Food Design for the Real World

DESIGN BY AND FOR FOOD: PLACE-BASED INNOVATION AND TRANSFORMATIVE DESIGN

Sonia Massari

FrancoAngeli
DESIGN INTERNATIONAL

Design International series

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To Roberta,
grateful to have walked through life with you as a friend.

To my grandparents.
A mia nonna Pina.

Foreword I

It is a common cliché to point out that food has been central to human life throughout history, not only as fuel for our bodies but also as an essential component in the formation of individual and collective identities. Food can convey affection and build community, but also express power. It can easily be turned into a tool for exploitation or even a weapon of war. Hunger continues to be a frightening reality for a large portion of humankind.

What's different today is that food has become central to all kinds of ongoing (and heated) debates about crucial contemporary issues ranging from the environment to public health, from trade to nationalism. Moreover, food has become more visible in mass communication, constantly presented to us through social media, TV shows, films, and printed media (at least for those who are still partial to that almost quaint modality of expression). Nostalgias and pastoral fantasies vie for our attention together with increasingly short-lived trends, celebrities, and influencers.

However, a certain awareness that something is not working as it should is spreading. The COVID-19 pandemic revealed how fragile the

global food system is. Climate change and extreme weather events like droughts and floods challenge agriculture, which in turn reinforces those very climate shifts, especially in the intensive, industrialized versions that make great amounts of food available and cheap.

It is when something does not work as we expect that we are forced to observe it closely, looking for solutions to repair it. This is where both food studies and food design can intervene in complementary and effective ways.

Food studies aims to examine various aspects of food as a total social fact, to use Durkheim's terminology: from the structures and dynamics of the food system to the flows and ebbs of culture and their influence on class, gender, ethnicity, religion, and politics. Over the past few decades, the field has grown to include journals, book series, and academic programs.

The analytical and critical contributions from food studies have great potential in supporting the research and practice in the field of food design, which instead tend to focus on applied interventions. Creativity and ingenuity can leave its unique mark on aspects of the food system ranging from communication to community building, from sustainability to waste reduction, as this book indicates. These kinds of initiatives tend to achieve the best outcomes when they are the result of collaborative and participative processes that include a broad variety of stakeholders, even when they hold very different values and priorities. This is where education is crucial, as Dr. Sonia Massari argues in this book: food designers need to be trained. Workshops, place-based educational activities, and academic courses can all contribute to shaping a new generation of designers who are invested in changing the global food system for the best.

Prof. Fabio Parasecoli
New York University

Foreword II

When I first encountered Sonia Massari's work over a decade ago, food design was still finding its language and frankly, its footing. We were a loose community of educators, designers, researchers, and practitioners working in parallel tracks, each discovering that traditional approaches weren't sufficient for the challenges we were trying to address. What Sonia has documented in this book is not just her own journey, but the maturation of an entire field.

The past fifteen years have witnessed a fundamental shift in how we understand the relationship between design and food systems. Where once these were seen as separate domains — design concerned with objects and experiences, food studies focused on culture and policy — we now recognize them as inextricably linked. Every design decision has implications for food systems; every food system embeds countless design choices. Sonia's work has been instrumental in mapping this terrain and developing the pedagogical approaches necessary to navigate it effectively.

What strikes me most about Sonia's approach is her commitment to learning through transformation. The bootcamps and other place-

based learning experiences she describes in Chapter 3 aren't just educational programs — they're laboratories for new forms of collaboration. When she brings together participants from forty countries with diverse disciplinary backgrounds, she's not just teaching about food systems; she's modeling the kind of cross-pollination that food system transformation requires.

I've spent years teaching students in NYU's Graduate Food Studies Program and Parsons' Integrated Design Department, watching bright minds wrestle with questions that don't fit neatly into academic silos. In my work with companies, I see similar challenges as they navigate innovation barriers, evolving technologies, and shifting regulatory landscapes. How do you design for sustainability when the system itself needs redesigning? How do you teach people to think critically about food when the very act of eating is both deeply personal and inherently political? These aren't just academic or corporate exercises — they're the questions that will shape both the current and next generation of food professionals, designers, and systems thinkers.

Sonia's earlier insights on technologies — both analog and digital — as enablers of *global community activation* resonate deeply with my own work. During the pandemic, she and her team frequently developed learning and engagement tools for virtual collaboration that did not replace in-person learning, but expanded its potential and its reach. Many of the place-based education activities or knowledge-sharing moments were, by necessity, transformed into virtual contexts — interactive dialogue spaces where students in Massachusetts could learn directly from farmers in California, designers in New York could collaborate with researchers in Italy, and educators worldwide could share design methods and insights in real time.

This is not just convenient; it is essential for addressing challenges that are simultaneously local and global.

The transdisciplinary framework Sonia champions reflects a broader evolution in how we understand expertise itself. The complex challenges facing our food systems — climate change, economic sustainability, cultural preservation — can't be solved from within any single discipline. They require what I call a *cross-pollination of expertise*, the ability to integrate insights from design, agriculture, technology, policy, business, and community organizing.

But this book offers more than a theoretical framework; it provides practical evidence. Sonia's documentation of specific programs, methodologies, and outcomes offers invaluable guidance for educators and institutions looking to develop similar approaches. Her honest reflection on what works, what doesn't, and why provides the kind of grounded insight that can only come from sustained practice and careful observation.

In my own work, I've learned that people initially want simple answers—clear guidelines, straightforward solutions, definitive frameworks. But food systems are irreducibly complex, and learning to work effectively within that complexity is perhaps the most important skill we can develop. Sonia's pedagogical approaches model this beautifully, creating structured experiences within which individuals can practice navigating uncertainty, building collaborations, and developing solutions that acknowledge rather than ignore complexity.

The timing of this book is particularly significant. Sonia's work offers compelling evidence that engagement with real-world challenges enhances rather than compromises educational quality. Students and professionals who participate in her programs don't just learn about design thinking — they apply it to urgent challenges, develop practical skills, and build networks that extend far beyond their immediate experiences.

This book is more than an academic treatise; it's an invitation to engage with food as a dynamic and transformative force for change. Sonia's insights challenge us to think critically, design thoughtfully, and, above all, to listen — to the environment, to communities, and to the food itself.

Stefani Bardin
Integrated Design + Food Studies Parsons/The New School,
Founder Unstuck Consultancy

Introduction to the Real World of Food Design: Why This Book, Why Now

In 1971, the publication of *Design for the Real World* established Victor Papanek (1923–1998) as one of the most radical and visionary design thinkers of the 20th century. His work became a landmark in the international debate on the social and ecological responsibilities of design. Translated into more than ten languages, the book entered the canon of alternative culture alongside seminal texts such as Rachel Carson's *Silent Spring* (1962), contributing to an urgent call for systemic change in how humans interact with the environment and with each other. Papanek's vision of the *real world*, like Carson's ecological alarm, saw design as a tool in service of humanity, not capital.

The Swedish edition of the book, significantly titled *Environment and Millions: Design as Service or Profit?* explicitly stated the dichotomy at the heart of his critique (2022). The design could either perpetuate unsustainable consumption or become an emancipatory practice capable of enabling inclusive, ecological, and socially rooted forms of action. In this spirit, this monograph takes the title *Food Design for the Real World*, a direct homage to Papanek's legacy, but reframed in light of the contemporary challenges facing food systems.

As Papanek wrote in his original preface: «Designers are involved, at least partially, in nearly all forms of environmental pollution» (Papanek, 2022, p. 47). However, his stance was neither cynical nor defeatist: he advocated for a co-constructive approach in which design could become a means for young people to participate in societal transformation. In alignment with this vision, contemporary pedagogical practices in food design have progressively endeavored to elucidate how designers, whether intentionally or not, have contributed to inequitable and unsustainable food systems, frequently through their adherence to marketing logic and technological determinism. Rather than falling into a morality of blame or a rhetoric of techno-correction (Grimes & Harper, 2008), these practices advocate for the design of futures centered on what the author has termed *sustainability natives* (Massari, 2016): a generation analogous to *digital natives*, who intuitively interact with digital technologies from birth. Similarly, *sustainability natives* grow up in cultural and educational environments where products, services, and systems are intentionally designed to foster ecological and social well-being. For them, ecological awareness, systemic thinking, and values of social justice are not external constructs to be acquired but inherent components of their worldview. The design of systems, services, and artifacts oriented toward sustainability becomes, in this context, second nature — experienced as intuitive, embodied, and meaningful rather than as skills to be explicitly taught.

Although initially conceived for researchers and educators, this book also addresses students. Echoing Papanek's dedication «to all [his students] have taught me» (2022, p. 41), it recognizes that the most significant questions and tensions in design often emerge within educational contexts. Students pose uncomfortable questions, challenge assumptions, and imagine alternatives. In doing so, they remind us that the *real world* is not only a space of constraints but also one of radical possibility.

Food Design for the Real World thus seeks to examine the epistemological foundations and methodological articulations of food design in its dual nature as both an object and medium of design. The text examines how food serves as a relational and systemic artifact that shapes cognition, emotion, culture, and community. It investigates the embodied and symbolic mediations of food, tracing how

food design emerges at the intersection of various disciplines, including product and service design, anthropology, semiotics, agriculture, food policies, and agroecology.

The reference to Papanek is not nostalgic but strategic. It reaffirms that design must be accountable for its material, environmental, and social consequences. As Escobar (2018) argues in *Designs for the Pluriverse*, the design must be redefined not as a top-down imposition of form but as a situated and collaborative practice capable of enabling *pluriversal* futures. This requires embracing participatory and transdisciplinary approaches while rejecting the false promises of techno-solutionism and confronting the complex needs of both human and more-than-human actors.

In this book, the *real world* refers to the plural and interconnected reality of food systems: a world shaped by tensions between the local and the global, the human and the more-than-human, the material and the symbolic.

In this context, food design is not a singular discipline but a mode of action and reflection that fosters empathy, generates meaning, and enables transformation.

Food Design for the real world: a situated and responsible practice

The chapters that follow embrace this invitation to open new doors. They explore how food, as both artifact and object, mediates between the sensorial, bodily, material, social, spatial, and productive relational dimensions of human experience.

Rather than seeking to offer a single, fixed definition of food design, this book takes a different approach: it explores how and where design has entered the real world of food — from the era of agri-food modernization to the present day. The objective is not to delineate a field but to demonstrate how design, in its many forms, has inhabited and transformed food-related practices, contexts, relationships, cultures, and systems.

The concept of the *real world* recurs throughout the four chapters of the book, serving as both a critical and operational framework. It

calls for a shift in focus — from abstract definitions to the situated practices, processes, and relationships that take shape within everyday, educational, productive, and territorial contexts.

1. Design in the real world of food: an emerging presence.

The first chapter examines how design has taken root and evolved within the agricultural and food landscape. While the application of design to food is not new — having historically manifested in packaging, interfaces, tools, spatial configurations, and product development — its presence has become more visible, explicit, and transdisciplinary over the past two decades. In a context where the traditional *T-shaped* designer, as conceptualized by IDEO (IDEO.org is a nonprofit design studio), is no longer sufficient to grasp the full complexity of food systems, there is a growing demand for design approaches that can engage with systemic transformation. As a result, the real world of food increasingly needs design — not merely as an aesthetic or functional support but as a cultural, social, and political enabler and catalyst.

2. Values, mediations, and everyday food choices.

The second chapter explores how people attribute value to food in everyday life through a set of cultural, symbolic, material, and affective mediations. Our daily food choices in the real world are shaped by these mediations, which influence behaviors, habits, and priorities. From this perspective, design is not merely a technical tool but an enabler of change: it operates on representations, experiences, and relationships. Food is not only an object of transformation but also a medium through which transformation becomes possible.

3. Teaching food design in real-world contexts: situated education.

The third chapter focuses on education. Through the analysis of twenty cases — including Bootcamps, Tenuta Labs, multiple-day workshops, field schools, and summer schools rooted in food innovation and design for agri-food — it investigates the effectiveness of design-based learning when it takes place in real, localized, and immersive contexts. Fieldwork, combined with design as a didactic methodology, enables the activation of transformative learning processes. Working with food in a *real-world setting* allows students not only to grasp the specifics of a territory but also to acquire tools

for reinterpreting and transforming the food systems they come from. When well-designed educational experiences generate outcomes that extend beyond tangible results, they shape mindsets, relational skills, and collaborative narrative and system models. The context — the real world — thus becomes a fundamental condition for creating high-impact learning environments. In this perspective, education becomes not only a space for acquiring tools and knowledge but a field of activation. Much like a butterfly flapping its wings, even a seemingly small intervention can reverberate through the complexity of agri-food systems, triggering transformative effects over time and across scales. This is the generative potential of food design education when embedded in real-world, situated contexts.

4. The role of the food designer in the real world: skills, competencies, and approaches.

The fourth chapter addresses the role of the designer within today's agri-food systems. What does a food designer do in the real world? Where can — and should — they operate? How can they generate a meaningful impact? In a context defined by complexity and transition, being a good problem solver or a skilled concept developer is no longer enough. Today's designer is called to be a facilitator of relationships, an initiator of dialogue, and a cultural mediator. Through approaches such as *Metabolic Food Design* and co-generative practices in Living Labs, the designer takes on emerging roles: as a community coach, an educator in multi-actor environments, and a strategic activator of local ecosystems. Design thus becomes a relational and transformative competence — one capable of crossing sectors and disciplines to generate change for and by food.

Premise: from practice to theory in the real world of food design

Before proceeding, it is important to clarify a foundational element of this book. The work presented here is rooted in over eighteen years of the author's personal and professional experience in research, design, agri-food innovation, and sustainability education. This trajectory has been developed through a transdisciplinary and situated

approach, positioned at the intersection of theory and practice, and cultivated across diverse academic institutions and real-world contexts, spanning multiple geographies and methodological paradigms.

In 2007, the author co-conceived, co-developed, and later directed Gustolab International Food Systems and Sustainability, the first center in Italy dedicated to food studies abroad. Over the course of thirteen years, she played a central role in shaping the center's pedagogical vision, designing its educational programs, and cultivating international academic partnerships. Among these were long-standing collaborations with U.S. universities such as the University of Illinois Urbana-Champaign, where she served as Academic Director of the Food Studies in Italy program for a decade, and the University of Massachusetts Amherst, where she coordinated the *Critical Studies on Food and Sustainability in Italy* program for an equivalent period. These experiences enabled the iterative development of educational and research formats grounded in design thinking and critical practice, with food conceptualized as both a cultural artifact and a relational medium.

Subsequently, as Director of the Academy at the Future Food Institute, the author expanded her work within an innovation-oriented ecosystem that integrated food systems education with community-based learning, public-private partnerships, and international training programs. For four years, she contributed to the development of training tools in Living Labs and transdisciplinary research formats. This initiative has deepened her reflection on the evolving role of educators in the agri-food design landscape — not merely as conveyors of technical knowledge but as facilitators of learning environments capable of cultivating critical thinking, collaborative agency, and design-led engagement with complex food systems.

In 2021, she co-founded, alongside Ricardo Bonacho, Mariana Eidler, and Pedro Alvarez, the nonprofit organization and platform FORK (Food Design for Opportunities, Research, and Knowledge) to bridge academic inquiry with professional practice in design for agri-food (Eidler *et al*., 2022). In parallel, the author has carried out consulting work with agri-food enterprises of various sizes, research institutions, foundations, and international consortia. She has also taught food design and scenario-based design research in institutions across Europe and the Americas, continually refining a pedagogical approach

grounded in real-world complexity and operational dynamics. These experiences have served as a testing ground for designing both innovative content and place-based adaptive teaching methods. They have also allowed her to observe how transformative learning processes unfold when rooted in direct, situated engagement.
Through this praxis, four primary pedagogical dimensions have emerged:

a) understanding the meaning of food in its dual and relational nature, explored through food cultures and international education models (e.g., study abroad);
b) identifying design opportunities within the everyday complexity of agri-food systems;
c) engaging critically and constructively with actors and structures that shape the real-world food landscape;
d) developing integrative and co-generative design approaches that bridge disciplines, languages, and knowledge systems.

More recently, the author's work has found academic continuity within the Department of Agriculture, Food and Environment at the University of Pisa, where she continues to apply and develop participatory and design-based research methods in agri-food and sustainability education. Here, design is explored not only as a method but as a strategic competence to interpret, navigate, and co-transform the agroecological and socio-technical dynamics of food systems.

The case studies, projects, and practices discussed in this book are primarily drawn from contexts in which the author has been directly involved — predominantly in Europe and, to a lesser extent, in North and South America. This scope reflects a commitment to grounded research but also the epistemic limitations of situated fieldwork and access. Thus, while the author's experience spans multiple geographies, it remains limited to specific socio-cultural and institutional settings. This delimitation does not imply exclusion but instead acknowledges the need to expand the dialogue to include underrepresented voices, territories, and epistemologies that remain outside the current analysis.

As Arturo Escobar (2018) reminds us, any discussion of *design for the real world* must be accompanied by an interrogation of what we mean by *real world*. In this book, the term refers to those contexts the author has directly experienced through lived, embedded, and

relational practices. The intent is not to propose generalized solutions or definitive models but to offer a situated contribution to the ongoing dialogue on food design as a field in transformation. Looking forward, there is a need to co-develop new trajectories that bring food design into closer conversation with underrepresented food cultures, emerging knowledge systems, and alternative visions — acknowledging their epistemic richness and transformative potential.

Food and design: between definitions and epistemological frameworks

In recent decades, food has come to be regarded as an industrial product, with its design encompassing the entire life cycle. Packaging has emerged as a potent medium for communication in this regard. However, in the past twenty years, the focus has shifted from product-centered design to the design of food-related acts (Ferrara, 2011), where design interprets rituals, interactions, and values. Within this framework, the term *food design* has emerged, referring to the design of new ways of relating to food and others (Guixé, 2010).

The growing interest in food-related design has led to a significant expansion of its applications, encompassing a diverse range of practices, domains, and interpretations. Initially rooted in the realm of product and experiential consumption, food design has progressively acquired broader significance, becoming a field of transdisciplinary experimentation that integrates aesthetics, communication, service design, social innovation, product design, and sustainability.

Food design today encompasses a constellation of subfields, including Design with Food, Design for Food, Food Product Design, Eating Design, Human-Food Interaction Design, Social and Food Service Design, as well as more recent frameworks such as Food Design Thinking and Agri-food Design-driven Activism. This diversity reflects the complex and intersectional nature of food design, highlighting its transdisciplinary potential. However, in some contexts, this umbrella term may risk oversimplifying the complex challenges that characterize contemporary agri-food systems.

For this reason, this book proposes to adopt the expression *design by and for food*, understood as a methodological and strategic approach within the broader field of food design. This linguistic choice reflects the intent to focus not only on food as a product or experience but on the relational, cultural, ecological, and political systems in which food is embedded and operates.

There is an increasing need to design to construct meaning, not merely objects: «to build in order to think» (Bagnara & Pozzi, 2008, p. 40). The future of food design will require openness to disciplinary contamination. While philosophy, literature, cultural studies, and food studies are already integral disciplines, others, such as engineering, agriculture, agricultural economics, and political science, can also provide theoretical and methodological tools to reframe food design through ethical, cultural, and relational lenses.

The user is no longer a passive consumer but a co-producer of meaning, embedded in a food system that is oriented toward co-creation. The future of food design lies in specificity and transdisciplinarity, aiming to design not only artifacts but also new cultural forms and food communities. Designers must be capable of guiding this process toward meaningful, inclusive, and transformative experiences. The methodological perspective adopted in this book is rooted in a systemic and transdisciplinary capacity of the designer to integrate knowledge and practices from various domains — from food studies to rural sociology, from cognitive sciences to pedagogy, from agriculture to circular economy, to mention a few — to address the complexity of agri-food systems. Central to this is the epistemological principle of co-evolution between design and context: the design process is not an externally imposed solution but a form of knowledge in action constructed through interaction with territories, communities, and cultures.

Food as a cultural artifact and mediating tool

The entire study, as presented here, builds on the assumption that food is not merely a material good or biological necessity but a complex cultural artifact that possesses a dual nature: both an object

of human activity and a cognitive and relational tool through which individuals construct meanings, identities, and relationships.

Drawing from the historical-cultural school (Vygotsky) and the ontology of design (Rizzo, 2005; Rizzo *et al*, 2009; 2020), food is interpreted as an artifact comprised of a material component (Hardware), an ideal component (Software), and a human component (Liveware), forming a triadic system that shapes food experiences and cultures. Six key cultural mediations activated by food are explored — sensory, bodily, spatial, social, productive, and material — which provide the interpretive framework for understanding and designing human relations with the food system.

This approach enables us to move beyond deterministic reductions — such as those derived from behaviorist approaches to food marketing — and instead affirms that food choices are not passive reactions to environmental stimuli but rather active, mediated, and culturally situated processes.

In this view, design does not simply involve the creation of artifacts; it also carries formative and transformative value. Designing meaningful experiences in the agri-food sector also means educating perception, sensitivity, and awareness. Thus, designing for agri-food systems increasingly becomes an educational process cultivated through experiential, workshop-based, and immersive formats that value empathy, collaboration, and systemic thinking. This integration stems from the need to move toward a more clearly defined field of study that combines both *design for* and *design by* agri-food systems. The aim is to enable transformation on two interconnected levels: within the food system itself and among the actors involved in it, including the designers, whose role is both facilitative and co-evolutionary.

This book explores both the theoretical foundations of mediated food experience (Chapter 2) and the educational practices through which these foundations can be activated, communicated, and transformed into competencies (Chapters 3 and 4). Chapter 4 briefly presents the *Tenuta Lab***,** one of the twenty educational formats examined in this monograph, proposed as an emblematic case for understanding the dynamics of situated learning and design. To support this reflection, it is useful to recall the image offered by philologist Giorgio Pasquali in a 1930 article published in *Pegaso*, where he

described Aby Warburg's method as a «slow progression through the labyrinth of becoming, by successive corrections of course, without rigid or dogmatic assumptions, but with a clear interpretive intention.» However, Warburg never explicitly referred to *sparks of knowledge*, his work on the *Bilderatlas Mnemosyne* offers a tangible example: a visual system that, through the juxtaposition of images from different times and cultures, sought to reveal latent meanings and stimulate new readings.

This metaphor is particularly effective in describing the *Tenuta Lab*, conceived as a living, dynamic, and open research environment — where design tools, educational approaches, and diverse forms of knowledge are brought into relation. The strength of the Tenuta Lab lies in its ability to generate unexpected connections and spark insights through situated interaction — a form of knowledge that emerges from the dialogue between hypotheses, contexts, and actors, activating transformative processes via a carefully crafted pedagogical and design framework. As in Warburg's method, the organization and interconnection of knowledge become generative devices capable of producing sparks of understanding and new forms of collective meaning-making.

This book draws on the hypothesis, aligned with Rizzo (2009), that future food design processes will exceed their original human intentions, generating new affordances — both sensory-motor and intentional — that enable novel forms of mindsets, relationships, narratives, and cultures. This vision is further articulated through the *B.E.FOO.D* model, which conceptualizes how food-centered educational design can act as a catalyst for systemic and value-based transformation.

Toward a situated and plural food design

In an era where agri-food systems lie at the heart of profound ecological, technological, and cultural transitions, it becomes increasingly urgent to question not only what it means to design for food but also who is called upon to do so. Must it necessarily be a designer who engages in design? Are design schools becoming the new schools of management — incubators of strategic and transformative com-

petencies? As food industries, municipalities, governments, and academic institutions face uncertain scenarios, explore the unknown, and attempt to navigate wicked problems, designers are emerging as key figures in facilitating processes of vision, connection, and action. In this context, design is neither a decorative act nor an isolated creative exercise but rather a cognitive and relational activity capable of triggering systemic change. It is precisely human thinking — which can be supported and amplified by artificial intelligence — that enables us to understand the why, generate meaning, and guide transformation with awareness. Design fiction, critical speculation, and systems thinking only acquire significance when rooted in intentional, embodied, and ethical reflection. One cannot design without designers — but the designers of the future will be called upon to continuously reinvent their role to remain relevant and valuable in a rapidly changing society.

A critical question is raised regarding the role and function of the food designer. Given the increasing intricacy and interconnection of agri-food systems, it appears improbable that a single individual possesses all the requisite competencies to design effectively, inclusively, and with transformative potential. Hence, the hypothesis is that the food designer of the future will not be a solitary professional but a transdisciplinary design collective — a working group capable of combining sensitivities, knowledge, and approaches, from service design to food sociology, from communication to territorial innovation.

The food designer can no longer limit their work to balancing form, function, and needs. They must operate in a context where objects communicate and experiences are co-created by users. Their role is to write the initial script, allowing people with their own cognitive and social tools to co-write the rest. This does not mean negating the role of the designer but reimagining it in light of new challenges: as facilitators of processes, community coaches, experienced directors, and activators of shared visions and values. In this vision, design is not a sectoral competence but a grammar of relationships — a way to construct meaning and change, starting from what nourishes us every day. A designer or a design collective?

Conclusion

Throughout this journey, food is not considered merely an object of design but a cognitive and relational device capable of generating meaning, fostering relationships, and enabling forms of situated learning. Each chapter in this monograph contributes to outlining a practice of food design that goes beyond the innovation of products or services to question the very conditions of design itself: its responsibilities, its transformative potential, and its capacity to envision more just and sustainable futures. Food, as both artifact and action, mediates between senses, body, material, space, production, and interpersonal relationships. In this sense, and drawing inspiration from Victor Papanek's provocation, this work explores what it means not only to design *in* the real world but also *through* the real world of food.

1. What can design bring to the agri-food sector?

The ecological transition must be implemented in all productive sectors, particularly in the agri-food sector, where significant exploitation of natural resources occurs (Kazak, 2022). Increasing the efficiency of the production process through more precise agronomic and breeding techniques appears to be the primary approach (Boix-Fayos *et al*., 2023; Cuadros-Casanova *et al*., 2023; Vela Almeida *et al*., 2023; Lacombe *et al*., 2018). However, given that around a third of food production is wasted, it is crucial to develop innovative strategies to minimize waste, for example, by improving the preservation of products over time (Waste Watcher, 2020; Fassio, 2017). Additionally, it is crucial to recover value from all food waste, which contains a substantial amount of nutrients. Food technologies can facilitate the use of ingredients from residues by incorporating them into foods with high functional and sensory properties (Fassio & Minotti, 2019). However, the use of alternative ingredients and innovative technological approaches must progressively be evaluated, considering the food safety of the final product (Willett *et al*., 2019; Langella, 2009; Gallen, 2005). Consequently, there is an imminent necessity for a heightened

degree of collaboration among food designers, agricultural economists, policy experts, agronomists, and nutritionists to facilitate the development of foods that will become an integral component of the future diet, while adhering to the principles of environmental sustainability (Massari, 2021).

The study of food design and the study of food are two rapidly growing and interconnected fields of research that share many points of convergence (Parasecoli, 2017). These fields address the interdependence between food, tools, design, and technology, recognizing the central role of design in the development and innovation processes in the agri-food sector (Margolin, 2013).

Within the design disciplines, it is essential to acknowledge the diverse range of professions that fall under this category (Tharp & Tharp, 2019). This encompasses a diverse range of professionals, including specialist designers, architects, urban planners, landscape architects, and beyond. Central to each of these disciplines is the act of designing, which is at the core of their practice.

Indeed, exploring the world of designers brings together a spectrum of specializations (as presented by the International Council of Design and Cumulus Association, see www.theicod.org and www.cumulusassociation.org). Visual communication designers, including graphic designers, navigate the visual landscape, utilizing semiotics, typography, layout, and human perception to create a diverse range of visual creations, from traditional graphic design applications to strategic branding initiatives. Industrial designers, also known as product designers, focus on creating objects for industrial production, utilizing their expertise in materials, manufacturing techniques, and ergonomics to design products ranging from furniture to electronics. Interior designers also design interiors, utilizing their knowledge of materials, space planning, lighting, and ergonomics to create functional and aesthetically pleasing environments in various settings. Social and service designers, specialists in intangibles, apply principles of psychology, social science, logistics, and communication to design systems and processes that deliver exceptional service experiences. UI/UX designers working in the digital world combine technology, psychology, and ergonomics to create both intuitive user interfaces and seamless digital experiences (Malpass, 2019; Rizzo,

2020). The evolving needs of society are constantly reshaping the design landscape, fostering new specializations and hybrids that often blur the boundaries between different categories.

Alongside these categories are specialized niches, such as food designers (Massari, 2021; Zampollo & Peacock, 2016). Advances in food preservation and processing have been driven by the design of highly complex tools and equipment, accelerated by urbanization and industrialization. This has led to significant technological developments in food production, distribution, and consumption, giving rise to new professions and creating different food landscapes (Margolin, 2013).

The concept of *food design* has rapidly gained relevance as a communication and aggregation tool for theorists, designers, and developers. However, the term' food design' incorporates a wide range of practices, from creative and craft activities to commercial promotion, often diluting its original definition (Guixe, 2021). In the literature, food design is often reductively divided into categories, some more related to food and others closer to the design domain. Among these, the most commonly used are 1) designing with food, 2) designing for food, 3) eating design, 4) food product design, 5) food spaces and foodscapes, and 6) social and service food design (Zampollo, 2016; Schifferstein, 2016).

This chapter explores the growing strategic importance of design in the agri-food sector, emphasizing its impact on innovation processes and systemic transformation. By framing food design as a transdisciplinary and practice-oriented approach, the chapter highlights how it contributes to shaping more sustainable, inclusive, and future-oriented agri-food systems.

This chapter is organized into three main sections.

1.1 – Outlines the historical background of the past three decades and the conceptual evolution of the term *food design*.

1.2 – Analyzes the contributions of design to the agri-food sector since industrialization, including the development of new food products and services, the promotion of healthier and more sustainable dietary practices, and the co-design of technologies and business models aligned with the needs of contemporary agri-food systems.

1.3 – Proposes current and future directions for research and practice, concluding with a summary of key findings and reflections on their broader implications.

1.1. Design as a cultural and systemic mediator

Design studies encompass a broad spectrum of human activities aimed at shaping and generating the elements that structure our environment. What sets design apart from related concepts such as management, organization, or innovation is its intrinsic capacity to generate meaning through relationships, engage with complexity without reducing it, and activate transformative processes rooted in both human and systemic dimensions. While management and organization typically operate within predefined, function-driven frameworks, design does not simply coordinate existing elements; it questions, reconfigures, and reimagines them toward alternative futures (Escobar *et al*., 2024).

As Manzini (2015) observes, design is grounded in a set of capabilities — critical thinking, creativity, practical sense, and analytical reasoning — that, like singing in a choir, is accessible to all and can be cultivated over time. This inclusive and developmental nature positions design as a collective tool for envisioning shared futures and alternative socio-economic models, such as the collaborative, platform, or longevity economies. In line with this perspective, Sleeswijk Visser (2005) emphasizes that users are experts in their own experience. In the context of food, this principle becomes universal: eating is a daily, shared act, and thus, every person becomes a potential contributor to the design process.

Unlike the linearity often associated with innovation — frequently defined in terms of technological progress or incremental improvement — design fosters a radical rethinking of the relationships among people, objects, spaces, and systems. Relational design, for example, moves beyond the creation of isolated artifacts to activate dynamic interactions and experiences, embracing systemic complexity and the coexistence of multiple worldviews (Escobar *et al*., 2024). In this

sense, design is both a practical tool and a political act: it supports pluriversal transitions and repairs social and ecological ruptures. It reconstructs the web of meanings that connect individuals to their environments.

Design is, therefore, not merely a creative gesture but a reflective and transformative practice — one that shapes us as we shape the world. As Manzini and Tassinari (2016) argue, design culture represents a form of embodied and shared knowledge and values, which fosters the emergence of new ways of thinking, acting, and coexisting. This transformative dimension is what distinguishes design from more linear, efficiency-oriented processes typically linked to management or innovation.

Strategic design, as described by the Helsinki Design Lab in *Recipes for Systemic Change*, is grounded in the belief that the present can be transformed into a plurality of better futures (Boyer *et al*., 2011, p. 139). Rooted yet guided by aspiration, the design seeks to balance imagination and inquiry, making and learning, communication and iteration, systemic thinking, and human-centeredness (Norman, 2024). Unlike innovation, which often focuses on performance or utility, design operates in the domain of meaning (Verganti, 2009). As Verganti argues, real innovation lies not only in improving function but in redefining meaning — transforming utilitarian objects into objects of affection and generating shared visions with enduring value. Design can also be understood as a form of situated intelligence — one that does not regard context as a neutral backdrop but as a network of material, social, and symbolic relationships. As highlighted by Ask, designers bring order to chaos (2016) by synthesizing insights from diverse disciplines, guided by empathy, curiosity, and integrative thinking. This systemic capacity distinguishes design from mere operational coordination: it enables relational thinking, anticipatory vision, and adaptive transformation.

Escobar *et al*. (2024) further articulate this view by describing design not simply as artifact production but as the cultivation of new ways of inhabiting the world. Within a dense mesh of interdependencies — among humans, non-humans, nature, and technology — design becomes an ontological and political act, capable of enabling pluriversal transitions and reconfiguring meaning. In this

light, design is not only a response to problems but a process of world-making.

At the same time, design is deeply embedded in the cultural and economic systems that produce it. In *The Shopmodern Condition* (2016), Linda Rampell critically examines the commodification of design, describing it as a *capitalist prosthesis* (p. 171) and as a mechanism of cultural homogenization. Her analysis serves as a reminder that design, despite its transformative potential, is never neutral. Precisely because of its embeddedness, the design must cultivate a reflective consciousness — capable of interrogating its assumptions, limitations, and consequences.

What makes design profoundly distinctive is its dual nature: it is simultaneously an action and a reflection, a practice and a theory. Methodologies such as practice-based research and design as research (Gotti *et al*., 2024) embody this duality, allowing designers to tackle complex challenges — such as urban coexistence, food justice, or climate change — through dialogic, inclusive, and adaptive approaches.

While management, organization, and innovation often follow linear and prescriptive logics, design functions as a cultural and systemic mediator. It is a form of knowledge-in-action that enables us to envision alternatives, embrace complexity, and regenerate meaning. As Anne-Marie Willis reminds us: «We design our world, while our world acts back on us and designs us» (2006, p. 80). It is precisely in this reciprocal process that the generative power of design is revealed.

Food, as an indispensable element of human life, naturally falls within the scope of design (Stummerer *et al*., 2020). Scholars such as Fry (2012) and Margolín (2017) trace the origins of design back to the Paleolithic era, suggesting that the earliest tools for eating and hunting already represent the roots of what we now call food design (Ceschin & Gaziulusoy, 2019; Stummerer *et al*., 2020). Nevertheless, the term *food design* only began to gain widespread use toward the end of the twentieth century.

1.1.1 Food Design: scope, practices, and research foundations

The field of food design is gradually emerging as a distinct area within the broader landscape of design. Following the pioneering work of Martí Guixé, widely recognized as the first to refer to himself as a *food designer* (2003), a growing number of practitioners have begun to explore the complex relationships between design and food. Although there is still no universally accepted definition of food design, it can provisionally be understood as a discipline that connects the act of designing with food-related practices. This connection can be expressed through the application of design methodologies to the domains of food and eating or through the critical examination of food systems from a design perspective (Zampollo, 2016).

Fabio Parasecoli expands this conceptual framework by proposing that food design encompasses a broad spectrum of ideas, values, methods, processes, and actions aimed at transforming, enhancing, and optimizing individual and collective interactions with and around food. These interactions include a diverse range of *material and immaterial* elements — such as edible materials, physical objects, multisensory experiences, natural and built environments, services, systems, and networks (as quoted in Zampollo, 2016, p. 7). This comprehensive approach enables food designers to envision alternatives for how food is produced, processed, distributed, purchased, prepared, consumed, and discarded. Furthermore, food design helps redefine culinary experiences and explore the multiple roles that food plays in shaping personal identity, social dynamics, and cultural practices (Bordewijk & Schifferstein, 2020).

«What makes food designers unique is their holistic, interdisciplinary, future-oriented, and optimistic approach, which is fundamentally rooted in a design education» (Bordewijk & Schifferstein, 2020, p. 131). This definition highlights that food design is not merely a technical or aesthetic practice but a systemic discipline that integrates design expertise with domain-specific knowledge. Its strength lies in its ability to engage with the inherent complexity of food systems through an integrated and forward-looking perspective.

To date, no single definition has captured the full scope of what food design encompasses or excludes. This has been reaffirmed by recent compilations of perspectives from international scholars and ex-

perts (Zampollo, 2022; 2023), which highlight the field's multifaceted nature: an area of research and practice that addresses cultural and social dynamics, the role of artifacts and spaces, collective well-being, and the ethical and technological implications of innovation.

Food design thus appears as a field in motion, characterized by a forward-oriented disposition and driven by the desire to contribute to more sustainable, equitable, and human-centered food systems — especially about health and nutrition. In this context, design is understood not as a static intervention but as an ongoing process of redesigning. Anchored in a human-centered approach, it shifts the focus from abstract theorization to the concrete, material, and relational conditions in which people act and live. It emphasizes the affordances of environments, artifacts, and interactions, prioritizing observed practices over declared intentions.

To navigate such complexity, many designers and researchers adopt design thinking as a guiding methodology (Brown, 2008; Cross, 2011). This iterative, action-oriented process involves exploring challenges, uncovering insights, and generating creative responses that are prototyped and tested in real-world contexts. When applied with sensitivity to nutrition and well-being, such methods can influence not only the composition of meals but also the design of utensils, environments, and broader relationships within local, national, and global food systems.

From the author's perspective, any attempt to fix the definition of food design risks being limiting or outdated — unless the aim is to communicate the field's breadth and multidimensionality across the agri-food chain. Rather than asking what food design is, it may be more productive to explore how design practices can more effectively permeate the agri-food sector and foster meaningful change. At its core, design may be described as a way of navigating complexity and uncovering embedded opportunities, albeit through the necessarily partial lens of abstraction.

To fulfill this potential, structured research approaches are needed, including practice-based research, practice-led research, and action research (Muratovski *et al*., 2022). These frameworks provide designers with a methodological foundation for initiating projects, defining boundaries, monitoring processes, and evaluating outcomes and strategic impacts.

Research in food design is driven by inquiry and experimentation that extend beyond functional and aesthetic concerns to encompass environmental, social, political, and ethical dimensions. As Manzini (2015) reminds us, designers must observe the world attentively, without resorting to reductive generalizations. This approach aligns with Berger (1972), who emphasized that objects must never be viewed in isolation but always in relation to one another and the self. Perception, in this view, is shaped by knowledge, belief systems, and cultural context.

A design approach that engages with food must, above all, develop the capacity to frame challenges — a skill as critical as generating potential solutions. Within the food sector, a deeper understanding can be achieved through a plurality of frameworks, tools, and design modes of thought, further enriched by interdisciplinary collaboration across food science, nutrition, and culinary arts.

As contemporary challenges become progressively complex, the roles and boundaries of design disciplines are evolving. There is a shift away from output-based design approaches toward more purpose-driven, systemic orientations. While traditional design domains (e.g., visual communication, industrial design, interior design, architecture) are often defined by their deliverables and formal languages, emerging areas such as food system design are guided by deeper motivations — experience, service, innovation, transformation, and sustainability (Sanders & Stappers, 2012).

The foundation for such an approach lies in education. Food design education should be rooted in challenge-based, project-based, and problem-based pedagogies that integrate self-exploration and are supported by curated learning experiences (to be discussed in Chapter 3). Designers must cultivate the ability to build systems of balance with the broader goal of restoring social cohesion and fostering long-term learning. At the heart of this challenge lies a concept that is both essential and evolving: balance in and through food.

1.1.2 A Critical micro-history of the term *Food Design*

As of 2025, we symbolically mark twenty-five years since the emergence of food design as an autonomous and recognizable field within the broader landscape of design disciplines. While the act of designing food — or designing with food — has ancient roots embedded in

material history, cultural practices, and production systems, it is only over the past two and a half decades that the term *food design* has gained public visibility and academic legitimacy, becoming an object of study, experimentation, and debate.

This recognition has been fostered by the convergence of three parallel trajectories:

1. The development of food studies in the United States, which framed food as a cultural, social, and political object.
2. The evolution of design studies in Europe has become more oriented toward systemic, critical, and relational approaches.
3. The growing prominence of speculative and transdisciplinary practices that have employed food as a design medium to explore languages, experiences, forms of collective activation, and civic engagement.

The reconstruction proposed here takes the form of a critical micro-history, articulated into three interpretive phases that trace the shift from a focus on objects and sensory experiences to a growing attention to systems, behaviors, and socio-cultural transformations. This classification, drawn from the author's direct experience, is not exhaustive but aims to provide a helpful map for understanding how different orientations have shaped the field of food design from the late 1990s to the present day (Figure 1).

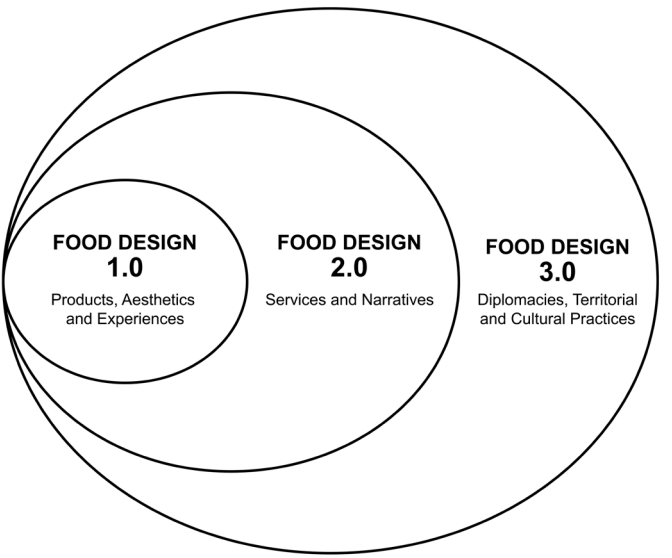


Figure 1.
Syntesis of ther 3 phases, from the late 1990s to the present day.
Source: Author.

Phase 1.0 – Food as object and experience (First Decade)
The first phase is characterized by the emergence of food as a designed object and as a multisensory experience. During this period, food design manifests primarily as an aesthetic and formal exploration, often positioned at the intersection of contemporary art, avant-garde cuisine, and experiential marketing. Notable cross-contamination emerges between design disciplines and gastronomic experimentation, primarily through molecular gastronomy and performative practices involving food.

A pivotal moment is Martí Guixé's SPAMT project (1997), exhibited at the H2O gallery in Barcelona. In response to changing habits influenced by personal computing, Guixé reimagines the Catalan *pa amb tomàquet* for consumption in front of a screen. This project symbolically marks a break between tradition and a new form of technologically mediated food design (Guixé, 2021).
Key figures in this phase include:

- Ferran Adrià, a leader in experimental gastronomy who blends scientific research and aesthetic innovation.
- Marije Vogelzang, who introduced the concept of *eating design* and developed emotionally and relationally charged rituals such as *funeral dinners* and *silent meals*.
- Honey & Bunny, a Viennese duo, released the documentary *Food Design* (2008), which critically explores industrial food production and everyday eating practices.

In this phase, food design is associated with symbolic objects, sensory formats, and aesthetic narratives. It becomes a medium for cultural reflection and the redefinition of consumption rituals. Guixé's 2010 book *Designing Food* articulates a radical perspective: food is not an end, but a design medium through which to interrogate contemporary life. Guixé distinguishes between:

- a *long duration* of anonymous, functional food innovations (e.g., the hot dog);
- a *short history* of conscious, self-reflective practices informed by design languages.

His SPAMT project exemplifies this *design neutralization*, stripping traditional foods of their symbolic layers to reflect on evolving societal habits. He challenges the term *food designer*, distancing design

practice from culinary, artisanal, or engineering logics, and framing it instead as a reflective and relational activity.

By the end of this decade, food design begins to institutionalize, with conferences, seminars, and early academic publications emerging. However, a paradox emerges: as the field seeks legitimacy, its definitional clarity becomes more and more elusive. Attempts to define food design are often framed in negative terms:

- It is not cuisine, though it dialogues with gastronomy.
- It is not food styling, though it deals with visual language.
- It is not food engineering, though it involves innovation.
- It is not art or marketing, though it borrows their tools and narratives.
- It is not nutrition, though it reflects the social and cultural implications of food.

This strategy of defining by exclusion highlights a structural tension within the field: on the one hand, a push for academic and disciplinary legitimacy; on the other, the irreducibly hybrid, situated, and relational nature of food design, which resists rigid classification. Rather than being seen as an epistemological weakness, this definitional crisis can be understood as a distinguishing feature: *food design* emerges as a liminal field that thrives on cross-contamination, on the tension between identity and openness, and on the capacity to generate questions rather than fixed answers. As Guixé often says, «food design is as far from cooking as it is from nutrition»: its purpose is not to produce recipes, but to activate imaginaries, provoke reflection, and transform relationships.

Phase 2.0 – Food as system and story (Second Decade)

The second decade marks a turning point. Food design shifts focus from objects and sensory experiences to systems and transformative narratives. The effectiveness of a food design intervention now lies in its capacity to alter behaviors, challenge norms, or transform socio-technical systems.

During this period, the idea takes hold that food design can no longer be limited to the design of objects or experiences; instead, it must aim to modify habits, behaviors, and complex systems. The effectiveness of a food-related project is thus measured by its capacity

to generate change: a bottle of wine does not qualify as food design unless it alters the way wine is consumed; a dish is not food design unless it intervenes in food practices; a utensil, a gastronomic experience, or a kitchen appliance cannot be considered food design unless they fulfill transformative criteria — be they behavioral, symbolic, cultural, or systemic.

This transition coincides with the expansion of food design's epistemic perimeter, now intersecting with service design, anthropology, consumer psychology, food policy, and sustainability. Food becomes a relational interface, an educational tool, and a speculative platform.

Signs of this shift include:

- The publication of manifestos, such as the ADI Food Design Manifesto (2015) and the Dutch Institute of Food & Design Manifesto (2018), represents a critical moment of epistemological positioning and cultural negotiation. As in other areas of design, the creation of a manifesto is never a purely theoretical gesture; it is a political act, a relational and transformative operation, and an attempt to establish a shared language to guide dialogue within and beyond the discipline.
- The emergence of networks: RLAFD *Red Latinoamericana de Diseño y Alimentos* (2014), FDNA Food Design North America Network (2015), FDXEd Food Design for Education (2015), Dutch Institute of Food & Design (2016), the first Cumulus Food Design Working Group (2015), the first International Journal of Food Design (2016).
- The development and proliferation of academic and experimental programs: from IED Rome's Master's in Food Design (2007) to the Food Non-Food program at Design Academy Eindhoven and numerous others across Europe, Asia, and the Americas (UNISG Pollenzo, SPD's master started in 2015; L'École de design Nantes Atlantique's courses started in 2012, ESAD Reims; ESHTE in Portugal, Unesco Food Design City program in Parma), and courses at Politecnico of Milan Design Department.
- The organization of conferences, festivals and exhibitions: *Food: Bigger than the Plate* (London and New York), Elle Decore virtual *Fab Food*, works by MOFAD, the first Museum on Food in New York, International Food Design Conferences

(2012 London, 2015 NYC) Understanding Food Design Conference (Milan 2015), EFOOD conference in Lisbon (since 2017), RLAFD encounters, Creative Tastebuds, and works by Creative Chef, Arabeschi di Latte, Emilie Baltz, Cloé Rutzerveld, Studio H, Fernando Laposse, and more, together with Marti Guixe, Marije Vogelzang and Honey and Bunny.

- The emergence of the first food design labs and specialized educational centers and studios — such as the one in Mexico, in the New School and NYU, in Lisbon and at Kwantlen Polytechnic in Canada — marked a turning point. At the same time, early programs in fields not initially related to food design, such as business, hospitality, and tourism, as well as nutrition, began to incorporate courses on food design and design thinking for the agri-food sector.

This expansion raises questions about the term itself. Is *food design* still adequate, or do alternatives like *design for food* better capture its systemic ambitions? While in the previous phase, the term served to distinguish the field from food engineering or agri-food marketing, it now begins to appear inadequate in the face of the urgent need to rethink food systems in systemic, equitable, and sustainable terms. Alternative expressions such as *design for food* or *design for food systems* begin to circulate — perceived as more inclusive and less ambiguous. The debate shifts from naming to strategic positioning: the key question becomes not what food design is but how design can contribute to reimagining food systems.

Phase 3.0 – Culture, diplomacy, territory (Third Decade)

Since the early 2020s, the field of food design has become deeply intertwined with cultural institutions, public diplomacy, and territorial innovation. Museums, dedicated Food Design Labs, Living Labs, international and co-funded projects, and transdisciplinary platforms have adopted food design to raise awareness, promote education, and facilitate systemic change.

Theoretical frameworks — such as agroecology, critical pedagogy, future and anticipatory studies and postcolonial studies — have positioned food design as a mediator between knowledge systems, disciplines, actors, and places. It is no longer just about designing

things but about facilitating transitions and sustaining coexistence. Emerging design goals include quality of life, gastro-diplomacies, democracies, food diversities, food justice, cultural heritage, territorial brand identities, active longevity, circularity, behavioral decarbonization, and collective and situated imaginaries of well-being. Design becomes an instrument of civic engagement and speculative inquiry.

Despite growing visibility, designers in the agri-food domain are often relegated to communication or aesthetic functions. Initiatives like FORK – Food Design Opportunities Research and Knowledge (2021) aim to address this, positioning design as a relational and systemic force in food transitions.

Today, food design operates as a liminal form of knowledge—situated between theory and practice, embedded in co-generative processes, and focused on reflexivity rather than fixed classifications. While it now permeates institutions and real-world food systems, it is not always labeled explicitly as *food design*, often to avoid associations with haute cuisine or food styling.

We are likely on the verge of a new phase. Perhaps food design will no longer reside in a single profession but become a distributed competence shared across sectors. Alternatively, perhaps new taxonomies will emerge to clarify its many forms. In either case, its definitional fluidity is not a limitation but a strength.

The central word remains design. Not to fix its boundaries but to explore its transformative potential within the complexity of food systems.

1.2 From mechanization to ecosystems: food design in the transformation of agri-food business

The aim of the second part of this chapter is to present the evolution and role of food design in agribusiness through five main transitions, whose beginnings correspond to different historical eras of the last century, in which design has contributed to accelerating innovation and transformation in agribusiness:

1. Food design for industrial mechanization and production, with the aim of finding solutions for modernizing food production.

2. Food design for industrial food processes (with food engineering): to find ways for food hygiene and safety.
3. Food Design for mass consumption services, with the aim of identifying systems for standardizing consumption and tastes.
4. Food Design of experiences, with the aim of finding ideas for culturally and socially enhancing food.
5. Food design for social and ecological ecosystems, with the aim of discovering participatory solutions for reconnecting and integrating people and nature.

Phases	ROLE OF DESIGN IN AGRI-FOOD BUSINESS	SOLUTIONS
1 From 40s 50s	Food Design for mechanization and industrial production	Solutions for the modernization of food production
2 From 70s	Food Design for industrial food process (with food engineering)	Solutions for food safety
3 From 80s 90s	Food Design for services and mass consumption	Solutions for standardizing consumption and tastes
4 From 2000s	Food Design for experiences	Solutions to culturally and socially valorize food
5 From 2010s	Food Design for social ecology and ecosystems	Solutions for the reconnection and integration of humans and nature

Figure 2.
1940-2025. The role of Food Design in time. Sum-up representation created by the author.

These phases correspond to historical contexts (figure 2), which are explained below through some illustrative cases that describe the relationship between design and innovation in the agribusiness sector in the United States and Europe (with some focus on Italy). While the previous section analyzed the epistemic development of food design as a disciplinary field, the following section traces its applied trajectory within the evolution of agri-food business practices.

1.2.1 Food design for mechanization and industrial production

The relationship between design and food production has also been extensively explored by historians such as Sigfried Giedion in his work

Mechanization takes command (1948). Giedion analyzes the impact of mechanization on food production, highlighting how technology has radically changed food production processes. However, he also expresses ethical concerns about the loss of naturalness of food in the age of mechanization, highlighting the importance of moral considerations in food design (Giedion, 1948; Ferrara & Massari, 2015). In *Mechanization Encounters the Organic*, Giedion provides a specific example of a continuous slaughter line in Cincinnati in 1873. This system allowed workers to quickly perform different stages of the production process using a series of tools such as pulleys, rails, hatches, and knives. Live and dead animals could be handled with relative ease. Later, new processing steps were introduced, such as canning to preserve meat. Giedion points out that the introduction of this preservation technology heralded the emergence of the food industry, indicating that the full process of mechanization coincided with the introduction of metal cans for food preservation. Other examples analyzed by Giedion include the continuous cycle process for bread production, made possible by the invention of the continuous oven (by Admiral Coffin in 1810) and the industrial bread-making process by gasification (developed by the British physician Dauglish in 1858). These developments significantly reduced the baking time of bread and contributed significantly to the modernization of the product (Picchi, 2000; Ferrara & Massari, 2015).

Similar mechanization processes were also applied to the production of other bakery products, such as biscuits, through a series of micro-inventions and technological improvements. The introduction of kneading machines, such as the one installed by Peter Barlow at the British Navy Bakery in Deptford in 1836, contributed to the development of more efficient production systems to meet growing market demands, although they were not yet rationalized according to the scientific principles of Taylorism. The resistance of the organic to mechanization, as highlighted by Giedion, raises important ethical and social issues that need to be addressed in food design. Giedion manifests a moral position (Margolin, 2012) that is typical of European culture and unfamiliar to the culture of North America, where food production has taken on increasingly industrialized forms. It should also be remembered that at the time of Giedion's writing, issues of food hygiene and wholesomeness were topical and were being ad-

dressed at a political and legislative level, with an increasing number of regulations to ensure greater safety in food production (Ferrara & Massari, 2015). This required developing a holistic approach that could consider not only technological efficiency, but also the impact on health, the environment, and the quality of life of consumers and citizens (Margolin, 2012; 2013).

In Italy, the modernization of food production started more slowly than in the United States and the United Kingdom, due to a predominantly rural economic and social structure in which food production was mainly family-based. This context limited the demand for prepared and processed foods. However, key moments have been identified, particularly in geographical areas with a strong production tradition (especially in northern Italy), where traditional models have been replaced by modernization processes that have facilitated the establishment of small and medium-sized agri-food industries. These have become part of already consolidated sectors such as viticulture and vegetable oil production, with industrial processing and vinification processes. Important examples include the industrial district of Marsala, which developed in the 19th century thanks to English entrepreneurs (Ferrara & Massari, 2015).

Other sectors that underwent industrialization processes include vegetable canning, cereal and flour processing, dairy production in northern Italy, fish processing in the south, and the import of colonial products such as tea and coffee. One of the first examples of food industrialization in Italy was the large-scale production of canned peas and tomatoes by Francesco Cirio in 1857. The promotion of Cirio tomatoes with posters depicting local landscapes is one of the earliest examples of visual communication and branding linked to food, with the aim of also enhancing the territory.

In the cheese sector in Lombardy region (northern Italy), Locatelli was founded in 1860 to produce Stracchino di Gorgonzola, to which other products such as Pecorino, Grana Lodigiano, and Parmigiano Reggiano were added in the following decades. Locatelli's strategy was to build factories in the areas of origin of the raw materials. In 1936, with the acquisition of the industrial dairies of Robbio and thanks to the ideas of Egidio Galbani, the production of the iconic *Formaggino mio* for children began (Ferrara & Massari, 2015).

1.2.2 Food Design for food processing and safety

These and other examples presented in the article by Ferrara and Massari in 2015 highlight the rapid development of the agri-food sector, especially after the Second World War. Especially in the 1970s, when the process of industrialization became more pronounced, affecting traditional products such as milk and its derivatives, wine, oil, coffee, and cured meats. As the economic conditions of the population improved, traditional food consumption patterns underwent significant changes. Although the 1970s saw an increase in the consumption of vegetables and citrus fruits, sugar and coffee, the greatest change was in the consumption of meat, which had to be imported at a rate of around 60% of national requirements, as Italian agriculture had difficulty in adapting to the new demand (Yates, 1962). The evolution of food, cooking, and nutrition was accompanied by changes in tastes and socializing moments around food.

It is clear that the consolidated Italian culinary tradition, the deep-rooted ways of preparing and preserving meat, cheese and fruit, combined with the environmental conditions of specific areas, as well as the structural economic conditions and the geographical configuration (mostly hills and mountains) of Italy, have limited the drive to modernize agri-food production. In Italy today, as in the past, the territory is still a strong driving force for processing and is often opposed to standardized industrial production (the introduction of Protected Designations of Origin and Geographical Indications, based on the characteristics of the territory and tradition, is a concrete labelling instrument for preservation and protection).

The United States, on the other hand, has developed a strong industrialization and mass production of the product. Contrary to what Ferrara and Massari wrote in 2015, this is not due to a lack of food culture and culinary and gastronomic culture in the USA (Ferrara & Massari, 2015). In fact, every regional and religious reality has a strong food culture component, as evidenced by the recent rediscovery of indigenous ingredients and culinary arts in US gastronomy). Rather, the reason lies in the vastness of the territory, the distribution of productive activities and the mass lifestyle, which have allowed the development of extraordinary examples of food production with a high degree of industrialization and standardization. Certainly, the promise

of uniformity, the concept of labor-saving food (Smallzried, 1956), and reliability stimulated the expansion of specific food characteristics (Ferrara & Massari, 2015).

In the 1950s, food engineering, a discipline concerned with the practical application of food science, emerged to ensure the efficiency and safety of industrial food processes. In the US, there has been considerable overlap between food engineering and food design from the outset, although they differ in their approaches, the former being scientific and mathematical in nature and the latter being more technical, cultural and behavioral in nature. In the United States, for example, technologies for the simultaneous extraction and cooking of food were developed between 1947 and 1949 and applied to the production of new snacks, breakfast cereals, and convenience foods. On this topic, Emily Bentley, the American historian specializing in the industrialization of food, has provided a comprehensive analysis of the development of prepared and ready-to-eat foods for children, highlighting their social significance during the Cold War (Bentley, 2009).

Design contributed to the development of the industrial food product, particularly through the evolution of packaging from mere functionality to the transmission of subliminal messages related to food consumption. Between the 1950s and 1970s, the main focus of food engineering was to reduce production costs (Margolin, 2012), which overall often led to the production of poor quality food, while the demand for taste variety stimulated the addition of minor components such as flavorings, vitamins, enzymes and new ingredients (Bosoni, 2000). The *superfood* concept itself emerged as a result of extensive research and development, highlighting the process of continuous modelling and improvement of food products (Ferrara & Massari, 2015). During the 20th century, large food companies underwent a series of transformations, characterized by increasing mechanization, automation, specialization, and internationalization. These developments contributed to the growing complexity of the food chain. The development of industrial research involved the reformulation of the biological, chemical-molecular, and formal characteristics of food products to adapt them to industrial processes and new distribution and sales circuits and media. Refrigeration has been one of the biggest changes in food technology. The advent of the cold

chain since 1999 has enabled the year-round availability of previously seasonal crops, but has also had some undesirable consequences, such as a reduction in the freshness and variety of crops.

1.2.3 Food design for mass consumption and standardizing tastes

With the Fordist industry, food became more available for mass consumption, transported from rural to urban areas through long distribution chains. This process of industrialization led to a rationalization of food processes, making them predictable and controllable for economic purposes. However, this rationalization has led to a disconnection from the naturalness of food, reducing the link with the land, the seasons, and social practices. The concept of *food deserts*, originating in the United States and first introduced by agricultural sociologists and nutritionists in 1995 (Gallagher, 2006), refers to urban and rural areas where residents have limited access to grocery stores that offer fresh, healthy, and nutritious food. These communities often rely heavily on convenient food outlets, such as convenience stores, which may offer mainly high-calorie foods, but low in essential nutrients. Lack of access to healthy food has contributed significantly to public health problems such as obesity, diabetes, and other chronic diseases (Grimes & Harper, 2008).

This has led to various irregularities, such as a reduction in the freshness and variety of products due to industrial concentration on the most suitable species for processing, which has led to the standardization of agricultural and dietary practices and the standardization of taste. This process has also affected the quality of social relations in general, contributing to a progressive dehumanization of social practices (Ritzer, 1997).

In the late 1990s, some dramatic events of modernity, such as cases of food poisoning, food adulteration, the use of genetically modified organisms and the presence of chemicals in food, together with chronic diseases such as cancer, diabetes and heart disease in the populations of developed countries, challenged the paradigm of industrial food development. This has prompted governments to reinforce food safety legislation and allocate resources to microbiological food research. The ethical and environmental implications of an efficiency-focused food chain, characterized by centralized

and standardized production systems, have once again become a subject of scrutiny. The earliest theoretical inquiries into food design emerged in the late 1990s, as both practitioners and scholars began to acknowledge it as a distinct domain within the broader field of design (Catterall, 1999; Guixé, 2003). In 2002, Italian designer Paolo Barichella registered the domain www.fooddesign.it, marking a pivotal moment in the formal recognition of the discipline. Shortly thereafter, in 2004, Marc Bretillot launched a culinary design studio at the École Supérieure d'Art et de Design (ESAD) in Reims and published his manifesto *Design Culinaire: Le Manifeste* (Bretillot, 2004, see marcbretillot.design). Concurrently, Anna Cerrocchi — who initiated the first international Food Design competition in 2001 — emphasized the experiential dimension of the practice. She described food design as «a design process based on users' needs, which modifies one or more characteristics of food and/or the objects, tools, and practices associated with its consumption, with the aim of enhancing both the physical and mental experience of food» (Zampollo, 2016, p. 5).

It was in this context that the first environmental movements emerged, followed by food studies, as discussed in the next section.

1.2.4 Food design for cultural experiences and valorizing food

It was during these years that a new movement called *Slow Food* was born (Parasecoli, 2004, p. 35). The movement's manifesto had the explicit aim of countering the frenetic pace of modern life and refocusing on food from a slower, more sensual, pleasure-oriented perspective, while promoting alternative forms of sustainable agriculture, biodiversity conservation initiatives, information campaigns, criticism of the culture of fast living, and support for slow practices. This approach did not represent a total rejection of industrial processes or standardization, but rather a search for a new balance to counter the excesses of modernity without adopting reactionary positions (Andrews, 2010). In 2011, Slow Food was awarded the ADI Compasso d'Oro (the most prestigious design award in Italy) for Service Design (Ferrara & Massari, 2015).

At the same time, the media have undergone a significant transformation, particularly in terms of managing the complexity of the global food production system. Documentaries, books, and journalis-

tic reports drew the public's attention to the practical problems of the food industry and revealed government interests in meeting global market demands. These media works have highlighted a wide range of issues related to health, nutrition, economics, the environment, control of agricultural production, advertising, consumption, and issues of global hunger and resource poverty. Public and political interest in food issues has led to the creation (starting in the US) of a new academic field known as food studies (Massari, 2017; Ferrara & Massari 2015), which includes ethical, health, environmental, aesthetic and cultural-social issues that have been central to debates about food production and consumption in recent decades (Bentley, 2009, p. 5). Although food studies have helped to understand the context, in the last decade, the need and urgency to find solutions have become apparent, and in this, the contribution of creativity and design studies has become crucial and very attractive to different sectors.

1.2.5 Food design for ecosystems and reconnecting humanity and nature

When, at the beginning of 2010, with the spread of digital technology and the dissemination of information thanks to the Internet, people began to think about how to reformulate food systems and supply chains to ensure the economic sustainability of production, design methods emerged as an interesting avenue to pursue. Recognizing the importance of typical products and territories as a source of innovative ideas and projects aimed at generating value in a context of *distinction* (Ferrara, 2011), design (especially in Italy) began to promote the idea of a synergy between the defense of territorial contexts and strategic design approaches in the food sector. This emerged from the results of the research carried out by Sistema Design Italia, which identified the systemic nature of Italian design, its rich cultural and material heritage, its skills and actors, and its relations with the production system, focusing on typically Italian product sectors. In some regions, such as Sicily and Campania, particularly interesting production dynamics have been observed in the agri-food sector, with a focus on the valorization of typical products linked to local identities (Ferrara, 2001). Attention to the systemic aspects of food design has led to a paradigm shift in the discipline, which encom-

passes and mixes different disciplines, from chemical engineering to molecular physics, from biology to genetics, from anthropology to psychoanalysis, from the sociology of food to the design of convivial spaces related to food (Parasecoli, 2021).

The study of food design and agri-food production offers a crucial interdisciplinary perspective for understanding the complex dynamics of the modern agribusiness system. Design plays a crucial role in the innovation and evolution of the food sector, but it must be guided by an awareness of the social, ethical, and environmental implications of its decisions and practices.

The historical analysis presented in this section underscores the evolution of design's multifaceted role within the agri-food system. Initially utilized as a tool to support mechanization and standardization, design has evolved into a catalyst for profound cultural, social, and ecological transformation. The five delineated phases not only document technological and industrial evolution but also a growing shift in perspective, which progressively perceives food as a relational, complex, and interdependent ecosystem. This diachronic reading lays the groundwork for the following sections, which will explore contemporary and future design strategies in the agri-food domain — approaches capable of integrating sustainability, participation, epistemic pluralism, and new ways of inhabiting food systems.

1.3 Toward an evolutionary reading of food design: objects, systems, and values

In recent years, food design has progressively taken on a more articulated and integrated form, marking a new phase characterized by the convergence of design approaches, systemic dimensions, and territorial contexts. Within this framework, the local dimension is no longer perceived merely as a constraint, but rather as an opportunity to activate situated co-design practices, fostered by relational dynamics and shared spaces (Manzini, 2015). Manzini's approach to social innovation has played a crucial role in steering design toward a transformative function, capable of generating social and environmental value—particularly within agri-food contexts.

In parallel, scholars such as John Thackara (2005) have highlighted the strategic role of food in processes of socio-ecological regeneration. The *Foodprint – Food for the City* project (de Rooden *et al*., 2012) stands as an early example of how food can act as a catalyst for new local economies, sustainable behaviors, and collective narratives. The figure of the *food system designer* (Massari, 2021) thus emerges as key in facilitating transdisciplinary processes among universities, enterprises, public institutions, and local communities. Moreover, *rural design* (Thorbeck, 2013) is gaining relevance as an emerging field focused on regenerating marginal areas through the integration of natural systems and human-centered design.

These transformations can be interpreted through the following representation, which offers an evolutionary view of food design along a temporal axis ranging from the 1940s to the present day.

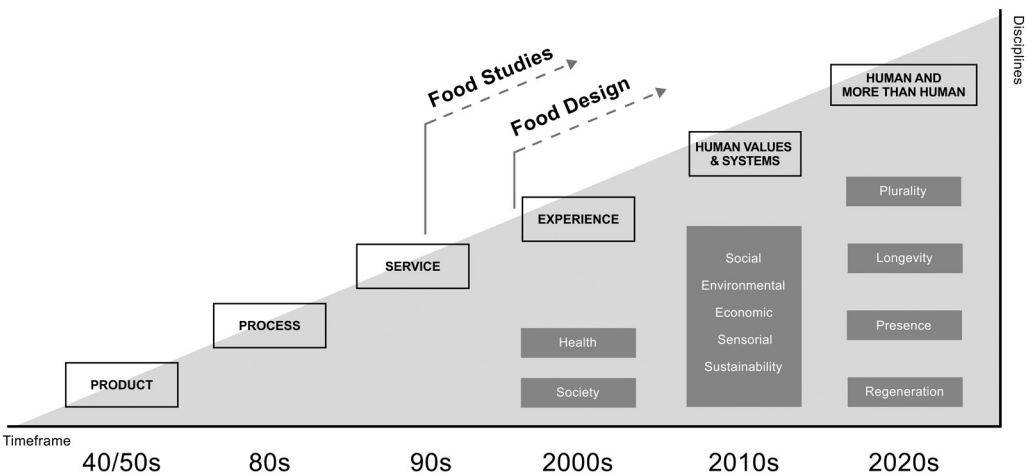


Figure 3. Evolutionary view of food design along temporal and disciplines axis. Source: Author.

The figure 3. illustrates a progressive transition:

- from a focus on food product design (1940s–1980s),
- toward an emphasis on processes and services (1980s-1990s),
- then on food experience design (2000s), also a result of digital technology becoming a part of people's lives,
- culminating in the design of values and complex sustainability systems (from 2010 onward),
- and, around the 2020s, integrating post-anthropocentric and multispecies perspectives — where terms such as plurality of

visions and actions, the longevity need, presence as active engagement, and regeneration (political, economic, social, and environmental) begin to emerge.

This evolution is accompanied by an increasing involvement of diverse disciplinary fields: initially limited to industrial design and food engineering, food design has progressively opened up to psychology, semiotics, sociology, pedagogy, and food studies, eventually incorporating agroecology, postcolonial studies, digital and complexity sciences, and more recently artificial intelligence. Food thus becomes an interface for exploring values such as sustainability, health, social justice, longevity, and regeneration.

The classifications that have emerged over the past twenty years should not be seen as competing alternatives, but rather as complementary lenses for reading the increasing complexity of the field. They offer a valuable map to navigate the contemporary food design landscape, recognizing food not merely as an object to be designed, but as a transformative medium capable of connecting disciplines, people, and contexts, and contributing to the development of more equitable, resilient, and sustainable agri-food systems.

Despite its growing importance, food design remains an evolving field and lacks a cohesive social identity (Massari, 2021). Definitions of food design vary widely among experts, reflecting different geographical and professional backgrounds (Bonacho, 2021). Some view it as a pathway to gastronomic creativity, while others regard it as a tool for social innovation (Manzini, 2015; Rawsthorn, 2013; Wilde & Bertran, 2019; Bertran *et al*., 2020). This lack of consensus also extends to public perceptions of food design, with the media often reducing it to food styling rather than recognizing it as an interdisciplinary practice. Nonetheless, food studies scholars have acknowledged its potential to drive innovation and transformative change in the food industry, highlighting its collaborative nature involving chefs, producers, and food scientists (Parasecoli, 2017).

1.3.1 Designing innovative food products for healthier and more sustainable lifestyles

In the context of the challenges of food supply in actual society, the food industry is faced with different complex issues related to nutrition, the environment, and consumer satisfaction. As the world's

population grows, it is essential to provide food that is both nutritionally adequate and environmentally sustainable. To meet this challenge, advances in biotechnology, nanotechnology, structural design, and artificial intelligence are providing farmers and food producers with new tools to find innovative solutions. However, the transition to more urban lifestyles has led to changes in dietary habits, with increased consumption of animal products and highly processed foods (Mc Clements, 2020). This has led to environmental risks such as increased production of greenhouse gases and intensive use of land and water resources. There are also human health concerns, given the adverse effects associated with the consumption of highly processed foods and foods of animal origin. As a result, there is growing interest in promoting a plant-based diet, including fruits, vegetables, grains, and legumes, to promote environmental sustainability and individual well-being. However, many people find it difficult to follow a healthy and sustainable diet due to time, cost, and availability of fresh produce.

In response to these challenges, the food industry is increasingly being called upon—also through the lens of design — to develop a new generation of processed foods that are simultaneously palatable, convenient, and health-promoting. In this evolving context, healthfulness can no longer be treated as a secondary attribute but must instead become the central driver of the food design process.

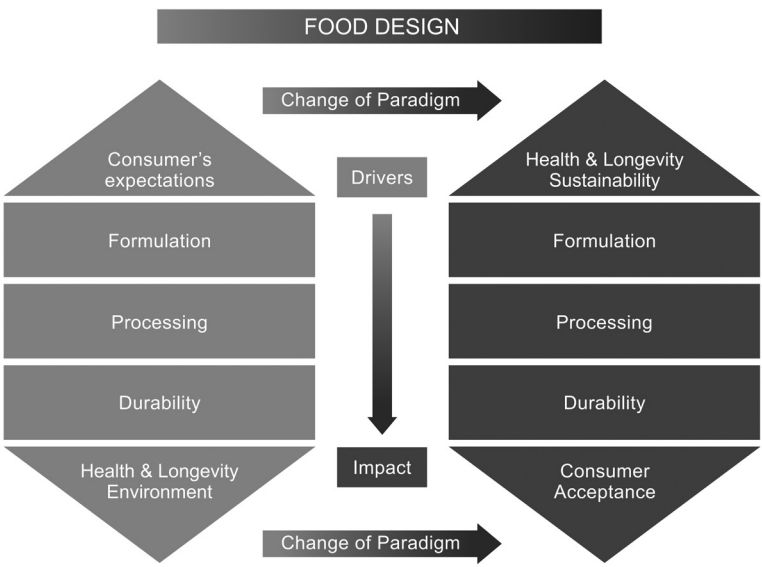


Figure 4.
A paradigm for the development of innovative products should be adopted by the industrial food value chain — one in which health and sustainability are no longer incidental outcomes (Capozzi, 2022), but integral to the design process , with *longevity* intentionally added as a further purpose by the author.
Source: Author.

As illustrated in Figure 4, this shift entails a paradigm change in which consumer expectations are complemented—and in some cases superseded—by broader priorities such as sustainability, health, and longevity. Accordingly, the selection of sustainable ingredients and technologies becomes a strategic factor, not only to ensure consumer acceptance, but also to generate positive environmental and socio-health impacts (Capozzi, 2022).

The following examples present innovative solutions to problems and needs related to food and gastronomy. Autoctonario is one of the projects launched in 2019 by Cuchara, a Uruguayan food design studio, which aims to contribute to the local gastronomic heritage through the design and marketing of products whose protagonist is the local raw material. The designers have worked with various researchers, producers, and gastronomy experts to highlight forgotten and *dormant* (Lorenzoni & Massari, 2023) resources, disseminate them among the population, and revalue them in the local collective imagination. They began by working with local fruits that were little known in their country. Chocolate was presented as the ideal complement: anything that contains chocolate becomes edible and appetizing, a great vehicle that makes it easier for people to try new flavors. For this first line, they developed snacks filled with *butia, arazá,* and *guava*, as well as chocolate bars filled with these fruits. They extensively studied the user experience, sizes, combinations, textures and colors of rock art and Indian mounds, archaeological remnants of the indigenous past. *Autoctonario* is an example of how tradition is not a static category or opposed to innovation, but part of a new combination and even a global trend, as evidenced by the rise of fusion cuisine or the success of experimental chefs around the world.

Food is a material, and even leftovers can be reused in different ways, for example, as new snacks. Elzelinde van Doleweerd, a graduate student at Eindhoven University of Technology, worked with a Chinese technology company to design food products and 3D print them from food waste.

But food design also reimagines food from its cultivation, from agriculture. Korean design studio Ulrim's *Coral* is a home algae microproduction kit that provides alternative proteins and new forms of nutrition in the home environment. This and other experiments with

alternative proteins (including solar protein) and plant-based products seem to have driven innovation in recent years.

The *Jellyfish Barge* is a floating modular greenhouse designed by designers and botanical scientists for urban agriculture. It is a low-cost solution that can purify the water it needs, uses only solar energy, is transportable and replicable, and is designed to create growable and usable spaces in urban watersheds. Combining zero-mile food production with the potential to trigger urban and social regeneration processes, the *Jellyfish Barge* is both a greenhouse and a place of encounter, education, and innovation.

These, and the many examples of projects called *recipes for the future* collected by Cerpina and Stenslei in their book *The Anthropocene Cookbook* (2022), may seem futuristic because they were created with possible emergencies or catastrophes to be faced in the Anthropocene in mind. Instead these projects have inspired other designers and innovators to create current, concrete solutions that can have both geological and ecological impacts. Many of the projects collected by the authors have their roots in radical design, the food industry, science, and film, creating cross-over hybrids (2022). For example, *Future Food Hack* (2015) explores various alternative approaches to agriculture. One of the project's kits (called *Agara*) is designed to grow food without soil. In his project *The Cow of Tomorrow* (2015), artist-designer Gong creates a future scenario in which farm animals, already heavily modified, can be further modified for energy production. He proposes implanting a tiny turbine in the cow's artery, which would allow it to use the blood flow to generate energy (p. 154). Although Gong's project is purely provocative and speculative, it is based on scientific indicators. So, it could be a clever use of existing foods, and innovations in biotechnology could mean that our future superfoods are more than just a source of nutrition.

In 2020, the start-up *Open Meals* supported the opening of the first restaurant to use a 3D printer to prepare sushi and a sophisticated health DNA identification system for its customers. Portions were 3D printed according to each person's health needs using these high-tech food concepts (*Singularity Restaurant*).

1.3.2 The impact of food design on consumer experience and food choice

Analyzing the impact of food design on consumer experience and food choice plays a crucial role in food and design research. Food design, understood as a discipline that applies design principles to food products, has been shown to be influential in shaping consumer perceptions and food preferences. Using visual, sensory, and conceptual design strategies, food design can positively influence the aesthetic appearance, taste perception, and symbolic connotation of food, thereby increasing the attractiveness and desirability of products. Furthermore, food design can play an important role in promoting healthier and sustainable food choices by encouraging the adoption of balanced diets and sourcing from ethical and local food sources (Evans, 2020; Sanders & Stappers, 2008). However, it is also important to consider the negative impacts of food design, such as the promotion of highly processed and unhealthy foods through misleading marketing strategies (Wansink, 2016). Analyzing the impact of food design on consumer experience and healthier and sustainable food choices and behaviors (which can support circularity models, bioeconomy, agroecology…) requires a transdisciplinary approach that integrates knowledge from psychology, food marketing, agriculture and design to fully understand the complex dynamics that drive consumer food behaviors (Fang *et al.,* 2008).

In Mexico, the mass availability of cheap genetically modified maize around the world has led Mexican farmers to stop growing native varieties of maize, resulting in the abandonment of many maize fields and the loss of local biodiversity. This has had a major impact on the gastronomy and food choices of Mexicans. Designer Fernando Laposse has revived the production of local maize varieties through the *Totomoxtle* project (Laposse, nd), involving women in the production process and designing solutions that use the colorful husks of native varieties as a raw material for eco-packaging and furniture solutions. A project that focuses on regenerating traditional agricultural practices to generate income for the local community and preserve biodiversity and culinary traditions for future food security. This example shows how participatory, systemic approaches to design can provide alternative livelihoods for diverse stakeholders, helping to

conserve ecological assets and support healthier, more sustainable food choices.

Among the various innovations in the field of sustainable food packaging, the *Tomorrow Machine* project is an interesting systemic solution: a Swedish design studio has created packaging based on waste that already exists in large quantities in the production of sugar, olive oil or beeswax, with the same expiry date as the product itself; the packaging becomes an educational tool and the choice of food-based materials becomes a central aspect of food sustainability.

Design, packaging, and branding can play an important role in overcoming the taboo of entomophagy, for example *HIVE* (2018) by studio *LIVIN Farms* is a kitchen product that allows its users to become micro-breeders. With Hive, it is possible to breed and feed mealworms for direct human consumption in a closed and well-controlled environment.

1.3.3 Design and design thinking for technological innovation in agriculture and new agri-food business models

The growing importance of responsible research and innovation (RRI) in the context of new technologies in agriculture has attracted interest from both academics and policymakers (Szymanski *et al*., 2021). However, while emerging agricultural technologies offer a wide range of opportunities for farmers, the process of RRI applied to such technologies is still largely unexplored in the academic literature. While the development of smart technologies in agriculture has led to an increase in the number of solutions available to farmers, the RRI process of new agricultural technologies has been little explored in research papers.

A recent research study presented by Rocha *et al.* (2024) provided interesting insights into the use of design in agriculture and food production, highlighting that design is an inherently human activity that can be applied in different contexts, including agriculture (Nelson & Stolterman, 2012). The thematic analysis conducted revealed that although design is widely considered and used to improve technological systems such as the IoT, its application in the agricultural context has not been systematically and consciously addressed. However, the growing interest in open-source agriculture and the lack of insight into the role of design in this area suggests that further research is needed to explore the potential of design in an agricultural context

in a more informed and strategic way (Kolagar *et al.,* 2022). Furthermore, the lack of consideration of social and community aspects in open-source agriculture is a gap that deserves attention and further investigation (El Bilali *et al*., 2021). The integration of design in agriculture and food production represents a rich field with still largely unexplored potential, which could open new perspectives and opportunities for the development of innovative and sustainable solutions in agriculture (Rocha *et al*., 2024). Moreover, new agricultural technologies allow developers to fully exploit the value of multiple types of knowledge and skills, and future research on innovation development in agriculture should consider that enabling the engagement of a wide range of actors and consider a greater diversity of values is essential for the development of more responsible and responsive tools for the unpredictability and complexity of today's food system.

The application of design thinking in agribusiness is proving to be a particularly useful approach to achieve this and to address key challenges such as food security, climate change, and sustainability. Over the years, design thinking has helped agribusinesses identify and address these challenges by focusing on the needs of farmers, consumers and the environment (Hurst & Spiegal, 2023).

Design thinking, a problem-solving-centered methodology introduced by IDEO in the 1990s (Brown, 2008), is a collaborative working process structured into five phases: empathy, problem definition, ideation, prototyping, and testing and validation. Design thinking is used to develop products and services that enable farmers to make informed decisions and improve their productivity and profitability (Brown, 2008). In addition, it can be applied to market research, enabling farms to gain a deeper understanding of consumer preferences, behaviors and values (Kelley & Kelley, 2013); it can facilitate collaboration with stakeholders such as farmers, suppliers, customers and regulators to develop more effective and sustainable solutions (Lockwood, 2009); and it can be used to create marketing campaigns that resonate with consumers and promote sustainable farming practices, thereby helping to improve the reputation and profitability of farms (Martin, 2009).

Through design thinking, farms can create innovative solutions such as precision farming tools, soil testing kits, and alternative fertilizers that respond to emerging farmer and consumer needs. Similarly,

design thinking can be used to improve operational efficiency along the supply chain. For example, by identifying critical points and designing targeted solutions, companies can optimize logistics, reduce waste, and improve product quality. It can also be used to improve the customer experience, for example, by designing intuitive online shopping systems or implementing tailored customer service programs. Finally, design thinking can be used to address environmental and social challenges, such as reducing food waste or improving animal welfare, by developing innovative and sustainable solutions.

Ultimately, the integration of design thinking in agribusiness promises to drive the industry towards greater sustainability, efficiency, and social responsibility through continuous innovation and responsiveness to emerging market and community needs.

In recent years, design thinking has found fertile ground in Living Labs (Lacombe *et al*., 2018; Gamache *et al*., 2020; Frow *et al*., 2015), open innovation contexts that actively involve end-users in design and development processes (Bergvahl and Ståhlbröst *et al*., 2009). This integration offers significant potential, enabling direct stakeholder involvement in the creative process and rapid iteration of proposed solutions (Leminen *et al*., 2012). Through this synergy, design thinking in Living Labs can facilitate greater uptake of innovative solutions, ensuring that they are truly aligned with end-user needs (Pallot *et al*., 2012).

For example, the unique and fundamental characteristics of the bioeconomy, such as the complexity of the knowledge base, different policy frameworks, and multiple types of innovation, pose specific challenges for the design of business models (Bröring & Vanacker, 2022). This can be described as *designing where it is hard to design*, as referred to in the concept of the book *Learning in Living Labs* (Mirthe Vab De Hee, 2024). In such contexts, characterized by complexity and uncertainty, design emerges as a key discipline to address innovation challenges in sustainable ways. Design methods can facilitate the exploration of creative and pragmatic solutions, actively engaging stakeholders and promoting the adoption of participatory and collaborative approaches. With its ability to integrate multidisciplinary knowledge and adopt user-centered approaches, design presents itself as a key catalyst for the creation of sustainable and resilient solutions that address emerging challenges (Jonas *et al*., 2008).

The literature suggests that design thinking, although not a new concept in product design, is widely used in various disciplines and sectors for the purposes of design-led innovation projects in agri-food. Ballantyne-Brodie *et al*. (2013) describe design-led innovation in a food context as a practical approach that can address scalability challenges in food sustainability projects and contribute to community connectivity and social capital development in local food initiatives. Olsen (2015) refers to this approach as a deep ethnographic immersion in the search for solutions to food needs-agency in empathy and understanding community voices, and the use of technology through scientific processes to achieve sustainable and ecological food choices. This approach enables entrepreneurial ventures in food supply issues, involving the exploitation of new ideas and opportunities through social entrepreneurial enterprises with local communities (Ballantyne-Brodie *et al*., 2013). Moreover, these attributes allow small businesses to regain control over some aspects of the food sector by allowing individuals to define what constitutes appropriate food, its provenance, and production (Corubolo *et al*., 2024). However, this right appears to be enjoyed disproportionately by affluent consumers, necessitating intentional and collective actions by various businesses and other stakeholders to ensure inclusive and balanced opportunities across alternative food networks.

The DESIS (Design for Social Innovation and Sustainability) project is a significant example of how design thinking is contributing to social innovation and sustainability. Through DESIS, diverse academic and design communities are collaborating with social, economic, and political actors to address complex challenges and promote positive change. DESIS has had a significant impact in addressing issues of equity, inclusion, and sustainability in multiple contexts, demonstrating the potential of design as a tool to create a better future for all. In addition, The Citizens' Institute on Rural Design (CIRD) project, a leadership initiative of the National Endowment for the Arts in partnership with the Housing Assistance Council, has promoted rural design through participatory workshops and design processes that link environmental, cultural, and social issues with educational, technological, and organizational research. These efforts aim to help create a healthy and prosperous rural future.

1.3.4 Design for future food

Participatory and community-based approaches to food design are intersecting with rural activism and environmental justice, particularly in contexts where socio-ecological systems are threatened by extractive economies, land abandonment, or the hegemonic logic of agribusiness. In these complex and often marginalized rural landscapes, artists, designers, architects, and innovation researchers actively engage in the development of situated practices that address material, symbolic, and ecological dimensions of food systems. These interventions often integrate new materials, visual cultures, and collaborative processes aimed at regenerating territories, fostering intergenerational knowledge exchange, and redefining the relationship between urban and rural environments, as well as between human activity and natural cycles (Lyson, 2004; Battisti *et al*., 2023).

Design here becomes part of a broader activist framework, where artistic languages and technological tools serve to engage communities, disseminate alternative imaginaries, and activate resilient forms of place-based innovation (McMichael, 2009). For instance, the exhibition *Paysans designers, l'agriculture en mouvement* places soil and biodiversity at the core of its curatorial narrative, showcasing a new generation of farmers and designers committed to regenerating ecosystems while rethinking temporalities and scales of agricultural production (Rubini & Tornier, 2022). The project proposes a new aesthetic and conceptual vocabulary for understanding agroecological transition.

Similarly, in response to the ongoing depopulation of terraced landscapes in the Italian Alps, three associations from the Vicenza region — *Adotta un terrazzamento*, *TerrazziAmo*, and *Vaghe Stelle* — have collaborated with rural communities in the Matese area to co-organize a dry-stone wall restoration workshop. This initiative not only preserves a centuries-old agricultural technique but also acts as a social infrastructure for collective memory, conviviality, and experiential learning, promoting a form of rural design rooted in care and interdependence (Alberti *et al*., 2018; Langella *et al*., 2024).

The *Intelligent Guerrilla Beehive* by artist and researcher Anne-Marie Maes bridges art and science to address pollinator extinction and biodiversity loss. Through speculative design and biomaterial

experimentation, the project reimagines beekeeping as a hybrid ecological practice, offering new modes of engagement with non-human life forms (see www.annemariemaes.net).

In *Omelia Contadina*, a short film and protest ritual co-created by artist JR and activist Alice Rohrwacher (see www.mubi.com), the decline of peasant agriculture is mourned in a symbolic funeral procession. The performative act denounces the marginalization of small-scale farmers and critiques the monocultural paradigm imposed by multinational corporations, while celebrating the cultural resilience and dignity of rural communities.

Studio Roosegaarde's Grow project (see www.studioroosegaarde.net/project/grow) explores the potential of optical technology in agriculture. Developed in collaboration with BioLumic's scientific director, Jason Wargent, and research partners, including Wageningen University, the project applies LED lighting (in red, blue, and UV spectra) over a 20,000 square meter field in the Netherlands. The light patterns, designed as artistic installations, aim to stimulate plant growth while reducing pesticide use by up to 50%, representing a fusion of science, aesthetics, and sustainable agriculture.

The *Sottrazioni* (2023) project critically addresses extractivism and land degradation by valorizing local stone-processing knowledge and minimizing waste in the transformation of raw materials. It demonstrates how the language of design can be harnessed to articulate territorial identity and to defend rural landscapes under threat from industrial and infrastructural expansion (see francescofaccin.it).

Finally, *Oltre Terra*, a project by *Formafantasma* presented at the National Museum in Oslo (2023), investigates the co-evolutionary relationships between humans and sheep through the lens of transhumance. The exhibition combines historical analysis and contemporary reflection to explore how domestication, wool production, and pastoral mobility have shaped landscapes and economies over centuries. It illustrates how design, when rooted in long-term ecological thinking, can reveal complex entanglements between species, matter, and migration (Trimarchi *et al*., 2023).

Together, these cases illustrate how participatory food design, when grounded in situated practices and relational ethics, can become a powerful tool for rural regeneration, cultural preservation, and

socio-environmental activism. They exemplify how design is not only about proposing alternatives, but also about co-constructing narratives, infrastructures, and communities that embody more sustainable and equitable food futures.

1.4 Conclusion

Within the context of current approaches to food design in the agri-food business, several significant elements emerge. Firstly, innovation in creating new food products stands out for its diversification and originality, encompassing alternatives to protein, meat reduction, nutrient-enriched foods, and nutraceutical applications. The literature and cases presented indicate a predisposition for design to take a forefront role in food system design. Historical analysis demonstrates the design's evolution and significant impact over a century in mechanizing production and creating tools for food, particularly in marketing and consumption. Design has been less prominent in production but is now showing promise in agriculture, rural communities, and the development of new food system models.

Secondly, the research underscores design's role in promoting a sustainable and healthy diet as a new paradigm for the food business. This approach prioritizes consumer centrality, promoting healthy, sustainable, and circular food choices while fostering community connections and balancing tradition with globalization. The cases presented also highlight the significant role of design in overcoming taboos and introducing emerging consumer behaviors, necessitating further research to fully understand and measure how food design can modify eating behaviors.

Lastly, another key aspect is the integration of responsible research and innovation (RRI) with information and communication technologies (ICT) and digitalization in agriculture. This combination facilitates automation and technological integration, promoting participatory and co-design approaches to responsibly and innovatively address challenges in the food sector.

This chapter aimed to elucidate the multifaceted reality of food design, recreating past identities and traditions using contemporary

elements to imbue them with new meanings. One of design's primary roles today is to invent new reciprocities. If modernity forged the idea that humans could dominate the environment and exploit nature, contemporary crises confirm the need for a paradigm shift. The challenge is to imagine and unveil alternative and emergent pathways.

Design today can contribute by advocating for the identities of rural and marginalized communities through activities that valorize artisanal traditions and local knowledge. It could become a bridge between past and present, conveying the cultural and historical roots of rural communities to new generations and culturally distant urban communities.

More systemic and transdisciplinary studies involving design should be activated in rural communities to facilitate understanding of drivers for more sustainable economic development, to create collaborative networks between local activities and authorities, to reduce consumption and waste, optimize processes, and generate positive impacts. This would enable a transition towards a more sustainable economy, transforming rural areas into places of soil conservation and active ecological awareness.

Design approaches like Norman's *humanity-centered design* (2024), along with rural design and other design thinking processes, appear promising for rural planning. Design can be a powerful tool to help rural communities make decisions about land use, architecture, and aesthetics that enhance quality of life and the environment, connecting social, artistic, cultural, technological, and environmental issues that shape the rural place, promoting sustainable economic development for rural communities, and improving human, livestock, crop, and ecosystem health by integrating research and practice among the many disciplines involved in rural issues to meet rural needs, provide new data, and stimulate new research questions. Lastly, the aim of activism artworks and radical speculative design projects presented here is evidence of what design can do to raise awareness among the public about challenges and innovations in the agri-food business.

In conclusion, a deep conviction underpins the structure of this book: design is the capacity to understand complexity, identify opportunities, and generate sustainable solutions for communities. In this

sense, food design is not limited to the creation of artifacts or experiences; it fosters entrepreneurship, innovation, and coexistence. It constitutes both a material and symbolic platform for cultural co-design. Designing food, therefore, means designing forms of conviviality.

These themes will be further developed in the chapters that follow, which explore how design can be used to interpret food values, activate transformative processes, and contribute to the regeneration of agri-food systems and the contexts through which they unfold.

2. The dual nature of food: food as object and medium of human activity

Changes in food and eating habits have been extensively analyzed across various disciplines, each adopting heterogeneous theoretical approaches. Some interpretations emphasize the decisive role of industrialization processes and technological development in redefining eating behaviors, while other perspectives attribute their evolution to structural changes of a psycho-emotional and relational nature or even to cultural and symbolic phenomena related to the construction of identity. An alternative, more critical view considers such changes as superficial manifestations, are them as devoid of any substantial impact on the deeper structures of society. Other sociologically based approaches highlight how food choices are shaped predominantly by the logic of adaptation and social belonging, according to which food reflects the consumption habits and distinctive strategies of social classes (Poulain, 2008).

Since the origins of scientific psychology, food has been analyzed not only as a response to a primary need but also as a central element in cognitive, affective, and relational developmental processes. Early childhood feeding practices, for example, have been read as a primary

form of mother-child interaction in which biological, emotional, and symbolic aspects are intertwined. Empirical studies indicate that infants possess an innate capacity for self-regulation in nutrient intake, which, however, can be susceptible to modification by dysfunctional educational practices and environmental stimuli (Birch, 1999).

The evolution of psychological theories has helped consolidate the view of food as an object capable of shaping or conditioning human behavior, with approaches ranging from psychoanalysis to learning theories to more recent systemic-relational perspectives. Since the 1980s, attention has gradually shifted to the study of the interpersonal and social dynamics that shape knowledge and expectations related to food and consumption contexts.

In parallel, contributions from marketing and advertising have oriented the analysis of eating behavior toward an understanding attitudes, needs, and environmental influences on consumption (Steptoe *et al*., 1995). However, the literature still tends to favor a view centered on the physiological or emotional aspects of eating behavior, neglecting the role of food as a cultural and cognitive artifact.

The progressive deconstruction of traditional food patterns, in terms of meal composition, timing, and places of consumption, is part of a context of increasing complexity, where individual choices are configured as the outcome of negotiations between often conflicting dimensions: health and pleasure, tradition and innovation, environmental sustainability, and economic needs. In this scenario, food both reflects and contributes to shaping contemporary society, marked by dynamics of mobility, digitization, and spectacularization (Scrinis, 2013).

As posited by Barthes (2006), food is not merely a set of substances but a system of signification — a repertoire of images, gestures, and social norms that must be analyzed within their cultural and historical context. In a liquid and uncertain society (Bauman, 2000), traversed that is continually undergoing technological and cultural transformations, food assumes multiple forms: it is care, ritual, performance, and communication. The growing influence of media contributes to transforming food into a normative device, an element of social distinction, and an object of identity performance (Franks, 2008).

In this framework, food is configured as an object of activity and a cultural mediator. Human beings have always mediated their relationship with food through material tools — utensils, technologies, and artifacts — that facilitate its enjoyment, but more importantly, transform its cognitive and symbolic meanings. Food artifacts, whether biological, technical, or digital, operate as mediators between the individual and the environment, contributing to the construction of knowledge and cultural production (Malafouris, 2013). Through food, narratives are transmitted, traditions are preserved, a sense of belonging is constructed, and innovation is experienced.

As presented in Chapter 1 of this book, technologies, and design processes have not only changed the environments of food production and consumption, but have also redefined the relationship between human beings and food, sometimes reactivating forms of consumption considered residual or obsolete. Examples include the return to local markets, buying directly from producers, and enhancing local products through digital platforms. In these cases, food is embedded in dense contexts of meaning — foodscapes — that reconfigure it as an aesthetic, cultural, and social experience (Johnston & Goodman, 2015).

Food choices, therefore, cannot be reduced to predefined market categories but must be understood as dynamic processes of negotiation in which personal values, material and symbolic contexts, cultural norms, and systems of meaning interact (Fischler, 1988). Food, today more than ever, represents a liminal dimension between public and private, between corporeality and an ethics, and between desire and control. In many cases, it is also an instrument of self-regulation, a search for well-being and control over individual existence. In a society marked by anxiety and uncertainty, it can embody as much a source of pleasure as a factor of stress and frustration.

While the medicalization and fragmentation of contemporary food highlight a process of extreme rationalization (Scrinis, 2013), food choices continue to be permeated by rituals, moral norms, and symbolic forms of belonging (Franks, 2008). Food is ultimately configured as a totalizing artifact, capable of conveying knowledge, facilitating social interactions, expressing identity, and reflecting the significant socio-cultural changes of our time. As observed by Spence

and Piqueras-Fiszman (2014), the sensory experience of food is also shaped by the tools, environments, and symbolic codes that accompany it, confirming the active role of artifacts in the co-construction of the food experience.

This chapter is organized in main five sections:

2.1 – Introduces the socio-cultural foundations of food practices through a Vygotskian and historical lens.

2.2 – Frames eating and food experience as an activity shaped by six key cultural mediations.

2.3 – Explores the role of tools in the genesis of the human–food relationship, investigating how they mediate and transform our evolving interaction with food.

2.4-2.5 – Concludes by analyzing the material and ideal components of food artifacts, and proposing a co-evolutionary perspective between cognition and food culture.

2.1 The food experience through the cultural-historical approach

The objective of this chapter is to explore the nature and origin of the relationships through which human beings define their food culture, to analyze how such mediations are transmitted across time and space, and to understand the role they play in food-related practices. The food experience is examined here through the lens of the cultural-historical approach, using Vygotsky's model of semiotic mediation as the analytical framework. In this model, the subject, the artifact, and the object of activity are interconnected (Vygotsky, 1987; Wertsch, 1991). The strength of this perspective lies in its ability to identify the objective of the activity as a structuring element through which the subject assigns meaning to the resources mediating their experience.

In this historical investigation of human food practices, so-called *natural* functions have been intentionally set aside (Cole, 1995, p. 100) to focus on cultural functions — that is, the mediations between subject and object.

Six fundamental relationships have been identified through which humans construct and define their food experience, attributing

meaning and value to food. The selection of these six cultural dimensions — sensorial, bodily, spatial, material (ingredient-based), productive/distributive, and social — emerged from a decade-long process of systematic observation and critical reflection across design, education, and transdisciplinary research in the food sector. Rather than stemming from a predefined theoretical framework, these six relationships were developed through an iterative process of categorization like the grounded theory approach (Glaser & Strauss, 1967), which identified recurring patterns of phenomenology across case studies and food-related artifacts.

These relationships serve as heuristic devices, offering analytical and design tools to support the understanding of food practices as culturally mediated activities in which materials, meanings, and values are interwoven and continuously transformed over time. The theoretical framework adopted is consistent with the cultural-historical perspective (Vygotsky, 1973; 1974), which views human action as structured by both material and semiotic tools, and with Schön's (1983) notion of reflective practice, which emphasizes the situated nature of knowledge.

Moreover, these relationships are aligned with contemporary approaches to systemic design for social change. Building on the legacy of design for social innovation (Manzini & Meroni, 2014; Meroni, 2007), creative communities (Mulas *et al*., 2017; Hu, 2011; Biggs & Travlou, 2012), systemic food innovation strategies (Manzini, 2015; Fassio & Tecchio, 2019; Fassio, 2017; Fassio & Cirilli, 2023), and network-based approaches (Dentoni *et al*., 2023; Dentoni & Bitzer, 2015; Dentoni *et al*., 2018), these relationships enable food to be understood not merely as an object or individual act, but as a dynamic nexus where local knowledge, cultural values, technologies, and social relations converge.

These six relationships unfold within culturally and socially mediated environments, where interactions with others play a crucial role in the development of cognitive capabilities. Historically, the intergenerational transmission of culinary traditions has enabled the preservation and evolution of culinary practices, giving rise to new food cultures. Tomasello (2005, p. 246) describes this phenomenon as the *ratchet effect*, emphasizing the cumulative nature of cultural learn-

ing. Ontogenetically, individuals acquire the use of cultural artifacts through daily interaction with others, internalizing them and developing higher psychological functions.

Every cultural element, including food practices and habits, has a dual nature: both objective and subjective. This implies that higher psychological functions, although initially formed on the interpsychological plane, constantly transform when they manifest on the intrapsychological plane (Vygotsky, 1987). This dynamic system reflects the ambivalence often inherent in individual food choices.

Food can be both the object and the medium of cultural mediation. In other words, within an activity, food may shift from being a mere object to becoming a cognitive tool capable of influencing preferences, choices, and eating behaviors. Understanding the relationship between socially embedded practices and the material substrate that embodies them — whether located in the minds of individuals or the cultural tools at their disposal — is therefore essential.

This leads to another duality of food artifacts: mediations always involve both a material and a conceptual component. Both play a fundamental role in shaping practices and activities and may evolve in parallel or diverge over time, provoking transformations — direct or indirect — in the systems of activity in which they are embedded.

This chapter emphasizes that food culture, as it is conveyed through diverse means and artifacts, can shift across time and space, influencing the organization of human thought and, consequently, individual behavior. Cognitive performance, like the food experience itself, is shaped by the artifacts that mediate individual activity; thus, understanding these performances requires considering the cultural history in which they are embedded. For this reason, it is crucial to study the tools of mediation and to reflect on what they are currently producing — and will continue to produce — in terms of significant changes, many of which remain unforeseeable.

The central question is: can we influence and transform the values through which people define their food? If so, can we redirect food choices toward healthier and more sustainable behaviors? Only by understanding these mechanisms can designers conceive new artifacts capable of influencing future food cultures — even the most

deeply rooted ones — and propose behavioral models oriented toward greater sustainability and well-being.

2.2 Food experience as a mediated and intentional activity

The food experience cannot be reduced to merely ingesting nutrients. If that were the case, artificial forms of feeding such as intravenous or enteral nutrition administered when individuals are unable to eat independently would also qualify as food experiences. However, such a reduction would be short-sighted, failing to grasp the complexity that characterizes the human relationship with food.

Unlike most animal species, the human relationship with nourishment is not limited to a physiological response to stimuli. Instead, it is the result of a mediated and intentional activity constructed within a cultural system. Humans interact with the world — a world of which they are an integral part — by creating what Armesto (2010) defines as *the meaning of eating*. But what does the act of *eating* imply in contemporary times?

Eating means seeking, choosing, preparing, transforming, matching, ingesting, exciting, judging, growing, preventing, teaching, communicating, remembering, and much more (Golino, 2014; Parasecoli, 2011).

Thus, the food experience extends well beyond the moment of the meal. It also occurs during product selection at the supermarket, tasting a dish, writing or following a diet, cooking, or searching for a restaurant online. Every food-related decision — from *what to cook today* to *how to cook it tomorrow* — involves the use of tools and practices: recipes, utensils, dietary regimes, commercial products, life philosophies, and value-based choices.

Hunger and satiety, the quintessential biological stimuli, constantly interact with other types of mediation stemming from the physical, social, and cultural environments in which individuals are embedded (Rozin, 1990; Geissler, 2000). In this regard, Aleksandr Luria's early work (1928) remains highly relevant, emphasizing how tools transform the human developmental environment and the structure of

psychological processes. Food experience, therefore, is never direct; artifacts always mediate it.

In contrast with traditional cognitive psychology (e.g., Goldstein, 2010; Groome, 1999), the cultural-historical approach developed by Vygotsky invites us to analyze human intentionality through the relationships individuals establish with the tools and signs they use. This paradigm rests on three foundational principles (Vygotsky, 1987):

- Semiotic mediation.
- The general genetic law of cultural development.
- The genetic (or historical-genetic) method.

As Wertsch (1995) observes, these three elements are conceptually inseparable and mutually illuminating, providing an integrated theoretical framework for analyzing mediated experiences, including those related to food.

2.2.1 Semiotic mediation and food artifacts

According to the principle of semiotic mediation, distinctive human behaviors are based on a mediated relationship with the environment, one that utilizes culturally acquired signs and tools (Vygotsky, 1974; 1997; 1998). This form of mediation breaks the immediate stimulus-response link observable in animals, instead introducing *self-generated stimuli* capable of intentionally guiding human behavior. These auxiliary stimuli allow individuals to exert voluntary control over their actions (Figure 5).

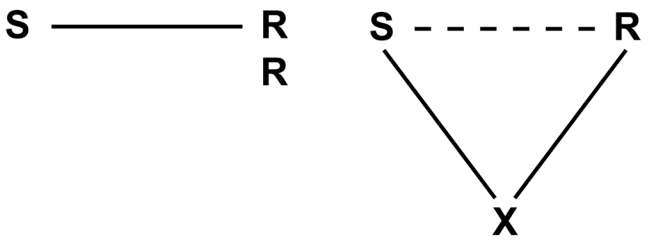


Figure 5.
The representation of natural and cultural forms of behavior.

Vygotsky's approach can be effectively aligned with theories of situated and distributed cognition, such as Gibson's ecological approach (1966; 1979; 2000) and the concept of affordance as developed by Norman (1988; 1999; 2013). Both frameworks challenge the traditional

view that action arises solely from the extraction of properties from objects. Instead, they propose that perception and action are shaped by intentionality and contextual embeddedness. Similarly, Jakob von Uexküll argues that, while animals are bound to their structural environments, human beings possess the capacity to transform the meaning of symbolic signals, to construct artificial environments, and modify them over time (Uexküll, 1982; 2001).

Vygotsky is even more explicit in emphasizing the individual's ability to actively integrate environmental stimuli into their mental activity, qualitatively transforming them through intentionality. His concept of the extracortical organization of higher psychological functions anticipates an integrated biological and cultural genesis of thought. This perspective allows us to move beyond both behaviorist and rationalist reductionism, reinstating action and context as primary agents in the construction of meaning (Save, 2003).

On a methodological level, this implies that every cognitive function — memory, attention, food experience — must be studied within the system of historically and culturally determined artifacts that mediate its expression. The cultural-historical school conceives of the individual and culture as co-constitutive elements whose isolated study inevitably leads to inadequate simplifications.

2.2.2 Eating behavior as unit of analysis

The cultural-historical approach proposes as its unit of analysis the interaction between subject, object, and artifact as its unit of analysis (Cole, 1996), represented through a triangular model that distinguishes between the direct biological relationship between subject and object (dashed line) and the culturally mediated one (solid line).

This unit is composed of three fundamental dimensions: the subject engaged in the activity, the object — the goal pursued through the activity — and the artifact that mediates the relationship between the subject and the object (Figure 6). The triangle highlights the distinction between natural functions, represented by the dashed line connecting subject and object directly, and cultural functions, characterized by the mediation of artifacts, which tend to transform and sometimes even replace direct biological functions.

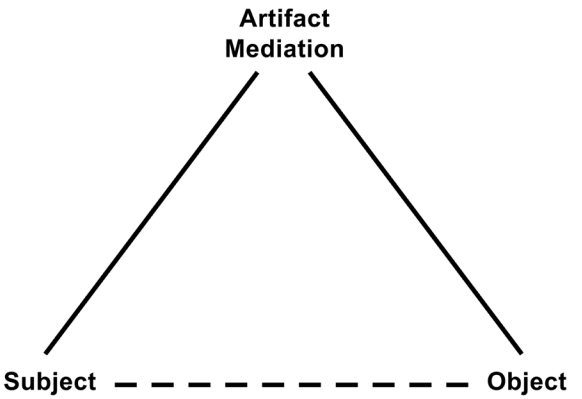


Figure 6.
Unit of analysis of activity according to Vygotsky.

A clarification is necessary. Both the biological and cultural pathways are essential for human development. The mediated cultural pathway does not substitute for the biologically determined S–O relation; instead, it overlays it. The S–O relation represents a biologically rooted connection that can occur independently of mediation. However, through cultural mediation, we can create a second level of reality that coexists with and may even override the biologically determined one. The biologically evolved structure remains foundational — Vygotsky was unequivocal on this point.

A paradigmatic example is offered by eating disorders such as anorexia, bulimia, and obesity, which reveal the complexity of eating behavior in contemporary societies. These conditions are virtually absent in non-industrialized contexts and were historically associated with religious or symbolic frameworks (Nuvoli, 2010). In modern Western societies, by contrast, eating becomes an act heavily charged with social expectations, aesthetic pressures, and emotional dynamics, often overshadowing its primary biological function of sustenance.

In such cases, the food experience reflects an increasing difficulty in distinguishing between biological needs and psychological desires, between physiological and emotional stimuli. Food, in this sense, becomes an affective, symbolic, and expressive medium (Counihan, 1999; Fischler, 1988; Mennell *et al*., 1992). This calls for a broader reflection on the communicative nature of so-called *inadequate* eating behaviors, which should also be analyzed through the lens of food semiotics (Parasecoli, 2011).

Returning to the Vygotskian triangle, each dimension — subject, object, artifact — contributes to defining the others. Artifacts, for example, possess a history and a function that make them interpretable only within the specific activity in which they are used. The subject's intentionality becomes legible through the goals pursued and how artifacts are employed or transformed. These same artifacts are expressions of the subject's intentions in interaction with the environment, and they take shape or evolve in response to specific objectives. Thus, the subject's intentionality and cognitive performance cannot be understood without taking into account the goals that guide their actions and the artifacts that mediate their realization. Nor can those goals be interpreted without considering the subject's history and identity, as well as the functions enabled by the specific artifact in use.

Take the example of a diet: it is a mediating tool through which individuals structure their eating behavior. The diet prescribes what is permitted and what is excluded, but its meaning varies according to the subject (age, health condition, social role), the context, and the goals pursued.

The same logic applies to everyday practices such as setting the table or following a recipe. These activities cannot be interpreted without understanding the artifacts involved, the purposes of the action, and the context in which it unfolds. This means that even the most familiar actions carry complex layers of meaning. As Rizzo (2020) notes, every artifact implies a dual relationship: on the one hand, it is designed to support a specific activity; on the other, it simultaneously alters that activity and reshapes the perceptual, motor, and social modalities of the agent who uses it.

In summary, the relationship between subject, object, and tool is never neutral nor static: it is always situated, culturally determined, and open to transformation. It is through this lens that the present work seeks to analyze the genesis and evolution of contemporary food experience.

2.2.2.1 Six relational mediations for defining the meaning of food

To outline the dynamics through which the meaning of eating is constructed in human experience, it is helpful to draw on the his-

torical-anthropological approach proposed by Jean-Louis Flandrin (2007). In his seminal work *Histoire de l'alimentation*, Flandrin opens the investigation with three foundational questions:

> **In what ways, and since when, has human nourishment differed from that of animals? Is it the type or the variety of foods? The preparation that humans subject food to before eating it? Or the rituals that surround its consumption, the conviviality, and the social functions of the meal? (Flandrin, 2007, p. 5)**

These questions introduce a reflection on food as a fundamentally cultural act, where food is not merely an object of consumption but a relational and symbolic device. As Nuvoli (2011) argues, in contemporary societies, food becomes «a locus for the mobilization of interests» (p. 102), serving as a medium through which social ties, identities, and value systems are constructed.

Food choices are deeply influenced by dynamics that extend far beyond the nutritional sphere, encompassing cognitive, affective, and socio-cultural dimensions. The selection of a food item is the outcome of a complex interaction between prior knowledge, subjective preferences, environmental conditioning, and emotional processes — a configuration that aligns with the concept of the «food environment as a culturally mediated and socially constructed space» (Nuvoli, 2011, p. 109).

This multiplicity of determinants has led scholars such as Fischler (1992; 2011) to introduce the concept of the *tyranny of choice*, describing the tension experienced by the modern subject between freedom of choice and existential uncertainty: the broader the range of food options, the more complex the decision-making process becomes, often generating anxiety and insecurity toward both the unfamiliar and the familiar. In such a context, eating behaviors cannot be analyzed as static structures but must be understood as contingent outcomes of constantly evolving processes.

The developmental perspective proposed by Vygotsky (1987) offers a robust theoretical framework for understanding how cultural tools and human activities, including those related to food are shaped through forms of mediation. Vygotsky suggests shifting the

focus from the analysis of objects to the analysis of processes, placing at the center the historical and cultural development of cognitive functions:

> **If we substitute the analysis of the object with the analysis of the process, then the principal task becomes, obviously, the reconstruction of each stage in the development of that process: the process must be traced back to its initial stages. (Vygotsky, 1987, pp. 94–95)**

This perspective allows us to interpret practices such as cooking not as mere technical acts but as complex cognitive activities whose function depends on the context and the goals pursued. For instance, cooking can be understood as a professional act (in the case of a chef), as an act of love (in a domestic context), or as an aesthetic and identity expression (as in the case of an amateur culinary enthusiast). While these actions may appear externally similar, they differ significantly in terms of intentionality, function, and meaning.

Vygotsky defines *fossilized behaviors* as those activities so deeply internalized that they become opaque to reflective awareness. This concept is echoed by Patel (2008), who observes that food artisans and practitioners are often unable to verbalize their practical knowledge, as it is embodied and activated in real-time through an implicit cognitive process:

> **An explanation is that they *know* how to do it, and this creates considerable ambiguity and confusion regarding the concepts and words used to describe the work process. (Patel, 2008, p. 96)**

To systematize this complex phenomenology of food experience, this book proposes the adoption of an analytical model that identifies six types of relational mediation through which human beings construct meaning, attribute value, elaborate consumption practices, and define their identity. Such mediations in the food context (Figure 7) are:

1. Relationship with the senses;
2. Relationship with the body;
3. Relationship with food as raw material - ingredients;

4. Relationship with production and distribution — food systems;
5. Relationship with the/to space;
6. Relationship with others.

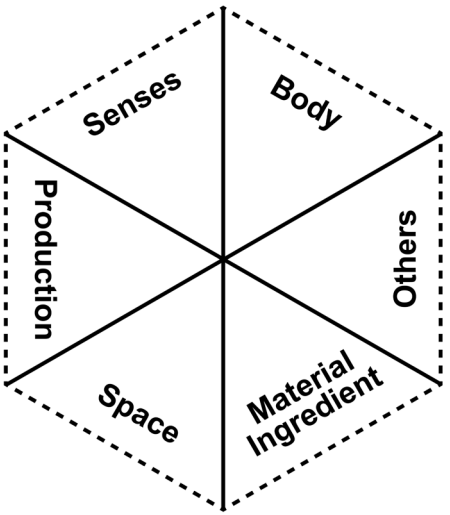


Figure 7.
The Six Mediated Relations.
Source: Author.

The model of six relational mediations that structures the food experience is the result of theoretical systematization and qualitative analysis carried out during the author's doctoral research (Massari, 2012) and subsequently applied in her educational work in the field of the food design. This model was developed from a heterogeneous corpus of design artifacts in the field of food design, ethnographic observations, documented case studies, and scientific literature drawn from various disciplinary fields — including the anthropology of food (Fischler, 1992; Counihan, 1999), cultural psychology (Vygotsky, 1987; Bruner, 1966; 1991; 1997), sociology of the body (Featherstone *et al*., 1991; Featherstone, 1991), and food semiotics and history (Flandrin & Montanari, 2007; Montanari, 2006).

The six identified mediations — sensorial, bodily, material, productive, spatial, and social — represent emergent categories derived from observed practices, which have been organized within a unified interpretive framework capable of connecting the perceptual, cultural, and symbolic dimensions of eating and acting food (Figure 8 and 9).

This proposal aligns with a tradition of typological models that aim to define the meanings of food experience and can be situated along-

Figure 8.
Artifacts as food-mediated relations between subject and object.
Source: Author.

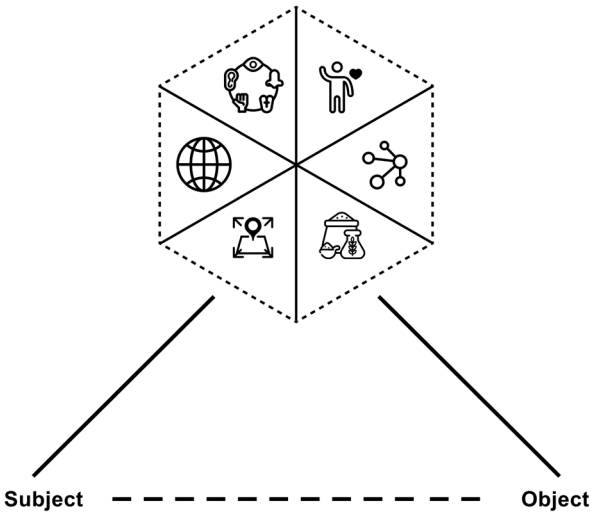
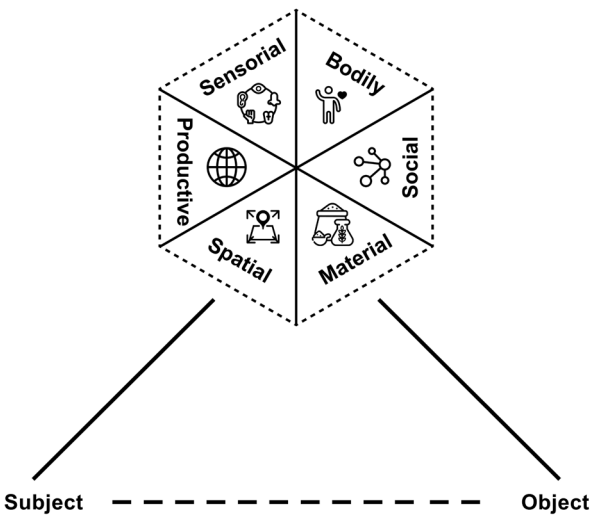


Figure 9.
Six mediations: spatial, social, material, productive, bodily, sensorial.
Source: Author.



side works such as Lévi-Strauss's Culinary Triangle (1964), Pollan's notion of the omnivore's Dilemma (2006) and Poulain's systemic classifications of eating behaviors (2008). The goal is to provide a theoretical framework applicable to the design of services, environments, and artifacts in the field of sustainable food and food innovation.

As emphasized by Rizzo (2000; 2020) and Ingold (2011; 2013), the analysis of each of these relationships cannot be separated from their historical evolution, social function, and the cultural goals that have shaped them. In the remainder of this chapter, we will demon-

strate how these relationships serve as tools of cognitive mediation, enabling humans to organize their food experiences in a coherent and culturally situated manner.

2.2.2.2 Sensorial relationships as embodied mediations

In contemporary society, the sensorial dimension has taken on increasing centrality within the food experience. The body, far from being a passive receiver of stimuli, becomes an active cognitive agent. Franchi (2009) identifies a tendency toward *aesthesis* in this process — a form of embodied synesthesia in which the subject, fully immersed in the experience, perceives food with and through the body. Food thus emerges as a multisensory medium capable of triggering complex forms of perception and emotion, where touch, smell, taste, sight, and even hearing contribute to the subjective construction of taste.

This approach is supported by neurocognitive literature on the role of sensory systems in the construction of food preferences and gustatory memory (Rozin, 1982). The organoleptic properties of food form the basis by which individuals learn to discriminate, select, and attribute value to food, not only in nutritional terms but also in symbolic ones.

A paradigmatic example can be found in the ontogenetic development of taste preferences. Studies in the psychology of eating behavior show that infants tend to prefer sweet flavors and soft textures while rejecting bitter or sour tastes. This innate predisposition is shaped over time by early sensory experiences, affective associations, and family dynamics (Ventura & Worobey, 2013).

Sensoriality is therefore an integral part of an implicit, culturally situated learning process in which the body functions as a cognitive interface.

Medical literature has also emphasized the modulatory effect of specific taste stimuli on behavior: for instance, a sweetened solution can reduce stress and the perception of pain in infants (Smith *et al*., 1990). This effect is not merely physiological — it is rooted in the sweet taste's capacity to evoke positive emotional associations, which then act as mechanisms for self-regulation and well-being.

The use of food for sensory gratification and emotional regulation is also evident in behaviors of overconsumption, such as binge eating, that exceed the primary function of nourishment and instead operate as symbolic and cultural practices (Fairburn, 2008). Nonetheless, the literature lacks a systematic theorization of binge eating as a ritualized form of sensorial mediation. It would therefore be valuable to draw upon research from social psychology on eating behavior (Herman & Polivy, 2008) as well as studies on *mindless eating* (Wansink, 2006; Wansink & Sobal, 2007).

Many food preferences are shaped through repetition and exposure — for example, familial practices that condition rhythms, tastes, and meal patterns from early childhood onward, establishing unwritten rules that guide behavior more than internal physiological signals. The senses not only receive stimuli but also learn and incorporate cultural, aesthetic, and symbolic values.

As Merlin Donald (2000; 2001) observes, human sensory experience is intertwined with higher-order cognitive systems that mediate perception through cultural structures:

> **Our perceptions of complex events depend on abstract concepts such as action, causality, space, and time, which are deeply influenced by culture and have supplanted a different cognitive field. (2001, p. 5)**

The body, through the senses, becomes a thinking tool — capable of elaborating knowledge in real-time (Wilson, 2002; Gallese & Lakoff, 2005). This perspective is also confirmed by embodied neuroscience (Gallese & Sinigaglia, 2011), which attributes a central role to the body in cognitive and decision-making processes.

This emerging dimension is clearly expressed in artisanal culinary practices, where the senses become tools for control and evaluation. Patel (2008) emphasizes how skilled cooks utilize vision, touch, and smell as forms of embodied cognitive mediation. The consistency of pasta dough, the aroma of a cake in the oven, or the color of a sauce provide the sensory cues needed to make complex operational decisions without relying on standardized tools.

> **The aim in this case was to create functional cognitive models, which are primarily physical: they correspond to a general schema of goal-oriented thinking. (Patel, 2008, p. 95)**

Empirical measuring practices — such as gauging the right amount of flour *by eye* — become situated cognitive schemas learned through imitation, practice, and adaptation. This kind of knowledge is transmitted through apprenticeship, observation, and correction — often within family or professional contexts — giving rise to a proper epistemology *of doing*.

Over time, this knowledge becomes *embedded* in the body. It is refined through practice, eventually becoming adaptive automatisms capable of responding to environmental variables (such as humidity or seasonal ingredient changes). In this sense, one can speak of endocorporeal learning, where knowledge is inscribed in the body and its actions.

This vision of the body as a sensorial and cognitive unit, activated through practice and purpose, contributes to redefining food not merely as an object of consumption but as a tool for constructing knowledge, value, and identity.

2.2.2.3 The relationship with the metabolic body: between transgression and control

The body is one of the primary interfaces through which human beings attribute meaning to food. Eating is not merely a biological function — it constitutes a symbolic space in which tensions, conflicts, idealizations, and disciplinary practices are enacted. In this sense, food becomes an incorporated object of consumption, directly influencing bodily aesthetics, health, and social representation.

As Franchi (2009) points out, one of the deepest contradictions lies in the ambivalence between transgression and control: on the one hand, food is a source of pleasure, hedonism, and gratification; on the other, it becomes an object of vigilance, self-censorship, and identity construction. This dualism is reflected in what Featherstone, Hepworth, and Turner (1991) define as the construction of the *postmodern body* — a good to be cultivated, displayed, and optimized, serving both as an identity marker and a surface for cultural projection.

In advanced modernity, the body acquires a biopolitical value, not only as the locus of individual health but as an emblem of success, efficiency, youth, and self-discipline. Thinness, once an aesthetic attribute, has evolved into a social norm, incorporating values such as speed, productivity, and well-being (Nuvoli, 2011). In this context, diet — understood as a regulated set of eating practices — becomes a cultural mediating tool used to shape the body according to socially sanctioned ideals.

This process is not new. In the Middle Ages, the Galenic theory of the four humors provided an epistemological framework in which each food was assigned symbolic qualities (hot, cold, dry, moist) to be balanced according to the individual's temperament (Armesto, 2010). Foods and cooking methods were prescribed not only for dietary reasons but as moral-medical acts intended to maintain psycho-physical and cosmic balance. Similarly, macrobiotic cuisine and traditional Eastern medical systems such as Ayurveda still rely on analogous systemic logic.

This cultural system of food values persists today in varied forms. The proliferation of dietary regimes — from ketogenic to Mediterranean, from *mental* diets to *sensorial* ones — attaches moral, identity-based, and symbolic significance to foodsin addition to their nutritional content. However, a rigorous scientific review would require, in specific passages, a clearer distinction between clinically validated approaches and cultural belief systems. For instance, the often implicit equivalence between *natural* and *healthy* food demands critical scrutiny, as it is frequently contested in the fields of nutrition and food policy (Nestle, 2013; Scrinis, 2013).

Taken as a whole, diet functions as a *situated cultural artifact* that must be understood about its historical context, its individual and collective purposes, its representations of the body, and the regimes of knowledge that sustain it. Far from being a neutral behavior, *eating healthy* is often loaded with moral judgments and political implications. For example, vegetarianism is frequently motivated by ethical, ecological, or spiritual concerns, leading to a moral elevation of food and a critique — implicit or explicit — of dominant dietary norms (Beardsworth & Keil, 1997).

Historically, many religions have utilized food as a means of regulating both the body and the spirit. Jewish dietary laws (*kashrut*),

for example, go beyond hygiene concerns to sacralize everyday life through food. In this context, cooking *kosher* becomes an act that fuses ethics, identity, and spirituality — what Foucault (1988) would have described as a *technology of the self*.

The relationship between body and food is also deeply social. The body is continuously observed, judged, measured, and subjected to mechanisms of inclusion and exclusion. Obesity, for instance, is not only a clinical condition but also a stigmatized social category that can lead to marginalization, as numerous studies in social psychology have shown (Puhl & Heuer, 2009). At the same time, entire markets of self-surveillance are emerging — from the diet industry to nutraceuticals, from cosmetics to fitness trackers.

Shifting focus from the *biological body* to the *relational body*, it is important, following Corbeau (1992; 1997), to distinguish between *sociality* and *sociability*. The former refers to the set of norms and codes imposed on the individual according to their social status; the latter concerns the individual's creative capacity to negotiate, adapt, and reinterpret these norms, including through food practices (Nuvoli, 2011). This dual dimension — both structured and agentive — is inscribed in the conceptual triangle of the consumer, which evolves and space, allowing us to understand how food choices emerge from a situated interaction between the individual, the context, and the food itself.

2.2.2.4 The relationship with the material food: material and cultural matter

The relationship between humans and food ingredients originates first and foremost as a material interaction — an adaptive and technical dynamic that predates the symbolic codification of food. Before the ingredient became *signifying*, it was a matter to be touched, preserved, domesticated, and transformed.

As Jared Diamond (1997) observes, culinary knowledge has deep roots in the technical evolution of civilizations. The human ability to select and combine ingredients was decisive in the transition from hunter-gatherer to agrarian societies. Through empirical experience, humans learned to ferment, salt, dry, crush, and cook foods, developing forms of technical knowledge that preceded culinary codes.

Cooking tools — such as primitive earthen ovens, stone grills, or metal vessels (see Papin, 1691) — acted as material mediators between humans and nature. These artifacts not only rendered ingredients edible but also made them culturally transformable. As Montanari (2006) notes, the passage from edibility to *cookability* marked a turning point: food becomes a *work*, the result of deliberate technical and cultural choices.

Thus, the ingredient is not a given but a product of applied knowledge. The domestication of spices, the selection of cultivars, the invention of recipes, and the use of tools and fuels — all confirm the ingredient's role as an *epistemic material*, a bearer of technical and social knowledge.

Culinary transformation is, therefore, an act of cultural mediation through which the ingredient is endowed with meaning. Lévi-Strauss (1964), with his *culinary triangle*, interpreted preparation techniques (raw, cooked, rotted) as cultural codes through which each society constructs fundamental symbolic oppositions. While his model has been criticized for its rigidity (Poulain, 2002), the central idea remains: cooking is not merely a technical process but a form of language.

As a transformable material, the ingredient also becomes a vehicle for constructing both individual and collective identity. As Sutton (2001) suggests, cooking is a form of embodied memory where ingredients act as catalysts for affective, cultural, and mnemonic meanings. In line with recent studies in food design and sensory interaction (Mueller *et al*., 2023), the ingredient is understood as a material interface through which individuals act, perceive, and construct meaning.

At the same time, the inclusion or exclusion of certain ingredients reflects ethical, religious, political, or environmental values (Heldke, 2003). As highlighted in recent works by Lupton and Turner (2022), the ingredient is now embedded in complex meaning networks that encompass corporeality, digital narratives, and the performative expression of food-related identity.

Based on this complexity, we can identify at least five distinct value dimensions through which humans ascribe meaning to food ingredients:

1. Edibility
   Refers to the biological and cultural criteria by which a substance is considered food. This value is highly variable and subject to symbolic and ritual norms. Mary Douglas (1972) demonstrated how food taboos serve to reinforce social order and mark cultural boundaries. Edibility is never fully objective; it is always interpreted within social frames.
2. Digestibility
   Encompasses both physiological suitability and perceptual acceptability. Fischler (1988) emphasized how the *principle of incorporation* functions symbolically: what we eat changes who we are, but who we are also shapes what we can *digest* culturally. Digestion becomes a metaphor for identity and social compatibility.
3. Quality
   Refers to aesthetic, sensory, and technical value ascribed to the ingredient. Notions such as authenticity, craftsmanship, or sensory refinement are often social constructions rooted in memory, reputation, and storytelling (Johnston & Baumann, 2015). The idea of *goodness* extends beyond flavor to include ethical, emotional, and cultural dimensions.
4. Healthfulness
   This value is grounded in both scientific knowledge (or its popular interpretations) and in media-driven discourses. Scrinis (2013) critiqued the dominance of the nutricentric view, where foods are primarily judged by their nutritional content, thereby fostering moralistic classifications (good/bad, natural/industrial) that shape contemporary dietary practices.
5. Symbolic Value
   Includes the affective, ritual, and identity-related meanings attached to an ingredient. *Comfort food*, for example, evokes deeply personal or familial memories (Sutton, 2001). In other cases, such as religious cuisines or alternative food movements, the ingredient becomes a symbol of moral coherence, activism, or a sense of belonging.

These value dimensions are layered and interdependent: an ingredient may be edible but culturally indigestible, healthy but perceived

as low quality, or tasty yet symbolically unacceptable. Cooking and consuming ingredients, therefore, involve a continuous negotiation among social norms, personal preferences, expert knowledge, and cultural practices.

From an ecological and multispecies perspective, the ingredient can no longer be conceived solely as a raw material to be transformed. Still, it must be understood as a living presence within a web of vital and sympoietic relationships. Food thus becomes an expression of co-evolution between humans and their natural environments — a dynamic node within ecological networks that involves soil, climate, plants, animals, and microorganisms. To rethink the ingredient in these terms means to recognize not only its cultural and nutritional value but also its ethical and relational significance within agri-food design processes.

In many indigenous cultures, the ingredient is not seen as inert matter but as a living being with which humans establish reciprocal relations. As Robin Wall Kimmerer (2013) notes, the act of gathering, cooking, or offering food is part of a spiritual and ecological reciprocity system, where food is a gift, not a commodity, and gratitude is an integral part of the process. This ontological perspective, found in Native American, Andean, Oceanic, and African communities, invites us to rethink the ingredient as an ethical and spiritual mediator, one rooted in care, listening, and responsibility. Integrating such worldviews into food system design also means acknowledging plural food epistemologies and valuing ancestral sustainability practices that may prove essential in addressing global ecological challenges.

2.2.2.5 The relationship with production and distribution: omnivorous knowledge

Food procurement has always been a central activity in shaping the human relationship with food. Forms of food production and distribution have historically defined not only what and how we eat but also how we know, evaluate, and select food. The ingredient thus acts not only as a mediator of taste or memory but also of cognitive and symbolic processes related to the food supply chain.

In early societies, the link between diet and territory was direct: food availability depended on the ability to exploit the local environ-

ment in a balanced way. Humans gathered, hunted, cultivated, and bred using rudimentary tools, adapting to the ecological niches in which they lived (Diamond, 1997). In this context, food biodiversity was a widespread and embodied knowledge: so-called *package crop systems* (such as rice-soy in Asia or maize-beans in the Americas) integrated nutritional, agronomic, and cultural needs (Montanari, 2006).

Artificial selection and the agricultural revolution triggered a process of rationalization and simplification of cultivation systems. Whereas in the past, farmers cultivated what they consumed, today, the distance between production and consumption is mediated by progressively complex logistical, economic, and communicative systems. In particular, agricultural industrialization has led to a drastic reduction in crop diversity: according to the FAO, about 75% of genetic crop diversity was lost during the 20th century (FAO, 2019).

This growing distance has cognitive implications: the average consumer has lost direct contact with production cycles and, with it, much of the traditional ecological knowledge. Food becomes anonymous, decontextualized, while the production process is entrusted to invisible specialists (Lang & Heasman, 2015). However, it is precisely this opacity that fuels a new demand for transparency and meaning: consumers now seek information on origin, agricultural methods, supply chains, labor ethics, traceability, and environmental impact. In other words, the production-distribution relationship takes on an epistemic value.

As Pollan (2006) notes, the modern omnivore — today's consumer within complex food systems — is required to resolve an epistemic dilemma: on what grounds should one base food choices in a context marked by informational overload and product proliferation? The contemporary response is a search for *cognitive anchors*, which take shape through certifications (e.g., organic, PGS, fair trade), quality labels, territorial narratives, and digital traceability tools (TruCost, 2021). Food is thus evaluated not only for what it is but for how it has been produced, distributed, and narrated.

From this perspective, the act of purchasing food itself undergoes a transformation: buying local food from small producers or through

participatory platforms becomes an act of belonging, responsibility, and often a political identity. *Local or Km0* food, for example, acquires symbolic value as a counter-narrative to globalized food systems. Yet, as Fonte (2013) points out, this value is not intrinsic; instead, it emerges from the web of relationships activated between consumer, producer, and territory.

The increasing complexity of food systems has led many scholars and activists to speak of food literacy or food system literacy — a set of competencies enabling individuals to critically understand and assess the relationships linking production, distribution, the environment, and health (Vidgen & Gallegos, 2014; Cullen *et al*., 2015). The ability to read the supply chain becomes a cultural and political practice: conscious purchasing, seasonal consumption, and support for regenerative or biodynamic practices are not merely nutritional decisions but actions of identity and systemic mediation.

A notable case is the consumption of food from biodynamic agriculture (regardless of scientific validation, what matters here is the meaning attributed by the consumer), often distributed through direct digital platforms. In such models, food value extends not only to its nutritional properties but also to the narrative information accompanying the product, including regenerative philosophy, respect for soil health, seasonality, and the relationship with the producer. Those who choose such products often accept changes to their consumption habits — e.g., eating only what is naturally available — partially delegating planning to the supplier. This purchasing model, based on trust and storytelling, configures a digital mediation of food value (Utter *et al*., 2021) and demonstrates how distribution itself can become a pedagogical and cultural tool.

The ability to read the food supply chain extends beyond the passive reception of information; it requires a critical understanding of the underlying production and distribution models. In this regard, it is useful to distinguish between two approaches (Table 1).

These two models coexist within today's food systems, yet they respond to different values, expectations, and visions of food. The ability to choose between them — or to integrate them — is now a core competence within food system literacy (Cullen *et al*., 2015; Vidgen & Gallegos, 2014).

Conventional Model	Alternative Model (e.g., CSA, farmers' markets)
Long supply chain with multiple intermediaries	Short or ultra-short supply chain, often direct
Industrial production focused on the standardization	Local, artisanal, diversified production
Standardized and regulated labeling	Relational traceability and direct knowledge of the producer
Consumer as a passive actor (price-taker)	Consumer actively involved in decision-making
Unidirectional (one-way) communication (packaging/advertising)	Bidirectional communication (dialogue, networks, events)

Table 1.

An example of food citizenship: *La Ruche qui dit Oui!* (France/Europe). One of the most emblematic models of food citizenship is that of Community Supported Agriculture (CSA), which fosters direct cooperation between producers and consumers. A relevant case study is *La Ruche qui dit Oui!*, a European network founded in France in 2011, which connects local farmers and urban consumers through a digital platform.

The principle is simple: each *ruche* (hive) is a local buying group managed by a coordinator (often a non-farmer citizen) who organizes the weekly distribution of orders in a shared space. Products are traceable, seasonal, and local, and profits are shared between producers and coordinators. Beyond the economic aspect, the initiative promotes transparency, accessibility, and participation, reinforcing the connection between those who produce and those who consume.

According to Brunori *et al*. (2019), initiatives like *La Ruche* promote a new form of food democracy based on informed choice, reciprocity, and attention to social and environmental sustainability. These models foster diffuse learning, raise consumer awareness, and valorize short food supply chains as tools for civic empowerment. The relationship between production and distribution thus becomes a cognitive and cultural mediation: food serves as a carrier of information, and the act of consuming it entails a continuous negotiation between expert knowledge, accessibility, ideology, and desire. As omnivores, humans do not merely choose what to eat — they decide how to relate to the food system in which they are embedded.

2.2.2.6 The relationship with space: food landscapes, foodscapes, and narratives

As early as the late nineteenth century, Edward Bellamy envisioned in *Looking Backward* (1888) a future society in which domestic kitchens had disappeared, and meals were consumed collectively in large *people's palaces*, with menus ordered remotely (Bellamy, 1992). This utopian vision surprisingly anticipates certain contemporary practices related to industrial distribution, food delivery, and the deconstruction of the domestic kitchen (Steel, 2020; Warde, 1999). More than mere science fiction, Bellamy's utopia offers a valuable lens through which to reflect on the long-term transformations in the relationship between food, space, and society.

Food is deeply embedded in the spaces where it is purchased, prepared, and consumed. Spatiality is not merely a functional or environmental context but a symbolic and social device that shapes perceptions, practices, and the meanings attributed to food (Franchi, 2008).

Throughout history, food-related spaces have served as a site for defining social and cultural hierarchies. In medieval societies, for instance, the arrangement of dishes on the table reflected the social order: the finest foods were placed near high-ranking diners, while the sharing of utensils, cups, and surfaces among multiple individuals constituted a form of promiscuity that was later regulated by early etiquette manuals (Montanari, 2006).

In the contemporary context, the relationship with space has been reshaped by social, technological, and cultural changes. Increased mobility, women's participation in paid labor, the flexibilization of daily schedules, and the individualization of consumption have transformed meal rhythms and reorganized food spaces (Franchi, 2009; Warde, 1999).

Food experiences now unfold *around the clock* and across a multiplicity of locations: people eat in cars, offices, shopping centers, and public urban spaces. The domestic kitchen is complemented — and in some cases replaced — by hybrid environments such as bistros, coworking spaces with food services, and meals delivered and consumed in informal settings. The pervasiveness of food spaces does not diminish their symbolic dimension, but rather continuously reinvents it.

Research on *food environments* and *foodscapes* (Mikkelsen, 2011; Yasmeen, 2006) emphasizes that space is not merely a backdrop but a performative actor in food practices. The aesthetics of environments, the interior design of restaurants, the layout of market stalls, or the packaging architecture in supermarkets directly influence consumption choices and habits. Wansink (2006), for instance, demonstrated that container shapes, lighting, visual layout, and even background music can significantly affect food intake. In a similar vein, Spence (2020) showed that integrated sensory design (e.g., sound, light, touch) in food consumption spaces can have measurable effects on eating behavior and taste perception.

This spatial dimension is also central to understanding the symbolic value of consumption settings: a sandwich eaten outdoors can carry a completely different meaning than the same food consumed in a school cafeteria or a fast-food restaurant. The value of food is never absolute but always relational and situated.

In experiential marketing and consumption design, food spaces are crafted to trigger immersive narratives: consider thematic formats (Asian street food, medieval restaurants, gourmet kitchens), food halls modeled after historical markets, or the spectacular staging of fine dining experiences. In these contexts, food becomes a vehicle for multisensory storytelling, and space turns into a stage for performative expression (Scarpato, 2002).

A paradigmatic case is that of restaurants that center their offering on the theatricality of food preparation. From Japanese teppanyaki to molecular cuisine and more popular formats like culinary cabaret or televised show cooking, food takes on a performative and communicative role, generating shared imaginaries and a new aesthetic status for eating. From this perspective, even domestic space is being reimagined: kitchens become open-plan, merge with living areas, transform into culinary laboratories, and carry symbolic markers of identity (technology, sustainability, craftsmanship). The design of kitchenware, the organization of the refrigerator, and the presence of professional tools all function as indicators of a food lifestyle expressed through space (LeBesco & Naccarato, 2012). Carolyn Steel (2020), in her work *Sitopia*, proposes a systemic vision of the city through food and the spaces it inhabits, arguing that the way we

organize food shapes our urban environments, social relations, and identities.

It is important to acknowledge that agricultural settings, such as farms, farmers' markets, and urban gardens, have emerged as venues for cultural engagement and food-related tourism. The proliferation of experiential agritourism initiatives, educational farms, and accessible food manufacturing facilities underscores this transformation. In these spaces, food narratives are co-constructed with producers, thereby reinforcing the link between product, territory, and identity. Food thus acquires value through the spatial relationships that frame it, guide its practices, and define its symbolic possibilities. Food space is both culturally constructed and a constructor of culture — a place where sensory experiences, memories, belongings, and aspirations are articulated.

2.2.2.7 The relationship with others: food as a social device of inclusion, exclusion, and belonging

The act of eating is never a purely individual gesture. Even in its most solitary forms, food evokes relationships — with others, with a reference community, and with shared symbolic systems. Food plays a central role in processes of socialization, identification, and differentiation and is therefore considered by scholars to be a social artifact (Fischler, 1988; Counihan, 1999; Counihan & Van Esterik, 2012).

This social dimension of food manifests itself from the earliest stages of human relational experience: it is through the family, affective bonds, and daily routines that one learns a *language of eating* made up of rules, rituals, shared tastes, and aversions. As noted by Sutton (2001), eating practices are transmitted through exposure and imitation within relational contexts. Cultural transmission of food thus takes place through interpersonal processes and codified forms of implicit knowledge.

In many religious communities, dietary prescriptions perform normative and identity-shaping functions. Jewish dietary laws (kashrut), for instance, regulate not only which foods may be consumed but also how they must be prepared, served, and shared. The Torah sets distinctions between permitted and forbidden animals: quadrupeds must have cloven hooves and chew the cud (such as sheep, goats,

and cattle); among birds, only those that are non-rapacious and diurnal are permitted; among fish, only those with fins and scales. Cooking meat in milk is prohibited, in observance of the ban on consuming *the calf in its mother's milk*. Moreover, the slaughter and preparation of meat must follow specific rituals, which vary even among Jewish communities — Sephardic in the Mediterranean, Ashkenazi in Eastern Europe, and Levantine in the Near East — each with its own interpretations and localized practices of kashrut.

As Fischler (1988) argues, food taboos often serve as symbolic boundaries that reinforce collective identity. Religious prescriptions can thus be interpreted as devices of cultural and spiritual cohesion. Historically, power structures have also used food as an instrument of inclusion and punishment. The Carolingian capitularies, for example, report that abstention from meat was prescribed as a penalty for serious crimes, with clear symbolic implications (Montanari, 2006). In the absence of primary sources directly consulted, such references should be interpreted cautiously and may benefit from further historical investigation.

Table manners, which emerged in the Middle Ages and were codified over the centuries, respond to the same logic of social distinction. As Elias (1978) contends, table etiquette constitutes a system of learned self-control that functions both to discipline the body and to delineate the boundaries of civilization. Food thus aggregates and disaggregates. It can forge deep bonds — as in family meals, convivial rituals, or celebratory banquets — but can also exclude, stigmatize, or provoke xenophobic attitudes. In certain contemporary political and media narratives, others' food habits are used as identity markers to justify the rejection or marginalization of ethnic and cultural groups (Heldke, 2003; Johnston & Baumann, 2015).

The notion of *authentic* or *traditional* food — central to contemporary food and tourism marketing — is often the outcome of simplification and nationalization of culinary and gastronomic memory. Italy represents a prominent example: as Domenichini (2007) explains, the concept of a *national culinary tradition* is a recent construct, emerging between the late 19th and early 20th centuries, aimed at unifying and codifying the plurality of local cuisines into a homogeneous identity narrative. Franco La Cecla has referred to this

process as the *invention of tradition*, instrumental in constructing national identity.

However, the relationship between individual and community is not unidirectional. As already mentioned, Corbeau (1997) distinguishes between sociality (the values and norms imposed by culture) and sociability (the personal and creative use the individual makes of those norms). Thus, the individual is not merely subjected to cultural impositions but can reinterpret, transgress, or transform them into meaningful personal experiences.

A contemporary example is the ritual of the aperitivo, which in recent decades has acquired significance as a moment of fleeting aggregation and diffuse sociability: an informal, quick, and highly symbolic instance of urban postmodern conviviality. While lacking quantitative systematization, qualitative studies on urban food practices highlight its aggregative and symbolic functions (Warde & Martens, 2000).

In educational and participatory contexts, food is emerging as a medium to promote inclusive practices, foster intercultural dialogue, and support processes of urban regeneration and social cohesion (Eden *et al*., 2008). In this sense, participatory design applied to food can offer concrete tools for activating collaborative relationships and new forms of food citizenship.

Finally, food is configured as a layered relational device, capable of acting simultaneously on multiple levels: psychological, social, cultural and political. The relationships that humans establish through food are always situated in intersubjective space, where the meaning of an ingredient, a dish, or a gesture depends as much on context as on the relational history of the person performing it. This perspective proves particularly productive in the domain of participatory food design and eating design, where eating practices become opportunities to design relationships, negotiate identities, and create new spaces for sharing. As Manzini (2015) argues, participatory design applied to food can activate transformative processes grounded in local interactions, convivial practices, and new forms of active citizenship.

Although such mediation is traditionally centered on human relationships, an expanded reading also includes *non-human others* (Figure 10): farmed animals, plant species, environments, ecological

agents, and microorganisms that actively participate in food systems. In this sense, food design can take on a multispecies function, opening up to forms of conviviality, care, and responsibility that transcend the human–non-human divide. This expansion helps illuminate dynamics that are often marginalized but critical to ecological sustainability and justice.

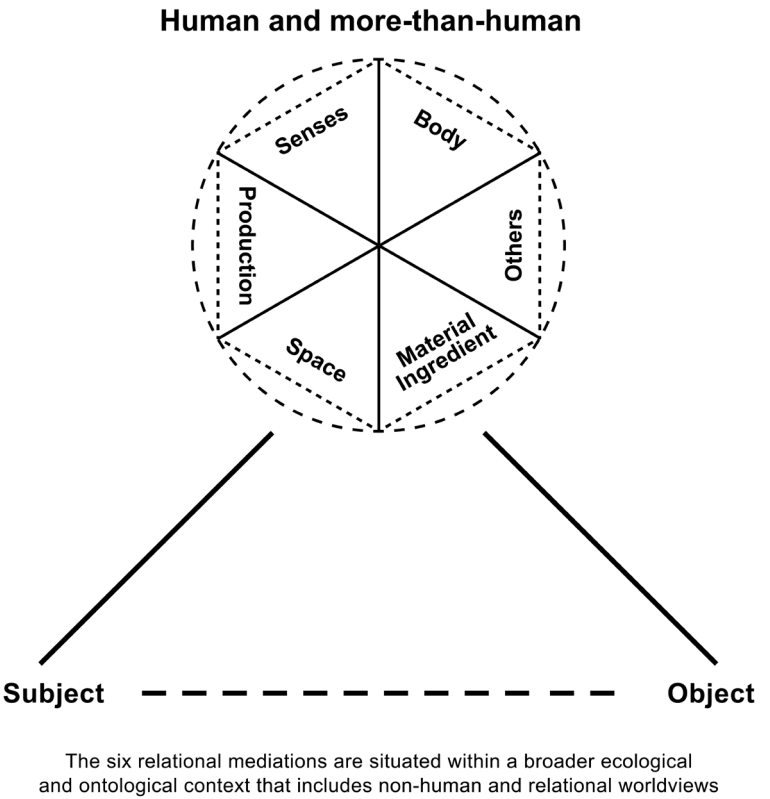


Figure 10.
Six relations in food ecological and multispecies frame.
Source: Author.

Indigenous epistemologies offer a radically different perspective on the relationship between humans and food. In many native traditions, food is understood as a relational being, part of an animated cosmos imbued with spirit and subjectivity. This conception diverges from the Western ontology of food as an object or resource, opening the way to an ethics based on reciprocity and gifting rather than extraction and consumption. In the context of food design and agri-food systems design, these worldviews have the potential to inspire more eco-centric and de-colonial approaches, grounded in respect for the

land, soil regeneration, and the recognition of non-humans as co-actors in the system.

The integration of these perspectives into food design does not entail the simplification or instrumentalization of these viewpoints. Rather, it signifies an acknowledgement of the plurality of knowledge systems and the transformative value of Indigenous epistemologies. These epistemologies offer radically different ways of understanding the relationships between food, living beings, and territory.

Authors like Robin Wall Kimmerer (2013) and Kyle Whyte (2018) urge us to consider these ways of knowing not as *alternatives* but as living knowledge systems that raise essential questions about how we dwell, cultivate, and design in the world.

2.2.3 The egg as a mediating device

The recent crisis in the egg sector in the United States — marked by price hikes, health emergencies related to avian flu, tensions along industrial supply chains, and the expansion of plant-based alternatives — represents a paradigmatic case through which to observe how a single food item can rapidly change its value and simultaneously activate the six cultural mediations of food described in the previous chapter. According to the U.S. Bureau of Labor Statistics, egg prices dropped by 12.7% in April 2025 — the largest monthly decline since 1984. Although the recent drop in egg prices offers some relief to US consumers, the overall picture remains complex. Supply chain resilience, disease management, and consumer confidence will all be key factors in determining whether this downward trend will continue or prove to be only temporary.

This emblematic example offers a fertile ground to explore how food mediations intertwine. From the body to the territory, from the senses to collective identity, each dimension is activated and redefined through the convergence of production crises, technological transformations, and value-based conflicts. The egg, once an ordinary ingredient, is increasingly becoming a systemic and cultural node in the United States (as potentially elsewhere) revealing the complexity of contemporary food design. Let's now explore some food design examples related to eggs that may help to better understand the scope of the six relational dimensions previously discussed.

First, the mediation with the body is reactivated by the tension between scientific nutritional knowledge and widely shared perceptions of health and risk. The egg, traditionally seen as a daily protein source, becomes the subject of diverging narratives that question its healthiness, encouraging new eating habits and selective consumption practices. Consider the example of food designer Annie Larkins' *plant-based egg project* (2019), which aims to highlight the unethical and unsustainable practices of industrial chicken farming. Its key ingredient is pea protein isolate, used to replicate the nutritional profile of a real egg. To reproduce the egg's characteristic *sulphur-like* flavor, Larkins uses *Kala Namak* — a kiln-fired rock salt from South Asia — while an *alginate* (a natural acid extracted from brown algae) forms a yolk-like sphere that can burst like a real egg. Larkins emphasizes that her creation is not intended as a market-ready product, but rather a work-in-progress that explores how to feed a growing population without placing further strain on the planet. Her hope is to create space for conversations around food sourcing and production in the context of the climate crisis.

In parallel, the mediation with the ingredient reveals increasing complexity: the egg is not merely food, but a technical-functional component essential to Western culinary systems. Its substitution with alternative products — plant-based, fermented, or 3D-printed — raises questions about the design nature of ingredients and the redefinition of what is considered natural.

The egg crisis also intersects with the mediation of production and distribution: the industrial farming model, based on economies of scale and global logistics chains, reveals significant vulnerabilities. This has triggered local responses, forms of agri-food mutualism, and new territorial design practices that refocus attention on origin, production methods, and traceability. A few years ago, eating designer Marije Vogelzang conducted an experiment called *EGGCHANGE* — a pop-up *bank* and alternative philosophical-economic model. In this space, fertilized eggs became natural capital: each user could open an account and receive an egg, with the possibility of eating it, incubating it, hatching a chick, and perhaps initiating a regenerative cycle. The value of the investment was determined by time and care, not by financial profit. Returns were governed by natural laws, not the market. *EGGCHANGE* invited participants to reflect on the economic

system that includes us all — farmers, consumers, institutions — and proposed a paradigm shift: bringing the ethical issue physically into the home, taking care of an animal, and experiencing firsthand what usually remains invisible. In this way, the chicken on the plate takes on a new meaning — personal, political, and relational.

On the level of spatial mediation, the configurations of food-related places are shifting: in restaurants, markets, and retail spaces, eggs become absent, substituted, highlighted, or celebrated. Their presence or absence communicates symbolic, aesthetic, and ethical messages. Domestic kitchens also adapt, reformulating recipes and everyday rituals. In 2024, at a renowned Italian food and wine exhibition, the project NEW EGG was presented — a surprising collection of domestic chicken coops born from the collaboration between the artists Vedovamazzei and a high-quality egg producer. The initiative aimed to develop projects that reimagine a renewed relationship with nature, crossing boundaries between disciplines and domains (art, architecture, design, and food).

The mediation with the other emerges through the value tensions eggs generate: vegans and vegetarians, environmentalists and producers, critical consumers and nostalgic defenders of the *real taste* all confront one another on ethical, political, and cultural grounds. The choice to consume or reject eggs thus becomes both an identity statement and a form of social positioning.

The sensorial mediation is no less significant: the texture, yolk color, smell, and cooking behavior of egg substitutes challenge taste memory, trust in experience, and openness to perceptual hybridization. Food design must engage with consumers' sensory intelligence and the tacit culture of taste. Designer Giulia Soldati, with the aim of inventing and promoting new dining rituals, launched Con.tatto, which literally means, *Con-Tact* (2016), a project in which eating with one's hands becomes part of the dish's completion process. It challenges individuals to step out of their comfort zone and rediscover food through touch. In one experience, a raw egg yolk is placed on the palm and gently rocked to be seasoned with salt, pepper, and fried bread crumbs; meanwhile, on the back of the hand, a Mediterranean-inspired dish can be recreated using homemade egg pasta, cherry tomato sauce, olives, capers, and basil.

Taken as a whole, these dynamics reveal how a seemingly simple ingredient can become a complex device — one capable of activating practices, conflicts, and imaginaries. The egg, from an ordinary food item, is reconfigured as a systemic and cultural node, demonstrating how the six mediations can serve as an effective analytical lens to interpret the complexity of food in contemporary society (often acting as more than one value lever at the same time). From this perspective, designing (or rethinking) the egg means designing an ecosystem of relationships, values, and visions of the future.

2.3 The role of tools in the genesis of the human–food relationship

Humans have always needed nourishment to survive: carbohydrates, fats, proteins, minerals, vitamins, and water — all of which are found in natural substances within their environment. These substances are selected and consumed in the form of food, which can be defined as culturally constructed and socially valued products, transformed and ingested according to protocols of use and meaning that are deeply socialized. As Sutton (2001) points out, food memory is embodied and socially mediated, constructed through the daily interactions between the body, culture, and food.

In certain Italian pedagogical and cultural perspectives, food knowledge is also understood as an empirical process guided by the senses and transmitted through imitation and practice within local communities (Cherchi, 2007). While this view is useful from a descriptive standpoint, it can be significantly strengthened through engagement with international theoretical contributions that have examined cultural transmission and embodied learning in food-related processes (Fischler, 1988; Sutton, 2001; Mintz & Du Bois, 2002).

From this perspective, food can be considered a structuring tool in the cognitive and social organization of human groups (Poulain, 2008), serving as a cultural system that shapes behaviors, identities, and values through both material and symbolic mediations.

A methodological note is needed here to clarify the theoretical framework presented in the previous section (2.2). The six mediations

— senses, body, material, production/distribution, space, and others, social — emerged from a qualitative coding process conducted during the author's doctoral research, involving the analysis of food-related artifacts, design practices, and case studies. While the model is not yet formally established in international literature, it was developed using a qualitative approach inspired by grounded theory and design ethnography and aligns in part with well-established disciplinary areas such as food studies, cognitive sciences, design, and anthropology. As such, it is intended as a heuristic tool to support relational and systemic analyses and interventions in food systems.

This chapter adopts a qualitative interpretative approach: some examples and observations are drawn from oral sources, unpublished research materials, and design practices observed during the author's professional experience. Although not generalizable, these data serve as starting points for theoretical reflection consistent with the scientific literature on food as a relational and cultural construct (Pink, 2009; Julier, 2000; Kimbell, 2011).

The following paragraphs will explore the role of these mediations in shaping the human–food relationship across time and space and how the use of food-related tools has influenced human evolution — phylogenetic, historical, ontogenetic and microgenetics**.** Each level of analysis — biological, cultural, and individual — contributes to understanding the origins and transformations of food practices and the knowledge systems that support them in relation to context and intention.

2.3.1 Phylogeny, biological inheritance, and eating styles

A co-evolutionary relationship between genetic heritage, environment and culture is manifested in food. According to Tomasello (2005), human beings are bearers of a dual inheritance: biological and cultural. The first is expressed in the human capacity to adapt to natural environments; the second is the ability to interpret, transform, and transmit knowledge and tools, including those related to food.

Nutrition, as an adaptive behavior, has evolved throughtout the history of the human species. For a long time, dietary choices were determined by the local availability of resources and by the human organism's adaptation to its habitat. For instance, genetic research has

shown that populations with a historical pattern of dairy consumption developed mutations that favor the persistence of lactase production into adulthood (Itan *et al*., 2009). At the same time, the protein-rich diet of early hominins is consistent with intense physical activity and a metabolic system quite different from today's (Cordain *et al*., 2000).

Food preferences, even during the prenatal period, are partially influenced by the maternal diet. Recent studies show that the fetus is exposed to aromatic compounds through the amniotic fluid, influencing familiarity with and acceptance of certain flavors after birth (Mennella *et al*., 2001; Ventura & Worobey, 2013). Breastfeeding also serves as a vehicle for the transmission of gustatory and olfactory information, suggesting that the maternal body functions not only as a biological but also as a cultural, instrument.

These observations reveal how phylogenesis and ontogenesis are intertwined: genetic modifications selected over time adapt to environmental and cultural changes, while food practices reciprocally shape the environment itself. Nabhan (2004) explored this reciprocal tension, suggesting that food cultures not only respond to biodiversity but actively shape it through the selection of plant varieties and agricultural practices.

The concept of food co-evolution implies that shifts in the human diet — from hunting and gathering to domestication and industrialization — are not merely cultural adaptations but have had measurable effects on the biological evolution of the species. This is also evident in the increasing incidence of metabolic and diet-related diseases in contemporary societies, often attributed to a misalignment between genetic heritage and modern food environments (Pontzer *et al*., 2021).

Therefore, the analysis of food requires an integrated approach that takes into account the biological plasticity and cultural agency of humans. Food, in its most primitive form, is already the result of mediation between nature and culture, and food is configured as an artifact that reflects and orients the evolutionary path of humanity.

2.3.2 Historical evolution: from social to cultural food practices

The historical evolution of the relationship between humans and food is based on a long process of cultural transmission that has trans-

formed eating from a merely biological or social act into an entirely cultural phenomenon. As Tomasello (2005) notes, human beings inherit not only a biological legacy but also a cultural one, comprising shared tools, knowledge, and intentions transmitted from one generation to the next through interaction, imitation, and collaboration. Throughout history, food artifacts have become repositories of shared meanings and social norms. Techniques of transformation, culinary practices, modes of consumption, and food-related rituals have acquired normative functions, regulating both individual and collective behaviors. Food culture has gradually taken shape as a semiotic system in which every gesture — from ingredient selection to plate arrangement — carries a symbolic, identity-based, and performative value (Douglas, 1972; Fischler, 1988).

Within this context, the recipe is not merely a procedural sequence but a culturally shared model that embodies internalized norms, values, and worldviews. Preparing a dish according to a recipe entails reproducing, often unconsciously, a set of rules acquired through imitation or verbal transmission. However, as Barham (2007) points out, transforming a recipe into active knowledge requires an understanding of the physical and chemical processes that underlie its efficacy. Only through such understanding is it possible to personalize and innovate the culinary experience.

The historical development of food practices is also linked to the spread of written language and normative texts: from religious prescriptions to dietetic treatises, from collections of popular proverbs to the first printed cookbooks. These textual artifacts have played a central role in the formalization of food knowledge, contributing to its standardization and dissemination across wide socio-cultural contexts (Montanari, 2006; Sutton, 2001).

Understanding a recipe, as well as the ability to combine ingredients, select tools, and manipulate raw materials, implies a form of cultural learning rooted in socialization, interaction, and direct experience. It is through active imitation (rather than mere emulation) that the subject transforms shared knowledge into personal competence.

In peasant societies, food traditions became consolidated through environmental continuity and intergenerational family transmission. Agricultural and culinary practices were learned from early childhood

within shared contexts, where knowledge was constructed through daily coexistence with others, repeated use of tools, and direct experience of seasonal cycles. As Cherchi (2007) notes, this situated learning was based on trial and error, and the gradual sedimentation of knowledge connected to both the environment and the community.

Finally, Jablonka & Lamb (2007) define culinary traditions as the result of cumulative cultural evolution, where innovation and adherence to norms coexist. Food practices transform over time while retaining a recognizable continuity thanks to shared and learned models. This dynamic has enabled human food cultures to persist and renew themselves across generations, making food a powerful artifact of cultural and identity transmission.

From this perspective, the transmission of food practices and the evolution of food artifacts can be interpreted as forms of distributed cultural design in which material tools, gestures, and usage protocols are historically consolidated through mechanisms of appropriation and innovation. The food design practices analyzed in Chapter 1 are embedded within this genealogy, representing contemporary outcomes of a long evolution in which food assumes the characteristics of a cultural and design artifact. Analyzing these cases thus means exploring how food design emerges from socially and culturally sedimented dynamics that are continuously reinterpreted.

2.3.3 Ontogenetic evolution: interacting with intentions

In the evolutionary process of human development, ontogenetic growth represents the phase in which the individual, starting at birth, gradually enters into a social and cultural environment rich in artifacts, tools, and shared practices. These elements are not neutral: they carry design intentions, symbolic functions, and historically constructed meanings that the child learns through interaction with others. The ability to recognize others as intentional agents — endowed with goals, desires, and beliefs — is the evolutionary foundation that enables the development of the socio-cognitive skills typical of human beings, distinguishing them from other species with complex social intelligence yet lacking cumulative cultural transmission (Tomasello, 2005).

From the earliest months of life, infants interact with their environment through their bodies and senses, touching, grasping, tasting,

and observing. According to Tomasello (2005), this competence rests on the progressive development of what he calls the *ecological self*, that is, the infant's ability to perceive their own body as an entity situated in space and distinct from others. Initially, the child interacts with objects without a mental representation of others' intentionality. Still, around nine months of age, they acquire the awareness that others act with goals, thus opening up to the possibility of intentional imitation.

In continuity with these observations, Vygotsky (1987) demonstrated how the development of higher psychological functions — such as logical memory, voluntary attention, and abstract thinking — depends on the individual's participation in social interactions mediated by artifacts. These functions emerge through a specific sequence: first on the inter-psychological plane (between the child and the adult) and then on the intra-psychological plane (internalized within the individual's mental activity). It is within this transition that food, understood as a material, symbolic, and relational object, plays a central role in the individual's cognitive, emotional, and cultural processes.

In the context of food, this translates into the child's ability to learn not only how to manipulate an ingredient but also why a specific action is performed — for example, kneading to smooth a dough or tasting a sauce to adjust its salt level. The appropriation of food-related artifacts (recipes, utensils, practices) thus takes place through an interiorization process that is initially intersubjective — based on interaction with adults and peers — and then intrasubjective, according to the well-known formulation of the cultural-historical school.

Higher psychological functions, such as logical memory, voluntary attention, and planning abilities, emerge precisely from this dialogue between individuals and cultures. Through imitation, the child acquires behavioral models that are progressively adapted and transformed. It is within this process that food practices are situated not as biological routines but as meaningful cultural acts that the subject learns, elaborates, and transmits.

An emblematic example is the consumption of *foreign* foods from other cultures: when faced with an unfamiliar dish, such as sushi or an ethnic preparation, the individual may choose to imitate others, reject what is unfamiliar, or invent their mode of consumption. These be-

haviors demonstrate how, even in the everyday act of eating, complex cognitive processes of interpretation, adaptation, and innovation are activated.

Such dynamics are even more evident in food design: the use of new tools, materials, or protocols leads to gradual adaptations in both individual and collective practices. When an individual modifies a habit, they may — if the change is shared — trigger a new cycle of cultural transmission. This is the ground on which intentional innovation in food emerges: from modifying a recipe to inventing a new consumption mode, the design act arises as an intentional response to a problematic situation.

In conclusion, the ontogenetic evolution of the individual is closely tied to the use of food-related artifacts. These, in addition to having a material function, constitute proper cognitive and cultural tools. Through interaction with them, the subject constructs knowledge, develops identity, and contributes to the reproduction and innovation of the food practices of their community. This perspective is essential for understanding food not only as a nutritive substance but as a mediator between the individual, culture, and design. Such innovations, originating from individual gestures or situated learning, may remain confined to the personal sphere or, if effective or culturally relevant, be adopted by other members of the community and integrated into collective repertoires of food practices (Jablonka & Lamb, 2007; Sutton, 2001). In this way, they contribute to the construction of new forms of meaning, tools, and practices, which only later acquire the status of *tradition*.

Although rarely investigated with due attention, these microgenetic dynamics represent fundamental moments in the transformation of food cultures. It is also through these incremental and distributed processes that relationships between individual, food, and environment emerge — or are reconfigured — as suggested in the model of mediations previously discussed. These mediations can serve as privileged spaces for observing how innovation takes root and spreads within food systems.

2.3.4 Creative use of tools in microgenesis

As demonstrated in the previous paragraphs, human interaction with the external world and the acquisition of knowledge occurs through

mediation. The acquisition of tools and symbols by children is facilitated through interaction with others, leading to the internalization of these tools and the creation of experiences that can evolve over time. Social and cultural processes do not generate fundamental cognitive abilities; rather, they transform basic abilities into more complex capacities.

The body, tools, and space thus become active parts of the cognitive system: dynamic elements in constant reshaping, acting as *thinking devices* (Patel, 2008), that are distributed structures in which cognition is extended and embodied. This perspective finds a privileged application in the food domain, where every food experience can be understood as a situated configuration of knowledge, memory, and interaction.

Vygotsky's (1987) general law of cultural development explains how higher psychological functions originate in social contexts and are transformed over time into internalized processes. However, such internalization is never a simple reproduction: it involves transformations that lead to the individual reworking of contents and practices. Higher mental functioning does not faithfully replicate social structures but draws inspiration from them to generate creative adaptations (Wertsch, 1991).

In the culinary context, this translates into a flexible and reflective use of tools and techniques. Consider, for instance, an experienced cook who, while starting from a standard recipe, makes modifications based on ingredient availability, environmental conditions, or the type of event being catered. This adaptation is made possible by an understanding of the underlying processes of dish preparation — a situated knowledge derived from experience that is enriched over time through interaction with the context and with others (Barham, 2007).

The example of the chef or the pastry maker who adjusts dough consistency based on ambient humidity demonstrates how technical knowledge can never be fully standardized but requires constant fine-tuning. In the kitchen, knowledge is not exhausted in recipes. Still, it manifests as a form of situated cognition that draws on bodily, sensory, and gestural models, often learned through imitation and refined by direct experience.

This type of learning is particularly evident in professional settings, where, despite regulations and codified procedures, effective

performance relies on the ability to handle the unexpected and adapt behavior in real-time. On the one hand, standardization (e.g., in hotel kitchen manuals) ensures repeatability and consistency; on the other hand, flexibility and creativity are essential for maintaining service quality and solving unforeseen problems (Patel, 2008).

Such flexibility is evident not only in task management but also in the capacity to innovate. As previously discussed, minor innovations — emerging from individual solutions — can become collective assets if shared and adopted over time. These processes are echoed in social design contexts, where the designer's role is not only to propose solutions but also to facilitate the emergence of new practices through interaction with communities and local knowledge (Manzini, 2015).

Within the framework of the six mediations (sensory, bodily, material, productive, spatial, and social), these microgenetic processes manifest in the ongoing reconfiguration of relationships among individuals, food artifacts, and systems of meaning. Innovation is therefore not an isolated act but the result of a dialogue among subjects, tools, and environments, producing new ways of knowing, doing, and experiencing food.

Even if initially rooted in the life of a single individual, such innovations — if recognized as effective — may be adopted by other members of the community and, through emulation, enter the collective repertoire, contributing to the emergence of new shared practices. In food design contexts, these micro-innovations often form the foundation of what, over time, becomes a ritual, a recipe, or a codified practice. This is how what we call *food culture* is born and structured.

The adoption and adaptation of food tools not only support the consolidation of situated competencies but also represent a crucial point for understanding food design as a distributed cognitive practice. This approach is not limited to designing food for food, but concerns the entire experiential and design chain of the food experience, from everyday gestures to cultural transformation. This perspective reinforces the idea that design — especially in food contexts — should be understood as a situated and transformative practice, where tools are not merely means but catalysts of complex cognitive and social processes. This approach will be explained in greater detail in chapter 3 of this book.

2.4 Material and ideal components of food artifacts

Both distributed cognition theory and the cultural-historical school assign a central role to mediation in understanding the interactions between individuals and their environments. However, they interpret this function in different ways.

According to the distributed cognition paradigm, mediations are knowledge structures embodied in material supports: they are representational media that include both human minds and the physical artifacts used in everyday contexts (Hutchins, 1995). From this perspective, the artifact is not merely a tangible object created by humans but rather a component of the world that has been modified through goal-directed human activity. The artifact is, therefore, simultaneously material and ideal. Its physical form does not exhaust its meaning: it expresses the participation of the artifact itself in the social and cognitive practices in which it originated and which it continues to mediate (Cole, 1996).

In the cultural-historical paradigm, the emphasis shifts to the **i**nternalization of mediators and how they, through activity, convey and transform meanings. Artifacts carry with them a legacy of previous practices and knowledge, influence the new practices they enter, and are, in turn, reshaped by them. This dynamic view highlights the interaction between the materiality of the tool and the user's consciousness, which cannot be reduced to mere technical function or surface form. Physical features themselves become historical and cultural expressions of idealized functions, embodied through a learning process distributed over time.

Vygotsky (1987) distinguished between two fundamental types of mediators: tools and signs**.** The former are outwardly oriented and act upon the environment (e.g., a knife, a mixing machine); the latter are inwardly oriented and act upon the mind of the subject (e.g., language, numbers, religious symbols). This distinction is useful for understanding internalization and learning mechanisms: acting with tools modifies both the environment and the subject, who internalizes new signs and cognitive strategies.

In this view, embodiment — that is, the incorporation of knowledge into objects and practices — plays a fundamental role. Wartofsky's theory (1979) distinguishes between three types of artifacts:

- Primary artifacts: tools directly employed in production (e.g., utensils, digital technologies, furniture, appliances);
- Secondary artifacts: tools for transmitting knowledge and usage practices (e.g., recipes, manuals, narratives, food codes);
- Tertiary artifacts: tools for imagination and symbolic abstraction (e.g., utopias, ideal models, mythic narratives, food ideologies).

As Wartofsky (1979) emphasizes, artifacts are not merely functional instruments but bearers of historical and cultural knowledge. When a primary artifact is modified — e.g., a kitchen tool is re-engineered or digitized — it inevitably produces effects on both its ideal dimension (software) and relational dimension (liveware). A change in one of the three components — software, hardware, or liveware — affects the other two. For example, a software update (new practices or values) may require new material supports (hardware) and simultaneously redefine social interactions (liveware). Conversely technological innovation in hardware may generate new representations of food and novel cultural practices.

These transformations are not neutral: they influence habits and shared meanings, reshape norms of use, and can lead to the emergence of new food cultures. Here, design plays a strategic role. Designing food artifacts means intervening consciously on one or more levels of mediation — material, ideal, or social — to shape food practices, generate new meanings, activate communities of practice, or support the adoption of sustainable models.

The design intervention must, therefore, simultaneously consider (Figure 11):

- Hardware: the physical and material components of the system as material infrastructure — tools, spaces, technologies;
- Software: cultural codes, shared knowledge, rules, and protocols of use that guide activity and practices;
- Liveware: the human component of the system, i.e., the people who, as agents or mediators, transmit, learn, or transform the activity. This is a critical resource for adaptation, negotiation, and the generation of new knowledge.

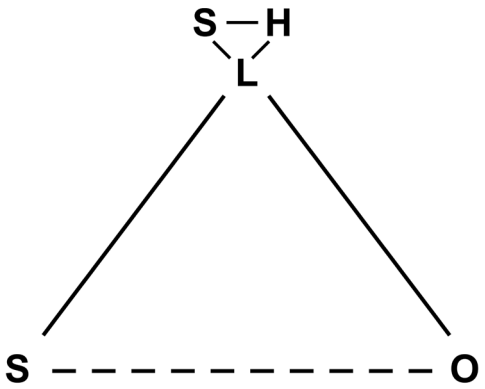


Figure 11. New Activity Analysis Unit. Source: Rizzo, Wells, Save, & Sujan, 2004.

Many contemporary food design projects and case studies, as discussed throughout this book, are based precisely on the intentional manipulation of software (norms of use, symbolic values), the reinvention of liveware (actor engagement), and the hybridization of hardware (tools, packaging, physical and digital environments). Understanding these three levels of mediation provides a sound theoretical framework for decoding and guiding transformations in contemporary food artifacts and practices.

The interaction between these three levels is dynamic and co-evolutionary. None of the three operates in isolation, and their mutual influence is subject to constant realignments, disjunctions, or synergies. For example:

- The same hardware (e.g., a knife) may change its function and meaning depending on the cultural context (e.g., cooking tool, ceremonial object, design icon);
- The same software (e.g., a dietary model, religious code, HACCP protocol) may be implemented through very different hardware (e.g., packaging, mobile apps, people).

Food design must account for these articulations. Understanding the hybrid nature of the food artifact — as material, cultural, and relational — enables the design of meaningful and transformative food experiences. An innovation that begins at the material level may have a systemic impact, reshaping behaviors, norms, and cultures.

From this perspective, food design emerges as a transformative practice: the conscious design of food artifacts can influence lifestyles, redefine people's food identities, and contribute to the

emergence of new models of relationships between humans, food, and the environment.

2.5 Cognition and food culture: a co-evolutionary design perspective

The concept of omnivorousness, which refers to humans as physically, constitutionally, and socially adaptable, offers a key conceptual foundation for understanding the interaction between cognition and food culture. As Soler (1979) demonstrates, the food preferences of a people are not determined solely by the qualities of foods but by the mental and symbolic structures that populations build around them. From this perspective, human cognition related to food experiences can only be understood in connection with the phylogenetic, historical, and cultural evolution of humanity, as well as with the ontogenetic and microgenetic development of individuals (Figure 12).

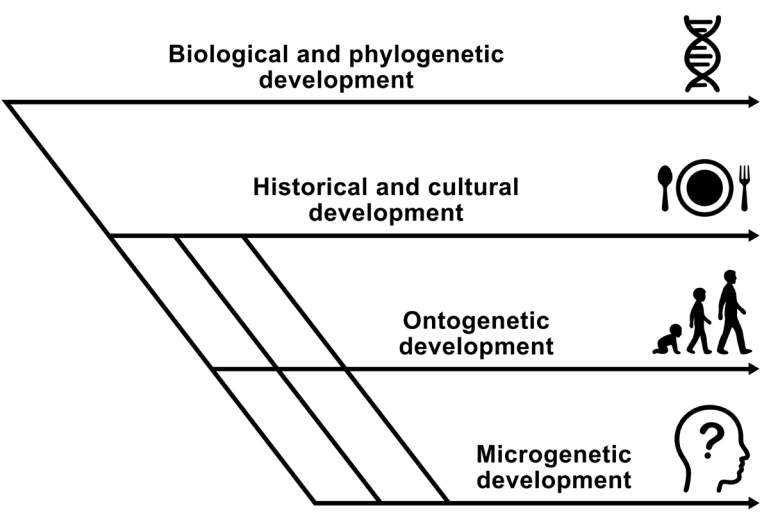


Figure 12. Co-evolutionary development of food experience. Source: Author.

Following Vygotsky's paradigm, which draws on core elements of Darwinian evolutionary theory, the process of internalizing knowledge and food practices is realized through culturally mediated artifacts and practices. From early childhood, individuals learn how to use tools, utensils, and symbols related to food within a shared network of historically situated meanings.

This cultural transmission is not neutral: it acts as a mechanism of regulation and transformation of individual consciousness, shaping interpretive categories, cognitive automatisms, and food choices. Through cultural learning, artifacts — both material and symbolic — are internalized, contributing to the development of specific cognitive skills and the establishment of new practices.

As Cole (1996) highlights, the mind does not operate in isolation but through artifacts distributed across space and time, interweaving individual and collective actions into dynamic and fluid contexts. Culture thus becomes an active component in the construction of the mind and in shaping the food experience.

We can identify three interrelated streams: (1) biological evolution, (2) cultural evolution, and (3) individual development. To these, we add the microgenetic dimension — situated learning processes that occur in response to new challenges or unfamiliar contexts, sometimes over very short periods (Patel, 2008). All these levels interact in shaping the food experience, mediated by material, social, and symbolic artifacts.

In an era defined by the knowledge society and digital communication, food is increasingly becoming the object of collective and collaborative experiences, where knowledge spreads globally, instantly, and interactively (Cecchinato, 2005). Designed artifacts — digital or physical — play a fundamental role in constructing new food meanings, and promoting emerging values, norms, and practices. Food designers today operate in this fluid scenario, where designing food artifacts also means designing culture, behaviors, and identities. Montanari (2009) draws a parallel between cognitive elaboration and culinary processes, suggesting that the encounter and layering of ingredients — namely, experiences — enable the generation of new ideas and meanings. Food, both as a practice and as a metaphor, thus stands as a powerful medium for cognitive and design processes.

Recognizing this co-evolution between cognition and food culture enables designers to intervene not only in material practices but also in the symbolic and cognitive infrastructures that shape how we eat, perceive, and design food today.

2.6. Conclusion: knowledge, innovation, and design in contemporary food systems

As discussed in Chapter 1, food design is not merely a creative or aesthetic act but a transformative practice capable of producing systemic impact across food production, distribution, and consumption. In this context, design serves as a mediator between technological infrastructures, cultural systems, and social practices, acting as a catalyst for innovation.

Knowledge, from this perspective, is no longer a static entity but a dynamic and distributed resource that guides design processes. Innovation in agri-food systems can be interpreted through the lens of open innovation (Taylor, 2001), where value is co-generated by a multiplicity of actors — companies, institutions, and citizens — through shared and participatory practices. Conversely, closed innovation approaches limit the absorption of external knowledge and the collaborative construction of solutions.

Within this scenario, the user takes on an active role as a co-designer of food practices, experiences, and meanings. Food is no longer a mere object of consumption but a relational practice embedded within an ecosystem of knowledge. The emergence of models such as living labs and massive collective intelligence exemplifies the rise of learning environments where design, participation, and social innovation converge.

It is, therefore, essential to overcome the disciplinary silos that persist in the agri-food sector, to promote transdisciplinary approaches capable of enabling sustainable transformation. Food design must consider the historicity of artifacts, the centrality of the user, cultural diversity, and the territorial embeddedness of practices.

Designing thus entails activating a deep reading of material, cognitive, and relational mediations to generate new food systems and cultures. This is the ambition of contemporary food design: to provide tools, processes, and visions that can reshape the relationship between humans, food, and the environment. Building on the theoretical framework established in Sections 2.1–2.4, and as will be demonstrated in Chapter 3 through a selection of immersive, place-based, co-designed educational programs developed over the past fifteen years, design can foster transformative environments where knowledge becomes the driving force behind shared change.

3. Transformative Learning in Place-Based Food Design Education

Global cultural and technological transformations are driving a continuous evolution in design education. The agri-food sector is emerging as a strategic field in which design not only addresses sustainability challenges but also fosters new models of learning and collaboration. In today's highly complex and interconnected global context, design for the agri-food sector is emerging as a crucial domain for the creative recombination of existing resources and for facilitating dialogue between expert and non-expert knowledge. When applied to agri-food systems, design — understood in its transformative and systemic dimension — assumes a crucial educational function. It can no longer be confined to product or service innovation alone. However, it must actively contribute to the development of awareness, relationships, and shared visions among designers, local communities, and territorial stakeholders.

In the previous chapter, the dual nature of food was explored: it is simultaneously the object of practice and a medium that mediates the relationship between humans and the world. Food was examined as a complex cultural artifact, capable of activating a plurality of

mediations that shape the eating experience along six fundamental dimensions: sensory, bodily, spatial, relational, productive, and material. These six relationships — rooted in culture and history, yet dynamic and continuously evolving — not only structure our daily relationship with food but also offer a profound interpretive framework for designing new food cultures that are meaningful, transformative, and oriented toward human values.

Building on these theoretical premises, this chapter aims to analyze how such mediations can be not only the object of theoretical reflection but also operational tools within educational settings. From this perspective, food design education does not consist merely of the transmission of content or skills; rather, it is conceived as a co-evolutionary, experiential, and situated process in which students, educators, territorial stakeholders, and real-world contexts collectively learn to recognize food as a complex object and to consciously co-design contemporary agri-food systems — they become co-builders of knowledge, co-agents of learning and transformation.

Design for agri-food systems — and more importantly, as this chapter will show, design through agri-food systems — plays a crucial role in cultivating visions and design capacities oriented toward sustainability, equity, and systemic innovation. Design becomes a formative device that enables participants to develop a greater critical awareness of food supply chains, agricultural practices, socio-ecological relationships, and cultural imaginaries associated with food.

The quintuple helix model, which emphasizes cooperation among academic institutions, government, industry, civil society, and the environment (Carayannis *et al*., 2021), has stimulated the creation of innovative educational environments capable of rethinking traditional pedagogical practices to address complex problems (Nöel, 2020; Pontis & van der Waarde, 2020). Collaborative learning, especially through work in heterogeneous teams, fosters the sharing and synthesis of diverse and plural ideas, thus contributing to the development of innovative solutions (Laal & Ghodsi, 2012).

The transdisciplinary approach of design, in specific, has the potential to enhance the value of diverse knowledge systems, including non-academic contexts, and to generate new forms of collaboration. The alignment between educational content and the evolving

demands of professional practice has become essential in preparing future designers to operate in a rapidly changing society. To this end, innovative pedagogical methodologies — such as experiential, event-based, and place-based learning (Rowe *et al*., 2011) — have demonstrated a significant impact in shaping designers capable of tackling multidimensional challenges.

The last two chapters of this book aim to respond to four main research questions that explore the transformative potential of place-based educational models in the agri-food sector:

a) What is meant by transformation and transformative learning in the context of agri-food systems? Can place-based educational approaches effectively contribute to this transformation, considering that food is both the object and the medium of systemic change? Why it is important to study them?

b) In place-based design and creative activities such as Bootcamps, Tenuta Labs, 3-5 days workshops, and field schools, which tools (e.g., learning settings, transdisciplinary frameworks, facilitation mechanisms, and design devices) prove most effective in fostering collaboration among territorial actors who often face difficulties in dialogue and cooperation for agri-food system transformation? In what ways can design activate changes in the food sector?
The analysis focuses on the potential of these educational formats — understood as temporary laboratories akin to *living labs* — as active models of collective co-creation;

c) What potential role does the designer play in these agri-food transformative processes? Drawing on the analytical framework developed by Wittmayer and Schäpke (2014), this chapter demonstrates that within Bootcamps and place-based educational settings, the designer assumes the role of *process facilitator* rather than a technical expert. Designers activate short-term actions while also acting as *mediators of plural knowledge*, enabling dialogue across different perspectives. Understanding whether the designer has contributed to enabling collaborations that were previously difficult among agri-food system actors offers valuable insights into the potential role of the food designer within an agri-food

Living Lab. This perspective allows us to critically assess how design can act as a catalyst for inter-institutional dialogue, trust-building, and systemic innovation in complex food ecosystems;

d) Finally, what competencies and mindsets can designers acquire through place-based programs to become effective *agents of change in the agri-food sector*? This includes encouraging all participants — designers, educators and stakeholders alike — to translate theoretical reflection into concrete actions and solutions, moving from *dormant resources* to ideas and ultimately implementation and execution (Lorenzoni & Massari, 2023). In this context, what are the roles of designers? However, these roles should not be interpreted as rigid categories but rather as dynamic positions situated along a continuum of involvement and responsibility.

The objective of this chapter is to demonstrate how, across twenty different cases of place-based education in the agri-food field, students of food studies and food design engaged in situated and diverse ways with local contexts to activate systemic transformation. This empirical section of the book investigates which immersive educational formats proved most effective in cultivating transversal competencies, while fostering adaptability, innovation, and active collaboration in response to global agri-food challenges.

This chapter is organized into four main sections:

3.1 – A theoretical framework introducing key concepts of *place-based, experiential*, and *transformative learning* about agri-food systems;

3.2 – An explanation of the methodology and analytical indicators used to examine twenty place-based educational programs aimed at fostering innovation in agri-food systems between 2010 and 2025. These cases involve the author in various roles—as co-designer, educator, organizer, or facilitator;

3.3 – A concluding reflection on the broader implications of this approach for the future of design education in the agri-food sector. It introduces the evolving role of the designer as a mediator of territorial collaboration and a key figure in the transformation *for* and *by* food systems.

3.4 – A discussion of the results, leading to the definition of the *B.E.FOO.D Framework*, a conceptual tool that maps the specific challenges and characteristics of teaching, learning, and designing within food design-oriented place-based educational programs.

3.1 Towards a theoretical framework for Agri-Food design education: situated, transdisciplinary, transformative

In recent years, immersive and place-based educational formats—such as bootcamps, summer schools, field schools, and hackathons—have gained prominence in the agricultural and food sector. These intensive experiences serve not only as pedagogical tools but also as design devices capable of generating contextual knowledge, social impact, and shared solutions within short timeframes. By fostering direct engagement between students and local territories, they stimulate critical and creative thinking while encouraging the co-design of resilient and sustainable responses.

Within these contexts, new professional profiles are emerging — such as the *designer for transition* and the *material and circular designer* — who operate at the intersection of technological innovation, systemic design, and cultural transformation (Symbola, 2024, p. 20). These roles reflect the need for hybrid skills that bridge technical expertise with ecological sensitivity and social awareness.

Place-based approaches also encourage students to transcend disciplinary and cultural boundaries, using food as a relational and collaborative medium. Educational formats such as bootcamps support this dynamic by combining team-based learning, stakeholder interaction, and situated challenges. As noted by Tovey (2015), these formats can help shift the designer's identity from problem-solver to facilitator of change.

In this learning ecology, the role of the educator also evolves. Rather than acting solely as an expert or lecturer, the professor becomes a facilitator and co-learner — shaping how data is collected and interpreted, how sustainability is framed, and how knowledge is

co-produced (Clough, 1992; Fonow & Cook, 1991). This transformation reflects a broader shift toward reciprocal and inclusive learning experiences, especially relevant in transdisciplinary and intercultural settings.

3.1.1 Competencies in food design education for shaping change

The growing complexity of global challenges — from climate crisis to food insecurity and ecological injustice — demands a radical rethinking of educational and design paradigms. International organizations such as UNESCO (2017), the World Economic Forum (2020), and the European Commission through the GreenComp framework (Bianchi *et al*., 2022) have identified key competencies to support the transition toward more sustainable societies.

To promote a systemic transformation of the agri-food sector, it is essential to adopt a structured competence framework capable of enabling designers, educators, and citizens to interpret complexity, envision sustainable futures, and act with awareness. The GreenComp framework, developed by the Joint Research Centre of the European Commission, provides a reference model for integrating sustainability competences into educational pathways. Structured around four interconnected areas — *Embodying sustainability values*, *Embracing complexity in sustainability*, *Envisioning sustainable futures*, and *Acting for sustainability* — GreenComp identifies twelve key competences that are fully applicable to the agri-food domain.

Given the urgency and specificity of the challenges affecting contemporary food systems, these areas can be rearticulated in a situated and contextualized manner, adopting a food-oriented perspective. A reinterpretation is therefore proposed, as follows: *Embodying food sustainability values*, *Embracing complexity in food systems*, *Envisioning sustainable food futures*, and *Acting for sustainable food transformation*. This adapted reading allows the conceptual framework to be grounded in the material, ecological, and cultural dimensions of food, highlighting its transformative potential in educational and design practices.

The first area, *Embodying food sustainability values*, invites critical reflection on individual and collective values in relation to food justice,

intergenerational equity, and the rights of nature. The competences of valuing sustainability, supporting fairness, and promoting nature acquire heightened relevance when applied to the agri-food context, where decisions on production and consumption directly affect both ecosystems and human and non-human communities.

The second area, *Embracing complexity in food systems*, encourages engagement with the systemic and often contradictory dynamics that characterise food as a cultural, ecological, social, and economic phenomenon. The competences of systems thinking, critical thinking, and problem framing are essential for understanding the interdependencies between agricultural practices, regulatory frameworks, food cultures, and planetary boundaries.

The third area, *Envisioning sustainable food futures*, enables the imagination of transformative scenarios for regenerative, equitable, and inclusive food systems. The competences of futures literacy, adaptability, and exploratory thinking support the design of alternative visions capable of transcending dominant linear and extractive models, fostering circular, place-based, and multispecies approaches.

Finally, *Acting for sustainable food transformation* emphasises the role of individual and collective agency. The competences of political agency, collective action, and individual initiative enable engagement with food systems not only as consumers or designers, but as social actors capable of influencing policies, supporting movements, and promoting bottom-up innovations. In this sense, food emerges not only as an object of design, but as a medium for democratic participation and systemic change.

This situated adaptation of the GreenComp framework — provisionally named *FoodComp* — foregrounds food's potential as both a pedagogical and political lever. It aligns with the author's educational approach, grounded in everyday practices, local contexts, and ecological relationships that support daily living (Table 2).

In this perspective, a set of transversal competences — such as transdisciplinarity, cognitive flexibility, emotional intelligence, creativity together with system and design thinking — emerges as central (Massari, 2021). These competencies should not be understood as isolated skills, but as interconnected devices capable of enabling agency, transformation, and systemic design capacity (Stokols *et al.,*

GreenComp Area	FoodComp Area	Focus
Embodying sustainability values	Embodying food sustainability values	Reframes values of justice, equity, and nature through the lens of food systems and ethics
Embracing complexity in sustainability	Embracing complexity in food systems	Highlights systemic, socio-ecological, and cultural dimensions of agri-food challenges
Envisioning sustainable futures	Envisioning sustainable food futures	Anchors imagination and future literacy in food system innovation and scenario planning
Acting for sustainability	Acting for sustainable food transformation	Emphasizes civic agency, collective mobilisation, and design-led action within food contexts

Table 2.
Comparative between Bridging GreenComp and FoodComp.
Source: Author.

2008). They require an integrated educational approach that brings together heterogeneous elements to generate systemic solutions (Bammer, 2020; Klein, 2010; Gibbons *et al.,* 1994).

Transdisciplinarity — the ability to integrate diverse forms of knowledge — constitutes an epistemological foundation for sustainability education. In the agri-food domain, it allows for the navigation of complex systems by considering socio-ecological, economic, and cultural interdependencies. Systemic design and participatory approaches, foster the hybridization of scientific, technical, and local knowledge, activating co-creation and place-based experimentation (Lacombe *et al*., 2018; Toffolini *et al.,* 2021; Eastwood *et al*.,2022).

In parallel, cognitive flexibility emerges as an essential competence for operating in contexts marked by uncertainty and ambiguity. It involves the ability to reconfigure strategies, activate latent resources, and imagine sustainable alternatives. These features are central to the concept of *futures consciousness* (Ahvenharju *et al*., 2018; 2021) and Bandura's theory of agency (2000; 2001), which argues that intentional design requires the ability to anticipate multiple scenarios and adapt to change.

Emotional intelligence, in turn, is fundamental for facilitating participatory processes, managing conflict, and building relationships of trust. Competencies such as empathy and emotional regulation are recognized as catalysts for co-creation and collaboration in transdisciplinary settings. Gidley (2017) emphasizes their transformative role in shaping ethical and shared visions of the future, while the GreenComp framework highlights emotional intelligence as a key component of collaboration and systemic awareness (Bianchi *et al.,* 2022).

Finally, creativity represents a critical competence — understood not merely as individual talent but as a collaborative, reflective, and generative practice (Massari *et al.,* 2023). Critical literature (Beyer, 1987; Paul & Elder, 2010; Forrester, 2008) underscores the need to develop pedagogical frameworks that recognize creativity as the outcome of the interaction among motivation, environment, knowledge, and thinking styles (Sternberg, 2006; Beck, 1992; Csikszentmihalyi, 1990). In agri-food Living Labs (explored in chapter 4), for example, design thinking promotes creativity as the capacity to generate shared solutions, co-designed services, and new imaginaries. Transformative techniques such as storytelling, role play, team building and embodied practices (Kara, 2015; Hawkins, 2013; Pauwels & Mannay, 2019) have proven effective in enabling agency, critical thinking, and imaginative capacity.

To conclude, a new educational paradigm for design in agri-food systems must be established on four fundamental pillars: transdisciplinarity, cognitive flexibility, emotional intelligence, and co-creativity. Educating for change means activating a design culture capable of generating shared visions, systemic transformations, and regenerative practices oriented toward the common good (Massari, 2021; Tharp & Tharp, 2018).

3.1.2 Origins and definitions of the concept of transformation

The term *transformation* originates from the Latin *transformare*, meaning *to change form* (Harper, 2023). This etymology conveys the idea of a profound shift — an interpretation that has been embraced across multiple disciplines: in physics, as the conversion of energy; in medicine, as pathological cellular mutation; and in the social sciences, as the structural reconfiguration of actors or systems. In the field of education, transformation is widely recognized as a model in which learning is deeply embedded in change processes, primarily through the adoption of transdisciplinary approaches and the active involvement of students in real-world, meaning-making contexts (Howland *et al.,* 2012; Jahnke & Wildt, 2023).

Initially developed by Mezirow (1991) to describe individual learning, the concept of *transformative learning* has evolved to encompass collective and social dimensions. Jahnke and Wildt (2023) define

transformative learning as a process of decontextualizing academic knowledge and recontextualizing it within social, territorial, and professional settings. This model extends beyond interdisciplinarity into transdisciplinarity, where knowledge is co-constructed across epistemic boundaries through collaborative interactions among students, educators, and stakeholders.

Historically, the concept of transformation has been invoked during moments of profound systemic change. Karl Polanyi (1944) famously used the term *The Great Transformation* to describe the restructuring of the global economy in the post-World War II era. Later, Merritt (1980) applied it to post-Soviet transitions toward liberal democracy and market economies. Kollmorgen *et al*. (2015) distinguish between gradual evolutionary changes and *structural transformations* — the latter being radical and irreversible. More recently, transformation has become central to the discourse on sustainable development and socio-ecological transitions, with UNESCO (2017) emphasizing the need to reimagine education as a catalyst for systemic change.

In this framework, the university is called upon to transcend the metaphor of the *ivory tower* and engage directly with societal transformation (Kollomorgen, 2010). Wildt (2022) describes this shift as the *transformative turn*: a paradigm change that places learning — rather than teaching — at the center of higher education, grounded in students' active engagement with place and community. Academic knowledge is thereby reshaped through co-creative practices involving local actors, public institutions, and private organizations.

Transformative learning aligns with pedagogical models such as education through science and lifelong learning, which link theoretical insight with experiential knowledge and civic responsibility (Jankowski, 2022; Wagenaar, 2022). This corresponds to what Barr and Tagg (1995) describe as a shift *from teaching to learning*, a move away from co-constructive models toward learner-centered paradigms.

One of the most emblematic practices of this shift is *service learning* and *community-based learning*, which combine academic instruction with real-world engagement. According to the literature (Eyler & Giles, 1999; Kolb, 1984; Mayer & Norman, 2020), service learning

fosters collaboration between students and communities to co-identify needs and co-design situated interventions. It enables students to critically apply disciplinary knowledge, develop transversal competencies, and engage with complex and ethical societal challenges (Clayton *et al.,* 2013; Clayton *et al.,* 2015; Anderson *et al.,* 2019; Giles & Eyler, 1994). Furco (1996) and Bringle and Hatcher (2009) underline how service learning enhances empowerment and fosters experience-based transformative learning.

In the domain of design education, service learning has demonstrated a remarkable efficacy in fostering experiential learning environments that yield substantial and tangible impact. However, implementing these models is not without challenges, given the need to coordinate diverse actors and integrate theory, research, and action. In agri-food design education, such challenges are further amplified by the ecological, systemic, and cross-sectoral nature of the field (Sangiorgi, 2011).

Faced with this complexity, it becomes essential to develop educational models in food design that enable students to engage critically, work transdisciplinarily, and design in context. Only through the integration of theoretical and practical knowledge — and the creation of collaborative and flexible learning spaces — can we foster a design culture capable of addressing social innovation, sustainability, and systemic agri-food transformation.

3.1.3 Transformative and transdisciplinary learning

Transformative learning, as originally theorized by Mezirow (1991), emphasizes a shift in perspective that allows individuals to reinterpret their experience and assumptions through critical reflection. Over time, this concept has evolved into a rich and pluralistic theoretical ecology, encompassing various approaches in adult education (Stuckey *et al*., 2013). For example, Freire's notion of *conscientização* (1970) emphasizes social emancipation through awareness of oppressive structures, while Jung (1921) situates transformation within a process of individuation, focused on the unconscious and personal integration (Boyd & Myers, 1988). Other scholars — such as Daloz (1986), Dirkx (1998; 2006; 2008), and Cranton (Taylor & Tisdell, 2020) — have further developed the subjective, emotional, and develop-

mental dimensions of transformation. Despite their diversity, these approaches share the understanding of transformation as a situated, nonlinear, and multi-layered process, involving cognitive, affective, and social domains (Jahnke & Wildt, 2022).

A key contribution of this literature lies in its attention to the emotional and epistemological challenges inherent in transformative education — especially when applied to transdisciplinary contexts. Students, often educated in formal systems centered on disciplinary certainties and predetermined answers, may experience confusion, disorientation, or frustration when exposed to real-world complexity and divergent worldviews. These *disorienting dilemmas* (Mezirow, 1991) can, however, serve as powerful catalysts for transformation — provided they are explored in safe-yet-critical environments facilitated by educators (Dirkx, 2008; Zehr *et al*., 2024). In this model, the educator becomes not a transmitter of knowledge but a guide for negotiated meaning-making and the development of reflective agency.

Transdisciplinary learning shares these transformational aims. As Lange (2015) notes, the prefix *trans-* implies *going beyond form*, pointing to a process that reshapes both knowledge and practice. In design and sustainability education, transdisciplinary approaches promote the co-production of knowledge through epistemic hybridity and collaboration across disciplines, actors, and contexts (Mitchell *et al*., 2015; Massari, 2021). These processes generate transformation in three directions: redefining the problem space; shifting knowledge flows and actor configurations; and enabling learning and worldview changes among all participants (Mitchell *et al*., 2015; Feriver *et al*., 2016; Ross & Mitchell, 2018). Taimur and Ross (2023) describe this transformation as a cycle involving: creative pluralism, where each actor brings their worldview; descriptive clarification, where perspectives are expressed through proposed actions; and normative convergence, where common frameworks are built through critical discourse.

Together, transformative and transdisciplinary learning enable a shift from fragmented, discipline-bound knowledge toward integrated, reflexive, and participatory processes of change. This synergy is especially relevant to design education for sustainability and social innovation, where learners must navigate uncertainty, collaborate

across differences, and reimagine future systems (Müller *et al*., 2005; Popa *et al.,* 2015; Pohl *et al*., 2018).

3.1.4 Situated and Place-Based learning for systemic change

Transformative learning experiences have been shown to be most effective when embedded in situated and place-based pedagogies, which emphasize action, reflection, and real-world engagement (Fry *et al.,* 2003; Howland *et al.,* 2012). Active learning strategies, including project-based, problem-based, and inquiry-based models, have been shown to enhance performance, engagement, and critical capacities (Deslauriers *et al*., 2019; Freeman *et al*., 2014). Among these, Place-Based Education (PBE) is of considerable significance for agri-food systems. Rooted in Dewey's pragmatism (1910; 1916; 1938) and developed as a critique of neoliberal detachment from local contexts (Freeman, 2008), PBE fosters learning that is in, from, about, and for a place (Granit-Dgani, 2021). It operates through four key dimensions—biophysical, psychological, sociocultural, and political-economic (Ardoin *et al*., 2012) — yet also raises critical questions about how *place* and *identity* are defined in intercultural settings (Waite, 2013; Bertling, 2018).

In the agri-food context, place-based and transformative approaches are recognized as crucial for addressing systemic challenges related to sustainability, justice, and resilience (Papanek, 2022; Brown & Wyatt, 2010). They involve a redefinition of the role of both educators and designers, who must become facilitators of co-creation and territorial regeneration. This shift aligns with calls in the literature for research methodologies that are participatory, practice-based, and co-designed, such as action research (Bradbury-Huang, 2015), engaged scholarship, and citizen science (Rowell *et al*., 2017; Mauser et al., 2013).

One key concept is *sustainable place-shaping* (Roep *et al.,* 2015; Horlings, 2019; 2020), which emphasizes the relocalization of everyday practices and the reconfiguration of socio-ecological relationships through practice theory (Giddens, 1990; Schatzki *et al.,* 2000). In this view, sustainability is not only a normative or analytical concept (Frank, 2017), but a transformative and relational practice that emerges from situated human actions (Miller, 2013; Wuesler, 2014).

Transformative change in place-based design often manifests through three main models: top-down (institution-led), bottom-up (community-driven), and hybrid approaches (Blythe *et al*., 2018; Feola, 2015). Several conceptual frameworks support the analysis of these dynamics, including the transition approach (Geels & Schot, 2007), social-ecological systems theory (Folke *et al*., 2005), sustainability pathways (Leach *et al*., 2012), and transformative adaptation (O'Brien, 2012). In the agri-food field, place-based educational formats — such as Living Labs, service learning, and simulation environments — can serve as powerful platforms for situated transformation (Kolb & Kolb, 2005; Van de Heuvel *et al*., 2021; Herth *et al*., 2025).

As explored in the empirical sections of this book, these pedagogical formats demonstrate that design education can activate regenerative capacities by integrating place, participation, and purpose—providing students with the tools not just to learn, but to drive change.

3.1.5 Critiques and ethical Implications of transformative learning

Since the 1990s, Mezirow's theory of transformative learning has significantly influenced adult education, positioning the transformation of personal frames of reference as a central pedagogical goal. However, several scholars — including Cranton (2016) and Mälkki (2010) — have critiqued the theory's overemphasis on cognitive-rational processes, often at the expense of emotional, embodied, and social dimensions. While Mezirow later opened to more complex views, his focus remained anchored in critical reflection and discursive rationality. In response, authors such as Daloz (1986), Dirkx (1998; 2008; Dirkx *et al*., 2006), and Cranton (2016) proposed alternative models that foreground affective and symbolic processes. Dirkx, for example, conceptualized transformative learning as being rooted in introspection and the unconscious, emphasizing its connection to symbolic and emotional experiences. These perspectives are especially relevant in food design education, where students engage with ethical, cultural, and affective meanings that often transcend purely technical dimensions.

A growing body of literature emphasizes the transformative role of empathy. Although Mezirow did not explicitly frame empathy as a core component, his concepts of open-mindedness, judgment suspen-

sion, and active listening can be interpreted as foundational to empathic engagement (Mezirow, 2003). Scholars such as Taylor (2007) and Willis (2012) discuss that empathy fosters safe dialogic spaces where conflicting perspectives can be explored without judgment, while Gravett (2004) underscores the capacity of transformative experiences to generate perspectival shifts and strengthen empathic skills — critical in transdisciplinary food system contexts that require active stakeholder dialogue.

Ethical considerations are at the heart of the transformative learning discourse. Mezirow (1991) and Moore (2005) caution against predefining the outcomes of a transformative process, as this could devolve into a form of ideological indoctrination. Instead, educators must act as critical facilitators, ensuring inclusive, open, and reflective spaces where learners maintain complete autonomy. This becomes crucial in food-related education, where pedagogical framing — e.g., of industrial agriculture, indigenous knowledge, or food sovereignty — can carry significant political weight. In authoritarian or ideologically charged environments, the misuse of transformative learning can compromise its core principles: critical inquiry, freedom of thought, and dialogical openness.

Today, transformative learning is becoming more and more prevalent through active, situated methodologies that link research, design, and collaboration with external stakeholders. In food design education, this includes problem-based, project-based, and service-learning formats (as already discussed in Section 3.1.2), which enable students to co-create knowledge alongside farmers, entrepreneurs, policymakers, and communities. When adapted to agri-food contexts, these methods foster critical and ethical engagement with environmental transitions, intercultural dynamics, and systemic change.

Service-learning projects on food policy or project-based interventions in regenerative agriculture can catalyze deeply transformative experiences, enabling learners to connect values with practice and engage in reflexive, context-aware decision-making. These approaches combine critical reflection and action, co-creation and uncertainty, offering one of the most advanced terrains for cultivating transformative, ethical, and situated forms of food design education.

3.1.6 Embodied learning and design thinking: two pillars of transformative education in Agri-Food contexts

Among the most promising perspectives to emerge in recent years within transdisciplinary and transformative education, two key concepts deserve specific attention: embodied learning and design thinking. Both represent pedagogical approaches that transcend the traditional theory-practice divide, emphasizing the integration of mindset, body experience, and context.

The embodied learning paradigm, as proposed by Allen, Robles, and Vilsmaier (2023), holds that knowledge is not constructed solely through abstract cognition but is fundamentally grounded in bodily experience and sensory perception. This view is rooted in a broader tradition of embodied cognition and experiential epistemology, including the seminal works of Varela, Thompson, and Rosch (1991), Lakoff and Johnson (1999), and Schön (1983). Within transdisciplinary educational settings, embodied learning requires practices that actively engage students' bodies, emotions, and senses — including fieldwork, cooking, farming, and the exploration of food and rural environments.

Such activities — central to many of the short-format programs analyzed in the empirical section of this book — support not only transformative learning but also a reconfiguration of relationships between self, others, and the material world. In this sense, embodied learning becomes a foundational condition for cultivating ecological, relational, and ethical awareness. It allows learners to *think through the body*, internalizing knowledge in a profound and lasting way.

In parallel, design thinking has emerged as a key methodology for enabling co-design and social innovation within transdisciplinary learning environments (Philipp & Schmohl, 2023). Its iterative process — empathy, definition, ideation, prototyping, and testing — aligns closely with the goals of transformative pedagogy, as it promotes active participation, mutual listening, creative iteration, and critical reflection. These stages build on foundational contributions in human-centered and reflective design by authors such as Brown (2009) and Dorst (2011).

Empathy, the starting point of the design thinking process, finds resonance within the embodied learning perspective, as it enables

the shared, multisensory engagement necessary for understanding others' lived experiences. The integration of design thinking in agri-food education — especially in collaborative projects with farmers, communities, and food professionals — has demonstrated strong potential to generate context-sensitive, scalable, and sustainable solutions. These outcomes are achieved through inclusive, iterative pathways that foster collective ownership of change.

However, it is important to acknowledge the challenges associated with the effective implementation of these approaches. Embodied and design-based pedagogies often require time-intensive facilitation, suitable physical and relational settings, and an institutional culture that is open to ambiguity, vulnerability, and experimentation. Educators must be trained to support students through disorienting phases, while institutions must provide structural support for reflection, risk-taking, and collaborative engagement.

Embodied learning and design thinking not only enhance the transformative potential of agri-food education but also serve as fundamental levers for developing the systemic, affective, and design competencies needed to face contemporary food and sustainability challenges. The empirical section that follows explores how these dimensions have been activated and integrated across twenty food design educational experiences conducted between 2010 and 2025.

3.2 Methodology: from theory to practice

Fostering authentic transformative learning within transdisciplinary educational settings requires the co-facilitation of the process by both educators and learners. This implies acknowledging the open-ended and non-deterministic nature of learning outcomes and reconfiguring the role of the teacher — from a transmitter of knowledge to a critical facilitator. The construction of welcoming, trustworthy, and safe environments becomes essential to sustain students' emotional and cognitive engagement, especially during phases of disorientation which, when adequately supported, can become catalysts for change (Mezirow, 2003; Dirkx, 2008). In this context, empathy emerges as a central pedagogical tool, enabling

reflective engagement with relational, identity-based, and value-laden challenges that characterize transformative learning and complex co-design processes.

These premises serve as the interpretive lens through which the educational formats analyzed in this chapter are examined. While the international literature has extensively explored the principles of transformative learning and the implementation of transdisciplinary teaching approaches (Taimur & Ross, 2023), the contribution of food design to transformative learning experiences within agri-food systems remains under-investigated. Numerous studies document the tangible outcomes of food design — products, services, systems, experiences — but few focus on its transformative potential as a site of situated and collaborative learning. Systematic reflections on how such educational practices may influence the relationships with food of designers and other actors involved in co-design processes are still lacking.

This chapter addresses this gap by exploring how food design education can foster the transformation of agri-food systems through the construction and dissemination of a design culture rooted in place, grounded in human values, and oriented toward systemic co-creation. Following the ethical and political vision of Victor Papanek in *Design for the Real World* (1971), design must no longer be subordinate to industrial or market logics but should instead respond to real human and ecological needs. Educating agri-food designers today means nurturing systemic, empathic, imaginative, and collaborative capabilities, while also supporting the activation of what Lorenzoni and Massari (2023) define as local and place-based *dormant resources*.

As Papanek (2022) asserts, design is the most powerful tool man has to shape his products, his environments, and, by extension, himself. This claim highlights the political and ethical dimensions of design as both critical inquiry and responsible action, enabling a rethinking of the relationships between food, place, and society.

This chapter serves as a theoretical and methodological bridge between the literature on transformative learning and the empirical analysis presented in the following sections. It draws from twenty experimental educational formats, designed and co-organized by

the author between 2010 and 2025. These initiatives — diverse in objectives, durations, contexts, and participants — reveal recurring patterns of transformative engagement that will be systematically analyzed.

The research methodology adopted involved the construction and validation of a qualitative evaluation matrix, aimed at analyzing the short and intensive place-based educational formats dedicated to designing sustainable solutions for agri-food systems. Implemented across both formal academic programs and non-formal learning environments, these initiatives share a common foundation in experiential, transdisciplinary, and participatory pedagogies.

The analytical framework was informed by Simon Sinek's Golden Circle model (2011), which guided the identification of the following dimensions:

Why: why can place-based food design education activities be transformative? This axis defines the transformative, cultural, and systemic motivations underlying each format. It explores the foundational values, learning goals, and visions of individual, collective, and territorial change.

How: how do place-based food design education activities activate transformation? This axis investigates the methodological and operational strategies adopted to pursue those goals, including participatory dynamics, design devices, transdisciplinary frameworks, and models of co-creation.

What: what is needed in these formats? This axis focuses on the structural and contextual features of each format — settings, tools, types of activities, and resulting outputs.

The methodology follows a critical auto-ethnographic approach (Ellis *et al*., 2011), involving the inductive systematization of educational practices and their integration with theoretical reflections from international literature. This approach is not merely descriptive but constructive: the matrix was developed as an operational, meta-design, and evaluative tool to both assess past initiatives and support the design of future transformative educational programs. To mitigate the risks of subjectivity inherent in auto-ethnography, the process included internal triangulation, peer debriefing, and iterative validation with co-facilitators who had collaborated in the design and delivery

of the formats. A participatory observation method was employed, as the author was directly involved as co-designer, facilitator, educator, and researcher.

The data analysis (Table 3) was structured according to four analytical constructs derived from realist evaluation (Pawson *et al*., 2005):

4) RESULTS Tangible outputs, and intangible outcomes Results combine evaluation tools from sustainability education with approaches to transformative agency	**1) STRUCTURE AND CONTEXT** Format settings, Transdisciplinary Framework Structure and context, informed by situated learning, epistemic flexibility, and the significance of immersion
2) INTERVENTION Co-creation, participatory activities Intervention, participation and co-design, drawing from co-production of knowledge, participatory design and facilitation practices	**3) MECHANISM** Design Devices and Pedagogical Architectures Mechanism, learning processes, inspired by narrative methods and disorienting dilemmas

Table 3.
Mapping the data according to realistic constructs.
Source: van der Wee *et al*., 2024.

1. Structure and context: the socio-physical and organizational environment in which the activities take place, including the physical setting, interpersonal relationships, learning configurations, and the overarching transdisciplinary framework.
2. Intervention: the educational or co-design-driven action aimed at generating change, specifically the didactic configurations and co-design processes that are activated.
3. Mechanism: the process or reaction that explains the effectiveness of the intervention, namely the design devices and the pedagogical and motivational architectures that trigger transformative learning.
4. Results: the observable effects of the intervention, distinguishing between tangible outputs (e.g., prototypes, projects) and intangible outcomes (e.g., transformative competences, attitudinal shifts, mindsets development).

Data were collected and systematized post-event through project documentation, visual narratives, audio recordings, field notes, participant observation, informal interviews, surveys and user-generated content. Each axis includes specific indicators constructed through the triangulation of three data sources:

1. Document analysis of materials produced during the activities (design outputs, visual documentation, reflective texts);
2. Critical auto-ethnographic observation by the author;
3. Internal triangulation using matrix indicators as proxies for competency activation and transformative impact;
4. Surveys, comments, data in journals, and social media posts left from the participants.

Based on these four axes, twelve qualitative indicators were developed and grouped accordingly. Some of these indicators were associated with a three-level qualitative scale (low, medium, high) and grounded in consolidated theoretical frameworks across multiple domains: sustainability education (UNESCO, 2017), transformative learning (Merizow, 1991), applied transdisciplinarity (Lang *et al*., 2012), and situated educational design (Kolb&Kolb,2005).

The corpus of analysis consists of heterogeneous materials from immersive, place-based educational contexts in food design. These enabled the activation of six cultural mediations of food — sensory, bodily, spatial, material, productive, and social — previously introduced in Chapter 2. The matrix allows the author to explore whether and how these mediations were activated and how they supported the development of core transformative competencies, such as empathy, systems thinking, collaborative creativity, and cognitive flexibility.

Ultimately, the matrix facilitates comparative analysis, identification of recurring patterns, and the recognition of areas needing improvement. It is designed not only as an evaluation tool but also as a generative framework for designing future educational experimentation in agri-food systems. Its applicability, however, depends on the richness of documentation, the presence of reflective facilitation, and the learners' willingness to engage in critical self-assessment. While the matrix has proven effective in capturing multi-layered dynamics of transformative learning, further testing across institutional and cultural contexts could improve its robustness and methodological validity.

Designed retroactively to interpret the twenty case studies, the matrix is not a predictive tool but rather an inferential-qualitative framework. Based on indicator triangulation, it enables the emergence of cross-cutting patterns and critical success conditions for trans-

formative learning in agri-food design education, functioning as both a reflective tool and a strategic guide for future pedagogical innovation.

3.2.1 Matrix: structure, indicators, and theoretical foundations

This section presents the structure of the evaluation matrix developed to analyze twenty short and intensive educational experiences conducted between 2010 and 2025. These initiatives, situated within agri-food design education, offer valuable insights into how transformative learning processes can be activated through real-world engagement, cultural mediation, and participatory design.

Axis 1: STRUCTURE and context (Indicators 1–4)

This axis addresses the pedagogical and logistical foundations of the format, assessing its coherence, adaptability, and alignment with situated learning environments.

1. *Duration and immersion level*
   Assesses not only the chronological duration but also the cognitive, emotional, and participatory intensity required.
2. *Educational setting and territorial anchoring*
   Evaluates whether learning takes place in formal or informal contexts, level of education if formal or academic environment, and whether the activities are embedded in urban and rural territories. Contextual anchoring is essential for experiential and place-based learning. Examines the strength and depth of relationships established with local communities, actors, and institutions, referring to the literature on community-based and place-based learning.
3. *Flexibility and format adaptability*
   Examines the program's capacity to adapt to different participant groups, local contexts, and learning objectives. Flexibility is understood both as an epistemological and design-related competency (Kolb & Kolb, 2005; Sterling, 2021).
4. *Assessment practices and reflectivity*
   Analyzes the types of evaluation (formal, self-assessment, peer review, stakeholder feedback) and the presence of tools promoting metacognition and critical reflection (Boud & Molloy, 2013).

Axis 2: INTERVENTION, participation and co-design dynamics (Indicators 5–8)

This dimension investigates participant engagement, disciplinary diversity, external collaboration, and the integration of design and empathy-based methodologies.

5. *Participant composition and disciplinary integration*
   Looks at whether teams are mono-, multi-, inter-, or transdisciplinary and whether external stakeholders are involved.
6. *Project intensity and active participation*
   Captures the degree of engagement in co-design processes and the quality of interaction with the local context (Sanders & Stappers, 2008).
7. *Empathic activation*
   Based on the EOE – Empathy-Oriented Education model, this indicator assesses the activation of empathy toward the self, others, and the broader ecosystem (Massari *et al.,* 2021).
8. *Cultural mediations*
   Investigates whether the format activates the six core mediations of food experience — senses, body, space, others, production, and materiality — as theorized in Chapter 2. How these mediations contribute to embodied and transformative learning.

Axis 3: MECHANISM and narratives (Indicators 9-10)

9. *Narrative structure and motivation pedagogical model*
   Assesses the internal narrative arc and the learning path structure. The formats may follow specific models such as:
   - IAI – Inspiration, Aspiration, Action, a model promoting ideation through aspiration and visioning (Massari *et al*.., 2022; Massari & Roversi, 2023) created and promoted by Future Food Institute;
   - EICS – Exploration, Inspiration, Create, Sharing, based on sequential stages of engagement and co-creation (Massari, 2012b). The 4-F model of emotional and cultural adaptation is also referenced to assess affective transitions during international or intercultural programs (more information will be provided in chapter 4).

10. *Design methodology*
    Reports the presence and application of design frameworks such as Design Thinking, Lean, or Prosperity Thinking, and their alignment with the format's educational goals (Vignoli and Roversi, 2021). Methodologies such as design thinking, agile prototyping, and design sprints enable students to engage with complex problems while narrowing the gap between theory and practice. Possible other design methods applied: culinary design, video-editing design, graphic design, and so on.

Axis 4: Outputs and OUTCOMES (Indicators 11–12)

11. *Tangible outputs*
    Assesses the quality and relevance of design artifacts such as concepts, prototypes, maps, performances or installations, viewed also as material traces of learning processes
12. *Intangible outcomes*
    Explores whether the format supports the development of key competencies for sustainability transitions: systems thinking, cognitive flexibility, collaborative creativity, and empathy (Massari, 2021).

A detailed version of the matrix, complete with data from the twenty educational programs analyzed, can be found in the Annexes Session at the end of the book.

3.3 Results from the analysis

The comparative analysis of the educational formats included in the matrix reveals a significant evolution in the ways design has been applied in the agri-food sector over the past 15 years, primarily as a transdisciplinary pedagogical practice. These diverse experiences fall along a continuum of design intensity and duration: short, high-intensity formats tend to foster immersive and co-creative environments, while longer programs (such as study abroad modules) are more suitable for in-depth cultural exploration and relational learning. This

temporal diversity has supported the design of learning environments that facilitate participants' transformation toward a renewed design identity. In these contexts, food design activities — interweaving embodiment, sensory practices, spatial and social interactions, and systemic food knowledge — function as experiential devices that activate the six cultural mediations of food (see Chapter 2). Developed by the author from a historical-cultural approach and enriched through international practice, these mediations — linked to the senses, the body, space, others, materiality, and the food production and supply chain — serve as conceptual and operational gateways for situated and transformative learning.

All programs were conducted in international contexts, except one that involved exclusively Italian participants. Therefore, this variable is not significant or analytically relevant in the interpretation of the results.

From a methodological standpoint (Indicator 10), the selected formats show progressive sophistication. While Design Thinking remains the most commonly used framework, it is often hybridized with complexity-aware and sustainability-oriented approaches, such as Lean Design, Agile Prototyping, and, in the case of FFI Bootcamps, Prosperity Design Thinking — a model developed over time by Future Food Institute (Vignoli *et al*., 2021; Massari & Roversi, 2023). The widespread use of co-design demonstrates a clear intent to engage students in participatory and context-sensitive processes with local actors.

A salient finding is the explicit implementation of the Empathy-Oriented Education (EOE) model in recent formats (Figure 13). EOE model is described in Massari *et al*. (2021) and Allievi *et al*. (2021) as a pedagogical framework designed to foster sustainability in higher education through a progressive development of empathy. It is structured around three levels:

- Empathy with oneself (Ego-centric empathy);
- Empathy towards others (altruistic or Other-centric empathy);
- Co-constructive empathy (Eco-centric empathy), enabling collaborative meaning-making and action.

The model aims to guide learners from individual awareness to cooperative engagement, supporting them in becoming active and

empathetic problem-solvers. It can be effectively integrated with Design Thinking and interdisciplinary approaches to enhance food sustainability education.

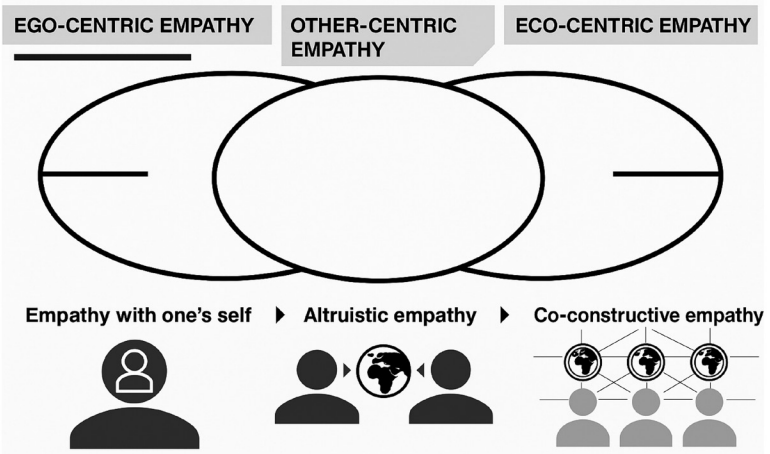


Figure 13. Empathy-Oriented Education (EOE) model. The process guided critical co-creation and reflection across three levels:
a) Self-reflexivity, connecting personal experiences with research practices;
b) Functional reflexivity, critically analyzing research methods and the knowledge produced with others;
c) Ecological reflexivity, integrating a systemic and interconnected perspective. This figure has been adapted by the author from the work of Massari *et al*., 2021, Allievi *et al*., 2021.

In these cases, empathy is no longer treated as a by-product of teamwork or intercultural exposure but becomes a central pedagogical goal. This shift is reflected in the core competencies developed through design practice: collaborative creativity, systemic and circular thinking, cognitive flexibility, and emotional intelligence (Indicator 7 and 12) — skills now essential for designers operating in complex and interdependent systems (Massari, 2021).

Regarding assessment tools (Indicator 4), more advanced formats employ dialogic and distributed evaluation strategies, such as peer-to-peer reviews and stakeholder feedback. Evaluation, in these cases, becomes a constitutive part of the co-design process, contributing to its evolution. The tangible outcomes — prototypes, service concepts, scenarios, and systemic maps — illustrate a broad spectrum of design outputs consistently informed by systemic design principles.

Many of the analyzed formats are also deeply embedded in intercultural, interdisciplinary, and territorial contexts. The six cultural mediations of food (Indicator 8) appear to be fully activated in these cases, reinforcing the relationship between design education and local food cultures.

Overall, the analysis not only maps different design methodologies but documents the emergence of a transformative food design

pedagogy — centered on empathy, complexity, and value creation for real-world agri-food innovation.

The four interpretive trajectories presented below synthesize the principal findings:

1. Design intensity as a transformative lever: formats characterized by high design intensity (e.g., Tenuta Labs, Climate Shapers Bootcamps, Sexy Beans Design Bootcamps) prove more effective in stimulating cognitive, emotional, and attitudinal change. Intensity is determined not by duration alone but by the degree of immersion and complexity addressed, aligning with experiential learning and action research paradigms (Indicators 1, 6, 12).
2. The enabling role of transdisciplinarity and territorial embeddedness: formats that engage local actors and are situated in active territories (e.g., Tenuta Labs, Regenerative Food Design Bootcamp, Climate Shapers Bootcamps) facilitate systemic understanding and embodied knowledge (Indicators 2, 5). These findings align with the AKIS framework (Knickel *et al.,* 2009) and principles of systemic innovation and mission-oriented approaches (Manzini, 2015; Mazzucato, 2018).
3. The role of pedagogical and emotional architecture: programs employing narrative scaffolding and reflective frameworks (e.g., IAA, EICS, 4F) enable deeper emotional engagement and the transformation of knowledge into situated competence (Indicator 9). These approaches draw from critical pedagogy and place-based learning.
4. Format flexibility and generativity: the best-performing formats employ modular and adaptive structures, enabling transferability and contextualization across various settings (Indicator 3). Reiterations of formats across territories (e.g., Sexy Beans Bootcamps in France and Italy, Tenuta Labs from Siena to Grosseto province) demonstrate the viability of a generative food design pedagogy aligned with the Living Lab model (Leminen *et al.,* 2012; Bergvall-Kareborn & Ståhlbröst, 2009).

These findings address two of the central research questions.

First: *how and when does food design generate transformation in place-based educational contexts?* The matrix indicates that trans-

formation occurs when intensity design, transdisciplinarity, flexible format, and reflective practice converge in situated learning environments. Furthermore, the integration of real-world design practice strengthens professional competencies, enabling all participants to apply methods in complex contexts. Nevertheless, challenges persist, including the necessity to refine evaluation tools and reinforce mentorship structures (Redström, 2020).

Secondly, *what is the designer's role in this context*? The role of designers engaged in these activities can be interpreted through the lens of the *embodied designer*, inspired by Horlings *et al.* (2019; 2020). Similar to the concept of the *embodied researcher*, this figure actively contributes to real-time co-creation in local contexts, embodying a form of situated transformation that affects all participants — not just the designers. The transformative value of this approach lies in the integration of sustainability principles, such as reciprocity, inclusiveness, transparency, and care — principles that shape the ways students, educators, and stakeholders approach their design practices and will be presented in the next chapter.

This perspective invites a paradigm shift in sustainability and food design studies, recognizing the designer not merely as a co-producer of artifacts and knowledge but as an agent of empowerment and self-transformation. In this light, the Bootcamps/Tenuta Labs or 3-days workshops becomes not just a learning format but a space for activating sustainable practices and catalyzing transformation in the agri-food system. Understanding whether the designer contributed to fostering collaborations previously absent or difficult among agri-food system actors is especially relevant. This dimension enables a deeper understanding of the potential role of food designers serving as mediators, enablers, and facilitators of food systemic co-creation.

3.3.1 Activating the mediations: examples of educational practices

As previously discussed in the analysis of transformative trajectories and their epistemic implications, this section explores how the six cultural food mediations — sensory, bodily, material, spatial, social, and systemic — have been concretely activated within the educational formats examined. The comparative analysis of twenty place-based educational initiatives developed between 2010 and 2025 confirms

the relevance of this model as both a conceptual and operational framework for transformative food design education.

The examples provided here are illustrative and not exhaustive. Each activity was tailored to the specific territorial context and learning outcomes desired, resulting in unique forms of mediation. Importantly, the mediations rarely operate in isolation; they tend to overlap, blend, and influence one another. As in everyday food practices, multiple mediations often interact simultaneously, reflecting the complexity through which food acquires meaning and value.

Sensory Mediation

Sensory activities often represent a privileged gateway for stimulating design imagination and awareness of one's relationship with food. In all the programs analyzed, blind tastings and sensory mappings using local ingredients triggered deep reflections on perception, taste memory, and food identity. Some Bootcamps adopted *taste archaeology* strategies — for instance, dinners inspired by historical periods (ancient Roman, Renaissance) or provocative scenarios (hunger-based dinners, food justice events, *Jeffersonian dinners* on food unsustainability) — designed to critically deconstruct familiar taste experiences and stimulate new interpretive paradigms. Technical sensory workshops were also conducted, incorporating synesthetic approaches both during eating experiences and within active, productive activities.

Bodily Mediation

The body is not merely an operative tool, but a fundamental cognitive vector. Manual and physical activities — ranging from harvesting, seeding, and cheesemaking to honey extraction with local beekeepers — proved crucial in activating forms of embodied knowledge. Direct participation in these practices enabled learners to grasp, in a tangible way, the materiality, temporality, and physical demands of food production processes. In some Bootcamps, groups also engaged in artisanal fishing at sea, sharing the daily life of local fishers. These immersive experiences, frequently referred to by participants as perceptual turning points, activated a deep bodily awareness of the environment and the food life cycle.

Material Mediation

Food transformation became a means to explore the symbolic, aesthetic, and systemic value of matter. In many place-based education initiatives, food prototyping was carried out using leftovers or marginal ingredients as a prompt for reflecting on circularity and ethical transformation. Students co-designed objects, packaging, communication tools, and sensory installations in which the materiality of food was narrated as a bearer of cultural and political meaning. Even in the design of experiences and events, food was treated as a living, dynamic material, playing a central role in the staging of the project. Cheese produced by participants and honey collected with beekeepers became narrative and symbolic artifacts within project exhibitions. Attention was also given to energy, and to the transformation of food into something else.

Spatial Mediation

The relationship with space was activated through affective mapping, urban and rural walkscapes (walking landscapes), and redesigns of abandoned markets, wineries, squares, farms, and hybrid spaces. In some study abroad programs, the participatory redesign of markets and collective spaces became a lever for territorial regeneration. Exploration of these places was often accompanied by experiential and reflective activities, fostering deep learning about the relationship between space, food practices, and social dynamics. Coastal areas, salt flats, and local ports became true *foodscapes* to be explored and reimagined through design. Scavenger hunts in markets, menu and restaurant interior explorations, as well as individual and expert-led scouting activities, filming, shooting, and on-site sketching of spaces. The initial sense of spatial disorientation — learning and living in unfamiliar settings — was often described by participants as a crucial turning point in their transformative process.

Relational Mediation

Most of the programs included co-design or inter-design activities with local actors — producers, administrators, citizens, and activists — activating dialogical and intergenerational exchanges. Participant groups became simultaneously subjects, objects, and collaborators

throughout all stages of the design process — both target users and co-designers at the same time. *Narrative dinners*, co-created with farmers and chefs, became rich educational environments in which personal stories, future visions, and local knowledge intersected with student projects. These dinners often served as informal yet generative spaces, where policymakers, researchers, and producers could collectively build shared meanings. Exploratory visits were followed by collective reflection moments, reinforcing participant cohesion and fostering relational empathy.

Food System and Productive Mediation

The systemic approach was implemented through visual tools (value chain maps, stakeholder maps, food system canvases, multi stakeholders and transversal empathy maps) and complex participatory processes linked to real-world challenges — from regenerating short supply chains to designing agroecological services or strategies for food sovereignty. In many cases, speculative workshops with local stakeholders, decision-making simulations, and structured or informal focus groups were activated. Co-exploratory activities, such as shopping or cooking with producers and local families, were experienced as powerful cognitive and emotional activators. In post-activity evaluations, many participants described these moments as pivotal for understanding the interdependencies that define food systems.

This overview shows how the six cultural food mediations model should not be interpreted solely as a theoretical framework for analysis, but as a practical and pedagogical tool for designing transformative educational experiences. Food — in its material, social, spatial, bodily, sensorial and systemic dimensions — becomes language, environment, and pedagogical device. Through design, the mediations are translated into practices that connect perception, action, and reflection, enabling situated, critical, and relational learning oriented toward personal and collective transformation.

These activities are not isolated examples, but deliberate applications of a situated design approach rooted in the epistemology of food as a medium of transformation.

However, it is important to acknowledge that not all mediations are equally easy to activate in every context. The relational and systemic dimensions, in this case, often necessitate robust stakeholder engagement, the establishment of trust-building processes, and ample time for dialogue and co-creation to occur. In short-term formats such as Bootcamps, this can pose a challenge. In some cases, institutional constraints, language barriers, or cultural mismatches between participants and local communities may limit the depth of interaction or mutual understanding.

Furthermore, the activation of systemic awareness — while desirable — may remain superficial if not supported by iterative reflection, guided facilitation, or sustained engagement with the food system's complexity. These limitations do not invalidate the approach but highlight the need for adaptable, context-sensitive pedagogical strategies that recognize and work with such constraints.

3.3.2 Limits: reflections on method, positionality, and scientific validity

The analysis conducted has intentionally refrained from focusing on the specific content of the design outcomes. Instead, it has maintained a comparative and neutral lens to highlight the educational, relational, and methodological dynamics observed across the different formats more effectively. In all the cases analyzed, the expected output was the co-design of innovative solutions in the field of food design developed by participants in response to real, situated challenges.

Topics ranged from the regeneration of urban markets and the valorization of marginal rural territories to communication strategies for regenerative agriculture, the promotion of sustainable school canteens, and the design of food retail formats and socially impactful services (see Annex 1). This diversity demonstrates not only the versatility of food design as a pedagogical tool but also its capacity to activate critical awareness, systemic thinking, and agency.

From a methodological perspective, the research follows a qualitative, auto-ethnographic, and retrospective approach. The evaluative matrix was not intended as a predictive tool but rather as a posteriori analytical device aimed at exploring the enabling or inhibiting condi-

tions for transformative learning within food design education. The heterogeneity of data — stemming from the informal nature of many of these experiences — represents a limitation in terms of comparability. However, it aligns with a situated and interpretive approach, consistent with Event-Based Design Education (Massari *et al.,* 2025).

1. Positionality and cultural scope. All educational programs analyzed were conducted in European contexts, predominantly in Italy, and involved participants mainly from Europe and North America. This geographical and cultural concentration inevitably reflects specific epistemic, socio-economic, and pedagogical assumptions rooted in Western educational traditions. Such positionality must be acknowledged as a potential limitation, specifically when the findings are considered through postcolonial or DEI (Diversity, Equity, and Inclusion) lenses. The design approaches, values, and practices presented may not be universally transferable and should be critically reinterpreted when applied to different cultural, political, or ecological contexts.
2. Inclusion, voice, and agency. One of the strengths emerging from participants' feedback lies in the recognition of voice and self-agency. Many highlighted how the programs allowed them to *flow into their voice*, represent their communities, or reclaim knowledge from personal or ancestral experiences — e.g., rediscovering the value of farming techniques learned from grandparents and finding new ways to share them. Several comments also emphasized the importance of feeling welcomed, listened to, and safe in expressing dissenting or minority perspectives. This supports the idea that these formats can act as epistemically inclusive spaces where lived experience and embodied knowledge are acknowledged alongside academic expertise. Participant feedback was collected through post-activity reflection sessions, anonymous surveys, and spontaneous digital contributions (text and audio). These reflections were thematically analyzed and integrated qualitatively into the matrix interpretation.
3. Accessibility of spaces and contexts. Across all programs, efforts were made to situate activities in accessible, inclusive

environments — not only in physical terms (e.g., rural areas open to all participants, low-threshold public venues) but also in social terms, favoring horizontal dialogue and peer-to-peer dynamics. The environments (farms, food labs, community kitchens) were often selected to lower hierarchical barriers and encourage a relational pedagogy based on trust and co-responsibility.

4. The six cultural mediations of food as learning devices. The framework of the six mediations — sensory, bodily, material, productive, spatial, and relational — proved effective in both analytical and pedagogical terms. It allowed for *cross-cutting interpretation of food experiences,* surfacing moments of emotional resonance, spatial awareness, ecological literacy, and embodied empathy. This positions food not just as an object of learning but as a *relational medium and agent of transformation*. From this perspective, food is not merely a pedagogical content or a design object but a proper epistemic medium. Through situated, multisensory, and participatory design practices, food design generates contextual knowledge that emerges from the interaction between bodies, environments, and meanings. This type of knowledge — which could be defined as *trans-sensory* and embodied — is essential for addressing the complexity of contemporary agri-food systems. The integration of practical experiences has strengthened designers' professional preparation by enabling the application of design methodologies in real-world contexts (Kolb & Kolb, 2006). However, several critical issues have emerged, including the need to improve outcome evaluation tools and to enhance support through more structured mentorship solutions (Redström, 2020).
5. Future evolution and co-development potential. Although the current research focused on retrospective analysis, several participants expressed a desire to replicate or adapt these experiences within their communities. This suggests an *emerging need for open-source educational models*, modular toolkits, or peer-led programs that can scale in *a context-sensitive and locally driven manner.* Co-developing such

frameworks with participants and partner institutions could be a promising direction for future action-research initiatives — especially within food systems innovation, sustainability, and equity-oriented design.

In conclusion, while this research does not aim for universal generalization, it offers a reflexive and situated methodology that can inform educational practices aligned with the values of equity, sustainability, and systemic transformation. By embracing a plurality of voices and a justice-oriented design lens**,** this framework could be further adapted to diverse socio-cultural and geographic contexts**,** contributing to the development of more inclusive, intercultural, and decolonial pedagogies in the food design field.

In consideration of these factors, food design can be conceptualized as a mode of situated and generative knowledge production, consistent with the paradigm of research through design (Frayling, 1993; Koskinen *et al.,* 2011). Its capacity to foster critical reflexivity, transformative agency, and meaning co-creation positions it as a key tool within a design pedagogy oriented toward social, ecological, and cognitive justice.

3.4 The B.E.FOO.D Framework: The Butterfly Effect of transformative learning in place-based Food Design education

The B.E.FOO.D framework (*Butterfly Effect* of transformative learning in Place-Based Education by *Food Design*) maps out the interdependent dimensions underpinning educational practices aimed at systemic transformation for and by food. Drawing on the metaphor of the butterfly effect, the model shows how even small, situated interventions carried out through educational food design can generate significant impacts on individuals, communities, and agri-food systems.

At the core of the framework are the six cultural mediations through which value is attributed to food. These mediations are essential not only for understanding how food is experienced and

interpreted but also serve as the foundation for designing learning experiences and design-based activities. They define both the structure and the meaningfulness of the proposed interventions.

Surrounding this core, the framework unfolds in four wings, each representing a pillar of transformative food design education (Figure 14):

1. Situated learning settings, which highlight the relevance of context and territory (place-based learning);
2. Design mechanisms are understood as the targeted and adaptive application of design methods and tools;
3. Participatory interventions reflecting the active and collaborative engagement of multiple stakeholders in co-design processes;
4. Tangible and intangible results, including both material and tangible results (such as prototypes, deliverables, and artifacts) and more profound transformations (such as changes in mindset, relationships, and imaginaries).

At the intersections between these four elements, four key dynamics emerge:

- Reflective pedagogy, stemming from the interplay between real-world contexts and the targeted use of design methods, fostering critical and emotional engagement with local practices and environments;
- Design intensity refers to the activation of design as a catalyst for meaningful and sustained participation of all actors within co-design processes;
- Transdisciplinary territorial embeddedness, expressed through the collaboration of diverse forms of knowledge, experiences, and roles — designers, educators, producers, policymakers, and students — towards shared context-specific goals;
- Format adaptability highlights the necessity of tailoring educational and design structures to the specificity of the context setting and the nature of the expected outputs and outcomes.

The visual model (Figure 15) of the B.E.FOO.D framework, illustrates how the interplay between participatory approaches and anticipated

outcomes contributes to the transformation of mindsets and the strengthening of inter-actor relationships. These shifts have a direct impact on food cognition, reshaping perceptions, values, and practices among all participants. Simultaneously, the interaction between educational settings and design-pedagogical architectures fosters the transformation of systems and visions, enhancing and evolving food cultures. A reading of the framework from this dual perspective reveals how food culture and food cognition represent two sides of the same coin — a conceptual convergence explored in depth in Chapter 2.

From these transformations emerges the so-called butterfly effect, articulated along four complementary dimensions by and for food transformation:

A) on the cognitive and mindset level:
   - embodying values by food: assuming values through food;
   - embracing competencies by food: developing situated, collaborative, and transformative competencies through food;

B) on the narrative and systemic level:
   - envisioning futures for food: envisioning sustainable and alternative futures for food;
   - acting for food: executing concrete actions of transition and regeneration for food systems.

These four dimensions mirror the four so-called *Foodcomps* hypothesized at the beginning of the chapter.

Eco-cognitive Activation occupies a liminal space between designing for food and by food. It defines a relational process in which food is not only a designed object nor merely a cultural medium, but an active mediator of cognition, culture, and systemic transformation. It is the dimension in which sensorimotor affordances and cognitive affordances overlap, as described in Chapter 2.

This activation occurs through the embodied and contextual engagement with food practices, enabling the emergence of situated knowledge, shared meaning, and transformative agency across disciplines and domains.

Eco-Cognitive Activation is an original concept developed in this research to describe a specific form of transformative activation that

transcends traditional cognitive and relational approaches in education. Unlike models focused solely on critical thinking (cognitive dimension) or altruistic empathy (relational dimension), this notion integrates:

1. Ecological awareness as embodied systemic thinking — the ability to perceive, interpret, and act with an understanding of oneself as part of a living ecosystem. This includes environmental perception, contextual sensitivity, and the recognition of one's impact as a situated actor within socio-ecological systems.
2. An active and design-oriented eco-centric dimension, which goes beyond general eco-awareness by promoting a fundamental shift in the way we think, design, and make decisions. Ecology becomes not merely a content area but a transformative epistemic lens that guides the co-construction of knowledge and sustainable futures.
3. The integration of mind, body, and environment as a result of the interplay between embodied learning, systemic empathy, and place-based practices. Eco-cognitive Activation involves learning with and through the environment, engaging the senses, food materiality, and ecological interactions.

This activation is fully aligned with the goals of the transdisciplinary food design approach many times presented in this book: a perspective grounded in local territories, ecological values, and the transformative potential of education. In conclusion, Eco-Cognitive Activation functions as a key enabling mechanism for systemic change, as it interconnects:

- Cognition: mind, body, and context;
- Ecology: knowledge, empathy, and ecological sensitivity;
- Agency: transformative learning and situated design action.

The B.E.FOO.D framework captures the generative potential of food design education when it is situated, participatory, reflective, and transdisciplinary. It offers a model for designing educational ecosystems capable not only of co-constructing and transmitting knowledge, but also of actively transforming systems, relationships, and imaginaries by and for food.

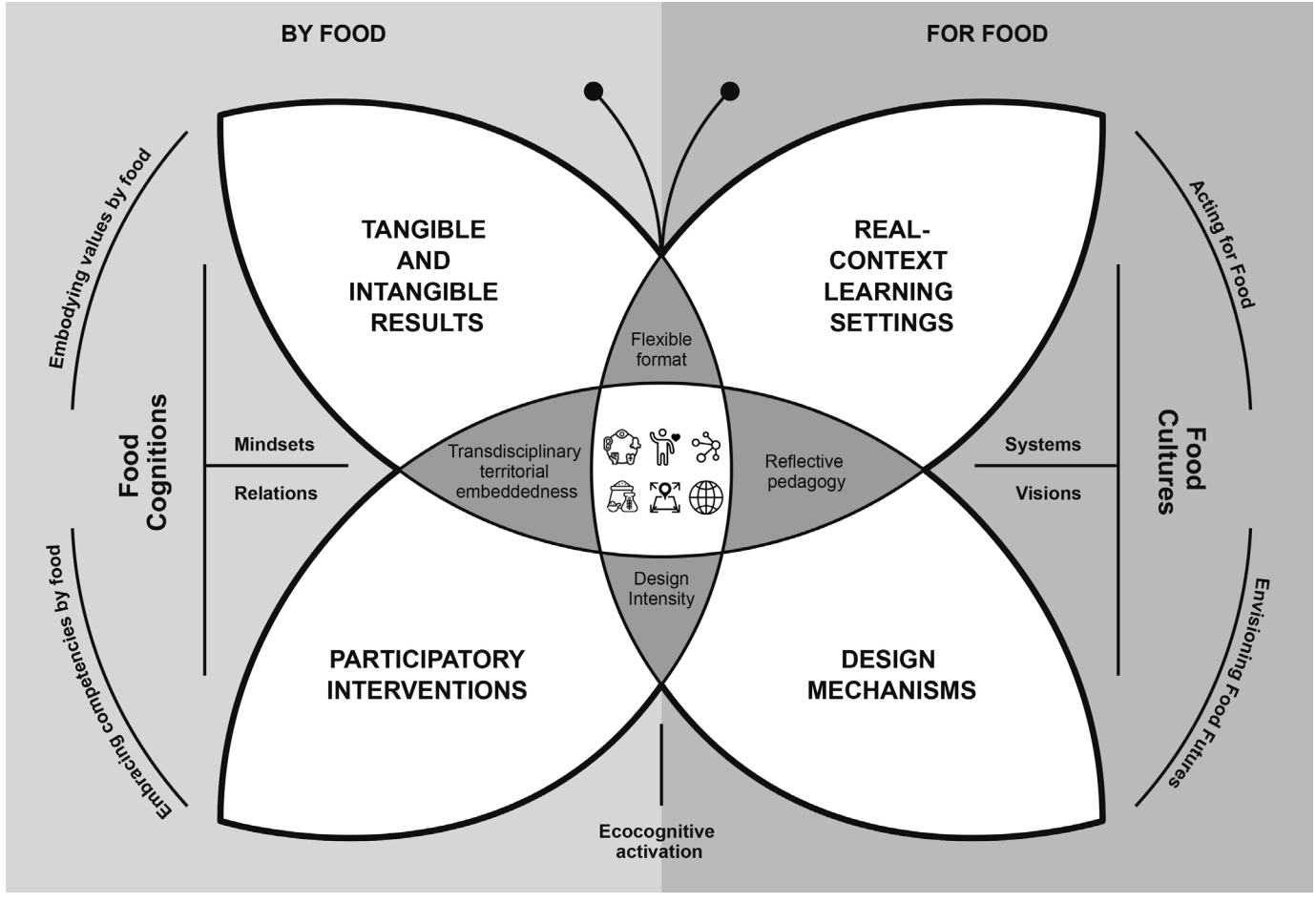


Figure 14
B.E.FOO.D model. The acronym B.E.FOO.D. stands for Butterfly Effect of Food Design. Source: Author.

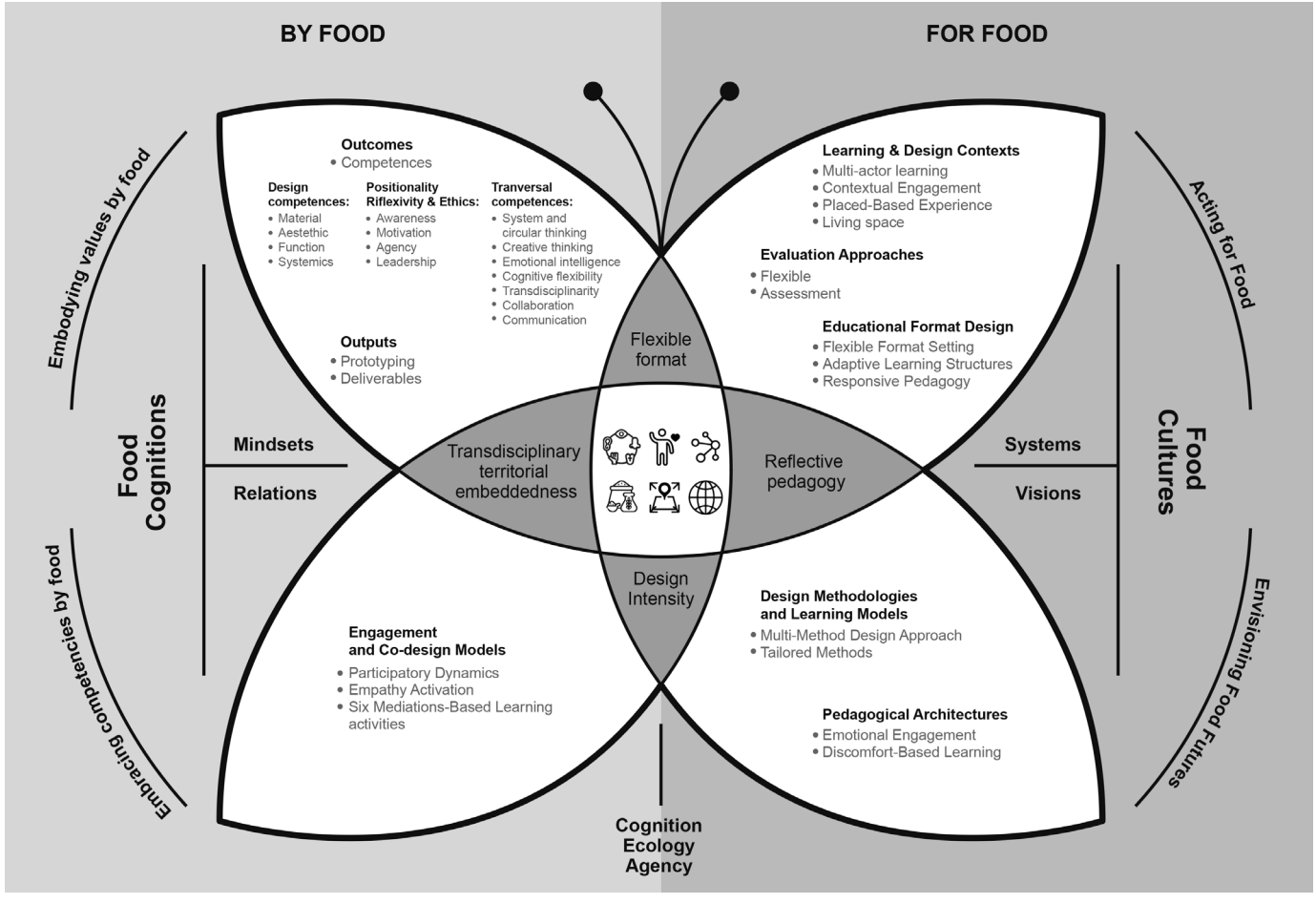


Figure 15.
B.E.FOO.D model. Source: Author.

3.4.1 Food culture and cognition: two wings of the same butterfly

The Butterfly (Figure 16), chosen as the symbolic core of the B.E.FOO.D framework, encapsulates multiple layers of meaning that effectively express the transformative, relational, and systemic nature of the educational models explored.

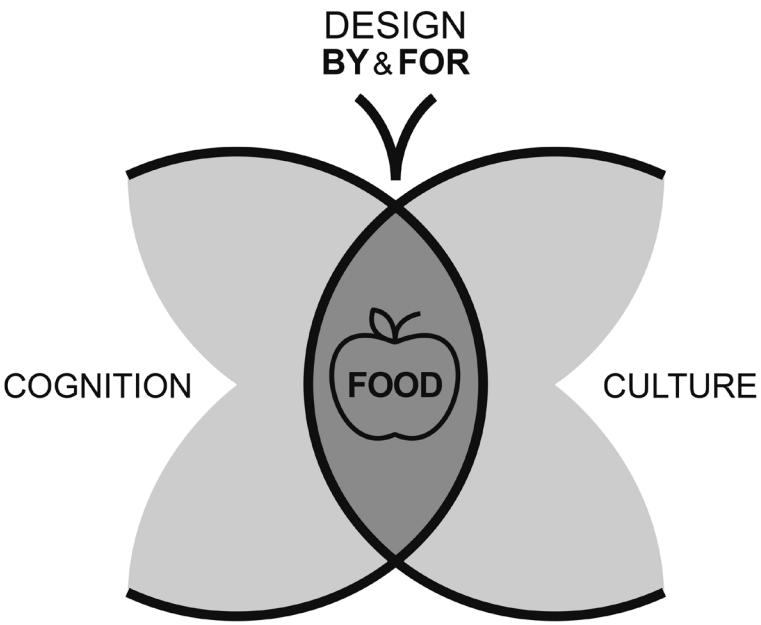


Figure 16. The metaphor of the Butterfly for the B.E.FOO.D model. Source: Author.

In chaos theory, the *butterfly effect* refers to the idea that small changes in initial conditions can generate far-reaching and unpredictable consequences in complex systems — a butterfly flapping its wings in one part of the world may, metaphorically, trigger a storm elsewhere. Similarly, short-term, context-based educational interventions — such as those documented in this book — can, when carefully orchestrated and deeply rooted in place, activate lasting transformations not only at the level of outcomes but also in the mindsets and relationships of the actors involved.

In the B.E.FOO.D model, the four wings represent the core components of transformative learning experiences: real-world setting, design mechanisms, participatory actions, and tangible and intangible results. These elements operate not in isolation but through constant interaction — altering one inevitably reshapes the others, much like

in any living system. At the center of the butterfly — its vital core — lie the six cultural mediations of food: lenses through which humans construct meaning in their relationships with food. In this framework, culture and cognition are like the two wings that must function in harmony to enable flight — two inseparable facets of transformation.

The butterfly does not fly alone. Its ability to attract, communicate, and inspire — just like in participatory educational systems — depends on the richness and quality of the relationships it generates. As with butterflies in nature, whose wing colors reflect polarized light to signal and attract others, well-designed educational processes can activate dormant resources, generate unexpected connections, and spark new trajectories in other territories and communities. In this context, the role of the designer assumes a renewed responsibility: not simply to facilitate or structure activities, but to create the enabling conditions for the butterfly to fly on its own. Once a fertile ecosystem has been established, the designer-coach may step back, allowing the community — the butterfly itself — to carry forward the processes of transformation, inspiration, and regeneration autonomously.

The *Butterfly Effect of Food Design* model guides learners and educators through mobile nodes, dormant resources, and emergent relationships, where food serves not only as a topic but as an epistemological and educational medium. As previously discussed, the model encompasses six cultural mediations and the Eco-Cognitive Activation dimension, offering a dynamic structure for navigating agri-food complexity. The conceptual shift from *design for food* to *design by food* lies at the heart of this transformation: design is no longer applied to food, but rather generated through food. Food is not simply an object of design, but a medium through which design can be activated, enacted, and transformed.

In this paradigm, food acts as a relational and cultural artifact, a cognitive and sensorial tool, and a site of embodied and situated learning. The framework moves beyond a technical or experiential notion of food design, proposing instead a transformative pedagogy aimed at cultivating critically aware, contextually embedded, and ecologically literate design citizens. By integrating the six mediations, the framework reinterprets design competencies not as a set of technical skills but as systemic, ecological, relational, and cultural capabilities.

This shift aligns with advanced reflections on design for sustainability (Manzini & Rizzo, 2011; Versteijlen & Wals, 2023) and with emerging transformative paradigms in educational research (Horcea-Milcu *et al*., 2024; Caniglia *et al*., 2021).

Although rooted in the field of food design, this research shifts its center of gravity: from designing about food objects to building systemic educational experiences, where food functions as a relational and epistemological device. The analyzed formats become cognitive and cultural bridges that help diverse individuals interpret and transform their relationship with food, territory, design, and community.

In this sense, the *Butterfly Effect Food Design* – B.E.FOO.D model (Figure 17) is not only an operational tool but a pedagogical grammar for transformative design. A grammar that fosters meaning-making, promotes transformative competencies, and supports the creation of situated shared value. The framework is suited for application in high-complexity contexts such as agri-food Living Labs, where transdisciplinary teams and wicked problems intersect (more details in chapter 4).

Figure 17.
The B.E.FOO.D Model: A *Design by and for Food* Grammar for Food Design Education.
Source: Author.

Far from proposing a rigid identity for the food designer, the model suggests a co-generative and inclusive design posture, one that embraces diversity, plurality, and contamination. This move redefines the food designer's role from that of isolated creator to that of facilitator of meaningful, transdisciplinary, and situated practices — practices rooted in shared meaning-making and capable of fostering ecological and relational futures. In line with a tradition of critical and responsible design

(Papanek, 1971), it promotes a systemic vision in which learning and transformation unfold through a continuous and relational process.

As the analyzed cases demonstrate, designing by food is not simply about acquiring knowledge but about transforming design subjectivities. Participants are not passive recipients, but co-authors of generative practices capable of reshaping relationships, languages, and imaginaries. Food becomes a generative lens through which new connections, capacities, and social imaginaries can emerge.

The conceptual move from *design for food* to *design by food* is the most innovative and distinctive element of this work: it no longer implies designing for food as object, but by food as medium, in a process that generates meaning, relationships, and new forms of design citizenship. In this sense, the proposed framework distinguishes itself from more technicity or aesthetic approaches, aligning instead with a tradition of critical, ecological, and responsible design.

3.5. Conclusion

The twenty collected and analyzed experiences show that it is possible to construct generative educational environments, in which food is not merely a theme but a cognitive environment, not only content but a relational and transformative lever. The designer progressively takes on the role of facilitator, co-creator, and sense-maker. Educating for and by agri-food systems thus means shaping individuals capable of inhabiting complexity, co-designing with others, and imagining ecological, systemic, and relational futures.

By incorporating a rhizomatic learning framework, the B.E.FOO.D model aligns with recent reflections in Embracing the Rhizome (Philipp & Schmohl, 2022), advocating for non-hierarchical, networked knowledge production and participatory, embodied education systems.

In VUCA (Volatility, Uncertainty, Complexity, Ambiguity) contexts (Bennett & Lemoine, 2014), however, these learning environments must be flexibly structured and adequately supported. Institutions are responsible for providing logistical and financial infrastructure, while students must be equipped to engage with non-academic

stakeholders — requiring not only communication and design skills, but also reflective spaces to process their lived experiences.

In such a vision, universities become agonistic arenas, not neutral transmitters of content but collaborative sites for negotiating knowledge, values, and change. Universities and public bodies are thus called to promote iterative programs of research and educational development, grounded in empirical evidence and committed to fostering systemic and cultural innovation. Investing in the formation of educators and students as agents of change is essential, through workshops, labs, interdisciplinary practices, and learning settings that promote participation, reflexivity, and imagination.

Only under these conditions can transformative learning generate active and conscious citizens — capable of designing food systems that are ecologically rooted, socially just, and culturally meaningful.

The present research contributes to defining a new grammar of food design education: not normative but generative, rooted in empathy, in the plurality of knowledges, and in the living connection with territories. A grammar that shifts attention from form to relation, from product to system, recognizing design as a transformative practice and a tool for active citizenship.

In the context of the systemic ecological and social crises of our time, the concept of the Anthropocene has become paradigmatic, marking a new geological epoch in which human activity has emerged as a planetary force capable of profoundly altering the Earth's biophysical conditions. However, beyond acknowledging the damage wrought by this anthropocentric dominance, it is increasingly urgent to envision the contours of a post-Anthropocene — a conceptual horizon in which traditional categories of subject, nature, knowledge, and design are rethought and renegotiated through the lens of radical interdependence between humans and entities that are more-than-human. From this perspective, the more-than-human paradigm — developed across political ecology, relational ontologies, and posthumanist theory (Haraway, 2016; Braidotti, 2019) — invites us to move beyond the modern nature-culture divide and to recognize the distributed agency of material, living, and non-living actors that co-shape the ecological and cognitive landscapes we inhabit.

The B.E.FOO.D model, conceived as a theoretical and operational framework for education and design in agri-food systems, positions itself within this broader epistemological and methodological shift, placing at its core deep attention to relational ecologies and transformative learning. Grounded in principles of situated co-design, systemic empathy, and embodied knowledge activation, B.E.FOO.D acknowledges and supports the dynamic interplay between human subjectivities, ecological agents, and material contexts. The integration of more-than-human thinking does not imply a devaluation of human agency but rather a repositioning of the human within a complex relational web where design becomes an act of listening, care, and shared responsibility.

By adopting the quintuple helix framework (Figure 18) — which expands traditional models of innovation to include, beyond academia, industry, and government, both civil society and the environment — agri-food systems transformation can be interpreted as a process of co-generative and multispecies innovation. Within this framework, nature is no longer a passive backdrop or resource; it is an active participant in the process. However, it is recognized as an epistemic partner and transformative actor, capable of guiding new forms of situated knowledge, ecological ethics, and territorial justice.

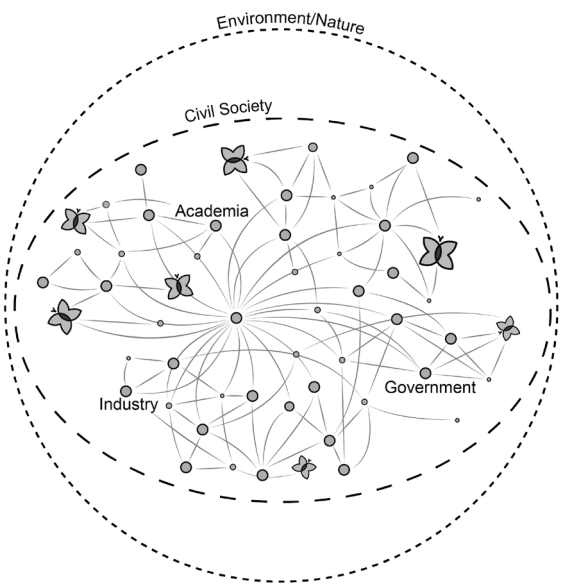


Figure 18.
B.E.FOO.D and the Quintuple Helix: a rhizomatic model of food design and learning.

It is precisely in the interaction between design intentionality and collective ecological intelligence, between co-experimentation practices (such as Living Labs) and eco-cognitive activation within real-world settings, that a new paradigm for inhabiting the post-Anthropocene may emerge. This is not a nostalgic return to nature, nor a technocratic abstraction, but rather a set of concrete, generative transitions toward futures that are sustainable and plural — where human and more-than-human beings coexist and co-evolve within an inseparable relational fabric.

In the context of food design education, directionality and responsibility represent the two key coordinates that guide the actions of the educator-designer, who operates simultaneously as an autonomous professional and as a representative of the institution in which they work. When engaging with stakeholders who hold divergent political views and interests, the educator-designer must preserve their critical autonomy, reflecting independently, having the courage to express dissent in the face of ethical dilemmas, and simultaneously taking responsibility for the social implications of design decisions. Suppose it is true that empirical evidence alone does not produce change. In that case, people do not alter their behavior simply because they are *convinced by data*. Then, the food designer's primary task becomes facilitating relationships that open up spaces of doubt and dialogue across different value systems. Problematizing, in this sense, means offering multiple interpretations of reality, enabling dialogue between distant worlds, and co-creating shared visions capable of bridging conflicts of interest.

In this scenario, the role of the food designer undergoes a substantial transformation:

1. working in real, living contexts — not simulated environments, but spaces marked by tensions, needs, and concrete dynamics — requires the designer to abandon the detached position of the observer and adopt a transformative posture. Tools such as Living Labs represent privileged environments in which designing means not only conducting research but also enabling change.
2. In contexts resistant to transformation, the designer must be able to activate directionality, developing strategies that reveal the regenerative potential of food and distribute responsibility among all the actors involved.

4. Designer by and for food. Co-generating meanings, visions, and futures

In the field of education for food design, many of the categories used in the analytical matrix described in Chapter 3 derive from consolidated pedagogical models or are borrowed from adjacent disciplines. However, the analysis of twenty educational experiences within food design training reveals an urgent need to revise these theoretical frameworks, moving beyond linear instructional structures and prescriptive approaches. The results indicate that agri-food systems when activated as both cognitive and operational devices, generate complex dynamics that span epistemological, bodily, material, and relational dimensions.

Several of the educational experiences analyzed reveal that conventional tools — such as those derived from Design Thinking, typically applied in its standardized sequence of empathy, ideation, prototyping, and testing — prove insufficient to engage with the relational, temporal, and ecological complexity inherent in agri-food systems. Recent critiques in design literature have highlighted the limitations of Design Thinking in dealing with *wicked problems* and systems characterized by unpredictability and emergence (Tonkin-

wise, 2015; Kimbell, 2011). These approaches, originally developed to streamline innovation in corporate settings, tend to frame problems too narrowly and overlook the deeper systemic, cultural, and ethical dimensions of food.

In response, some educators and researchers are turning toward more adaptive, contextual, and relational forms of design inquiry — such as systemic design, frame innovation, and Living Lab-based methods — which align more closely with the embodied, place-based, and co-generative practices described throughout this book. The design processes used in some of the observed educational programs appear to be distributed, emergent, and situated, in contrast with the linear progression characteristic of traditional Design Thinking. They function as *temporary Living Labs*. Rather than following predefined phases, templates, or standardized solutions, the place-based experiences foster adaptive and collective design shaped by continuous negotiation among actors, constraints, and contexts. What emerges is a form of self-organized collective intelligence capable of generating value through iterative, contextualized, and reflexive processes.

However, a more fundamental question emerges from this discussion: precisely what is the nature of these Living Labs? Living Labs (LLs) are recognized as participatory innovation ecosystems despite the absence of a unified definition (Ceseracciu *et al*., 2023; ENoLL, 2021; Pereira *et al*., 2020). According to ENoLL (2019), their core characteristics include multi-stakeholder involvement, real-world settings, user engagement across the entire innovation process, equitable co-creation, orchestration mechanisms, and the adaptive use of diverse methods. In recent years, LLs have been acknowledged as valuable frameworks for addressing complex global challenges — such as climate change and inequality — through systemic and transformative approaches (Caniglia *et al*., 2021; OECD, 2020; Zivkovic, 2018).

In this evolving scenario, the B.E.FOO.D framework offers an original contribution by articulating a situated and embodied grammar of food design that expands current paradigms of transformative and systemic learning. Its emphasis on food as a medium — rather than an object — aligns with the logic of generative and emergent design and finds resonance with the core principles of *theory U* (Scharmer, 2009). Both approaches share a commitment to profound transfor-

mation grounded in the intentional suspension of judgment, embodied presence, and the co-creation of shared futures. However, while Theory U provides a valuable model for tracing individual and collective shifts in awareness and intention, the B.E.FOO.D framework takes it a step further by materializing these principles within the cultural, ecological, and sensory dimensions of food. It integrates systemic empathy, embodied cognition, and place-based experimentation, thereby enabling Eco-Cognitive Activation — a process in which learning, design, and ecological awareness converge. As such, B.E.FOO.D does not merely translate Theory U into the agri-food domain but enriches it by embedding transformation within everyday practices and material interactions. This perspective redefines the role of the designer as a facilitator of meaning-making processes rooted in ecosystems and communities and capable of navigating the temporal, affective, and epistemological complexities of food systems.

This chapter is organized into three main sections:

4.1 – This section revisits the analysis of twenty immersive educational experiences within agri-food systems, assessed through the matrix introduced earlier. When well-structured, these experiences function as true laboratories of meaning, activating generative processes of learning and transformation. In this context, food design emerges as a catalyst for individual, collective, and systemic change. Agri-food systems become dynamic spaces for experimentation, critical reflection, and social innovation. The *Tenuta Lab* case study exemplifies this format.

4.2 – Drawing on the concept of *embodied research*, as presented by Horling *et al*. (2019), this section explores the multiple and situated roles that designers can assume within place-based educational contexts. A central and provocative question arises: can the role of the food designer today truly be embodied by a single professional figure?

4.3 – The final section introduces the concept of the *food designer's metabolism*: the ability to internalize the values and cultural mediations of food and convert them into transformative design energy. This is a key competence for envisioning alternative futures and contributing to the emergence of more conscious and sustainable food cultures — *by and for food*.

4.1 Beyond established models: rethinking educational design by agri-food systems

In the previous chapter, the comparative analysis of twenty place-based educational activities in the field of food design reveals a dual epistemic trajectory: on the one hand, what it means to design *for* agri-food systems; on the other, what it means to design *through* them. The data collected show that agri-food systems are not merely objects of design intervention but also act as cognitive and relational devices capable of generating learning, agency, and innovation. In this perspective, they are not just environments or content but rather generative and performative infrastructures — true interfaces among the ecological, social, technical, and experiential dimensions of design.

The educational formats analyzed highlight that the most transformative experiences are not necessarily the longest or most formalized but those capable of generating situated, distributed, and context-rooted design processes. In such settings, the agri-food system is activated as a complex network of places, practices, relationships, and meanings, contributing to co-evolutionary dynamics between participants, territories, and knowledge in transition. The design here does not follow a linear process or a rigid system strategy but rather manifests as an emergent and adaptive process, constantly redefined by contextual specificities and the transdisciplinary nature of the groups involved.

At the same time, designing *by* agri-food systems — meaning using food, agriculture, and productive landscapes as pedagogical tools — means activating a unique educational infrastructure. Experiences developed in rural or semi-rural contexts show how interaction with the *living matter* of food systems fosters transformative learning processes that are difficult to replicate in simulated or academic settings. The territory, its temporalities, and the unpredictability of productive environments challenge conventional didactic codes, requiring the negotiation of new interpretive tools and operational grammar. In these situations, design becomes an experience, a relation, and a transformation rather than a purely technical or communicative act.

This perspective suggests that agri-food systems if consciously and intentionally inhabited, can not only be transformed but also actively transform those who engage in the design process. New design modalities emerge that are not focused on control or prescriptive planning but on the activation of situated, generative dynamics, the formation of *micro-alliances* with living components of the context, and the embrace of complexity as a core material of educational design.

Qualitative data collected through evaluations, interviews, informal feedback, and spontaneous participant narratives confirm the transformative potential of food design in the 20 initiatives. Keywords such as empathy, awareness, transformation, and evolution frequently appear alongside expressions like «I found the best version of myself» or «I now feel part of a collective ecosystem.» As one stakeholder shared during the final feedback session, «I felt the university acting as a network coach, and I saw myself becoming an active protagonist in this process.» These reflections show that highly relational and situated learning environments can have a profound impact on identity construction, design attitudes, and transversal competencies.

Collaborative activities are often described as synergistic, multidisciplinary, and intellectually stimulating, confirming the importance of the social and dialogic dimensions of learning. Even critical aspects — described as challenging, intense, or disorienting — are not perceived as obstacles but as essential phases of a transformative journey. As reported by many participants, these moments marked important turning points for personal and collective growth, facilitated precisely by immersion in complexity. One participant noted: «Systems thinking was already an instinct I had been fostering, but systems design was something I had no term for before this experience.» This comment captures the emergence of a form of systemic design literacy that is rarely achieved through traditional educational approaches.

Particularly significant are the reflections from the Climate Shapers Bootcamps in Pollica (developed with Future Food Institute), where the introduction of the Prosperity Thinking Method supported the development of an ethical and systemic design vision: «The systemic design approach will guide my future projects for plane-

tary health»; «Prosperity Thinking has become a reference for my community work.» These testimonies confirm that well-facilitated educational environments not only foster knowledge acquisition but also inspire vision, meaning, and a desire for transformative engagement. Comments like «Creativity to deal with the need for flexibility. Design to propose possible solutions,» and «Design methods can give us another point of view to see the same problem,» show a sophisticated understanding of design as both a method and a mindset. At the same time, critical observations — such as «design tools are not always helpful, you have to think outside the box especially since you are dealing with stakeholders with different interests and objectives» — underscore the need for adaptive and context-sensitive design facilitation.

Short and intensive food design programs, when well structured, function as true laboratories of meaning. They activate co-constructed, generative learning processes. Within these contexts, food design becomes a catalyst for personal, collective, and systemic transformation, while agri-food systems become active terrains for experimentation, reflection, and social innovation. In particular, rural and agricultural environments do not merely serve as operational backdrops; they emerge as active agents of learning. When interpreted through the lens of the six cultural mediations of food, agri-food systems become living pedagogical environments capable of provoking cognitive disruptions, perceptual restructuring, and the redefinition of meanings. Here, learning does not stem from a simple *learning by doing* approach but unfolds as an embodied experience for all participants.

4.1.1 *Temporary Living Labs* and design: from situated participation to systemic transformation

The evidence emerging from the analysis of the twenty educational experiences examined suggests that specific intensive formats, when appropriately designed, can function as generative learning devices. In particular, these formats appear capable of activating transformative processes not only at the individual level but also at the collective and systemic scale within agri-food systems. Building on this observation, the following section aims to systematize the key theoretical

and design elements that define *Temporary Living Labs* as adaptive, reflective, and transformative educational infrastructures — capable of addressing complex territorial issues and fostering new forms of transdisciplinary collaboration.

These formats have been conceived as multi-actor learning spaces, where individuals from scientific, social, and territorial backgrounds engage with shared challenges, bringing diverse knowledge, experiences, expectations, and intentions. This is what Jackson & Barnett (2019), and Wals (2019) describe as a *learning ecology* or *sustainability-oriented ecologies of learning*.

Some of the findings that emerged from the analysis of the twenty educational experiences examined in this study confirm what has already been discussed in the literature on sustainability competencies (see, for example, the GreenComp framework; Bianchi *et al*., 2022), particularly about skills such as problem-solving, systems thinking, critical thinking, communication, collaboration, and a sense of responsibility toward people and the environment.

However, what the literature does not yet fully clarify is whether these place-based educational formats — real *temporary Living Labs* — are genuinely capable of enabling designers, educators, and stakeholders to foster transformations within agri-food systems.

The analysis of the educational experiences presented in the previous chapter offers some indirect answers to this question, highlighting how the combination of narrative tools, cultural mediations, and situated evaluation practices can help overcome disciplinary boundaries and activate transformative processes. As discussed earlier, transdisciplinary and embodied approaches allow for transformative learning rooted in the dimension of being, where thinking and doing are integrated within a reflective relationship with oneself, others, and the design ecosystem.

From this perspective, the shared construction of food values draws on the six cultural mediations of food, which are not only dimensions of food-related experiences but also heuristic tools capable of revealing and activating learning dynamics within agri-food systems. Transdisciplinarity, therefore, is not an automatic result of heterogeneous participation but emerges when spaces for negotiation, facilitation, and co-creation are intentionally designed. Only

through effective relational devices does transdisciplinarity materialize as a generative hybridization among knowledge systems, languages, and practices.

At the same time, food is not only a thematic object but also an operational environment. From this perspective, the food designer is not simply a facilitator but a situated agent capable of activating projective convergences between actors and knowledge systems. It is precisely through their relationship with agri-food systems that designers contribute to constructing design ecologies capable of generating contextual innovation. The material, symbolic, and embodied mediations activated through food become transformative devices for both learning and design processes.

In these design ecologies, one of the most relevant elements that guide the quality of interaction is empathy. Within this paradigm, empathy is neither a phase of the process nor a mere soft skill: it is a situated, dynamic, and assessable meta-competence. It serves as an intrinsic criterion of experience, modulated over time and space, and is capable of revealing the quality of relationships among human and non-human actors, participants, and territories. Systemic empathy is not a prerequisite for co-design; rather, it represents one of its most meaningful outcomes. As such, it provides a valuable interpretive key for understanding the deep nature of transformative learning processes.

The analysis conducted in Chapter 3 demonstrates how the more mature educational formats, as highlighted in the evaluation matrix, give rise to advanced forms of participation that take shape as micro-local alliances: co-designed relationships grounded in trust, situated knowledge, seasonality, biodiversity, and shared narratives. These are not merely stakeholder inclusions but co-generative processes of vision-building, tool-making, and meaning-making. Simultaneously, assessment practices are also transformed. They are no longer based on standardized metrics but on narrative and reflective tools co-constructed with communities. Evaluation becomes a practice of transformative accompaniment: not a judgment but an act of recognition. This shift supports the concept of *territorial narrative evaluation*, a critical and participatory process anchored in local engagement.

Ultimately, what emerges from the analyzed formats is not only the transmission of design or transversal competencies but a deeper transformation of design identity, understood as a situated, reflective, and relational awareness of one's actions within the agri-food system. Learning is triggered by direct engagement with real-world complexity and concerns the learner's ability to reposition, reformulate, and reinhabit design as a relational, reflective, and situated practice. In this sense, the six cultural mediations of food — sensory, bodily, spatial, relational, productive, and material — do not operate as a rigid evaluation grid but as a dynamic experiential map. They help surface the discontinuities, resonances, and openings generated through the design process.

A particularly significant insight from the analysis concerns the flexibility of the formats. Their ability to adapt to different geographical, cultural, and institutional contexts — while maintaining methodological coherence and design rigor — reflects the principles of Living Labs (Leminen *et al*., 2012). Unlike traditional innovation settings, Living Labs actively engage non-academic actors, expanding participation and enriching the co-design process (Bergvall-Kåreborn *et al*., 2009). From this perspective, Living Labs represent a strategic infrastructure (Figure 19) for adaptive, relational, and transformative food design education, capable of responding to the growing com-

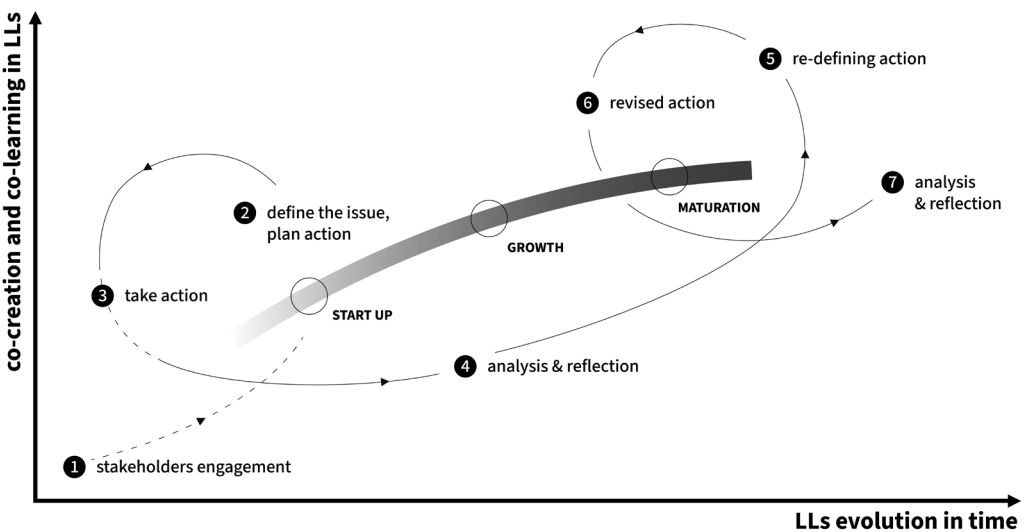


Figure 19.
Living Lab model as presented by Massari *et al*., 2023

plexity of territorial systems. As collaborative and adaptive ecosystems, they offer a promising trajectory for the future of educational design in agri-food systems, integrating experimentation, inclusivity, and ecological justice.

4.1.2 The *Tenuta Lab Case*: interpreting discomfort as a catalyst for transformative design learning

A concrete example of a *temporary Living Lab* applied to food design education is provided by the Tenuta Lab format, originally co-defined and co-developed by the author at the Department of Agriculture, Food and Environment (DISAAA-a) and PAGE research group, at the University of Pisa. Initially launched to foster internal collaboration among PhD students, researchers, and professors, it evolved into a multi-purpose pedagogical format: a mentoring program for early-career researchers, a capacity-building tool for national and international academic networks, and a place-based coaching environment for doctoral students navigating complex multi-actor agri-food systems.

Tenuta Labs take place entirely within working farms, where formal, informal, and non-formal learning environments are intentionally blurred. The term Tenuta Lab, co-coined by the author together with other collaborators, merges the historical meaning of tenuta — from the Latin tenuta, past participle of tenēre, meaning *to hold* or *to cultivate*, commonly referring to a farm or agricultural estate — with the concept of a lab, understood as a space for experimentation. It designates a hybrid context: an agricultural and design laboratory where land stewardship, social innovation, and co-experimentation are integrated into situated and transformative practices.

In alignment with the pedagogical strategies described in this book — especially those related to the six cultural mediations of food and systemic empathy — Tenuta Labs serve as situated infrastructures where plural knowledge and practices converge. These labs are structured to integrate design devices functioning as emotional and motivational catalysts. Many of these stem from over a decade of field experimentation by the author in creative learning within intercultural and food studies abroad contexts. Tools such as AEIOU, ecosystem drawing and reifications activities, empathy exercises, and co-design playful immersive games are adapted and tailored to

the local agri-food context and activated through hands-on engagement (Figure 20).

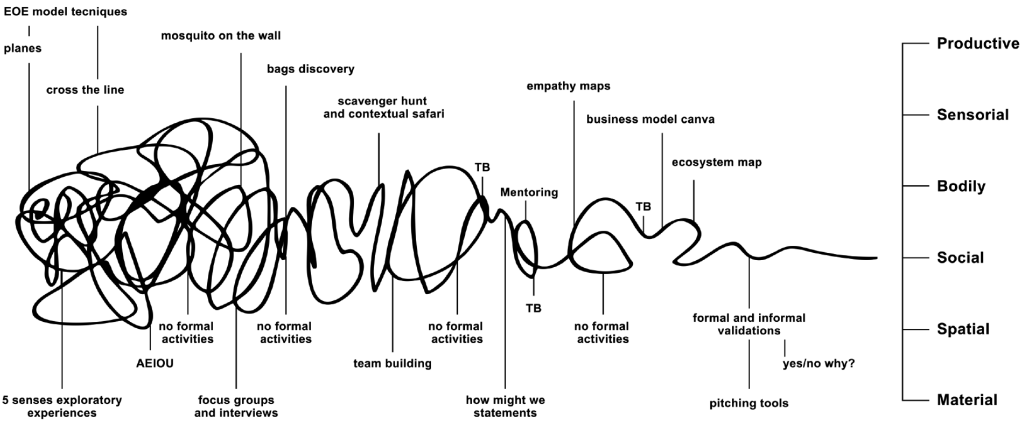


Figure 20. Applying DT, toolbox methods, and experiential activities in a complex learning setting. Source: Author.

This generates a condition of productive discomfort, experienced by participants as both cognitive and relational tension. Rather than a flaw, this discomfort is understood as a necessary precondition for transformative learning. It triggers the desire to question, to engage, and to reconfigure knowledge through transdisciplinary collaboration and confrontation with real-world complexity.

Empathy is a key tool of Tenuta Lab. As conceptualized in the EOE (Empathy-Oriented Education) model (Massari *et.al*, 2021), draws inspiration from Jeremy Rifkin's vision (2009) of an empathic civilization, where the extension of empathy beyond the self becomes a driver for social cohesion and ecological responsibility. In this framework, empathy is not merely emotional resonance, but a transformative capacity to engage relationally with humans and more-than-human systems.

Each Tenuta Lab follows a modular yet flexible sequence of experiential phases — Fun, Fly, Fight, Fit — that guide participants through moments of enthusiasm, friction, criticality, and eventual convergence. These phases map the affective-intellectual arc of transformative learning and help articulate individual and collective repositioning within the design process. In the initial *Fun* phase, participants are enthusiastic about meeting new people, exploring innovative ideas, and seizing opportunities. In the *Fly* phase, tensions begin to rise as participants engage in critical reflection on unfamiliar approaches and plural design methods. The *Fight* phase introduces a sense of disori-

entation and resistance, especially when facing unfamiliar elements such as narrowly defined working themes, linguistic and disciplinary barriers, or intercultural challenges. Finally, the *Fit* phase marks the achievement of a new balance. Here, participants engage in creative interactions that lead to the integration of diverse perspectives — an essential condition for transformative learning in design — transformative learning through the 4Fs (Figure 21).

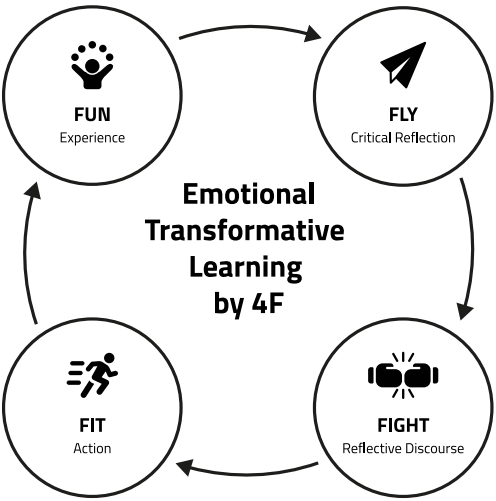


Figure 21.
Transformative Learning model by 4F.
Source: Author.

The concept of *Tenuta Lab* defines a space for co-designing agricultural and educational practices, where transformative approaches related to Education for Sustainable Development (ESD), systems thinking, and the interconnection between food, territory, and social imagination are actively explored. Recent research conducted between 2022 and 2023 (Toro-Troconis *et al*., 2023; Almad *et al*., 2023) highlights the effectiveness of intensive educational formats such as ESD Bootcamps in strengthening participants' perceived control over embedding sustainability principles into curriculum design. These outcomes have been linked to the use of structured pedagogical tools, such as the *CoDesigns ESD Framework and Toolkit Planner*, which — while not adopted in the Tenuta Lab — offer a valuable reference for understanding the transformative potential of immersive and co-creative approaches in ESD. Significant differences in *Usefulness*, *Control*, and *Behavioural* components between pre-and post-test conditions further confirm participants' increased readiness to inte-

grate sustainability practices in education, in line with the assessment and validation tools developed by UNESCO IESALC (2023).

Within this framework, the Tenuta Lab acts as a site of anticipatory learning and a living agri-food laboratory, where capacities for *future thinking* are cultivated, transition scenarios are explored, and situated educational practices are co-generated. Drawing on Lovell's notion of *food thinking* (see thecommontable.eu), food becomes a cognitive, emotional, and cultural catalyst for critically examining the relationships between individuals, the environment, and food systems. Additionally, as discussed by Zeher *et al*. (2024), the *discomfort* that may arise through unfamiliar food experiences is embraced as a pedagogical stimulus capable of activating critical awareness and renegotiating meaning.

Through these dimensions, the Tenuta Lab becomes a context in which transformative education, participatory design, and systemic reflection converge, contributing to the development of ecological, critical, and anticipatory competencies that are essential for inhabiting the future in sustainable and multispecies ways.

As evidenced in the broader analysis of the twenty educational case studies, the Tenuta Lab format stands out for its ability to foster inclusive spaces of reflexivity, co-creation, and value negotiation. It exemplifies a form of place-based education that mirrors the principles of Living Labs: open, adaptive environments where stakeholders engage in iterative processes of experimentation, reflection, and shared innovation. The Tenuta Lab can thus be interpreted as a temporary Living Lab — not simply as a space for learning *about* food systems, but as a place where food systems are actively transformed through design practices rooted in empathy, cultural mediation, and real-world engagement (more details about Tenuta Lab are provided in Annex 2).

Among the reflections shared by participants of the Tenuta Lab, a PhD candidate in economics expressed surprise at being able to step outside her usual theoretical framework, finding herself in dialogue with an agronomist to identify economic solutions — an experience that helped her distinguish between co-creation and co-design. A participant with a background in design thinking initially found the absence of a structured brief destabilizing, interpreting the initial

disorientation as a form of productive discomfort. A neuroscience doctoral student suggested that informal learning environments like this should be integrated into all PhD training, while a law student noted that the transformation she experienced occurred first on a personal level, and only later on a professional one.

Nonetheless, some challenges remain. A structured assessment framework is still lacking, aside from a final reflective survey administered at the end of the experience.

To fully realize its transformative potential, the format requires further development in the areas of impact evaluation, particularly for intangible outcomes such as mindset shifts, and mentorship structures, to ensure continuity and institutional integration. These aspects are critical for the format's consolidation as a replicable model of food design education aligned with the complex demands of sustainability transitions.

4.2 From the *embodied food designer* to micro-local alliances

These findings from the analysis raise a further question about the actual posture and skills required of those facilitating such transformative pathways. What kind of food designer is needed within these contexts — and can such a multifaceted role be embodied by a single individual? Inspired by the typology of researcher roles proposed by Wittmayer and Schäpke, this model includes the roles assumed by designers across most of the 20 educational programs analyzed. Overall, the study confirms the presence of the five roles identified by Wittmayer and Schäpke (2014) for researchers in the field of sustainability: the reflective designer, the process facilitator, the knowledge broker, the change agent, and the self-reflexive designer.

The results show that designers do not perceive these roles as separate or mutually exclusive, in line with what Wittmayer and Schäpke (2014, p. 492) had already observed: different roles were assumed at various stages of the place-based educational activities, and in many cases, roles were combined — for example, the role of facilitator

with that of change agent. The roles adopted depend on the designers' individual capacities and networks, as well as on their normative positioning about food systems and design. They are also shaped by the process of interaction with other disciplinary domains and with the local context in which the food design program was developed.

The *reflective designer* is often the most objective among designers, analyzing empirical phenomena from a distanced and non-involved perspective. They are technically skilled and methodologically rigorous — a good technician, *a good designer*.

The *knowledge broker* recognizes the multiplicity of voices, interests, knowledge systems, and objectives present in place-based food design, seeking to integrate this diversity into their activity.

The *process facilitator* develops a sense of *response-ability*, acquiring the necessary competencies and building networks to perform such roles, while also becoming more critically aware of theoretical notions related to food. In this role, facilitators support participants' reflections on their specific local contexts through the use of creative and visual methods.

The *change agent* assumes this responsibility through design, applying their design skills to transform rituals, narratives, and food-related artifacts. In this case, clear parallels can be drawn with *citizen science*: food designers are called upon to participate in knowledge production rooted in situated experiences and, like citizen science researchers, must take responsibility for both context and community. Food, as a medium, operates simultaneously as a designed artifact and as a lever for fostering ecological and social consciousness. Both the food designer and the citizen scientist learn and operate within territorial contexts: while the former designs through local engagement, the latter generates data, observations, and interpretations grounded in lived experience. However, neither role is limited to observation alone: both co-produce value and transformation. They act within hybrid contexts — scientific, cultural, agricultural, and social — activating forms of collective intelligence and fostering both individual and collective empowerment.

The *self-reflexive designer* undergoes a personal transformation and a heightened sense of awareness — conditions that appear to be preliminary requirements for facilitating transformative processes.

Becoming part of the relational fabric that constitutes a place means, for the food designer — whether consciously or not — becoming part of the transformation of that place itself. This involves offering new perspectives on certain practices or actively participating in processes of planning, envisioning, and reflection. This designer brings their *whole self* into the field: their personal background, values, skills, attitudes, and ambitions in interaction with places and people. Being self-reflexive also entails reflecting on one's responsibility and willingness to change in response to what has been learned through the design process. Integrating such learnings into one's personal and professional life creates additional spaces for transformation. In this way, food design becomes an experimental space for embodying values and learnings tied to the activation of transformative change. According to the author, this concept forms the very foundation of transdisciplinarity.

In view of this finding, which has been substantiated by Horling *et al*. (2019), *transformative methods* are defined not only as those that produce transformative outcomes but also as those that reshape the very modalities by which research is conducted during the design process — for instance, by placing themes such as inclusivity, reciprocity, aesthetics, vulnerability, and trust at the center of inquiry. An illustrative example is provided by Moser (2016), who shows how the co-design of research processes brings ethical and equity-related debates to the forefront of research design itself. This constitutes a transformative element, as it challenges pre-existing knowledge systems. It is a highly compelling issue, and the present study contributes to its exploration.

Considering the overall findings and the relevance of pluralization in food design, this book provocatively asks whether the role of the food designer can truly be embodied by a single individual. Based on the findings of the empirical analysis — and in light of the growing demand for food design to address food volatile and complex contexts — it is increasingly likely that the notion of a singular *food designer* will give way to that of *design-based working groups for and by food*, where the designer assumes the role of an *orchestra conductor*.

The results of this research also demonstrate that the so-called *food designer* cannot merely be a skilled technician or a proficient

designer. That is not enough. Throughout their academic and professional careers, food designers must be capable of developing all the roles described in this study. It is a continuous process of growth and evolution — especially in the areas of leadership and knowledge mediation — which cannot be confined to formal educational training but must instead evolve and be nurtured throughout multiple pathways of lifelong learning.

4.3 To be an embodied food designer, *you need guts*

In the previous chapter, the figure of the *embodied designer* was introduced — a concept that draws inspiration from the model of the *embodied researcher* developed by Horlings *et al*. (2019). This model was metaphorically articulated through four bodily dimensions: head, heart, hands, and feet — each representing a key aspect of engaging sustainability research.

In this section, those same metaphors are revisited and reframed within the specific domain of food design. The reinterpretation proposed here offers a situated perspective on what it means to embody knowledge, values, and actions through food.

Heart: reimagined through a food design lens, the heart represents the ethical and value-driven impulse that guides the designer toward food sustainabilty and care. It manifests in processes of personal reflection and transformation that inform design choices and interactions.

Feet: in this adapted model, the feet symbolize a deep, physical, and experiential engagement with the contexts in which food design takes place. The designer is not a distant observer but becomes an active participant in the relational networks of territories, communities, and local actors. This grounded presence implies ethical responsibility and nurtures affective and dialogical connections, which are essential for the co-construction of knowledge. Such direct involvement activates transformative learning and reinforces the notion of food design as a situated, embodied, and relational practice.

Hands: the hands represent the material and operative dimension of designing. In this reframing, food designers act as facilitators, knowledge brokers, or change agents, applying participatory and project-based approaches. Central to this is the activation of co-design processes that are collaborative and inclusive.

Head: the head represents theoretical reflection, which enables the designer to make sense of experience. In the context of food design described in this book, this reflection is articulated through the application of the six food mediations that give meaning to food as a medium. These include sensory, bodily, material, productive, social, and spatial relationships, all of which elevate the values embodied in food.

This study proposes expanding the metaphorical figure of the *embodied food designer* by incorporating an essential organ: *the liver***.** Metaphorically speaking, the liver becomes the symbolic site of *critical digestion* — the place where information, experiences, and tensions encountered in educational or co-design processes are internalized, re-elaborated, and transformed into vision and action. As in human physiology, effective transformation is not the result of superficial absorption but of the system's (individual or collective) capacity to *metabolize* knowledge, values, and conflicts — returning them as creative, decisive, and relational energy.

Within sustainability-oriented food design processes, this energy translates into the *capacity to act with courage* — a role that can metaphorically be assigned to the *liver* of the design system. The liver filters transforms and makes usable the most complex and potentially toxic inputs—just as the designer engages with and processes the contradictions of the agri-food system (Figure 22).

Thus, it takes *guts* — in both a symbolic and operative sense — to face the challenges of sustainability: to question entrenched practices, to sustain value-based tensions, and to generate shared systemic responses. As Tuters and Kera (2014) have also pointed out, *metabolic design* is not merely a technical process but a deep cognitive interaction that generates new codes of meaning. It enables participants to appropriate values through a *trans-sensorial and embodied experience*. In this scenario, the designer acts as an enzyme*:* not the direct producer of transformation but the one who makes it possible, sustainable, and enduring.

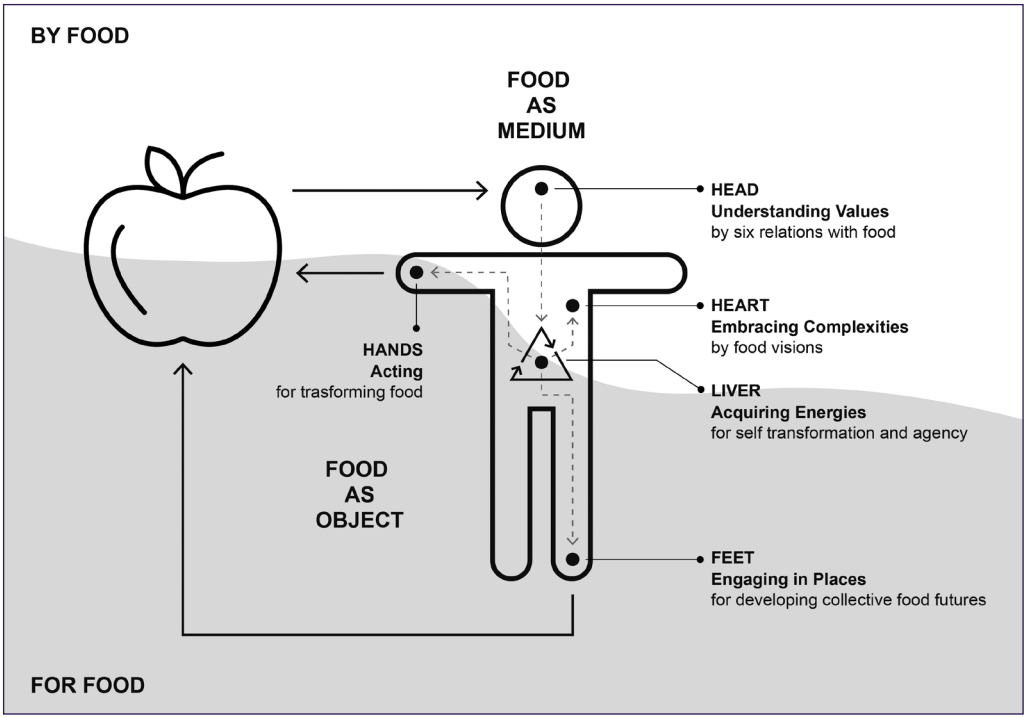


Figure 22.
Metabolic food design.
Source: Author.

Just as many of the living food design educational laboratories analyzed in Chapter 3 have demonstrated their ability to support participants in developing essential transversal competencies — such as adaptability, innovation, communication, and ethical leadership — these are crucial capacities for addressing today's environmental and social challenges.

Embodied food design, therefore, does not merely aim to produce tangible outputs (products, services, systems) but constitutes a *transformative practice* in itself. It legitimizes the integration of normative positioning, personal commitment, and critical reflection, and it acknowledges the *self-transformation* of the food designer as a legitimate outcome of designing through food.

This approach goes beyond traditional paradigms of food design by proposing new metrics for evaluating impact — not solely based on production but also processes of personal and collective empowerment and transformation. The model of the *embodied designer* highlights how food design in territorial contexts can become a critical and political practice — capable of fostering new narratives and sustainable dynamics — on the condition that the designer engages fully as an

ethical and relational subject in the co-construction of knowledge for the agri-food system.

4.4. Conclusion

To conclude this chapter, it is beneficial to reflect on a series of inquiries that emerged during one of author lecture on the transformative role of food design in the present day.

These questions are not included to be definitively answered, but — as Victor Papanek also noted — to illustrate how the questions posed by students represent one of the most authentic ways to test the solidity of a theoretical framework. They compel scholars and practitioners alike to move beyond theoretical assertions and engage with the real complexity of design practice — its ethical tensions, contradictions, and operational challenges.

One student remarked that food design often appears to be exclusive, shaped by market dynamics and reflective of a capitalized, industrialized worldview. How, then, can food design become a more inclusive tool? Historically, food design developed within industrial societies in response to the demands of mass production. However, today's global context foregrounds the centrality of place. Food design can become inclusive only by being grounded in local territories, in community values, indigenous knowledge systems, and place-based practices. Such rooting allows for situated, sensitive, and potentially transformative design processes — ones that aim to be not only more inclusive, but also more just.

Another question concerned the role of food designers in corporate contexts: What can a food designer offer to the CEO of a food company today? While there is no formulaic answer, one key contribution lies in facilitating a shift in mindset — through the creation of new examples, connections, and relational spaces capable of transforming even long-established business models. The experience of transdisciplinary collaboration in Living Labs and training programs developed with companies demonstrates that transdisciplinarity is not an innate disposition but a learnable posture — one that can foster meaningful change in both startups and large corporations.

Some students asked about the aspirations that should guide the work of food designers today. In response, the idea was shared that food design is ultimately an act of responsibility — a commitment to shaping more livable, equitable futures. However, a tension was also noted: in contemporary design culture, visibility and social media recognition may sometimes outweigh transformative impact. This risk is particularly pronounced among younger designers, who face increasing pressure to produce *instagrammable* outputs. It is essential, therefore, to reaffirm the revolutionary potential of design as a means to uphold and promote healthy, equitable, and sustainable values. The urgency of our time is not only ecological, but also ethical and cultural.

Another question focused on current market trends. Despite the prevalence of sustainability in public discourse, it is not yet the dominant driver in consumer behavior. Instead, issues such as health, longevity, and well-being appear to be stronger forces. Rather than judging these trends, designers are called to metabolize them — to critically understand how to embed systemic and sustainable values within dominant paradigms, through creative mediation and cultural intelligence.

Finally, a question was raised about the development of synthetic foods — such as the *neo-fruit* case, an entirely lab-generated product. Does this represent the future of food design? While such innovations may not reflect present priorities, emergencies — by their very nature — introduce unpredictable variables. As has been observed in humanitarian and crisis contexts, design is often suspended during emergencies, as survival becomes the immediate concern. Yet it is precisely in these moments of crisis that individuals often reveal a deeper authenticity. Such contexts, while challenging, can offer fertile ground for listening, for understanding lived realities, and for envisioning a more meaningful *after*.

In the end, the core issue returns to that of values: identifying not only the strategic or institutional priorities, but also the values genuinely experienced by individuals and communities. Designing by and for those values — rather than merely correcting or optimizing systems — may be the most radical and necessary path forward.

5. Final conclusions

Design is progressively entering the agri-food domain, offering methodological approaches that can challenge entrenched paradigms and shift mindsets. While still often perceived as tied to aesthetics, objects, or spaces, food design today extends into deeper territories: experiences, relationships, and systems. Designing food — and designing by food — means acknowledging its transformative potential in sensorial, social, productive, material, spatial, and bodily dimensions. This book has traced a structured path across three main sections: a theoretical-historical foundation (Chapters 1 and 2), a comparative analysis of twenty immersive educational experiences (Chapter 3), and the elaboration of a pedagogical framework for food design grounded in place-based transformative learning (Chapter 4). The work offers critical, interpretive, and practical tools to address the complexity of contemporary food systems, calling for a paradigmatic shift from design for food to design by food.

In this perspective, food is no longer simply the object of design; it becomes a relational medium, a cognitive artifact, and a transformative infrastructure. The B.E.FOO.D framework — derived from the

evaluative matrix developed in this research — is not merely a method but a design grammar that is situated, generative, and embedded in practice. Design emerges as a dialogical and embodied act of co-creation and critical agency.

Two main trajectories of learning are revealed. For educators, design by food offers a pathway for shaping transformative learning experiences — non-linear and rhizomatic, rooted in the entanglement of actors, environments, and mediations. For designers, food becomes both content and language: each mediation unlocks new design possibilities that redefine the designer's role — not as an isolated author but as a facilitator of collective visions.

This book primarily draws on experiences developed in European and North American contexts, aligning with the author's professional work. It does not aim to propose a universal model nor to represent the entirety of global food design practices. On the contrary, it acknowledges that agri-food systems worldwide are plural, dynamic, and culturally situated. The objective is to share reflections and tools that may be adapted, questioned, and enriched through dialogue with other approaches and contexts. In the future, it will be essential to explore how food design principles can be further developed and reinterpreted in relation to locally grounded food systems and knowledge that remain underrepresented in the existing literature.

Some of the twenty case studies analyzed, framed as temporary *Living Labs*, have demonstrated their potential to function as experimental ecosystems of meaning. These labs offered inclusive, project-based, and relational spaces for situated citizenship and ecological transition. From this perspective, agri-food design emerges as a politically, ethically, and context-sensitive practice.

Three core contributions emerge from this work:

1. The conceptualization of the six cultural mediations of food — sensorial, bodily, material, spatial, relational, and systemic — as heuristic and pedagogical tools to activate critical, embodied learning connected to place and imagination.
2. The development of an evaluative matrix to analyze place-based food design educational formats. This tool helps identify indicators of design intensity, transdisciplinarity, and

transformative potential, enabling the co-creation of adaptive and generative learning environments.

3. The formalization of the design *for and by* food paradigm, which transcends the fragmented categories found in existing food design literature (e.g., with food, for food, product food design, eating design, etc.), offering instead a unified, situated, and embodied approach to food as both object and epistemic medium.

As Papanek (1971) once argued, designing for the real world entails moving beyond elegant solutions to irrelevant problems toward crafting tools and visions that reconnect people to nature, culture, and community. It is precisely the direction in which design by food points — not toward a discipline but toward a posture, an ethic, and a generative orientation.

From this perspective, a final synthesis emerges — one that encapsulates the political and pedagogical stakes of this work. Designing through food means not only nourishing the body but also cultivating critical awareness. It is the recognition that each design gesture — no matter how small — has the potential to generate relationships, reorient imaginaries, and activate alternative futures. In a world that urgently calls for regeneration, food reveals itself not merely as matter but as meaning—as living language and design infrastructure.

Ultimately, design *by and for* food is more than a theoretical proposal: it is a call to action. This is an invitation to designers, educators, researchers, to engage with places, collaborate with communities, and embrace the complexity of transition. Only through these commitments can we shape new design grammars — capable of transforming dissonance into connection, latent resources into shared assets, and ephemeral experiences into resilient food cultures.

In an era defined by uncertainty, design must not seek to simplify complexity but to inhabit it. To trace evolving cartographies, navigate rhizomes, and co-construct meaning where fractures prevail. The future of food design lies not in trends or aesthetics alone but in mediations — in the capacity to design with empathy, imagination, and courage.

Designing food, for food, and by food is — now more than ever — an act of responsibility.

AI Use Disclosure

Artificial intelligence language tools were employed exclusively to support linguistic revision, stylistic consistency, and proofreading of this manuscript. All conceptual content, original analysis, empirical research, and theoretical contributions are the sole work and intellectual responsibility of the author.

Afterword: Bridging Disciplines, Designing Futures

It is with great pleasure and deep respect that I contribute this afterword to Sonia Massari's compelling and timely work on food design. As an esteemed colleague I have had the privilege of knowing for over a decade, Sonia has consistently demonstrated a rare ability to bridge disciplinary divides with empathy, intellectual rigor, and visionary thinking. Her work has not only enriched the academic discourse around food systems and design but has also inspired practical, transdisciplinary approaches that resonate deeply with the mission and activities of the PAGE group at the University of Pisa.

As an agricultural economist and engaged scholar, my professional journey has been shaped by a commitment to fostering collaboration among the diverse actors of the so-called Quadruple Helix of innovation — academia, industry, government, and civil society. This framework has guided much of the work we do at PAGE, where we strive to co-create knowledge and solutions that are both scientifically sound and socially relevant. Sonia's work exemplifies this same spirit of engagement and inclusivity. Her ability to translate complex theo-

retical insights into actionable strategies for food system transformation makes her a vital ally in the pursuit of sustainable innovation.

One of the most striking aspects of this book is its commitment to operationalizing transdisciplinarity — a concept often discussed in theory but rarely implemented with such clarity and purpose. Sonia's exploration of food design as both a theoretical framework and a practical methodology mirrors the PAGE group's own ethos: to foster integrative research and education that transcends traditional academic silos. At PAGE, we believe that addressing the complex challenges of agri-food systems requires not only interdisciplinary collaboration but also the co-creation of knowledge with stakeholders, communities, and learners. Sonia's work provides a robust intellectual foundation for this approach, offering tools and perspectives that are both innovative and actionable.

Chapter 2 of the book, which delves into the dual nature of food as both product and medium, resonates particularly strongly with our research at PAGE. We have long emphasized the symbolic, cultural, and communicative dimensions of food in our projects, from participatory rural development to urban food policy. Sonia's articulation of food as a *mediated and intentional activity* aligns with our understanding of food as a vehicle for meaning-making, identity, and social transformation. Her co-evolutionary design perspective, which integrates cognition and culture, offers a powerful lens through which to analyze and influence food behaviors and systems.

In Chapter 1, Sonia poses a critical question: What can design bring to agri-food business? At PAGE, we have explored this question through a variety of applied research initiatives, including sustainable value chain development, agroecological transitions, and food innovation labs. Her emphasis on *design for future food* echoes our commitment to anticipatory governance and scenario planning in food systems. We see design not merely as a tool for product development but as a strategic approach to envisioning and shaping desirable futures — futures that are inclusive, resilient, and ecologically sound.

Chapter 3's focus on food design education is particularly relevant to our pedagogical work at PAGE. Sonia's proposed theoretical framework and matrix for agri-food design education provide a much-needed structure for rethinking how we teach and learn about food systems. Her insights into the role of Living Labs and experiential

learning environments align closely with our own educational philosophy, which emphasizes hands-on, problem-based learning and the cultivation of systems thinking. We have found that engaging students in real-world food challenges not only enhances their learning outcomes but also fosters a sense of agency and responsibility.

Throughout this book, Sonia Massari demonstrates a profound ability to synthesize diverse perspectives and methodologies into a coherent and compelling narrative. This integrative spirit is at the heart of our collaboration over the years and continues to inspire the work we do at PAGE. Whether through joint research projects, co-teaching initiatives, or shared participation in international networks, our partnership has been grounded in a mutual commitment to innovation, inclusivity, and impact.

Sonia's work exemplifies the best of what transdisciplinary scholarship can achieve: it is intellectually rigorous, socially engaged, and deeply human. Her capacity to connect dots across disciplines, cultures, and practices has helped to build bridges where others saw boundaries. In doing so, she has not only advanced the field of food design but also contributed to a broader movement toward more sustainable, equitable, and meaningful food systems.

As we look to the future, the synergies between the themes explored in this book and the ongoing work of the PAGE group offer fertile ground for continued collaboration and innovation. The challenges facing our food systems are immense, but so too are the opportunities for creative, collaborative solutions. By embracing the principles of food design as articulated by Sonia Massari — principles rooted in empathy, systems thinking, and co-creation — we can move closer to realizing the transformative potential of food in our societies.

In closing, I would like to express my gratitude to Sonia for her enduring contributions to our shared field and for the inspiration she continues to provide. Her work reminds us that food is not only a necessity but also a powerful medium for connection, creativity, and change.

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A special thanks to my grandparents, who were the first to pass on to me the value of food, production, transformation, and culture. In them, perhaps, lies the origin of my design-oriented gaze.

It's difficult, in just a few lines, not to forget someone. This acknowledgment is dedicated to all the people with whom I have collaborated in almost twenty years of work in food design: restaurateurs, producers, distributors, food processors, cooks, chefs, researchers, technologists. Without you, I could never have learned what I share today.

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Thank you.

Annexes Session

Annex 1

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	STRUCTURE AND CONTEXT																														
		INDICATOR 1 Duration and Immersion Level						INDICATOR 2 Educational Setting and Territorial Anchoring																								
		1.1 Duration of the Format			1.2 Immersion Level			2.1 Higher education and life long learning		2.2 Spatial Setting			2.3 Level of Contextual Engagement			2.4 Participant Profiles							2.5 Real-context involvement								
		< 5 days	5 –10 days	> 10 days	Short Immersion	Extended Immersion	Distributed Immersion	Formal education	Non-formal education	Rural	Urban	Periurban	Absent	Observation	Co-design	Students	Faculty	Academic researchers	Local community members	Public sector representatives	Food producers - farmers cooperatives	Other profiles	Low	Medium	High							
PLACE-BASED EDUCATIONAL PROGRAMS	**1.**FOOD CULTURE AND ARCHITECTURE SEMESTER STUDY ABROAD - COURSE 2010 GUSTOLAB/HWS			●			●	●			●	Rome (IT)		●		●	●														Low
	2.VANTAN FOOD DESIGN 5-DAYS FOOD DESIGN FIELD SCHOOL ABROAD 2010 GUSTOLAB/VANTAN SCHOOL		●		●			●			●	Rome (IT)			●	●	●				●	●									Medium
	3.BRANDING ITALIAN FOOD CULTURE AND CUISINE FACULTY LED PROGRAM ABROAD - FIELD SCHOOL 2011 GUSTOLAB/ UIUC			●	●			●			●	Rome (IT)		●		●	●		●												Low
	4.FOOD AND MEDIA SUMMER STUDY ABROAD - COURSE 2012 GUSTOLAB/UMASS			●		●		●			●	Rome (IT)			●	●	●		●		●										Medium
	5.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2013 ISIA Pordenone/PDW		●		●			●			●	Pordenone (IT)		●		●	●														Low
	6.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2016 ISIA Pordenone / PDW/GUSTOLAB / HWS		●		●			●			●	Pordenone (IT)		●		●	●														Low
	7.FOOD AND SUSTAINABILITY SEMESTER STUDY ABROAD - FIELD SCHOOL 2017 GUSTOLAB / UIUC		●			●		●		●		Farm in Italy			●	●	●		●	●	●	●										High
	8.FOOD&CLIMATE SHAPER BOOTCAMP 2021 FUTURE FOOD INSTITUTE / FAO / POLLICA LIVING LAB		●		●				●	●		Cilento Region (IT)			●	●	●	●	●	●	●	●										High
	9.MEDITERRANEITY & FOOD DESIGN BOOTCAMP 2022 FORK/FUTURE FOOD INSTITUTE / POLLICA LIVING LAB	●			●				●	●		Cilento Region (IT)			●	●	●		●	●	●											High
	10.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2023 FUTURE FOOD INSTITUTE/POLLICA LIVING LAB/THE CHEFS' MANIFESTO	●			●				●	●		Cilento Region (IT)			●	●	●	●	●	●	●	●										High

High Degree Medium degree Low degree

		STRUCTURE AND CONTEXT														
		INDICATOR 3 Flexibility and Format Adaptability						INDICATOR 4 Assessment Practices and Reflectivity								
		3.1 Learning approach			3.2 Adaptability			4.1 Assessment Modalities (Who evaluates, and how)				4.2 Documentation and Traceability			4.3 Level of Reflexivity and Metacognition		
		Problem-Based Learning (PrBL)	**Challenge-Based Learning (CBL)**	**Project-Based Learning (PBL)**	**Low** Format is rigid and highly context-specific	**Medium** Format allows some adaptation but retains a fixed core structure	**High** Format is modular and can be customized based on context and learner needs	**Instructor-led grading** Traditional summative assessment	**Peer-to-peer assessment** Reciprocal formative feedback	**Stakeholder assessment** Evaluation from external actors (e.g., local community, partners)	**No formal assessment** Open-ended or self-evaluated	**No formal documentation or public sharing**	**Basic reporting or visual outputs**	**Structured documentation (e.g., mapping, logbooks,); public dissemination and legacy tools**	**Low** No reflective component	**Medium** Occasional moments of individual or group reflection	**High** Explicit integration of metacognitive practices (e.g., reflective journals, collective discussions, critical feedback loops)
PLACE-BASED EDUCATIONAL PROGRAMS	1			●	Low			●				●			Low		
	2			●	Low			●	●	●		●			Low		
	3	●			Low			●					●		Low		
	4	●			Low			●	●	●			●		Medium		
	5			●	Medium				●	●				●	Medium		
	6			●	Medium				●	●				●	Medium		
	7	●			High			●	●	●				●	High		
	8		●		High				●	●	●			●	High		
	9	●			Medium					●	●			●	High		
	10		●		High				●	●	●			●	High		

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	STRUCTURE AND CONTEXT																								
		INDICATOR 1 Duration and Immersion Level						INDICATOR 2 Educational Setting and Territorial Anchoring																		
		1.1 Duration of the Format			1.2 Immersion Level			2.1 Higher education and life long learning		2.2 Spatial Setting			2.3 Level of Contextual Engagement			2.4 Participant Profiles							2.5 Real-context involvement		
		< 5 days	5 –10 days	> 10 days	Short Immersion	Extended Immersion	Distributed Immersion	Formal education	Non-formal education	Rural	Urban	Periurban	Absent	Observation	Co-design	Students	Faculty	Academic researchers	Local community members	Public sector representatives	Food producers - farmers cooperatives	Other profiles	Low	Medium	High
PLACE-BASED EDUCATIONAL PROGRAMS	**11.**TENUTA LAB SUVIGNANO TENUTA LAB 2023 University of Pisa / Food Agriculture Enviroment department / PAGE / Suvignano Farm		●		●			●		●		Farm in Italy			●	●	●	●	●	●	●	●			High
	12.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2024 FUTURE FOOD INSTITUTE / POLLICA LIVING LAB		●		●				●	●		Cilento Region (IT)			●	●	●	●	●	●	●	●			High
	13.TECH AND FOOD BOOTCAMP 2024 FUTURE FOOD INSTITUTE / ITS TECH AND FOOD		●		●			●		●		Cilento Region (IT)			●	●	●	●	●	●	●	●			High
	14.SEXY BEANS BOOTCAMP (France Edition) 2024 L'Ecole de Design Nantes Atlantique / ISIA Design Roma / Koln Interrnational School of Design / Elisava		●		●			●			●	Nantes (FR)			●	●	●	●	●	●	●	●			High
	15.REGENERATIVE FOOD DESIGN BOOTCAMP 2024 FORK / FOODDESIGNLAB LISBON / VIVIDFARM		●		●				●	●		Farm in Portugal			●	●	●	●	●	●	●	●			High
	16.FOOD DESIGN WORKSHOP TALENT CAMP 2024 ISIA Pordenone / CUMULUS / PDW	●			●				●		●	Pordenone (IT)		●		●	●	●							Low
	17.SPOKE1 ONFOODS TENUTA LAB TENUTA LAB - MENTORSHIP PROGRAM FOR ECRs 2024 University of Pisa / University of Parma / ONFOODS / PAGE / Suvignano Farm	●			●				●	●		Farm in Italy			●	●	●	●	●	●	●	●			High
	18.TENUTA LAB PAGANICO TENUTA LAB 2024 University of Pisa, Dottorato Nazionale in Sviluppo sostenibile e cambiamento climatico / Paganico Farm		●		●			●		●		Farm in Italy			●	●	●	●	●	●	●	●			High
	19.SEXY BEANS BOOTCAMP (Italy Edition) 2025 ISIA Design Roma / L'Ecole de Design Nantes Atlantique / Koln Interrnational School of Design / Elisava		●		●			●		●	●	Rome (IT)			●	●	●	●	●	●	●	●			High
	20.FOOD DESIGN THINKING 3-DAYS WORKSHOP 2025 CHIEAM / SEMI DI VITA / SILOE	●			●			●		●		Farm in Italy		●		●	●	●			●			Medium	

High Degree Medium degree Low degree

		STRUCTURE AND CONTEXT														
		INDICATOR 3 Flexibility and Format Adaptability						INDICATOR 4 Assessment Practices and Reflectivity								
		3.1 Learning approach			3.2 Adaptability			4.1 Assessment Modalities (Who evaluates, and how)				4.2 Documentation and Traceability			4.3 Level of Reflexivity and Metacognition		
		Problem-Based Learning (PrBL)	**Challenge-Based Learning (CBL)**	**Project-Based Learning (PBL)**	**Low** Format is rigid and highly context-specific	**Medium** Format allows some adaptation but retains a fixed core structure	**High** Format is modular and can be customized based on context and learner needs	**Instructor-led grading** Traditional summative assessment	**Peer-to-peer assessment** Reciprocal formative feedback	**Stakeholder assessment** Evaluation from external actors (e.g., local community, partners)	**No formal assessment** Open-ended or self-evaluated	**No formal documentation or public sharing**	**Basic reporting or visual outputs**	**Structured documentation (e.g., mapping, logbooks,), public dissemination and legacy tools**	**Low** No reflective component	**Medium** Occasional moments of individual or group reflection	**High** Explicit integration of metacognitive practices (e.g., reflective journals, collective discussions, critical feedback loops)
PLACE-BASED EDUCATIONAL PROGRAMS	11		●		High				●	●				●	High		
	12		●		High				●	●	●			●	High		
	13		●		High			●	●	●			●		Medium		
	14			●	High				●	●			●		Medium		
	15			●	High				●	●				●	High		
	16			●	Medium				●				●		Low		
	17		●		High				●	●	●			●	High		
	18		●		High				●	●				●	High		
	19		●		High				●	●	●			●	High		
	20		●		Medium			●		●			●		Medium		

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	INTERVENTION: PARTICIPATION AND CO-DESIGN INDICATOR 5 Participant Composition and Disciplinary Integration 5.1 Disciplinary Background			5.2 Type of Stakeholders Involved					5.3 Level of Integration and Cross-Contamination			5.4 National / International	
		All designers Participants have backgrounds in design-related fields	**Designers + other disciplines** Heterogeneous group including non-designers	**Non-designers only** Participants from fields unrelated to design	**Academic institutions** (universities, research centers)	**Civic and community actors, NGOs** (activist groups, informal collectives)	**Industry actors** (private companies, startups)	**Policy makers / public administration**	**Hybrid actors** (e.g., social innovators, cross-sector professionals)	**Low - Multidisciplinary** Actors work in parallel;limited dialogue or shared processes	**Medium - Interdisciplinary** Disciplines interact with shared tools, frameworks, or objectives	**High - Transdisciplinary** Full integration of diverse academic and non-academic actors; co-design of knowledge, mutual learning, and boundary-crossing collaboration	**National**	**International**
PLACE-BASED EDUCATIONAL PROGRAMS	**1.**FOOD CULTURE AND ARCHITECTURE SEMESTER STUDY ABROAD - COURSE 2010 GUSTOLAB / HWS	●			●					Low				●
	2.VANTAN FOOD DESIGN 5-DAYS FOOD DESIGN FIELD SCHOOL ABROAD 2010 GUSTOLAB / VANTAN SCHOOL		●		●	●	●			Medium				●
	3.BRANDING ITALIAN FOOD CULTURE AND CUISINE FACULTY LED PROGRAM ABROAD - FIELD SCHOOL 2011 GUSTOLAB / UIUC		●		●		●			Medium				●
	4.FOOD AND MEDIA SUMMER STUDY ABROAD - COURSE 2012 GUSTOLAB / UMASS		●		●	●	●		●	High				●
	5.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2013 ISIA Pordenone / PDW	●			●					Low				●
	6.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2016 ISIA Pordenone / PDW / GUSTOLAB / HWS	●			●					Low				●
	7.FOOD AND SUSTAINABILITY SEMESTER STUDY ABROAD - FIELD SCHOOL 2017 GUSTOLAB / UIUC			●	●	●	●		●	High				●
	8.FOOD&CLIMATE SHAPER BOOTCAMP 2021 FUTURE FOOD INSTITUTE / FAO / POLLICA LIVING LAB		●			●	●	●	●	High				●
	9.MEDITERRANEITY & FOOD DESIGN BOOTCAMP 2022 FORK/FUTURE FOOD INSTITUTE / POLLICA LIVING LAB	●			●	●	●	●	●	High				●
	10.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2023 FUTURE FOOD INSTITUTE/POLLICA LIVING LAB/THE CHEFS' MANIFESTO		●			●	●	●	●	High				●

■ High Degree ■ Medium degree ■ Low degree

		INTERVENTION: PARTICIPATION AND CO-DESIGN																			
		INDICATOR 6 Project Intensity & Active Participation			INDICATOR 7 Empathic Activation						INDICATOR 8 Cultural Mediations										
		Project Intensity			7.1 EOE			7.2 Level of Empathy			8.1 Mediating dimensions activated through design and learning processes						8.2 Level of Cognitive and experiential mediations explicitly activated		
		Low Informative or exploratory participation only	**Medium** Active involvement in selected phases (e.g., ideation or testing)	**High** Full engagement across all design phases: research, ideation, co-design, prototyping	**Ego**	**Other**	**Ego Other Eco**	**Low** Only other	**Medium** Ego and other	**High** EOE	**Body**	**Senses**	**Space**	**Others / Community**	**Production**	**Materiality of food**	**Low** Up to 1	**Medium** Up to 3	**High** Up to 6
PLACE-BASED EDUCATIONAL PROGRAMS	1	●				●		Low				●	●				Medium		
	2		●			●		Low				●		●		●	Medium		
	3	●				●		Low				●		●			Medium		
	4			●	●	●		Medium			●	●	●	●	●	●	High		
	5	●				●		Low						●			Low		
	6	●				●		Low						●			Low		
	7			●	●	●	●	High			●	●	●	●	●	●	High		
	8			●	●	●	●	High			●	●	●	●	●	●	High		
	9			●	●	●	●	High			●	●	●	●	●	●	High		
	10			●	●	●	●	High			●	●	●	●	●	●	High		

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	INTERVENTION: PARTICIPATION AND CO-DESIGN INDICATOR 5 Participant Composition and Disciplinary Integration 5.1 Disciplinary Background			5.2 Type of Stakeholders Involved					5.3 Level of Integration and Cross-Contamination			5.4 National / International	
		All designers Participants have backgrounds in design-related fields	**Designers + other disciplines** Heterogeneous group including non-designers	**Non-designers only** Participants from fields unrelated to design	**Academic institutions** (universities, research centers)	**Civic and community actors, NGOs** (activist groups, informal collectives)	**Industry actors** (private companies, startups)	**Policy makers / public administration**	**Hybrid actors** (e.g., social innovators, cross-sector professionals)	**Low - Multidisciplinary** Actors work in parallel;limited dialogue or shared processes	**Medium - Interdisciplinary** Disciplines interact with shared tools, frameworks, or objectives	**High - Transdisciplinary** Full integration of diverse academic and non-academic actors; co-design of knowledge, mutual learning, and boundary-crossing collaboration	**National**	**International**
PLACE-BASED EDUCATIONAL PROGRAMS	**11.**TENUTA LAB SUVIGNANO TENUTA LAB 2023 University of Pisa / Food Agriculture Enviroment department / PAGE / Suvignano Farm			●	●	●	●	●	●	High				●
	12.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2024 FUTURE FOOD INSTITUTE / POLLICA LIVING LAB		●		●	●	●	●	●	High				●
	13.TECH AND FOOD BOOTCAMP 2024 FUTURE FOOD INSTITUTE / ITS TECH AND FOOD			●	●	●	●	●	●	High			●	
	14.SEXY BEANS BOOTCAMP (France Edition) 2024 L'Ecole de Design Nantes Atlantique / ISIA Design Roma / Koln Interrnational School of Design / Elisava	●			●	●	●	●	●	High				●
	15.REGENERATIVE FOOD DESIGN BOOTCAMP 2024 FORK / FOODDESIGNLAB LISBON / VIVIDFARM		●		●	●	●		●	High				●
	16.FOOD DESIGN WORKSHOP TALENT CAMP 2024 ISIA Pordenone / CUMULUS / PDW	●			●					Low				●
	17.SPOKE1 ONFOODS TENUTA LAB TENUTA LAB - MENTORSHIP PROGRAM FOR ECRs 2024 University of Pisa / University of Parma / ONFOODS / PAGE / Suvignano Farm		●		●	●	●	●	●	High				●
	18.TENUTA LAB PAGANICO TENUTA LAB 2024 University of Pisa, Dottorato Nazionale in Sviluppo sostenibile e cambiamento climatico / Paganico Farm			●	●	●	●	●	●	High				●
	19.SEXY BEANS BOOTCAMP (Italy Edition) 2025 ISIA Design Roma / L'Ecole de Design Nantes Atlantique / Koln Interrnational School of Design / Elisava	●			●	●	●	●	●	High				●
	20.FOOD DESIGN THINKING 3-DAYS WORKSHOP 2025 CHIEAM / SEMI DI VITA / SILOE			●	●	●	●			Medium				●

High Degree Medium degree Low degree

		INTERVENTION: PARTICIPATION AND CO-DESIGN																			
		INDICATOR 6 Project Intensity & Active Participation			INDICATOR 7 Empathic Activation						INDICATOR 8 Cultural Mediations										
		Project Intensity			7.1 EOE			7.2 Level of Empathy			8.1 Mediating dimensions activated through design and learning processes						8.2 Level of Cognitive and experiential mediations explicitly activated		
		Low Informative or exploratory participation only	**Medium** Active involvement in selected phases (e.g., ideation or testing)	**High** Full engagement across all design phases: research, ideation, co-design, prototyping	**Ego**	**Other**	**Ego Other Eco**	**Low** Only other	**Medium** Ego and other	**High** EOE	**Body**	**Senses**	**Space**	**Others / Community**	**Production**	**Materiality of food**	**Low** Up to 1	**Medium** Up to 3	**High** Up to 6
PLACE-BASED EDUCATIONAL PROGRAMS	11			●	●	●	●	High			●	●	●	●	●	●	High		
	12			●	●	●	●	High			●	●	●	●	●	●	High		
	13			●	●	●	●	High			●	●	●	●	●	●	High		
	14			●	●	●	●	High			●	●	●	●	●	●	High		
	15			●	●	●	●	High			●	●	●	●	●	●	High		
	16	●			●	●		Medium					●	●		●	Medium		
	17			●	●	●	●	High			●	●	●	●	●	●	High		
	18			●	●	●	●	High			●	●	●	●	●	●	High		
	19			●	●	●	●	High			●	●	●	●	●	●	High		
	20		●		●	●	●	High					●	●	●	●	High		

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	MECHANISM														
		INDICATOR 9 Narrative Structure and Motivation Pedagogical Model						INDICATOR 10 Design Methodologies								
		9.1 Cognitive, experiential framework guiding the educational process				9.2 Emotional/Discomfort/ Motivational Architecture		10.1 Structured methods used for project development within the format					10.2 Level of methodological structuring			
		EICS Exploration / Inspiration / Creation / Sharing	**IAA** Inspiration / Aspiration / Action	**No structure**	**Other**	**4F** Fun / Fly / Fight / Fit	**None**	**Design Thinking (DT)**	**Prosperity Thinking**	**Lean Design**	**Agile Prototyping**	**Other Design Methods**	**Low** Unstructured	**Medium** Use of recognized methods (e.g., DT or Lean), but limited adaptation	**High** Purposeful selection or hybridization of methods, adapted to context and learning objectives	
PLACE-BASED EDUCATIONAL PROGRAMS	**1.**FOOD CULTURE AND ARCHITECTURE SEMESTER STUDY ABROAD - COURSE 2010 GUSTOLAB / HWS	●				●		●				●				**Medium**
	2.VANTAN FOOD DESIGN 5-DAYS FOOD DESIGN FIELD SCHOOL ABROAD 2010 GUSTOLAB / VANTAN SCHOOL			●		●		●				●				**Medium**
	3.BRANDING ITALIAN FOOD CULTURE AND CUISINE FACULTY LED PROGRAM ABROAD - FIELD SCHOOL 2011 GUSTOLAB / UIUC				●	●		●								**Low**
	4.FOOD AND MEDIA SUMMER STUDY ABROAD - COURSE 2012 GUSTOLAB / UMASS	●				●		●				●				**Medium**
	5.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2013 ISIA Pordenone / PDW	●				●		●		●						**Medium**
	6.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2016 ISIA Pordenone / PDW / GUSTOLAB / HWS	●				●		●		●						**Medium**
	7.FOOD AND SUSTAINABILITY SEMESTER STUDY ABROAD - FIELD SCHOOL 2017 GUSTOLAB / UIUC	●				●		●				●				**Medium**
	8.FOOD&CLIMATE SHAPER BOOTCAMP 2021 FUTURE FOOD INSTITUTE / FAO / POLLICA LIVING LAB		●			●			●	●		●				**High**
	9.MEDITERRANEITY & FOOD DESIGN BOOTCAMP 2022 FORK/FUTURE FOOD INSTITUTE / POLLICA LIVING LAB		●				●	●		●	●					**High**
	10.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2023 FUTURE FOOD INSTITUTE/POLLICA LIVING LAB/THE CHEFS' MANIFESTO		●			●		●	●			●				**High**

High Degree Medium degree Low degree

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	MECHANISM														
		INDICATOR 9 Narrative Structure and Motivation Pedagogical Model						INDICATOR 10 Design Methodologies								
		9.1 Cognitive, experiential framework guiding the educational process				9.2 Emotional/Discomfort/ Motivational Architecture		10.1 Structured methods used for project development within the format					10.2 Level of methodological structuring			
		EICS Exploration / Inspiration / Creation / Sharing	**IAA** Inspiration / Aspiration / Action	**No structure**	**Other**	**4F** Fun / Fly / Fight / Fit	**None**	**Design Thinking (DT)**	**Prosperity Thinking**	**Lean Design**	**Agile Prototyping**	**Other Design Methods**	**Low** Unstructured	**Medium** Use of recognized methods (e.g., DT or Lean), but limited adaptation	**High** Purposeful selection or hybridization of methods, adapted to context and learning objectives
PLACE-BASED EDUCATIONAL PROGRAMS	**11.**TENUTA LAB SUVIGNANO TENUTA LAB 2023 University of Pisa / Food Agriculture Enviroment department / PAGE / Suvignano Farm	●				●		●		●		●			**High**	
	12.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2024 FUTURE FOOD INSTITUTE / POLLICA LIVING LAB		●			●		●	●			●			**High**	
	13.TECH AND FOOD BOOTCAMP 2024 FUTURE FOOD INSTITUTE / ITS TECH AND FOOD		●				●		●						**Low**	
	14.SEXY BEANS BOOTCAMP (France Edition) 2024 L'Ecole de Design Nantes Atlantique / ISIA Design Roma / Koln Interrnational School of Design / Elisava				●	●		●		●	●	●			**High**	
	15.REGENERATIVE FOOD DESIGN BOOTCAMP 2024 FORK/FOODDESIGNLAB LISBON / VIVIDFARM				●		●	●		●	●	●			**High**	
	16.FOOD DESIGN WORKSHOP TALENT CAMP 2024 ISIA Pordenone / CUMULUS / PDW				●		●	●							**Low**	
	17.SPOKE1 ONFOODS TENUTA LAB TENUTA LAB - MENTORSHIP PROGRAM FOR ECRs 2024 University of Pisa / University of Parma / ONFOODS / PAGE / Suvignano Farm	●				●		●		●	●	●			**High**	
	18.TENUTA LAB PAGANICO TENUTA LAB 2024 University of Pisa, Dottorato Nazionale in Sviluppo sostenibile e cambiamento climatico / Paganico Farm	●				●		●		●	●	●			**High**	
	19.SEXY BEANS BOOTCAMP (Italy Edition) 2025 ISIA Design Roma / L'Ecole de Design Nantes Atlantique / Koln Interrnational School of Design / Elisava	●				●		●		●	●	●			**High**	
	20.FOOD DESIGN THINKING 3-DAYS WORKSHOP 2025 CHIEAM / SEMI DI VITA / SILOE	●					●	●		●					**Medium**	

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	OUTPUTS AND OUTCOMES													
		INDICATOR 11 Outputs					INDICATOR 12 Outcomes								
		Type of outcome expected at the end of the learning experience					12.1 Competencies						12.2 Level of trasformative learning		
		Mapping	**Scenario Concept**	**Design Concept**	**Prototype**	**Experiential Installation / Performance**	**Emotional Intelligence** From indicator 2,7,9	**Cognitive Flexibility** From indicator 2,3,4,9	**Systemic and Circular Thinking** From indicator 2,4,5,6,8	**Collaborative Creativity** From indicator 5,6,7,10,11	**Transdisciplinarity** From indicator 2,5,6,7,8	**Collaboration and Communication** From indicator 2,4,5,6,7,8,11	**Low** 0-1 skills activated	**Medium** 2-3 skills activated	**High** More than 4 skills activated
PLACE-BASED EDUCATIONAL PROGRAMS	**1.**FOOD CULTURE AND ARCHITECTURE SEMESTER STUDY ABROAD - COURSE 2010 GUSTOLAB / HWS	●	●					●		●		●		**Medium**	
	2.VANTAN FOOD DESIGN 5-DAYS FOOD DESIGN FIELD SCHOOL ABROAD 2010 GUSTOLAB / VANTAN SCHOOL					●			●	●		●		**Medium**	
	3.BRANDING ITALIAN FOOD CULTURE AND CUISINE FACULTY LED PROGRAM ABROAD - FIELD SCHOOL 2011 GUSTOLAB / UIUC	●								●				**Low**	
	4.FOOD AND MEDIA SUMMER STUDY ABROAD - COURSE 2012 GUSTOLAB / UMASS				●	●	●	●	●	●	●	●			**High**
	5.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2013 ISIA Pordenone / PDW		●	●				●		●		●		**Medium**	
	6.PORDENONE DESIGN WEEK 5-DAYS FOOD DESIGN WORKSHOP 2016 ISIA Pordenone / PDW / GUSTOLAB / HWS		●	●				●		●		●		**Medium**	
	7.FOOD AND SUSTAINABILITY SEMESTER STUDY ABROAD - FIELD SCHOOL 2017 GUSTOLAB / UIUC			●		●	●	●	●	●	●	●			**High**
	8.FOOD&CLIMATE SHAPER BOOTCAMP 2021 FUTURE FOOD INSTITUTE / FAO / POLLICA LIVING LAB		●	●		●	●	●	●	●	●	●			**High**
	9.MEDITERRANEITY & FOOD DESIGN BOOTCAMP 2022 FORK / FUTURE FOOD INSTITUTE / POLLICA LIVING LAB			●	●		●	●	●	●	●	●			**High**
	10.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2023 FUTURE FOOD INSTITUTE/POLLICA LIVING LAB/THE CHEFS' MANIFESTO			●		●	●	●	●	●	●	●			**High**

High Degree Medium degree Low degree

	CONTENT AND PROGRAM PROFILE Name, Type, Year, Organizers/Partners	OUTPUTS AND OUTCOMES													
		INDICATOR 11 Outputs					INDICATOR 12 Outcomes								
		Type of outcome expected at the end of the learning experience					12.1 Competencies						12.2 Level of trasformative learning		
		Mapping	**Scenario Concept**	**Design Concept**	**Prototype**	**Experiential Installation / Performance**	**Emotional Intelligence** From indicator 2,7,9	**Cognitive Flexibility** From indicator 2,3,4,9	**Systemic and Circular Thinking** From indicator 2,4,5,6,8	**Collaborative Creativity** From indicator 5,6,7,10,11	**Transdisciplinarity** From indicator 2,5,6,7,8	**Collaboration and Communication** From indicator 2,4,5,6,7,8,11	**Low** 0-1 skills activated	**Medium** 2-3 skills activated	**High** More than 4 skills activated
PLACE-BASED EDUCATIONAL PROGRAMS	**11.**TENUTA LAB SUVIGNANO TENUTA LAB 2023 University of Pisa/Food Agriculture Enviroment department/ PAGE / Suvignano Farm	●	●	●			●	●	●	●	●	●			**High**
	12.GASTRO DIPLOMACY & CLIMATE SHAPER BOOTCAMP 2024 FUTURE FOOD INSTITUTE/ POLLICA LIVING LAB	●		●			●	●	●	●	●	●			**High**
	13.TECH AND FOOD BOOTCAMP 2024 FUTURE FOOD INSTITUTE/ITS TECH AND FOOD			●				●	●	●	●	●			**High**
	14.SEXY BEANS BOOTCAMP (France Edition) 2024 L'Ecole de Design Nantes Atlantique/ ISIA Design Roma/Koln Interrnational School of Design/Elisava			●	●	●	●	●	●	●	●	●			**High**
	15.REGENERATIVE FOOD DESIGN BOOTCAMP 2024 FORK/FOODDESIGNLAB LISBON/ VIVIDFARM			●	●		●	●	●	●	●	●			**High**
	16.FOOD DESIGN WORKSHOP TALENT CAMP 2024 ISIA Pordenone/CUMULUS/PDW	●	●					●		●		●		**Medium**	
	17.SPOKE1 ONFOODS TENUTA LAB TENUTA LAB - MENTORSHIP PROGRAM FOR ECRs 2024 University of Pisa/University of Parma/ ONFOODS/ PAGE / Suvignano Farm	●	●				●	●	●	●	●	●			**High**
	18.TENUTA LAB PAGANICO TENUTA LAB 2024 University of Pisa, Dottorato Nazionale in Sviluppo sostenibile e cambiamento climatico/Paganico Farm	●	●				●	●	●	●	●	●			**High**
	19.SEXY BEANS BOOTCAMP (Italy Edition) 2025 ISIA Design Roma/L'Ecole de Design Nantes Atlantique/Koln Interrnational School of Design/Elisava			●	●	●	●	●	●	●	●	●			**High**
	20.FOOD DESIGN THINKING 3-DAYS WORKSHOP 2025 CHIEAM / SEMI DI VITA / SILOE	●	●	●			●	●	●	●	●	●			**High**

#	PARTECIPANTS & LEVEL	CORE GOALS	KEY DELIVERABLES
1	US architecture students (BA, study-abroad)	Re-design food places in Roman neighbourhoods	Spatial concepts for markets & food-sharing parks
2	Japanese culinary & design students (BA)	Create a cross-cultural food-experience event	Full event: menu, staging, service
3	US students (BA, study-abroad)	Analyse Italo-US food branding & propose EXPO concept	Food “Made in Italy” showcase proposal for Chicago Expo
4	US students (BA + MA,study-abroad)	Narrate food experiences and systems in Rome through media	Mini-docs & promo videos
5	Intl./Italian design students (BA)	Futures for food-sustainability education (from Barilla Foundation data)	Scenario ideas & educational toolkit
6	Italian design + US architecture students (BA)	Present & future scenarios for sustainable diets	Prototypes for sustainable-diet solutions
7	US food-studies students (BA + MA)	Brand & stakeholder-engagement model for an organic farm	Visual identity + food-educational tools for schools
8	Mixed-age, cross-sector international group	Local & global sustainable-food solutions	Food concepts, food system solutions and prototypes
9	Students from 3 EU design /food schools	Re-Design the Mediterranean Diet Museum	Exhibition & service concepts
10	Mixed-age, cross-sector international group	Sustainable diet & integral ecology (with Chef Manifesto)	Community action plan
11	Intl. PhD candidates (Agri-Food-Env.)	Agro-ecological living-farm model (ex-Mafia land)	Operational framework & systemic prototypes. Action plan for Suvignano Farm
12	Mixed-age, cross-sector international group	Integral-ecology food solutions	Food concepts, food system solutions and prototypes
13	Italian ITS students	Integral ecology via food education	Local food-solution prototypes
14	Design & food-design students (4 EU schools)	Boost legume production & consumption	Product, Service, Communication and Education concepts
15	Intl. students & researchers	Brand / education / certification for regenerative farming	Regenerative-farm toolkit
16	Intl. design students	Alternative food markets & consumption futures	Scenario map
17	Intl./national students & researchers	Understand living lab via food-design thinking (ex-Mafia land)	Multistakeholder collaboration model
18	Italian & intl. PhD candidates	Agro-ecology, tourism & education challenges	Action plan for Paganico farm
19	Design & food-design students (4 EU schools)	Agro-ecology & legume promotion (Rome focus)	Local service concepts
20	Intl. students	New business models for organic-food co-ops	Innovative food solutions and action plan for cooperatives

Annex 2

The Tenuta Lab is an immersive and transdisciplinary learning experience that brings students and stakeholders together through co-designed challenges, bottom-up data collection, and place-based activities. It fosters student empowerment both as personal growth (*to be*) and as the capacity to act (*to do*), bridging international perspectives with local engagement. The lab promotes transformative learning through shared experiences, mobility, and interaction with complex territorial realities—specifically farms and rural contexts.

Dimension	From the Participants	From the Stakeholders
Team-building	Similar team-building throughout the experience	Team-building activities to foster group cohesion
Tailoring	Tailoring to participants	Tailoring to stakeholders
Student Empowerment	Empowerment of students → *to be*	Empowerment of students → *to do*
Challenge-Based Approach	Challenges proposed by participants	Challenges proposed by stakeholders
International Perspective	International and cross-cultural exchange	Locally grounded, context-specific contributions
Place-Based Approach	Mobility and immersion in diverse contexts	Anchored in local realities and territorial needs
Bottom-Up Data Collection	Experiential insights and observations	Community-driven knowledge and lived expertise

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Sonia Massari is a researcher at the University of Pisa and a design strategist with over 20 years of international experience in food design, sustainability education, and agri-food systems innovation. Her work focuses on participatory approaches, human-food interaction, and the role of design in shaping inclusive, sustainable futures. She bridges research and practice using transdisciplinary, empathy-based methods and transformative learning. She teaches at ISIA Roma, lectures internationally, and co-founded the FORK Food Design Organization. She received the NAFSA Research Award (2014) and the ASFS Pedagogy Award (2020).

Food Design for the Real World explores the transformative potential of design within agri-food systems. Inspired by Victor Papanek's call to address real human needs, the book adopts a transdisciplinary and situated approach to investigate food as both a medium and an object of design.

Blending theory and practice, it traces the evolution of the food design field and introduces a six-mediation framework for understanding food experience. Drawing on twenty real-world educational case studies, it presents *B.E.FOO.D*, a model for transformative, place-based learning and design *by* and *for* food.

At its core lies the concept of the food designer's metabolism —the ability to transform cultural values into generative energy. Like a butterfly effect, small food-centred actions can trigger systemic change.

Through collaborative formats such as *Living Labs and Tenuta Labs*, the book demonstrates how co-creation can reimagine food systems and empower communities.

Aimed at designers, educators, researchers, and changemakers, this book invites readers to move beyond reductive models and to activate *dormant resources* and meaningful connections among people, places, and values—towards more just, sustainable, and shared food futures.

FrancoAngeli
La passione per le conoscenze