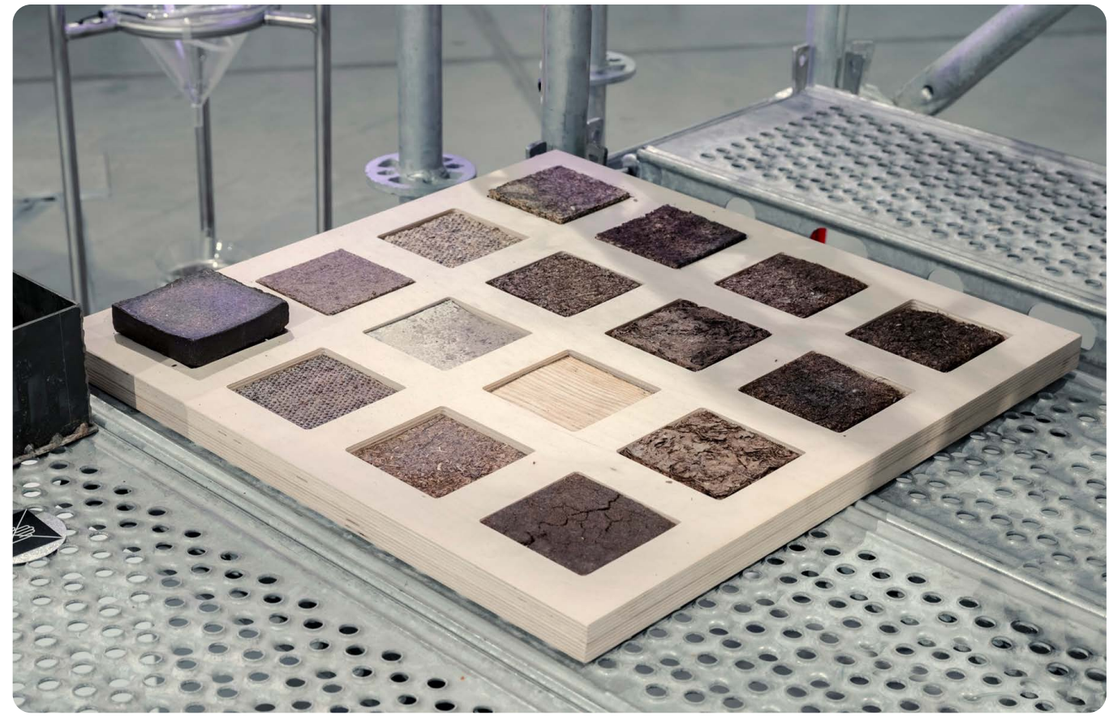


Image 7 Experiment results (2019, Budapest - MOME

LET'S GET RADICAL

The global fashion system is crumbling under its contradictions. Overproduction, exploitative practices, and environmental devastation persist even as the industry markets itself as increasingly “sustainable.” Designers are caught in an unforgiving paradox: striving to create ethical alternatives while competing in the same profit driven system that fosters burnout and isolation.

From my network and personal experiences, I’ve observed that more and more designers, particularly those in the so-called sustainable fashion movement, are nearing their breaking points. The pressure to “stand out” in an oversaturated market of greenwashed messaging creates an impossible juggling act: craft beautiful, ethical designs, while also serving as a marketer, brand builder, and entrepreneur. Makers and repairers, essential to a circular fashion system, face similar pressures in a system that undervalues their labor and prioritizes mass production over care and quality.

As part of my work in Hamburg through the Fab City project in collaboration with Helmut Schmidt University and the dtec.bw EU-funded initiative, I’ve researched the challenges of local fashion ecosystems. The findings were stark: Designers remain hesitant to adopt open-source practices, fearing loss of identity and control over their work. Local producers and repairers prioritize hands-on, tangible processes, feeling disconnected from digital-first distributed design platforms.

Competition within sustainable fashion is particularly fierce, contradicting the collaborative ethos required for systemic change.

These realities highlight the urgent need to reimagine how fashion operates. What if we removed the concept of brands altogether? What if fashion became a true commons, supported by shared resources, a collective clothing fund, and a cooperative ethos that values community and craftsmanship over profit?

This zine reflects on these challenges and possibilities through personal narratives and speculative futures. It explores a radical vision: a fashion world where designers are not brands but facilitators, and where collaboration replaces competition—unlocking a system that supports and sustains everyone, from the maker to the wearer.

Sarah Prien

Self-Expression in Collaboration: What Fashion Can Learn from Music

Imagine the roots of jazz: a soloist improvises with their own unique voice, while the band weaves a shared rhythm, harmonizing individual brilliance with collective energy. Or think of hip-hop's remix culture: one track's beat becomes the backbone of countless interpretations, a foundation for storytelling, commentary, and innovation. *"Amen Brother"* The Winstons, famous for its "Amen break," has been endlessly sampled, forming the basis of genres like drum and bass, hip-hop, and more.

In these art forms, individuality and collaboration aren't at odds—they thrive together. This is the model for a fashion world beyond brands: a designer's work can serve as the foundation for infinite variations, where each adaptation becomes its own expression of creativity.

A World without brands

In this envisioned future, fashion is no longer dominated by brands, competition, and market driven survival. Instead, it operates as a collaborative ecosystem, powered by a *shared clothing fund*. Everyone contributes monthly, based on income, to support the design, production, repair, and distribution of clothing. Fashion shifts from being a fast-moving consumer good to a basic necessity, creating a system that values care, longevity, and community over profit.

Designers, freed from the pressure to monetize their creations, take on the role of *facilitators*. They remain true to their unique styles and visions but focus on sharing their work in ways that invite reinterpretation and adaptation. Like a great jazz soloist or a hip-hop producer, their creations are the spark that inspires others to build something new.

The Role of the Designer as a Facilitator

Far from erasing individuality, this system enhances it. Designers still create with their own distinctive styles, but their work isn't locked away in proprietary silos. Instead, their designs are like musical samples or jazz standards—frameworks for infinite variations. Facilitators work hand-in-hand with communities, co-creating garments that resonate with local needs, traditions, and materials.

A designer might hold workshops, teaching people how to adapt a modular pattern for their region or collaborate with other facilitators to create hybrid designs that draw on multiple cultural influences. Their creativity fuels the creativity of others, creating a ripple effect of innovation and expression.

The Future in Motion

In this brandless fashion world, the competitive cycle that pits designers against each other dissolves. Instead of racing to stay ahead of trends, designers focus on leaving legacies: ideas, patterns, and practices that empower others to create. Fashion becomes a shared language, evolving through collective effort while celebrating individual voices.

This future is one of harmony—where self-expression and collaboration, individuality and community, thrive together. Much like jazz and hip-hop, fashion can become an open field of creativity, where every thread connects us, and every piece tells a story of shared making

Fashion as a Living Ecosystem

This world celebrates diversity, not through brands, but through the collective creativity of communities remixing and reimagining shared ideas. Designers are credited for their original work, much like how a sampled beat still recognizes the original producer, but their creations evolve into something far greater than a single vision.

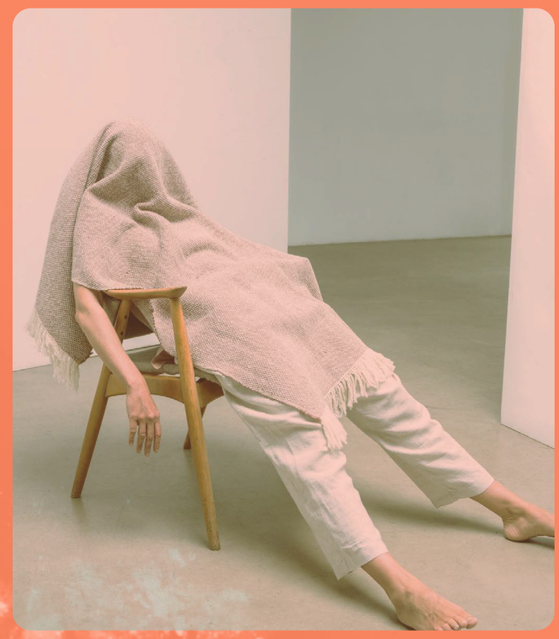
Local production hubs work with open-source designs to tailor clothing for their communities, minimizing waste and reducing carbon footprints.

A global platform stores and shares patterns, offering guidance for material adaptation, care, and repair. This platform also serves as a digital commons where designers collaborate and celebrate each other's contributions.

Clothing becomes deeply personal—not because of the brand on its label, but because of the community effort behind its creation and the stories woven into every piece.

Imagine a world where a single modular pattern for a jacket—designed with open source principles—becomes the foundation for countless interpretations: One adaptation transforms it into a light, breathable summer coat for a Mediterranean community using locally woven cotton. or a robust, insulated jacket for a Scandinavian region, made from upcycled wool.

Each variation carries the signature of its local makers, preserving cultural identity while celebrating the collaborative spark that started it all.



Unfair Game

Cultural Appropriation and Economic Exploitation
The current system of fashion brands somehow already thrives on remix culture, but in a parasitic way. Designs and techniques are often extracted from marginalized communities or artisanal crafts and then sold as premium products by global conglomerates. These practices create an illusion of abundance and democratization, but the system remains driven by inequity and scarcity for most contributors.

Labor Exploitation

Most fast fashion relies on exploitative labor conditions to cut costs and maximize profits. The very communities whose ideas fuel the industry often don't see any financial benefit.

Cultural Appropriation

Techniques, patterns, and motifs are often lifted without acknowledgment or redistribution of value, perpetuating cycles of cultural theft.

Building an Economic Framework for the Fashion Commons

The commons model must flip this script, focusing on shared ownership, equitable redistribution, and localized production. Here's how the economics could work:

Community funding for universal access

A universal "clothing fund," financed by mandatory contributions tied to income, supports the design, production, repair, and care of garments. This system would parallel healthcare or public services: everyone pays in, and everyone benefits. Funds could be allocated to open-source platforms, local production hubs, and repair networks.

Community currencies

Community currencies (local or digital) could help facilitate equitable exchanges within fashion commons. For instance, someone could earn credits by mending garments or teaching dyeing techniques, which they could then use to access materials, patterns, or other services within the system. This model values labor and skills that are currently overlooked or undervalued in traditional fashion systems.

Credits & Licences

Designers are credited for their contributions through a transparent system. Like Creative Commons or open source licenses, these contributions are acknowledged without locking designs behind paywalls. Instead of "owning" a design, designers become stakeholders in a shared system, with funding distributed to them based on their needs.

Distributed Design

The commons would prioritize local manufacturing—producing garments close to where they're worn—to minimize waste and reduce carbon footprints. Designs and techniques are shared globally through open-source platforms, enabling localized adaptations while respecting the original contributors.

The fashion pluriverse

OS Repository Developers

Designers

Makers

Rent, machinery (e.g., sewing machines, laser cutters), and utilities for 50+ local workshops.

Workshops are community spaces where contributors create, repair, or learn

Recycling material pros

Small scale production workshops

Community Coordinators

Repairer

Workshops for community members to learn sewing, patternmaking, and garment repair.

Support for digital skills training for designers transitioning to open-source tools.

Case Study

Meet the designer

Sarah, Fashion Designer who runs a Fashion Hub in Hamburg

The Universal Fashion fund

Meet Sarah, a designer living in Hamburg, a city with a vibrant creative community but also a high cost of living. Sarah used to juggle freelance gigs, constantly pitching to brands and competing for attention online. But now, she's part of the Fashion Commons, where her creative work is supported by a universal clothing fund.

She receives a base income each month to cover her living expenses, calculated to reflect the cost of living in Hamburg. The clothing fund ensures Sarah receives at least €1,500 per month, covering her basic needs and giving her a buffer for savings or other expenses. In return, she contributes her designs to the commons, collaborating with others to create modular patterns and sharing techniques like laser-cutting fabrics.

Sarah's Commons Funds
Breakdown
Hamburg's monthly
cost of living (approx.):

Rent (small apartment): €800
Utilities and internet: €150
Groceries: €350
Transport: €100
Total: €1,400

So who pays for the future cost of fashion?

The clothing fund is financed through a universal contribution system: Each person pays a percentage of their income into the fund, similar to taxes or health insurance. This pooled money supports local production hubs, repair networks, and designers like Sarah, ensuring everyone has access to clothing as a basic necessity. With Hamburg's population of 1.8 million, this generates €10 million/month if 70% participate.

The Universal Fashion Fund
Pay monthly for fashion:

High Income (5000€/ month)
= 2,5% 125€ L

Low Income (1200€/ month)
= 1% 12€

A week in Sarah's commons' life

Monday:
Sarah delivers a digital workshop on laser-cutting fabric patterns to 50 participants via the platform.

Tuesday:
She collaborates with a local maker to prototype a raincoat design.

Wednesday:
She organizes a dyeing workshop with a material specialist, experimenting with plant-based dyes.

Thursday:
She assists a maker in adapting her raincoat design to fit various body types.

Friday:
She submits her new pattern to the commons repository.

Dividing the cake for all

Allocating the €10 Million Fund

Base Income for Key Contributors (70% of Fund = €7 Million)

Designers (1,000x):
€1,500/month per designer
= €1.5 million/month

Repairers (500x):
€1,800/month per repairer
(higher due to physical labor costs)
= €900,000/month

Makers/Producers(700x):
€1,800/month per maker
= €1.26 million/month

Material Specialists (200x):
€2,000/month per specialist
(higher due to material costs)
= €400,000/month

Community Coordinators (100x):
€2,500/month per coordinator
(higher due to organizational work)
=€250,000/month
TOTAL €4.31 million/month

Operational Costs and Resources (30% of Fund = €3 Million)

Small-Scale Production Workshops
(€1 million)

Material Subsidies
(€1 million)

Education and Training
(€500,000)

Commons Platform Maintenance
(€500,000)

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EVERYONE'S A DESIGNER

Resoap

Samuele Mengarelli, Chiara Piazzolla,
Leonardo Reguzzoni, Alice Salis, Nicolò Tosello

Open source community saponifier for exhausted oils

Project type
Product, service, community maker

Location
Milan, Italy Europe

Project description

Resoap is a stackable, electricity-free and Fab Lab producible kit that transforms discarded oil wastes into a potassium-based soap. The system exploits a simple saponification reaction by making it easy to replicate in urban gardens; each module has a specific function with the aim of making the whole process controlled, straightforward and easy to understand, while including the necessary safety measures.

Context and history

Resoap was conceived during an intensive workshop on sustainability and alternative production methods at Politecnico di Milano. The project aims to challenge conventional production practices, shifting from delocalized to more localized approaches. In the early concept generation we highlighted the pressing issue of oil reuse in urban contexts[1], leading to the exploration of innovative ways to repurpose it; through research we uncovered that combining precise quantities of waste oil and potassium hydroxide produces a versatile substance that can function as both soap[2 3] and a natural fertilizing biocontrol agent that targets harmful parasitic organisms while promoting biodiversity and a local balanced ecosystem.

The insights inspired the development of the project as a central element for urban gardens: by leveraging the saponification reaction, it seeks to foster sustainable practices and promote community building within modern cities. Resoap not only addresses the challenge of oil waste but also integrates into urban spaces as a tool for encouraging self-sufficiency and collective environmental action.

What is the need it tackles?

Household oil waste is common to have and challenging to manage, as citizens often lack dedicated spaces for its collection at home and specialized bins on the streets, unlike other types of waste. Typically, oil waste is stored

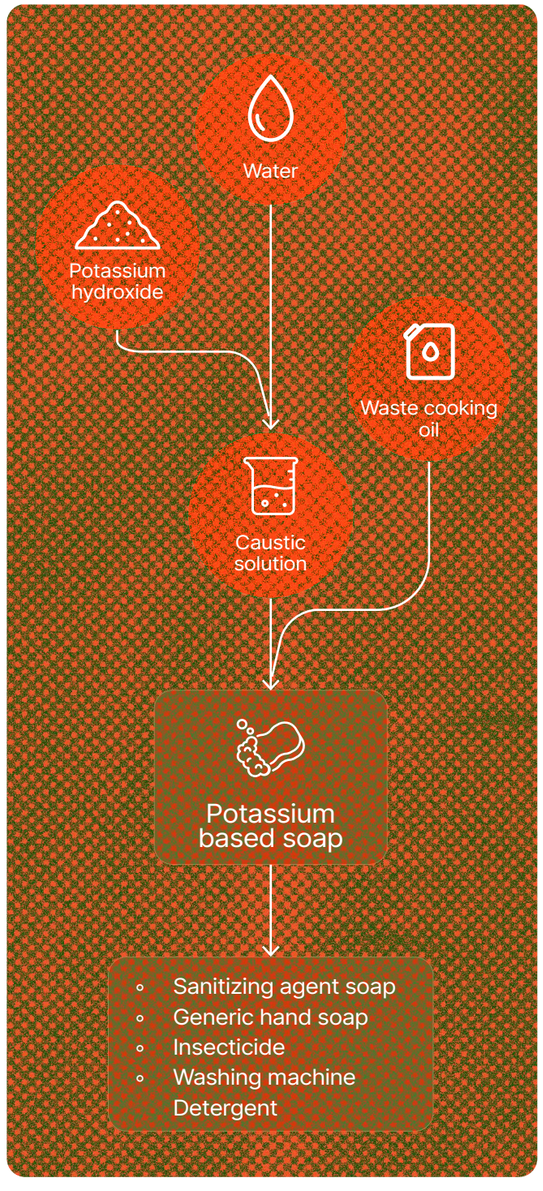


Figure 1 Potassium-based soap recipe (2024, Politecnico di Milano)

Image 1 Resoap and a batch of potassium-based soap (2024, Politecnico di Milano, Alice Salis)

in empty bottles or other containers and transported to disposal sites only when deemed sufficiently worthwhile. However, this approach is inefficient, often leading to improper disposal of oil waste, which not only causes environmental harm but also results in the loss of its potential as a valuable resource for new production processes[4].

What is the need it tackles?

Resoap has been developed following a design thinking approach, which helped the team to manage both divergent and convergent stages. The first diverging macrosteps consisted of research and experimentation about the different saponification processes, but also of an ethnographic observation carried out at Orto Comune Niguarda, a community urban garden, in Milan. During the convergent macrosteps, the team defined the shape and technical features of both the product and its supporting service.

The research highlighted how vegetable oils can be easily rendered useful again through the saponification process. Since saponification reaction presents some dangers due to the presence of potassium hydroxide as a reagent, the team made different soap making experiments, changing ingredient proportions, mixing tools and resting time. These changes in the recipe brought different results in terms of texture, viscosity and consistency. As a consequence, all possible variables have been analyzed, leading to a definitive recipe.

The ethnographic observation started from Milan, a globalized metropolis, characterized by the presence of a network of both Fab Labs and community gardens. Fab Labs represent a new way of production, made from inside the city and following principles of sustainability and circularity. At the same time, shared places for production of food are a surging reality and represent important improvements towards the creation of self-sufficient communities in urbanized contexts[1]. This aspect was verified during the shadowing process conducted at Orto Comune Niguarda, where the team analysed its structure and dynamics between the manager, the local administration and the garden users.

Starting from the results of research and observation phases, the team has designed the product and then the services; projectual choices, like keeping the product manual and electricity free, arose after those phases. Shape, materials and technicalities have been defined considering the sense of community and the users' safety as project constraints. This choice allowed the group to design an open source product and select the most suitable user interactions.

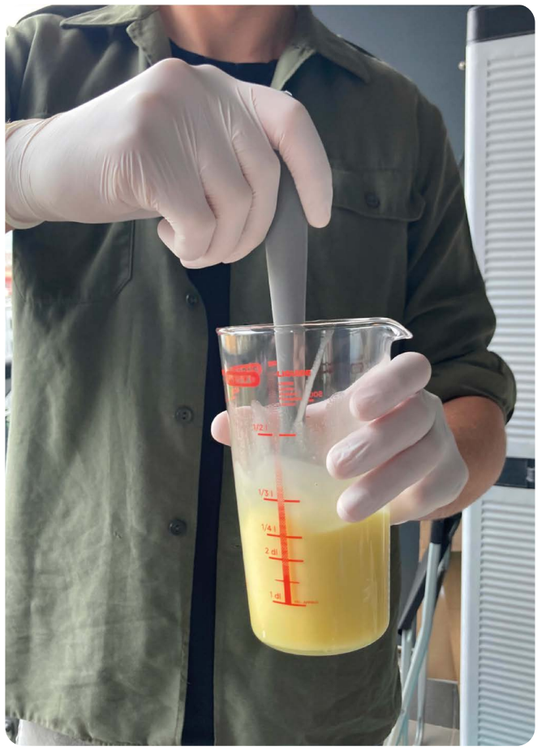


Image2 First experiment, mixing ingredients
(2024, Politecnico di Milano, Nicolò Tosello)

Image 3 First experiment, sample of potassium-based soap
(2024, Politecnico di Milano, Nicolò Tosello)

Image 4 Orto Comune Niguarda
(2024, Orto Comune Niguarda, Alessandra Micoli)

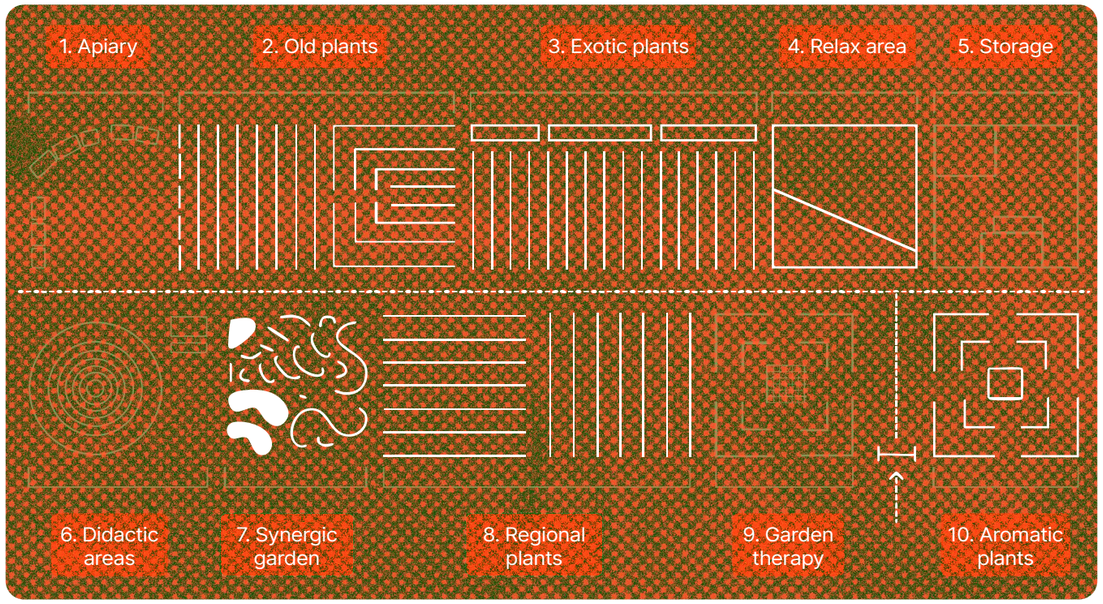


Figure 2 Orto Comune Niguarda" in italic? and add "(2024, Politecnico di Milano)" at the end

What impact does your project currently have?

Resoap is a project with a strong practical potential, capable of addressing urban environmental challenges through a creative approach. With the support and visibility provided by this publication, it could evolve into a replicable model of sustainability and social awareness, contributing to greener cities and more cohesive communities.

The environment's wellbeing is the primary focus of this project: not only does it serve as a more convenient alternative to storing waste oil in a jug that occasionally has to be brought to the landfill, or even worse, poured down the drain, but it also prevents that same oil from being wasted by giving it new life as soap or as a natural biocontrol agent that keeps away invasive pests but interacts in a completely harmless way with the plants it's sprayed on, leaving them unharmed.

The material outcome is just part of Resoap's impact; it also represents a symbol of communal effort and motivates who's involved in it to take part in the process. Urban gardens are often founded on a principle of selflessness and combined effort, and Resoap embodies elements of this spirit.

What is the global-local relationship of the project?

Resoap operates via collective effort in small-scale environments, welding closer the neighborhood collaboration between the private household sphere and community shared urban gardens. Resoap addresses an issue that would be otherwise not resolved locally, as usually it gets delegated to disposal sites, since waste oils are particularly difficult for individual households to manage effectively.

K-Soap, the output of Resoap, serves as a more environmentally friendly solution for plant protection and pest eradication. By targeting harmful organisms while promoting biodiversity, it supports a balanced local ecosystem.

Resoap's on-site production further eliminates the need for imports and complex logistics, ensuring a closer connection between production and consumption by having them close together. Traditional manufacturing gets decentralized and the use of locally sourced waste materials - used cooking oil in this case - gets encouraged.

Finally, the open-source ethos of the entire project plays a key role, as the ambition was to share knowledge and methods, making them accessible to a broader user base through clear instructions. Free accessibility fosters connections among maker communities, strengthening the global cooperation network of Fab Labs and facilitating the exchange of ideas. Resoap's model thus blends localized action with a shared international vision[6].

Why is Resoap distributed design?

Resoap represents a significant case study for distributed design as it addresses contemporary challenges - urban waste management, sustainability, and social cohesion - through a scalable, participatory model. It embodies the principles of distributed design by decentralizing production and encouraging localized, community-driven action.

One of our primary goals is to make the project accessible to everyone by adopting an open-source approach, allowing anyone to download the files and create their own unique version of Resoap, modifying it if needed. Developed through in-depth research into communities and their habits, the project now aims to foster the growth of an engaged and collaborative community around it.

However, not everyone in the target audience has access to the machinery required to produce Resoap: that's why the distribution plan emphasizes production facilitated by the Fab Labs global network [IMAGE 10]. This ensures accessibility while supporting local economies and promoting sustainable manufacturing practices.

Open and Collaborative

The saponification process and techniques for repurposing used cooking oil are designed to be easily shared and adapted to diverse global contexts. This approach empowers individuals and communities to take control of their resources and tailor the project to their unique needs.

Regenerative Approach

By transforming a harmful waste product into a resource, Resoap supports sustainable practices such as urban gardening and pest control. It actively reduces environmental impact while fostering a circular economy within urban settings.

Ecosystemic Thinking

Designed as a tool for urban gardens, Resoap seamlessly integrates into broader urban ecosystems. It generates value for communities by encouraging interaction, self-sufficiency, and environmental stewardship.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

During our research on the trends of self-production we stumbled upon a boomer-managed DIY channel called La Regina del Sapone, the Soap Queen. Despite the kitsch appearances of her blogs and the very rough makeshift procedures, our housewife queen always finds ingenious ways to apply recycling and repurposing in daily life situations and, more importantly, was always eager to share her discoveries with the internet community for free.

We feel inspired by those individuals that take initiative by themself and that, albeit oftentimes with limited resources, still try their best in bringing good changes to the world. We believe that everyone can contribute a little to the effort and that free, barrier-less communication is the way to achieve wonders in the future.

That's why we would like to have our queen over for a dinner of homemade french fries and Italian panzerotti. Of course, after the dinner is over, we would gather the waste oil and use it to make some high quality soap together.

QR 1
Discover how to use Resoap

QR 2
Explore fabrication and assembly instructions.

Image 5
Rotating spatula for mixing the soap (2024, Politecnico di Milano, Alice Salis)

Image 6
Tempered glass chamber for saponification reaction (2024, Politecnico di Milano, Alice Salis)

Image 7
Resoap in action (2024, Politecnico di Milano, Alice Salis)

Image 8
Resoap components (2024, Politecnico di Milano, Alice Salis)

The Makerspace's Open Door: A Generator pf Synergies and Commons

Eleni Charcharidou,
Maria Dimitriou-Tsaknaki

The case of 'Micro-wind turbine course'

Being part of a commons-based ecosystem

Epirus is a mountainous region in the North of Greece close to the borders with Albania. Its socio-economic history has been formed in alignment with the act of making and the crafts. Similar to most rural areas of the country, the villages of Epirus have been going through a state of abandonment.

During the last decade, a commons-based ecosystem has been developed in the region. According to the Wikipedia entry "an ecosystem consists of all the organisms and the abiotic pools with which they interact". The metaphor tends to highlight the interdependence and the synergies between the different members of the network (natural environment, human and more-than-human actors).

The local network is shaped by initiatives and groups that approach commons as practice, through transforming collectively their spheres of work, housing and food - their personal and collective living. A rural makerspace (Tzoumakers), a research lab (P2P Lab), an organisation pioneering community energy (Electra Energy), a cooperative supporting decentralization and sustainable repopulation of mountainous areas (High Mountains), an itinerant workshop on traditional building techniques (Boulouki), an initiative practising permaculture and energy autonomy (Nea Guinea) and an intercultural makerspace (Habibi.works) are some of the nodes that form the network. The spatial proximity amongst them, their geographical isolation as well as the mountainous and rural character of the area determine the development and the shape of this ecosystem.

Nevertheless, this ecosystem, while rooted in its locality, seeks to connect with a wider community, redefining itself in terms of place. Following a cosmolocal[1] approach, they aim to create infrastructures that facilitate the sharing of knowledge, techniques, and practices over open communication channels. "Cosmolocalism enables local communities of practice to connect globally, fostering collaborative networks. By creating dynamic relationships between different scales – by blending global connectivity with localised practices"[2].

In pursuit of such a collaboration, in October 2024 the biannual Wind Empowerment[3] Conference was held in Ioannina, Epirus with the aim to connect local-based actions and decentralised stories with a global network. Under the cadre of the conference, and as part of the 'Wind Mobile' action-research project[4], the 'Micro-wind turbine course' took place in Habibi.works[5]. Wind Mobile's main purpose is to create affordable wind-powered phone charging solutions while empowering local communities, such as refugees within camps and settlements, to produce their own electricity, utilizing local materials, recycled components, and local expertise.

The participation was not limited to direct action but extended to attentive presence, silent reflection, and the informal exchange of ideas.

Image 1 The ephemeral community shaped by shared manufacturing (October 17, Habibi.works makerspace, Eleni Charcharidou)

Habibi.works is an intercultural makerspace in the neighborhood of Katsika, Ioannina, near the refugee camp. This initiative values solidarity, trust, and respect over charity, providing a space for both locals and people on forced move to appropriate and use as they wish. Within its space, one can find a kitchen, a sewing spot, a safe-space for women, a gym, a barber shop, a free shop providing essentials, a media lab, a library, a bike-repair workshop, a garden and a makerspace. Placing the course in Habibi reinforced the goals of the project.

This review, written by Eleni and Maria, architects living in Greece and participants in the course, emphasizes the multiple meanings and values derived from this learning practice towards the development and empowerment of local and intercultural participation around the shared and distributed manufacturing. The threads of the network connect every previous experience with those that will potentially occur, providing continuity and value.

Developing a commons-based learning practise

The 'Micro-wind turbine course' aimed to build a small scale wind turbine for mobile phone charging in the refugee camp of Katsika.

It was characterised by its free and open nature, in the sense that no price fee nor registration was required for participation. The makerspace's door remained open during the workshop, so anyone interested could drop-in or out.

People coming from multiple backgrounds and distant geographies, people living in the refugee camp and locals contributed to the intercultural character of the course, working together for the manufacturing of an object that would be installed in-situ.

Image 2 Moments of pause (October 17, Habibi.works makerspace, Eleni Charcharidou)

The specific design, which utilizes upcycled loudspeaker magnets, was developed as part of a broader project. The design was led by New Guinea and the SmartRUE laboratory of Athens Polytechnic. Some participants from Fablab Winam in Kenya, Community Creativity for Development (CC4D) at the Rhino Refugee Camp in Uganda, and the Africa Makerspace Network in Ghana collaborated in the design process by responding to questionnaires about the materials and tools available in their respective locations. This is how the upcycled loudspeaker magnets, for instance, came to be.

The manufacturing phase was perceived as a point of a wider process of collective making and community resilience, from which the knowledge generated was meant to be transferred back to the initiatives and the communities.

The course focused on learning-by-doing while the hands-on activity supported non-verbal ways of communication. We worked with different materials, hand tools and machines, individually or in groups. Following a template and Kostas Latoufis' (researcher and facilitator of the course) instructions we worked with plywood for the creation of the blades, the stator, the rotor moulds and the magnet jig for placing the ring Ferrite magnets from loud speakers on galvanized metal disks. Planks of wood were carved to blades, after a lot of wood was removed, with the aim of giving them an airfoil shape. While working in groups, some of us welded and cut metal pieces for the generator support, the tail hinge, boom and vane. We prepared the coil winder, and then winded some triangular stator coils. At the end we assembled the blade rotor. The time limitation, resulting from the workshop's five-day duration, prevented us from completing the final fabrication of the wind turbine.

Cultivating shared meanings

The five-day course was capable of creating shared meanings amongst its participants. We recognise those meanings as the values that arose from the collective experience.

The specific design of this micro-wind turbine supported the application of many different tools and techniques while getting exposed to every phase of the construction helped us have an image of the final result. The **applied knowledge** holds significance at both the personal and community levels. The hands-on approach not only enhanced technical competence but also fostered a sense of agency and self-efficacy. On a collective level, the application of knowledge became a unifying element, fostering collaboration and co-creation. Learning, as an active engagement with tools, materials, and the challenges they bring, was transformed from an individual pursuit into a communal effort, where the success and knowledge of one participant supported the progress of others.

Beyond the industrialisation, acceleration and standardisation of technological production, the course supported open technology, **distributed design**, and sustainable energy production. It served as a different paradigm of technological creation which aims to fulfil societal needs while redefining innovation and making within ecological limits and scarcities. The manufacturing phase was a situated and context-based practice as we used local and shared infrastructure for creating a common object.

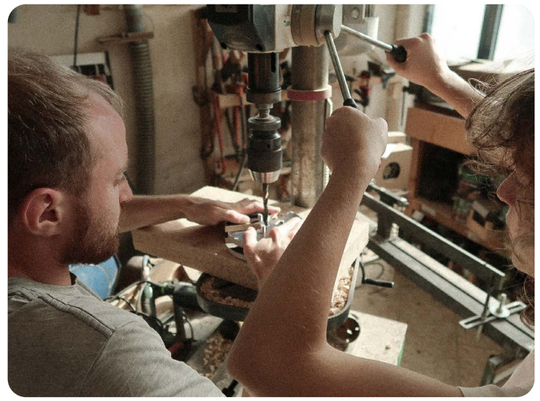


Image 3 P2P learning through four hands and one tool (October 17, Habibi.works makerspace, Kostas Latoufis)

Image 4 The table laden as a center of synergies (October 14, Habibi.works makerspace, Kostas Latoufis)

The distribution of know-how extended beyond the act of teaching, creating an environment where the knowledge could fly in every direction. Rather than having a fixed hierarchy of knowledge sharing, the course fostered an environment of mutual exchange, where anyone could be both a learner and a teacher. Each participant had a different story, background and level of knowledge and expertise concerning manufacturing, construction, engineering or collective making. Participants with prior experience, like B. (a carpenter from Syria), contributed by guiding others, achieved with non-verbal communication. This model of **peer-to-peer learning** enforces the democratisation of knowledge and supports a culture of openness, where participants are encouraged to ask, share, agree or disagree, and develop new skills together.

Throughout the course, the makerspace's door remained open, encouraging engagement and participation of the Habibi community while also allowing us to become part of Habibi's day-to-day life and rhythm. For some of the asylum seekers, residents of the camp and members of the Habibi community, the course became an entry point to get interested in using the makerspace. While working on the turbine blades, the smells of cooking mixed with those of wood, a ping-pong ball got lost in the lab, creating the possibility for interaction, play, and co-learning. Alongside us, members of the Habibi community, already familiar with the space, were crafting a table for their temporary residency, asserting spatial agency. The open door facilitated

the formation of an **ephemeral community**, where the table laden with manufacturing tools became the center of synergies. Around it, a heterogeneous body of participants not only shared tools and space, but also time and knowledge as commons. The moments we shared did not end with the manufacturing; instead, at the closing of the day, the community would gather once more in Habibi's main hall, this time around the food that had been prepared throughout the day.

The creation of such a community allowed **diverse modes of involvement** to be cherished equally, where participation was not limited to direct action but extended to attentive presence, silent reflection, and the informal exchange of ideas. Moments of observation often became catalysts for unexpected contributions and contingencies, as participants incorporated their personal perspectives into the creative process.

The learning process was determined by the multiple and diverse takeaways that the participants would aim to take back home and return to their communities, after the end of the course. For some, it was the technical skills acquired, for others, it was the empowerment and the sense of autonomy, the value of collective creation, or a renewed perspective on learning itself. The workshop thus became a site for knowledge circulation, where this cycle of sharing becomes a tool of empowerment.

Finally, it cultivated a culture of repair, both as a set of practical skills and as a broader philosophy. Participants engaged with tools and materials not just to create something new, but also to restore, repurpose, and extend the life of existing objects. In displacement settings, the culture of repair carries a deeper resonance, reflecting resilience, resourcefulness, and adaptation. This approach embodies the potential for renewal, maintenance, and transformation.

Through these values, the workshop became a space to practice the principles of commons, fostering personal and collective development, social and technological transformation, and collaborative creation.

How do we define a successful learning practice?

The characteristics of a workshop alone are not sufficient to establish a fixed methodology of a successful learning practice. Probably, a more rigid or time-constrained process could have resulted in the completion of the wind turbine, raising the question: How do we define a successful learning practice?

Image 5 A community cherished by the moments in-between. Turna, the bird named common crane (October 17, Habibi.works makerspace, Eleni Charcharidou)

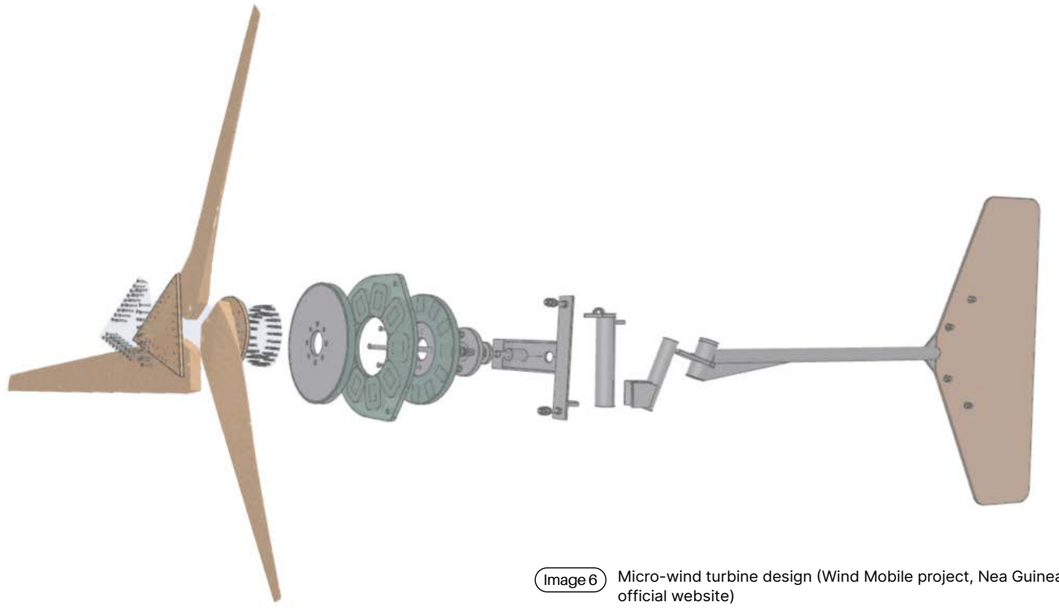


Image 6 Micro-wind turbine design (Wind Mobile project, Nea Guinea official website)

Success cannot merely be measured by the completion of the object. Beyond the tangible outcomes, the skills shared, the knowledge exchanged, and the relationships formed, all contributed to a stronger and more interconnected community, having an impact spanning both local and global scales. These outcomes extend the workshop's value beyond its immediate context but are always grounded to it.

Despite the fact that the wind turbine was not completed within the time constraints, the process allowed shared values to resonate while redefining the relationship between learning and productivity. Without neglecting the importance of material infrastructures and concrete outcomes, this review serves as a reminder that the success of learning practices lies in their ability to catalyze ongoing learning, collaboration and foster innovation within the community.

The presence of the network in the area creates the conditions to anticipate, iterate, and work toward the completion and the installation of the wind-turbine. The Epirus ecosystem allows not only to imagine but to also to pursue the continuation of this experience towards synergies and commons.

This text, in part, is an invitation to imagine how this ecosystem of knowledge, creativity, and collaboration can continue to remain open, adaptable, and even scale wide. Reflecting on the course and writing this text was a learning practice itself; a shared affair aiming to communicate the thoughts and questions arising to a broader community.

QR 1
Nea Guinea initiative

QR 2
Habibi.works intercultural makerspace

QR 3
The essence of repair - Words by Mathew Lubari

CHAPTER 04

The Redistribution of Power

Who and what has power? What happens when power is understood as something relational, something shared? A practice, an ecosystem, as adrienne maree brown describes, that thrives and grows when nurtured, rather than an inflexible, imposed dynamic? How are distributed designers around the globe disrupting hegemonic power structures? How are communities reimagining, reclaiming and redistributing power for pluralities of realities? And how, ultimately, does redistributing power restore agency to beings, communities, and institutions?

From individual agency to systemic influence, power shapes our world. It is evident not only in material artefacts or outcomes of design processes, but in attitudes, narratives, and institutions—legal, educational, and cultural—that shape who has agency, whose knowledge is valued, and whose needs are centered or even considered. Design, in its dominant form, has long operated within a model of power over—dictating solutions, extracting knowledge, and reinforcing expertise hierarchies.

Across diverse geographic, societal, cultural, economic, and environmental contexts, our community engages with the redistribution of power, from shifting access to reimagining power itself. Contributors in this chapter weave together the relationships between power, value, knowledge and making, demonstrating how power shapes each and vice versa. Each contribution proposes an alternative, a path (of many) through which Distributed Design restores agency to beings (humxn and more-than-humxn), communities, and institutions.

By disrupting entrenched hierarchies and fostering collective agency, these practices illuminate ways to move from power over to power with—restoring decision-making, agency, and creative capacity to communities and ecosystems.

Speculative Archives

In conversation with Rural Futurisms

Lesego Bantsheng & Siyabonga Njica,
Rural Futurisms

Rural Futurisms navigates the complexities of archive building through its speculative digital archive of engagements in Makgobistad, South Africa. This archive is shaped by ongoing interactions with the local community, challenging the colonial legacy of archaeology, which has historically depicted rural African communities as incapable of preserving their own histories. Colonial institutions have transformed living stories into static objects, stripped of their voice and purpose. In contrast, Rural Futurisms envisions its digital archive as a dynamic, temporal record of rural materiality. The project will span two years as an evolving collection that captures the material practices, stories, and cosmologies of the Makgobistad community.

Rural Futurisms has been collaborating with the Makgobistad community for the past two years under the Governing Through Design and South Designs grant. The project explores Yuk Hui's concept of Cosmotechnics[2] in relation to Tswana spatiality, highlighting the necessity of a platform archive that challenges existing representations of Tswana spatiality as organic or random.

By positioning this archive as a site of conversation, mistranslations, and encoding, the work reimagines what it means to document and design. It invites global spatial practitioners to consider how digital tools can amplify rural voices and histories while redefining legibility, power, and value within the structures of design.

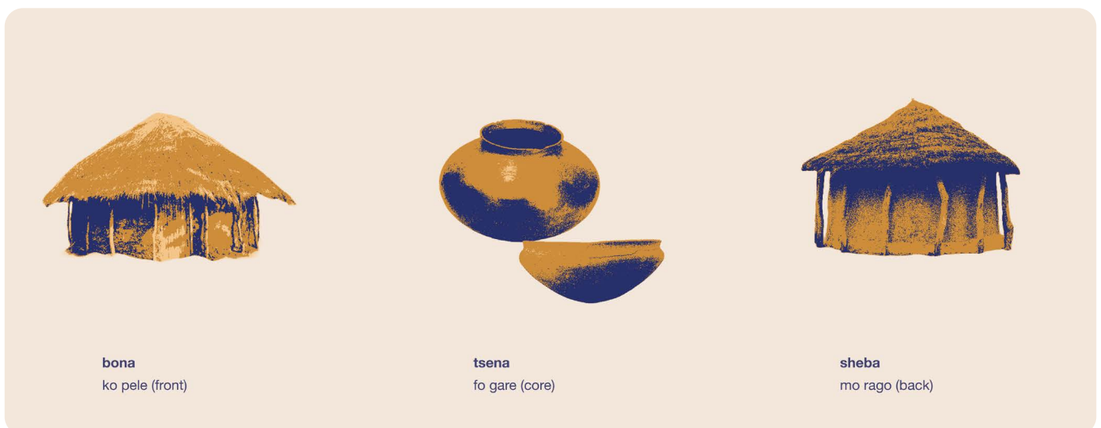


Image 1 Landing page of rural futurisms archive, Feb 2024, Makgobostad, Motheo Mamabolo

Image 2 Makgobistad Community members and rural futurisms team in front of Hut-Lab, Feb 2024, Makgobostad, Motheo Mamabolo

Image 3 Rural Futurisms speculative design workshop with Makgobistad community March 2023, Makgobostad, Rural Futurisms

A conversation between Rural Futurisms' Siyabonga Njica and Lesego Bantsheng

Siyabonga Njica

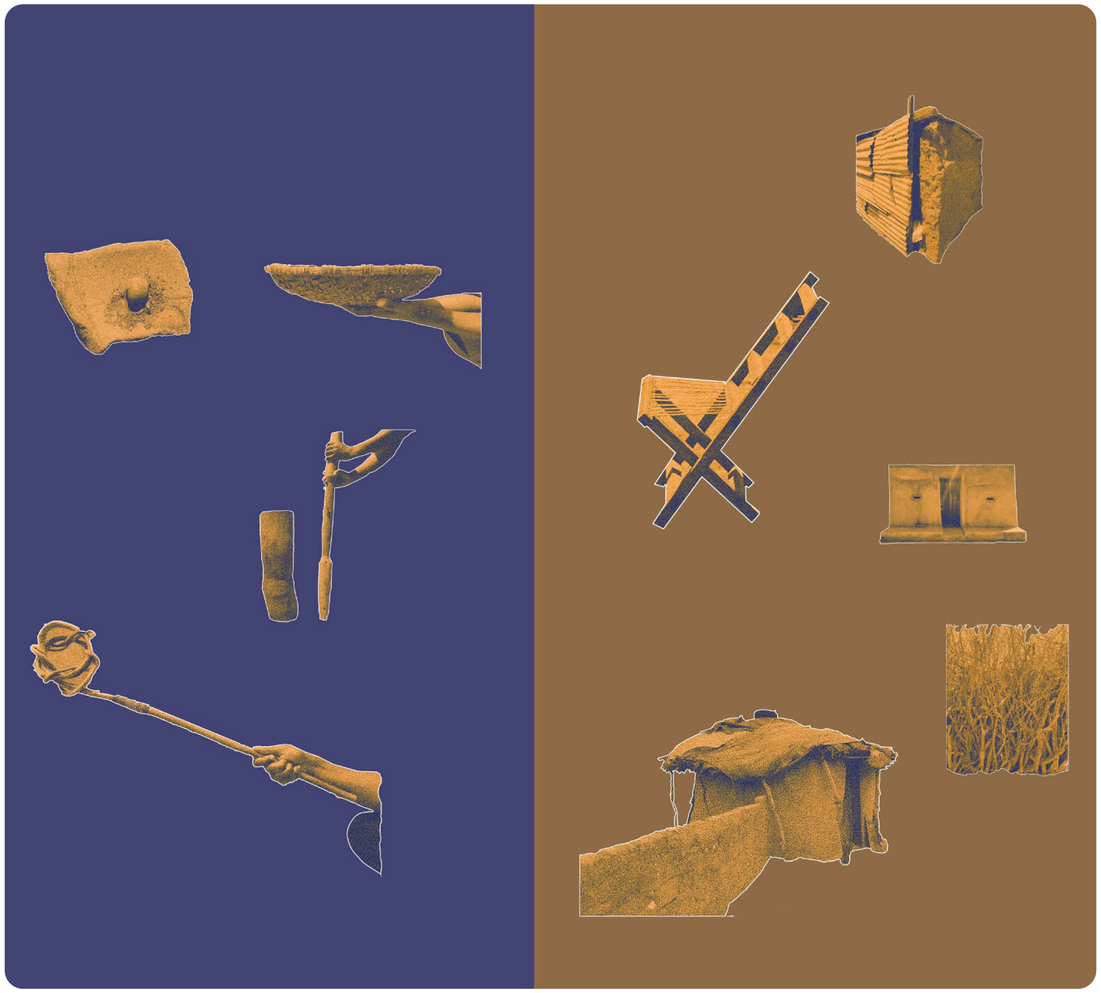
So we have recently published the archival portion of our Rural Futurisms project. How would you say we as an organisation have navigated the complexities of archive building through this speculative platform and what are the implications of speculation in archive building?

Lesego Bantsheng

I'll begin with a reflection on the role of speculation in archive building. While Tswana cultural heritage is embodied in villages such as Makgobistad, the intellectual repository of this spatiality has often been caricatured through the lens of coloniality. As individuals interested in this cultural heritage, we are confronted with the colonial gaze embedded in the archive, which excludes the knowledge valuation of the custodians of these objects. This brings to mind Saidiya Hartman's book Wayward Lives, Beautiful Experiments[1], in which she uses the archive as a tool to expand upon what she terms Critical Fabulations. Speculation proves to be a powerful tool in surpassing the colonial gaze, particularly in relation to traditional bio- and geo-based artefacts, and in restoring agency to these communities.

Siyabonga Njica

Yes, we acknowledge the complexities of archive building, particularly in colonised contexts and in contexts with distributed and embodied knowledge repositories. We sit with this tension by centering the distribution, temporality, situatedness and embodiment of the objects, and juxtaposing them with the colonial archive. Moreover, we navigate this complexity through an archive of borrowed representations and voices—distorted and encoded to be recognisable to their custodians, yet visible enough to onlookers to convey not only the meaning of the object itself, but also how we can craft design to respond to an entirely different register.



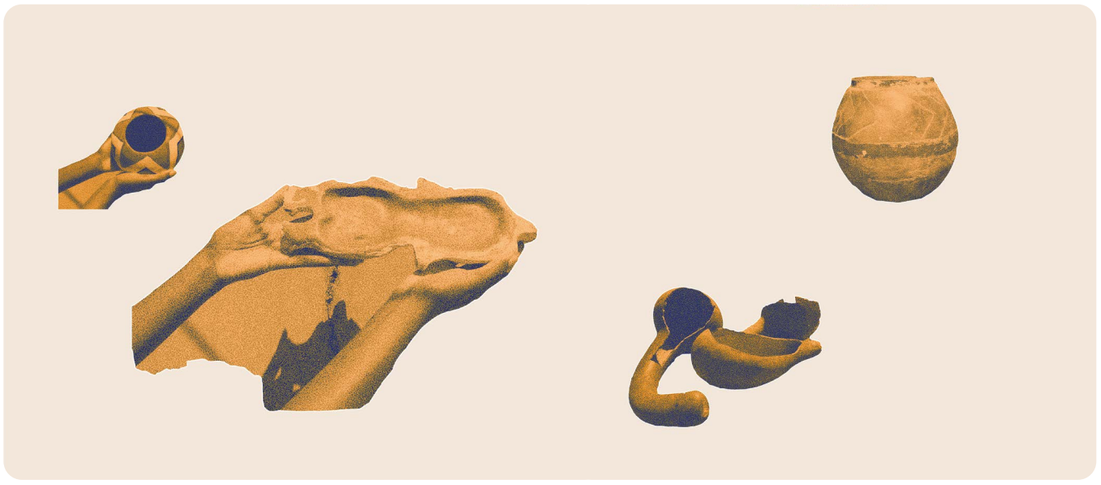


Image 4 Excerpt from Rural Furtusms platform archive, March 2023, Makgobostad, Rural Futurism

Lesego Bantsheng

Considering the rural context in which the project Rural Futurisms is concerned, what is the significance of building a digital archive and how can this serve the Makgobistad community?

Siyabonga Njica

The archive is, first and foremost, intended for and curated to render visible the cultural inheritance of the people of Makgobistad. We envision the digital archive as a discursive, speculative, and effective response to archival silences, hidden or discarded histories, and the ways in which erasure is inherent to the archive itself. The Makgobistad archive is not only Rural Futurisms' modest contribution to the growing repository of African digital sources, but it is also our hope that it will ensure rural communities of the future have access to their indigenous African cultural history.

Lesego, Makgobistad is a place you hold dear. Could you share why the project focused on Makgobistad and reflect a little bit on what you thought were the principles of this project that can be observed or applicable in other localities?

Rural Futurisms navigates the complexities of archive building through its speculative digital archive of engagements in Makgobistad, South Africa.

Image 5 Hut-lab building process with Makgobistad community Feb 2023, Makgobostad, Motheo Mamabolo.

Lesego Bantsheng

Yes, indeed. Makgobistad is one of the constellation of villages surrounding the town of Mahikeng, where my family resides. Makgobistad is unique in its geography, situated on the South Africa-Botswana border. The village was once unified with its other half, now separated by a border fence and located in what is today a different country. These Tswana localities, which might appear homogeneous, fascinate me for the ways their political history influences their cultural heritage, conservation, and pride. As you know, Siya, people in Makgobistad often refer to Botswana as being better positioned to preserve Tswana heritage, which intrigues me in its recognition of this cosmopolitical shift.

The underlying principles of the project can certainly be applied to different contexts through the very lens we utilised—the exploration of Hui's cosmotechnics, observing technical objects to understand the moral and cosmic. This perspective suggests that objects themselves are not static, but are enabled by these principles. These are principles we aim to learn from, more so than from the objects themselves.

Siyabonga Njica

How do we think our project embodies this notion of distributed design?

Lesego Bantsheng

The project embodies distributed design by recognising how the South designs its planetary future in diverse ways, including those of Makgobistad. The historical crafting of Makgobistad occurred through distributed and decentralised processes, where community members served as custodians and agents of "design," negotiated upon shared terms, customs, and relationships. Our platform draws inspiration from this, shaped by conversations and workshops with community members about what they value.

The project acknowledges distributed value systems of knowledge and legibility through the curated representation of artefacts and dialogues, presented within the interpolated directory of home. This approach highlights the importance of community-driven narratives and contextualised design principles.

What is in store for Rural Futurisms the organisation?

Siyabonga Njica

Rural Futurisms is a young and deliberately slow organisation, designed to operate in the background for the long term. We carefully select our projects to ensure deep immersion within communities, functioning within a non-profit framework. By structuring our organisation as slow—and therefore not a primary source of income for its collective—we aim to direct the majority of our project funding towards benefiting the communities with which we collaborate.

We are broadening the scope of our engagements with communities, collectives, institutions, and design approaches, reflecting our ongoing learning about how the South designs its planetary futures. In 2025, our work will focus on the intersections of food systems, design, and technology. As a collaborative organisation, we are constantly seeking like-minded partners to join us as we continue learning and working together!

Image 6 Hut-lab building process with Makgobistad community Feb 2023, Makgobostad, Motheo Mamabolo.

QR 1
Rural Futurisms Website and archival repository

QR 2
Planetary Design Conference Indigenous Infrastructures of Worldmaking Panel, Berlin

Let’s Go Fly the Kite

Violeta Tsenova, Heather Thomas, Jemily Rime, Fabrizio Galeazzi

A heritage project driving culture change and community action to shape a more inclusive and ecological economy

Project type
Community

Location
Cambridge, UK
Europe

Project description

Let’s Go Fly the Kite is a community development project that uses local heritage and present-day narratives to drive culture change within Cambridge, UK. This citizen heritage project focuses on The Kite – a historically significant area in Cambridge with a unique culture of resilience, cooperation, and activism. The project investigates the design of tools, processes, and events that activate the place’s heritage to enable local actors (residents, business owners, governmental agencies, researchers) to reimagine the future of their neighbourhood and come together to enact those visions. We do so through an online platform – the Navigator – and a two-day festival.

Let’s Go Fly the Kite is led by Together Culture Cambridge – a community interest company – in collaboration with Anglia Ruskin University’s StoryLab Research Institute and The Cambridge Room charity, with the support of the Cambridge Science Centre and funding from The National Heritage Fund.

Besides the four authors listed in this profile, the project encompasses the entire Together Culture team, an advisory board, and the creation of 20 temporary paid roles including a group of ten citizen historians, a professional historian, four actors, two student assistants, and a filmmaker, working together to enable project activities.

Context and history

The Kite (originally known as Barnwell) was created in the 19th century to house workers serving the University of Cambridge. The area was intentionally built away from the Colleges so that workers and students would not interact. The history of the place elucidates the power that this university had over the city – with its own police, courts and jails – in many ways independent from the legislations of the country[1]. In the 20th century the Kite area developed as a place of cooperative spirit and innovation – from housing the Cambridge Co-operative Society to the first birth control clinic in Cambridge to a myriad of shops and squatter communities. In the 1960s-70s most of the Kite area was slated for demolition prioritising retail. Residents self-organised, campaigned against the redevelopment and even declared the Kite an autonomous city – this collective action is known as The Fight for the Kite. Nonetheless, the redevelopment took place, with a few Victorian streets and buildings surviving by being granted a heritage status. Most recently, the area has been identified as a potential site for transformation into a new Life Sciences Quarter.

The intersection of new redevelopment talks, international reports on the decline of participation in democratic life[2] and Cambridge being one of the most economically divided cities in the UK[3] calls for supporting community action.

Let’s Go Fly the Kite is thus motivated by this context and the work of Together Culture at the Kite neighbourhood. They have been working in the area for over four years, have existed as a community interest company since 2021, and have a community space on Fitzroy Street in the heart of the Kite. The company has been fostering community engagement through various initiatives focused on systems development, process improvement, and capacity-building events. These efforts follow an annual cycle of activities, including:

- **Events exploring cultural transformation:** Helping participants understand how culture is shaped and how they can influence change.
- **Creative and collaborative skill-building workshops:** Training people in practical skills to foster innovation and teamwork.
- **Citizens’ Studio:** A collaborative space where community-generated questions are used to co-create solutions that could lead to new social enterprises and engagement programs.

Image 1 Together Culture’s space on Fitzroy St. (January 2024, Cambridge, Image created by Rajen Mistry for Together Culture, used with permission).

- **An annual incubator:** Supporting the community in bringing these ideas to life, turning them into actionable projects with local impact.

After the Citizens’ Studio in 2023, Heather Thomas, co-founder and CEO of Together Culture, and the Together Culture team observed that while there was a strong sense of pride and belonging, there were few opportunities to use the Kite’s heritage to drive collective decision-making on future redevelopment plans. Key questions surfaced:

1. What were the historical conditions that enabled the Kite identity to be shaped?
2. What are the parallels and differences between the past and the present of the area?
3. How do we present and act on these parallels?

These questions are the foundation of Let’s Go Fly the Kite. The project runs from August 2024 until February 2025 in its first iteration. It will then continue as part of Together Culture’s ten-year strategy of developing opportunities for a citizen-led economy.

What is the need it tackles?

The multiple crises (economic, democratic, climate) facing our society require us all to think differently in how we build capacities in citizens, researchers and institutions[4]. One route to do so is by leveraging heritage’s potential to bring together diverse communities[5].

Let’s Go Fly the Kite engages people who live, work in, and frequent The Kite in rediscovering, sharing, and celebrating a story of Cambridge with which those who have been socio-economically marginalised can identify. Synthesising a more inclusive narrative is about redistributing power through interrogating how we might adapt, collaborate and find ways to prosper under conditions of ongoing change [IMAGE 2] [IMAGE 3]. Concretely, the project activates these three elements – adaptation, collaboration, and prosperity – to develop skills for active citizenship (i.e., active listening, conflict resolution, and self-expression as listed in[2]). The project does this through a variety of channels.

Our team at StoryLab (Violeta, Jemily and Fabrizio) prototypes the use of digital tools to showcase the interweaving of experiences and heritage over multiple temporalities. We are developing a digital archive and an online platform. The Navigator is a web platform supporting users in navigating themes of power and cooperation, and it will be used as a tool in future Together Culture capacity-building events.

What was the development process of the project like?

For this six-month period, we focused on synthesising the historical narrative, collecting interviews and stories from residents, processing the interviews for archiving, designing the Navigator, and preparing for the Kite Festival (February 2025).

To achieve this, a local historian (Mike Levy) was hired to conduct desk-based research, sifting through archives and consolidating approximately 200 years of the Kite area into a narrative. He identified key historical figures and overarching themes. Together Culture and StoryLab then recruited and trained ten people (“Storyfinders”) to conduct interviews on personal histories of the area as well as hopes for its future. Together Culture organised four story-sharing events in October and November 2024, where past and present residents as well as others who work and frequent the Kite shared their experiences. Additionally, the Storyfinders followed their own interests (ranging from theatre to migration to economic depravity) and collected over 100 interviews in total.

Insights from the interviews were synthesised by Together Culture with support of StoryLab and the involvement of the Storyfinders to identify important moments from their interviews. The historian, also a playwright, combined his research with these insights to deliver scripts for four seven-minute-long enhanced podcasts weaving temporalities, heritages, experiences, and visions of the future through visually augmented audio experiences.

StoryLab produced these podcasts and integrated them on the Navigator. We designed a user experience around active listening to the stories coupled with interactive prompts. The prompts encourage users to reflect on the strategies used by the people represented in the podcasts to adapt, collaborate and question power-dynamics. The tool supports the submission of more stories and links to a digital archive of project outputs, hosted by the Figshare platform and assigned a Creative Commons use license.

At the time of writing (December 2024), we are preparing the festival activities which will celebrate and merge multiple temporalities and launch the Navigator.

Image 2 During one of the story-sharing events, attendees created call-to-action placards with slogans and visions for the future. These are now exhibited on the kite-shaped black board at Together Culture (November 2024, Cambridge, Image created by Violeta Tsenova, CC-BY).

Image 3 Close up of two slogans created during a story-sharing event (November 2024, Cambridge, Image created by Violeta Tsenova, CC-BY).

What impact does your project currently have?

The project has economic, cultural and symbolic impact. Several paid positions were created – a historian, ten Storyfinders, a filmmaker, four actors performing at the festival, a research fellow, and two student assistants working with StoryLab. StoryLab is also providing an internship opportunity for a group of six students to deliver an interactive installation showcasing the Navigator at the Kite festival. With this we recognise our own research power-dynamics and the ability to support the skill and career development of students.

Importantly, the project has allowed for the upskilling of local people to become ambassadors for local knowledge, which creates a subtle power shift supporting the work of Together Culture in engaging and amplifying citizens’ voices. Together Culture will take over an additional space – one of the heritage-listed buildings on Fitzroy Street – to continue community activities and launch a community garden, a first step towards transforming the Kite into a permaculture neighbourhood [IMAGE 4].

There are also discussions with Jesus College (University of Cambridge) to cooperate in the design of future events, shifting prevalent ideas of “town vs gown” into “town and gown”, championing a more inclusive future.

All this has been recognised by both BBC Radio Cambridgeshire locally and then nationally, broadcasting an interview with Heather Thomas and Mike Levy.

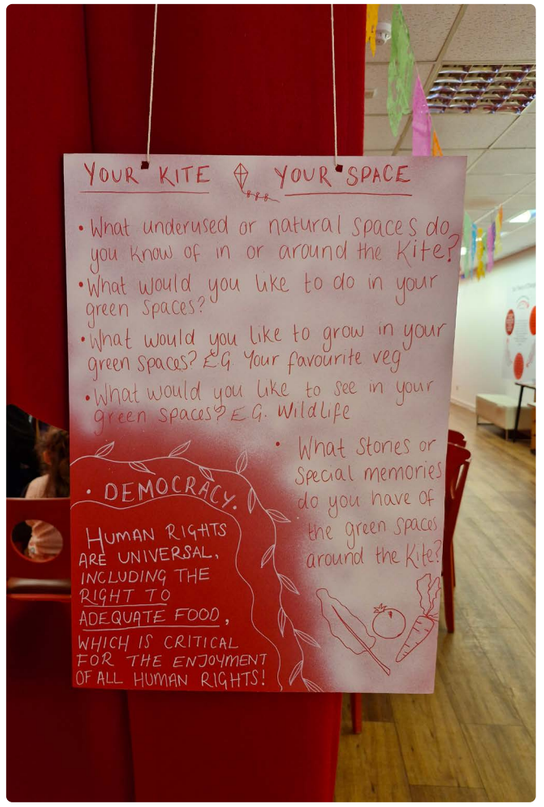


Image 4 Prompts to discuss and shape the vision of the Kite as a permaculture neighbourhood (November 2024, Cambridge, Image created by Violeta Tsenova, CC-BY).

What is the global-local relationship of the project?

Reclaiming the Right to the City is a global struggle and we provide one localised approach that leverages heritage narratives to initiate more equitable participation in urban redevelopment. Locally, *Let’s Go Fly the Kite* draws on personal histories, community narratives and lived experiences of residents. These stories are gathered through interviews and community events, ensuring that the project remains rooted in the area’s identity.

At the global level, the use of Creative Commons licensing and the online Navigator platform allow these local stories to be shared and accessed worldwide, inviting others to learn from and build upon this localised knowledge. We aim for this blend of community-driven content and global accessibility to illustrate how local heritage can contribute to a broader, interconnected narrative.

Why is *Let’s Go Fly the Kite* distributed design?

Although a community heritage project coordinated by a community interest company may not strike readers immediately as distributed design, we want to put forth *Let’s Go Fly the Kite* and Together Culture’s long-term mission as such. The project is not a one-time event but an ongoing process of engagement with the community. As new stories and materials are gathered, the content evolves and grows, encouraging continuous participation. This characterises the Navigator as a tool that must be ongoingly developed and iterated. Presently, it consists of enhanced podcasts, but the vision is to tell stories in different ways, with different media and to provide an index of resources on self-organising and other themes, reflecting community needs. The involvement of residents in collecting stories, the creation of a shared, open-source digital platform, and the iterative nature of the design process all contribute to envisioning new collective futures for the Kite and act on them.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

Violeta: I would like to have dinner with the cordyceps endoparasitic fungi and its infected host – an ant. In their dynamic, the parasitic fungus slowly takes over the ant’s behaviour, turning it into a “zombie”. The ant is manipulated into finding an environment that is favourable for the fungi, allowing it to spread more spores and infect more ants, thus reproducing. Besides seeing this as an “on the nose” metaphor for capitalism, it exemplifies a power dynamic we all could fall into unknowingly.

Image 5 Kite Festival, Taken by Rajen Mistry, from the project

Heather: I would say Daisy Hopkins. Daisy Hopkins is a hero of The Kite story. The University of Cambridge used to have powers (and a police force) which enabled them to put people in prison, without recourse to trial. Women were overwhelmingly the victims of injustice in what I would call a misuse of power. In 1891, Daisy Hopkins was arrested for talking to an undergraduate on the street. She refused to let this limit the possibilities of her life or let this happen to her or anyone else. She took the vice chancellor of the University of Cambridge to the High Courts of Justice, which eventually led to an Act of Parliament which took away the University's rights to operate outside of the law of the rest of the country in 1894. I walk freely down the streets of my neighbourhood because of Daisy's gumption. I would love to know what fuelled her, who supported her, and if she had a sense of how what she was doing would shape the future.

Image 6 Kite Festival, Taken by Rajen Mistry,from the project

QR 1
Read about The Kite project.

QR 2
Hear Heather and Mike's interview.

Designing Under Extreme Resource Constraints

Mohammad Idrees Rasouli, Cambridge School of Art,
Anglia Ruskin University, Cambridge, UK

How practicing Distributed Realities in Afghanistan can shape the future of Distributed Design

The Need for Envisioning the Future of Distributed Design

The concept of designing under extreme resource constraints (both physical and psychological constraints) has become increasingly relevant in an era of local and global uncertainty, where geographically isolated, politically volatile, socially complex societies demand adaptability, serious design, contextual and responsible thinking and making. These connected forms of global challenges can be referred to as distributed realities: urban conditions that are dispersed across spatial, temporal, and cultural dimensions, which require holistic thinking and interconnected engagement by committed and dedicated people across a dynamic range of locally networked yet distributed forms of knowledge and decision-making.

While the existing concept of Distributed Design positions creative skills and the making approach close to communities of knowledge and practice and points of demand, practicing it in extremely resource-constrained regions such as Afghanistan requires a comprehensive [holistic] approach influenced by the different types of realities found on the ground. This enhanced form of Distributed Design aims to increase the resilience of local businesses and small-scale production through a larger and more connected form of interface with communities of shared identity and the wider society to deliver design outcomes that are culturally appropriate and seamlessly integrated with traditional craftsmanship and small enterprises.

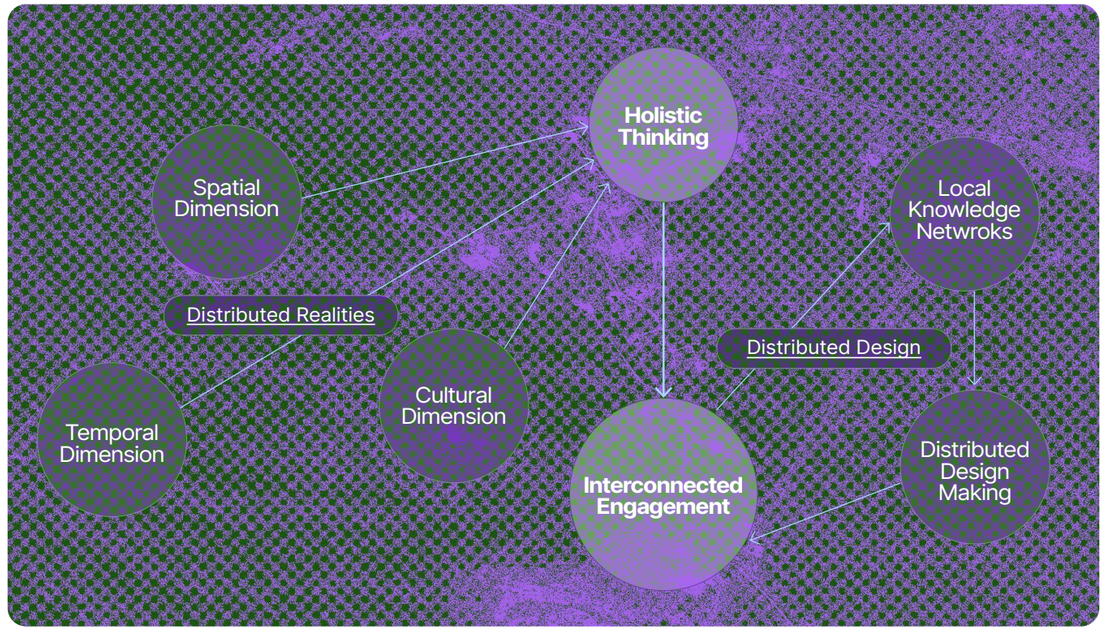


Figure 1 Distributed Realities Framework for Practicing Distributed Design in Extremely Resource-Constrained Environments by Author

The distributed realities approach presented in this article proposes how socially connected clusters of local designers, makers, and users, who collaborate closely to develop high-tech design capabilities in extremely resource-constrained environments, can shape the future of Distributed Design. The focus of this approach is on the holistic utilisation and application of spatial, temporal, and cultural intelligence while also deploying small, adaptable tools and machinery suited to the immediate human and urban conditions. Throughout the text, this is referred to as “holistic thinking” or “holistic approaches.”

The motivation behind the distributed realities approach presented in this article is to enhance current Distributed Design practices and ‘the need for a more circular and emotionally durable production and consumption methods that reduces the consumption and waste of resources’[1]. It further puts emphasis on building a stronger relationship between people and designed objects through recombining locally available resources and capabilities for the creation of new social functions and meanings. This approach further compliments Distributed Design by building upon Schumacher’s concept of “small”[2], enabling local and connected systems of people, ideas, and information to influence as a node in the larger global network, fostering resilience, diversity, and adaptability[3]. It strengthens Distributed Design’s approach to sustainability by building upon Manzini’s concept of “SLOC – Small, Local, Open, and Connected”[4], prioritising human-scale interactions and sustainable practices that will further ensure the rootedness of global systems in local contexts by highlighting meaningful change arising from contextually and culturally interconnected units acting collectively within a global framework.

Why Afghanistan?

Afghanistan, located in the south part of the world in Central Asia, has been a conflict zone for over forty years with poor infrastructure and a prevailing atmosphere of constant fear and distrust. Cultural values translocated through the historic Silk Roads have remained the same, but the country’s identity has been shaped and reshaped by various foreign powers, resulting in the formation of a punctuated character and activities.

Dynamics between the capital city’s (Kabul) varying degrees of intensity, such as new forms of power, marginalisation, and violence, volatile government, and unpredictability, and urban reordering have created differentiated modes of thinking. Making cultures, on the other hand, have been formed by several waves of environmental and economic influences—including the 1970s Russian invasion followed by the post-9/11 invasion by the international coalition led by the United States of America, the flows of international media

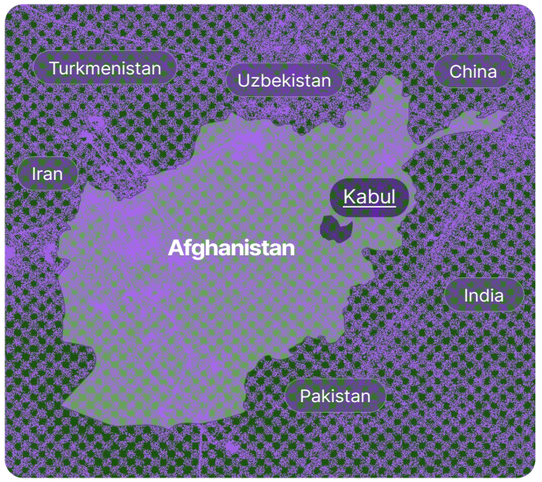


Figure 2 Locating Afghanistan in the Global Context by Author

and foreign aid workers, and the social configuration through numerous conflicts, physical separations, financial hardships, and environmental degradation—which have determined Afghanistan’s resources and people’s mindset.

Considered a least developed economic context[5], Afghanistan is an extreme and unusual location for Distributed Design where cross-cultural flows, ideas, and people are in constant shift and rearrangement. This has resulted in a concentration of multicultural design practices and production methods that are neither functional nor contextual[6], making it an ideal place for exploring the concept of distributed realities by examining—how Afghanistan, as an extremely resource-constrained environment, can inspire a deeper understanding of equitable and holistic approaches to Distributed Design? Through a practice-based case study, this article explores Afghanistan as a compelling environment, highlighting the cultural and social structures that shape design in least developed cities and Afghanistan’s potential for shaping the future of Distributed Design.

A Resource-constrained Environment

Resource-constrained environments enable conditions, systems, and actions that facilitate the unfolding of human potential through in-context design and through what the context has to offer while helping with incorporating and synthesising outcomes into the local way of life[6]. Distributed Design in regions similar to Afghanistan is dependent on a pragmatic process in which reflection upon capability and available resources plays a key role, with inputs managed and channelled independently.

In such specific social, cultural, and geographic locations, resource constraints are personal (internal) limitations[7] that encompasses our cultural, social, and environmental circumstances, such as lack of access to knowledge and skill, limited budget, and availability of funds. Resource constraints in these environments are also geographic (external) restrictions[8] [9] that encompasses our technological, economic, and political circumstances, such as shortage of tools and equipment, limited infrastructure, and access to electricity.

Resource constraints are “powerful tools for the designer”[10] and are, thus, seen as the catalyst for bringing several elements into relationship with one another to stimulate successful projects in specific cultural and geographic contexts[11], such as .], such as the MittiCool Clay Fridge (2005) and Freedom Chair (2008). By analysing how Distributed Design is practiced under resource constraints in Afghanistan, this article takes a qualitative approach to outline the principles that can inspire the global design community to develop ideas and practices that are circumstantially and critically responsive to the feelings, material conditions, dispositions, values, and belief systems of people within the world they inhabit[12].

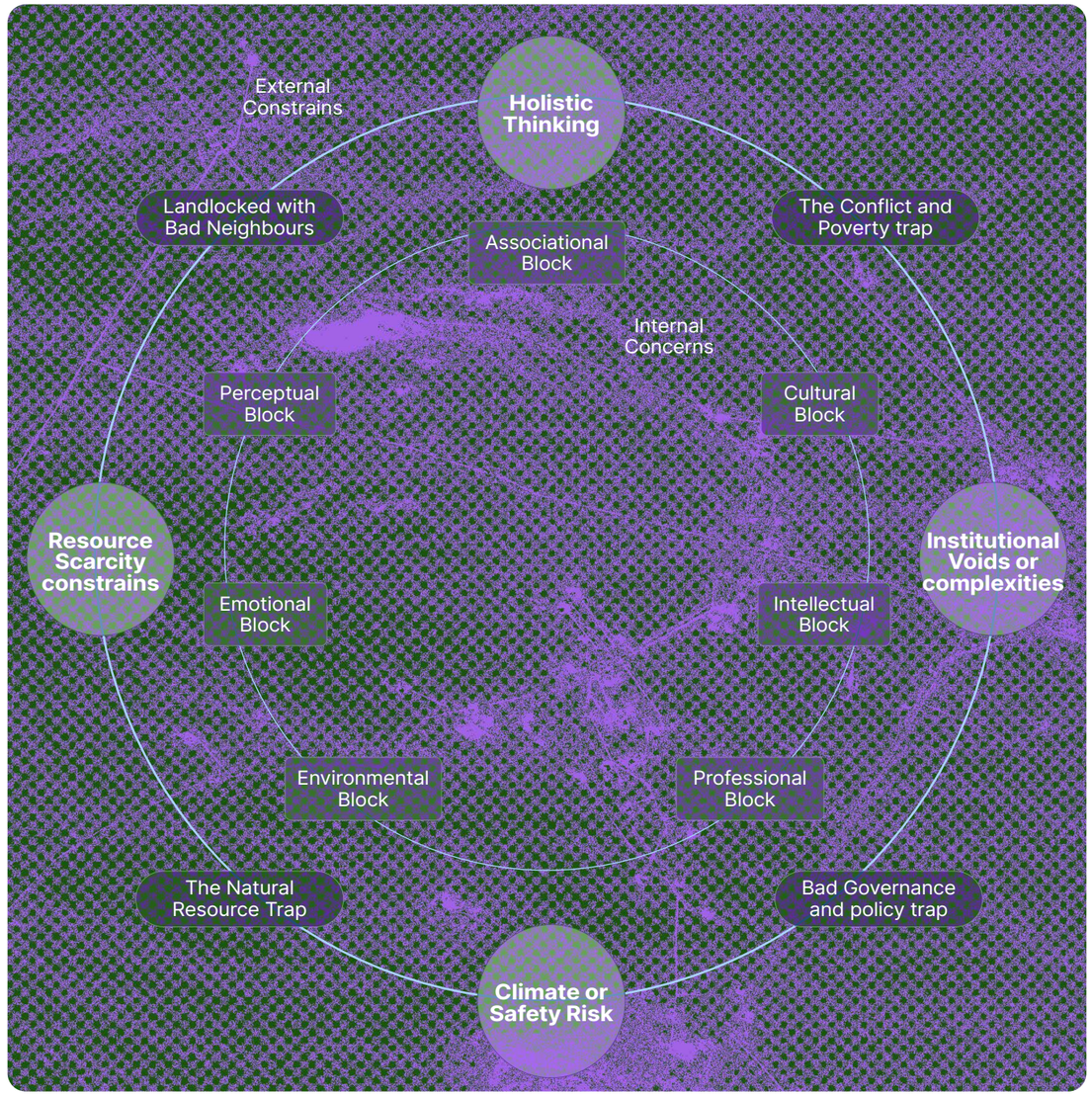


Figure 3 Resource Constraints Framework by Author (based on Papanek, 1985; Collier, 2008; and Bhatti and Ventresca, 2013)

Image 1 View of Kabul, Afghanistan from Chelsetoon by Author

Practicing Distributed Design Under Extreme Resource Constraints

Designing under extreme resource constraints is a form of inquiry and action taken in a specific location that combines available materials and tools, intention, and imagination. However, one of the main issues facing regions such as Afghanistan, especially those with a colonial past and influence, is that design methods involving digital and fabrication tools in these contexts have received little or no attention due to lack of knowledge and understanding as well as accessibility and lack of electricity.

This situation has created a gap in understanding the relationship of design to development (design for industry) or the role of design in achieving sustainable development goals (design for good). Therefore, the distributed realities framework brings a holistic approach to Distributed Design that is intensely localised and culturally situated, in which thinking (cognitive) and making (behavioural) activities are highly influenced by the individual’s internal and external constraints. This form of deeper connection to the immediate and fluctuating human and urban conditions by the maker communities not only transfer new forms of knowledge and data systems but also influences the flow of relationships across the interconnected components of design practice and outcome.

Through hyper-local and hyper-contextualised design solutions, designing under extreme resource constraints enables the development of new ideas that can transmit liberatory joy to the body and community[13]. This is achieved by prioritising existing resources (available tools, materials, and equipment), and in turn designing outcomes that are more efficient in their use, ethical in their practice, and more effective in their purpose[14]. In the context of Afghanistan, designing under extreme resource constraints opens the possibility for community-based collaborations and open access to up-skilling of the local community and building capacities of urban resilience[15]. The localised and regional potential of practicing Distributed Design in such environments can provide design processes and ethical and sustainable approaches, such as systemic problem-solving and environmental interactions promoted by Qaf (2014) and Mangai (2012) projects, that seek radically distinct perspectives and positionalities.

This approach displaces Western thinking and doing as a framework and possibility[16] for Distributed Design by presenting conscious distributed governance and shared decision-making techniques for a more inclusive and localised world.

Why the Future Distributed Designer is Decolonial

In an increasingly interconnected world facing shared crises, such as climate change, economic instability and resource depletion, the future role of distributed designers and their approach in extremely resource-constrained environments, such as Afghanistan, would need to continue evolving towards creative diversity and resilient approaches to idea generation and practice. Their efforts should centre on empowering marginalised and underserved populations within specific cultural and geographic contexts. Key to this shift lies in the continued development of collaborative objectives and collective actions that leverage existing assets and practical grassroots methods. By involving many players, these efforts can amplify contextually distributed behaviours and positively impact the lives of local people through inclusive, culturally appropriate design solutions that align with their values and purchasing power.

A key characteristic of the future distributed designer shaped by the distributed realities approach is their ability to practice Distributed Design 'more consciously'[17] within an extremely resource-constrained environment where the awareness of external influences enables conscious use of materials, adaptive use of production techniques, and the development of contextually suitable outcomes. This is achieved through the application of tried and tested processes and technologies in ways that are known to the local people and the maker community. This means consciously modifying and unifying design ideas to suit the immediate context and available materials and tools. Furthermore, this means the transformation of colonised views through finding alternative knowledge by acknowledging and honouring the culture of makers and end-users and their social structure.

Design's Ethical and Cross-cultural Responsibility

In the East (primarily the Middle East and Asia), designers with their "flexible way of thinking and making"[18] follow methods that are simultaneous and integrated into their way of life[19]. However, with the arrival of European colonialism—the psychological and physical domination and control by Europeans upon non-European people and their behaviour[20]—came organised processes and techniques that valued perfectionism, resulting in the colonised losing confidence and the will to develop new modes of interaction with the world[21].

Design "can shape our tools and environments as well as our society and behaviour"[7], however, due to their turbulent history and volatile social and economic conditions, design in regions such as Afghanistan, has been absent from this perspective, where 20% of the world's population lives under extreme resource constraints[5]. Furthermore, there is a lack of awareness and understanding of design's role and responsibility within the local population, resulting in a limited contribution to design at both the philosophical and practical levels.

Designing under resource constraints can put a strong emphasis on design's role in building local design talent for viable futures through the exploration of ethical "localised desires"[12] based on a reflective decision-making process and a more deliberate approach to Distributed Design.

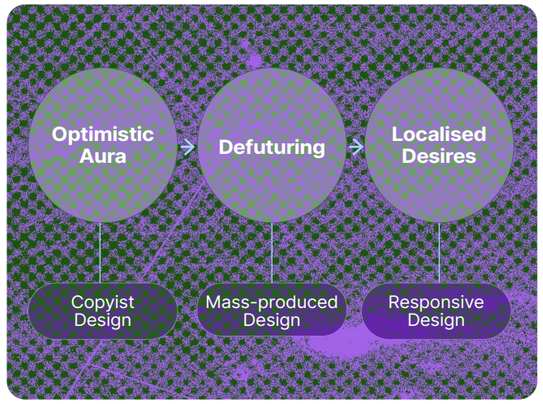


Figure 4 Distributed Design as Localised Desires by Author (based on Clark, 2009 and Fry, 2011)

Design, therefore, provides a unique opportunity for similar regions to connect and interweave their political, cultural, economic, and environmental dimensions and develop theories and methods directed by their local resources and capabilities. Considering these findings, we will now explore some key categories of learnings identified from the Hawa project carried out in Kabul, Afghanistan to describe how extremely resource-constrained environments can inspire deeper equitable and holistic approaches to Distributed Design and demonstrate the approach taken in this project based on the distributed realities framework. Additionally, the implications of extreme resource constraints on Distributed Design practices and future global design methodologies are discussed in the following section.

Holistic Thinking and Interconnected Engagement

The Hawa project, which means air in Farsi and Pashto languages, was initiated by the author and designed in collaboration with a community of makers and end-users in Kabul, Afghanistan during the summer of 2019. The

Image 2 Making of Hawa in Kabul, Afghanistan by Author

aim was to design and make a multipurpose household device for air-drying and dehydrating food at home in Afghanistan through the understanding of complex relationships between people, urban systems, and the environment.

The interdependencies of these interrelationships demanded a shift from isolated thinking and making to systems thinking[3] and nurturing ecosystems of locally available resources (tools, materials, and equipment), users, and makers. For example, strong concentration of skilled craftsmen in the locality provided site-specific knowledge production undertaken inside the shop/workshop where the designer/maker would interact with and adapt to the surrounding environment. This meant finding new meanings for existing objects by having an inquiry-led dialogue with the available tools and materials, the production environment, and a sharp focus on addressing the needs of end-users in the present 'moment on now'[22].

The design and making processes were significantly influenced by the arrangement of the immediate environment, characterised as "a form of active investigation"[23] that prioritised discovery and experimental manipulation over a theory-first approach. This method aimed to generate novel knowledge and context-specific design outcomes.

A crucial aspect of making the household device contextually appropriate and adaptable involved the continuous adaptation and rearrangement of production techniques by moving away from rigid cultural and traditional practices, such as copying and appropriation, towards a more strategic and disciplined methodology. This approach, which integrated "doing the right thing whilst having the right emotion"[24], enabled the creation of designs capable of effectively responding to dynamic challenges through a judicious blend of activity and receptivity to the complexities of the immediate surroundings, whether arising from social, economic, or environmental changes. Having access to key user insights, rapidly user-testing prototypes, and engaging with key suppliers, while being aware of local conditions, helped establish feedback loops for iterative improvement, which in turn allowed all stakeholders to learn from both successes and failures.

In an extremely resource-constrained environment like Afghanistan, this approach was especially crucial as it emphasised creative adaptability and sustainability to locally available resources. Real-time input from the community ensured that design outcomes remain relevant to their unique context. This approach further compliments Distributed Design's aim of designing with resource-constrained communities rather than designing for them, with a deeper focus on fostering organic collaboration through shared knowledge and collective effort. By doing so, it enables sustainable inter- and cross-disciplinary collaborations, bridging gaps across local enterprises in a specific location where all players are engaged as collaborators rather than mere recipients of new design solutions, fostering a resilient and empowered community.

Bridging Creative Ideas with Resilient Practices

The second category of learnings are concerned with approaches that promote distributed governance and decision-making to empower communities of end-users and makers and ensure that design solutions are not only innovative but also deeply rooted in local realities. For example, unavailability of electricity strongly shifts everyday power structures within the community, and with it, the choices of tools, materials, and equipment.

This situation has enabled the creation of local councils within the maker clusters who coordinate the use and availability of key infrastructure and high-tech equipment where the designer/maker would ensure that everyday decisions regarding a design project are not only relevant but also resilient to the shifting political and environmental landscape of the community they serve and work with.

Image 3 Site-specific Knowledge Production Undertaken Inside the Shop/Workshop by Author

Image 4 Coordinating the Use and Availability of Key Infrastructure and High-tech Equipment by Author

This in turn influenced the scalability and adaptability of creative ideas and encouraged their cross-pollination, while localising decision-making to reduce dependency on centralised infrastructure and resource bottlenecks, resulting in a flexible management of a network of autonomous yet interconnected nodes. This distributed approach to design enhanced the overall system's ability to respond to everyday electricity load-shedding, oversubscription of key tools and equipment, and socio-economic disruptions. Furthermore, shared decision-making helped with stronger trust and accountability among stakeholders where trust in formal institutions was very limited, while also building stronger social cohesion and mitigating potential conflicts over resource mismanagement by ensuring collective oversight, responsibility, and awareness of everyone's needs.

The Role of Cultural and Social Structures

The final category of learning is concerned with deeply intertwining the local structures that shape communities (such as values, traditions, and everyday social norms) with the design to ensure outcomes are both culturally suitable and contextually appropriate. For example, the diversity of materials, forms, and shapes in these regions goes beyond addressing functional needs, Integrating cultural and social structures enabled shared ownership of challenges and opportunities with the community of end-users and makers as well as engaging with other locals such as artisans, tradespeople, and leaders as co-creators to develop not just functional design but also functional systems. This integration would further enhance community wellbeing without compromising existing heritage while advancing technological progress. Furthermore, this approach to Distributed Design is centred on advancing models that establish local systems and are efficient, human- and planet-centred, while also being adaptive, enduring, and responsive to people's needs and local conditions.

Shifting Paradigms and Relevance to Distributed Design

Distributed Design in extremely resource-constrained environments, such as Afghanistan, originates from the point when Western methods of design are displaced with a more strategic and disciplined methodology and when learning in place and making in place merge with kinetics, spiritual presence, and emotion. The distributed realities concept presented in this article argues that we have entered an "age of tribalism"[25] due to the increasingly strong collective pressures from

macro-economic, political, geographical, and cultural processes that are intertwined and require localised practices that integrate both cognitive and behavioural activities. This approach to Distributed Design further emphasises the "rethinking of the mainstream way of thinking and doing that are small, local, and connected actions"[4] in which available resources are catalysed and used in the best way possible, based on "geographic clustering"[17], indicating that successful design is spatially concentrated and is developed through better local understanding.

Towards Plurality in Distributed Design

A key characteristic of Distributed Design, thus far, has been to respond to situations of emergency, growing population, and rapid urbanisation. However, its methods and processes have been less focused on the needs of designers and makers in conflict-ridden and geographically complex regions and less so on engaging members of their diverse communities in long-term transformative change through systemic thinking, design, and manufacturing.

The distributed realities approach to Distributed Design discussed in this article further emphasises the need for incorporating diverse cultural values, symbols, and design expressions by recognising the importance of local knowledge, traditional practices, and personal experiences to shape the design and development of new solutions. This approach challenges the homogeneity of traditional design practices and provides ways for shaping the future of Distributed Design by emphasising holistic thinking with available tools, materials, and equipment in extremely resource-constrained environments through interconnected engagement with the immediate context to bridge creativity and practice, and distributed decision-making with social and cultural structures.

Future Directions

Seen in this light, Distributed Design's future for least developed cities lies in continuing to foster a pluralistic, inclusive, and adaptive framework, such as the one presented here, that recognises the role of resource-constrained environments and the importance of their diverse local knowledge systems and cultural and contextual dynamics. Shifting its focus from an emphasis on rapid responses and technical solutions, the findings from this article suggest that Distributed Design for locations similar to Afghanistan should adopt long-term, systemic approaches that integrate available resources, social and cultural structures, and community-level priorities to enhance effectiveness in resource-constrained environments. This transition calls for a continued reimagining of design methods and processes that emphasise cross-disciplinary collaborations, geographic contexts, and local clusters to address the challenges of resource-constrained regions.

One critical direction is the need for traditional design in extremely resource-constrained environments, such as Afghanistan, to transition towards a distributed realities approach to Distributed Design. This involves the deeper integration of local communities as active partners in the design and manufacturing processes, aiming to minimise resource usage. This necessitates a reconsideration of the role of designers and makers, as well as their processes in these contexts, shifting from being solution developers to facilitators of collaborative design, empowering communities to become co-designers rather than merely beneficiaries. This will ensure that design outcomes are culturally appropriate and contextually relevant.

Another area of focus is how within Afghanistan, and similar regions, approach to design shifts to blending cultural practices with advanced technologies to create urban systems that are not only efficient but also respectful of the local ecosystem and heritage. This necessitates bridging the gap between the global and the local and fostering scalable and rooted solutions specific to cultural and geographic contexts. This will ensure that Distributed Design in such contexts grapples with the ethical dimensions of design by critically assessing the impact of design outcomes on local power dynamics, social equity, and availability of resources.

Image 5 Integrating Diversity of Materials, Forms, and Shapes in Urban Fabric by Author

QR 1
Discover MittiCool Clay Fridge, a project by Mansukhbhai Prajapati.

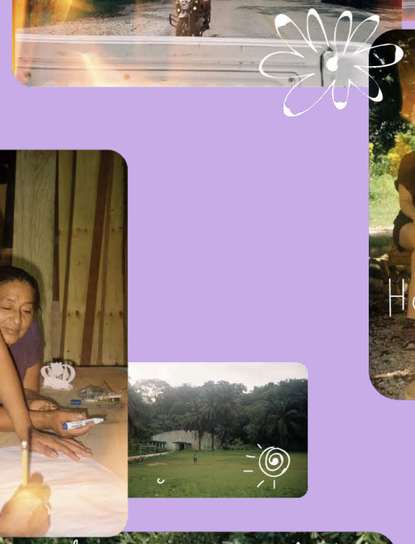
QR 2
Meet the Freedom Chair, a project by Global Research Innovation and Technology.

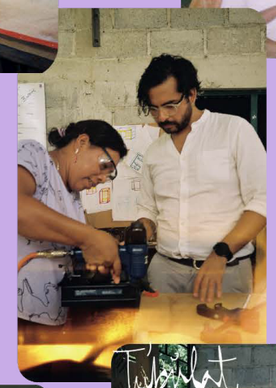
QR 3
Qaf, a sustainable washing system by Mohammad Idrees Rasouli.

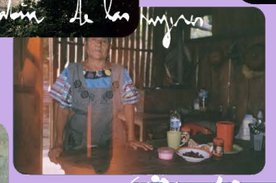
QR 4
Find out more about the water purifying transporter, Mangai by Mohammad Idrees Rasouli.

Seeds of Wood, Roots of the Future

Alberto Blanco,
Paola Zanchetta







Kantamanto Social Club

Daan Sonnemans,
Kantamanto Social Club & Fab City Foundation

Learning from and valuing inherently sustainable (textile) ecosystems like Kantamanto Market to lead global sustainability discussions

Project type
Community

Location
Accra, Ghana
Africa

Eindhoven,
The Netherlands
Europe

Project description

The Kantamanto Social Club is a community-driven upcycled fashion collective rooted in Ghana's Kantamanto Market. It empowers the voices and practices of communities in the Global South, whose sustainable traditions have long been overlooked and undervalued by global systems. Through activism and knowledge sharing, the collective reclaims and amplifies these traditions, challenging dominant narratives in the fashion industry.

The project seeks to disrupt power imbalances by fostering equitable dialogue between global fashion communities, industries and knowledge systems. It calls for a fundamental shift in the global textile industry, centering these communities as frontrunners of circular and regenerative fashion. In doing so, it envisions a future where these historically marginalised communities drive systemic change and shape a fairer, regenerative world.

Context and history

Images of overflowing textile landfills across Africa are all too familiar, often evoking outrage at the Global North's disposal of post-consumer textiles in the Global South. Yet, the power systems driving this exploitative waste stream remain largely unchallenged, even as fast fashion consumption grows unchecked. Beyond the waste lies a story of systemic injustice—but also one of agency and innovation.

Kantamanto Market in Ghana, a vibrant hub of over 30,000 artisans and retailers, embodies the creativity and resourcefulness of communities confronting the burden of the world's discarded textiles. While external actors debate the exact percentages of secondhand clothing entering Africa that are deemed waste, Kantamanto's community-driven circular systems keep millions of garments out of landfills. Their work demonstrates that sustainable and regenerative practices are not theoretical but deeply embedded in local traditions and knowledge systems.

Kantamanto Social Club, initiated in June 2023 after an online residency program organised by The OR Foundation, builds on this legacy of resistance and ingenuity. This program brought together Ghanaian, Dutch, and British design students to explore the realities of waste colonialism and its impact on communities like Kantamanto. The project debuted with Kanta to the World, an exhibition in London co-hosted with Trashclub London, showcasing the upcycled drip of ten Kantamanto creatives. What began as an exhibition has since grown into a movement, rooted in the creativity of Kantamanto's community and inspiring action toward systemic change within global fashion systems.

What is the need it tackles?

The fashion industry is among the most polluting and fastest-growing sectors globally, with companies like Shein producing up to 10.000 new styles per day[1]. This hyper-fast fashion trend generates excessive waste, with less than 1% of recovered textiles being recycled[2]. A significant portion of this waste is exported to the Global South, where it overwhelms local communities, damages ecosystems, and destabilises economies.

While European governments advocate for increased textile collection rates, facilities are already overwhelmed with unwanted, low-quality garments. The European recycling infrastructure continues to face significant challenges in scaling up operations, while frequent bankruptcies among recycling companies exacerbate the problem[3]. A viable solution to this immense challenge has yet to be implemented on a global scale.
The Kantamanto Social Club addresses the need for alternative fashion futures by showcasing innovative circular ecosystems like the Kantamanto Market. The project underscores the potential of these systems to minimise waste and inspire sustainable practices on a global scale. It also aligns with evolving global policies, such as the European Waste Framework Directive[4], positioning Kantamanto as a model for tackling textile waste through a regenerative framework.

Image 1 The Or Foundation's Ecotox team at Shatta's beach, Accra, Ghana. (22-11-23, Accra, Ghana, Daan Sonnemans)

What was the development process of the project like?

Kantamanto Social Club originated from the aforementioned Sender-Receiver Residency. This program brought together students in a digital space

Image 2 Upcycler Phaqe Mani at his tailoring shop on Kantamanto Market (24-11-23, Kantamanto Market, Accra, Ghana, Daan Sonnemans)

to learn about the second hand textile industry and the concept of waste colonialism while engaging directly with the Kantamanto community. The goal was not only to raise awareness among European (fashion) design students but also to inspire them to develop local interventions that address waste colonialism and support efforts to combat it.

The project was built on the idea of exposing the absurdity of the global secondhand textile industry. By curating upcycled Ghanaian fashion from discarded textiles most likely originating in the Global North and selling these items back to the same consumers who initially discarded them, the initiative highlights an obvious paradox: once these garments are redesigned and labelled as designer fashion, people suddenly become willing again to pay premium prices for them.

Last year, the project was showcased at Dutch Design Week 2024, where it won the **Manifestations 2024 Young Talent Award.** Following this, the outfits appeared on the catwalk at the Next Nature Museum's Future Fashion event. Recently, the project was featured at Munich Fabric Start in January 2025. Additionally, we have received a grant and are developing a knowledge exchange program between the Kantamanto community and Dutch fashion education and industry.

Image 3 Panel discussion with Trash Club and The Or Foundation during the Kanta to the World exhibition in London (02-09-23, East Village, London, Daan Sonnemans)

Image 4 2-Steps Custom's outfit showcased on the Future Fashion runway by Next Nature Museum (08-11-24, Eindhoven, The Netherlands, Dinke van der Zalm)

What impact does your project currently have?

The project so far has collaborated with nine upcyclers and one stylist from the Kantamanto Market, whose work has been showcased to over 35,000 visitors at three exhibitions across two countries. These events have not only brought international visibility to their work but have also generated over €2,000 (30.000+ Gh₵) in direct sales, providing tangible economic benefits. Beyond the exhibitions, the project has catalysed broader initiatives, including a collaborative research proposal between Avans University of Applied Sciences, The OR Foundation, and Raddis Cotton to revitalise Ghana's regenerative cotton industry. Additionally, the project has supported an independent documentary on the Kantamanto Market, Threads of Resilience by Frida Lidbom.

However, the project's most significant impact lies in empowering the upcyclers of Kantamanto Market. These artisans continue to pursue their passions despite facing limited recognition within their local community. One upcycler said, "You are really helping us a lot. We are grateful for that. Not even our own Ghanaians respect the work that we are doing." Since the project began, the upcyclers have formed the Kantamanto Upcyclers Association, a collective dedicated to mutual support and shared growth. Through the project's efforts, some members have been able to travel to Europe supported by The OR Foundation. Their work has also started to gain local recognition, receiving media attention and being featured on global platforms like Vestiaire.

Image 5 Kanta to the World showcase at Manifestations during Dutch Design Week 2024 (18-10-24, Eindhoven, The Netherlands, Oscar Vinck)

Image 6 Kofi Heller posing in his upcycled sunflower suit in front of a textile bale storage space (12-12-24, Accra, Ghana, Ben Breuer)

Image 7 Alpha Costume posing in his upcycled red curtain suit on a waste covered beach in Accra (12-12-24, Accra, Ghana, Ben Breuer)

Looking ahead, the next step is to integrate the voices of the Kantamanto community into the broader global conversations about the fashion industry's shift toward circularity and regeneration, ensuring their practices and perspectives help shape a more sustainable future.

What is the global-local relationship of the project?

The Kantamanto Social Club addresses the global challenges posed by the second-hand textiles industry's impact on climate change and socio-economic stability by exploring localised solutions. By highlighting the highly specialised work of Kantamanto designers, the project connects their creativity and craftsmanship to a global audience, promoting the message of sustainable fashion, conscious consumption, resource efficiency, and resilience.

Through exhibitions, digital media, and global collaborations, the project bridges the divide between local practices and global perspectives, fostering cultural exchange and mutual learning. This approach transforms Kantamanto's local efforts into global inspiration, ensuring their sustainable practices play an important role in shifting the fashion industry toward more conscious and creative solutions.

Why is Kantamanto Social Club distributed design?

The Kantamanto Market is an inherently distributed design ecosystem where over 30,000 entrepreneurs and artisans collaborate to address the detrimental consequences of the Global North's overconsumption. Through their diverse roles—specialised retailers, tailors, menders, upcyclers, cleaners, and painters—this network breathes new life into millions of previously unwanted garments, exemplifying a regenerative and ecosystemic design approach.

This project considers Kantamanto's sustainable ecosystem as a blueprint for a new model of global production and consumption, to replicate its principles worldwide. By supporting the local ecosystem and sharing its practices and methodologies on a global scale, the project fosters open and collaborative innovation. While physical garments currently travel back to the Global North, the ultimate aim is to eliminate these waste streams by creating a system where knowledge, rather than materials, is shared globally.

If you could have dinner with anyone (humxn, plant, fungi, or otherwise) living or dead, who would you dine with?

If I could have dinner with anyone, it would be Kwame Nkrumah. I'd love to discuss his vision for a unified Africa, decolonisation, and how his ideals could inspire solutions to today's challenges. His bold dreams for equity and resilience remain deeply relevant, and I'd be honored to learn from his wisdom and vision for a sustainable future.

QR 1
Explore Kantamanto Social Club platform.

QR 2
Keep up with Kantamanto Social Club

Non-Foreclosed Access Points

Ren Loren Britton

Pluralizing Virtuality

How can we change, resist, refuse and retool the structural conditions of ableism so that we can have technologies of intersectional access that are open, re-combinable and plural?

Image 1 An organic green shape is overlaid on top of a Matterport Screenshot collage. A view of spots where scans of the MACBA Galleries have been scanned are shown as well as a messy 3D rendering of the gallery space and a small map on the top left.

In the workshop "Study of Presence: Non-Foreclosed Access Points: pluralizing virtuality"[1] conducted at MACBA in Barcelona in Fall 2024, I opened a space to hold a series of questions emerging from engaging with 3D scanning technologies, specifically Matterport. In this workshop I invited participants to unfold with me some problems, possibilities and agents of remote access and (re)considered agents with agency in virtual spaces, 'here' and 'there'. Matterport is a 3D scanning technology MACBA is using to enable virtual tours for some of its exhibitions.

This workshop was part of the ongoing project, High Latencies[2], by visual artist and programmer Nicolás Malevé and activist and researcher Jara Rocha – their project takes the museum's infrastructures and socio-technical dependencies as a case study, with the temporary department: the Department of Presence Studies. As they affirm, there are many ways of being present in the digital and logistical operations at the museum: one can be a visitor, a worker, an artist, a piece, bacteria, a procedure, a memory. They further affirm that there are also many ways of being absent. Each of these forms of presence carries with it stories of appreciation, experimentation, repetition, subjugation, learning, care, exclusion, erasure, resistance and damage. Their department considers forms of presence that are affected and activated through software systems.

My invitation into this context was to engage with Matterport and to consider the forms of presence, absence and reproduction this tool holds. What are the circumstances set up at MACBA and what emerges when engaging this software? Who is it for, why is it there, what has it been designed for and how is it used?

Image 2 Cellphone Snapshot of Workshop, 2024, Ren Loren Britton, Digital Collage, CC4R.

Matterport, MACBA, Virtuality & Tools

Matterport is an online platform utilized by MACBA as a 3D tool to provide remote access to exhibitions by 3D scanning some exhibitions and enabling bipedal 'walking' through a digital twin of any scanned exhibition. Built as a tool to be used by the industries of travel, renovation and real estate, navigating through an exhibition in this 3D environment produces an experience completely other to what it is to move through any exhibition at MACBA, in fact when engaging with the tool with Jara, Nicolás and myself we concluded - what it produces is not "a visit", but something else. Foreclosures of movement in space are assigned through limits of where the scan has scanned, and one primary way of understanding the spatial relationships in this 3D environment is through measuring distance.

Image 3 A plastic glove labeled with the word 'translation' connects with ribbon to other objects that change state and words that label them.

This measuring of distance as one queer way of knowing space was something my colleagues, Jara and Nicolás and I laughed about while visiting an exhibition online in Matterport. When in the virtual visit of an exhibition we laughed when noticing that we could measure paintings, screens, angles and distances between artworks - if this was an important mode of accessing artwork like - knowing aesthetic traditions, or perhaps the history of the content of an artwork - then Museum Matterport would make a lot of sense.

The laughing continued when my colleagues wrote to me during the writing of this article to share that, actually yes it had come to pass: a group of teenagers at MACBA used Matterport to measure the gallery spaces by setting up a "tirolina" zipline experiment[3]. Coming back to the question of what measuring tools can do for bodies in physical or virtual spaces. It begs to wonder what queer ways of conceptualizing the space of a gallery, what information is being transmitted through measurement: 'here'? Where is 'here' and where is 'there' and how do we measure them in contemporary modes of virtuality? The premise of the Virtual Tours offered by MACBA provide a version of accessibility where the physicality of the building is the site, to be scanned, understood and transported into a digital double - transported onto my, your, our computers 'there'. The 'there' is wherever we are online - and the 'here' that we refer to - is always the museum, where we presumably aren't. The success of the tool seems to be determined by how many of us 'there' access the museum's exhibitions virtually: the 'here' - where we aren't.

> Digital transformations in remote access always create a different experience 'there' than being 'here', and rather than attempt to make them the same, why not lean into the fact that they are different and this is an opportunity - each space has different affordances.

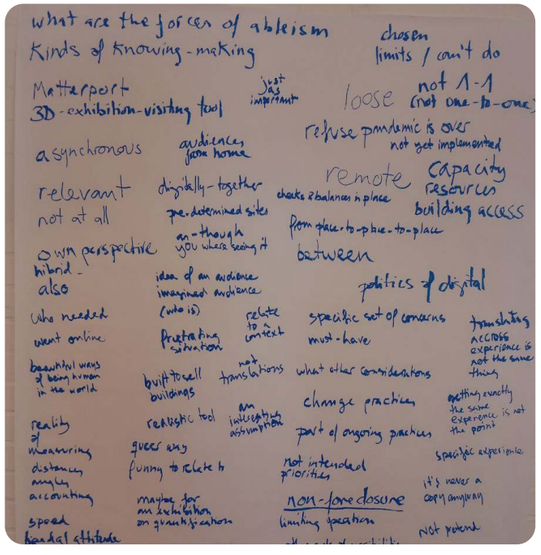


Image 4 An overview of one of the galleries scanned by Matterport is shown.

This one way flow of agency when hybrid access is configured, is something I have been critical of over time. Where is the 'here' and where is the 'there' and why do those of us 'there' want to have access to the 'here'? Like Paulo Freire[4], bell hooks[5], Teaching to Transgress Toolbox[6], Diskrit-Kubi.net[7], Another Roadmap School[8] and others have conceptualized and the banking model

of education - us in the virtual ‘there’ are empty banks, waiting to have our heads filled with the important knowledge ‘here’ - where we can’t be. This one-way flow of agency where online audiences become framed as being ‘on the side’ or a ‘nice addition’ of the main event, away from us online, is woefully commonplace.

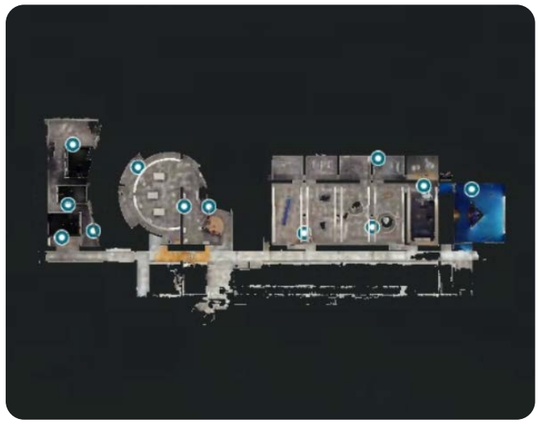


Image 5 An overview of one of the galleries scanned by Matterport is shown.

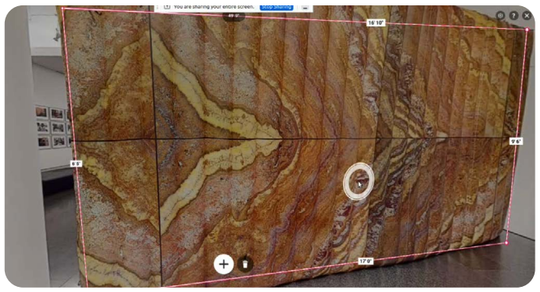


Image 6 An artwork is measured in Matterport in feet.

Online access must be the basis

Connecting online to the event, whatever it happens to be – from a disability justice perspective – must be the baseline from which to move from. As has been often rehearsed within disability community, during the beginning of the Covid-19 Pandemic when nondisabled audiences needed access to work, culture and multiple forms of everyday life - it went online, something that disabled community had been asking for - routinely, and yet it was only when non-disabled people needed it, then it happened.

Tracking this specific operation of ableism and subsequent gain, and loss of access is the project Remote Access Archive from Aimi Hamraie[9] and the Critical Design Lab[10], which archives all of the ways that access has and is being lost by disabled folks who during an earlier moment of the Covid-19 Pandemic (because indeed as Mia Mingus writes in her heart rocking article “You are not entitled to our deaths” the pandemic is not over[11]). This experience of a massive widening of remote access is something that is now in the writing of this article, winter 2024 waning again. Currently, nondisabled people move through the world again as though the pandemic is over, without the same attention to our interdependent realities that is still needed.

Image 7 2024, Ren Loren Britton, Digital Collage & Screenshot from Matterport, CC4R.

For those of us in the disabled community we know that if nondisabled people needed remote access regularly that questions of how online and offline spaces are conceptualized would be further along. The point of rehearsing this critique is not to center the ableism that pervades spaces both on and offline. Rather online access and producing more interesting, more connecting, more accessible, more desirous, more playful ways of accessing culture is work that I am deeply interested in. Critiquing Matterport and MACBA’s use of it then, is rather to invest in remote access, with a capacious curiosity to expand and learn from practices that move with feeling, sensing, learning, playing and pluralizing forms of remote access. The desire here is to keep rehearsing accessible presents beyond the paradigms of → no online access at all← and → the banking model where we’re just deposits for the knowledge ←. Experimenting towards ways beyond the ‘here’ solely determining what is relevant for us ‘there’ is what I mean by ‘Non Foreclosed Access Points’ and practices of ‘Plural Virtuality.’

One example of this kind of multi-directional flow is the project “Emoji Proxies & Ghost Messengers”, which troubles the ‘here’ and ‘there’ in the agential flow between spaces[12,13]. Developed by Karl Moubarak, The Hmm and Hackers & Designers this project prototyped various digital tools like a scent diffuser where online audiences can release a scent (meant to smell like the internet) into the physical audience. Or in another iteration, online audiences control the view of the on-site camera via emoji commands: zooming in on what they want to see, not merely to view one point that the organizers ‘here’ have decided is most important. Shifting the ‘here’ and ‘there’ of agency, the ‘here’ and ‘there’ can move around.

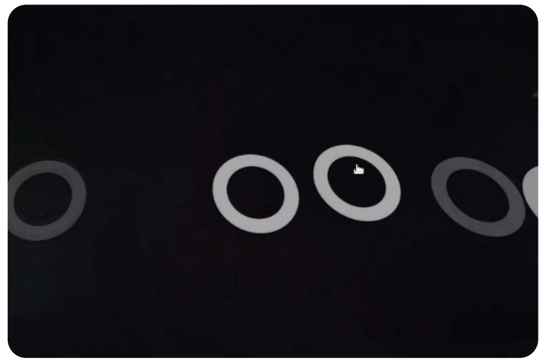


Image 8 2024, Ren Loren Britton, Digital Collage & Screenshot from Matterport, CC4R.

Back to the Workshop

In the workshop with participants we considered a wide variety of ways of knowing and experiencing materialities, objects and artworks - we engaged the visual, olfactory, emotional, shape-shifting, tactile, audible, time-based and perhaps some form of measurement as ways of knowing the material world around us. Together we sat with paradigms of ‘here’ and ‘there’ and considered what the priorities around remote access technologies like Matterport were for the museum.

Sitting with institutional and collective desires for documentation, remote-access, transformation, accessibility and priorities of software tools – in the workshop we compiled an incomplete list of things we can and can’t yet do in virtual visits.

What can’t we do so far:

- Lean over and whisper to a friend about the work
- Visit all artworks (not all have been scanned)
- Navigate to the “wrong place” in the exhibition (not all spaces are scanned as scans are paid per-point)
- Read most of the wall labels
- Visit video artworks outside of proprietary channels (like Youtube - which is used to link to videos in the exhibition)
- Ensure there is an access copy and/or closed captions available for every video / audio work
- Move through the exhibition at various heights, our point of view assumes we meet artworks about mid-height, not as if we were seated, or of high or low stature
- Touch anything but our computer
- Smell anything other than the environment we’re currently in
- See the back of things most of the time
- Access the exhibition via a screen-reader
- Make an experience comparable to visiting the exhibition in real life
- Move outside of the grid
- Visit all of the works because of image rights/ copyright
- Know how much computing power and energy is required to maintain the data/produce the 3D models vis-a-vie Matterport that we access online
- Know how much Matterport costs to produce and maintain
- Visit every exhibition, only the ones that have been scanned with unclear reasons as to why and more...

Critiquing Matterport and MACBA’s use of it then, is rather to invest in remote access, with a capacious curiosity to expand and learn from practices that move with feeling, sensing, learning, playing and pluralizing forms of remote access. The desire here is to keep rehearsing accessible presents beyond the paradigms of → no online access at all← and → the banking model where we’re just deposits for the knowledge ←

What we can do so far:

- Visit the exhibition in a way at any time, any day
- Question the paradigms of authorship at work, this becomes very notable when some artworks are ‘blanks’ in the virtual visit prompting the question: who owns the rights, and why?
- Use other technologies to caption artworks on our computers at home
- Imagine what non-foreclosure in virtual worlds could be like
- Visit as many times as we like without having to pay
- Adjust the brightness of your home/computer space
- Set all the sensory conditions of your home/ computer space as you like
- Visit the exhibition from bed
- Demand ever more delicious and necessary forms

of access making, even when they are imperfect
- Make comparisons between the visual tactility we see and the sensorial world all around us, finding textures in our home space that seem to echo the visual textures online as a way of comparative knowing
- Problematize visuality
- Play around with an awkward scan-logic of the museum
- Choose what is audible / non-audible - all sound works need to be actively turned ‘on’ rather than walking into a loud environment without warning
- Move far and fast by ‘jumping’ from one scan-point to another
- Have some experience of the architecture of the museum itself
- Measure the distance of everything scanned, from one thing to another with seeming reliability of ‘factual’ distance and more...

Following the playful address and possibility of transformation from can - to - can’t or of barrier to point of critique - in the workshop participants were prompted to bring objects that can transform either through significance or state. Some brought seeds, computers, apples, pears, mechanical plushies, ribbons, bumper stickers resisting racial capitalism and handheld fans. After introducing each shape shifting object we labeled all of the actors in this web of remote access we could think of onto the shapeshifting objects. Laying them on the ground we made a network of unstable objects, agencies and relations and identified lines of connection between these elements. Through a solid green ribbon we laid out relations that seemed fixed, and through a multi-colored ribbon we related between objects that seemed malleable. Through laying out the series of actors that come up when making decisions around remote access both from people visiting the museum and working in the museum we realized the complexity of relations and instabilities when talking about what can and can’t be done when engaging remote access.

Some relationships seemed foreclosed from the start, others were non-foreclosed and could be reformulated. Depending on who was mapping the set of relationships between the labeled actors - different participants understood the relations between actors in different ways. For some the relation seemed fixed and completely unchangeable, for others, it was new, open and permeable. At the end of this exercise the group came together and processed the experience. Reflections emerged around the frustrations of noting how things have been done and expecting that this was enough, knowing that it was important and that they were doing it - so what was the problem? Another reflection emerged that ‘just because something has been done this way doesn’t mean it has to continue to be done this way’ - tying de-colonial and access considerations to each other.

Image 9 2024, Ren Loren Britton, Digital Collage & Screenshot from Matterport, CC4R.

Plural points towards non foreclosure

When it comes to Matterport and remote access, a single point perspective is rendered through a 3D modeling software that presents the museum through a matrix of 90 degree rectangular boxes expanding in all directions. This single point perspective builds upon one way of perception that in the case of Matterport started with real estate, and has now been taken up within the arts.

What I hope to re-conceptualize within this article is that the kind of plural, open and re-combinable access points of remote-access must adopt strategies of situated perspectives that are specific and adjustable and that likely cannot abide by the rules of the tool as given. Digital transformations in remote access always create a different experience ‘there’ than being ‘here’, and rather than attempt to make them the same, why not lean into the fact that they are different and this is an opportunity - each space has different affordances. No sensory way (sight, sound, smell, touch, taste) of meeting an exhibition has to be a limit unless we choose strategies and modes of visiting that foreclose it to be so. Let us make virtual visiting of all sorts of events as another kind of event-making practice that prioritizes a different kind of experience & access, that lets us bump into something new. Let us dream with a disability justice informed perspective that honors and creates spaces for non-normative and non-physical engagements with exhibitions as valuable. Let us pluralize virtuality towards non-foreclosure.

Digital transformations in remote access always create a different experience ‘there’ than being ‘here’, and rather than attempt to make them the same, why not lean into the fact that they are different and this is an opportunity - each space has different affordances.

Members' Booklet

Contributions

Our yearly publication is an act of worlding — a space to reflect, exchange, and imagine what has been, what is, and what could be. As challenges intensify around us, we deliberately carve out space to find joy in our community and celebrate the many ways we are knowing, being, and doing.

Over the last years, we have grown from 15 to 26 member organizations, each bringing distinct cultural, social, and environmental perspectives. These hyperlocal realities create a richness of knowledges—translated, mutated and adapted into our communal interactions and collective intelligences. Together, we cultivate design as an accessible, transformative tool for co-creating equitable, regenerative, and decentralized futures.

The past three years, in particular, have been a period of deep reflection— individually and collectively — that has not always been comfortable. Not only have we expanded in numbers but also in experience, challenging our own assumptions, questioning our trajectories, and refining our approaches. Rather than unraveling, this ongoing process of "co-spection," a shared introspection, has strengthened our community bonds. We hold space for new voices and ideas, embracing friction as a generative force for change.

As activists, changemakers, radical thinkers, and critical makers, intentional exchange remains at the heart of our practices. We close this edition with a series of reflections from our Platform members.

From nurturing local ecosystems of creativity to navigating our relationships within a distributed network, we explore how we have thrived locally and connected globally. These are not just stories but lived experiences—musings and learnings, challenges and opportunities that we first encountered as individuals and now face as a collective.

Above and below ground, our wildflower field extends beyond its edges, seeding and shaping the ecosystems around it.

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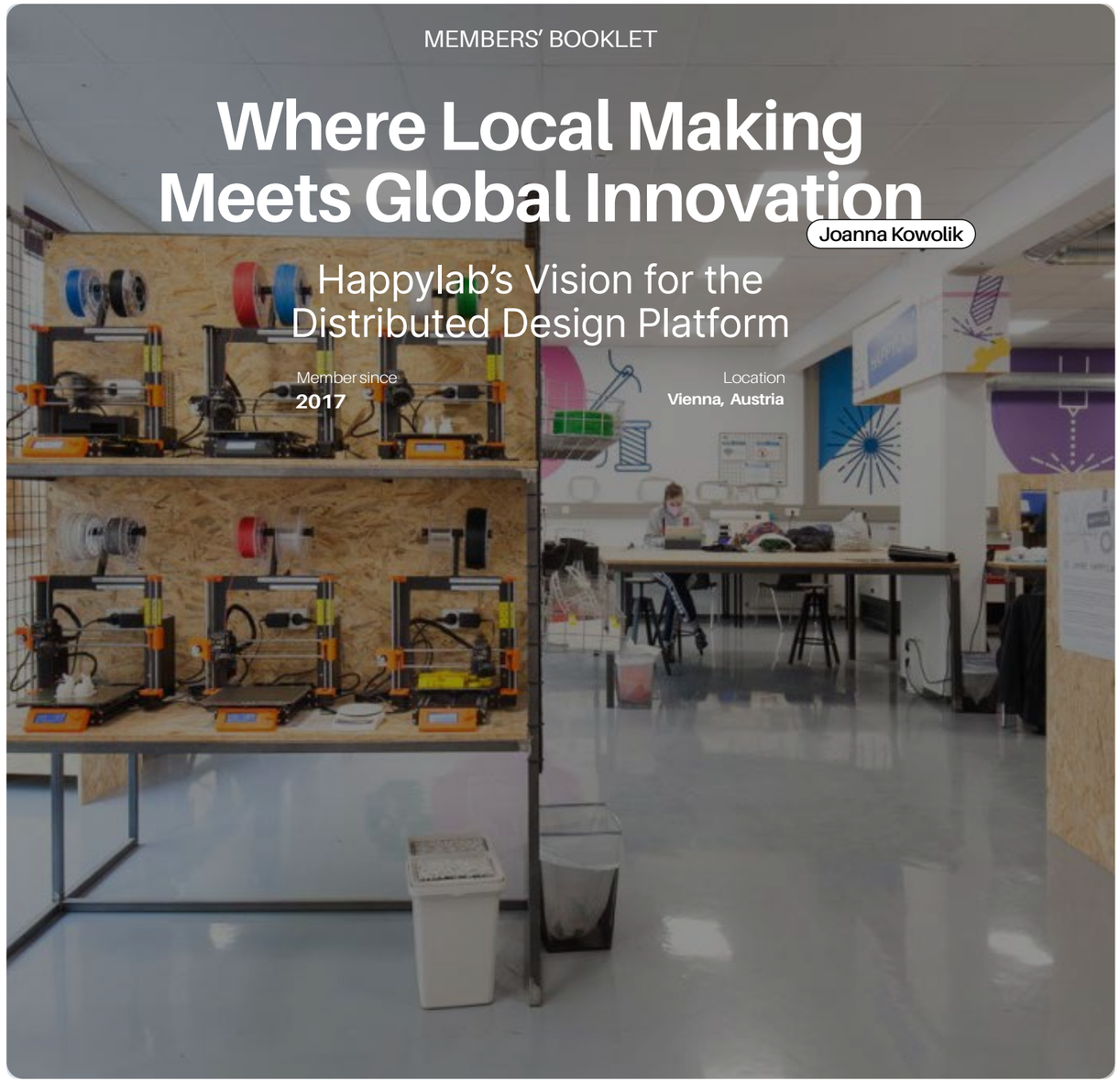
Meet the Distributed Design Platform

The Distributed Design Platform coordination team

Since 2017, the Distributed Design Platform has become a powerful catalyst for design education and collaboration. Operating at a global level across Europe and through local nodes run by our incredible members, we are an exchange and networking hub for the European maker and design movement. Through regular programming, publications, we have been able to consistently reach a global audience and foster a vibrant online community – all with the common vision of a more open, collaborative, regenerative, and ecosystemic present and future.

Through holistic support in competencies building, mobility schemes, awards, and beyond, we work to uplift and empower our Creative Talents so they can continue to grow beyond the traditional parameters of design.

Open Dot	Italy
Pakhuis de Zwijger	The Netherlands
Re:Publica	Germany
Maker	Denmark
Polytechnic University of Lisbon (IPL)	Portugal
Happylab Vienna	Austria
Fab Lab Budapest	Hungary
Espacio Open	Spain
Ars Longa	France
Fab Lab Barcelona/ IAAC	Spain
TMDC	Spain
P2P Lab	Greece
Politecnico di Milano | Polifactory	Italy
SPLOT	Poland
Metalab	Ukraine
Knowledge Center of Vestmannaeyjar	Iceland
Global Innovation Gathering	Germany
Fab City Foundation	Estonia
Danish Design Center	Denmark
Museum of Architecture and Design	Slovenia
Center Rog	Slovenia



Happylab

Austria's first Fab Lab, established in 2006. The term Fab Lab refers to an open high-tech workshop equipped with computer-controlled machines that people can use to manufacture a wide variety of products on their own. It is far more than just a room with machines that can be used by the interested public. A key aspect is providing low-threshold access to appeal even to those not yet equipped with the relevant prior knowledge. The Happylab is an interdisciplinary entry point for all who have creative and/or technological project ideas and a founding member of the Distributed Design Platform.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

With 1,700 active members, Happylab stands as one of the largest maker communities in Europe, serving as a crucial hub for designers, local producers, students, and innovators in Vienna and throughout Austria. Through various research projects, we continuously strive to make our space as diverse and inclusive as possible, with a particular focus on inspiring women and girls to engage with digital production possibilities. With this mindset, we strive to be an open space that provides different individuals the opportunity to connect with their ideas and develop solutions together with us and the community. In the last years the Distributed Design project was one of our key initiatives, which has fostered a tight-knit community of talents who share common values and collaborate closely with each other and our organization. The residency format brought makers and designers together to work on their projects in the same space, naturally encouraging collaboration and open exchange between participants. This environment facilitated shared learning experiences and peer-to-peer knowledge transfer. Through direct knowledge transfer from Platform members to residents during talent exchange programs, collaboration and open work practices were fostered on an international level. This enabled the talents to immediately incorporate their newly acquired knowledge into their work and develop new projects based on these insights.

How do we expand the reach of our local community's work and foster glocal connections?

The Distributed Design Residencies program has been crucial in expanding our reach and nurturing young creative talents. Since 2018 we've witnessed a remarkable snowball effect, with the program gaining recognition among students from various universities in and around Vienna. This initiative has led to valuable cooperations with design universities and alumni associations, enhancing our communication channels and community outreach. On an international level, we maintain active exchanges through numerous research projects with various partners. There our Distributed Design Residency program has consistently garnered significant attention, allowing us to showcase innovative and interesting projects through our talents, effectively bridging local expertise with global impact.

How has our organisation's approach evolved over the years?

Being part of the Distributed Design Platform has significantly shaped our organizational evolution. The connections and exchange between Platform members have become a vital aspect of our work, creating a trusted network of partners that has provided numerous learning opportunities for all participants. The ability to exchange ideas with like-minded individuals across Europe has brought fresh perspectives to our work. The Platform with a collective that shares common values and goals has created a powerful momentum that attracts interest and opens new doors. Particularly beneficial has been our close collaboration with the Danish Design Center and the Circular Strategy Wheel, which we try to integrate into our maker community. This has led to improved integration of circular practices in our Fab Lab, both in workshop operations and maker projects.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

The values of Distributed Design deeply align with and reinforce our core principles as a Fab Lab. Openness and collaboration are fundamental to our daily operations - we actively gather and share knowledge, make resources publicly available, and contribute to generating new understanding within our community. This commitment to openness extends to how we approach partnerships; we actively seek collaborations with organizations that complement our expertise, particularly in science, research, and education, embodying the ecosystemic thinking that Distributed Design promotes.

The values of Distributed Design have also become deeply embedded in our talents' projects. With each successive call and residency cycle within the Distributed Design Platform framework, we've observed these principles increasingly reflected in applicants' submissions and project ideas. Applicants have progressively incorporated aspects of openness and collaboration into their work, with their projects increasingly aligning with these imperatives.

About HappyLab Vienna

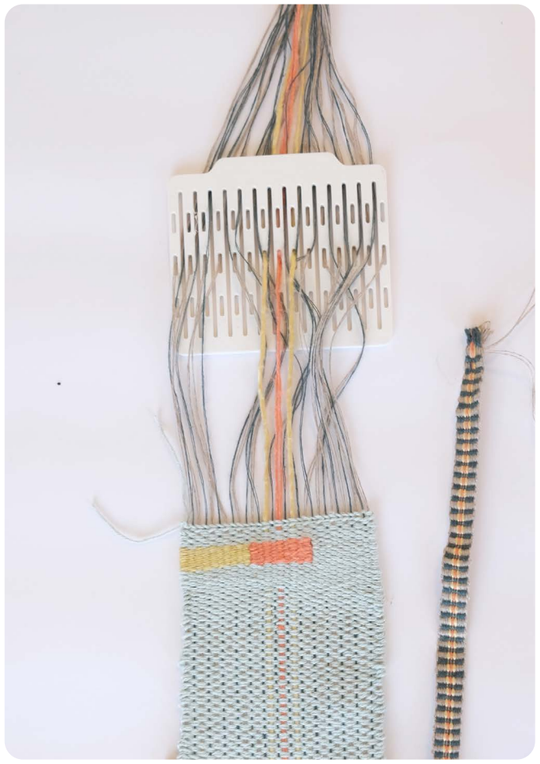


Image 1 3D-printed weaving comb "Johann" © Gundula Hickisch

If we could revisit the start of our Distributed Design journey...

"The idea is good, but the world might not be ready yet" - Stay persistent and be patient. Like an echo in the forest, what you or your collective communicates will reach the right people, and they will come with exciting and innovative ideas - the very ideas you wish to support and nurture. Sometimes the echo is simply delayed, so stay committed to your vision. Be patient and enjoy the journey with the lovely people you meet during it.

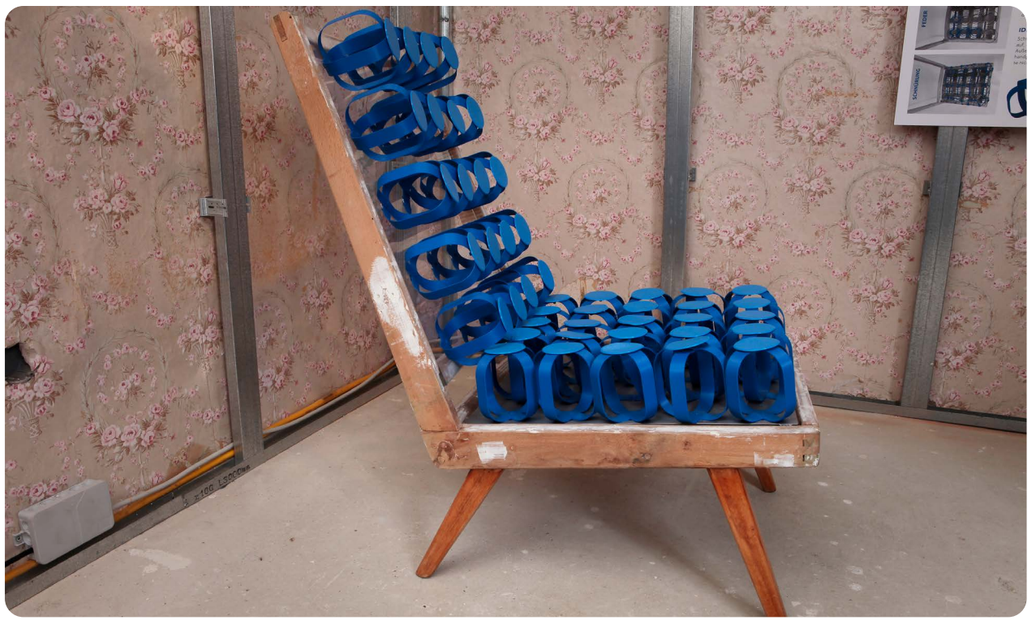


Image 2 Rethinking spring core armchair constructions with digital fabrication tools © Alexandra Pichler

Image 3 Mycelium material based on sawdust from the wood workshop in the makerspace © Mariia Samahala & Mykhailo Zhuk

Image 4 Feel Refill © Prostor Studio

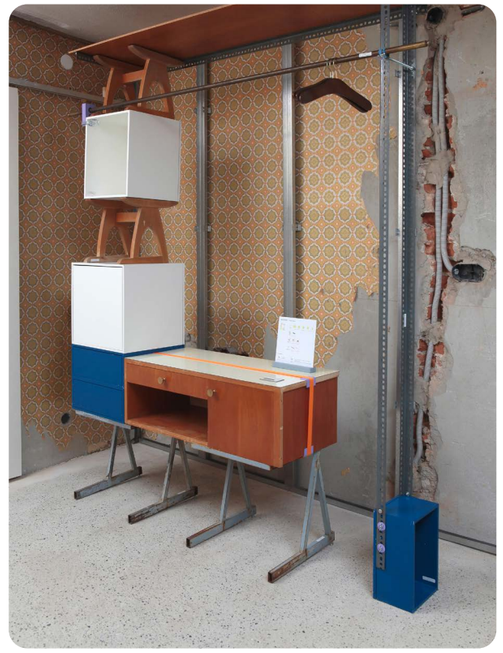


Image 5 "Reconfigured" - a system for reusing found furniture elements © Stephanie Bauer

QR 1
Cindy Fodor - Biomaterials

QR 2
Happylab Distributed Design Residency 2023/24

QR 3
Maker Portrait - Prostor Studio

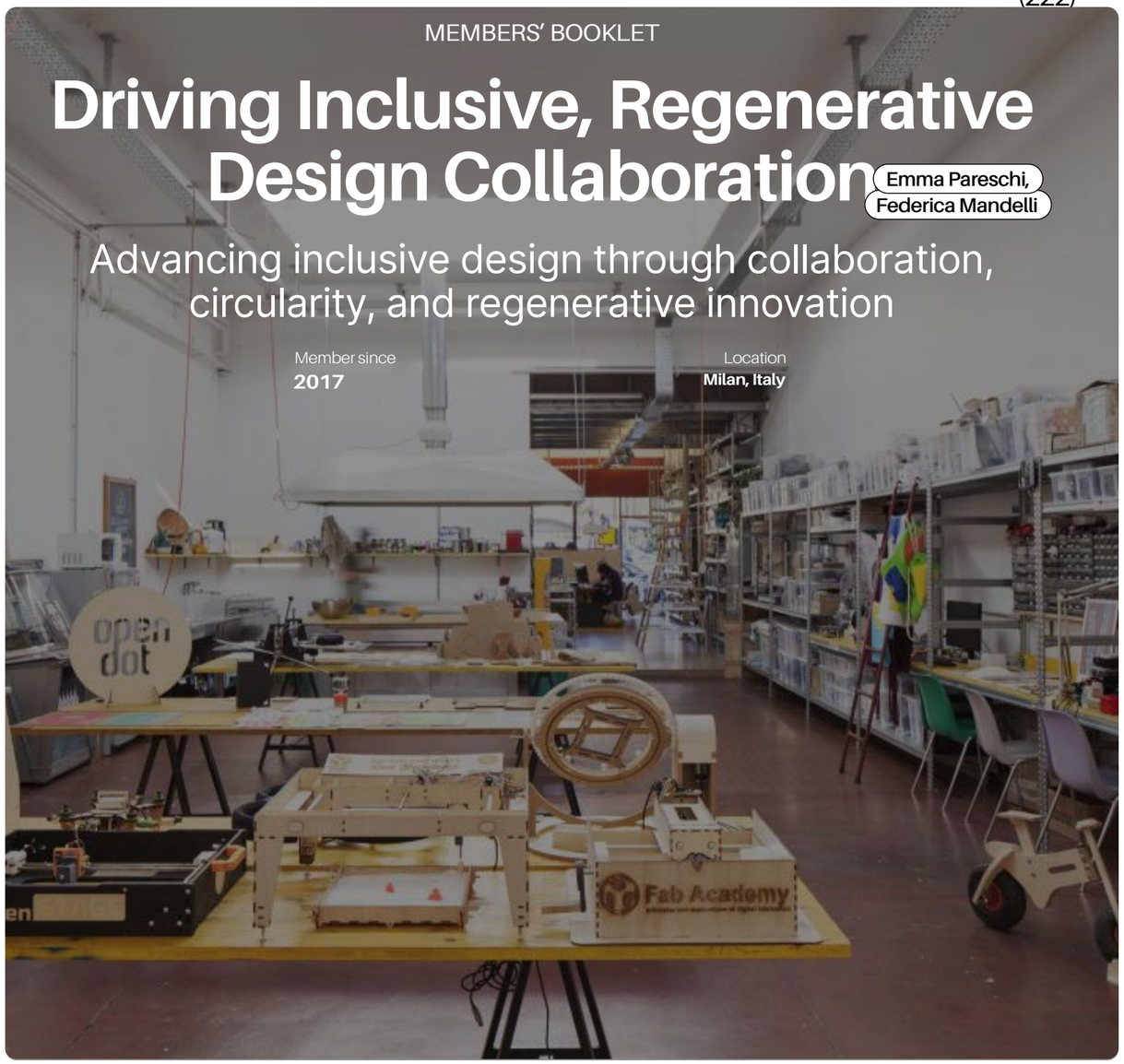
Image 6 "Alles Spitze" - free patterns for laser cutting imitating lace © Stephanie Edelhofer

Image 7 L(eft)OVERS - free database of vectors that fill the spaces between laser files © Nina McNab

10 years in the future

Looking ahead to 2035, we envision Distributed Design becoming a mainstream approach to product development and manufacturing, with local production hubs like Happylab playing a pivotal role in this transformation. As one of Europe's largest maker communities, we see ourselves evolving into a key node in a vast network of local manufacturing centers, where digital designs flow globally while production remains deeply local.

As an organization that has consistently focused on inclusivity and knowledge sharing, we will continue to emphasize making these advanced capabilities accessible to diverse groups, particularly maintaining our commitment to engaging women and girls in digital fabrication. Our strength lies in creating collaborative environments where innovation can flourish, and we envision scaling this approach to help establish similar inclusive maker spaces across Europe and beyond.



Opendot

Milan-based innovation hub dedicated to driving positive social impact, with a focus on sustainability and circular economy. Its key areas of interest include health and care, circular design, food and fashion systems. By employing co-design methodologies and embracing open-source values, rapid prototyping, and advanced technologies, OpenDot fosters meaningful change. Its internal Fab Lab serves as a cornerstone for experimentation and collaboration, amplifying its ability to address complex challenges and promote innovative solutions.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

OpenDot actively fosters creative ecosystems at the local level by offering training programs, hosting community events, and launching open calls for designers to engage in collaborative activities. Through these initiatives, OpenDot empowers individuals with skills and knowledge, connects communities and promotes sustainable practices.

A key initiative is Swap&Fix (2023-24), a series of events around the topic of recycling and fixing clothes, with the ambition of acting as a hub and repair point for the neighborhood and the city. For over a year, OpenDot has raised awareness by inviting local fashion brands committed to sustainability to share their values and network. Organizing talks and workshops for an increased committed community, the goal is to encourage the repair, exchange, and customization of clothes, reducing waste and extending the life cycle of garments.

Another notable project is the Summer School on Health & Care (2019–20), an advanced training program where designers, makers, and healthcare professionals learned how to apply co-design and digital fabrication to healthcare innovation, with lectures focused on parametric design, surgical modeling, training kits, and custom orthotics. Lastly, the 2nd edition of "Unwanted Furniture" was focused on young designers Under 30, asked to apply Circular Design strategy to furniture. The workshop and exhibition took place during the Milan Design Week, raising awareness among designers and citizens about the importance and impact of revamping old furniture through an open source catalog of 10 circular design strategies: a step-by-step guide to extend the life cycle of furniture in an easy way. These initiatives exemplify OpenDot's commitment to open, collaborative, and regenerative practices, creating a thriving local creative ecosystem.

How do we expand the reach of our local community's work and foster glocal connections?

Being part of the Distributed Design Platform has allowed OpenDot to address key topics in sustainability, circular design, and open innovation, becoming a reference point for diverse communities. Through the Platform, OpenDot has engaged citizens, students, start-ups, professionals, and businesses, fostering an inclusive ecosystem. The Platform has amplified OpenDot's ability to create meaningful connections both locally and internationally, facilitating collaboration across different expertise and interests. By participating in exhibitions, conferences, and collaborative projects, OpenDot has brought global ideas to its local context and shared its local work with the broader Distributed Design network. This has positioned OpenDot as a hub where diverse communities converge to co-create impactful solutions, demonstrating how local actions can have a global resonance.

How has our organisation's approach evolved over the years?

Being part of the Distributed Design Platform has shaped OpenDot's approach by embedding it within a dynamic movement supported by a wide-reaching community. This global network has provided OpenDot with opportunities for continuous confrontation, collaboration, and improvement with an international dimension. Engaging with other like-minded organizations and individuals has allowed OpenDot to exchange ideas, share experiences, and refine its methods, leading to a more open, flexible, and collaborative way of working. The ability to draw from such a diverse pool of knowledge has enriched OpenDot's practices, encouraging more interdisciplinary and inclusive approaches to design.

Additionally, the Platform has expanded OpenDot's network and these connections have been instrumental in the initiation of new projects, as they create a fertile ground for collaboration and co-creation. Being part of a community that values open-source principles, circular economy, and social impact has provided OpenDot with both the inspiration and the partnerships needed to launch new innovative initiatives.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

Collaboration and Openness are at the core of our work, shaping our approach toward greater inclusion and recognizing all living beings within the design process. The principle of "openness," as defined by Distributed Design, encourages us to share our design processes, making them transparent, replicable, and accessible. This fosters

About OpenDot

inclusivity by allowing people from diverse backgrounds—designers, citizens, healthcare professionals, and communities—to contribute meaningfully to co-design. Embracing openness challenges the anthropocentric view, recognizing that design should serve not only humans but also the natural environment and all living systems. This empowers a broader range of stakeholders to create designs that respect all forms of life.

Ecosystemic Thinking and Regeneration guide us in reimagining urban systems. We recognize our responsibility to lead the transition toward sustainable, equitable, and regenerative systems. The Platform value of “ecosystemic” thinking helps us acknowledge the interconnectedness of social, cultural, and environmental systems. We aim to design solutions promoting the health of all these systems. Through “regeneration,” we aspire not just to replace issues but restore and renew systems. This mindset challenges the status quo of urban development and consumption patterns, pushing us to rethink how we can design to regenerate ecosystems—through circular design in fashion, reusing urban resources, and developing health solutions that respect both human and environmental needs.

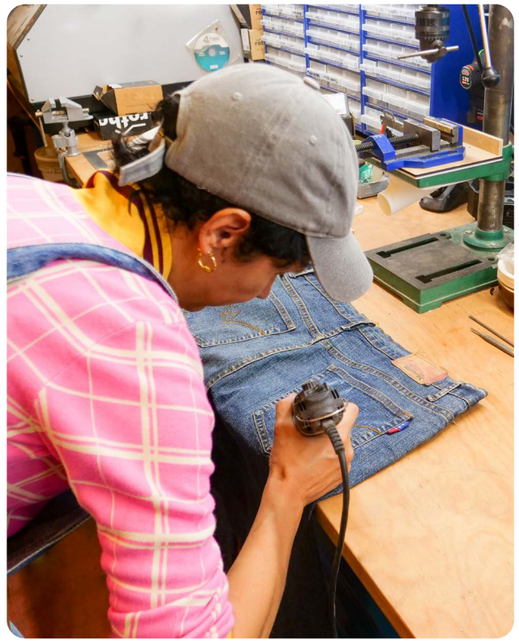


Image 2 Swap&Fix Fashion event, customization of denim (March 2024, OpenDot)

If we could revisit the start of our Distributed Design journey...

If we could revisit ourselves at the beginning of our Distributed Design journey, we would advise focusing not on the ambition to create something entirely new, but rather on improving, adapting, and scaling existing ideas and solutions. It is essential to recognize that we don’t need to start from scratch—building upon the work of others and learning from their experiences is a more effective approach. Furthermore, we would encourage ourselves to embrace a mindset of curiosity and collaboration, understanding the importance of asking questions, seeking advice, and engaging with the community. This approach would have helped us accelerate our growth and refine our impact.

Image 3 “Unwanted Furniture!” exhibition during the Milan Design Week (2023, Milan, OpenDot)

Image 1 Swap&Fix Fashion, Community event in OpenDot (2024, Milan, OpenDot)

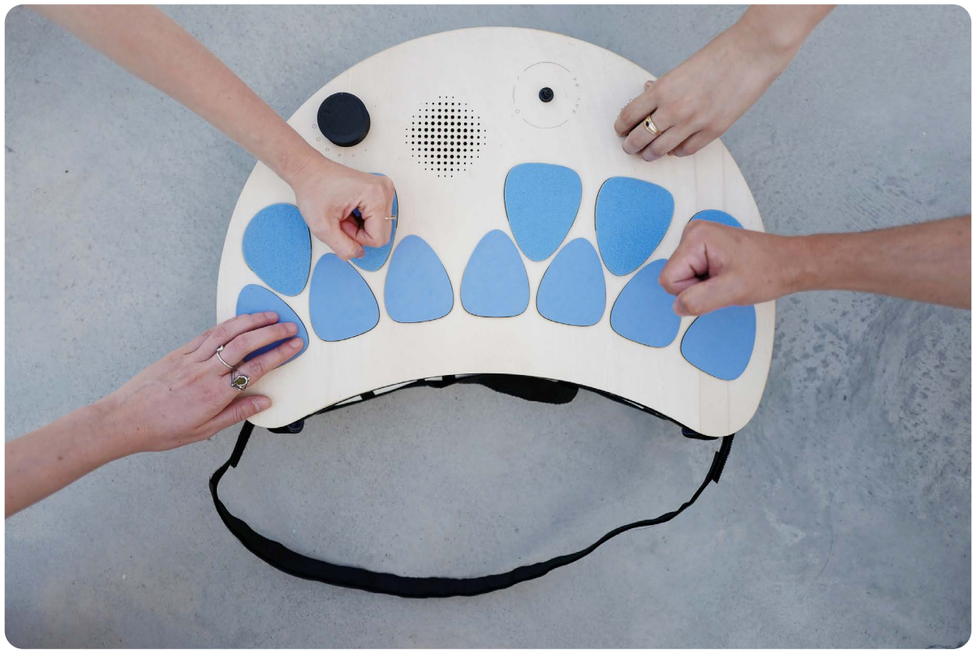


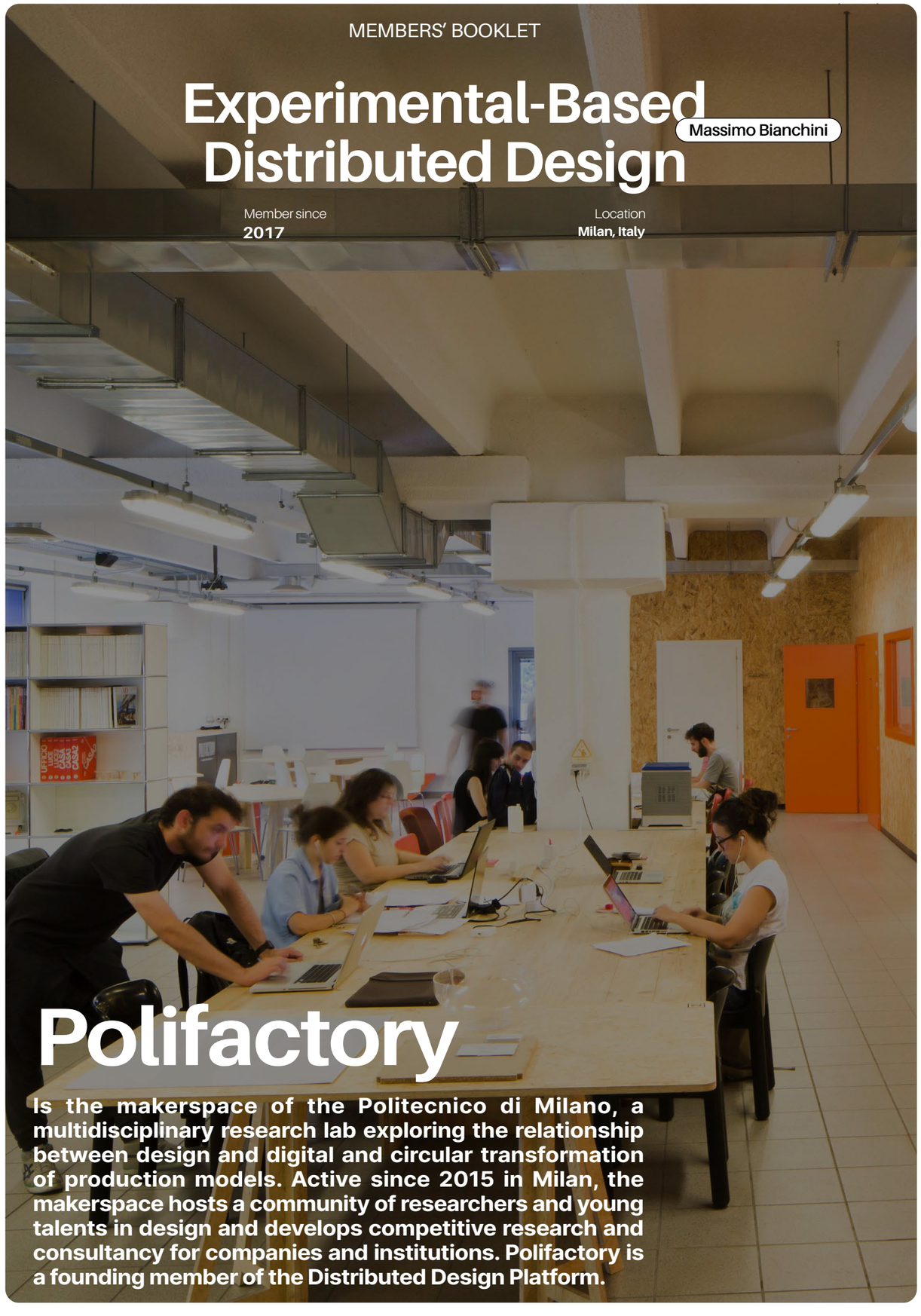
Image 4 “Drum project” developed during the “Health & Care summer school” (2019, Rome, OpenDot)

Image 5 “Health & Care” Summer School, brainstorm session (2019, OpenDot)

10 years in the future

In 10 years, we will see Distributed Design as a more interconnected and regenerative ecosystem, focused on the coexistence of all living beings—human and non-human—and the planet. Advancements will include deeper collaboration across disciplines, cultures, and sectors, with a stronger emphasis on decentralized, open-source and sustainable design practices.

OpenDot will continue to play a key role as an enabler, facilitator, and trigger for change. We will foster planetary co-existence and equal rights for all beings, ensuring design systems are inclusive and regenerative. By empowering communities to co-create solutions, we will shift towards a holistic design approach, integrating social, environmental and economic systems. With strengths in open-source design, circularity, and community-driven innovation, we will guide efforts to address global challenges, creating solutions that respect all life forms and the planet’s health.



MEMBERS' BOOKLET

Experimental-Based Distributed Design

Massimo Bianchini

Member since
2017

Location
Milan, Italy

Polifactory

Is the makerspace of the Politecnico di Milano, a multidisciplinary research lab exploring the relationship between design and digital and circular transformation of production models. Active since 2015 in Milan, the makerspace hosts a community of researchers and young talents in design and develops competitive research and consultancy for companies and institutions. Polifactory is a founding member of the Distributed Design Platform.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

As a university makerspace, Polifactory's local community of reference is that of the design students at the School of Design of the Politecnico di Milano, a public university with more than 4,500 young designers enrolled, one of the largest and most prestigious in the world[1]. During the seven years of the Distributed Design Platform project, Polifactory conceived and organised two cycles of design initiatives dedicated to exploring food and care ecosystems. More than 200 young designers participated in the seven open calls for ideas to generate ideas for open-source solutions. Around 100 designers were selected who then developed 25 projects working as makers in residence within Polifactory. The first cycle of initiatives[2] - Fabcare, Next Steps, DeliCe and CTRL+ - explored the relationship between Distributed Design and healthcare ecosystems by stimulating young designers to design and prototype, also by working with patient innovators and healthcare specialists, open-source solutions dedicated to monitoring and preventing diseases and improving patients' quality of life. The second cycle, with three initiatives dedicated to exploring the relationship between Distributed Design and food systems, promoted the development of open-source solutions inspired by the EU's From-farm-to-fork Strategy dedicated to plant-based food processing, monitoring, and preservation of food production[3].

How do we expand the reach of our local community's work and foster glocal connections?

Regarding exploring collaborative care and food ecosystems, participation in the Distributed Design Platform facilitated the development of relationships and collaborations with the maker community, institutions, and stakeholders in the Milan area, including the City of Milan and the Milanese Fabs. Thanks to the experience gained locally, Polifactory has, in parallel, transferred this knowledge within national and European research and innovation projects (PNRR, Horizon 2020, Horizon Europe), primarily dedicated to the urban circular economy.

How has our organisation's approach evolved over the years?

Participation in the Distributed Design Platform also allowed Polifactory to implement an experimental-based approach applied to Distributed Design. This approach, applicable to innovation challenges defined through preliminary research and concept generation, combines experimental verification and iterative prototyping with data to explore, test and improve design solutions. Polifactory uses this approach both to develop prototypes and proofs-of-concept at urban or sectoral scales within European research and innovation projects and in teaching activities at the Product Design degree courses of the Politecnico di Milano, making the principles and practices of open and distributed design interact with those of industrial design, making and hacking. During the seven years of the Distributed Design Platform project, the basic principles of Distributed Design have been transferred to over 500 students within ten teaching laboratories of the School of Design.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

Over the years, the Distributed Design values and principles have been progressively applied, tested, critically discussed, and finally adapted within Polifactory's Design and operational practices. Distributed Design is an approach and resource embedded in Polifactory's design culture. It supports young designers in their talent-in-residence pathways, implements pilot initiatives on a corporate or urban scale, and even conceives the new Circular Food System Lab, a system of multidisciplinary research laboratories distributed within the Politecnico di Milano that combines design-driven and technological innovation to support the circular transition of food systems.

If we could revisit the start of our Distributed Design journey...

In applying the principles of Distributed Design, Polifactory carefully balances the values that characterise the culture of distributed systems (the 'Distributed' component) and those that characterise the culture of design and design-driven innovation. In recent years, there has been much effort in developing

About Politecnico di Milano - Polifactory

the elements of openness, circularity, inclusiveness, and regeneration characterising distributed design. This virtuous process seems to have relegated to the background of certain technical fundamentals of professional practice and design processes that guide the creation of functional, aesthetically pleasing, and user-friendly products, spaces, interfaces, or services, such as basic design and ergonomics. Correctly balancing the set of coexisting values in Distributed Design can be relevant for those who want to develop this approach in the more ‘traditional’ professional and production environments and for those who use it in social and open innovation.

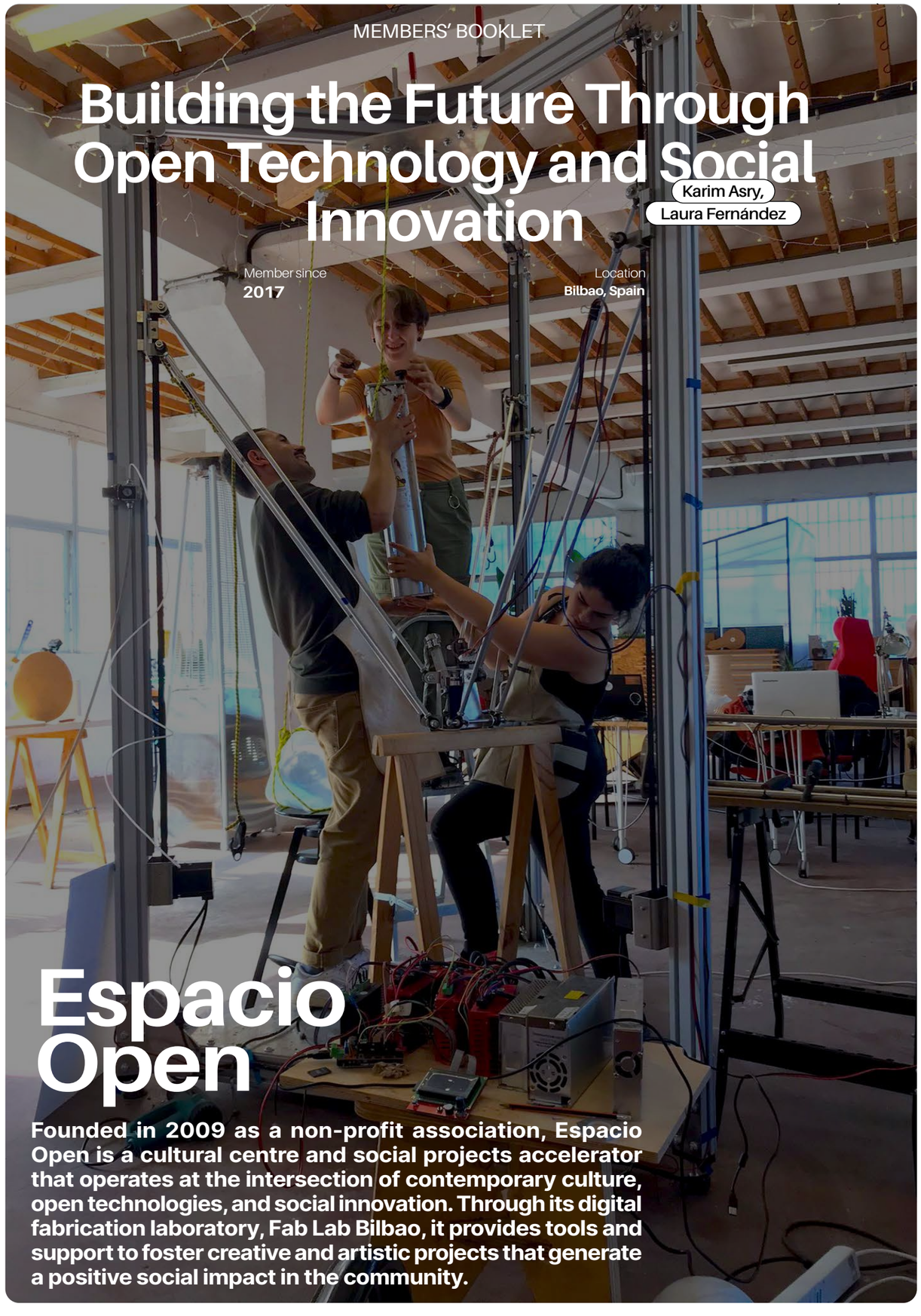
Image 1 The Open Farmer Kit project developed within the Distributed Food Factory initiative (2023, Milan, Polifactory)

Image 2 The Twistr project developed as part of the Next Steps initiative (2019, Milan, Polifactory)

10 years in the future today

The maker movement, which grew significantly in the 2010s, has faced a decline in the last decade due to reduced funding, makerspace closures, sustainability issues and a slowdown in the utopian push. The goal of democratizing production through digital fabrication has clashed with adopting more complex and automated technologies, hindering the diffusion of these practices and the scalability of projects. In this context, Distributed Design has integrated circular economy and inclusiveness into design processes, evolving into an approach that combines technological innovation and socio-environmental sustainability. It has stimulated designers, makers and Fab Labs to create local solutions for global problems, while often remaining confined to the hipster economy, characterized by high cultural capital but limited economic resources. Virtuous examples of Distributed Design on a large scale for production purposes are still too few, highlighting the need for more excellent applications on an industrial scale. Distributed Design is still probably a “young” approach, which could consolidate regulatory standards for its processes like the ISO standards relating to user-centred design. Its evolution also requires a reflection on more-than-human forms of design, which are more inclusive and responsible but also increasingly automated.

Therefore, the main future challenge for Distributed Design is to be recognized not only as a cultural phenomenon but as a force for socio-technical and economic transformation on a local and global scale. In the coming years, the democratization of design and production tools, the integration of artificial intelligence into creative processes, and the adoption of new rules and standards, such as the Right to Repair and the Digital Product Passport, are expected. In the next decade, it is desirable that the field of Distributed Design can increase its experimental culture developing experimental-based skills in developing design processes. This aspect is fundamental in the case that Distributed Design confirms itself as an approach and practice closer to the world of research and open and social innovation and that it can also develop in more traditional production areas.



MEMBERS' BOOKLET

Building the Future Through Open Technology and Social Innovation

Karim Asry,
Laura Fernández

Member since
2017

Location
Bilbao, Spain

Espacio Open

Founded in 2009 as a non-profit association, Espacio Open is a cultural centre and social projects accelerator that operates at the intersection of contemporary culture, open technologies, and social innovation. Through its digital fabrication laboratory, Fab Lab Bilbao, it provides tools and support to foster creative and artistic projects that generate a positive social impact in the community.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

One of Espacio Open's main objectives is to support grassroots initiatives and local talent by providing space, tools, and guidance to help them incorporate creative technologies into their processes. Through the Residencias de Creación (Creative Residencies) programme, Fab Lab Bilbao offers expert mentoring and funding to enable local creators to integrate digital fabrication tools into their creative workflows. These projects utilise open-source tools, with at least part of the outcomes being openly shared to benefit the wider community.

As partners in several European projects, we have worked to strengthen connections between creative ecosystems and local communities. This is exemplified by the European T-Factor project, where we have acted as connectors between grassroots initiatives, educational institutions, and international experts to co-design solutions to local challenges through temporary urbanism strategies. Another recent project showcasing local impact and commitment to open practices is the Muro de la Memoria (Wall of Memory), led by Espacio Open, where open-source ceramic 3D printing technologies were applied to preserve the history of our neighbourhood and its residents.

How do we expand the reach of our local community's work and foster glocal connections?

Distributed Design has been an invaluable ally within our ecosystem. Emerging talents have relocated to Bilbao after participating in Distributed Design activities, while projects incubated at Espacio Open, such as Jetclay, have greatly benefited from the European network by hosting workshops in collaboration with other Distributed Design members. Furthermore, the overall sense of belonging to a genuine community of practice, exchanging knowledge and expertise to address shared challenges, has been highly valuable for Espacio Open.

How has our organisation's approach evolved over the years?

The Distributed Design network has allowed us to highlight emerging local talents and benefit from exchanges and insights with our peers across Europe. In the early editions as Platform members, we focused on providing general support around skills and methodologies for maker-to-market approaches in a bootcamp format. We then sought to consolidate relevant communities around one of our flagship incubated projects, the open-source 3D clay printing community, Jetclay. After building a large-format open-source printer within the Distributed Design programme, with the collaboration of creative talents from various parts of the world, Espacio Open became one of the nodes in this international network. Since then, we have continued to work towards expanding the network, promoting the use of these open technologies and incorporating ceramics—materials humanity has used for thousands of years—into new digital, distributed manufacturing approaches.

In this latest edition, we shifted the focus and launched a new initiative aimed at using digital technologies as tools to foster design processes based on open science and the maker philosophy, in order to stimulate critical thinking and bring emerging technologies closer to creative profiles. Our intention is to continue these training processes with local talents from artistic and cultural backgrounds in order to promote the use of digital fabrication technologies as tools for prototyping potential futures.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

At Espacio Open, the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—are fundamental to our approach. We prioritise openness by fostering an inclusive culture where knowledge, tools, and resources are accessible to all, empowering individuals and communities to innovate. Collaboration drives our efforts to connect diverse stakeholders, from local artisans to global innovators, creating interdisciplinary partnerships that enrich the creative ecosystem and amplify impact.

We embrace regeneration by incorporating circular economy principles and ecological awareness into our projects, aiming not only to sustain but also to actively repair and renew systems. Ecosystemic thinking shapes our vision, recognising the interconnectedness of our actions within broader social, economic, and environmental contexts.

About Espacio Open

If we could revisit the start of our Distributed Design journey...

If we could go back to that Maker Faire in 2017, where we celebrated our first Distributed Design Gathering—before COVID, before the maker community became the primary manufacturer of emergency PPE overnight—I would tell ourselves: be more radical, prepare to face challenging situations, and harness the trust and wisdom within our network to create a meaningful impact.

Image 2 (de) Futuribles workshop (November 2024, Espacio Open, creative commons BY-NC 4.0)

Image 1 One of the neighbours that participated in the "Muro de la Memoria" (Wall of Memory) project with his sculpture. (November 2024, Espacio Open, creative commons BY-NC 4.0)

Image 3 One of the neighbours participating at "Muro de la Memoria" (Wall of Memory) project (March 2024, Espacio Open, creative commons BY-NC 4.0)

Image 4 Some of the printed pieces (May 2024, Espacio Open, creative commons BY-NC 4.0)

Image 5 Large-scale open source printer working (November 2024, Espacio Open, creative commons BY-NC 4.0)

10 years in the future

The future is already here, just not evenly distributed, as science fiction writer William Gibson once said. We envision a world where our network's experience, and Distributed Design in general, serve as foundational elements for building better futures. Access to knowledge and designs will continue to become increasingly universal, while manufacturing becomes progressively more localised. Radical new approaches to the critical use of technology and circular economy principles will push boundaries further, enabling societies to find a harmonious balance between traditional crafts and digital tools. This synergy will lead to the creation of a new generation of products and processes that will not only drive economic growth but also serve as pillars of social equity and environmental sustainability. In this envisioned future, Distributed Design will play a pivotal role in transforming the way we think about production and consumption.

QR 1
Jetclay: a community around 3D printing

QR 2
Memory Wall: local heritage and digital fabrication.

QR 3
(de) Futuribles workshop

How does our organisation's work contribute to fostering creative ecosystems at the local level?

We see it as our responsibility to bring people together and facilitate discussions on complex issues with a broad audience. Through the events and workshops we've co-created with the Distributed Design community, we've consistently explored topics related to open, collaborative, regenerative, and ecosystemic design. These events have provided creative talents the opportunity to showcase their work both online and offline, attracting diverse audiences, including designers, students, policymakers, and industry professionals. This dynamic mix of participants fosters insightful questions, valuable exchanges, and meaningful connections.

For example, in 2024, creative talent Daisy Dawson hosted an event at Pakhuis de Zwijger on neurodiversity in design, an idea that was sparked during an event we organized in November 2023. Similarly, a fruitful collaboration emerged with creative talent Pepijn Duijvestein, who joined the Distributed Design community in 2022. A year later, Pakhuis de Zwijger and TJIKKO Upcycle Club joined forces for an engaging event on upcycling. These examples highlight how our efforts continue to create opportunities for collaboration and dialogue within the community.

How do we expand the reach of our local community's work and foster glocal connections?

One of the most valuable aspects of this community is the opportunity to connect with people from diverse places and backgrounds, fostering collaboration to identify shared struggles, values, and solutions. One way this exchange takes place is through the interactions and events we host at Pakhuis de Zwijger, where creatives, designers, citizens, and others come together to share their experiences and knowledge. Additionally, international exchanges between creatives and Platform members provide another valuable opportunity for this exchange to happen across the entire community. For Pakhuis de Zwijger it is valuable to be part of a network with talented people like from the Distributed Design Platform.

How has our organisation's approach evolved over the years?

The values of the Distributed Design Platform are very close to the core values of Pakhuis de Zwijger. Giving space for an open dialogue, working together towards a sustainable future (for everyone) and seeing the value of regenerative principles in design is always the basis for the events we create. What has changed in our programming, and what we have learned from participating, is placing the perspective of designers at the center, instead of simply 'adding a design perspective' to the conversation. The Distributed Design events were created with and for designers, with a focus on their success stories, future visions, core principles, and struggles. These events aimed to explore the role of design in the regenerative transition and highlight each designer's experience in contributing to this change. That lesson learned is something we will keep on using in events to follow.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

At Pakhuis de Zwijger, we are driven by a set of ambitions that align closely with the values of Distributed Design. While we have explored these ambitions and values separately in past events, our recent work with the Distributed Design Platform has allowed us to interweave these concepts and explore their deeper meaning. This shift has made our programs more value-driven, prioritizing principles over categories such as innovation, policy, or partnerships. By centering these values, we were able to improve connections between local and global contexts, creating a hub for creative talents and initiatives. These principles also guided us in navigating challenges and opportunities with a holistic approach. That made the conversations that arose in the events not always easier, but more impactful for sure.

About Pakhuis de Zwijger

If we could revisit the start of our Distributed Design journey...

If we could revisit ourselves at the start of our Distributed Design journey, we'd advise focusing on building a stronger local network to connect creative talents, designers, and experts, fostering long-term partnerships over the years. We would remind ourselves to view the project as a cohesive platform, rather than a series of separate yearly events, and to engage more deeply with other member organizations to share insights and collaborate more meaningfully. Finally, we would prioritise researching the values and contributions of the Distributed Design network early on, ensuring that our events are even more impactful for participants and attendees.

10 years in the future

In 10 years from now, Distributed Design will have evolved into an ecosystem where collaboration is beyond physical borders, disciplines, and technologies. With the rise of AI, the role of designers will shift from creators to facilitators to ensure that our values are at the forefront. Pakhuis de Zwijger will continue to create impactful dialogues on the challenges of that time, using our strengths in fostering connection and inclusivity to bridge diverse perspectives. By blending technology with human-centric design, we'll help shape a future where Distributed Design thrives as a tool for collective impact.

Image 1 Designing (for) tomorrow set-up at PDZ (12/11/24', Amsterdam, Faezeh Mohammadi)

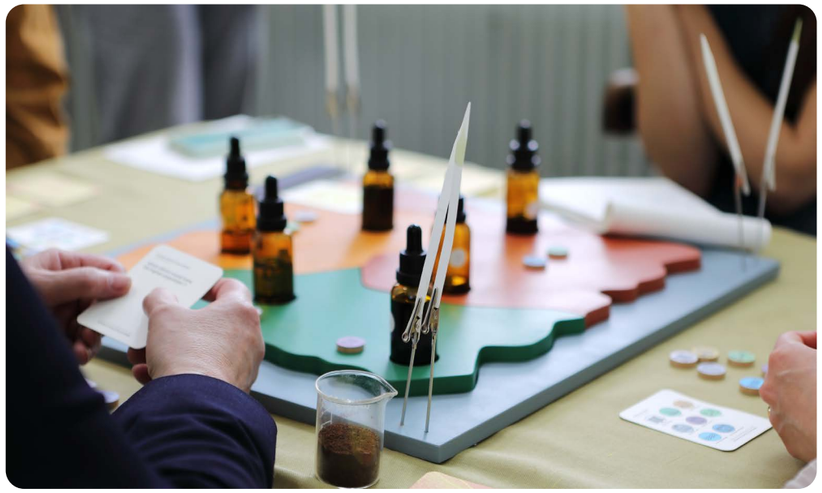


Image 2 'Archives of Past and Future Smells' project by DD creative talent (30/09/24', Maastricht, Cemre Cara)

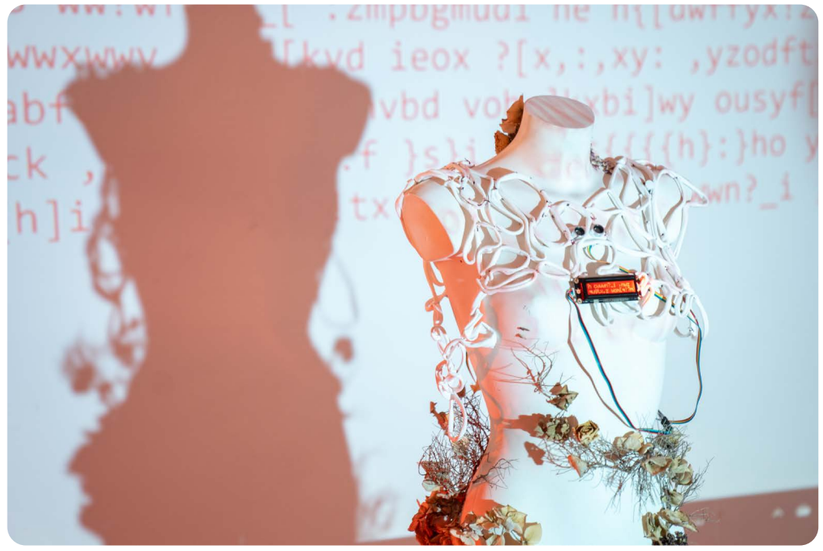


Image 3 '<body>, as body syntax' project by DD creative talent (30/09/24', Bologna, Anna Fedele)

QR 1
2024 DD Programme: Designing (for) Tomorrow

QR 2
2023 DD Programme: Design for Impact & A Living

QR 3
2022 DD Programme: The Design Beyond the Decline

QR 4
2021 DD Programme: Designing Circular Cities

Part of GIG's role is community management, which involves cultivating connections between members across the globe who are engaged in similar work, enabling them to exchange knowledge and support each other in advancing their projects. For example, a Greece-based community member developed a project called Libre[1], an open-source water desalination device. Through GIG, another community member in Basra, Iraq, learned about this project and is now working on an iteration of the device that utilizes solar power.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

GIG hosts every year a gathering in Berlin, Germany, hence the name Global Innovation Gathering. where makers, designers and change makers from around the world come together to showcase their work and exchange ideas on latest grassroots designs and technologies. We are fostering connections between network members all year long, by hosting online thematic calls on making and designing topics that are of interest to members. We also work on connecting makers to each other by planning residencies and regional gatherings where makers travel to each other's spaces to learn first hand. One of our main goals is to foster a distributed manufacturing network that would allow for the production and replication of Open Source technologies that would help local ecosystems thrive. By connecting local and global ecosystems in open structures, we ensure that knowledge flows to where it is most needed and that we are able to change from bottom-up.

How do we expand the reach of our local community's work and foster glocal connections?

GIG and the Distributed Design Platform share many common values and topics, making this a highly fruitful partnership. Through this collaboration, GIG has gained valuable European connections while contributing to the international reach of the Platform. As a network ourselves, we have been able to exchange knowledge on the meta-level of network management and outreach—exploring how to build and sustain a community both online and offline.

We have actively attracted global makers, open hardware designers, and makerspaces from around the world, contributing to the international growth of the Platform. Additionally, through the Distributed Design website and other communication channels, we have accessed a rich repository of designs and products, which have proven highly valuable to our community. Our members take pride in having their designs and projects featured in the Platform's annual publication, Driving Design.

How has our organisation's approach evolved over the years?

One of the main perspectives gained from the Distributed Design Platform is understanding new ways in which the work of communities and networks can be showcased. We have connected to Platform members who are doing similar work and exchanged knowledge and resources. We are now considering creating a badge with our members that would then help maintain and push forward concepts of sustainability and openness in our members' spaces around the world.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

We believe in the power of community to address pressing challenges. We are committed to solving problems locally and sustainably by utilizing and/or establishing local infrastructures. At the same time, we believe in collaborating across borders to support the development, exchange, and adaptation of grassroots innovations to tackle global issues. The Platform has been instrumental in bringing our vision to life by connecting us with creative talents from across Europe and the world, as well as by openly documenting products and solutions.

If we could revisit the start of our Distributed Design journey...

Real power lies within the community that shares a vision and common purpose to drive change.

10 years in the future

We will have an ecosystem of Makers selling their grassroots innovations from around the world, offering their services, and openly collaborating to enhance their products and replicate them where they are most needed.

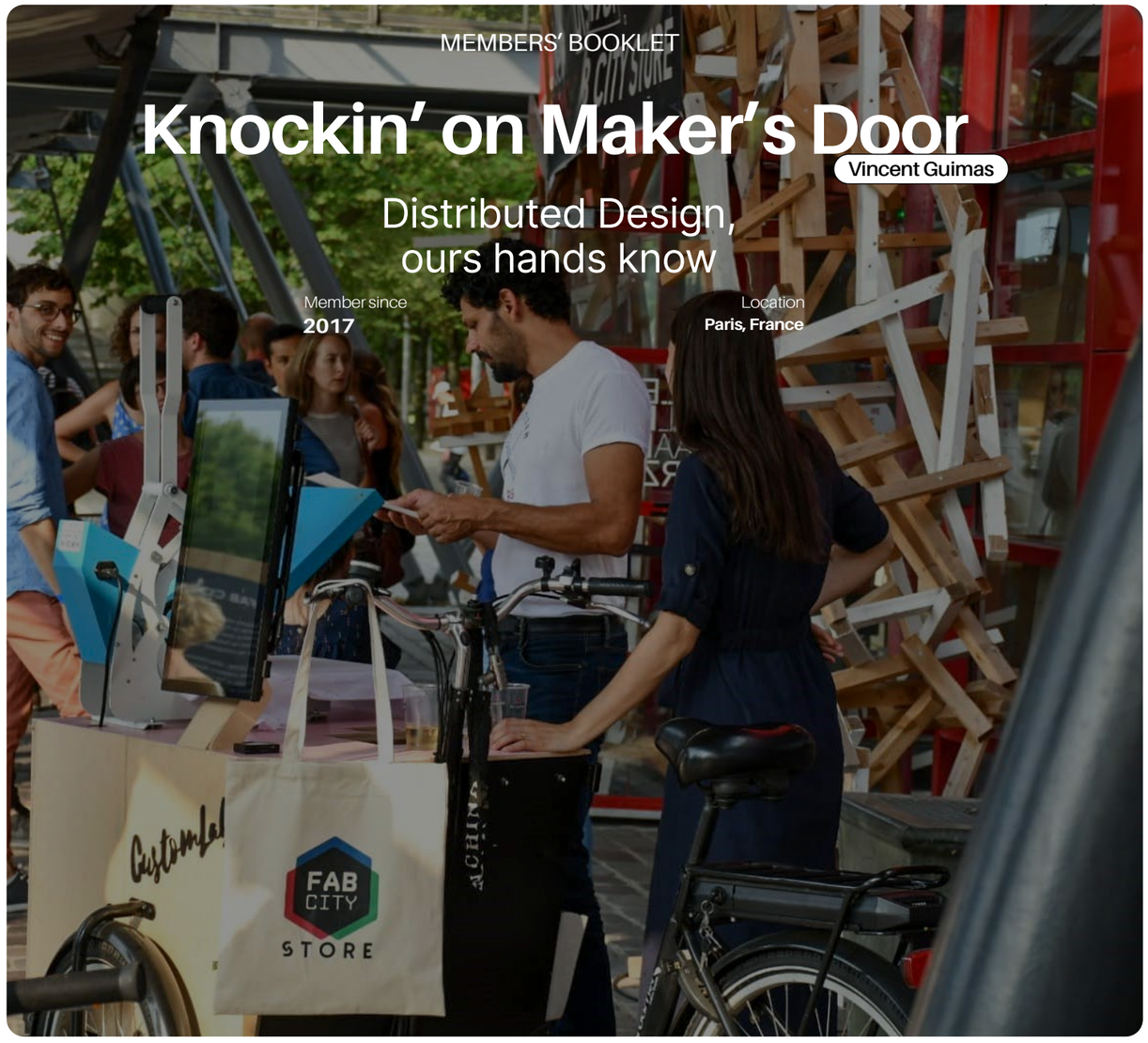
Find out more about GIG

Image 1 Global Innovation Gathering workshop at re:publica makerspace 2024 Credits: Chaïma Attia

Image 2 Group photo from the Global Innovation Gathering 2024 (2024, Berlin, Erin) Credits: Chaïma Attia

Image 3 Members of the community gathering Credits: Chaïma Attia

Image 4 Collective community care ideation workshop Credits: Chaïma Attia



Ars Longa

Founded in 1997, Ars Longa is a non-profit design agency based in Paris and its suburbs. We are dedicated to promoting circular design, social innovation, and collaborative economies. As an active member of the Distributed Design Platform, we create bridges between creators, communities, and institutions, focusing on inclusion and sustainability. Our activities include artistic residencies, educational workshops, and projects exploring the intersections of design, technology, and ecology. Our last key projects include HARBOR[1] which explores the intersection of Rivers and Citizen engagement, Re-Label[2], a platform fostering good makers lab practices by labeling local ecosystem and the Fab City Store[3], showcasing innovative, locally produced designs and technologies.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Since its launch, Ars Longa fosters creative ecosystems at the local level through initiatives - almost all - that merge artistic creation, social innovation, and sustainability. Here are 3 actions to illustrate our motto "local is logical"

- **HARBOR** (Highlight Actions Reconnecting citizens with the Beauty Of Rivers)[1] serves as an entry point to (re)discover practices, focusing on the renewed relationship between the city, rivers and citizenship. This project creates spaces for actions that connect local communities with ecological and urban challenges.

- **Re-Label[2]** is a platform that certifies eco-design practices and promotes collaborative reuse within local ecosystems, focusing on sustainable materials, provenance, and durability. It helps raise awareness of responsible purchasing and supports the reuse of materials. Operating within a specific territory (neighborhood or community), it fosters collaboration among designers, artisans, and consumers, providing tools like a label generator and certification to build a trusted value network.

- **Fab City Store[3]** is providing a space to showcase locally designed and produced innovations. Fab City Store empowers local creators and connects them with broader networks, enhancing the visibility of sustainable practices within the community.

How do we expand the reach of our local community's work and foster glocal connections?

Throughout the seven years of collective adventures, the Ars Longa team and associated designers have been able to measure the evolution of learning, action, and sharing methods in this project. This evolution has naturally encouraged partnerships and developed working collaborations beyond the defined programmes.

What is particularly interesting to observe during the recent Platform member exchanges, such as those with HappyLab (Vienna) or Fadia Elgharib of Global Innovation Gathering, is the quality of listening and the exchanges with our local partners. It's also been fascinating to see the evolution of local practices in a broader context. Europe, with all its countries and inhabitants, is incredibly diverse. The various cultures, ways of working, and perspectives can potentially create friction, yet it is exactly these differences that allow for a more holistic approach. Our last visit to the Vestmannaeyjar Island Fab Lab provided an intense and awe-inspiring example of this friction. Sociological, economic, and demographic realities may seem distant, yet there are strikingly similar overall approaches and methods of engagement.

The Distributed Design Platform Awards and Mobility Scheme is another example of how several designers from the Ars Longa ecosystem have been given the opportunity to showcase their work, engage, and challenge their practices, particularly during events such as Vienna Design Week or Republica in Berlin. These rare experiences have undoubtedly contributed to opening new perspectives and fostering collaborations for the designers who participated in the Distributed Design programme.

How has our organisation's approach evolved over the years?

Joining the Distributed Design Platform has transformed the way Ars Longa approaches all of its projects. The collaborative methods of network animation and the promotional tools at the service of creation have led us to rethink our processes, by integrating openness to diverse practices and cooperation at each stage of development. This change has encouraged us to regularly refer to projects or methodologies from the network.

Beyond our participation in the Distributed Design actions, we have adopted a motto for each of our projects: "Local is logical", or how to translate the evidence and the merits of producing locally by adopting circular patterns (materials, practices). To quantify and qualify this approach, we have designed and developed a certification system called Re-Label, allowing us to formalize sustainable practices and strengthen confidence in eco-designed products.

Of course, the Distributed Design Platform has also reinforced our focus on glocal (global-local) connections, demonstrating how international collaboration can inspire local transformations. By integrating these values into our DNA, Ars Longa continues to evolve as a hub for cooperative and inclusive design practices, fostering the emergence of other projects that foster creation in the service of social and ecological transitions.

Find out more about Ars Longa

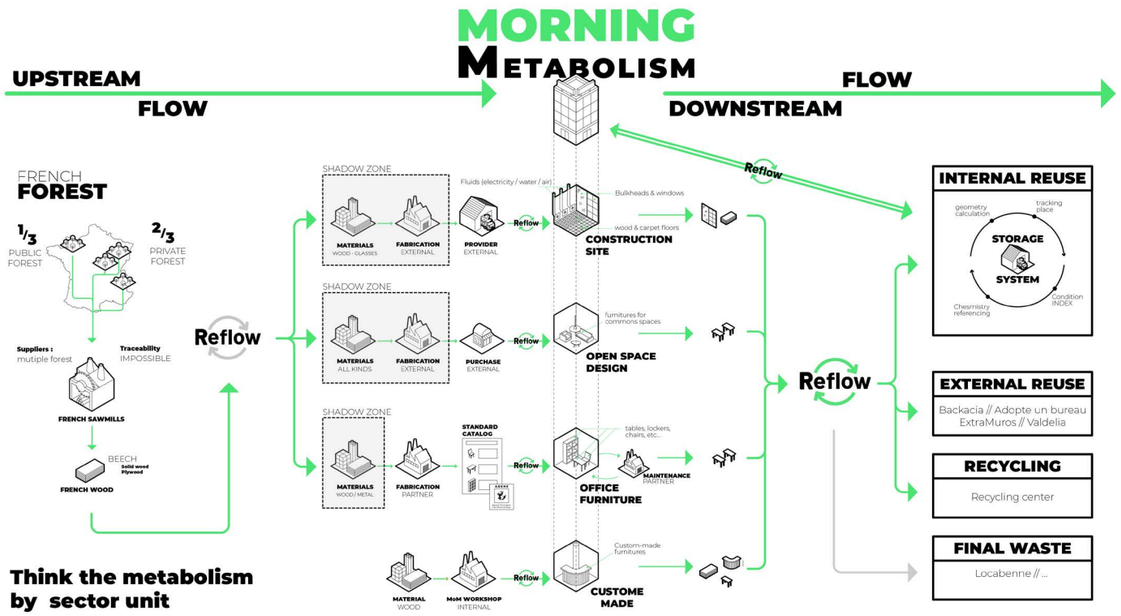


Figure 1 Re-Label analyses for a Co-working venue. Soumaya Nader & Thibaut Louvet, Open licence

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

Deeply rooted in Ars Longa's ethics and working method to Learn, Act, and Share - the core values of Distributed Design have given us the opportunity to consolidate and compare our approaches.

Openness is probably the pillar that has most marked and changed Ars Longa's thinking and engagement processes. Integrating knowledge sharing from the very beginning of a project and creating accessible frameworks are now at the root of our projects. The example of Re-Label, which certifies sustainable practices that foster trust between stakeholders, is one of the examples of projects born from our membership to the Distributed Design Platform. It also represents important changes in our modes of collaboration, encouraging a participatory approach where creators, communities and institutions co-design solutions. This is a particularly evident notion visible in the HARBOR initiative, where different stakeholders are working together to rethink the relationship between a river, the city and its citizens. Finally, the idea of regeneration underlies several paths including those of the circular economy and sustainability. Ars Longa has been able to develop and share its practices, nourishing the recycling and innovation dialectic, as demonstrated by the designers we have been supporting for more than six years through the Fab City Store. Ecosystem thinking encourages us to consider our work as part of a larger network, where local actions contribute to global change. By integrating these values, Ars Longa is building a resilient, inclusive and sustainable design ecosystem.

If we could revisit the start of our Distributed Design journey...

Looking back to the start of our Distributed Design journey, we would say to ourselves "you are going to be part of a family" who will embrace uncertainty and trust the knowledge by doing process. The strength of a distributed network lies in its diversity, and while the open and collaborative nature of the Platform may seem complex at first, it is precisely this complexity that fuels confidence to innovate. We would also encourage ourselves to actively seek inspiration from other members early on, as the exchange of ideas and practices has proven to be one of the most enriching aspects of our participation. Lastly, we'd advise focusing on documenting and sharing our learnings to leave a tangible impact for future collaborators.

Image 1 First navigation tests of a dinghy co-built with students from the Barcelona college Col·legi Montserrat. (may 2024, Somorrostro. Beach, Barcelona, Vincent Guimas, open licence)

Image 2 Fab city Store activity as part of the Fab City Summit 2018 event jointly organized by Fab City Grand Paris and the city of Paris (2018, parc de la Villette, Paris, Soumaya Nader, Open licence)

Image 3 Fab City Store event

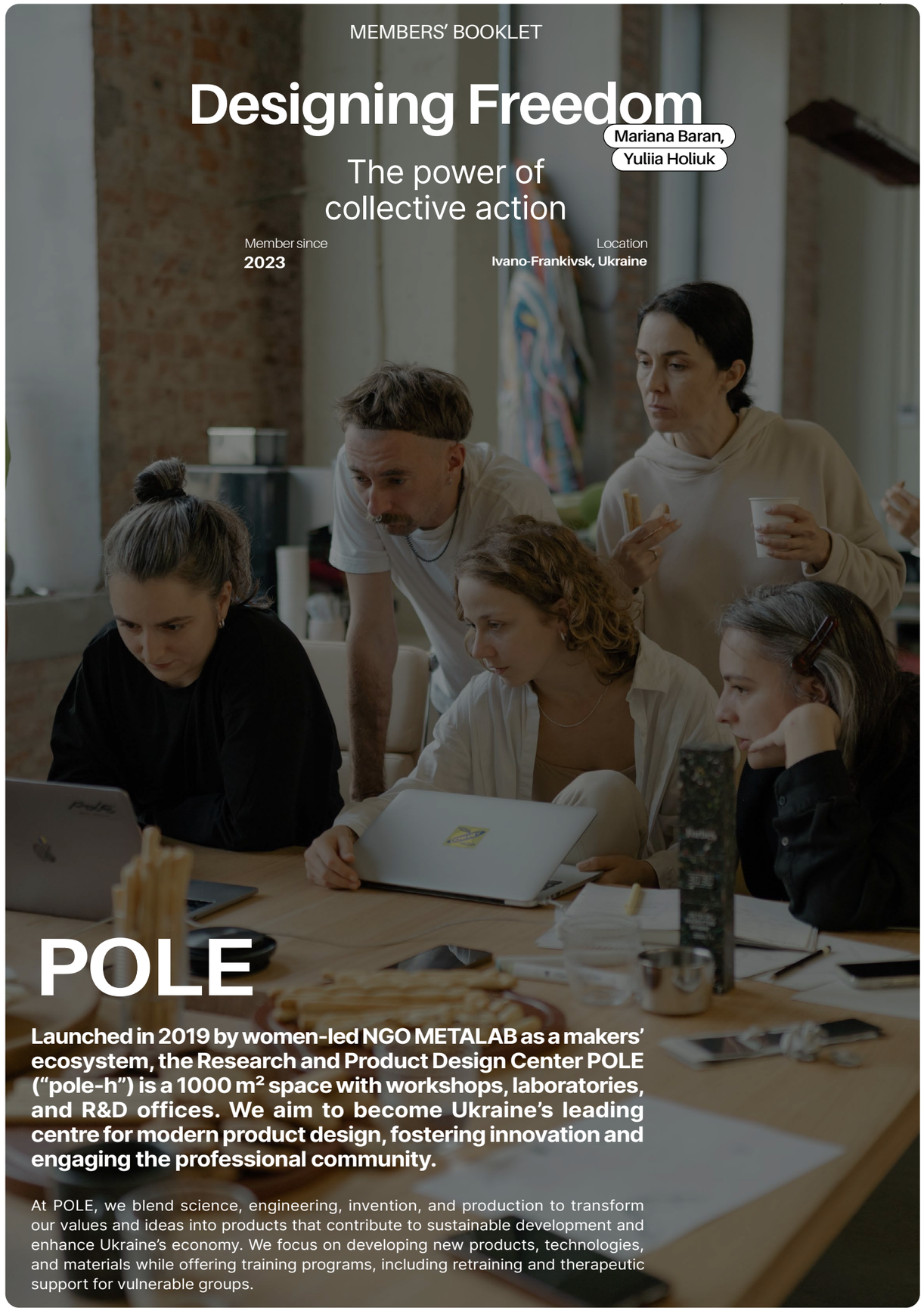
10 years in the future

In 10 years, Distributed Design will have evolved to become a widely adopted framework for sustainable and inclusive creation, deeply rooted in local and global contexts. The field will likely experience shocks, frictions with the integration of AI in our design, production and collaboration strategies across borders and disciplines. Ars Longa plans to develop new fields of experimentation, including the exploration of the dialectic Citizen Energy/ Creation and Culture. The challenges to come for designers will be those of the balance between matter and energy of transformation in the era of the circular economy. A design that combines energy transition, social innovation and artistic expression. This is what we are starting to do with the GreenKommon project.

We also envision Ars Longa as a bridge builder, continuing to foster glocal connections and serving as an incubator for experimental projects that push the boundaries of what design can accomplish to regenerate communities and ecosystems.

QR 1
Find out more about the Greenkommon project.

QR 2
KOSTBART website



How does our organisation's work contribute to fostering creative ecosystems at the local level?

We aim to strengthen the communities of makers, inventors, scientists, and artists, especially during wartime by creating programmes to help them continue their work using our spaces and support.

In 2024, we held a series of networking events to openly discuss challenges and find solutions together. POLE's greenhouse programme allows everyone to come to us with an idea or product development to refine the concept, create prototypes and bring their product to market.

One of the most significant collaborations involved the production of mirror plates using three-coordinate CNC mills for the new collection Ivasyk by renowned Ukrainian designer Ivan Frolov. He is one of the most celebrated Ukrainian designers globally, and in this latest collection, he reimagines an ancient folk tale through innovative design techniques. As part of our Sustainable Materials Lab, we have continued our research and experiments with Roman concrete technology. We see great potential in sustainable materials for the future of reconstruction, design, and construction in Ukraine. Roman concrete could help us repurpose construction debris left from war-damaged buildings, creating a more eco-friendly, durable, and energy-efficient material. Recently, we worked in a frontline community in the Kharkiv region, where together with locals constructed a water well using Roman concrete near a natural spring to enhance the public space.

How do we expand the reach of our local community's work and foster glocal connections?

We are a recent member to the Distributed Design Platform, and we've already recognised the incredible potential of this community. With the funding, we organised an open discussion on authentic Ukrainian product design featuring Barry Katz. This event took place even before the official opening of the space. For the POLE team, it was crucial to bring together a community of scientists, engineers, artists, business leaders, and others to collectively reflect on authentic Ukrainian design, the challenges we faced because of the war, and the future that lies ahead for the industry. Barry Katz, the father of the design thinking approach, has been a great source of inspiration for everyone through his belief in our project and his support for Ukraine.

The highlight of the year for us was the opening of POLE. On this day, we invited the local community to explore our spaces and discover the opportunities our centre offers. We hosted workshops in ceramics, metalworking, weaving, and more for everyone interested. It is crucial for us that people understand POLE as an open space for ideas and experiments, where innovation can emerge at the intersection of multiple fields.

Our team was also inspired by the networking events, which allowed us to connect with like-minded individuals. Moving forward, we plan to strengthen these new connections and invite those interested in collaborating on themes related to POLE.

How has our organisation's approach evolved over the years?

The idea to establish POLE was originally inspired by makerspaces across Europe. Despite the challenges of war, we remain committed to aligning with global trends in sustainable practices and promoting inclusivity in design and architecture. **Since the war highlights the vulnerabilities that need to be protected and strengthened, we are grateful for the opportunity to share our vision for the global development of the design field while still focusing on local opportunities and resources.** Belonging to an open community with the same values is a true joy. All Distributed Design Platform members form a resilient ecosystem capable of addressing modern challenges and creating spaces and products that embody freedom and innovation.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

The values underlying the Platform also serve as the foundation for POLE. Our primary significance has always been people: those who work with us, receive support, or interact with our products. We strive to create a living ecosystem where each tie reinforces the other and where innovations emerge at the intersection of various fields, which cannot be achieved in closed environments.

Find out more about POLE

Image 1 Workshop in a ceramic studio, 2024 (Olexandr Demianiv)

Image 2 Fragment of the POLE space, 2024 (Olexandr Demianiv)

Image 3 Setting up the space before the event in POLE, 2024 (Tania Pashynska)

Through various programs and projects, we encourage residents, teams, and individual inventors to collaborate, challenge themselves, and explore new work formats. Today, freedom has become the central value for Ukrainian society as a whole. The experience of the war has made us realise how much unity, openness, and cooperation are needed to create and protect freedom in its various forms.

If we could revisit the start of our Distributed Design journey...

Sincere horizontal connections are the basis of resilience and strength. Care creates beauty and makes us happier. Courage is always worth it.

10 years in the future

We envision the future of the Distributed Design Platform as one that prioritises inclusivity and freedom for every individual and community. A growing emphasis on traditional crafts, art, and design created by people and rooted in local practices holds great promise. By revisiting the knowledge of our ancestors—who created in harmony with natural processes—we can uncover solutions to modern challenges. Local ecosystems, shaped by nature's rhythms, once guided the choice of materials, techniques, and aesthetics to make spaces and products practical and sustainable. These principles remain relevant today and must inform the development of inclusivity and accessibility grounded in local resources, opportunities, and needs.

Looking ahead, we believe design will embrace a nature-oriented sense of beauty, with a shift towards quality, durability, and adaptability. Consumption trends will favour products designed to be transformed, reused, and tailored to evolving needs.

At POLE, we aspire to be a cornerstone of the Distributed Design ecosystem. We are committed to sharing our ideas, innovations, and embodied products, ensuring that freedom — a value shaped by our lived experiences — is central to everything we create. By fostering connections, honouring our shared past, and envisioning a hopeful future, we aim to contribute to a collaborative, resilient, and sustainable world shaped by the principles of Distributed Design Platform.

Image 4 Photographing custom-made awards, 2024 (Olexandr Demianiv)

Local ecosystems, shaped by nature's rhythms, once guided the choice of materials, techniques, and aesthetics to make spaces and products practical and sustainable.

Image 5 Making things happen in the POLE wooden workshop6 2024 (Olexandr Demianiv)

Image 6 Roman concrete samples created in the Sustainable Materials Laboratory, 2024 (Olexandr Demianiv)

QR 1
Listen to the conversation with Barry Katz

QR 2
Join POLE on Instagram!

MEMBERS' BOOKLET

Crafting the Pluriverse

Guillem Camprodon, Jessica Guy,
Sally Bourdon, Julia Bertolaso

Beyond the Lab: Distributed Design as a Tool for Agency, Autonomy, and Regeneration

Member since
2017

Location
Barcelona, Spain

Fab Lab Barcelona

Founded in 2007 at IAAC as the first European node of the MIT-funded Fab Lab network, Fab Lab Barcelona emerged at the intersection of open technology, participatory design, and global systems of production. More than a laboratory, it operates as a hub within a planetary struggle over access to tools, knowledge, and agency in the digital age. Situated within a network of over 2,500 labs worldwide, it is a site of resistance against proprietary enclosures and extractive models of innovation, an experimental ground where commons-based approaches to design challenge current system logics.

For years, Fab Lab Barcelona has worked within and beyond the maker movement, interrogating its emancipatory potential. Rather than embracing the empty promise of innovation for its own sake, the lab engages in situated making, a practice that is collective rather than individualistic, rooted in local knowledge while connected to global struggles for technological sovereignty. It seeks not merely to speculate on futures but to create alternative presents, ones where digital fabrication, open-source methodologies, and circular economies are leveraged to resist precarity and build infrastructures of care.

As a founding member and coordinator of the Distributed Design Platform, Fab Lab Barcelona collaborates with communities worldwide to decenter extractivist design paradigms and advance regenerative, post-growth approaches. In an era marked by ecological collapse and technological enclosures, this work is not about scaling startups or optimizing production, it is about reclaiming agency, reconfiguring supply chains, and constructing infrastructures for collective transformation.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Fab Lab Barcelona nurtures the local ecosystem by developing open, inclusive, and replicable design practices. Our work equips communities with the tools and knowledge to reshape the infrastructures that define their lives. Through learning programs, residencies, and community-led projects, we foster distributed knowledge and capacity-building, ensuring that access to tools, networks, and opportunities remains a shared commons.

At the core of our practice is the belief that learning is lifelong, a process of learning, unlearning, and relearning, where critical reflection fuels action. Through peer-led education, we cultivate collective intelligence, building networks of practitioners who adapt, innovate, and challenge dominant models of progress.

Rooted in the productive city vision, the foundation of the Fab City model, we actively support local communities in reclaiming the means of production, ensuring cities evolve from sites of extraction to productive and regenerative ecosystems. Through initiatives from the last five years like Make.Works, Remix El Barrio, the Food Tech 3.0 incubation program, and the newly established Ensemble network of productive spaces, we prototype new urban infrastructures built on collective ownership, resilience, and the right to make.

How do we expand the reach of our local community's work and foster glocal connections?

Fab Lab Barcelona's approach is not about expansion but replication. Just as cells do not grow indefinitely but instead multiply to form more complex systems, tissues, organs, entire living beings, our work scales by creating new nodes that interweave into larger ecosystems. Rooted in open knowledge and collaborative methodologies our works scales from tools, toolkits, trainings and programs to platforms and networks.

To turn these ideas into action we operate across a diversity of projects that range from co-designing environmental monitoring tools for citizen engagement (Smart Citizen), toolkits to map weak signals to explore emergent futures (Atlas of Weak Signals), trainings for emergent designers to learn applied circular design practices (Circular Cities Challenge), programs to embed maker-centered learning in high-complexity schools (DTecla), project reimagining urban production models (Fab City Barcelona), platforms to support creative in Europe who work on alternatives to mass production (Distributed Design Platform), or coordinating the educational network of the Fab Lab global community (Academany).

Barcelona, in this framework, is not merely a host but a living node in a global system of production, knowledge-making, and distributed resilience.

How has our organisation's approach evolved over the years?

We have never been static. Over the years, our approach has evolved significantly through our engagement with the Distributed Design Platform. As its coordinator, we have moved from a "push and pull" dynamic to a facilitating role, fostering reciprocal relationships between network actors. This shift allows us to learn from diverse practices while sharing insights, creating a more horizontal system of exchange where the

Find out more about Fab Lab Barcelona

community evolves organically. This is reflected in our co-designed value briefs, membership agreements, and collective impact reports, ensuring that openness and adaptability guide our processes.

Our work continues to evolve as we learn from designers, makers, and creatives who join us. We have shifted from a site of technological experimentation to a hub of social, economic, and environmental transformation. What started as a place to explore digital fabrication and open-source tools has evolved into a platform for systemic change that works and impacts outside the walls of our lab. Over time, the plurality of these approaches has enriched our network, expanding our understanding of what is possible and shaping how we refine design to meet evolving societal needs.

A crucial shift in our work has been actively questioning who has access to design and making. The field has long been dominated by Western narratives and practitioners, excluding diverse perspectives. We are committed to increasing representation by fostering greater accessibility and equity in makerspaces, actively seeking underrepresented voices for publications, workshops, and exhibitions. By making visible diverse practices and worldviews, we aim to create an ecosystem that reflects the full spectrum of creative expression.

We have moved beyond the traditional project-based mindset, recognizing that true transformation happens not in the lifespan of a single initiative but in the long-term cultivation of ecosystems. True change does not come from creating something that lasts forever, but from contributing to the evolving fabric of our communities. Whether through a methodology for digital fabrication in complex learning environments or sharing food and conversation during an event, each act of learning and unlearning shapes the pathways we continue to explore. By remaining open to constant adaptation, reflection, and collaboration, we challenge static mindsets, deepen our understanding, and ensure our work remains responsive and relevant.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

As intrinsic values shaped by years of collective work within our orbit, these principles emerged through shared experimentation, collaboration, and critical inquiry. We were proud to see them catalyzed into the foundational values of the platform.

Openness is not just about ensuring that design remains a commons rather than a commodity, it is about constructing infrastructures that resist enclosure. It means developing tools, platforms, and networks that are adaptable, reinterpretable, and reclaimable, embedding the right to remake and repurpose into the very fabric of technological practice.

Collaboration is about dismantling the illusion of the solitary designer-genius, positioning design as a collective intelligence formed through mutual aid and shared knowledge. Our approach emerges not from a single point of authority but from a multiplicity of nodes, where distributed agency creates more than the sum of its parts.

Ecosystemic thinking is antidisciplinary by necessity, rejecting the artificial separation of knowledge into isolated fields and rigid silos. At a time when discussions center around general (artificial) intelligence, we advocate for situated intelligences, those rooted in lived experience and place-based knowledge.

Regeneration extends beyond ecology, it is about restoring autonomy and reclaiming the right to shape the material world. It means designing not for infinite scalability but for resilience, not for disruption but for repair.

At Fab Lab Barcelona, design is an act of resistance against the forces that seek to commodify creativity, extract labor, and restrict participation.

If we could revisit the start of our Distributed Design journey...

If we could go back to the beginning of our Distributed Design journey, we wouldn't change a thing. Every decision, every experiment, failure, and breakthrough—was shaped by its time and context, reinforcing the necessity of uncertainty, adaptation, and ongoing experimentation.

We remember how we struggled to bridge a divide that never should have existed, the false opposition between designers and makers. Makers dismissed designers for their lack of technical skills and hands-on experience; designers dismissed makers for lacking systemic thinking, creative sensibility, and conceptual depth. It took time to understand that this was never a conflict but a missed opportunity for symbiosis. Now we could say that we made a change. Suddenly, emerging designers rejected the sterile desk in a white-walled studio: "We don't want to wait for industry—we want to build our own tools, shape our own materials, and create the technologies that support our work." This wasn't just about individual agency; it was about redefining design itself, reclaiming production, and challenging the passive role that industry had assigned to creatives.

What we have learned, above all, is that lasting impact is not built in isolation but through deep collaboration and ecosystem-building, where regeneration, inclusivity, and openness are structural, not afterthoughts. We have

Image 1 & 2 Weaving with Johann workshop as part of the Distributed Design programme at the Vienna Design Week 2024

Image 4 Collective XXL embroidery installation as part of CENTRINNO project

Image 3 Corn husk weaving workshop as part of the Distributed Design programme at the Vienna Design Week 2024

learned to listen—to communities, emergent needs, and the slow process of co-creation. Distributed Design is not imposed but cultivated, thriving in its networked, plural nature. It is a tool for systemic change—focused on replication over scale, contribution over ownership, and repair over disruption.

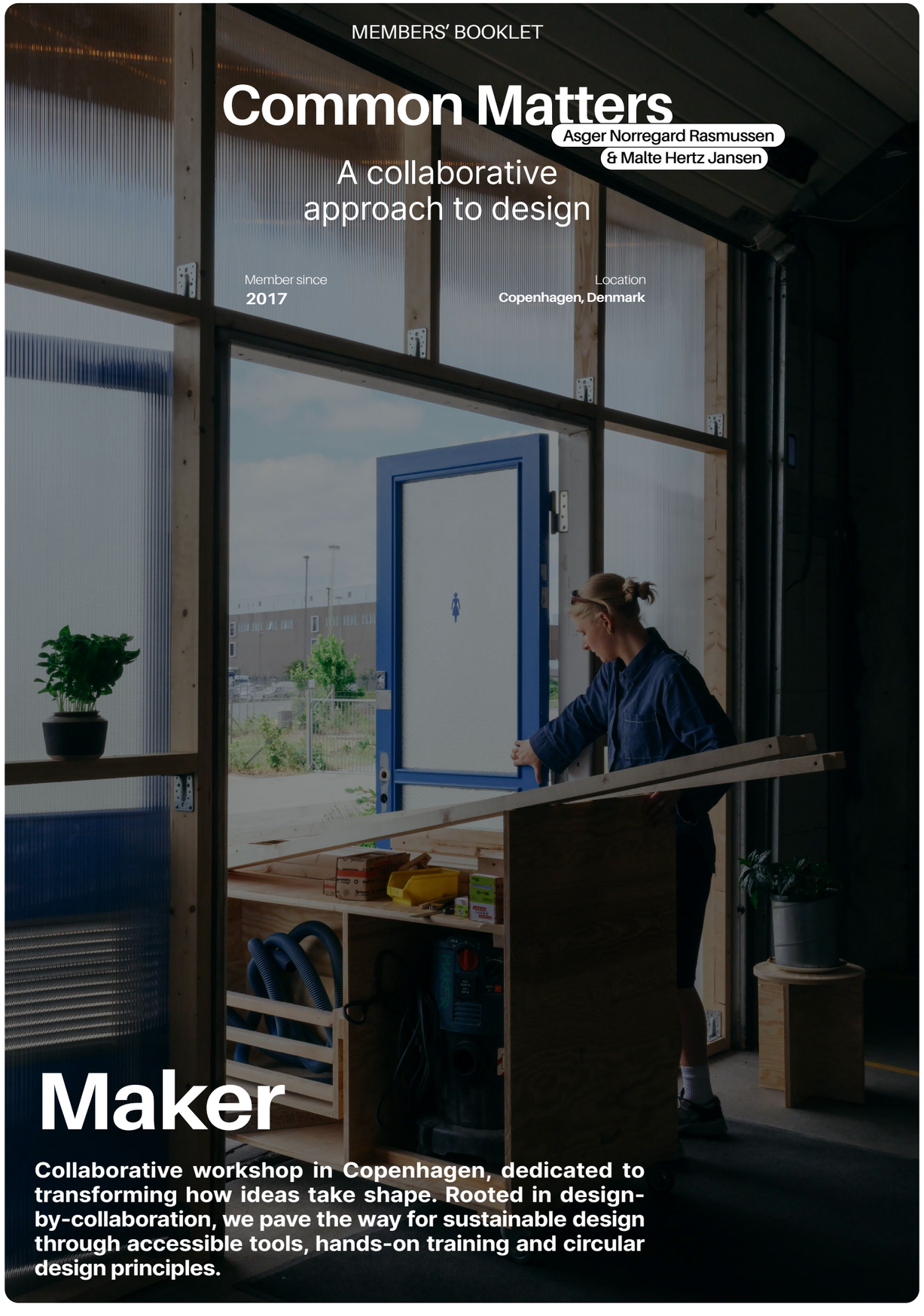
10 years in the future

Looking ahead, we see Distributed Design as a key part in building more resilient and regenerative communities. The monopolies that once dictated who designs, who manufactures, and who profits from creation are being dismantled by resilient networks of local, regenerative production.

By 2034, we no longer speak of "makers" and "designers" as separate identities. Instead, the act of designing and making has merged into a shared literacy, a new crafter identity, embedded in how people engage with the world. Workshops have replaced sterile design studios, production hubs are no longer confined to industrial zones, and cities have become spaces of material autonomy rather than nodes of extraction. In Barcelona, the Ensemble network of local production hubs has become a strong reality, creating self-sustaining, community-driven ecosystems where production is embedded in everyday life.

We will continue to shape the future of Distributed Design, ensuring that creativity, equity, and openness remain at the core of a systemic change. The way ahead is both challenging and full of hope, and we remain committed to our mission in building a world where design is a tool that can help us adapt, grow, and share what we have created until this day.

Our community keeps expanding as makers, educators, researchers, scientists, and creatives work to bring this vision to life — and we hope you will join us.



Situated in the centre of Copenhagen, our workshop provides professionals, and businesses with the tools and facilities to design, innovate and create. Maker is more than a workshop. We empower our community to share knowledge, learn new skills, and bring their visions to life. By offering hands-on training, promoting strategic business development, and hosting public events, we make it more accessible for everyone to shape a better tomorrow.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Maker has significantly impacted Copenhagen's local ecosystem of creatives, makers and designers, through an accessibility approach to our open access workshop facilities, public events and residency programmes.

Through strategic projects and partnerships, Maker has empowered professionals, businesses, and makers to innovate while driving forward the principles of circular design and design-by-collaboration.

1. **Distributed Design Platform:** As a founding member, Maker has played a pivotal role in connecting designers, makers, and creative professionals on a local scale as well as across Europe. The platform fosters collaboration by enabling creators to share ideas, develop decentralized manufacturing solutions, and embrace sustainable design practices. Through annual design residencies, masterclasses and exhibitions, Maker has amplified the reach and impact of local creatives, integrating Copenhagen into a wider network of global innovators.

2. **CIRCuIT Project, "CIRCULAR CONSTRUCTION IN REGENERATIVE CITIES":** This EU-funded initiative focuses on advancing circular construction practices. Maker contributes by bridging the gap between designers, architects, and the construction industry, encouraging the reuse of materials and regenerative approaches to construction and architecture. Through hackathons and prototyping, Maker was part of transitioning toward a more sustainable urban development model while inspiring others to adopt similar practices.

3. **KOSTBART:** A local initiative rooted in resourcefulness, KOSTBART collaborates with citizens, artists, and professionals to upcycle waste materials into valuable design products. By hosting community workshops and knowledge-sharing sessions, Maker empowers participants to reimagine waste as a resource, promoting sustainable practices and strengthening craftsmanship.

Through these projects, Maker has solidified its role as a vital space for community-driven design and local production, transforming how people create, collaborate, and build.

How do we expand the reach of our local community's work and foster glocal connections?

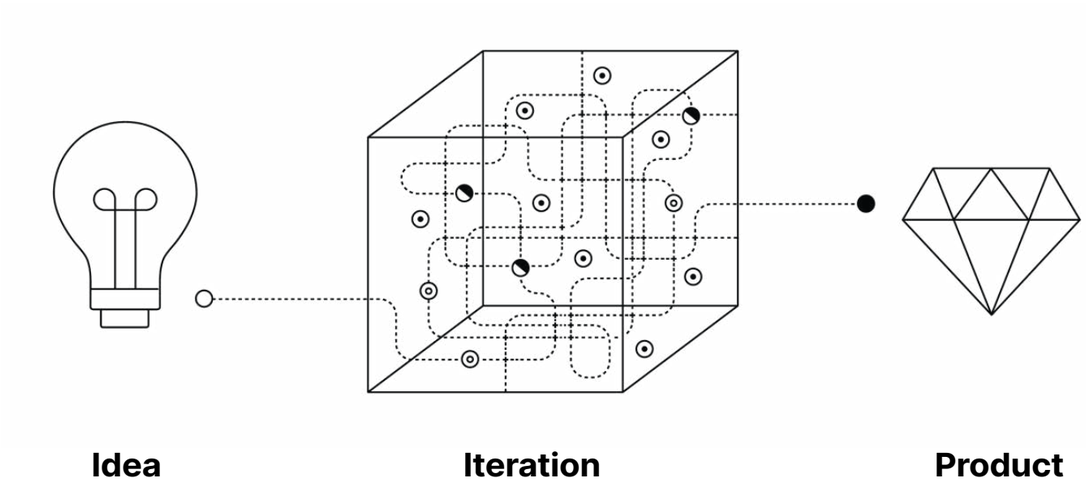
Being a member of the Distributed Design Platform has significantly expanded the reach of our local community's work. Through annual residencies, Maker has enabled creative talents to prototype, iterate, and design for a distributed model, connecting local innovation with European networks of designers, makers and spaces.

Residencies provide both local and international participants access to Maker's workshop facilities, capacity building, and engagement with our community and partners. By participating in the Distributed Design Platform, residents gain access to a broader European network, enhancing their opportunities for collaboration and visibility.

A compelling example of this is **Studio CircOlar**, a material-driven design practice connecting architecture, design, and art. As part of Maker's 2023 Distributed Design Residency, Studio CircOlar leveraged the mobility scheme to enhance their project and connected with European peers. Their participation culminated in showcasing their work at the **Distributed Design Exhibition** during Vienna Design Week 2024.

Through the Distributed Design Platform, Maker bridges local and global efforts, empowering creatives to experiment, design and connect focusing on circular and distributed design practices.

Find out more about Maker



Graph 1 "Iterative Kaos" (2024, Maker)

How has our organisation's approach evolved over the years?

The Distributed Design Platform has profoundly shaped Maker's approach, methods, and perspectives over the years. Inspired by the project's focus on distributed and collaborative practices, we have expanded and refined our 'design-by-collaboration' ethos to foster deeper connections between local creatives and partners, global networks, and circular design principles.

One key evolution is our shift toward a more ecosystemic approach—viewing design not as a standalone process but as a dynamic collaboration across diverse disciplines, communities, and resources. This perspective has influenced how we structure our work and partnerships, emphasizing shared learning and co-creation to solve challenges holistically.

Additionally, the Platform has inspired us to experiment with and embrace more distributed practices, such as encouraging open-source design, utilizing local materials, and integrating global feedback loops into our work. The Platform has not only enriched our practices but also redefined how we collaborate to shape a sustainable and inclusive future.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

Since joining the Distributed Design Platform, the values of openness, collaboration, regeneration, and ecosystemic thinking have become deeply embedded in Maker's overall approach and strategy. These principles guide our projects and partnerships, driving us to design solutions collaboratively, prioritize circular practices, and foster connections between local and global networks. The values shape how we navigate challenges—by embracing shared knowledge, design-by-collaboration, and circular design practices, ensuring that every initiative aligns strategy.

If we could revisit the start of our Distributed Design journey...

If Maker could revisit the start of its Distributed Design journey, we would prioritize scaling impact through facilitated testing of Distributed Design business models, with a stronger focus on trans-European collaboration and implementation. Additionally, we would emphasize engaging more qualitatively by facilitating deeper dives with fewer residents and offering more tailored training activities. While resource constraints are a factor, this approach would strengthen cross-border collaborations, drive more impactful outcomes, and advance the practical application of distributed design principles across Europe.

Image 1 Studio CircOlar "Pulp-scape" (2024, Maker V-10, Studio CircOlar, Credit: Studio CircOlar)

Image 2 Studio CircOlar "Pulp-scape" (2024, Vienna Design Week, Studio CircOlar, Credit: Studio CircOlar)

Image 3 Asger Jansen from Maker

Image 4 "Maker V-10, collaborative approach to design" (2024, Maker V-10, credit: Alf Arén)

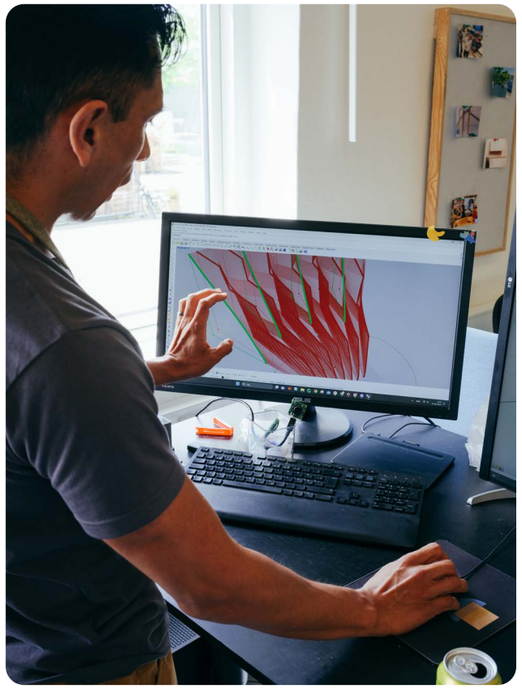


Image 5 "Maker V-10, 3D modeling" (2024, Maker V-10, credit: Alf Arén)

Image 6 "A Community Approach - residency" (2023, Maker V-10, exhibition)

10 years in the future

In 10 years, Distributed Design will challenge the existing environment for design and local production, based on design-by-collaboration, with local communities driving scalable solutions that are accessible, regenerative, and interconnected. Maker as an organisation could play a pivotal role in this transformation, acting as one of many global spaces, where diverse local and global networks converge to prototyping, scaling, and sharing knowledge. Our strengths in fostering cross-disciplinary collaboration, supporting circular design, and empowering local makers holds the potential for us to lead in creating new business models and practices that challenge traditional production systems. By continuously expanding our network and tools, we will help shape a future where design is truly decentralized, regenerative and inclusive.

QR 1
CIRCuIT project website

QR 2
KOSTBART website

QR 3
Discover Studio CircOlar here.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Our approach centres on empowering local talents by providing educational programs and access to tools, knowledge, and networks that help them bring ideas to life. We cultivate an environment in which creatives, entrepreneurs, scientists, and industry leaders meet to share expertise. This collaborative framework not only encourages social inclusion and cultural preservation but also enables the region's unique resources—such as seafood, cultural traditions, and environmental stewardship—to inform projects that align with community needs.

One example is our maker-to-market bootcamp, which offered year-long support to emerging talents in digital fabrication, business development, and communication. Participants learned how to transform prototypes into marketable products, engaging local industries and reinforcing regional value chains. Another initiative is the North Atlantic Youth Blue Innovation Camp, where young participants from Greenland, the Faroe Islands, Norway, and Iceland collaborate on solving coastal resilience and sustainability challenges. By applying distributed design principles, participants generated fresh perspectives on local resource management and ecosystemic thinking. Finally, the Matey Seafood Festival—a result of Distributed Design bootcamp ideation—connected local restaurants, the fishing industry, and international culinary experts. This celebration of fish, culture, and innovation successfully integrated tourism, heritage, and open-source collaboration into the heart of our community.

How do we expand the reach of our local community's work and foster glocal connections?

Membership in the Distributed Design Platform has placed our local efforts in a global context. It has given us the opportunity to share our island's stories, resources, and projects with an international audience. Through the Platform's network, our local community has learned from others working in similar ecosystems worldwide, facilitating a two-way knowledge exchange. These global connections have enriched local practices, expanded our collaboration networks, and inspired us to embrace new methods and technologies that transcend geographic borders.

By being part of the Distributed Design Platform, we have fostered a "glocal" mindset, where local traditions meet global collaborations. For instance, connecting with designers and makers from different regions has brought fresh insights into sustainable materials, circular economy models, and new fabrication techniques. Our experience has shown that blending global best practices with local expertise can unlock entirely new applications, allowing Vestmannaeyjar's unique marine resources to become prototypes for sustainable innovation well beyond Iceland.

How has our organisation's approach evolved over the years?

Over time, our involvement in the Platform has encouraged us to refine our engagement strategies, explore new materials, and adopt a more inclusive approach. We have moved from simply providing tools to co-creating frameworks that enable participants to think critically about distributable, reproducible, and ecosocial solutions. Our selection processes, mentoring methods, and follow-up support have evolved to ensure that talents can consistently develop their projects, maintain momentum, and directly contribute to open source ecosystems and environmental goals. We've gained a more holistic understanding of innovation—one that integrates cultural authenticity, community well-being, and global sustainability challenges.

Find out more about Knowledge Center Vestmannaeyjar

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

The values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—are at the core of our methodology. We prioritize open-source knowledge sharing to ensure that breakthroughs here can inform others worldwide. Our collaborative ethos connects different sectors, enabling fisheries, tourism operators, educators, and designers to work toward common goals. Regeneration and ecosystemic thinking ensure that projects respect the environment, reusing resources where possible and nurturing rather than depleting local assets. These values guide us through challenges by reminding us to embrace diversity, pursue symbiotic partnerships, and remain flexible in adapting to new opportunities.

If we could revisit the start of our Distributed Design journey...

Looking back to when we first joined the Distributed Design journey, we would emphasize the importance of patience, openness to experimentation, and active community engagement. Initially, integrating traditional industries with open design concepts can feel daunting, but we would reassure ourselves that this fusion leads to meaningful innovations. We would advise taking the time to foster trust among stakeholders and celebrate small victories as the building blocks of long-term cultural and economic resilience.

Image 1 Maker-to-Market Bootcamp in Fab Lab Vestmannaeyjar where ideas around the coastal community were formed.
Photo by Ingibjörg Grétarsdóttir

Image 2 Visit at local fishing industry sites on Vestmannaeyjar Island, Iceland

Image 3 Participants in North Atlantic Youth Blue Innovation Camp in Fab Lab Vestmannaeyjar, present ideas around challenges of the ocean.
Photo by: Frosti Gíslason

Image 4 Distributed Design Platform Member Exchange with Polifactory

Image 5 & 6 Harbour of Vestmannaeyjar Island, Iceland

Image 7 Young chefs, guest chefs and representatives of the fishing industry in Iceland at MATEY Seafood Festival in Vestmannaeyjar, Iceland Photo by: Karl Petersson

10 years in the future today

Ten years from now, Distributed Design will be even more widely embraced, with co-creation across continents commonplace and localized production networks intertwined with global knowledge flows. Our organisation will play a role by refining sustainable, circular practices rooted in oceanic resources and cultural authenticity. We see ourselves spearheading new training programmes that integrate environmental science, circular economy principles, and distributed manufacturing techniques. By then, the "local" in our approach will have expanded: we will engage a far-reaching network of creatives, each contributing expertise to address pressing global issues like climate change, resource scarcity, and social inequity. Our strength lies in our proven ability to translate intangible cultural heritage and local intelligence into solutions with universal relevance. In this future, we will continue to serve as a catalyst—nurturing relationships, inspiring regenerative production models, and advocating the values that make distributed design a truly transformative force for good.

MEMBERS' BOOKLET

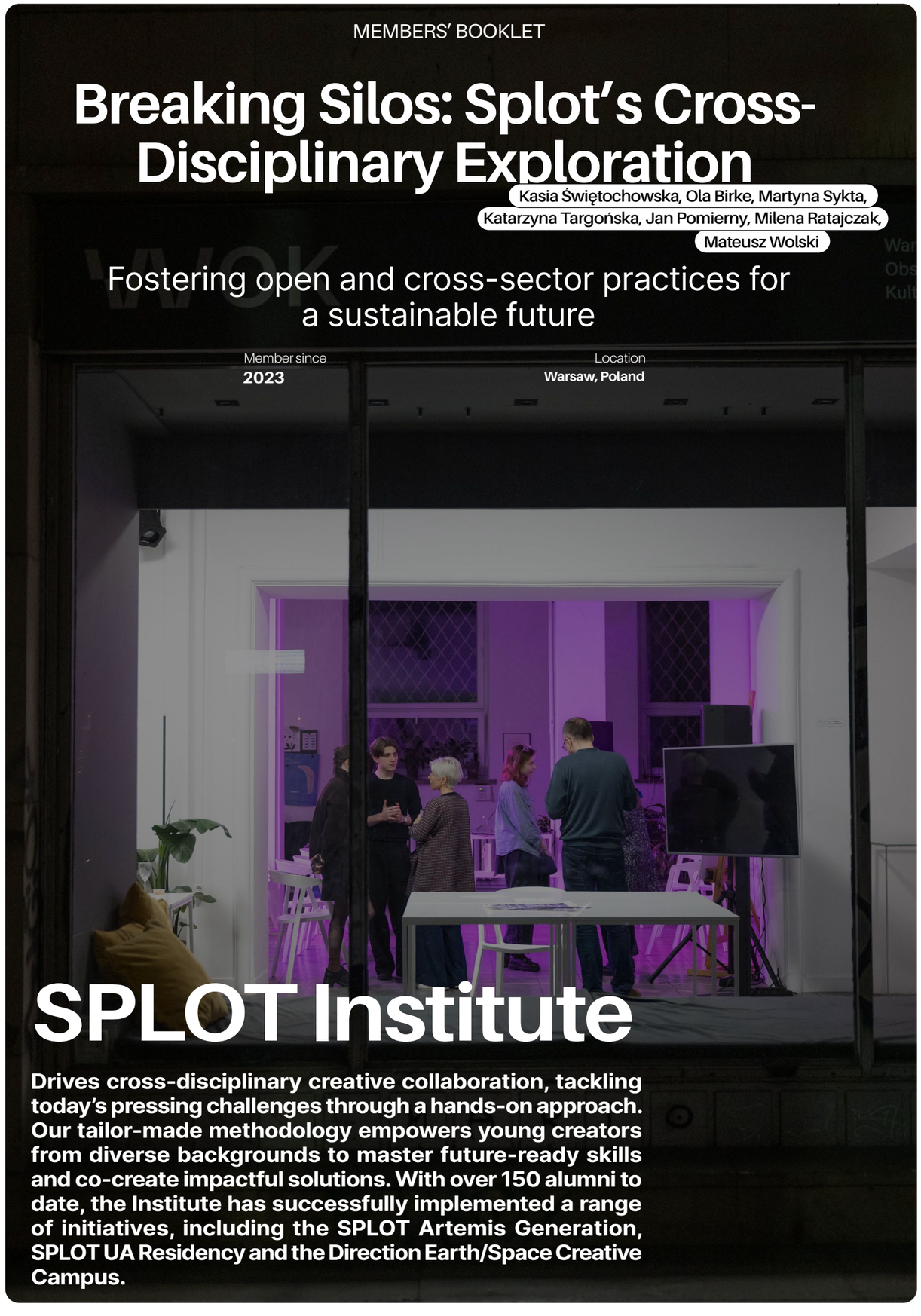
Breaking Silos: Splot's Cross-Disciplinary Exploration

Kasia Świętochowska, Ola Birke, Martyna Sykta, Katarzyna Targońska, Jan Pomierny, Milena Ratajczak, Mateusz Wolski

Fostering open and cross-sector practices for a sustainable future

Member since
2023

Location
Warsaw, Poland



SPLOT Institute

Drives cross-disciplinary creative collaboration, tackling today's pressing challenges through a hands-on approach. Our tailor-made methodology empowers young creators from diverse backgrounds to master future-ready skills and co-create impactful solutions. With over 150 alumni to date, the Institute has successfully implemented a range of initiatives, including the SPLOT Artemis Generation, SPLOT UA Residency and the Direction Earth/Space Creative Campus.

Through the SPLOT Open series, we advocate for openness at the intersection of design, science, and culture, striving to democratise access to knowledge and creation. Here we also discuss open projects and explore what "openness" truly means in practice, while further bridging local and global networks of creativity.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Through targeted initiatives, we create opportunities for young creatives to address local challenges and to build more open, collaborative, democratic, and regenerative communities. There are three key areas of our work:

Facilitating creative cross-sector collaborations
We bring together diverse local actors – ranging from artists and scientists to policymakers and entrepreneurs – to address pressing community issues. By creating in-depth training programmes involving all of them, we enable meaningful exchanges that strengthen local creative networks.

Empowering young creatives through residency programmes
Our residency programmes provide young creatives from diverse backgrounds with the space and resources to explore and address glocal challenges. These residencies nurture a sense of community engagement, and equip participants with new skills to drive long-term, sustainable change within their communities.

Grounding creativity in policy frameworks
Our collaborative projects are inspired by (and sometimes question) key policy documents and regional development plans, ensuring our work advances broader community goals. By systematically connecting creative initiatives to established priorities, we build lasting partnerships and create measurable impact that resonates with institutional stakeholders.

How do we expand the reach of our local community's work and foster glocal connections?

Our membership in the Distributed Design Platform has been instrumental in amplifying the impact of our community's work. It has legitimised our efforts, deepened local collaborations, and opened pathways for international connections.

Legitimising local actions and building partnerships
Being part of the Platform has significantly enhanced our credibility, making it easier to secure partners for local events and projects. Citing our membership has not only strengthened our proposals but also facilitated meaningful collaborations with diverse stakeholders.

Discovering hidden local talents
Through our membership, we have strengthened bonds with the local community. Although we believed ourselves well-acquainted with the active players in the local field, we were thrilled to uncover new initiatives, talents, and projects that we had not encountered before. This involvement has enriched our understanding of the creative ecosystem in Poland and helped us engage more deeply with its members.

Enabling access to European grants
Through our partnership with the Platform, we gained an additional opportunity to apply for European grants – this has opened doors for scaling our initiatives and enhancing their impact across borders.

Our involvement in the Distributed Design Platform has been a catalyst for growth, enabling us to bridge local efforts with global networks and establish a stronger presence within the international creative landscape.

How has our organisation's approach evolved over the years?

Our approach has evolved to place greater emphasis on open practices and interdisciplinary collaboration. Through the Distributed Design Platform, we've been focusing more on merging open methodologies across diverse disciplines while strengthening connections between various initiatives.

The Platform, expertly managed by Fab Lab Barcelona, has also provided us with valuable insights into community building, helping us strengthen our network and refine our strategies for fostering collaboration.

Find out more about SPLOT Institute

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

The values of Distributed Design are central to SPLOT's work. All prototypes created as part of SPLOT initiatives are published as open source, and we continuously strengthen this commitment to openness.

We also embed these values into our interdisciplinary residencies, integrating them into participant briefs, creative methodologies, and the sharing of outcomes. This ensures that openness, collaboration, and ecosystemic thinking remain at the heart of our programmes.

These principles shape our goals and guide us in building sustainable partnerships, navigating challenges, and cultivating long-term impact locally and globally.

If we could revisit the start of our Distributed Design journey...

Tap into the Distributed Design Platform network's wealth of knowledge – these remarkable individuals are eager to share their invaluable experiences and insights.

10 years in the future

We hope that distributed design practices are set to become increasingly vital, shifting from alternative or experimental approaches to mainstream strategies adopted by public administrations and institutions. Ideally, these practices will be embraced by the general public by choice, not just out of necessity – such as in conflict zones, where Distributed Design helps alleviate shortages of materials. We hope that growing consumer awareness will drive the popularity of Distributed Design solutions, and our role will be to contribute to raising that awareness.

MEMBERS' BOOKLET

Distributed Design Education in Action

André Rocha

Fostering open and cross-sector practices for a sustainable future

Member since
2018

Location
Lisboa, Portugal

IPL Fablab Benfica

The Polytechnic University of Lisbon (IPL) encompasses eight specialized schools covering Arts, Communication, Education, Engineering, Health Sciences, and Business. Newsweek's 2019 global list of maker schools recognized IPL as the only Portuguese institution featured, highlighting our leadership in educational innovation through digital fabrication.

Through the SPLOT Open series, we advocate for openness at the intersection of design, science, and culture, striving to democratise access to knowledge and creation. Here we also discuss open projects and explore what "openness" truly means in practice, while further bridging local and global networks of creativity.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

We drive three interconnected actions. First, we organize maker events through Maker Faire Lisboa (2019-2023) and collaborate with initiatives like the Gentler Futures Festival, creating catalysts for local creative collaboration where distributed design principles meet practical application.

Secondly, through our Fabschools initiative, we embed Distributed Design in education via higher educational offerings, assessment tools, and a growing catalog of educational designs. We reach local teachers through certified programmes, introducing them to proven projects like Alquimetricos[3] and Caleiduino[4].

Lastly, in our Visual Arts and Technologies BA programme, we integrate Distributed Design principles, complementing academic work with open calls that extend beyond the classroom. Our methodology encourages dialogue between students and established projects, leading to innovations like "dot."[2] and "Re-Bird"[7]. Alquiplus[8] exemplifies this approach, emerging from our engagement with Sun Factory's[6] technology while building upon Alquimetricos[3].

How do we expand the reach of our local community's work and foster glocal connections?

We transform locally-inspired educational assignments into globally relevant projects. Through our "Banco de Benfica" assignment, we challenged students to design furniture inspired by our neighborhood, producing projects like "T-AR"[1]. Our collaboration with Sun Factory's[6] low-tech solar-powered plastic recycling project exemplifies this evolution. Through our "SUN POWERED PLASTIC RECYCLING" open call, we connect our local maker community with the Swiss open-source ecosystem, sparking innovations like the "dot." Braille writing tool[2].

How has our organisation's approach evolved over the years?

From 2018 to 2023, we transformed our lab from a grassroots initiative into a regional Distributed Design hub, supporting projects from local education to international collaborations. Our Fabschools initiative exemplifies this evolution, as we distinguished between teaching design through distributed principles and developing open educational resources through distributed methodologies. This framework guides how we integrate established open-source educational projects like Alquimetricos[3], Caleiduino[4], and P.O.W.A.R[5], which serve as both teaching tools and inspiration for student innovation.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

At ESELx, we drive some of our product design courses within the Visual Arts and Technologies BA programme through Distributed Design values. Our lab catalyzes these values through hands-on learning and community engagement. Through our assignments, we emphasize documentation and knowledge-sharing, while our partnerships with initiatives like Sun Factory[6] and Alquimetricos[3] connect students to broader maker networks.

We extend this approach beyond our classrooms through fabschools.pt and our Postgraduate Course. Through Maker Faire Lisboa and other emerging local partnerships, we create platforms connecting local makers with international networks. Our open calls consistently invite dialogue with established Distributed Design projects, encouraging innovation through collaboration with existing projects and initiatives.

Find out more about IPL FabLab

If we could revisit the start of our Distributed Design journey...

Looking back, We would emphasize the importance of having our communication make a clear distinction between Distributed Design for Education and Design Education through Distributed Design from the very beginning. This clarity of purpose could have helped establish a more structured annual cycle of activities while maintaining the flexibility to adapt and grow.

The path to effective Distributed Design education emerged through practice and reflection, but starting with a clearer framework could have accelerated our progress. Yet, this organic evolution led us to our current approach: a dynamic balance between structured educational methodologies and the adaptability needed to embrace new opportunities and challenges. Perhaps the most valuable insight is that the endpoint often feels like it would have made the perfect starting point - but that's precisely how innovation and learning unfold in the Distributed Design landscape.

Image 1 Alquiplus – Alquimetricos – Sunfactory in one picture (01/2024, Lisboa, André Rocha, cc-by 4.0)

Image 2 Alquimetricos Workshop for Educators (05/2023, Lisboa, ESELx, IPL, André Rocha, cc-by 4.0)

Image 3 Curiosity and Ingenuity at Fablab Benfica 04/2022, Lisboa, ESELx, IPL, André Rocha, cc-by 4.0)

Image 4 Banco de Benfica in action (11/2022, Lisboa, ESELx, IPL, André Rocha, cc-by 4.0)

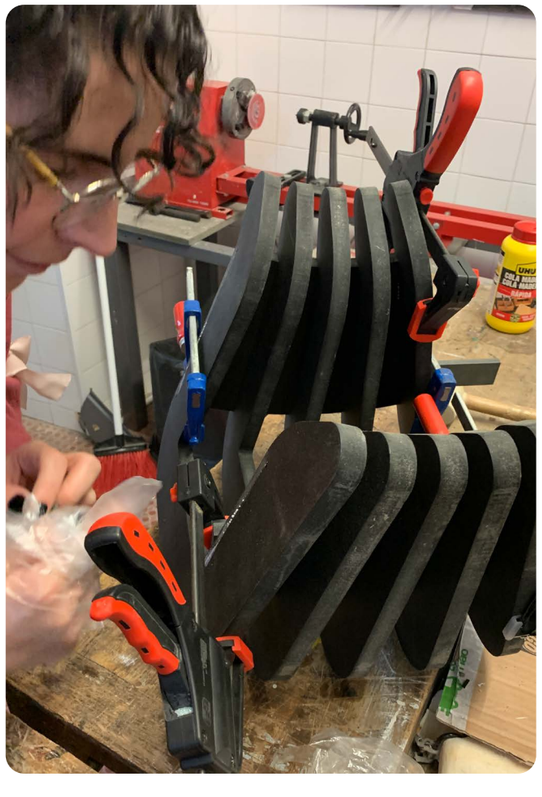


Image 5 PGDIEFD Final Project Public Presentation (09/2019, CIM Mouraria, Lisboa, André Rocha, cc-by 4.0)

10 years in the future

The landscape of Distributed Design faces significant transitions as we look toward 2035. The field must evolve to address crucial challenges while navigating growing tensions between traditional design approaches and emergent AI-driven design paradigms. Environmental imperatives will continue to reshape design practices and outputs, demanding rapid adaptation from the Distributed Design community.

As an academic institution, IPL's critical mission becomes even more vital in this context. Our role extends beyond merely implementing Distributed Design values - we must actively contribute to shaping how these values evolve in response to technological and environmental challenges. This journey begins in our undergraduate programmes but necessarily expands into research, where we can critically examine and influence the future of Distributed Design. Our Fabschools initiative will continue evolving as a framework for implementing Distributed Design principles across educational levels, while our assessment tools and methodologies will help standardize best practices. However, our most significant contribution may lie in our capacity to foster critical dialogue about the future of Distributed Design itself. By maintaining strong international collaborations while remaining grounded in local community needs, we aim to help bridge the gap between theoretical frameworks and practical implementation in this rapidly changing landscape – creating a truly glocal impact in the Distributed Design landscape.

Through the SPLOT Open series, we advocate for openness at the intersection of design, science, and culture, striving to democratise access to knowledge and creation. Here we also discuss open projects and explore what "openness" truly means in practice, while further bridging local and global networks of creativity.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

The P2P Lab fosters local creative ecosystems by nurturing collaboration, innovation, and community-driven solutions. One of the key spaces where this takes place is Tzoumakers, a rural makerspace established by the P2P Lab through a cooperative model. This environment strengthens co-creation and encourages the exchange of ideas and resources, empowering local communities to build sustainable solutions together.

The Cultimake project, hosted at Habibi.Works, exemplifies how inclusive collaboration can drive resilience. This project created a strong network that addresses social and economic challenges by uniting local farmers and refugees. Another initiative, AnotherFootball, uses football to inspire commons-based transformations. At the same time, the energy cooperative Commonen leads the way in sustainability with innovative projects like Greece's first agrivoltaic facility, integrating renewable energy into local communities.

Building on these successes, the Epirus Living Lab recently aims to bring together socially-oriented organisations, creating a platform for the collaborative co-creation of solutions in energy, rural development, and refugee integration. This initiative is empowering local communities to tackle pressing regional challenges, ensuring that sustainable, creative solutions emerge from the people who are most directly impacted.

How do we expand the reach of our local community's work and foster glocal connections?

Being a member of the Distributed Design Platform has greatly expanded our local community's reach by connecting us to a global network of innovators and practitioners. In this context, we have collaborated with international experts, such as Nea Guinea facilitators who guided small-scale wind turbine workshops at Tzoumakers, experts from Fab Lab Benfica who co-developed an automated irrigation system, and from P2P Food Lab who helped refine the harvester on wheels to meet local needs. Moreover, since 2022 the P2P Lab organised three summer schools that combined theoretical and hands-on exploration of alternative socio-technological futures, with more than 80 participants from 16 countries. These partnerships, along with access to funding and shared resources, have enhanced our ability to create sustainable, commons-based solutions that blend global knowledge with local action.

How has our organisation's approach evolved over the years?

While we initially focused on local, grassroots initiatives, being a member of the Distributed Design Platform has broadened our perspective to embrace global collaboration and open-source methodologies. This shift has led us to adopt a more holistic approach to innovation, emphasising commons-based solutions and participatory design. The Platform has encouraged us to experiment with community-driven production, forge cross-disciplinary partnerships, and share knowledge more openly. As a result, our work has become more scalable, inclusive, and impactful, with improvements in our dissemination, documentation, and organisational practices, enhancing both local and global connections.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

The values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—guide the P2P Lab's work. Openness drives us to share knowledge and resources, empowering local adaptation of our ideas. Collaboration is evident in initiatives like Tzoumakers, where we co-create tools with farmers, experts, and community members, fostering mutual learning. Regeneration informs our focus on sustainable energy and agriculture practices, restoring ecosystem balance. Ecosystemic thinking underpins projects like the Epirus Living Lab, which connects organisations and experts to address regional challenges collaboratively, building networks for long-term, sustainable change.

Find out more about P2P Lab

If we could revisit the start of our Distributed Design journey...

Building sustainable, community-driven systems takes time, and the process of co-creation is often messy but ultimately rewarding.

If I could revisit myself at the start of my Distributed Design journey, I would remind myself to stay open to unexpected opportunities and partnerships, as the true value of Distributed Design often emerges from diverse, unanticipated connections. I would encourage myself to keep a long-term perspective, focusing on the lasting impact rather than immediate results, knowing that transformative change happens gradually.

One example of this lesson came during a workshop we held at Habibi.Works in 2018 for the Cultimake project, focused on building a mobile chicken coop for the local refugee community. The focus on completing the physical construction overshadowed deeper engagement with the participants and collaborative exchanges that are essential to distributed design. This experience highlighted the importance of balancing tangible results with fostering meaningful relationships and co-creation throughout the process.

Image 1 The Commonen energy cooperative in Greece: Photovoltaic station on a factory roof. Photo taken on 10.6.2024, "Klaria", Bafra, Ioannina. Photographer: Dimitris Kitsikopoulos. License: CC BY-SA 4.0.

Image 2 Mobile chicken coop in the context of the Cultimake project. Photo taken on 3 August 2018, Habibi.Works. Photographer: Chris Giotitsas. License: CC BY-SA 4.0.

Image 3 Participants at the summer school 'Energy as a Commons' engaging in theoretical exploration of alternative socio-technological futures at Tzoumakers.

Image 4 Summer school on technology, society and the future: Workshop on traditional tar production technology. Photo taken on 22 July 2022, Frasta, NW Greece. Photographer: Boulouki team. License: CC BY-SA 4.0.

Image 5 Summer school on energy as a commons: Workshop on collaborative building of parts of a small-scale wind turbine. Photo taken on 31 August 2022, Tzoumakers. Photographer: Chris Giotitsas. License: CC BY-SA 4.0.

10 years in the future

In 10 years, Distributed Design will be fully integrated into daily life, with local communities worldwide collaborating to create sustainable, open-source solutions. The field will be characterised by a thriving ecosystem of interconnected urban, rural, and pristine spaces, with Distributed Design empowering local action while leveraging global digital commons. Imagine rural makerspaces like Tzoumakers driving community-driven energy solutions—such as restoring abandoned water mills to generate power—while urban and suburban hubs facilitate open-source development and peer-to-peer sharing networks. The P2P Lab will continue to empower these communities, fostering local-to-global connections, and enabling co-creation for resilient, self-sustaining systems. We will promote commons-based approaches, using our expertise in community-driven design to contribute to a more just and sustainable future, where collaboration and openness are the main driving forces behind innovation.

QR 1

Discover Tzoumakers: Rural Innovation.
Step inside Tzoumakers, our rural makerspace fostering creativity and co-creation.

QR 2

Crafting Resilience through Commons.
Explore how the Cultimake project unites farmers and refugees for sustainable solutions.

MAO acts as a cultural and educational hub, engaging both local and international audiences. Its mission is to inspire dialogue on the challenges of contemporary living and to foster connections between historical heritage and innovative practices in design and architecture. As part of MAO's broader vision, the CfC functions as a national platform supporting the development of Slovenia's creative and cultural sectors. Established in 2017, the CfC serves to bridge the gap between creativity, entrepreneurship, and innovation. It provides programmes and funding to empower individuals and organisations working across disciplines, with a focus on sustainable design practices and the integration of technology with tradition.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Our contributions to fostering local creative ecosystems that serve an interconnected network of various actors could be structured into three key areas:

Organising creative, educational and research-based projects. An example of this is our flagship event, BIO – the Biennial of Design, where this collaboration began, and more broadly its production in general. The latter emerged from the curatorial work of Jan Boelen, who together with MAO transformed the 24th Biennial (2014) into a multidisciplinary effort of creative collaboration aimed at strengthening local and international design networks.

Contributing relevant expert studies. CfC has commissioned and published several studies and guidelines, in order to promote creative sectors while actively working to improve conditions in them by addressing various specific needs and seeking to co-create more sustainable and collaborative models of (creative) work[1 2 3]

Offering support and promoting professionalisation of relevant creative fields as producers. We achieve this through grants, skill-sharing and mentorship schemes, as well as open calls that support innovative projects focused on themes such as circular design, the constructive fusing of digital fabrication with traditional ecological knowledge, sustainable practices and collaborative efforts. Notable programmes include the Partner Network of more than 30 creative hubs from all over Slovenia, the Creative Incubator, Creative Accelerator, and the MADE IN Platform.

By implementing these approaches, we have built communities of designers (creatives, creative companies, self-employed persons, artists, cultural producers, and managers), mentors (individuals and companies with expertise in creative, business, financial, marketing, and other specialised fields) and various partners (creative hubs – non-governmental, private or public organisations active in the creative sector; ministries, chambers, agencies, educational and development organisations). At the same time, we are involved in larger EU projects where we act as a national and regional contact point for EIT Culture & Creativity and New European Bauhaus (NEB), thus connecting Slovenian stakeholders with foreign partners and opening doors to new opportunities.

How do we expand the reach of our local community's work and foster glocal connections?

Our participation in the Distributed Design Platform reinforced our longstanding commitment to both local and international collaboration and decentralised approaches to design. The Platform and CfC share the mission of promoting open and sustainable design practices. We pursued this objective by first identifying communities and collectives in our immediate surroundings that embody these ideas, and further by facilitating the exchange of ideas and resources between them and across borders. This experience has served as a bridge to an international community from which we learn, transfer good practices to Slovenia, and establish new collaborations. In turn, our involvement has benefited the local community by creating numerous opportunities, whether through peer-to-peer exchange or directly through activities we organised as part of the initiative. These include open calls for limited-edition design products, exhibitions, round table discussions and much more.

How has our organisation's approach evolved over the years?

Our distinctive status as both a museum and a platform fostering development across creative sectors, each with highly specific roles and tasks, could potentially leave us immune to the most advanced developments in contemporary design. However, being part of the Distributed Design has kept us reflecting on state-of-the-art movements, reminding us to insist on the main objective of our organisation: to support the local scene,

Find out more about MAO

to engage, mobilise and exchange. Equally valuable to us has been observing the Platform's operational mechanisms. We adopted and adapted its framework to serve our specific needs and help structure similar CfC initiatives such as Partner Network and others

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

The concepts of openness, collaboration and sustainability are at the heart of our core mission, both in terms of how, why, where and with whom we work, and in terms of creative projects we choose to fund and promote. They also strongly influenced our involvement in the Distributed Design Platform when we organised two open calls for financial incentives to design a new limited-series product. The first, Design Dining: Slovenian Tableware Design (2022), focused on combining food and design, both recognized as sources of shared values, namely local, sustainable, sensory, and ritual. The second, Crafting Futures (2023), explored the fusion of contemporary design and modern techniques with traditional craftsmanship. The resulting products not only stand out from generic industrial goods but also address ecological concerns through sustainable practices and the use of locally sourced materials.

If we could revisit the start of our Distributed Design journey...

Embrace bold thinking and challenge conventions: new ways of creating, and therefore a new world, can be anything we want it to be.

Image 2 Cover of The cultural-creative imperative (2020) at the exhibition Created in Slovenia, Ljubljana 2022. Photo: Klemen Ilovar.

Image 3 Building With Earth, workshop at the 27th Biennial of Design BIO27 - Supervernaculars, production space Krater in collaboration with Atelier Luma (FR) and BC Materials (BE), Ljubljana 2022. Photo: Amadeja Smrekar / Krater.

Image 4 Woven shoe displayed on a screen, featuring a natural fiber design and contemporary sole pattern for eco-friendly footwear innovation.

Image 5 Design Dining: Pop-up dinner, Maribor 2021. Photo: Janez Klenovšek.

Image 6 Creative Incubator – Demo Day, Museum of Architecture and Design. Ljubljana 2024. Photo: Aleš Rosa.

QR 1
Read more here!

QR 2
Curious to know more?

Image 7 The 28th Edition of The Biennial of Design, exhibition by production platform Movement for Public Speech (Prostorož): Murmuring Orchids. November 2024. Museum of Architecture and Design / Centre for Creativity, Ljubljana. Photo: Lucija Rosc.

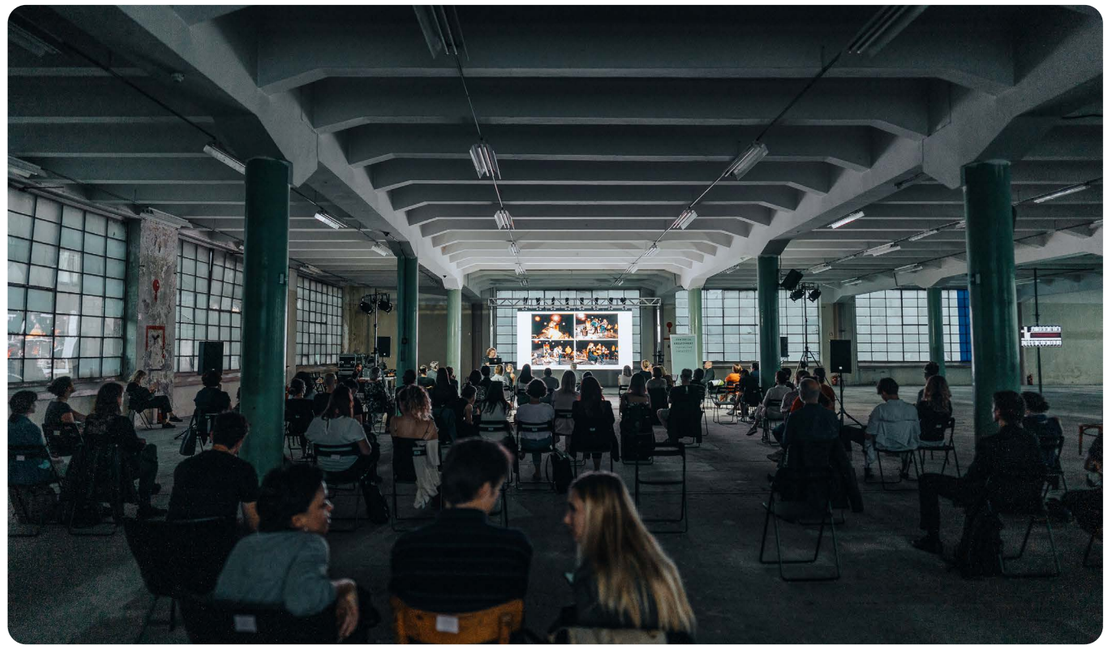


Image 8 Conference Art and the City, International Triennial of Art and Environment EKO 8, Maribor 2020. Photo: Sara Rezar.

Image 9 Exhibition Created in Slovenia, Ljubljana 2022. Photo: Klemen Ilovar.

10 years in the future

Ecosystemic thinking sees design as part of a broader, interconnected and interdependent system. Advanced Distributed Design programmes will emphasize the importance of networks, solidarity, shared resources, and the collective impact of design on society. While we are not creatives, makers, or designers ourselves, but rather their support network, we remain committed to amplifying Slovenia's presence on the global creative map by fostering partnerships and promoting cross-disciplinary projects not only within cultural and creative sectors but also across wider national and European innovative ecosystems. Our entire mission continues to be guided by our everyday working guidelines: engage, support, promote. We aim to remain a crucial connector between both Slovenian and international designers, makers, and industry stakeholders, driving forward-thinking solutions and shared knowledge for societal challenges.

How does our organisation's work contribute to fostering creative ecosystems at the local level?

Before open access to fabrication—both digital and traditional—was virtually non-existent in Hungary. As a grassroots initiative, we opened this door, providing opportunities for students and young entrepreneurs that were previously unavailable. Our impact extends beyond technology: we are working for a local ecosystem that connects traditional craftship with modern innovation, nurturing creativity and collaboration across disciplines. We are proud of on our:

Talent Nurturing through Woven Futures: This program introduces textile, jewellery, and ceramic designers to digital design and manufacturing technologies. By combining theoretical and practical training, it empowers participants to create at the intersection of technology, art, and design. The program imparts new knowledge and supports design-driven research, fostering innovative practices that we continue to integrate into our educational activities.

University Ambassador Program: Through this initiative, we equip university students with the skills to design for fabrication and use prototyping tools effectively. In turn, they contribute by building communities within their faculties, fostering a culture of creativity and shared learning. To onboard participants, we utilise the pool of our Distributed Design talent projects.

JetClay Collaboration: Since 2022 we are actively working to establish a local clay 3D printing hub based on all the principles of Distributed Design. This initiative not only promotes sustainable making practices but also aims to create an active community around clay 3D printing. Building on Hungary's rich heritage of ceramics, we bridge traditional craftship with modern technologies.

How do we expand the reach of our local community's work and foster glocal connections?

Through the Platform, our talents, and even us, have participated in international exchanges and engaged in activities such as the Circular Cities Challenge, where they ideated and prototyped circular design strategies. This engagement has been invaluable for fostering innovation, providing young designers with opportunities to learn from the Platform's activities while showcasing their work to a wider audience.

By sharing cool practices, including open-source projects like JetClay developed in Budapest, our work has been adopted and adapted by designers. This exchange has enriched not only our local ecosystem but also the broader Distributed Design community. Collaborations with international members have introduced new practices and expertise to Budapest, while also providing a platform to present local talent and traditions on a European stage.

How has our organisation's approach evolved over the years?

Being part of the Platform has significantly enhanced our Lab's visibility, elevating us to become a more established and recognised fabrication lab. It has amplified our voice, enabling us to position Hungary as a hub for design innovation and strengthening both our local and European impact. The Platform has been instrumental in helping us build partnerships within and beyond the project framework. It inspired us to ignite new and remix existing ideas, fostering creativity and collaboration.

How do the values of Distributed Design—openness, collaboration, regeneration, and ecosystemic thinking—shape the way we work?

We gained not only a vision but also a partnership and a toolkit that we have integrated into nearly all our activities. This collaboration has provided the "Ignition to Reshape" our lab's approach, fostering a deeper commitment to the values of openness, collaboration, regeneration, and ecosystemic thinking. We have not only reshaped our practices but also reinforced our identity as a lab committed to these values, making our work more impactful and aligned with local efforts to address pressing social and environmental challenges.

Find out more about Fab Lab Budapest

Mainly all our own projects share these values, embedding them promptly into our talent nurturing and our educational activities. These principles have also guided us in launching new services, such as setting up new labs and running a makerspace at a university of economics, where we represent and promote these core values. These initiatives not only align with the Distributed Design ethos but also ensure our sustainability, enabling us to thrive as an independent and private initiative. By integrating these values into both our projects and new services, we continue to reshape our Lab.

Image 2 Talents of 2020 Open Call (2020, Budapest, Dávid PAP)

If we could revisit the start of our Distributed Design journey...

We would tell ourselves to start with openness and embrace experimentation. The journey has taught us the value of sharing—both successes and failures—and the importance of global collaboration in solving local challenges. We've learned to never underestimate the potential of combining traditional knowledge with emerging technologies. We would also encourage ourselves to prioritise more shared fabrication activities with Platform members to strengthen connections and foster mutual learning. Additionally, we would focus more on space transformation projects and emphasise collective activities over individual ones to create more impactful and inclusive outcomes.

Image 3 JetClay workshop in 2022 (2022, Budapest, Dávid PAP)

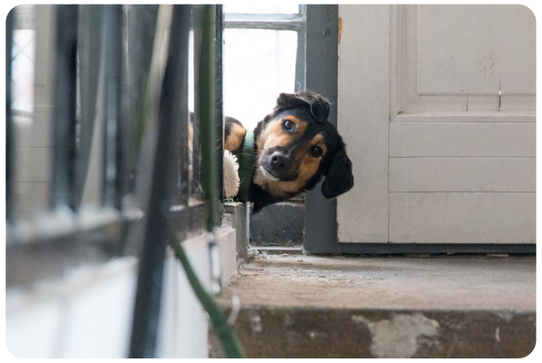


Image 4 Head of Security at FabLab Budapest (2022, Budapest, Dávid PAP)

Image 6 reCOVER - 3D printed orthosis for distributed manufacturing (2022, Budapest, Dávid PAP)

Image 5 Asya ILGUN enjoys her Distributed Design Mobility Scheme (2022, Budapest, Dávid PAP)

QR 1
Beloved 2020 Bootcamp project.

QR 2
BP GANG space transformation.

QR 3
Red Dot Meets Open-Source.

Image 6 Our very first Distributed Design project is the stool of Gergő CSICSICS (2019, Budapest, Milán RÁCMOLNÁR)

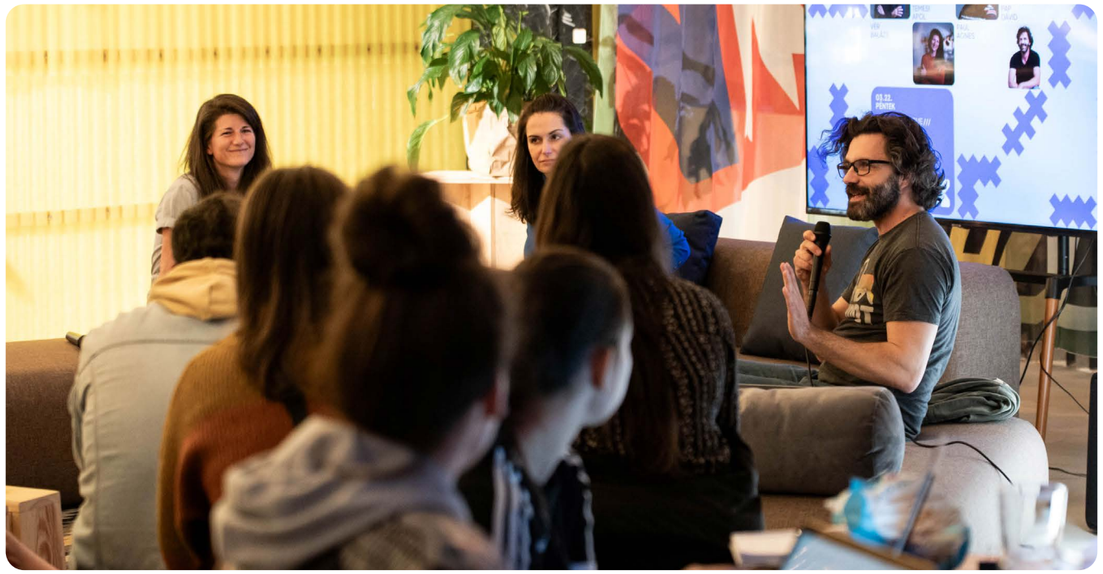


Image 7 Design Dialogue vol. 3 (2024, Budapest, András ZOMBORI)

Image 8 Platform members in front of FabLab Budapest (2019, Budapest, Anita BOLDOG)

10 years in the future today

In 10 years, we envision the field of Distributed Design as a more integrated and essential part of global and local innovation ecosystems. FabLab Budapest will remain a kind and welcoming space, a home for learning and knowledge sharing. We see ourselves as a hub for sustainable fabrication, where people come to learn not only when and how things should be made, but also when they shouldn't.

Our role will be to uphold the core values of Distributed Design, while taking a significant step towards becoming an international hub for understanding traditional technologies. We aim to provide a framework for blending these age-old techniques with digital tools, fostering innovation that respects heritage while embracing the future. In this way, we hope to inspire and support the next generation of makers and designers to create meaningful, sustainable, and thoughtful.

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This edition, our processes, and curation has been inspired by so many folx within and beyond our network.

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To our incredible community of member organisations and Creative Talents, for the beautiful network of support and practice that we have co-created over the years. Distributed Design is our utopia—not in the sense of an unreachable ideal, but as a space for possibility and opportunities. It is not perfect, nor is it meant to be; it is a work in progress, a living practice. We hope to continue to thrive locally and interconnect globally together for many years to come.

And, finally, to our contributors throughout the years. Your commitment to openly sharing your visions and approaches is essential to the many facets of redistribution. Each of you have demonstrated how embodying diverse practices, voices, and perspectives empower resilient ecosystems of creativity. This plurality fearlessly challenges the status quo, drawing attention to the change making potential of Distributed Design. Collaborating with you has been an honor.

With immense gratitude, thank you all for your spirit, your dedication to your craft and communities.

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CHAPTER 1
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By Grecia Bello Segovia, Ruddel Callisaya & Edwin Yuco from Fab Lab Barcelona, FabLab Santa Cruz, Unifranz

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By Antonio de Jesus Anaya Hernandez, Internet of Production and National Online Open University of Mexico

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By Ren Loren Britton

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MEMBERS’ BOOKLET

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By Massimo Bianchini from Polifactory, Department of Design - Politecnico di Milano

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Design is intrinsic to our daily lives. It surrounds us—in the products we use daily, from phones and watches to chairs and cars, to the streets and built environments we inhabit. Yet much of this design operates within a linear, extractive industrial modus operandi, which the Distributed Design community actively challenges. Through tangible examples, knowledge, and practices that demonstrate alternative ways of embodying design, we not only critique the status quo but call to action.

Driving Design is the seventh publication from the Distributed Design Platform. Established in 2017 and co-funded by the European Union, the Distributed Design Platform brings together Fab Labs, Makerspaces, cultural organizations, universities, and design centers from around the globe. This publication is a non-exhaustive anthology, a living archive, that supports the continuous evolution-- both present and future-- of Distributed Design.

From photo essays and manifestos to conversations and zines, contributors explore, question, and reclaim the systems that shape our world(s). This year our community shares their research and practices through the lens of the (re)distribution of making, knowledge, value, and power. Journey with us and explore how design is being reimagined, reconfigured, and redistributed.

Distributed Design

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