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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.

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.

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

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

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).

References

INTRODUCTION

By the Driving Design Editorial Team: Jessican Guy, Julia Bertolaso, & Sally Bourdon (Fab Lab Barcelona at IAAC)

(P.5)

1. Acaroglu, Leyla. (2020). The Mushroom Model. In Design Systems Change Handbook. UnSchool. Retrieved from https://online.unschools.co/courses/design-systems-change-digital-handbook.
2. Raworth, Kate. (2021). Doughnut economics: Seven ways to think like a 21st century economist. Chelsea Green Publishing.
3. Hunter, Nat., Lloyd, Gareth Owen, & Tooze, James. (2023). Systemic Objects: How the Materiality of Distributed Design Can Enhance Systemic Design. In Driving Design (Vol. 1, pp. 18–21). essay, Fab Lab Barcelona. Retrieved from https://distributeddesign.eu/driving-design-volume-i/.

CHAPTER 1
The Redistribution of Making

Building an Open-Source Initiative Layer by Layer

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

(P.10)

1. Karim ASRY, 2019, How to create an open source community around 3D printing with ceramics

From Distributed Design to Distributed Production

By Rebecca Matthew & Jessica Nguema, Internet of Production Alliance

(P.16)

1. Developing Data for an Open Internet of Production, page 90
2. Hernandez, A. de J. A. (2024). Map of Machinery (REV 3.0). Internet of Production. Available at: https://map.internetofproduction.org/ (Accessed: 16 January 2025).
3. Internet of Production. (n.d.). Open Know-Where. Internet of Production. Available at: https://www.internetofproduction.org/openknowwhere (Accessed: 16 January 2025).
4. Hutton, Sarah. (n.d.). People and Skills Specification (PSS). Internet of Production. Available at: https://www.internetofproduction.org/people-and-skills (Accessed: 16 January 2025).

Jugaad – South Asian Practice of Making

By Huzefah Haroon

(P.22)

1. Think with Google. (n.d.). Jugaad Innovation: How to Disrupt-it-Yourself. [online] Available at: https:// www.thinkwithgo-ogle.com/future-of marketing/management-and-culture/jugaad-innovation

New Design Craft

By Elia Maniscalco

(P.28)

1. Papanek, Viktor. 1984. Design for the Real World (3rd ed.) (2019). London: Thames & Hudson.
2. Monteiro, Mike. 2020. Ruined by Design. San Francisco: Blurb, Incorporated.
3. Fry, A., Goretti, G., Ladhib, S., Cianfanelli, E., & Carol, O. 2019. "Advanced craft" integrated with the saper fare; the role of intangible value, and the centrality of the artisan in high quality 21st century artisa. In Cuadernos Del Centro de Estudios de Diseño y Comunicación, 64. https://doi.org/10.18682/cdc.vi64.1217
4. Izidio, L. L., Cruz, B. D. O., Couto, R. M., Novaes, L., & Farbiarz, J. L. 2018. Design and handicrafts: The importance of interdisciplinarity in collaborative design practice. In Strategic Design Research Journal, 11(1), 9–14. https://doi.org/10.4013/sdrj.2018.111.02
5. Maniscalco, Elia. 2024. Design as a mediator of languages and activator of virtuous processes. In D. Haslrcl, T. Dogu, D. Avci-Hosanli, G. D. Turhan Haskara, A. R. Bayrak (Eds.), DSS 2024: Design Dialogues, 31 May 2024, Izmir University of Economics. izmir Ekonomi Oniversitesi Yay1nlar1. e-ISBN: 978-625-6001-04-6.
6. Mainsah, H., & Morrison, A. 2014. Participatory design through a cultural lens: insights from postcolonial theory. In Proceedings of the 13th Participatory Design Conference: Short Papers, Industry Cases, Workshop Descriptions, Doctoral Consortium Papers, and Keynote Abstracts - Volume 2, 83–86. https://doi.org/10.1145/2662155.2662195
7. Bistagnino, Luigi. 2008. Design for a new humanism. In Man at the Centre of the Project, edited by Germak C., 9-18. Torino: Allemandi & C.
8. Costanza-Chock, Sasha. 2020. Design Justice: Community-Led Practices to Build the Worlds We Need. Cambridge, MA: MIT Press.
9. Escobar, Arturo. 2018. Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds. Durham: Duke University Press.
10. Bovo, Tommaso. 2022. Design Liquido. Firenze: Forma ed.
11. Lorusso, Silvio. 2023. What Design can't Do: essays on Design and Disillusion. Eindhoven: Set Margins.
12. Carey, Hillary. 2020. Anti-Oppression Mindsets for Collaborative Design.In Design Research Society Conference 2020. https://doi.org/10.21606/drs.2020.277
13. Noel, Lesley-Ann. 2023. Design Social Change: Take Action, Work toward Equity, and Challenge the Status Quo. Berkeley: Clarkson Potter/Ten Speed.
14. Wise, Susie. 2022. Design for Belonging: How to Build Inclusion and Collaboration in Your Communities. Berkeley: Clarkson Potter/Ten Speed.
15. Small, Andrea, & Schmutte, Kelly. 2022. Navigating Ambiguity: Creating Opportunity in a World of Unknowns. Berkeley: Clarkson Potter/Ten Speed.
16. Assembly, U. N. G. 2015. Transforming our World: The 2030 Agenda for Sustainable Development. Retrieved from United Nations General Assembly: https://sdgs.un.org/goals.

Arakuaa Machine That Converts Plastic Bottles Into Textile Fibers

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

(P.40)

1. Villalta, H. (2016). Thesis in. Anthropology. Rol del sabio indígena en la. UNIBOL Guaraní y Pueblos de Tierras Bajas.
2. Haydee Villalta Rojas, H. A. (2020, 2 10). Scielo. Retrieved from Textil Isoseño: http://www.scielo.org.bo/scielo.php?script=sci_arttext&pid=S2306-86712020000200006

Kalotrofa

By Giannis Zgeras, Hara Kouki, Sofia Nikolaidou, Theodosia Anthopoulou

(P.46)

1. De Angelis, Massimo. 2017. Omnia sunt communia: On the commons and the transformation to postcapitalism. Bloomsbury Publishing.
2. Stavrides, Stavros. 2016. Common space: The city as commons. Zed Books.
3. Varvarousis, Angelos and Giorgos Kallis. 2017. Commoning against the crisis. In Another Economy is Possible. Culture and Economy in a Time of Crisis, eds. Castells, Manuel et al.,128-159. London: Polity.
4. Rushton Elizabeth, Lynda Dunlop, Lucy Atkinson, Laura Price, Joshua E. Stubbs, Maria Turkenburg-van Diepen and Lucy Wood. 2023. The challenges and affordances of online participatory workshops in the context of young people's everyday climate crisis activism: insights from facilitators. Children's Geographies 21(1): 137-146.
5. Zgeras, G., 2022. Game Design Machine. In: P. Di Monte and V. Lenna, ed., Tools for the Generative Commons. Saint Gilles: Generative Commons House.

Shaping Future Agriculture Through Digital Innovation

By Matteo Mojoli, Lorenzo Silvestri, Valentino Stella

(P.52)

1. Benton, T. G., Bieg, C., Harwatt, H., Pudasaini, R., & Wellesley, L. (2021). Food system impacts on biodiversity loss. Three levers for food system transformation in support of nature. Chatham House, London, 02-03.
2. United Nations. (n.d.). Population. United Nations. Retrieved December 11, 2024, from www.un.org/en/global-issues/population
3. Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, United Nations Children's Fund, World Food Programme, & World Health Organization. (2018). The state of food security and nutrition in the world 2018: Building climate resilience for food security and nutrition. FAO. openknowledge.fao.org/server/api/core/bitstreams/f5019ab4-0f6a-47e8-85b9-15473c012d6a/content
4. Drinkwater, L. E., & Snapp, S. (2007). Nutrients in agroecosystems: rethinking the management paradigm. Advances in agronomy, 92, 163-186.
5. Goulding, K., Jarvis, S., & Whitmore, A. (2008). Optimizing nutrient management for farm systems. Philosophical Transactions of the Royal Society B: Biological Sciences, 363(1491), 667-680.
6. Savary, S. (2014). The roots of crop health: cropping practices and disease management. Food Security, 6, 819-831.
7. Tilman, D., Fargione, J., Wolff, B., D'antonio, C., Dobson, A., Howarth, R., ... & Swackhamer, D. (2001). Forecasting agriculturally driven global environmental change. science, 292(5515), 281-284.
8. Green, R. E., Cornell, S. J., Scharlemann, J. P., & Balmford, A. (2005). Farmingand the fate of wild nature. science, 307(5709), 550-555.
9. Gomiero, T., Pimentel, D., & Paoletti, M. G. (2011). Is there a need for a more sustainable agriculture?. Critical reviews in plant sciences, 30(1-2), 6-23.
10. Therond, O., Duru, M., Roger-Estrade, J., & Richard, G. (2017). A new analytical framework of farming system and agriculture model diversities. A review. Agronomy for sustainable development, 37, 1-24.
11. Hall, A., Dijkman, J., & Ringrose, S. (2023). What does the agri-food systems transformation agenda mean for agricultural research organisations? Exploring organisational prototypes for uncertain futures. Global Food Security, 36, Article 100678. doi.org/10.1016/j.gfs.2023.100678
12. BCG. (2022). Net zero: The future of agriculture. Boston, Massachusetts, Boston Consulting Group. https://www.bcg.com/en-cn/publications/2022/the-net-zero-path-of-agriculture
13. Institute for Agriculture and Trade Policy. (n.d.). Growing a community food system. Retrieved December 12, 2024, from www.iatp.org/sites/default/files/Growing_a_Community_Food_System.htm
14. Goh, L. (2022). How AgriTech Is Transforming Traditional Agriculture in Emerging Markets. Breakthrough: The Promise of Frontier Technologies for Sustainable Development, 125.
15. McKinsey. (2020). Agriculture's connected future: How technology can yield new growth. McKinsey and Company.
16. Kudyba, S., & Kudyba, S. (2014). Big data, mining, and analytics. Boca Raton: Auerbach Publications.
17. De Clercq, M., Vats, A., & Biel, A. (2018). Agriculture 4.0: The future of farming technology. Proceedings of the World Government Summit, Dubai, UAE, 11-13.
18. U.S. Department of Defense. "Unmanned Vehicles". 2015. In the Department of Defense Dictionary of Military and Associated Terms, edited by Joint Chiefs of Staff, 1-2. Washington, D.C
19. European Union Aviation Safety Agency EASA. 2019. "paragraph 30 of Article 3 of Regulation (EU) 1139/2018 / Article 2(1) of EU regulation 2019/947 and article 3(3) of EU regulation 2019/945" EASA.
20. LeMieux, Jerry. 2016. Introduction to Unmanned Aircraft Systems. Boca Raton, FL: CRC Press, pp. 4-5.
21. Chen, J., Sun, J., & Wang, G. (2022). From Unmanned Systems to Autonomous Intelligent Systems. Engineering, 12, 16-19.
22. Schimmelpfennig, D. (2016). Farm profits and adoption of precision agriculture (No. 1477-2016-121190).
23. Liu, J., Xiang, J., Jin, Y., Liu, R., Yan, J., & Wang, L. (2021). Boost precision agriculture with unmanned aerial vehicle remote sensing and edge intelligence: A survey. Remote Sensing, 13(21), 4387.

24. Goodrich M., Schultz A., 2008. "Human-robot interaction: A survey", Found. Trends Human Comput. Interaction, vol. 1, pp. 203-275.
25. Baytas, M. A., Çay, D., Zhang, Y., Obaid, M., Yantaç, A. E., & Fjeld, M. 2019. The design of social drones: A review of studies on autonomous flyers in inhabited environments. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (pp. 1-13).
26. Cauchard J. R., Jane L. E., Zhai K., Landay J. A., 2015. Drone & Me: An Exploration into Natural Human-drone Interaction. In Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp '15). ACM, New York, NY, USA, 361–365.
27. Duru, M., Therond, O., Roger-Estrade, J., & Richard, G. (2016). Agriculture models at the crossroads of farming systems, food systems and territorial dynamics. In 12. European IFSA Symposium: Social and technological transformation of farming systems: Diverging and converging pathways.
28. Biggs, R., Schlüter, M., Biggs, D., Bohensky, E. L., BurnSilver, S., Cundill, G., ... & West, P. C. (2012). Toward principles for enhancing the resilience of ecosystem services. Annual review of environment and resources, 37, 421-448.
29. Letourneau, D. K., Armbrecht, I., Rivera, B. S., Lerma, J. M., Carmona, E. J., Daza, M. C., ... & Trujillo, A. R. (2011). Does plant diversity benefit agroecosystems? A synthetic review. Ecological applications, 21(1), 9-21.
30. Ratnadass, A., Fernandes, P., & Avelino, J. R. Habib.(2011). Plant species diversity for sustainable management of crop pests and diseases in agroecosystems: a review. Agronomy Sust. Developm. INRA.
31. Tscharntke, T., Klein, A. M., Kruess, A., Steffan-Dewenter, I., & Thies, C. (2005). Landscape perspectives on agricultural intensification and biodiversity-ecosystem service management. Ecology letters, 8(8), 857-874.
32. Müller, F., Hoffmann-Kroll, R., & Wiggering, H. (2000). Indicating ecosystem integrity—theoretical concepts and environmental requirements. Ecological modelling, 130(1-3), 13-23.
33. Wiskerke, J. S. C., (2015), 'Urban food systems', Cities and agriculture: developing resilient urban food systems, 1st edn, New York, NY, Routledge, 1-25.
34. Edmondson, J. L., Cunningham, H., Densley Tingley, D. O., Dobson, M. C., Grafius, D. R., Leake, J. R., ... & Cameron, D. D. (2020). The hidden potential of urban horticulture. Nature food, 1(3), 155-159.
35. Lin, B. B., Philpott, S. M., & Jha, S. (2015). The future of urban agriculture and biodiversity-ecosystem services: Challenges and next steps. Basic and applied ecology, 16(3), 189-201.
36. Säumel, I., Kotsyuk, I., Hölscher, M., Lenkereit, C., Weber, F., & Kowarik, I. (2012). How healthy is urban horticulture in high traffic areas? Trace metal concentrations in vegetable crops from plantings within inner city neighbourhoods in Berlin, Germany. Environmental Pollution, 165, 124-132. https://doi.org/10.1016/j.envpol.2012.02.019

Critical Access Primer

By Aimi Hamraie & Paul DeFazio, Vanderbilt University

(P.62)

1. Mingus, Mia. (2012, August 9). Reflections on an opening: Disability Justice and creating collective access in Detroit. Leaving Evidence. https://leavingevidence.wordpress.com/2010/08/23/reflections-on-an-opening-disability-justice-and-creating-collective-access-in-detroit/
2. Jackson, Liz. (2022, April 19). A community response to a #disabilitydongle. Medium. https://eejackson.medium.com/a-community-response-to-a-disabilitydongle-d0a37703d7c2
3. Konrad, Annika M. (2021). Access fatigue: The rhetorical work of disability in Everyday Life. College English, 83(3), 179–199. https://doi.org/10.58680/ce202131093
4. U.S. Department of Justice, Civil Rights Division. (2024, December 19). Introduction to the Americans with disabilities act. ADA.gov. https://www.ada.gov/topics/intro-to-ada/

CHAPTER 2
The Redistribution of Knowledge

Growing Sideways

By Réka Sára Mezei; Aalto University, Aalborg University

(P.68)

1. McArdle, Andrea. 1977. Tomorrow.
2. Hay, Audun Formo. Vink, Josina. Suoheimo, Mari. 2023, "The Context of Addressing Power Dynamics in Service Design," Service Design and Innovation Conference, 639–62. https://doi.org/10.3384/ecp203033.
3. Tronto, Joan. 1998. "An Ethic of Care," Generations (San Francisco, Calif.) 22, no. 3 (1998): 15–20.
4. Distributed Design Platform, ed. 2024. Driving Design. Barcelona: Fab Lab Barcelona. https://drive.google.com/file/d/1Fn0lI3spLcQ6d3MdjzsI3H1SaOcS04O1/view?usp=sharing&usp=embed_facebook.
5. Haraway, Donna J. 2016. Staying with the Trouble: Making Kin in the Chthulucene, Experimental Futures: Technological Lives, Scientific Arts, Anthropological Voices. Durham, NC: Duke University Press, p. 1.
6. Halberstam, Judith. 2011. The Queer Art of Failure. London: Duke University Press. p. 4.
7. Edelman, Lee. 2004. No Future: Queer Theory and the Death Drive, ed. Barale, Michèle Aina et al. New York: Duke University Press.
8. Johnston, Adrian. 2024. "Jacques Lacan," in The Stanford Encyclopedia of Philosophy, ed. N. Zalta, Edward and Nodelman, Uri. https://plato.stanford.edu/archives/sum2024/entries/lacan/.
9. Edelman, Lee. 2022. Bad Education: Why Queer Theory Teaches Us Nothing. Duke University Press. P. 23.
10. Halberstam. The Queer Art of Failure. p. 4.
11. Balskus, Elizabeth. 2010. Examining potentiality in the philosophy of Giorgio Agamben. Macalester Journal of Philosophy.
12. Wunker, Erin. 2016. Notes from a Feminist Killjoy: Essays on everyday life. Toronto: BookThug.
13. Kovács, János. 1930. "Az Ötven Éves Iparművészeti Iskola [The Fifty-Year-Old School of Applied Arts]," in Yearbook of the National Hungarian Royal School of Applied Arts 1880-1930, ed. Helbing, Ferenc E. I. Budapest.
14. Gróh, István. 1899. Az Országos Magyar Királyi Iparművészeti Iskola Története [The History of the National Hungarian Royal School of Applied Arts] (Budapest: Pátria Irodalmi Vállalat és Nyomdai Részvénytársaság. p. 1. Own translation.
15. Szablya-Frischauf, Ferenc. 1941. Az Országos Magyar Királyi Iparművészeti Iskola Évkönyve 1880-1941. Budapest. p. 5
16. Szablya-Frischauf, Ferenc. 1941. Az Országos Magyar Királyi Iparművészeti Iskola Évkönyve 1880-1941. Budapest.
17. Csaba, Rezső. Juhász, László. Szücs, Pál. 1977. Új magyar iparművészet felé: Mi az iparművész kulturális és társadalmi hivatása? [Towards a new Hungarian applied art: What is the cultural and social vocation of the applied artist?]. ArsHungaica.
18. Bundev-Todorov, Ilona. 1979. Magyar Iparművészeti Főiskola története 1945-1973 [History of the Hungarian College of Applied Arts 1945-1973]. ArsHungaica. p. 104; own translation.
19. Csaba, Rezső. Juhász, László. Szücs, Pál. 1977. "Új magyar iparművészet felé: Mi az iparművész kulturális és társadalmi hivatása? [Towards a new Hungarian applied art: What is the cultural and social vocation of the applied artist?]," ArsHungaica. pp. 164-165.
20. Bundev-Todorov, Ilona. 1979. Magyar Iparművészeti Főiskola története 1945-1973 [History of the Hungarian College of Applied Arts 1945-1973]. ArsHungaica. p. 108; own translation.
21. "Magyar Iparművészeti Főiskola - értekezletek, 1957-1958 [Hungarian College of Applied Arts - teacher meetings, 1957-1958"]" (Hungaricana Library, June 30, 1958)., p. 6. https://library.hungaricana.hu/hu/view/MOME_IPMUV_1957-1958/?pg=5&layout=s; own translation.
22. Bundev-Todorov, Ilona. 1979. Magyar Iparművészeti Főiskola története 1945-1973 [History of the Hungarian College of Applied Arts 1945-1973]. ArsHungaica. p. 112; own translation.
23. Bundev-Todorov, p. 114; own translation.
24. Pogány, Frigyes. 1971. Magyar Iparművészeti Főiskola 1971. Budapest: Pallas Irodalmi és Nyomdai Rt. pp. 6–7; own translation.
25. Palotai, János. 2006. A Név Kötelez - Kopek Gáborral, a Moholy-Nagy Mûvészeti Egyetem Rektorával Beszélget Palotai János [The Name Is Binding - János Palotai Talks to Gábor Kopek, the Rector of the Moholy-Nagy University of Arts]. https://balkon.art/1998-2007/2006/2006_9/11moholy.html; own translation.
26. Helbing, Ferenc E. I. 1930. Az Országos Magyar Királyi Iparművészeti Iskola Évkönyve 1880-1930. p. 5,
27. Bundev-Todorov. 1979. A Magyar Iparművészeti Főiskola története 1945-1973 [History of the Hungarian College of Applied Arts 1945-1973]. p. 113; own translation.
28. Halberstam, The Queer Art of Failure.
29. Haraway, Staying with the Trouble.

The Green Finger Initiative

By Tanushree Kedia, Nazli Terzioglu

(P.84)

1. Böhm, S., Spierenburg, M., & Lang, T.. 2020. Fruits of our labour: Work and organisation in the global food system. Exeter: Organization.
2. Dimbleby, Henry. 2021.The National Food Strategy: The Plan. London: The Independent.

Developing Data for an Open Internet of Production

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

(P.90)

1. mAkE – African European Maker Innovation Ecosystem. 2022. Retrieved from https://makeafricaeu.org/
2. European Commission. 2014. Horizon 2020: The EU Framework Programme for Research and Innovation. Brussels: European Commission.
3. Creative Commons. 2013. Creative Commons Attribution 4.0 International Public License. Mountain View: Creative Commons.
4. Harley, J. B., & Woodward, D. 1987. The History of Cartography, Volume 1: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean. Chicago: University of Chicago Press.
5. Snyder, J. P. 1987. Map Projections—A Working Manual. Washington, D.C.: U.S. Geological Survey.
6. Groover, M. P. 2015. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems. Hoboken: Wiley.
7. Fab Academy. 2024. About Fab Academy. Retrieved from https://fabacademy.org/about/
8. Deibert, Ronald J., Palfrey, John G., Rohozinski, Rafal, and Zittrain, Jonathan. 2008. Access Denied: The Practice and Policy of Global Internet Filtering. Cambridge: MIT Press.
9. Dougherty, Dale. 2012. The Maker Movement. Sebastopol: Maker Media.
10. OECD. 2000. Small and Medium-sized Enterprises: Local Strength, Global Reach. Paris: Organisation for Economic Co-operation and Development.
11. Wikifactory. 2024. Wikifactory: The Internet of Production Platform. Retrieved from https://wikifactory.com.
12. Shapeways. 2024. Shapeways: 3D Printing Service and Marketplace. Retrieved from https://www.shapeways.com.
13. SeekMake. 2024. SeekMake: CNC and 3D Printing Services. Retrieved from https://seekmake.com.
14. Xometry. 2024. Xometry: Manufacturing on Demand Platform. Retrieved from https://www.xometry.com.
15. Kitchin, Rob. 2014. The Data Revolution: Big Data, Open Data, Data Infrastructures and Their Consequences. London: SAGE Publications.
16. FabLab Network. 2024. About the FabLab Network. Retrieved from https://www.fablabs.io.
17. Make Works. 2024. Make Works: Find Local Manufacturers, Material Suppliers and Workshops. Retrieved from https://make.works.
18. Makezine Makerspaces. 2024. Make: Makerspaces - Inspiring a DIY Revolution. Retrieved from https://makezine.com/makerspaces.
19. Pearce, Joshua M. 2020. Distributed Manufacturing of Open Source Medical Hardware for Pandemics. Rapid Prototyping Journal, 26(8), 1345–1352. London: Emerald Publishing. https://doi.org/10.1108/RPJ-06-2020-0138.
20. Upbeat Labs. 2024. Bay Area Makerspaces Upbeat Labs. Retrieved from https://upbeatlabs.com.
21. University of Michigan. 2024. 3DLab: Digital Fabrication Services. Ann Arbor: University of Michigan. Retrieved from https://3dlab.engin.umich.edu.
22. MakerTour. 2024. Mapping Makerspaces Around the World. Retrieved from https://makertour.fr.
23. FabLab Barcelona. 2024. FabLab Barcelona and Partners: Driving Digital Fabrication Innovation. Barcelona: IAAC. Retrieved from https://fablabbcn.org.
24. Offene Werkstätten. 2024. Offene Werkstätten: Germany's Open Workshops Network. Retrieved from https://www.offene-werkstaetten.de.
25. UC Berkeley. 2024. Bay Area Makerspaces UC Berkeley. Berkeley: University of California. Retrieved from https://makerspaces.berkeley.edu.
26. Hackerspaces.org. 2024. Hackerspaces: A Global Community of Creators. Retrieved from https://hackerspaces.org.
27. Makery. 2024. Makery: A Map of Labs Worldwide. Retrieved from https://www.makery.info/map-labs/.
28. Field Ready Inc. 2024. Field Ready: Making Aid Locally. Retrieved from https://www.fieldready.org.
29. Internet of Production Alliance. 2024. IoP Data Awards R1 & R2. Retrieved from https://internetofproduction.org/data-awards.
30. Internet of Production Alliance. 2024. IoP IMA: Inclusive Manufacturing Alliance. Retrieved from https://internetofproduction.org/ima.
31. sphere.diybio.org. 2024. sphere.diybio.org: A Global Network for DIY Biology. Retrieved from https://sphere.diybio.org.

32. Kluyver, T., Ragan-Kelley, B., Pérez, F., Granger, B., Bussonnier, M., Frederic, J., et al. 2016. Jupyter Notebooks – A Publishing Format for Reproducible Computational Workflows. In F. Loizides & B. Schmidt (Eds.), Positioning and Power in Academic Publishing: Players, Agents and Agendas. IOS Press.
33. Fielding, Roy T., and Taylor, Richard N. 2000. Principled Design of the Modern Web Architecture. ACM Transactions on Internet Technology, 2(2), 115–150. https://doi.org/10.1145/514183.514185.
34. Mitchell, Ryan. 2018. Web Scraping with Python: Collecting More Data from the Modern Web. Sebastopol: O'Reilly Media.
35. Longley, Paul A., Goodchild, Michael F., Maguire, David J., and Rhind, David W. 2015. Geographic Information Systems and Science. Hoboken: Wiley.
36. Google. 2008. KML Reference: Keyhole Markup Language. Mountain View: Google. Retrieved from https://developers.google.com/kml/documentation.
37. Leaflet.JS. 2024. Leaflet: An Open-Source JavaScript Library for Interactive Maps. Retrieved from https://leafletjs.com.
38. Aggarwal, Charu C. 2016. Recommender Systems: The Textbook. Cham: Springer. https://doi.org/10.1007/978-3-319-29659-3.
39. Anaya, A. 2024. Map of Machinery. Zenodo.https://doi.org/10.5281/zenodo.14422306.
40. European Union. 2016. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data (General Data Protection Regulation). Official Journal of the European Union, L119, 1–88.
41. Wilkinson, Mark D., Dumontier, Michel, Aalbersberg, IJsbrand J., et al. 2016. The FAIR Guiding Principles for Scientific Data Management and Stewardship. Scientific Data, 3, 160018. https://doi.org/10.1038/sdata.2016.18.
42. Aggarwal, Charu C. 2016. Recommender Systems: The Textbook. Cham: Springer. https://doi.org/10.1007/978-3-319-29659-3.
43. Kimball, Ralph, and Caserta, Joe. 2004. The Data Warehouse ETL Toolkit: Practical Techniques for Extracting, Cleaning, Conforming, and Delivering Data. Hoboken: Wiley.
44. Chen, H., Chiang, R. H. L., and Storey, V. C. 2012. Business Intelligence and Analytics: From Big Data to Big Impact. MIS Quarterly, 36(4), 1165–1188. https://doi.org/10.2307/41703503.
45. Netflix Technology Blog. 2019. Introducing Metaflow: A Human-Centric Framework for Data Science Workflows. Retrieved from https://metaflow.org.
46. Van Rossum, Guido, and Drake, Fred L. 2009. Python 3 Reference Manual. Scotts Valley: CreateSpace.
47. McKinney, Wes. 2017. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython. Sebastopol: O'Reilly Media.
48. Eastlake, Donald, and Jones, Paul. 2001. US Secure Hash Algorithm 1 (SHA1). Request for Comments (RFC) 3174. Internet Engineering Task Force. https://doi.org/10.17487/RFC3174.
49. Gada, Darshan. 2024. Countries, States, and Cities Database. Retrieved from https://github.com/dr5hn/countries-states-cities-database.
50. MacQueen, James. 1967. Some Methods for Classification and Analysis of Multivariate Observations. Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, Volume 1, 281–297. Berkeley: University of California Press.
51. Cover, Thomas M., and Hart, Peter E. 1967. Nearest Neighbor Pattern Classification. IEEE Transactions on Information Theory, 13(1), 21–27. https://doi.org/10.1109/TIT.1967.1053964.
52. Ham, David, and Google. 2012. OpenRefine: A Free, Open Source Tool for Cleaning and Transforming Data. Retrieved from https://openrefine.org.
53. Euro-IX. 2024. The Internet Exchange Point Database (IXPDB). Retrieved from https://ixpdb.euro-ix.net/.
54. Massachusetts Institute of Technology. 2024. MIT Global Startup Labs. Cambridge: MIT. Retrieved from https://gsl.mit.edu.
55. MIT City Science Lab. 2020. Automated Hydroponic Systems Project. Cambridge: Massachusetts Institute of Technology. Retrieved from https://cityscience.mit.edu.
56. American Embassy in Mexico. 2018. STEM Education Programs in Mexico. Mexico City: U.S. Embassy. Retrieved from https://mx.usembassy.gov.
57. Hackaday. 2020. Dream Team Challenge 2020: Field Ready Dream team. Retrieved from https://hackaday.io.
58. Anaya, Antonio. 2021. MILQ. Retrieved from https://fabacademy.org/2021/labs/agrilab/students/antonio-anaya/projects/for_replication/.
59. U.S. Department of State. 2024. Professional Fellows Program. Washington, D.C.: U.S. Department of State. Retrieved from https://exchanges.state.gov.

Barduino

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

(P.102)

1. Fab Academy (n.d.). Fab Academy program webpage. https://Fab Academy.org/
2. Eduardo Chamorro (April 2020). SMPL documentation. https://gitlab.com/Fab Labbcn-projects/cnc-machines/six-pack-cnc
3. Fab Lab Barcelona (n.d.). MDEF program. https://Fab Labbcn.org/education/in-house-programs/master-in-design-for-emergent-futures

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

By Lars Petrova Taylor

(P.106)

1. Fab Academy (n.d.). Fab Academy program webpage. https://Fab Academy.org/
2. Eduardo Chamorro (April 2020). SMPL documentation. https://gitlab.com/Fab Labbcn-projects/cnc-machines/six-pack-cnc
3. Fab Lab Barcelona (n.d.). MDEF program. https://Fab Labbcn.org/education/in-house-programs/master-in-design-for-emergent-futures

The Other

By Carolina De Lara, Emma van Gerven

(P.112)

1. Wakkary, Ron. 2021. Things We Could Design: For More Than Human-Centered Worlds. Cambridge, MA: The MIT Press.
2. Myers, William and Antonelli, Paola. 2022. Bio-design: Nature + Science + Creativity. New York, NY: Thames and Hudson
3. Karana, E., Barati, B., & Giaccardi, E. 2020 Dec 31. Living Artefacts: Conceptualizing Livingness as a Material Quality in Everyday Artefacts. International Journal of Design [Online] 14:3. Available: https://www.ijdesign.org/index.php/IJDesign/article/view/3957
4. De Lara, Carolina. 2024. Bacterial Brickbats [Thesis] Borås, Sweden: The Swedish School of Design
5. De Lara, Carolina. 2024. Fermenting Knits. London, UK: Biocalibrated; Tools And Techniques For Biodesign Practices Symposium
6. Van Gerven, Emma. 2024. Inhabit [Thesis] Borås, Sweden: The Swedish School of Design
7. Arnardottir, Th ora, Dias, Jessica, Euale, Catherine and Campos, Lara. 2020. FUTURE WARDROBE: Living Symbiotic Wearables. Spain;United Kingdom: WORTH Partnership Projects I
8. Oxman, Neri. 2018. VESPERS III. London, UK: London Design Museum
9. Thatgamecompany. 2009. Flower. Sony Computer Entertainment
10. Hosoda, M. (Director). 2021. Belle (Ryuu to Sobakasu no hime) [Online access]. Studio Chizu.

Landscape of Possibilities

By Maialen Argoitia Paredes

(P.118)

1. Martín-Vide, J.P.. 2017. Restauración del río Besòs en Barcelona. Historia y lecciones. Ribagua, 2(1), pp. 51-60. https://www.tandfonline.com/doi/abs/10.1016/j.riba.2015.07.001
2. Duarte Poblete, S. S.; Romani, A. & Rognoli, V. 2024. Emerging materials for transitions: A taxonomy proposal from a design perspective. Sustainable Futures, volume 7. https://doi.org/10.1016/j.sftr.2024.100155

CHAPTER 3
The Redistribution of Values

If the Land Could Speak

By Mariana Quintero Vecchiato

(P.126)

1. Quintero Vecchiato, Mariana. 2011. Pensamiento Electrónico : El Dato Digital como Nueva Morfología del Conocimiento [Electronic Thinking: Digital Data as a New Morphology of Knowledge]. http://hdl.handle.net/10554/5715 Accessed 15 Dec 2024. Bogotá: Pontificia Universidad Javeriana.
2. Quintero Mariana., Tothill, Alejandra. 2023. Future(s) Design and Making Alternative presents.https://distributeddesign.eu/resources/mooc-new-and-emerging-digital-markets-for-creative-industries/ Accessed 15 Dec 2024. Barcelona: Distributed Design Platform
3. Diez, Tomas.,Tomico, Oscar. & Quintero, Mariana. 2020. Exploring Weak Signals to Design and Prototype for Emergent Futures. In: Temes de Disseny, No. 36, pp. 70–89, Barcelona: Elisava School of Design & Engineering.
4. Gershenfeld, Neil, Alan Gershenfeld, and Joel Cutcher-Gershenfeld. 2017. Designing Reality: How to Survive and Thrive in the Third Digital Revolution. New York: Basic Books.
5. Diez Ladera, Tomas,et al. 2018. Fab City: The Mass Distribution of (Almost) Everything. 2nd ed., Barcelona: -Institute for Advanced Architecture of Catalonia,.
6. Tomico, Oscar., Espelt, Guim., Quintero, Mariana., Tothill, Alejandra. & Guilemany, Roger., 2023. IO3: Design Futures Scouting. In A. Morrison (Ed.), Design Futures Literacies: Practices & Prospects (Vol. 1). Oslo: Oslo School of Architecture and Design.
7. Smith, Linda Tuhiwai. Decolonizing Methodologies: Research and Indigenous Peoples. Bloomsbury, 2012.

Resoap

By Samuele Mengarelli, Chiara Piazzolla, Leonardo Reguzzoni, Alice Salis, Nicolò Tosello

(P.160)

1. Núñez-Ríos, J.E., Aguilar-Gallegos, N., Sánchez-García, J.Y. and Cardoso-Castro, P.P. 2020, Systemic Design for Food Self-Sufficiency in Urban Areas. Zapopan: Guadalajara Universidad Panamericana
2. Setyawati, H., Anggorowati, D.A., Yunita, E., Angreani, F.N. and Fajriyatul, F. 2023, Making liquid dishwashing soap from used cooking oil with KOH and NaCl concentration variations using saponification process. Malang: Journal of Sustainable Technology and Applied Science (JSTAS). pp.29–35
3. O'Brien, Mandy, Ford, Dionna. 2014. Homemade Cleaners. Berkeley: Ulysses Press.
4. De Feo, G., Di Domenico, A., Ferrara, C., Abate, S. and Sesti Osseo, L. 2020. Evolution of Waste Cooking Oil Collection in an Area with Long-Standing Waste Management Problems. Salerno: Department of Industrial Engineering, University of Salerno
5. Greenfield, Adam. 2017. Radical Technologies - The Design of Everyday Life. London:Verso.

The Makerspace's Open Door: A Generator of Synergies and Commons

By Eleni Charcharidou, Maria Dimitriou-Tsaknaki

(P.166)

1. Kostakis Vasilis, Vasilis Niaros, and Chris Giotitsas. 2023. Beyond Global versus Local: Illu-minating a Cosmolocal Framework for Convivial Technology Development. Sustainability Science 18 (5): 2309-2322. https://doi.org/10.1007/s11625-023-01378-1.
2. Kotakis Vasilis, Lucas Lemos, and Asimina Kouvara. 2024. Another Scalability is Possible! From Nonscalability to Cos-molocal Scalability. tripleC 22 (2): 620-629. https://doi.org/10.31269/triplec.v22i2.1535
3. Wind Empowerment is a global network for the development of locally manufactured open source small wind turbines for sustainable rural electrification. (https://windempowerment.org/)
4. The project is supported by Re-Alliance and is developed within the School of the Earth Nea Guinea 'Energy for a Common Future' project, with the scientific support of the Rural Electrification Research Group (RurERG) of SmartRue - Smart Grids

Research Unit ECE NTUA and in collaboration with IEEE Greece Section SIGHT. (https://neaguinea.org/en/2024/03/26/wind-mobile/)
5. From a suffixed form of Arabic حَبِيب (ḥabīb, “beloved”), from the root ح ب ب (ḥ-b-b) relating to love.

CHAPTER 4
The Redistribution of Power

Speculative Archives

By Lesego Bantsheng and Siyabonga Njica, Rural Futurisms

(P.174)

1. Hartman, Saidiya. Wayward Lives, Beautiful Experiments : Intimate Histories of Riotous Black Girls, Troublesome Women, and Queer Radicals (New York: W. W. Norton & Company, 2020).
2. Hui, Yuk. “On Cosmotechnics: For a Renewed Relation between Technology and Nature in the Anthropocene.” Techne: Research in Philosophy & Technology 21 (2017).

Let’s Go Fly the Kite

By Violeta Tsenova, Heather Thomas, Jemily Rime, Fabrizio Galeazzi

(P.180)

1. Ferguson, D., 2024. Cambridge University urged to apologise over jailing of thousands of ‘evil’ women without evidence or trial. The Observer / The Guardian. [online] 7 Dec. Available at: <https://www.theguardian.com/society/2024/dec/07/cambridge-university-urged-to-apologise-over-jailing-of-thousands-of-evil-women-without-evidence-or-trial> [Accessed 9 December 2024].
2. Directorate-General for Education, Youth, Sport and Culture, ECORYS and Hammonds, W., 2023. Culture and democracy, the evidence: how citizens’ participation in cultural activities enhances civic engagement, democracy and social cohesion. [online] LU: Publications Office of the European Union. Available at: <https://data.europa.eu/doi/10.2766/39199> [Accessed 23 August 2023].
3. Ferguson, D., 2020. Beyond Cambridge’s colleges, UK’s most unequal city battles poverty. The Observer / The Guardian. [online] 12 Jan. Available at: <https://www.theguardian.com/uk-news/2020/jan/12/beyond-cambridge-spires-most-unequal-city-tackles-poverty> [Accessed 9 December 2024].
4. Huybrechts, L., Zuljevic, M., Devisch, O., Tassinari, V., Seravalli, A., Light, A., De Blust, S., Panagiotis, A., Bassetti, C., Bidwell, N., Teli, M., Storni, C., Avram, G., Marshall, M., Majetic, F. and Declerck, J., 2022. Reworlding: Participatory Design Capabilities to Tackle Socio-Environmental Challenges. In: Proceedings of the Participatory Design Conference 2022 - Volume 2. [online] Newcastle upon Tyne United Kingdom: ACM. pp.173–178. https://doi.org/10.1145/3537797.3537870.
5. Historic England, 2023. The Role of Heritage in Bringing People Together. [online] Available at: <https://historicengland.org.uk/research/heritage-counts/heritage-and-society/social-cohesion/> [Accessed 18 November 2024].

Designing Under Extreme Resource Constraints

By Mohammad Idrees Rasouli, Cambridge School of Art, Anglia Ruskin University, Cambridge, UK

(P.186)

1. Chapman, Jonathan. (2015). Emotionally Durable Design: Objects, Experiences and Empathy (2nd ed.). London: Routledge.
2. Schumacher, Ernst. (1973). Small Is Beautiful: Economics as If People Mattered. New York: Harper & Row.
3. Biggs, Che. Ryan, Chris. and Wiseman, John. (2010). Distributed Systems: A design model for sustainable and resilient infrastructure. Melbourne: University of Melbourne.
4. Manzini, Ezio. and Coad, Rachel. (2015). Design, When Everybody Designs: An Introduction to Design for Social Innovation. Boston: MIT Press.
5. World Bank Group. (2016). Poverty and Shared Prosperity: Taking on Inequality. Washington: World Bank.
6. Bhatia, Suni. and Priya, Kumar. (2018). Decolonising Culture: Euro-American Psychology and the Shaping of Neoliberal Selves in India. Theory & Psychology. Vol. 28, No 5, pp. 645-668.
7. Papanek, Victor. (1985). Design for the Real World (2nd edition). London: Thames and Hudson.
8. Collier, Paul. (2008). The Bottom Billion: Why the Poorest Countries Are Failing and What Can Be Done About It. Oxford: Oxford University Press.
9. Bhatti, Yasser. and Ventresca, Marc. (2013). How can ‘frugal innovation’ be conceptualised? Oxford: Said Business School Paper Series.
10. Norman, Don. (2013). The Design of Everyday Things (Revised and Expanded Edition). Massachusetts: MIT Press.
11. Nelson, Harold. and Stolterman, Erik. (2012). The Design Way: Intentional Change in an Unpredictable World (2nd Edition). Massachusetts: MIT Press.
12. Fry, Tony. (2014). Design Futuring: Sustainability, Ethics and New Practice. London: Bloomsbury Publishing.
13. Tunstall, Elizabeth. and Agi, Ene. (2023). Decolonizing Design: A Cultural Justice Guidebook. Massachusetts: MIT Press.
14. Pansera, Mario. and Owen, Richard. (2015). Framing Resource-constrained Innovation at the ‘Bottom of the pyramid’: Insights from an Ethnographic Case Study in Rural Bangladesh. Journal of Technological Forecasting and Social Change. Vol. 92, pp. 300–311.
15. Gullion, Jessica. and Tilton, Abigail. (2020). Researching With: A Decolonizing Approach to Community-Based Action Research. Boston: Brill Sense.
16. Mignolo, Walter. and Walsh, Catherine. (2018). On Decoloniality: Concepts, Analytics, Praxis. Durham and London: Duke University Press.
17. Cowen, Tyler. (2004). Creative Destruction: How Globalization Is Changing the World’s Cultures. New Jersey: Princeton University Press.
18. Gunn, Wendy. and Donovan, Jared. (2012). Design and Anthropology. Surrey: Ashgate Publishing.
19. Kasturi, Poonam. (2005). Designing Freedom. Design Issues. Vol. 21, Number 4, p. 76.
20. Horvath, Ronald. (1972). A Definition of Colonialism. Current Anthropology. Vol. 13, No. 1, 1972, pp. 45–57.
21. Harvey, David. (1990). The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change. Oxford: Blackwell Publishing.
22. Fry, Tony. (2011). Design As Politics (English edition). Oxford: Berg Publishers.
23. Rheinberger, Hans-Jorg. (1997). Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube. California: Stanford University Press.
24. Kwa, Chunglin. (2011). Styles of Knowing: A New History of Science from Ancient Times to the Present. Pittsburgh: University of Pittsburgh Press.
25. Friedman, Jonathan. (1994). Cultural Identity & Global Process. London: Sage Publications.

Kantamanto Social Club

By Daan Sonnemans, Kantamanto Social Club & Fab City Foundation

(P.198)

1. Williams, Dilys. 2024. Shein: The unacceptable face of throwaway fast fashion. The Guardian. https://www.theguardian.com/fashion/2022/apr/10/shein-the-unacceptable-face-of-throwaway-fast-fashion
2. Ellen MacArthur Foundation. 2017. A New Textiles Economy: Redesigning Fashion’s Future. Cowes: Ellen MacArthur Foundation. https://www.ellenmacarthurfoundation.org/publications
3. EuRIC and Municipal Waste Europe. 2024. Crisis in Europe’s textiles sorting and recycling sector could trigger a domino effect. Brussels: EuRIC. https://ec.europa.eu/eurostat/databrowser/view/env_wastrdmp__custom_13198298/default/table?lang=en
4. European Commission. 2024. Waste Framework Directive. Brussels: European Commission. https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

Non-Foreclosed Access Points

By Ren Loren Britton

(P.204)

1. Workshop: “Study of Presence with Ren Loren Britton (workshop). Non-Foreclosed Access Points: pluralizing virtuality” Part of the series: High Latencies / [contra] panorama, 2024, MACBA Barcelona: https://www.macba.cat/en/activities/study-of-presence-with-ren-loren-britton-workshop-non-foreclosed-access-points-pluralizing-virtuality/.
2. Research project: “High Latencies: Studies of the presence with Jara Rocha and Nicolás Malevé / [contra]panorama, 2024/25, MACBA Barcelona: https://www.macba.cat/en/activities/high-latencies/.
3. Tirolina, Missió tirolina [Reportatge fotogràfic activitat], 25-5-2023, MACBA Barcelona: https://www.macba.cat/es/repositorio-digital/?slug=ahis07539-missio-tirolina-reportatge-fotografic-activitat
4. Freire, Paulo. 2000. Pedagogy of the Oppressed 30th Anniversary Edition. New York: Continuum.
5. Hooks, Bell. 1994. Teaching to transgress: education as the practice of freedom . London: Routledge.
6. Teaching to Transgress Toolbox. http://ttttoolbox.net/
7. Diskriminierungskritische Perspektiven an der Schnittstelle Bildung/Kunst. Diskrit-Kubi.net
8. Another Roadmap School. https://www.another-roadmap.net/
9. Critical Design Lab. 2020 - Ongoing. Remote Access Archive. https://www.criticaldesignlab.com/project/remote-access-archive.
10. Critical Design Lab. https://www.criticaldesignlab.com/.
11. Mingus, Mia. 2022. You Are Not Entitled To Our Deaths: COVID, Abled Supremacy & Interdependence. https://leavingevidence.wordpress.com/2022/01/16/you-are-not-entitled-to-our-deaths-covid-abled-supremacy-interdependence/.
12. Chaix, Victor. 2023. Emoji Proxies & Ghost Messengers (Conference Report, day 2). https://networkcultures.org/goinghybrid/2023/03/29/workshop-emoji-proxies-ghost-messengers-conference-report-day-2/
13. Moubarak, Karl. 2022 / 23. Emoji Proxies & Ghost Messengers. https://moubarak.eu/projects/emoji-proxies-ghost-messengers/.

MEMBERS’ BOOKLET

Experimental-Based Distributed Design

By Massimo Bianchini from Polifactory, Department of Design - Politecnico di Milano

(P.226)

1. According to the QS World University Rankings by Subject 2024, the Politecnico di Milano Design System was ranked 7th worldwide.
2. Polifactory Website. Accessed 2024. https://www.polifactory.polimi.it/en/research-2/.”
3. The three initiatives are Open Food Factory, Distributed Food Factory, and Distributed Design for biodiversity. See https://www.polifactory.polimi.it/en/research-2/.

A Global Movement

By Fadia Elgahrib, Geraldine de Bastion from Global Innovation Gathering

(P.238)

1. Dietel, Tom. 2024. Libre Water project on the Distributed Design Platform website. https://distributeddesign.eu/talent/librewater/. Accessed last January 2025

Knockin’ on Maker’s Door

By Vincent Guimas from ARS LONGA

(P.242)

1. Vincent, Guimas. 2024. HARBORS, (p.212). Driving Design Volume 2. Paris: Distributed Design Platform.
2. Re-label platform “homepage”. Accessed January 10. http:www.re-label.eu
3. Re-label platform “homepage”. Accessed January 10. https://store.fabcity.paris/

Distributed Design Education in Action

By André Rocha from Polytechnic University of Lisbon - IPL Fablab Benfica

(P.274)

1. David and Sousa. 2022. T-AR: A Response to Banco de Benfica Assignment. Lisbon: IPL.
2. Martins, Silva, and Figueiredo. 2024. dot. Braille Writing Tool. Lisbon: IPL.

3. Daguano, Fernando. 2023. Alquimetricos Educational Tools. lab.alquimetricos.cc
4. Gonzalez Martinez, Jose Manuel. 2022. Caleiduino. GitHub.
5. Zuloaga, Pablo. 2023. P.O.W.A.R v2.0. Hackster.io
6. Bernardo, Marco. 2023. Sun Factory: Low-Tech Plastic Recycling. Switzerland
7. Fernandes and Português. 2022. Re-Bird. Lisbon: IPL.
8. Cortinhas, Pinheiro, and Rocha. 2024. Alquiplus. Lisbon: IPL.

Building a Community

By Danaja Batinič, Kristina Dešman, Eva Simonič, Anja Zorko from Museum of Architecture and Design / Centre for Creativity

(P.282)

1. Bartolj, Tjaša; Kavaš, Damjan; Murovec, Nika. 2020. Statistical analysis of CCS 2008–2017. Ljubljana.
2. Klinar, Miha; Mihailovič Škrinjar, Mojca. 2020. KCDM: Designing Advantages, Building Trust and Changing Culture. Ljubljana.
3. Bartolj, Tjaša; Kavaš, Damjan; Murovec, Nika. 2020. The cultural-creative imperative. Ljubljana. Edited by Barbara Predan.

Editors

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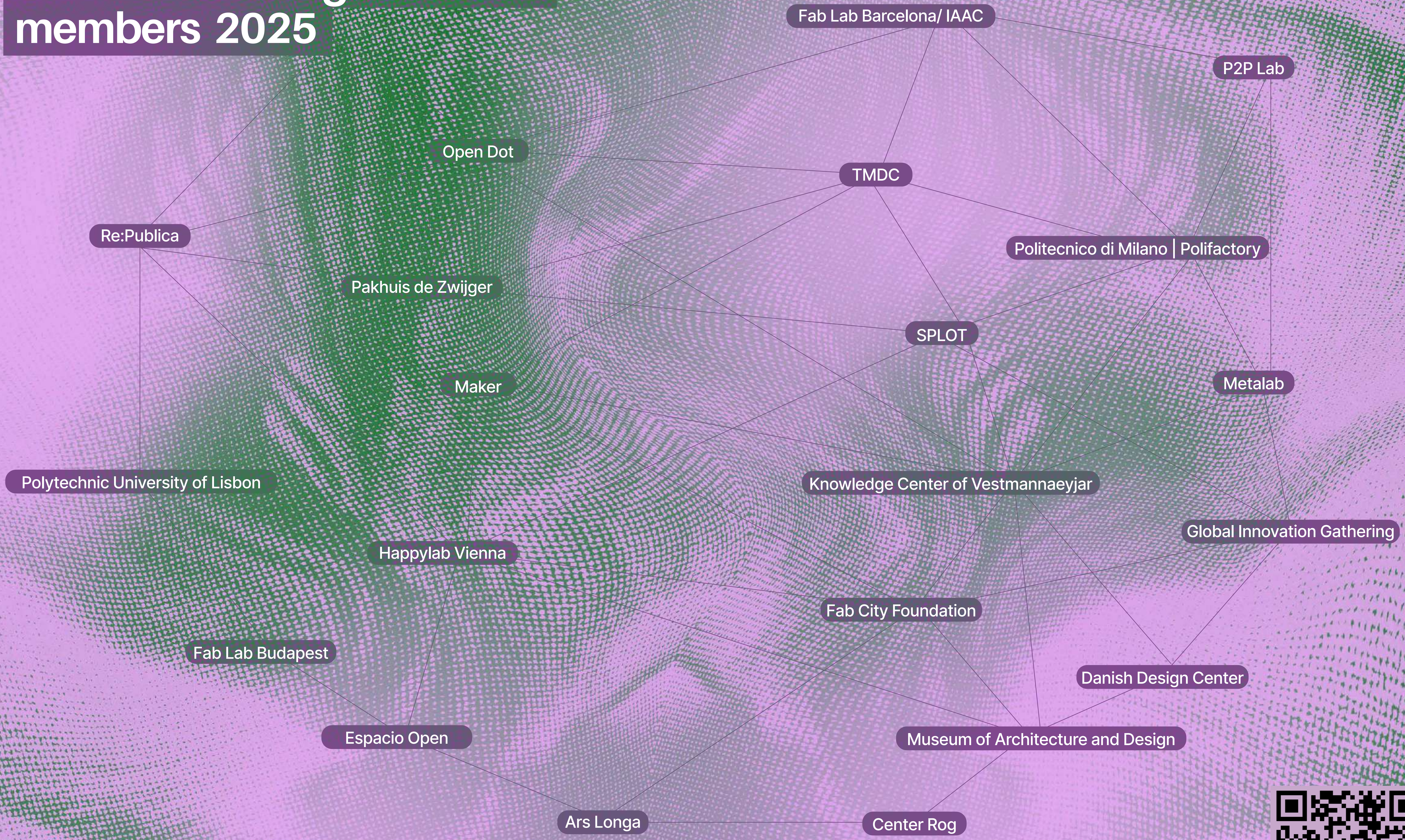

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Design is intrinsic to our daily lives. It surrounds us—in the products we use daily, from phones and watches to chairs and cars, to the streets and built environments we inhabit. Yet much of this design operates within a linear, extractive industrial 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.

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