



EUROANISH

NEW METHODOLOGIES TO
INTERVENE IN PUBLIC SPACE

EU RANISH

NEW METHODOLOGIES TO
INTERVENE IN PUBLIC SPACE

FURNISH

New methodologies to intervene in public space

Edited and coordinated by	Inés Aquilué Junyent
Graphic design, maps and layout by	Marina Ojeda Esquerdo
Text editing and revising by	Paloma Nieri Romero
Cover design by	Marina Ojeda Esquerdo

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Nexus II Building – Office OA
C/ Jordi Girona, 29, 08034 Barcelona
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K2M Building, S1, S103-S104
Jordi Girona 1-3, 08034 Barcelona
www.upc.edu/idp
e-mail: info.idp@upc.edu

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I.

PREAMBLE





Fig. 1

FOREWORD

Dr. Laia Pagès - CARNET

I have always had a love for books and reading, but first and foremost, I have always have had passion for challenging adventures. Some months ago, when Inés Aquilué proposed the idea of publishing a book about FURNISH, I thought that it was a fantastic idea, that it would become a valuable piece of work, an inspiration for potential projects and, most importantly, that it could be a great adventure.

The acronym FURNISH stands for Fast Urban Responses for New Inclusive Spaces and Habitat. All three editions have reflected the importance of the project's mission and the commitment of CARNET to make a positive impact on the mobility and lives of people in urban areas. At CARNET (the mobility research hub) we have always worked to improve people's lives by closing the gap between the automotive industry, public entities and the university. As a civil engineer working in Transportation Engineering projects by solving advanced mobility problems all my life, I have learned that some problems need a very holistic and transdisciplinary approach and this is exactly the way of approaching our work: in a systemic way and counting with a team of transdisciplinary people passionate about the same objective. In a parallel way, through research, partnerships, and innovation, the FURNISH project seeks to create new models for urban development that prioritize inclusivity, sustainability, and resilience. As CARNET, the FURNISH project's approach is also multidisciplinary, bringing together experts from fields such as urban planning, architecture, engineering, and social sciences.

I would like to thank all authors who contributed with their expertise and passion to this great book, especially Inés, without her hard work and commitment this piece of work would not be a reality today. Finally, I am convinced that this book will inspire others to join the mission of creating more sustainable mobility for all, as well as more inclusive and sustainable urban spaces and habitats. As we did at CARNET while working with each of the three editions in the past, I invite you now to read this book and enjoy the FURNISH adventure.



Fig. 2

THE FURNISH PROJECT

Dr. Inés Aquilué & Angélica Caicedo

Universitat Politècnica de Catalunya · BarcelonaTech & CARNET

FURNISH is the acronym of Fast Urban Responses for New Inclusive Spaces and Habitat, a project centred on transforming streets by re-habiting them. The project was born during the COVID-19 pandemic, when the emergency triggered the need for becoming more creative to reframe our general understanding, not only of our behaviour but also of our environment. Due to the high population density characteristic of urban areas, cities were the most crowded places, which made public space of the utmost value. People needed more than ever to get out, breathe, walk, and even bring indoor activities into the common open public space. Designers, researchers, makers, practitioners, academics, and civil servants had the responsibility of answering the question of how we could adapt our public spaces to new, fast, and emerging needs. The conclusion was that the public spaces should evolve and become more inclusive places for everyone, especially for the most vulnerable. Under these challenging circumstances, FURNISH a project led by CARNET emerged to rethink the public space while taking action as a fact, as a duty and as a right.

The current context, after the pandemic, is very desirable, as many European cities are looking to redesign their public spaces. FURNISH aims to tackle the challenge of creating more public spaces with tactical urbanism, which can reconfigure and co-create a street expanding the space for pedestrians and leisure. This strategy and local manufacturing can achieve the quick and effective deployment of urban elements in our streets, squares, courtyards, avenues, and others. Likewise, FURNISH seeks to empower local citizens through co-creation, giving them the opportunity to participate in the ideation of their own city's new image. Thus, the project foresees a reconfiguration of public spaces that promotes social cohesion and interaction, by means of the reorganisation of places and the deployment of temporary urban elements.

The principles that FURNISH uses to transform streets are the following:

[1] REFRAMING PUBLIC SPACE: The new mobility solutions are reframing the public space of European cities, unleashing its expansion. Citizens are reclaiming the public space, while FURNISH makes these new pedestrianised areas liveable and active.

[2] INDOORS TO OUTDOORS: FURNISH was born to bring indoor activities outdoors, facilitating the development of cultural, educational, recreational and commercial activities in public spaces.

[3] URBAN LIVING LAB METHODS: FURNISH is based on living lab methods that include an iterative and interactive cycle of activities, including elicitation, co-design, prototyping, testing, monitoring, and commercialisation. Frequently, some of the learning achievements derived from the living labs can be unexpected, because of the complexity of real-life environments.

[4] CO-CREATION [IDEATION, CO-DESIGN, CO-FABRICATION]: FURNISH is based on the learning-by-doing process, in which user input, design, and content play a central role from beginning to end. Users have an active role in all states of the co-creation process: ideation, design, fabrication, testing and evaluation.

[5] VULNERABILITY: The urban elements designed under the FURNISH process have a special focus on supporting a variety of vulnerable groups. From helping citizens to mitigate the negative effects that COVID-19 had upon cities, to the co-creation process centred on vulnerable groups such as children.

[6] IMPACT ANALYSIS: FURNISH methods incorporate the impact analysis of the implemented elements. The assessment of the prototypes aims to improve them through a holistic approach centred on the prototype's interaction with a real urban environment. FURNISH's impact analysis is specially designed to incorporate user needs into prototyping design through an iterative process.

[7] RESILIENCE AND SUSTAINABILITY: Sustainability must be addressed in all its complexity, including material, economic, social and ecological aspects. FURNISH proposals promote full life cycle consideration of the materials used, economic sustainability, city resilience, and social cohesion; with positive influences on health, wellbeing and ecological systems.



Fig. 3

FURNISH was conceived to have a beneficial impact not only in the environment where the urban elements are placed, but also in other contexts around the world where its implementation is needed. For this reason the project is based on open-source principles and also requires an accurate assessment, the results of which are part of the development of the urban elements. Ultimately, the process results in pilot installations documented in an open-source repository of knowledge related to urban planning, mobility, social behaviour, and temporary urban elements, that can be reproduced anywhere in the world.

To achieve the successful implementation and reproduction of the prototypes, the project follows - without exception - four consecutive phases, each of which has inputs, aims, methods, actors, and outputs.

The phases are:

[Phase 1] PROBLEM AND IDEATION: In this first phase the focus is on understanding the problem and the major design questions. The main objectives to achieve are a first design approach, the site location, the design teams' composition, the co-creation process definition, and confirming the agents involved.

[Phase 2] DEVELOPMENT: During this phase, the core of the prototype's development took place: the co-design and fabrication processes. This included a series of co-creation and fabrication workshops, in which the various design teams developed different prototypes according to the questions, agents and objectives discussed in the previous phase.

[Phase 3] IMPLEMENTATION, TESTING & ASSESSMENT: In this phase, the prototypes are implemented in their planned site and are accessed by the end-users. This means that people both inside and outside of the co-creation process are using, observing and testing them. One of FURNISH's specificities is that during this phase a testing and assessment of the elements implemented in real environments takes place.

[Phase 4] FINAL PROPOSAL: Once the prototypes are tested and improved, the design team proceeds to prepare the final documentation, which is part of the Open-Source Repository. The documentation includes a design booklet of each prototype and the digital files to reproduce them. All these documents are gathered and made freely available in the Open-Source Repository.

Following these four phases, the FURNISH project was developed in three editions. The **first edition** was deployed during the COVID-19 pandemic and focused on implementing easily-inserted mobile urban elements to decrease contagion while promoting social cohesion in the newly gained public space. During this first edition, seven prototypes of urban elements were implemented in five European cities: Barcelona (Spain), Milan (Italy), Espoo (Finland), Guimarães (Portugal), and Budapest (Hungary). The **second edition**, implemented only in Barcelona, was centred on working with two schools that participated in a municipal programme to protect

the public space in front of them. The **third edition** focused on co-creating with children to construct places for them to play and to be themselves. This edition was deployed in the streets of Barcelona and Milan.

Since 2020, eleven different prototypes have been implemented: AEIOU (Guimarães, 2020), Theatron (Budapest, 2020), KONCH (Espoo, 2020), MUE:SLI (Milan, 2020), Edus Point (Barcelona, 2020), VORA (Barcelona, 2020), Open Terrace (Barcelona, 2020), RAW (Barcelona, 2021), New Niu (Barcelona, 2021), El Cargol (Barcelona, 2022) and Playscapes (Barcelona – Milan, 2022).

FURNISH is transforming our public space!



Link to: <https://furnish.tech/>
Open-Source Repository of the Furnish Project

II.

METHODOLOGY





Fig. 4

CITIES AND NEW PUBLIC SPACES

Sílvia Casorrán & Dr. Rossella Ferorelli
Ajuntament de Barcelona & Comune di Milano

Barcelona or Milan, like most cities in the world, have a busy public space dedicated mostly to motorised vehicles - as a remnant of the 1960s. This situation has brought unexpected and negative consequences such as air pollution, noise, accidents, heat island effect, lack of green space, a more sedentary lifestyle, among others.

When the new century began, it was clear that cities needed to provide the conditions for their citizens to have a healthy and happy life. In order to achieve it, it was necessary to give back the public space to the people, and create both places for active mobility and places to stay, play, and enjoy the public space itself.

Finally, cities such as Milan or Barcelona have been steadily working to accomplish these guidelines and one of the main purposes has been placing children in the centre of city planning.

In the case of Barcelona, the programme Let's protect schools (Protegem les escoles in Catalan) has been working recently to create safe and healthy schools' surroundings. Until now the programme has pacified the surroundings - by reducing the traffic - of 200 nurseries, primary schools and secondary schools (out of a total of 585 education centres in the city). These new public spaces are mainly aimed for children and their families, but also for the general neighbourhood. They have been fascinating places to do research and innovation in terms of urban playable elements. FURNISH has been of the utmost importance by giving the municipality of Barcelona the chance to collaborate with international design schools, to test new natural materials and to have real urban elements in the city council's catalogue. For example, in order to adapt public spaces to meet new needs temporarily during the pandemic, the wood element called 'Vora' was implemented next to a school in Barcelona, and in 2023 will be assembled in other public spaces as well.

The city of Barcelona aims to become 'playable' by 2030. This means ensuring children's rights to play in public spaces and encouraging all elements of the city to be playable, such as streets, schools, parks, beaches, etc. All the urban developments of this initiative take the well-being of young children into account. In this context, the FURNISH projects have been very useful for Barcelona, allowing the council and the design school to work with school communities, through the living labs methodology which includes the participation of children to co-create the resilient and sustainable urban elements.

FURNISH offers a great opportunity for municipalities to transform their public space, to create new liveable areas where diverse activities (cultural, commercial, educational, etc.) can take place, and to work together with local communities.

On the other hand, Milan's adventure towards a better public environment has taken a different and parallel path. Unlike other cities in Italy, Milan's urban tissue developed simultaneously with its transport infrastructure, whose role grew extremely important since the beginning of the Industrial Age. Even now, regardless of the city's important progress towards a more efficient public transport network, its configuration shows a strong prioritisation for the car, with a significant amount of street space dedicated to private vehicular mobility and an abundant number of open air parking spots. Even in the city centre, the average experience in public space is poor, with the vast majority of sidewalks having a basic finish and many residential buildings with no public uses on the ground floors. Worrying levels of air pollution complete the description of the Design City, which lost its culture of public space a long time ago.

In order to change the picture, since 2018 Milan has developed a municipal programme named Open Squares (Piazze Aperte in Italian), dedicated to the conversion of former streets and parking areas into public spaces through tactical urbanism techniques. The programme consolidates methodologies for both citizen engagement and implementation of the projects, through multiple experimental activity cycles. During the first ones, citizens actively participated in

the implementation, but still in areas selected by the municipality. In 2019 the programme evolved into Open Squares in Each Neighborhood (Piazze Aperte in Ogni Quartiere in Italian) and the involvement of citizens was extended to every step of the process, from the selection of the urban areas for each intervention, to advanced co-design and collective implementation workshops.

FURNISH started in 2020, inspired by the urge to react to the pandemic, by not letting all the work made in the recent years fizzle out and surrendering to the inevitable eradication of social activities. Thanks to FURNISH, the tactical urbanism expertise of the city could be enriched by experiments in furniture design and self-construction. This is groundbreaking in Italy, due to rigid regulations strongly limiting the possibility for the installation of un-certified structure on public ground, mainly for safety reasons. Yet, the possibility to act on temporary experiments made it possible to work around the problem.

Lastly, in 2022 the cities of Milan and Barcelona started a new collaboration under the EIT Urban Mobility “Public Realm” call, with two projects focused on public spaces for children. FURNISH-KIDS created a new collaboration between the City of Milan and the Di Vona Speri School, and between Italian and Catalan children- through the co-creation process. In this brilliant experiment, the Milanese children were able to play with scaled models and later with the urban furniture of real dimensions. The children understood the power of interacting with the urban space, experimenting with new degrees of freedom and creative expression in a safe environment. The urban condition rarely allows for these experiences, especially for children in Milan, where, due to both the design of urban spaces and the cultural trait of conservative parenting, child-friendliness is still a long-term political ambition for the city.

Luckily, in 2022 Milan’s Mayor announced that the next Open Squares programme cycle will be entirely dedicated to children and school spaces, similar to Barcelona’s inspiring policy. This positions FURNISH as a forerunner, signalling a shift towards strong political will to improve the public space of the city.



Fig. 5

CO-DESIGN PROCESS

Dr. Roger Paez - Elisava

Co-design is a crucial component of the FURNISH projects. It is often defined as an approach to design that actively involves stakeholders or interested parties in the design process, in order for the results to meet their cultural, emotional and practical needs.^{1,2,3} All three editions of FURNISH and eleven resulting prototypes were tested in five European cities (Barcelona, Budapest, Espoo, Guimarães and Milan), exploring citizen engagement and expanding authorship through different methodologies of public space co-design.^{4,5}

The first edition (FURNISH-COVID19 in 2020) was a collaborative process among experts, a process in which seven teams shared their research and informed each other's design proposals and final prototypes. Two tasks were crucial to achieve this goal. First, the team worked through an online platform enabling the co-design of a series of prototypical Mobile Urban Elements (MUE) - made available through open access. In the setup, the team established the design parameters, evaluation criteria and venues for collaborative development. Second, all experts participated in the 'co-creation mentoring' activities, in order to actively mentor the process of co-designing the MUE prototypes. This included frequent collective work sessions for all project teams, enabling participants to strengthen collaboration. The result of these two tasks was a new core knowledge

[1] Burkett, I. (2012) An Introduction to Co-design. Knode.

[2] Ind, N. and Coates, N. (2013) The meanings of co creation, *European Business Review*, Vol. 25:1, 86-95.

[3] Zamenopoulos, T. and Alexiou, K. (2018) Co-Design as Collaborative Research, University of Bristol/AHRC Connected Communities Programme.

[4] Remesar, A. (2020) Co-design of Public Spaces with Local Communities, *The Palgrave Handbook of Co-Production of Public Services and Outcomes*, 335–351.

[5] Munthe-Kaas, P. (2015) Agonism and co-design of urban spaces, *Urban Research & Practice*, 8:2, 218-237.

community, collaboratively led and trained by design experts, comprising seven partnerships between local citizens, digital fabrication facilities and their respective municipalities.

The RAW proposal, included in the second iteration (FURNISH-XKIC, 2021), triggered a co-design process with schoolchildren for the final layout of a system of rammed earth blocks. The design team proposed an initial configuration for a temporary intervention in a pedestrianised street adjacent to a public school. The schoolchildren tested it first-hand, were taught the project's rationale by the design team, and subsequently engaged in collaborative sessions, during which they proposed a variety of potential layouts developed through the use of scale models. The design team selected five of the children's proposals, which were then condensed into a single design and built in the schoolyard, where it is still being used by the children who co-designed it.

The New-Niu proposal, also included in the second edition, had a co-design focus on the implementation process of a pre-designed system of wooden elements. Based on a system of combinable wooden parts designed and fabricated by the design team, schoolchildren and parents participated in the co-production of a temporary intervention around a public school gate. The act of collaboratively building the MUE on site became both a design action and a social event.

In El Cargol proposal, included in the third edition (FURNISH-KIDS in 2022), the collaborative aspect of design focused on the conceptualisation phase. Schoolchildren were encouraged to draw their visions for an outdoor classroom and space to enjoy music. These drawings were used as the foundation for conceptualising the final design of a bench/screen, which was made of sustainable locally harvested wood, and built in the design team's workshop.

Finally, the Shared Playscapes proposal, also included in the third edition, focused its co-design process on social impact and community building, using design as a mediator that fosters relations between people. The proposal was based on multiple co-design sessions with schoolchildren from Barcelona and Milan, intended to generate a

meaningful relationship between the two groups, using design protocols based on sharing and collaborating remotely. The project explored the values of co-design at both the material level (informing spatial, graphic and semiotic design decisions for a temporary, adaptable and reconfigurable public space) and the relational level (establishing an experiential, emotional and narrative link between participants).

If properly carried out, the co-design of public space has various positive values. First and foremost, it fosters citizen engagement and a shared responsibility for public spaces, leading to a more collective governance.⁶ At times the social dynamics generated by such processes outweigh the objective importance of their results, which is also a relevant design contribution to urban betterment.⁷ The design outcomes are not limited to material spaces or products but also include social relations and interactions.

Second, co-design expands authorship. It is a widely accepted fact that design authorship, especially in such a rich and contested area as public space, shouldn't be based solely on the expertise of professional designers.⁸ The traditional figure of the independent designer working alone in an ivory tower is in crisis, and rightfully so. Going beyond traditional participatory strategies (sometimes used as political/administrative smokescreens rather than ways to include and empower citizens), co-design makes it possible to address the crisis in design authorship by exploring new forms of distributed authorship in a proactive, innovative and egalitarian manner.

Third, co-design produces innovative solutions. Precisely by virtue of the many voices involved, co-design processes often generate unexpected solutions. In order for these results to transition from good intentions to applicable solutions, all stakeholders need to hone their skills. Citizens need to invest their personal and collective efforts towards a common

[6] França, J., ed. (2023) *Innovació Democràtica*. Ajuntament de Barcelona

[7] Paez, R. and Valtchanova M. (2021) *Harnessing Conflict: Antagonism and Spatiotemporal Design Practices*. *Temes de Disseny*, 37, 182-213.

[8] Manzini, E. (2015) *Design, When Everybody Designs*. MIT Press.

goal. Expert designers need to use design as a medium to articulate different (and often dissenting) voices to achieve a common goal. And policy makers need to generate the opportunities for co-design processes to not only happen, but also to have an explicit effect on the ongoing definition of desirable urban models.

Last but not least, co-design encourages and triggers critical thinking. Successful co-design processes often become vessels for testing ideas

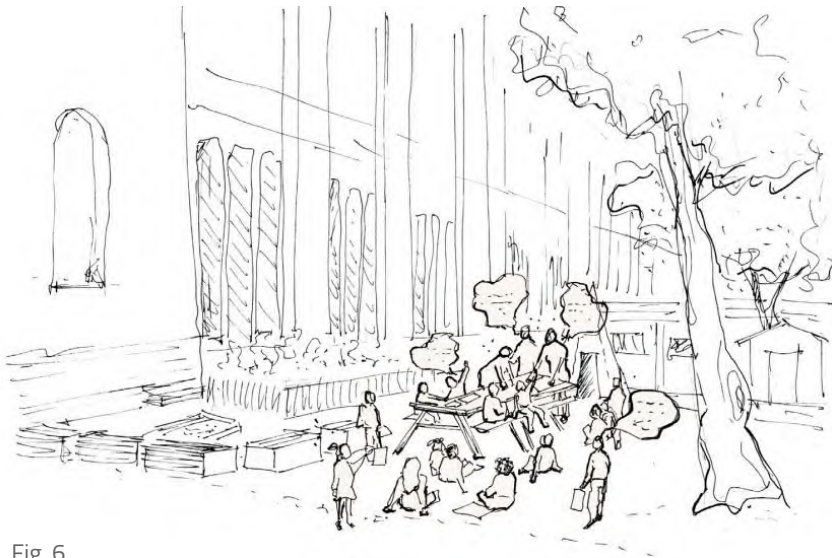


Fig. 6

collectively. Many of these ideas may be unfeasible dreams, some may even be poor ideas, but they all have the value of cultivating critical thinking, a much-needed skill in moments of global crises, such as the recent pandemic.

In a time when a significant amount of participatory processes have been degraded and used as a way to label top-down projects as community focused, it is especially important for designers to apply more robust forms of stakeholder and citizen engagement. It is not enough for public administrations to “allow” citizens to choose between solutions

for the public space proposed solely by design professionals. It is also not desirable for expert designers to comply uncritically with popular opinion that has been elevated to “objective” data through superficial participatory processes. Public space is, fundamentally, a contested space, constantly changing, and we should strive to keep it that way.

There are deep-seated political reasons contraindicating overarching solutions (from users, design experts, or policy makers) that attempt once and for all to resolve how public space should be designed, built, used and managed. What we urgently need is to dig deeper to find more meaningful ways to encourage all agents with a vested interest in public spaces (citizens, experts, policy makers) toward feeling impelled and, more importantly, taking active responsibility. Only then will we be able to find a dynamic balance between the many (and often contradictory) interests involved in public space design, use and management.

In conclusion, questions of ethics, politics, techniques and practices collide in collaborative forms of design. Many contemporary designers no longer aspire to be a classical all-knowing and all-powerful author, but rather want to explore new forms of co-creation and co-responsibility more in tune with the contemporary world. From open-source culture to urban interventionism, from new professional practices to engaged activism, design plays a significant role in shaping the current and future modes of governance. The FURNISH projects focus on design formats that humbly promote a collaborative approach to rethinking, designing, producing and managing public spaces. This focus on co-design addresses the urgent need to bridge differences, while interweaving people and places, and making a lasting positive effect in the city.



Fig. 7

CO-FABRICATION PROCESS

Vicente Guallart, Daniel Ibáñez & Michael Salka - IAAC

The public realm is, by definition, a complex space of diverse interconnections. Beyond the various interdependent environmental and infrastructural components (e.g., roads, sidewalks, plazas, street trees, lighting, furniture, signage, sewers, building façades, air flows, etc.), there is an even more complexly interconnected network of human interactions, which grows superlinearly with an increasing city size.¹ Recent urban design practice and research formally recognizes the need to better incorporate such broad, dynamic and intersectional perspectives in the built forms of the public realm, through a burgeoning emphasis on co-design.^{2,3}

Co-design can be defined as the meaningful, active engagement of stakeholders and end-users in the design process. This approach acknowledges the fundamental inability of any singular, centralised design or decision-making agent to appropriately anticipate the varied, emergent and shifting needs of diverse and evolving urban populations. Hence, co-design supports adaptation and resiliency by directly embedding the needs of these end-users through both consultation and immediate collaboration.

Numerous innovative tools enabling co-design with non-experts have been investigated and applied. Examples range from physical and digital gamification, to interactive model-building and mixed-

[1] Schläpfer, M.; Bettencourt, L. M. A.; Grauwin, S.; Raschke, M.; Claxton, R.; Smoreda, Z.; West, G. B.; Ratti, C. (2014) The scaling of human interactions with city size. *Journal of The Royal Society Interface*, 11(98).

[2] Meroni, A.; Selloni, D. (2022) *The Rise of Co-design Processes for Urban Commons*. SpringerBriefs Applied Sciences and Technology.

[3] Xue, Y.; Temeljotov-Salaj, A.; Engebø, A.; Lohne, J. (2020) Multi-sector partnerships in the urban development context: A scoping review. *Journal of Cleaner Production*, 268.

reality platforms.^{4,5,6,7} A handful of initiatives have also explored the potential of temporary built structures for engaging marginalised urban subpopulations, such as youths. However, the concept of co-fabrication, which is to actually involve stakeholders and end-users in the construction of real-world public realm installations, has yet to be thoroughly established.

Aside from improving the adaptation and resilience of proposals through the democratic consideration of design requirements, co-design promotes the concept of co-ownership, leading to the collective stewardship of the public realm. This is achieved through the end-users' participation in the development of the design, which also fosters self-identification with the result. Co-fabrication further advances this benefit, by leveraging both intellectual and physical actions to cement the relationship between the final object and the end-users, thus carrying out the role of makers and users. Such "learning by doing" is widely demonstrated to aid the long-term internalisation of knowledge.⁸ Moreover, co-fabrication exceeds the promotion of feelings of co-ownership by bolstering a sense of personal pride in the co-owned product. End-users not only contribute their thoughts and creativity to

[4] Aleksandrov, M.; Barton, J.; Pettit, C.; Soundararaj, B.; Zlatanova, S. (2022) Towards A Virtual Planning Support Theatre for City Planning and Design. In Barton J.; Aleksandrov M.; Zlatanova S. (Eds.), *Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 10(4), 5–12.

[5] Benze, A.; Mattsson, C. J.; Walter, U. (2019) Games as urban agora: An Analysis of games as participatory research, co-design, and educational tools in urban planning. In *The Routledge Companion to Games in Architecture and Urban Planning*. Taylor and Francis Inc, 221–233

[6] Nam, Y. T.; Oh, J.-H. (2017) Participatory Mixed Reality Space: Collective Memories. In Veas E.; Grasset R.; Langlotz T.; Martin A.; Martinez-Carranza J.; Sugimoto M. (Eds.), *IEEE International Symposium on Mixed and Augmented Reality Workshops*, 353–354.

[7] Rich, K. M. (2021). *Systems thinking and spatial group model building: A facilitator's guide*. ILRI.

[8] Levitt, S. D.; List, J. A.; Syverson, C. (2013) Toward an Understanding of Learning by Doing: Evidence from an Automobile Assembly Plant. *Journal of Political Economy*, 121(4), 643–681.

their own public space, but are also empowered by the physical proof of their ability to make change happen with their very own hands.

Public realm co-fabrication processes that engage non-experts require careful pre-planning strategies, in order to ensure that the fabrication tasks can be completed without dangerous, inaccessible or difficult to use tools. As well as still producing objects and structures robust and refined enough for urban contexts. Notably effective strategies include modular prefabrication and a preference for natural materials.



Fig. 8

The material transformations developed during the modular prefabrication that need hazardous, complicated or expensive tools should be carried out in a controlled lab or factory, prior to taking the elements to the installation site. In these settings, greater precision, efficiency and safety can be accomplished, while still leaving the final act of assembly to the co-fabrication community on site. For example, wooden elements can be pre-fabricated with high-risk tools like saws, drills and planers, but left unattached to one another. The non-expert co-fabrication team can then be assigned the responsibility for connecting

and attaching the elements in their ultimate position using bolts, dowels or other fasteners; which avoids the demand for sharp, heavy or powerful tools. 'Modular' in this case refers to the creation of discrete and disconnected components, which are individually small enough for easy manipulation and prepared for easy assembly. The accumulation of small modular elements generates large objects and systems greater than the sum of their parts. Modular elements may also be designed with methods of connection that are pre-determined, but the number, sequence and orientation of the connections is left open to interpretation. This frees the co-fabrication team to spontaneously elaborate the final form of the overall structure. By incorporating digitally-driven tools in the prefabrication stages, joineries can even be designed and shaped to not require a separate fastening mechanism, but rather connect securely due to their interlocking geometries.

Natural materials (especially bio-based) such as wood or bamboo, are the preferred ones for co-fabrication assemblies for multiple reasons. First, they are relatively lightweight, soft and non-toxic compared to conventional urban building materials like concrete or steel. These characteristics maximise safety for the people engaged in the co-fabrication process, mitigate the need for sturdy foundation systems or specialised tools, and reduce the risks of structural failure. Second, these attributes likewise facilitate an easy and affordable transformation of the material during the prefabrication phases, as well as the convenient loading and transporting from prefabrication facilities to the installation site. Third, natural materials have a clear relationship with their natural environment, which is too often lacking in urban spaces. The bio-based subcategory of natural materials even sequester carbon as well.

Therefore, prioritising their use in public realm co-fabrication projects is not only a logistical advantage, but also provides an opportunity for urban citizens to reconnect with their regional ecosystems. These materials also strengthen narratives regarding how the built environment can respond to ecological crises like climate change, resource depletion, pollution and biodiversity loss. Biophilic design studies also correlate sensory

experiences of natural materials with enhanced health and well-being.⁹ Combined, modular prefabrication and the use of natural materials facilitate installations appropriate for the vitality of the public realm, with its ever-progressing forms and functions. It should not be assumed that any co-fabricated solution will continue to serve its purpose indefinitely, as the populations it serves and the city where it is located mature organically over time. Together, these strategies are capable of generating structures that appear aesthetically polished and resolved upon completion. However, due to their lightness, non-toxicity and ease of connection, these structures maintain the possibility of being rapidly disconnected, warehoused, repositioned, repurposed or transformed into a different element, such as bioenergy or compost. In this sense, modular structures - jointly prefabricated and co-fabricated - are made from natural materials that emulate the same dynamic reconfiguration that the public realm manifests as a living urban space.

[9] Horwitz-Bennett, B. (2020) Natural materials in biophilic design: In creating a direct connection to nature, wood ceilings and wall systems can boost occupant health, well-being, and productivity. *Architectural Record*, 208(5).



Fig. 9

IMPACT ANALYSIS

Inés Aquilué, Angélica Caicedo & Joan Moreno

Universitat Politècnica de Catalunya · BarcelonaTech & CARNET

The need for an assessment arises because a project's implementation - independent of the designing and planning process and how promising the project might appear - does not always generate the expected impacts or benefits. The information gathered from the impact analysis helps designers and planners understand what does and does not work, and how measured changes are attributable to a particular feature of the project.¹ According to Khandker *et al.*, an effective impact evaluation should assess the ways in which beneficiaries are responding to the project, in order for the benefits of a well-designed impact evaluation to be long term and support co-creation by integrating the beneficiaries.²

The concept of design has not always been considered a linear, iterative and deductive process. In the article *How is design possible?*, Hillier and Leaman defend design as an evolving process, which needs to comprehend its past to reach its future.³ The approach, endorsed in research by design and learning by design, argues for a clearer process to assess the appropriateness of solutions. This approach requires working with socio-technical principles, which argue that technology is composed not only of scientific and innovative developments, but also human and social aspects. Thus, the social impact assessment of urban design is highly important. The nature of research by design creates knowledge that not only affects the project itself but, in the case of urban design,

[1] Hehenberger, L.; Harling, A.-M.; Scholten, P. (2015) *A practical guide to measuring and managing impact*. European Venture Philanthropy Association.

[2] Khandker, S.R.; Koolwal, G.B.; Samad, H.A. (2010) *Handbook on Impact Evaluation: Quantitative methods and practices*. The International Bank for Reconstruction and Development / The World Bank.

[3] Hillier, B.; Leaman, A. (1974) How is design possible? *Journal of Architectural Research*, 3(1), 4–11.

increases knowledge of both the society that benefits from the design, as well as the spatial environment in which it is inserted.⁴

Because FURNISH focuses on the designs' implementation in public spaces, it recognises the importance not only of the social impact but also the spatial impact. Public space has an important role in urbanity, which is defined as a combination of triggered unstable and fluctuant social interactions.⁵ In fact, some of the learning achievements derived from the living labs can be unexpected, because of the complexity of real-life environments.⁶ This represents a major challenge for constructing a model to assess the deployment of urban elements in public spaces. In FURNISH, the urban design elements and its users impact each other constantly. For this reason, the impact analysis of an urban element on its users can accelerate the inclusion of the role of society in urban design. The social issues concerning the physical environment affect the course of design and planning.⁷

In FURNISH - an urban living lab based on mobile urban elements - the impact analysis addresses the element itself (such as material or fabrication processes), the effects caused by the urban living lab on the beneficiaries (users, citizens, etc.), and the effects on the occupied surroundings. The three main aspects of the impact evaluation of the project are the Feasibility Impact, the Social Impact, and the Spatial Impact.

Feasibility Impact

Since one of the main aims of FURNISH was for the prototypes to be scalable around the globe, the prototypes should be easily fabricated in

[4] Gregorowicz-Kipszak, J. (2015) *Rethinking Social Impact Assessment through Urban Design: Towards designerly evaluation with a socio-form approach*. Chalmers University of Technology.

[5] Delgado, M. (1999) *El animal público*. Editorial Anagrama.

[6] Ballon, P.; Van Hoed, M.; Schuurman, D. (2018) The effectiveness of involving users in digital innovation: Measuring the impact of living labs. *Telematics and Informatics*, 35(5), 1201–1214.

[7] Gregorowicz-Kipszak et al. (2015) *op. cit.*

any workshop with digital fabrication tools. As a result, the prototype's reproduction evaluation was directly linked to its design. The first evaluation, conducted ex-ante, analysed how comprehensible the fabrication process was. Through an anonymous survey, each prototype was assessed by all designers of the other prototypes. To collect the required information, a questionnaire was created and included an evaluation of the following aspects: a) comprehensibility, b) ease of fabrication, c) scalability, and d) construction process of the prototype.

Social Impact

The prototypes' assessment in real environments incorporates a forecast of the acceptance that the users will have of the future urban element. As it is a prototype, the assessment after its implementation informs the improvement and adaptation of the design and location of the urban element's future versions. It is complex to measure the influence of users in the production of space. However, social impact assessments are a valuable tool to foresee the acceptance of the future implementation of the urban elements in the public space.

The social impact analysis of FURNISH aimed to qualify and understand the social benefits produced by the prototypes. Two concepts were key in designing the methodology for this assessment. The first was an analysis of the achievement of the main objectives and the second was the living lab approach to design, the latter of which reinforces the benefits of user involvement in the design process.⁸ Hence, the user's opinion is one of the essential factors for measuring the social impact of the installed elements. In order to comprehend the nature of the user/prototype relationship, it is key to understand the benefits of user appropriation and the user's degree of satisfaction with the prototype.

In FURNISH, the social impact was one of the major issues, especially concerning citizens using the space before and during the installation. This impact was assessed through two main tools that collected both quantitative and qualitative data. The quantitative information collected

[8] Ballon, P. et al. (2018) *op. cit.*

explains the frequency of use of the prototype. This was collected through counting users, which is an indicator that identifies if there is an appropriation of the element or not. The qualitative information identifies the benefits perceived by the users of the prototype. Both ex-ante and ex-post approaches were implemented. All parts of the research compose a complementary and comprehensive evaluation, making for a valuable contribution. The tools used are described below:

- *Observation forms (OF):* They analysed the impact of the element on the users and the space. These were carried out before and during the prototypes' implementation.
- *Surveys:* These were completed by users during the prototypes' implementation, and aimed to evaluate their satisfaction with the prototype.

Spatial Impact

In addition to the social impact, the spatial impact is a key aspect in identifying the added value that any action gives to an urban environment. For FURNISH, the spatial impact refers to the impact that implemented urban elements have in public spaces. This is important for the project, given that it informs the overall performance analysis of additional locations for future prototypes.

The intrinsic particularity of public spaces, those places where various synergies and interactions occur, due to the hundreds of activities and behaviours that take place, causes these interaction phenomena to be difficult to predetermine and reproduce.⁹ Therefore, an evaluation criteria is needed. Understanding the dynamics of an urban space helps to identify the impact that an urban element and its environment have on each other. This is why both ex-ante and ex-post approaches are necessary for the spatial analysis of urban living lab projects.

In the FURNISH project, the relationship of the prototypes to their immediate surroundings was an aspect of the utmost importance,

[9] Delgado, M. (1999) *op. cit.*

therefore it was necessary to assess the elements and state the criteria needed to further implement them in other sites. To record this impact, an Observation Form to evaluate changes in the space was used. The observer had to provide their perception of the impact caused by the element on the space and vice versa; likewise, the form was used to track the spatial interactions and conflicts that happened during the implementation. Thus, once the prototypes were installed, this form was completed to analyse the spatial impact caused by each prototype. The form required the observer to fill in the following parts: (a) a description of the spatial changes caused to its surroundings, (b) the physical changes caused by users or designers in the urban element once installed, (c) an overall view of the prototype installed, d) its spatial impact concerning the required social distancing (in the case of COVID-19 edition), and e) a brief description of its ecological cycle.

The analysis carried out for all prototypes during the three FURNISH editions helped to improve their design and the understanding of the relation between users and urban elements. The prototypes' assessment gave key information about the urban element's potential improvements. The assessment was constructed considering the importance that the three issues –feasibility, social impact and spatial impact– had in the core of the project, building a direct link between the goals of the project and the performed impact assessments.¹⁰ From the experience of the FURNISH project, it can be concluded that urban living lab environments foster collaboration and innovation, as tested in other living lab environments.¹¹ As well, the greater the interaction within the living lab, the more robust the relationship between the new urban design and its social environment will be.

[10] Aquilué, I.; Caicedo, A.; Moreno, J.; Estrada, M.; Pagès, L. (2021) A Methodology for Assessing the Impact of Living Labs on Urban Design: The Case of the Furnish Project. *Sustainability*, 13(8), 4562.

[11] Ballon, P. et al. (2018) *op. cit.*

01.

FURNISH 2020

| 1st Edition |



COVID 19

After the COVID-19 lockdown when people were allowed outside again, public spaces became significantly crowded and safe social distancing was challenging to achieve. FURNISH's main objective was to decrease the afflictions caused by the pandemic, looking to gain and improve public spaces, to avoid overcrowding, and respect the social distancing needed to prevent contagion through design.

FURNISH aimed to empower local citizens by giving them a chance to participate in the creation of their city's new image, and to create a community of 'tactical urbanism first responders' empowered by digital fabrication. During the COVID-19 pandemic, many European cities started to rethink and design their public spaces and FURNISH was one of the leading projects.

1 **AEIOU**
Guimarães | EAUM

2 **EDUS Point**
Barcelona | UPC

3 **Konch**
Espoo | NOT-19

4 **Mue:sli**
Milan | UNPark

5 **Open Terrace**
Barcelona | IAAC

6 **Theatron**
Budapest | BPGang

7 **Vora**
Barcelona | Elisava

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**2
5
7.**



3

4

6

The design approach tackles the need to expand the public urban space during the pandemic crisis. The proposal addresses one of the main challenges identified by the municipality of Guimarães: to promote new safe devices of cultural expression in the public space, especially for festivities related to their social and cultural heritage. One example is the Nicolinas celebration, initiated in the 17th century, which traditionally gathers the population in the city centre for playing, dancing and singing. This cultural event has a big impact on the identity of the community. Numerous examples of yearly popular celebrations in European cities have been cancelled or affected due to the COVID-19 Pandemic, such as Las Fallas (Valencia), St. Patrick's Day (Dublin), Carnival (Venice), Vappu (Finland), among many others.

DESIGN

Considering this premise and context, a set of portable autonomous spatial devices with megaphone-like shape were designed to amplify the sound of drums, for the Nicolinas celebration, in the city of Guimarães. The AEIOU (Amplification Element for Interactive Open Urbanism) devices are intended to generate new ways of expanding a traditional event, reaching a greater number of people and simultaneously maintaining social distancing. The amplified traditional event spreads the positive feeling and expands the public space by projecting the music and joy of the celebration.

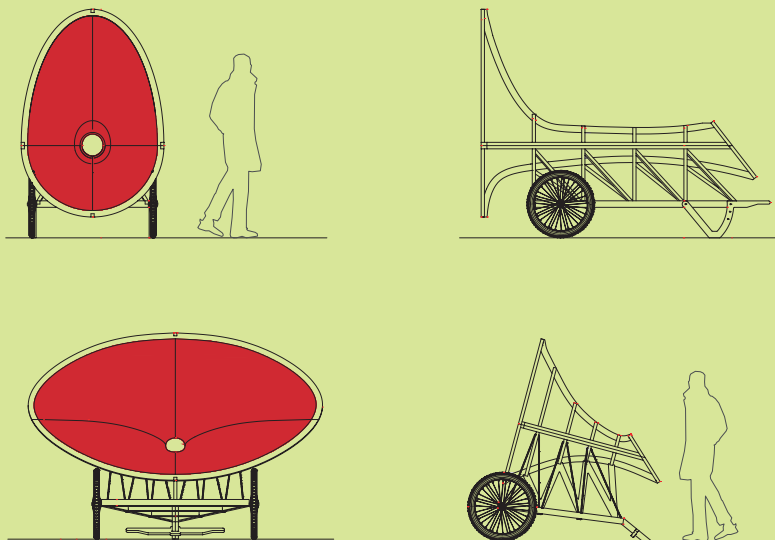


Fig. 10



Fig. 11



Fig. 12

PROCESS

The prototype design was supported by parametric modelling tools, especially the curved surfaces of the AEIOU prototypes. The structure and inner surfaces were produced by CNC milling. The structures are defined by a contouring system, built in birch plywood (30 mm thickness). All the parts have interlocking connections, reinforced by screwing. The curved surfaces, produced in flexible plywood (3mm thickness), were fixed by screws to the structural skeleton of the prototypes. The transportation of the prototypes is done by human traction, moving through common bicycle wheels. The weight of the structure allows it to be moved by a single person. Three prototypes were produced and placed in public space.

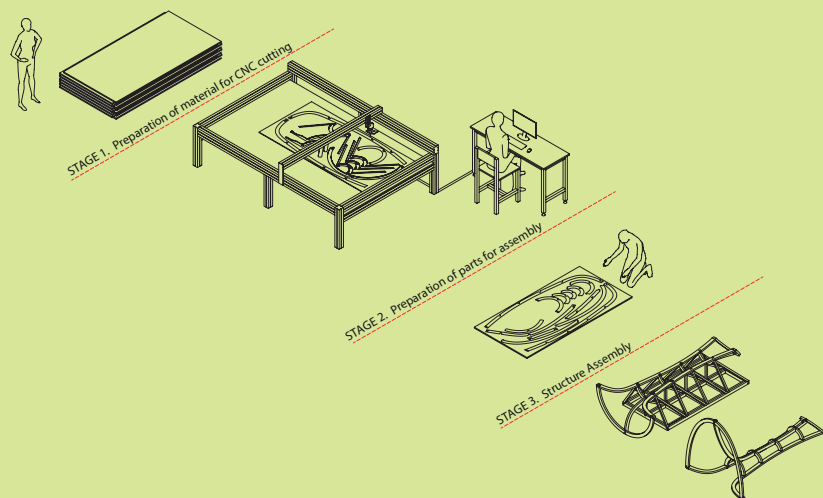


Fig. 13



Fig. 14



IMPLEMENTATION

The AEIOU prototypes were designed to be placed in streets and public spaces. Given the context of the Nicolinas celebration, the implementation was planned in the urban and historic centre of Guimarães. A few representative places were considered for the celebration, such as Campo de São Mamede, Castle, Carmo Garden, Mumadona Square, Santiago Square, Misericórdia Square, Largo de Navarros, Toural Square, Alameda Public Garden and São Gualter Church.

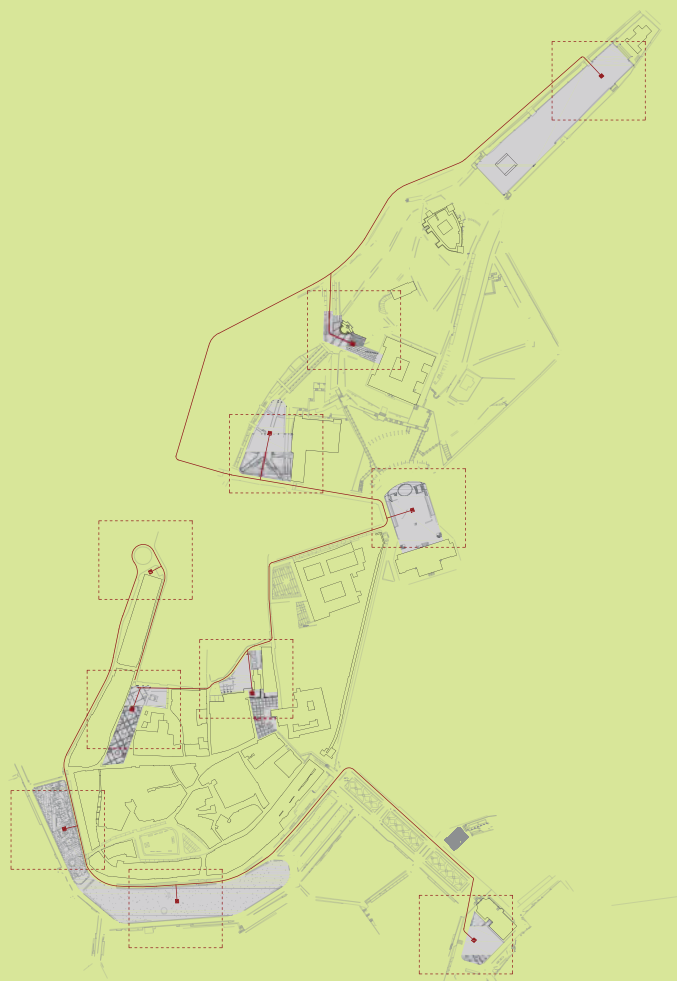




Fig. 16



Fig. 17

TEAM

The team results from a collaboration between members of the School of Architecture of the University of Minho (EAUM) and the I+D+Arq R&D unit from the Universitat Politècnica de València. The partners combine a transdisciplinary group of professionals and researchers with proven competences in architecture, urban and landscape design, construction technologies, computational design and digital fabrication.

EAUM is a research and education centre for Architecture, Design and, recently, Visual Arts focused on promoting the importance of complementary knowledge and multidisciplinary work.

EAUM staff: Bruno Figueiredo (Architect), Paulo J.S. Cruz (Civil Engineer), Marta Labastida (Architect), Carlos Maia (Architect), André Fontes (Architect), Ivo Oliveira (Architect)

The I+D+Arq research group is centred in the integration of new technologies, exploring computational design, customisation processes and digital fabrication tools, such as 3D Printing in the field of design, architecture, construction and urban planning.

I+D+Arq staff: Jose Luis Alapont Ramón (Architect), Javier Alfonso Bono Cremades (Architect), Marco De Rossi Estrada (Industrial Designer)

Production: João Carvalho (Architect, PhD Candidate), Tatiana Campos (Architect, PhD Candidate) and João Ribiero (Architect, PhD Candidate), Cláudia Quintela (Product Designer, Interactive Design Master student) and Samuel Ribeiro (Product Engineer, Design Institute Laboratory technician)

Project secretariat: João Ribeiro, staff of the Design Institute of Guimarães (IDEGUI)

EDUS POINT

Universitat Politècnica de Catalunya Team | Barcelona

Julián Galindo González
Miguel Y. Mayorga Cárdenas

Under the conditions derived from COVID-19 and the protocols for the use of spaces and physical distancing, we propose a new urban furniture system, with the aim to create urban relations and a focus on educational spaces. Based on the strategic location of an ephemeral and itinerant architectural device, the system intends to:

- 1) Intervene quickly with the participation of the citizens, creating more active, agile and informed possibilities for decision-making in the management of urban space.
- 2) Promote relationships based on proximity, from the study of existing relationships, daily uses, travel footfall, micromobility, and adapting daily uses to the environmental conditions.
- 3) Extend educational activities and uses - beyond classrooms and centres - from the appropriation of outdoor spaces and all kinds of public spaces and facilities.
- 4) Empower students, teachers and citizens to become actors of ICT (Information and Communications Technology) and the knowledge society through an artefact that becomes a classroom, a set and a meeting place at the same time.

DESIGN

The pilot project is a usable and adaptable intervention, which is also replicable. The module includes: the design of a removable architectural device and basic installation kit; an urban strategy with possible locations close to an educational centre; the design of thematic contents according to the location of the module; the design of an accessible interactive digital interface; the design of a sensorization and data collection system; the design of a web mapping platform in real time; the design and realisation of participation workshops; an analysis of results and formulation of proposals; and a proposal of itineraries, scalability and future replicas. The intervention will allow continuous learning and experimentation on the use and appropriation of urban space by citizens. Transdisciplinarity is encouraged and proposals are made that cross-sectionally address issues of tactical, urgent, resilient and proximity urban planning.

One of the requirements of FURNISH was the replicability of the design in different FabLabs around the world, for which a simple wooden modular system with a cubic shape was designed, based on the ideas of kit design and open composition. An efficient and economical construction system was used, which is uniform and allows the building of multiple modular structures, flexible in their grouping and extension. In order to achieve lightweight temporary constructions, an easy and quick to assemble and disassemble basic cube (200 x 200 x 200 cm) was designed, which can be built without metal accessories or tools. To solve the main structure, an elementary construction system with the two types of wooden bars and joints for all the knots was used inspired by the old Japanese knots. In addition, the basic cube has a system of anchors in the facades and perimeter, in order to attach the cubes to each other and install a series of accessories according to different needs (a modular erasable blackboard, horizontal support planes, a fabric for vertical and horizontal enclosures to give shade or allow for projections, an electrical installation, a WI-FI repeater, and a sensorization system).

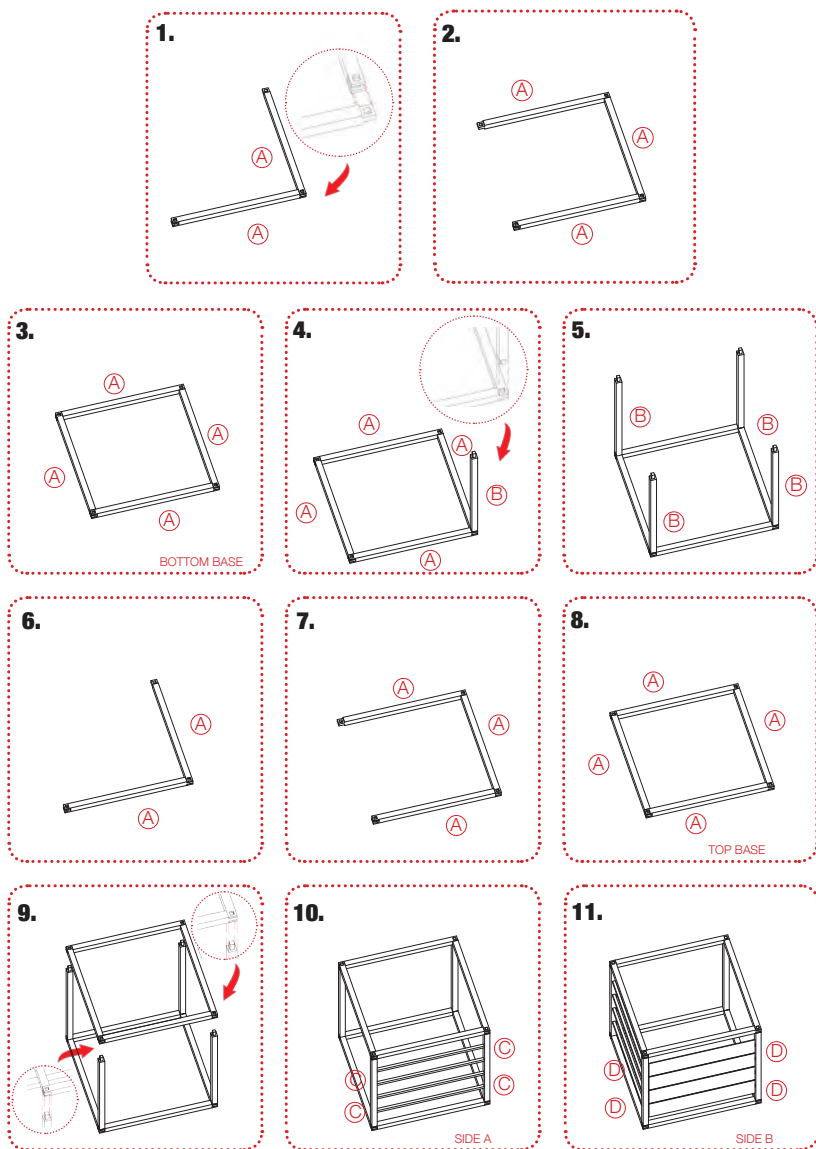
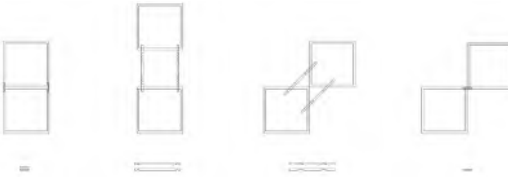
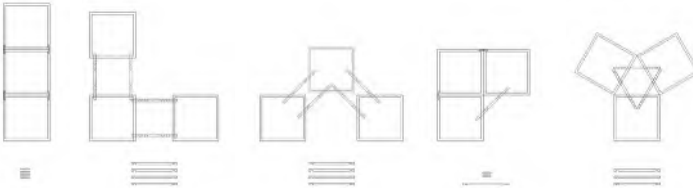


Fig. 18

1. 

2. 

3. 

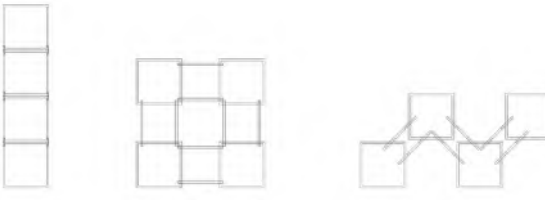
4. 

Fig. 19

PROCESS

Universitat Politècnica de Catalunya (UPC) formed an interdisciplinary team which developed the entire project. The participation of all members in the collaborative design process was key to define the location strategy, the form and functionalities of the intervention kit, the activities to be developed, as well as the implementation of the artefact and its monitoring.

The participation of LabMq (FabLab of ETSAB) was essential due to the 1:1 scale of the object and its testing in the city. Research was carried out regarding the construction technique, the design and digital fabrication of the artefact, the solution of the knots and joints, the ways of grouping between cubes, and the possible combinations of the facades.

The Edus Point project at the Institut Barri Besòs, as an ephemeral urban intervention, allowed for the exploration of relationships and synergies between educational spaces and their environment. The pilot test encouraged the participation and collaboration between academia (researchers and students of UPC), the educational community (directors, teachers, students of the Institute) and the neighbourhood (family and neighbours). The implementation, construction and testing of the artefact was carried out with direct collaboration of the students and the teaching staff, who adapted the structure for various educational and cultural activities according to different needs.



Fig. 20



EDUS Point / Punt EDUS
Educational Expanded Dispositive for Urban Space
& Community Networking
UN AULA, UN PLATÓ I UN PUNT DE TROBADA

ESCOLES BARRIS EDUS

FURNISH
GARNET

IMPLEMENTATION

The element is, at the same time, an artefact (adaptable modular furniture), an interface (sensorization and digital mapping) and content (programme of activities). For the implementation of the project in the urban space, the public secondary school "Institut Barri Besòs" was selected. The public educational centre is open to the neighbourhood, a socio-cultural melting pot with democratic and participatory workings. The institution promotes a technological and scientific focus, and above all, aims to improve the life of the neighbourhood's residents and the future of its students. Due to the characteristics of its own social environment and needs, the high school is strategically placed in the Besòs neighbourhood in a vulnerable area. The community had a great interest in the development of the proposal and the intervention highlighted the interactions of the school with the neighbourhood.

The pilot project was executed between November 20 and 27 of 2020. The location was on the wide sidewalk at the entrance of the secondary school, when COVID-19 restrictions were still in place. The intervention, in addition to allowing social distancing and good ventilation, used the public space as an extension of the high school and encouraged the integration of school life with the neighbourhood.

The adverse environmental conditions of the school area - such as noise, lack of shade and pollution - were verified with sensors and demonstrated the poor quality of public spaces in school environments. In spite of these conditions, various debates, lectures, music classes and projections were held in the area. The artefact has proven to be useful and adaptable in many ways, such as an outdoor classroom, display area, meeting point, information point, internet connection point, health point (analysis, vaccinations, general medical advice...), proximity market point, drinks kiosk, magazine kiosk, temporary shelter, etc.



Fig. 21



Fig. 22

TEAM

The project team is made up of members from different disciplines, with specialties such as urban sustainability, art, culture, education, design, technology and public space; with an approach focused on collective work, reflection and action, around urban and spatial relationships between the citizen and its environment.

Prof. Miguel Y. Mayorga Cárdenas (PhD and MSc in Urbanism)

Prof. Julián Galindo González (PhD and MSc in Urbanism)

Prof. Inmaculada Rodríguez Cantalapiedra (Technical Architect PhD in Physical Sciences)

Prof. Josep Bordonau (PhD and master at UPC)

Prof. Miquel Estrada (PhD in Civil Engineering)

Xavier Ferrer Masip (Architect)

Israel Arias Reyna (Bachelor's in industrial design)

Maria Camila Olaya (MSc in Advanced Studies in Design)

Francesco Caradonna (Degree in Architecture in Polytechnic University of Catalunya)

Marta Gamiz Sanchez (Degree in Architecture in Polytechnic University of Catalunya)

Patricia Paniagua Abreu (MSc in Advanced Construction in Building from the UPC)

Fanny Esther Berigüete Alcántara (MSc in Advanced Construction in Building from the UPC)

Cristina Poza López (Architect by the ETSAB-UPC)

Xavier Costa (Master in Interactive Communication, Telecommunications and Multimedia in the UAB)

Jorge Rodríguez (Telecommunications Engineer from UPC)

For more information about the prototype visit the following websites:

<https://eduspointupc.wordpress.com/>

<https://etsab.upc.edu/es/servicios/laboratorio-de-maquetas/labmaq-maker/proyecto-furnish>

K O N C H

NOT-19 Team | Espoo

Krisjanis Rijnieks

Dorota Orlof

Ranjit Menon

Leda Vaneva

KONCH was designed and built during the COVID-19 pandemic in Espoo, Finland. At the time, public spaces were mostly closed, the premises of schools and universities could be used only under special circumstances or not at all. Studies had to continue, but for the most part, there were few alternatives to online teaching. Poorly ventilated and limited capacity classrooms were sometimes available, but a better resource for activities at that time was the outdoors, where fresh air is available by default and the space can be used respecting local social distancing requirements. KONCH was built as a series of public space elements that could also be used for comfortable sitting and as communication devices. Each KONCH has a built-in half-duplex radio transceiver that simultaneously transmits to all connected elements nearby. In that way, a group of people can have a socially distanced and laid-back meeting without the need to raise their voices.

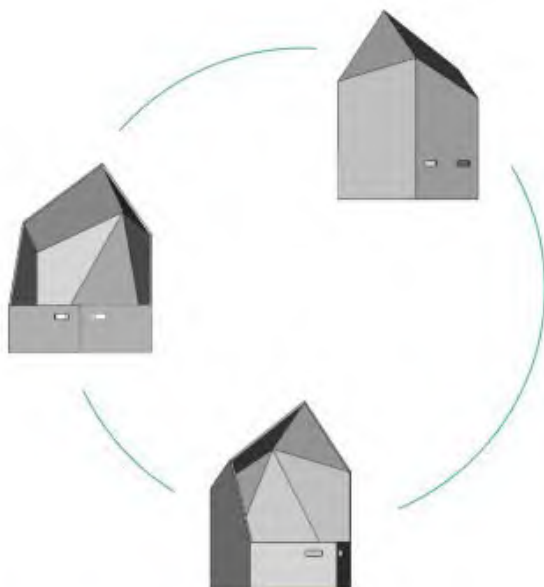
DESIGN

KONCH was designed to maintain a safe distance between individuals while providing them with an aesthetic and comfortable meeting space equipped with essential communication tools. Its physical design evolves with the current digital trends, which is especially relevant in the global education ecosystem. The aim was for the elements to stand out and look interesting to potential visitors. Once visitors are inside the element, KONCH should be comfortable enough for them to stay there for some time.

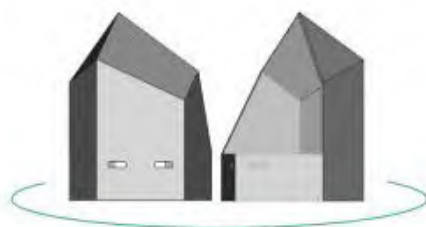
Several requirements guided the design choices, such as open-source, replicability, location independence, maintainability, modularity, and the ease of transportation. Key constraints included the size of the CNC machine available (the maximum material size to be cut with the machine is 130 x 120 cm), the limited budget to purchase the material to create several copies, and the visually interesting - yet technically possible - complexity of the form. The final size of the object is 115 cm in diameter and 160 cm in height. 18 mm thick pine outdoor plywood was chosen as the material due to its availability in Finland and its weather-resistant qualities.

Radio communication electronics were a part of the object, with wirelessly connected Raspberry Pi minicomputers with the open-source Mumble voice chat software. A custom microphone PCB was designed along with 3D-printed fittings. Audio amplification and speaker modules were used to achieve an optimal balance between the layout of the parts and sound quality.

Fire safety became a consideration once the initial plan to do outdoor testing changed because the winter approached. The spacious main lobby of Väre - the building which houses Aalto University School of Art, Design and Architecture - was used for the testing. It was a midpoint between a classroom and a public outdoor space. The constraint of fire safety was unexpectedly useful, as it was best achieved by housing all the electronics in a single IP-rated box. This guided the layout design of the electronic modules and provided a realistic pathway to weather-resistant electronic solutions.



Spread around, not too close to each other



Next to each other, walls creating separation



Back to back

Fig. 23



Fig. 24

PROCESS

Deciding on the final form of the element was the most difficult task for the team, different methods were tried to collectively develop and agree on a specific design. The process started with brainstorming and sketching sessions, which proved challenging.

The team shifted into a cardboard prototyping session, where each teammate translated their 2D sketches into tangible 3D prototypes using cardboard, a cutter knife and tape. At the end of the session, the team collectively agreed on which prototype to use as a starting point for the CAD design.

The CAD software choice was FreeCAD because it can be installed on any computer and operating system for free, their design files can be opened and edited anywhere in the world with a computer. Parametric design allowed the change of critical measurements until the last minute, including the material's thickness. Anyone can adapt the open-source design to their locally available material thickness without rebuilding the project from scratch.

While CAD design was mostly a single-person effort, the creation of the physical piece was done by all team members. It took a few days to produce all the parts of the final object. Setting up and monitoring the CNC process was done by one person, and the finished parts were developed by the remaining team members. Assembly of the objects was done by the whole team.



Fig. 25



IMPLEMENTATION

The initial site was selected based on the proximity to a university and campus. The objects had to simultaneously be close to both open space and where the highest footfall was. Ideally, the spot would have been used for outdoor activities in the past too.

Alvarin Aukio (Espoo) seemed like a good location as many people pass through it during summer. However, in winter this wasn't the case. Shortly before the project's testing phase, it was decided to change the location to an indoor open space. The objects were installed in the main lobby of the Väre building, which houses the School of Art, Design and Architecture and School of Business of Aalto University. It was a good compromise, as it was a relatively open space with a reasonable footfall, even though it wasn't outdoors.

The objects attracted attention and many people used them to sit down for various reasons, such as using their digital devices, having a nap or socialising. Not many people discovered the communication possibilities of the objects, and most of the few people that exploited that feature knew about it before, because the team had occasionally explained that use.

The objects were implemented in another space outdoors in spring 2021, near the Oodi Library in central Helsinki. It was a part of an art festival and people were making music with the objects. An unexpected use was discovered for the KONCHes, as drums with networked audio features.



Fig. 26



Fig. 27

TEAM

Team leader: Krisjanis Rijnieks | www.rijnieks.com

Krisjanis has a background in painting, new media and digital fabrication. He created an open-source projection mapping software ofxPiMapper for the Raspberry Pi minicomputer as his master's thesis at the Aalto Media Lab. After graduating from the Fab Academy in 2018 from Fab Lab Barcelona, he manages the Aalto Fablab, a part of the Aalto Studios at Aalto University.

Team member 1: Dorota Orlof | www.dorkastrong.com

Dorota is an illustrator, graphic designer, and creative director. She is a Graphic Design MA graduate from the Academy of Fine Arts in Cracow, and a Fab Academy alumni from the Institute of Advanced Architecture in Barcelona. Since 2013, she has worked as an independent designer, creating projects benefiting culture, science, and education.

Team member 2: Ranjit Menon | www.ranjitmenon.com

Ranjit is a Helsinki/Mumbai based trans-disciplinary designer, artist and certified usability analyst with an MA in Sound in New Media (Aalto University). He seeks to integrate systems thinking oriented to design with the interaction and service design fields. His academic interests include Cognitive Sciences. He is teaching the course E.A.S.T. (Experiments in Art of Systems Thinking) & Sound Design at the National Institute of Design, India.

Team member 3: Leda Vaneva | www.ledavaneva.com

Leda is a multidisciplinary artist and designer based in Helsinki. She holds an MA degrees in New Media (Aalto University, FI) and Photography (National Academy of Arts, BG), and is part of the Finnish artist associations MUU and AV-Arkki. Leda explores the possibilities of digital fabrication in the context of contemporary art.

MUE:SLI

UNPark Team | Milan

Paolo Carli

MUE:SLI - Mobile Urban Element: Sport, Leisure and Inclusion is an adaptable modular urban furniture system for public space. It has numerous plug-ins, multiple functions and uses related to sport, leisure, and other recreational activities. It is also in full compliance with physical distancing to prevent the spread of Covid-19. The furniture has been specifically created under the logic of public space reclaim, equipping the chosen space with a multifunctional platform for street sports and other outdoor abilities, which can be installed in any space due to its numerous possibilities of re-articulation. The implementation space was under the Serra - Monte Ceneri Overpass in Milan, now a parking lot. MUE:SLI is able to change the perception and use of different urban spaces, both due to the very arrangement of the MUEs and their use, depending on the plug-ins installed from time to time.

DESIGN

MUE:SLI consists of eight modules, each approximately measuring 180 x 100 cm, with a height of 100 cm. Each module, in its basic configuration as a simple bench, allows for two people to sit, ensuring that the users are not sat face to face and there is a minimum distance of 1 m between them, to comply with Covid-19 regulations.

The modules can be combined and integrated in multiple ways or be used individually. The aim is to allow the assembling of the modules into various diverse shapes in public spaces, as well as their replicability in other urban contexts.

Each individual module (Mobile Urban Element, or 'MUE') can be transformed with different plug-ins according to the preferred use. MUE:SLI allows for the attachment of seats; tables for working, eating or games (chess and cards); plant pots; vertical informative panels; and elements for street sports such as handles, handrails, baskets, nets, etc.

During the FURNISH project/workshop, only the urban furniture plug-ins were designed and built according to safety and testing reasons. The construction of the plug-ins for sports activities was postponed for another time.

The main material MUEs are made of is wood, specifically OSB (Oriented Strand Board) panels (122 x 244 cm) cut by a CNC machine. The digital fabrication technique used to create the MUE is sectioning (slicing). The interlocking structure of the plug-ins is also made of OSB wood panels, with other materials integrated, such as plastic, terracotta pots, waterproof fabrics, and other materials obtained from local recycling.





Fig. 28



Fig. 29

PROCESS

The installation of MUE:SLI under the Serra - Monte Ceneri Overpass was part of a broader co-design and inclusion project called UNPark - Urban Nudging Park, which involved a partnership of citizens, local schools, social and sports associations, shops, and institutional partners.

Active citizenship was part of MUE:SLI from its initial stages. Online questionnaires, face-to-face surveys and interviews were carried out regarding the needs to be addressed by the project (ex-ante) and the impacts on the public space chosen for the installation and testing phase of the MUEs (ex-post).

Flexibility was the key concept of MUE:SLI, applied to production, form, function, context and costs. MUE:SLI was created exclusively with a CNC milling machine and laser cutter, using the sectioning technique, which interprets any shape and generates two-dimensional interlocking geometries which are then assembled with flat machining. The project uses both an open system logic - in constant transformation - and digital fabrication technologies.



Fig. 30



IMPLEMENTATION

The installation and field test of the multifunctional urban furniture system MUE:SLI is part of the wider research project UNPark - Urban Nudging Park, which ran from March 2020 to November 2020 and is funded by the social responsibility programme of the Politecnico di Milano (Polisocial Award 2019).

UNPark was a multidisciplinary effort that studied the possibilities of transforming the current car park under the Serra - Monte Ceneri Overpass into a multifunctional plaza equipped for street sports and other social activities. This materialised through short, medium and long-term projects, and temporary interventions.

The Serra - Monte Ceneri Overpass is located in the north-western part of Milan, in the middle of the consolidated urban fabric. It overlaps for almost 2 km with the Circonvallazione esterna (an external ring road), along viale Renato Serra and viale Monte Ceneri. The overpass is between 5 and 7 metres high and 12 metres wide, and is spaced 13 metres away from the buildings on each side.

These almost 2 km of infrastructure create a fragmented environment, marked by a strong physical and social polarisation. The overpass has an unexpressed potential waiting to be unlocked, today a separation barrier, but hopefully tomorrow a tangible element of connection and social cohesion.

The implementation of the project had two parts and was supported by citizen engagement. The first part was the MUE:SLI Kick Off, which ran from 4 to 9 December 2020 and tested three of the eight modules. The second part was the UNPark/FREESTYLE, which ran from 18 to 26 September 2021 and transformed the same portion of spaces under the overpass, between via Plana and via Bartolini, into a parterre for sports activities, recreational events, concerts, conferences and meetings; using all of the eight MUE:SLI modules in the stand-alone mode to set up the space (entrance, information point, stage, etc.).

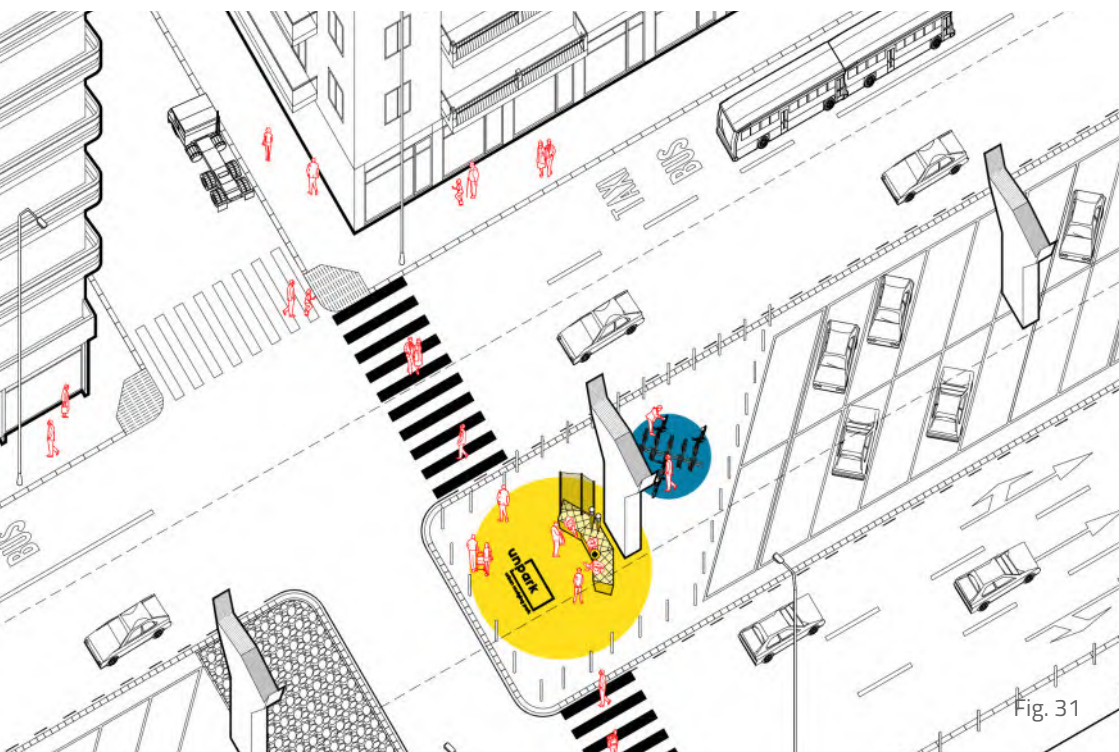
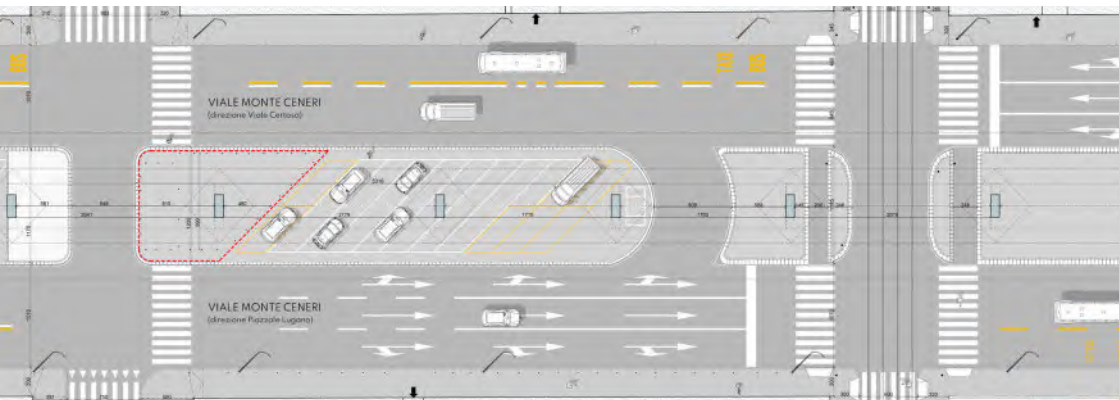


Fig. 31



Fig. 32

TEAM

The team is made up of the UNPark team of the Politecnico di Milano and Ideas - Bit Factory. It was a strongly multidisciplinary group, with the presence of architects and designers who pursue the dissolution of traditional disciplinary boundaries and investigate - along the lines of increasingly narrative environments - the relational and emotional aspects of projects, especially the ones related to the regeneration of monofunctional urban infrastructures.

The UNPark team was able to tackle projects in an original and innovative way thanks to the presence of environmental and digital fabrication experts, planners, designers, textile architecture and urban design experts, and citizens as part of the stakeholders. The support of Ideas - Bit Factory (www.ideas-bit-factory.it) made the results of the project more concrete and interesting.

The active members of the UNPark of the Politecnico di Milano and Ideas - Bit Factory team for the FURNISH project are:

Barbara Di Prete (team leader and researcher),
Paolo Carli (corresponding member and researcher)
Agnese Rebaglio (researcher)
Carol Monticelli (associate professor)
Davide Crippe (designer)
Emilio Lonardo (PhD candidate)
Giulia Procaccini (PhD candidate)
Patrizia Scrugli (architect) / Davide Stanga (founder of Ideas – Bit Factory)
Chaira Santandrea (maker of Ideas – Bit Factory)
Osama Zeima (maker of Ideas – Bit Factory)

OPEN TERRACE

IAAC Team | Barcelona

Vicente Guallart
Daniel Ibáñez
Michael Salka

In order to enable restaurants and bars to remain open during COVID-19, while respecting social distancing requirements, the city of Barcelona authorised more than 2.600 terraces to occupy what was formerly an adjacent street or parking space.

IAAC's Valldaura Labs and Master in Advanced Ecological Buildings & Biocities (MAEBB) class of 2020/21 produced and installed a prototype urban element system, comprising wooden platforms that form a terrace that matches the level of the sidewalk and massive wooden curbs that act as concrete traffic barriers. The new wooden curbs are also capable of supporting a vast catalogue of attachable 'plug-in' furniture components, such as benches, planters, bike parking racks or railings.

DESIGN

During a difficult time these temporary terraces proved to be a crucial lifeline for bar and restaurant owners, as well as for the citizens' well-being. Thus, it was of the utmost priority to make these temporary spaces not only safe, but also inviting, comfortable and environmentally-sound.

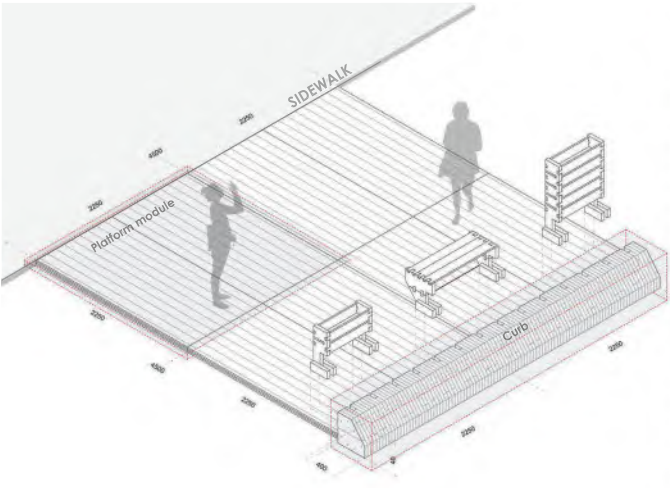
The IAAC team tackled the FURNISH initiative with the aim of making public spaces safer and more attractive during COVID-19, by combining local digital fabrication with tactical urbanism strategies, and harnessing a humanistic and ecological perspective.

The resulting system, called Open Terrace, raises platforms from street level to sidewalk level, supported by 3D-printed bases of adjustable height. It seamlessly integrates the new spaces created with the pedestrian realm rather than the vehicular. This decision also makes the surfaces fully accessible for wheelchair users.

Another virtue of the design is its multifunctionality. The significant wooden curbs binding the arranged platforms not only serve as a secure traffic barrier, but also as foundations for an array of 'plug-and-play' furniture elements - including structures for shade, seating, planter boxes, bike racks, railings, shelving, display cases and others. The multifunctionality, along with the modular nature of the elements, and its dimensioning optimised for easy transport and rapid installation/removal - with common flatbed trucks - empowers Open Terrace to easily adapt to a wide variety of urban spaces, as well as to the diverse needs of various business owners and user groups.

The primary construction material is local wood, an accurate choice that allows for sustainable wood consumption, limited carbon emissions, and a naturalistic look for the modules with an innate visual relationship to the place of origin. A large QR code engraved on the prototype directs users to more information about its forestry practices and their ecological impacts.

Terrace arrangement



Vectorial arrangements

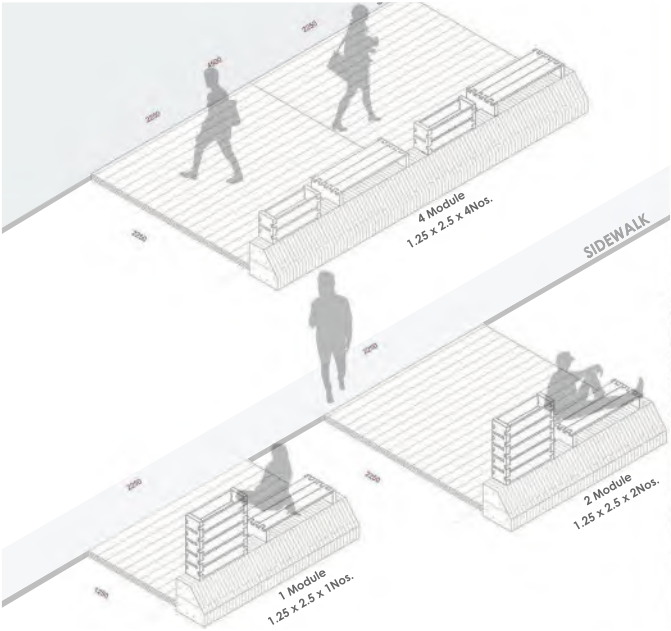


Fig. 33

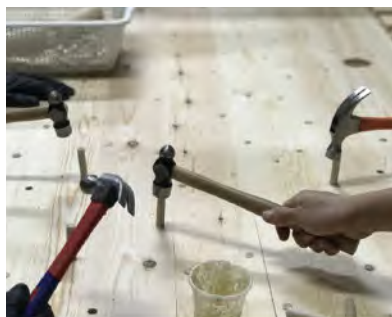


Fig. 34

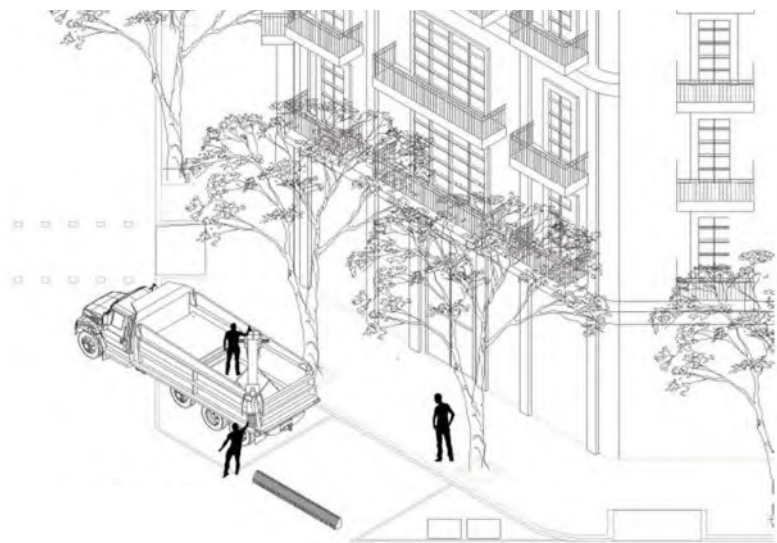
PROCESS

Open Terrace was constructed from FSC-certified and regionally-sourced redwood pine and beech. The modules were prefabricated entirely at Valldaura Labs in Barcelona's Serra de Collserola Natural Park, using computer-numerical-control (CNC) machinery, laser cutters, 3D printers and carpentry tools. These tree species were chosen for their positive ecological impacts and for their demonstrated longevity in exterior urban conditions in the Mediterranean climate.

All connections were made with wooden dowels or joints using minimal chemical adhesives. The exposed surfaces are weather-proofed with bio-based linseed oil and turpentine. The 3D printed components are made of polyethylene terephthalate glycol (PET-G) filament. Therefore, all components are optimised for disassembly, reuse and eventually composting.

Open Terrace is a rapidly deployable modular design, whose elements can easily be reconfigured to suit different conditions and uses. The needs that the prototype addresses were determined through collaboration with the City Council of Barcelona and the proprietors of the café using the expanded terrace.

Step 1: Place curb elements as traffic barrier



Step 2: Place platforms with crane

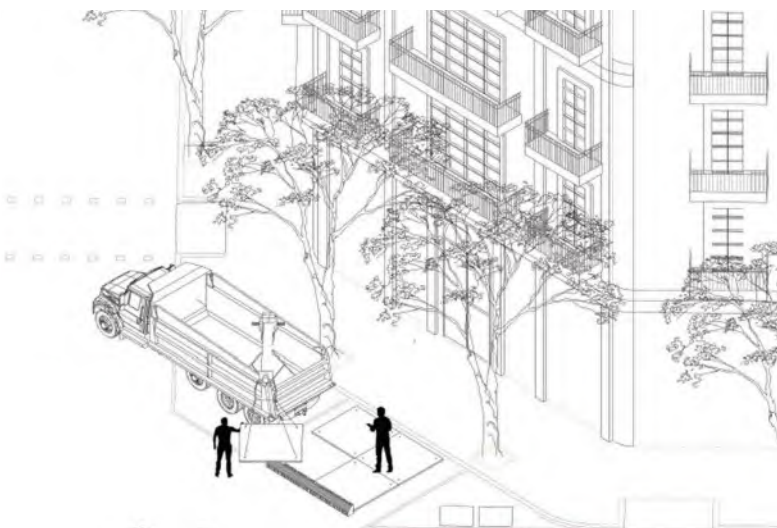
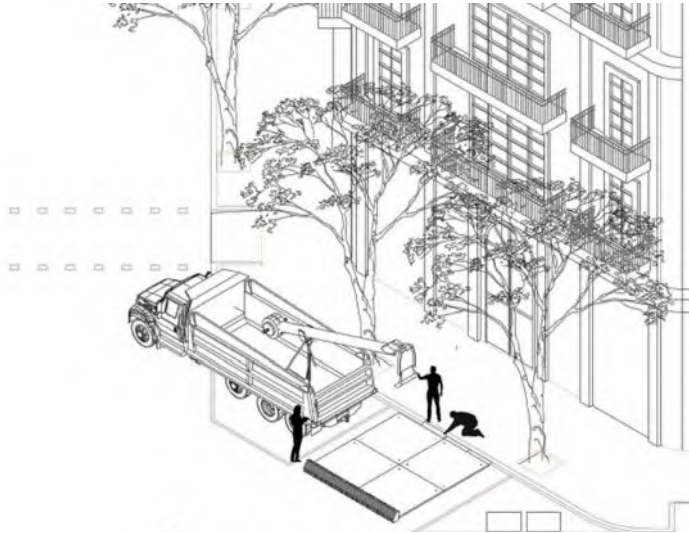
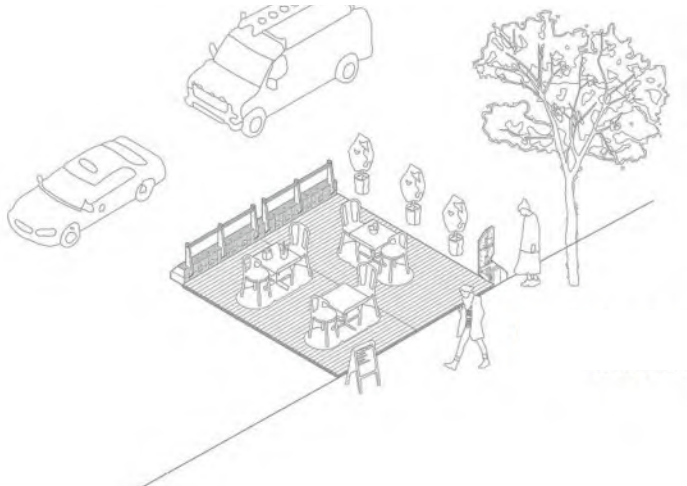


Fig. 35

Step 3: Level platforms and install threshold to meet sidewalk



Step 4: Installation of the whole prototype



IMPLEMENTATION

The prototype was installed for testing on the terrace of The Coffee House Barcelona, on the corner of Carrer de Casanova and Carrer de Valencia. This particular site was selected due to being the typical chamfered corner intersection – characteristic of Barcelona’s Eixample district. Thus, the results are immediately transferable to thousands of similar intersections within Barcelona’s urban fabric.

Like the entire design and fabrication process, the installation of Open Terrace modules was completed by the IAAC’s Valldaura Labs team and students of the 2020/21 edition of the Master in Advanced Ecological Buildings & Biocities (MAEBB) programme. It was a group of 17 emerging designers from 14 countries throughout the globe, many of whom have since taken the lessons learned in Open Terrace and FURNISH back to their respective homelands.



Fig. 36



Fig. 37

TEAM

The Master in Advanced Ecological Buildings and Biocities (MAEBB) is an immersive academic programme of the Institute for Advanced Architecture of Catalonia (IAAC). It uses an advanced practical approach to train professionals in the design and construction of ecological buildings and biocities. MAEBB is hosted at Valldaura Labs, a facility dedicated to self-sufficiency research, located in Barcelona's Collserola Natural Park.

Open Terrace was completed in a design + build studio as part of the 2020/21 MAEBB. The course was led by Michael Salka, Technical Coordinator of Valldaura Labs; and Vicente Guallart, Co-Director of the MAEBB and Founder of IAAC.

MAEBB Directors: Vicente Guallart, Daniel Ibáñez

Open Terrace Instructors: Vicente Guallart, Michael Salka

Valldaura Labs Operations Manager: Laia Pifarré

MAEBB Academic Coordinator: Fabio Capra-Ribeiro

Valldaura Labs' Green Fab Lab Manager: Marc Garcia Ruiz

Open Terrace Designers (MAEBB Students): Akshay Sunil Mhamunkar, Amritha Prabhuram, Bartłomiej Najman, Christa Hörburger, Daphne Vakalopoulou, Engjëll Rodiqi, Fatemeh Nejatii, Ignacio Reyes Solis, Kevin Xi Lim, Marilia Fernández, Mona El Batrik, Paulina Sevilla, Philipp Wienkämper, Rebecca Baierwick, Yangchuan Tian

Open Terrace Sponsors: Barcelona City Council, Mause

Open Terrace Consultants: Eduard Carrasco, Carles Casamor, Mia Serra, Xavier Matilla

Open Terrace Photography: Adrià Goula

THE Δ TRON

BPGang Team | Budapest

Dávid Pap

Due to the pandemic, human connection and culture was limited to people's homes and their immediate environment. From singing on balconies to courtyard concerts, communities improvised new forms of interactions and rituals, while sharing experiences based on mutual trust. The installation of THEATRON was carried out in a typical down-town urban house in Budapest with a peculiar courtyard tenement with hanging corridors. By repurposing the site, THEATRON transformed the common spaces of the block into new cores of community life. The main objectives of the project was creating new daily rituals in this space, giving the community an opportunity for safe gathering, and providing an auditorium for plays and concerts. Different elements were designed to furnish and inhabit the courtyard, although the elements can be set up in any public space.

DESIGN

The installation has two target areas in the building: courtyard and inner balconies. In the corridors CNC milled plywood cutty-stools and window sills were placed to invite the residents to use this common area as their own balcony. The courtyards' design and installation of digitally fabricated sets of furniture and graphics stimulated more interaction between residents through art, music and theatre. It comprises three functions based on the same design. The smallest block is designed for sitting, the higher elements for standing and leaning on them. These taller blocks can also act as a compartment for plants and decorative pieces or display for information.

The primary approach was to make all elements with plywood as the material and using CNC milling as the manufacturing technology. Birch plywood was used for the stool, the hanging shelf and the upper wood parts of the courtyard elements. The parts were designed with digital joints for the CNC milling, which means there is no need for other tools besides glue and clamps. To construct the bottom parts, concrete (screed) was chosen. Four moulds were enough to manufacture all 20 pieces. The concrete parts and treated plywood elements are weatherproof. The block size is 40x40 cm, making it easy to store six pieces of furniture on a regular shipping palette. Between the elements many plants were added.

The material used was CNC milled plywood. Even the concrete base's mould is made of plywood. This material makes the furniture weatherproof and scalable. However, due to its heavy bottom the element is safer, the concrete elements are stable and static, while the plywood top blocks are moveable and user friendly.

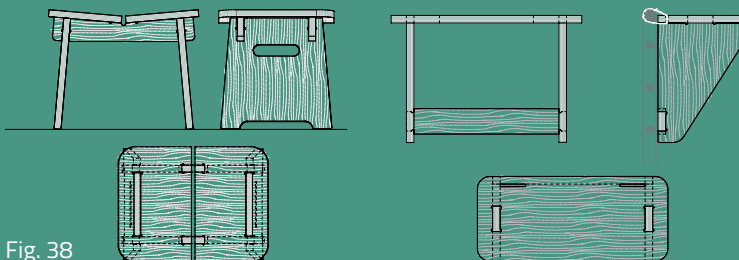


Fig. 38



Fig. 39



Fig. 40

PROCESS

The installation was carried out in a typical down-town urban house with a peculiar courtyard tenement with hanging corridors, but the elements could be set up in any public space.

The reasons to choose this place were the opportunity of an unused area owned by a small community with traditional Hungarian architecture and the diverse spatial possibilities given by the different areas of the building (courtyard, inner balconies, firewall) that provided the elements with different opportunities to adapt.

When rethinking the site, the focus was on transforming the common spaces of the block into new centres of community life. The main goals of the project were creating new daily rituals, building a safe community gathering spot and providing an auditorium for plays and concerts.

The courtyard was divided into a 50x50cm grid system and placed 20 digitally fabricated pieces of furniture, safely distanced, and some plants between them.



Fig. 41



IMPLEMENTATION

Once the elements were implemented in the courtyard and in the balconies, users' tests were performed. Most of the users, approximately 80%, haven't used the space before, only passed through it. 46,2 % stated they did "not much" or "not at all" liked the place before the installation was placed. More than 95,4% said that the element caught their attention. Commonly listed reasons of why the project caught their attention include aesthetics, community forming force, and functionality. Less frequent answers were modernity and could be used during a pandemic.

More than 80% percent agree or strongly agree that the urban element is appropriate for its use and would like to maintain it for longer. They also found it suitable for being replicated and placed in other sites of the city. Most of the users found it easy to use and likeable, but not very comfortable. More than 80% found that the element was integrated well and said it provided a safe community gathering spot, a new function, and an aesthetic change for a blank courtyard. Most users found that the prototype promotes physical distance and security to prevent the spread of Covid-19.

The feedback about the installation was positive; people often eagerly inquired about the urban element being implemented in other courtyards too.



Fig. 42



Fig. 43

TEAM

Even though every member of the team was responsible for specific tasks, the team worked as a big family during the whole project, always helping each other.

Director: Dávid Pap

Architecture concept: Fanni Hegyi

Furniture design: Kristóf Kovács

Design for manufacturing: Máté Gadolla

Manufacturing process: Dániel Pázmán and Levente Kruppa

Graphic design: Zsófi Kezes

V O R Δ

Elisava Team | Barcelona

Roger Paez

VORA is a prototype to consolidate the temporary public spaces that have occupied streets in response to the COVID-19 crisis. It creates a boundary that can be appropriated and played with, encouraging new uses for the now expanded public space near schools. VORA builds a safe barrier between cars and the new pedestrianised spaces, where users can engage in leisure, educational and cultural activities.

VORA is a system, not a specific object. Its size and layout can be adapted to any site to generate a safe boundary that will protect and activate expanded pedestrian space. Once the system is installed, its plug-in components can be rearranged according to the needs of the site, adding slides, steps, benches or combined playscapes.

VORA aims to promote positive sociocultural exchanges and community-building in compact city centres. The proposal is based on a bold defence of the values of temporality in the design, use and management of public space.

DESIGN

VORA's key design objectives address sustainability (local manufacturing, renewable materials and digital fabrication) and inclusion (citizen engagement through participation, co-creation and appropriation) through aesthetics (style, hybridity and variation). These three dimensions have been combined from conception to the final implementation through a simple ephemeral architecture device. The strength and exemplary character of the project lies in using a simple element to support local production (sustainability) and engage the community (inclusion) through low-key yet high-quality design (aesthetics).

VORA proposes a sober design style as an alternative to the flashy aesthetics usually associated with temporary space design and tactical urbanism. Soft aesthetics contribute to a better integration of ephemeral architecture interventions with the public space. Additionally, high-quality temporary solutions reinforce the intrinsic value of temporality and break the common myth that temporary equals poor quality.

VORA's objective is to develop a hybrid design that is open to the interpretation of its end users. It aims to offer an alternative to excessively specialised design in public space. By pursuing subtly hybrid aesthetics, it reinforces the active role of citizens in creatively engaging with the design, freeing it from predetermined expectations based on its supposed nature and urban function. VORA purposefully navigates a carefully curated indeterminacy, leaving the design open to multiple interpretations, by simultaneously creating a safety boundary, a bench and a playscape.

VORA's objective is to find beauty in change, which stems from understanding that the temporary nature of the element is its main aesthetic quality. On the one hand, its configuration is not stable or fixed, it can be adapted at any given moment – in terms of size, layout, and specific ramp and seat configuration. On the other hand, its low-key design lends aesthetic pre-eminence to the end users rather than the design itself.

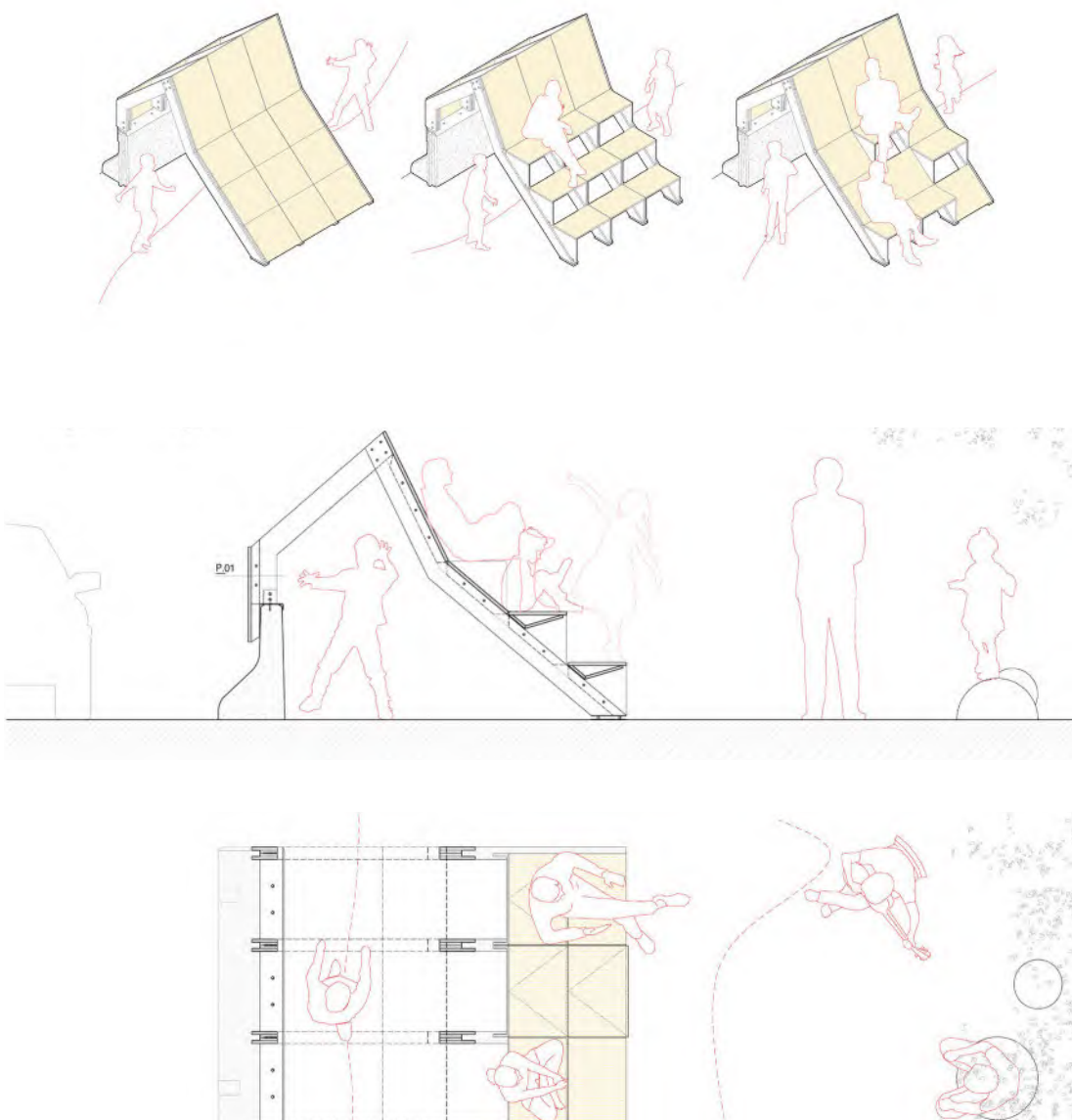


Fig. 44



Fig. 45

PROCESS

VORA used a co-creation process to include relevant stakeholders in the design and develop the continuous customisation of the system. VORA was the result of a multi-disciplinary team of students and professional designers, architects, engineers and builders of different ages and levels of expertise. Furthermore, its design was then fine-tuned through a co-design phase between seven international design teams allowing the main design team to incorporate knowledge and expertise from across Europe.

VORA promoted the active participation of citizens in the definition of their public spaces through the active involvement of the educational community (educators, students and parents) in the definition of the project's uses. These uses included formal lectures, practice-based educational experiences, school meetings and informal play.

VORA's objective is to promote the positive appropriation of public space by all, ensuring that it is co-opted by none. This was met through an organic balance between planned and unplanned activities. On weekday mornings VORA was used through planned events, mostly educational. During drop-off and pick-up times it worked as a social hub (triggering relations between local residents while allowing safe physical distancing) and a central playground for the neighbourhood. During weekends it became a space where children or elderly people shared experiences.

VORA was designed by a team from ELISAVA led by Roger Paez, PhD Architect. Support was provided by the Barcelona City Council and the Sagrada Família school. VORA's initial digitally fabricated prototype was tested with end users in Barcelona's public space for a full month in 2020 and subsequently shared via open-source. VORA has been adapted and further developed as an industrialised element, so it can meet all the necessary requirements for its full implementation in public spaces.



Fig. 46



VORW

VORW és un projecte per aconseguir de manera segura els espais públics temporals, garantint al mateix temps el confort de la via de la ciutat. I, en l'acta d'un bon veïnat que promou el cost de l'usuari públic i promou la qualitat de vida.

VORW forma part de l'ecosistema d'innovació i desenvolupament per la ciutat. Els seus projectes i desenvolupaments en què participen i desenvolupen els seus propietaris i els seus clients. Els seus projectes i desenvolupaments en què participen i desenvolupen els seus propietaris i els seus clients.

L'Associació de Barcelona i l'Escola Sagrada Família donen suport a VORW, desenvolupant i digitalitzant per ELSAVA.

IMPLEMENTATION

The implementation of VORA had a substantial impact, scientifically measured through onsite monitoring and anonymous surveys of the prototype's performance.

VORA turned a recently pedestrianised road space close to a Barcelona public school into a thriving community hub, temporarily activated by different age and interest groups that often shared the space. The impact of turning five parking places and their adjacent area into a complex public space, through tactical urbanism mechanisms and the addition of VORA to establish a boundary between pedestrians and cars, was significant. Rather than a generic road space co-opted by traffic, this corner became a hub for positive social exchange and community-building.

Thanks to the careful monitoring of its performance while it was installed in the public space, we can demonstrate the following: strong visibility (between 200 - 500 people per hour on weekdays); a high rate of interaction with the structure (10 - 15% of passers-by); a diverse and healthy series of civic uses (e.g., reading, writing, drawing, resting, chatting, meeting, stretching, eating, drinking, spontaneous play, organised games, after-school activities, theatre performances, and playing music); and a high proportion of user satisfaction (>100 people responded to an anonymous digital survey: 93% were interested, 79% were fully satisfied, 75% spent more time, 72% believe it's replicable, 85% believe it's easy to use, 71% believe it's integrated to the surroundings).

Formal written reports from the city council and the school reinforce the positive results of the prototype. The reports expressed the project fosters social interaction and community-building, through a carefully designed system, a strong social purpose, a solid sustainable approach (social, environmental and economical), and a clear opportunity for replicability in compact and dense cities. VORA also had a significant impact in the press and social media, and was awarded the Madrid Design Festival 2021 MINI Award.



Fig. 47



Fig. 48

TEAM

VORA was designed and digitally fabricated by a team of researchers, professors, staff, alumni and students of ELISAVA Barcelona School of Design and Engineering (UVic-UCC), led by Roger Paez, PhD. Support for VORA was provided by CARNET, Barcelona City Council and Sagrada Família school.

Elisava Research: Roger Paez (PI/project manager), Toni Montes (design coord), Manuela Valtchanova

Elisava Students and Alumni: Mar Gené, Judith Tremosa, Selen Kurt, Inés Fernandez, Clàudia Blanes, Morgie Shaban, Albert Sitges, Roger Guilemany

External collaborators: Adrian López Rancaño (miba architects), Eduard Riba de Palau (structural consultant)

Elisava Fabrication Team: Noel Díaz (fabrication coord), Juan Carlos Inés, Nicolás Olmos, Iván Perera, Llúcia Gomez, Jose Penido, Eleanor Murphy, Juan Garrido, Pedro Pineda, Selen Kurt, Albert Sitges, Mar Gené, Clàudia Blanes

Assembly Team: Jaume Grau/Brava Performing Arts (assembly coord), Francesc Torrent, Mar Gené, Judith Tremosa, Selen Kurt, Clàudia Blanes, Morgie Shaban, Albert Sitges, Roger Guilemany

FURNISH 2021

| 2nd Edition |



SCHOOLS

The Municipality of Barcelona developed the Let's Protect the Schools programme to provide Barcelona's schools with safe, comfortable, and healthy public spaces that work as meeting places for children, their families and neighbours. Following this systemic urban strategy, FURNISH emerged as an opportunity to pacify the streets near schools. The project's objective was to develop successful interactive prototypes to stimulate the permanence of people in these areas. These places had the potential to work as transitional spaces, connecting the urban and school environments in a creative way, promoting longer stays before and after school hours, and enabling its use as extensions of classrooms and playgrounds - engaging children to play, be active and learn.

Under the umbrella of the FURNISH project, two prototypes were implemented and tested in front of two schools in Barcelona. The first one was placed in Entença School in the district of Eixample and the second one in front of Antoni Brusi School, in the district of Sant Martí. This edition was part of the New European Bauhaus initiative, promoted by the EIT Community.



1 **New Niu**
Escola Entença Barcelona - IAAC

2 **RAW**
Escola Antoni Brusi Barcelona - Elisava

• 1



2.

NEW NIU

IAAC Team | Barcelona

Vicente Guallart
Daniel Ibáñez
Alex Hadley
Michael Salka

Barcelona's Escola Entença is a unique institution that embodies a spirit of creative transformation, by virtue of its location within the walls of a recently closed prison. However, this particular spatial history has left the school's students with limited access to playful or natural spaces.

IAAC's Valldaura Labs and Master in Advanced Ecological Buildings and Biocities (MAEBB) class of 2021/22 combined natural materials - sourced directly from the forest of the Collserola Natural Park bordering the city - with digital design and fabrication techniques to produce a modular system. The aim was for the young students of Escola Entença to assemble the system into a floating 'nest' (or 'niu' in Catalan) of wooden frames crowning the main doors, marking the entrance to the schoolyard. Other secondary elements were part of the project as well, in the form of furniture that helped the students reconnect with nature while providing multiple urban functions for the neighbouring community. These were located on the sidewalk outside the entrance.

DESIGN

The floating nest enhances and celebrates the entrance to the school, bringing the energy of the forest to the city through its material, which is locally-sourced wood. The nest is constructed from over 1.500 wooden elements, each cut with a computer numerical control (CNC) router. These elements are attached together, becoming self-supporting modules, which can then be stacked and arranged - like pixels - into numerous configurations. This means that the final form remains flexible and open to interpretation, yet becomes rigid when the modules are attached together. The individual modules can be assembled at a small, child-friendly scale, and subsequently compiled into a larger form while maintaining its structural integrity.

Another key aspect of the installation are the two large wooden boxes with habitable interior voids, placed along the public sidewalk outside the school entrance. These constructions reimagine the concept of 'waste', by blending multiple discarded wood carpentry scraps into textured surfaces that cover the boxes. The heart-shaped void in one of the boxes signifies the love that went into the design and construction processes, as well as the joy the object will bring to the students who play with it. The leaf-shaped void of the second box conveys the forest - where the wood necessary to make the element came from - and the broader ecological networks all people are enmeshed in.

Finally, a series of wooden benches and steps preserve the rawness of the material, while still benefiting from the use of advanced tools. The tree trunks used for the elements were 3D-scanned prior to processing, enabling the design team to prepare custom joints and parts for them. This resulted in naturalistic and minimalist objects which - upon closer inspection - reveal distinct traces of technological interventions, making the raw material better suited to the urban context.

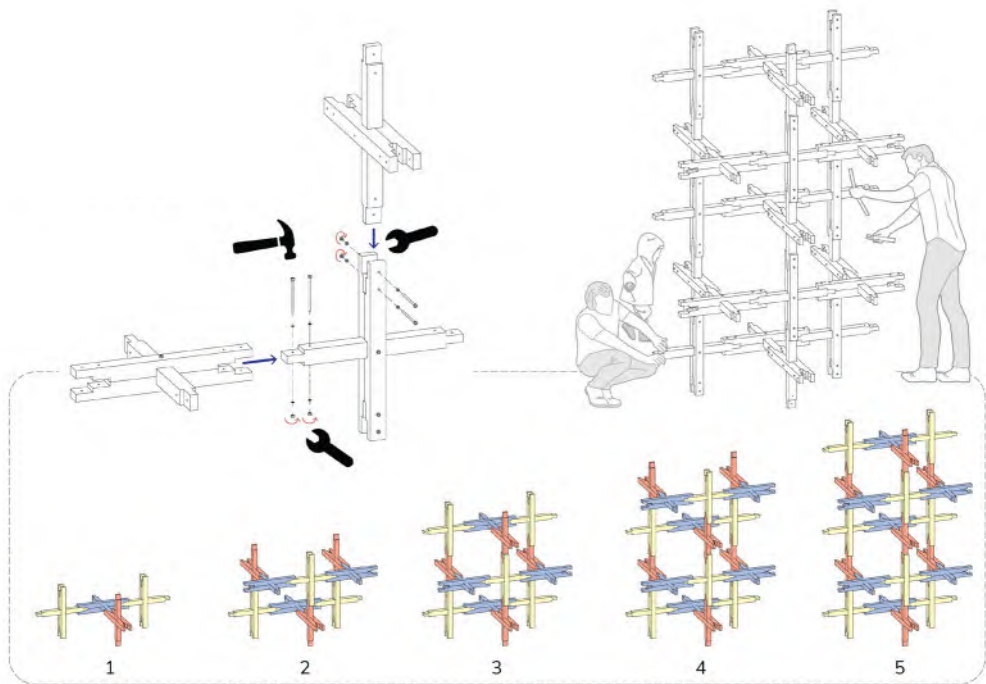


Fig. 49



Fig. 50

PROCESS

From the onset of the design process, direct engagement and discussion with community stakeholders was highly influential. During the initial site visit, the design team met with the school board of Escola Entença, which proved the value of participatory design, as the scope of the project evolved drastically during the course of the conversation.

The project was initially going to be located in the corner of the school, but the school board made it clear that the entrance was a more significant location. Then through continuous dialogue, many other features began to take shape.

Eventually the unanimous decision to create an element above the entrance of the school was reached. The element signifies the importance of the entrance on the street, gives the building a playful accent, and creates shade and a place of gathering. Benches and spaces for play were also suggested by the board, in order to address the needs of parents and students upon arrival and departure from the school.

The logical conclusion of this participatory design process was to execute an equally participatory installation process. Therefore, a modular component was incorporated, allowing non-experts to engage in a simple construction and rapid assembly. These components were prefabricated en masse in IAAC's Valldaura Labs, then brought to the site, assembled, and installed with the help of the very same parents and students who use the school entrance on a daily basis.



Fig. 51



IMPLEMENTATION

The elements were installed at the Escola Entença, in a pedestrianised characteristic chamfered corner of Barcelona's Eixample district. This school has 20 teachers and 275 pupils, of which 150 are between the ages of 3 to 6, and 125 between 6 to 9. The school building is in a street with heavy traffic, which causes several issues, such as noise, air pollution, and safety hazards due to the fast moving vehicles. The main objectives of the project already mentioned are reconnecting students with nature, providing play spaces, and offering diverse urban functions to the local community. Another primary objective was to improve safety by establishing a physical barrier between the sidewalk and the road. This boundary is enforced by the presence of the installed wooden elements, as well as new street trees which additionally help to purify the air and reduce noise.

Like the entire design and fabrication process, the installation of the prototype New Niu modules was completed by IAAC's Valldaura Labs team and students of the 2021/22 edition of the Master in Advanced Ecological Buildings and Biocities (MAEBB) programme. It was a group of 18 emerging designers from 14 countries throughout the globe, many of whom have since taken the lessons learned in New Niu and FURNISH back to their respective homelands.



Fig. 52



TEAM

The Master in Advanced Ecological Buildings and Biocities (MAEBB) is an immersive academic programme of the Institute for Advanced Architecture of Catalonia (IAAC). It uses an advanced practical approach to train professionals in the design and construction of ecological buildings and biocities. MAEBB is hosted at Valldaura Labs, a facility dedicated to self-sufficiency research, located in Barcelona's Collserola Natural Park. New Niu was completed in a design + build studio as part of the 2021/22 MAEBB. The course was led by Alex Hadley, Academic Coordinator of the MAEBB; and Vicente Guallart, Co-Director of the MAEBB and Founder of IAAC.

Management team:

MAEBB Directors: Vicente Guallart, Daniel Ibáñez

The New Niu Instructors: Vicente Guallart, Alexander Hadley

Valldaura Labs Operations Manager: Laia Pifarré

MAEBB Academic Coordinator: Alexander Hadley

Valldaura Labs' Green Fab Lab Manager: Bruno Ganem Coutinho

The New Niu Designers (MAEBB Students):

Andrea Paola Rubio Paredes, Leif-Andres Vallecillo Riksheim, Lillian

Wanjiru, Pablo Rafael Herraiz Garcia de Guadiana, Prachi Agarwal,

Rachael Margaret Verdugo Pelaez, Romain Jacques Kenny Russe, Roshni

Chirag Shah, Shagun Modi, Zani Kerubo Gichuki, Illeti Tutu Ibiyemi

Awosika, Kshitij Ramlal Sarote, Mónica Irene Pérez Rivera, Prasad

Choudhary, Agnieszka Szklarczyk, Pongpol Punjawaytegul, Suwapat

Rodprasert, Anton Hofstadt

Other participants:

The New Niu Collaborators: CARNET, Ajuntament de Barcelona, Escola Entença, EIT Urban Mobility

With the support of: Belloch Forestal, Alberch and Tallfusta

The New Niu Photography: Adrià Goula

RAW

Elisava Team | Barcelona

Roger Paez

RAW is a prototype that supports free and safe play in the city through the temporary transformation of public space. It is an open, modular system made up of prefabricated rammed earth units, which can be adapted to different environments. The modules are created with moulds and with the dimensions of a public space step: 120 x 40 x 15 cm. They can be stacked and arranged in different ways, without any additional elements. This generates shapes, levels, sequences, and nooks that attract school related activities to the public space.

RAW represents a commitment to a non-extractive and adaptable public space design, which offers abundant opportunities to play.

DESIGN

RAW is a modular system that can be configured according to the space, time and occasion. The diversity in the level of compactness of the material and in the possible configurations of the modules offer many options for generating playscapes. The rectangular modules of RAW have been dimensioned so that, when combined, they can form seating, boundaries, and surfaces for playing, running, and jumping. The different states of the earth offer textures for various experiences during play (prefabricated units, manually compacted, loose). The plasticity of rammed earth allows for the creation of interesting surfaces and shapes (slides, ramps, platforms, etc.) as well.

Rammed earth is a damp mixture of subsoil with suitable proportions of sand, gravel, clay, and in some cases stabiliser. Using earth as a building material for ephemeral architecture may seem paradoxical, but it has many advantages. Earth can be given a variety of finishes, and RAW uses it in three different densities, which are prefabricated, compacted manually, and loose. This diversity adds complexity to the resulting uses and ways to play with the element. Additionally, earth is a natural, reusable, and recyclable material with a very small carbon footprint. At the end of the prototype's useful life in public space, it was reused on the playground of the Antoni Brusi school, in a new layout co-designed with the schoolchildren. As repeated use and playing causes the rammed earth blocks to break down, RAW will eventually blend completely into the surface of the playground, returning to the natural cycle.

Earth is one of the most widely available and well-regarded materials in human history. Moreover, it is not just a building material, it is a process. There is no other material that can be recycled and reused repeatedly without a loss of quality. Earth has many advantages in comparison to common industrial building materials: it saves energy, reduces environmental pollution, absorbs pollutants, and is ideal for do-it-yourself construction at the community level.



Fig. 54

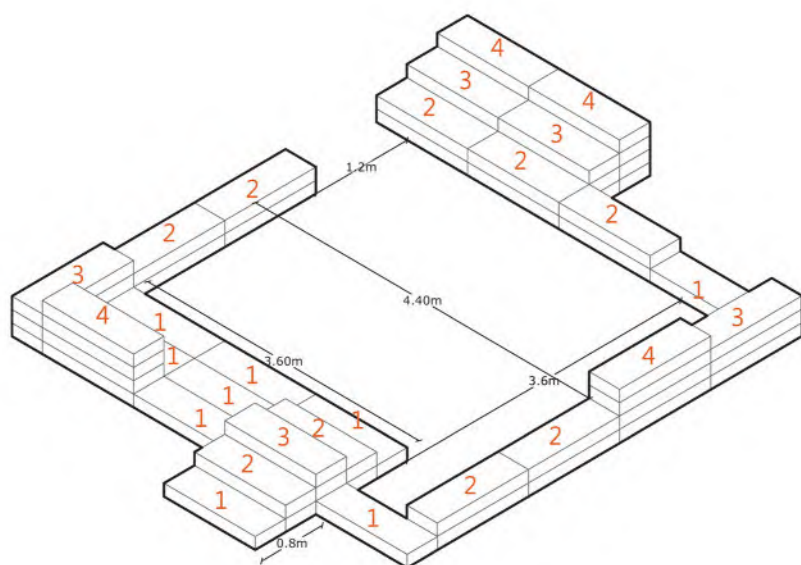
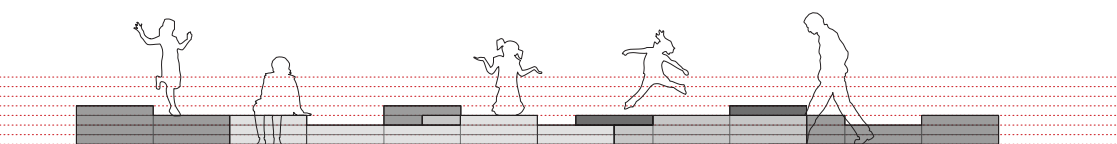


Fig. 55

PROCESS

During the design of the prototype, the concepts of “playing” and “being together” had a dominant role. The participatory process and the construction of the prototype by the users themselves were an important part of the process. These principles lead to the activation of public space and its occupation by users.

Time is one of the basic components of the design, the material itself and the way it was designed – as a reconfigurable system – work with the notions of both temporariness and permanence. Even though each implementation of RAW and its material are temporary, the project is also timeless because it can be reproduced by different groups of people, in different places and at different moments in time.

The process of building and interacting with RAW offers an educational experience through cooperation and contact with the earth (nature). The concepts of collaboration, sustainability and systematisation are interconnected, and reinforce one another to fulfil the initial design aims.

The building process is exceedingly simple. The rammed earth modules were prefabricated in the GLS Prefabricats facilities in Tàrraga. On the implementation day, they were transported using a small truck with an in-built crane and then unloaded directly to their final position. No additional material was used to stabilise or tie the blocks together, as their weight was sufficient to guarantee stability and dry construction greatly improves the system’s reusability. Subsequently, loose earth was placed in contained areas defined by the prefabricated blocks. One of the areas was manually compacted while the other was left completely loose. Different levels of compactness allowed the team to test the material’s general performance, as well as its behaviour specifically related to playability. The total amount of time spent to set-up RAW, both in the street and in the schoolyard layouts, was only three hours.



Fig. 56



IMPLEMENTATION

The street in front of the Antoni Brusi school is quiet. Its dominant element is a group of trees that extends along the entire length of the street, emphasising its linear quality. It is located in a residential area next to the Ciutadella park and library. Despite the calm nature of the street, vehicles still drive at a high speed, creating an unsafe environment for children and pedestrians. The team studied mobility patterns and the activities that people in the area do at different times - while the school is open, during the evenings, and on weekends when the activities and their intensity change completely.

The layout has two functions: generating a protective boundary between the children and the cars by distancing them, and creating a playing area that is a magnet for activities. RAW responds to the form and the needs of the site, without introducing hard limits and offering a smooth transition to and from the entrance of the school. The existing street furniture was used to extend the experience along the entire length of the street. To achieve this, a design grid derived from anthropometric and in situ measurements was used. The dynamics between the existing furniture, the pavement and the prototype were studied; and the design language chosen was lines, with the aim of creating an open-ended functional space connected to its environment and a rich experience for the user.

The concepts of participation, modularity, and sustainability (reuse) were important for the design strategy. In accordance, the same pieces of the first implementation were reused to build a second layout of RAW in the schoolyard.

After the installation of RAW on the street, students and the school community were involved in the design of the relocation. During this process a robust co-creation methodology was followed, and RAW was re-installed in a pit layout, based on the students' partial solutions using scale models. RAW remains in the schoolyard in full use, slowly reintegrating into the soil due to its very successful use as a playscape.

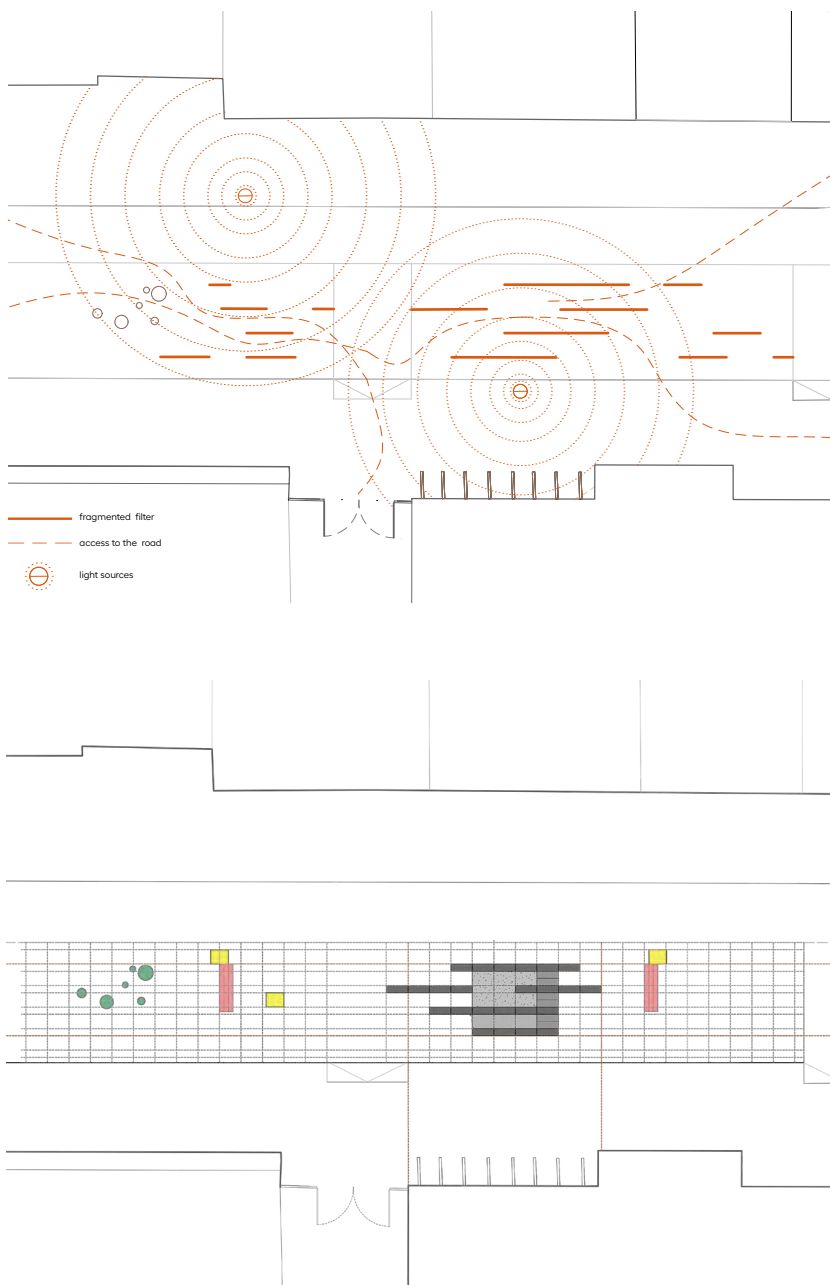


Fig. 57



Fig. 58

TEAM

The prototype was tested in Barcelona in December 2021 (on the street) and January 2022 (on the schoolyard) and shared in open source so it can be implemented throughout Europe.

RAW was designed and fabricated by a team of researchers, professors, alumni and students of ELISAVA Barcelona School of Design and Engineering (UVic-UCC), led by Roger Paez, PhD. RAW was supported by CARNET, Barcelona City Council and Antoni Brusi school.

Elisava Research: Roger Paez (PI) , Jordi Queralt

Elisava Alumni-Design: Liana Kalaitzoglou

Elisava Students-Assembly: Diana Mehrez, Emma Moreno, Eloi Sànchez, Qhosha Vad

CoDesign: Antoni Brusi School 6th grade students

Collaborators: CARNET, Ajuntament de Barcelona, Escola Antoni Brusi, GLS Prefabricats

Construction: GLS Prefabricats

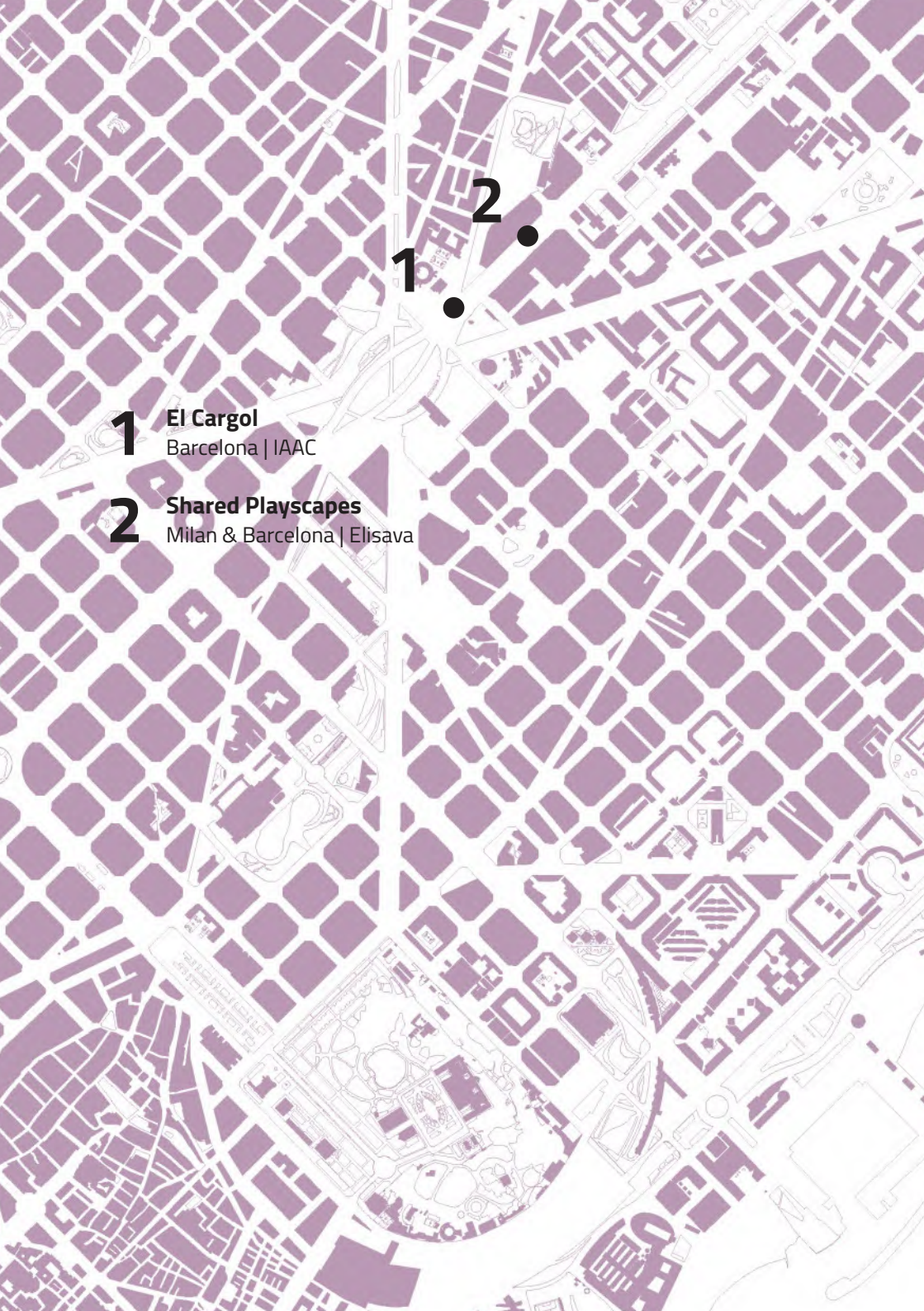
FURNISH 2022

| 3rd Edition |



KIDS

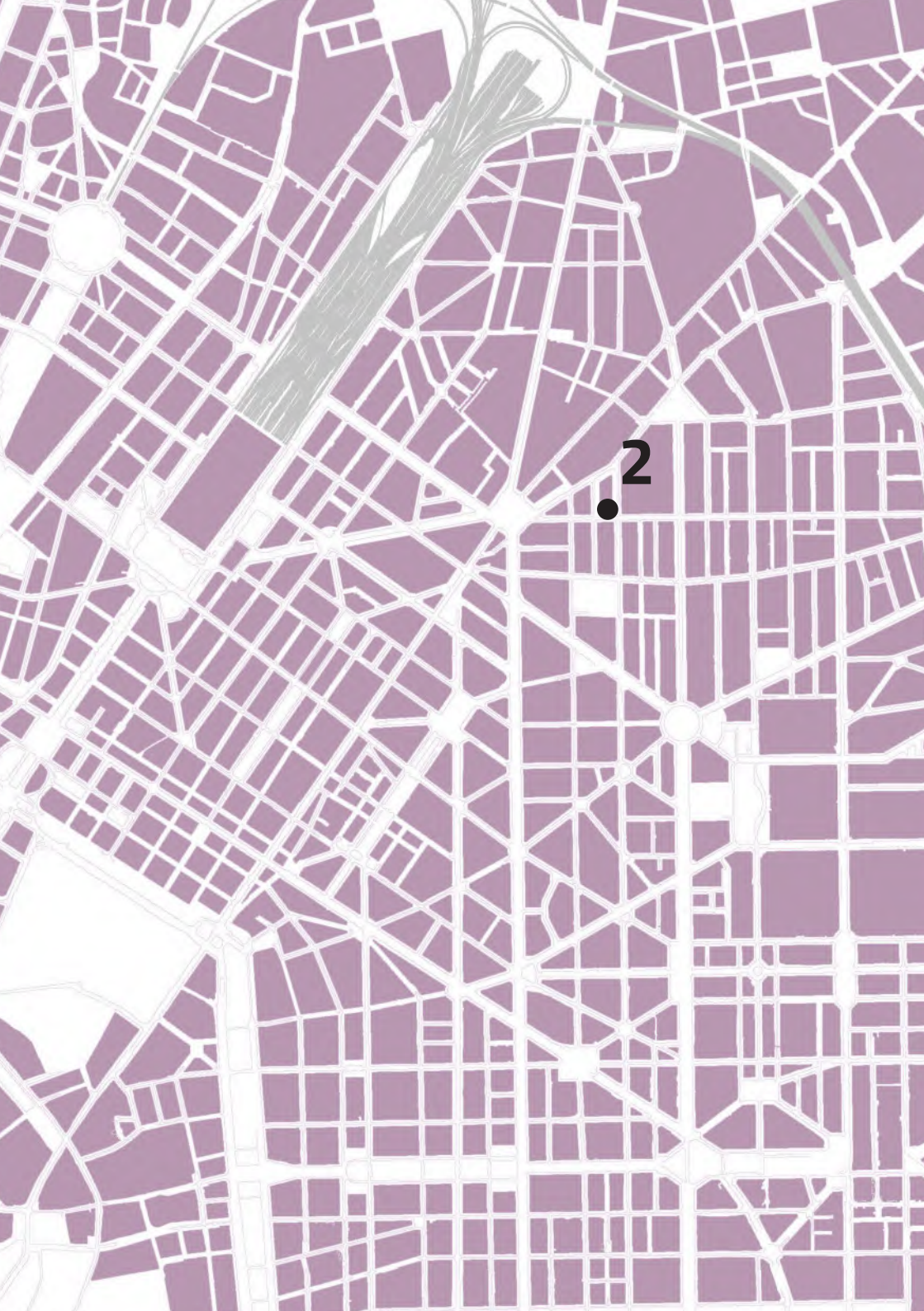
FURNISH-KIDS - the third FURNISH edition - created interventions using the urban living lab methodology. The project developed new spaces through prototyping in a co-creation process with children, in order to improve the liveability of these spaces with a focus on kids. The new ways of moving and reclaiming space for citizens triggered the conversion of turning areas occupied by private cars into new open spaces. Milan and Barcelona - both cities with dashing projects that have redesigned public open spaces, putting pedestrians and cyclists first - hosted full scale prototypes in the public space. These projects were co-designed, co-fabricated and tested by children, a full urban living lab experience that prioritised co-creation across the whole project.



1 • 2 •

1 **El Cargol**
Barcelona | IAAC

2 **Shared Playscapes**
Milan & Barcelona | Elisava



EL CARGOL

IAAC | Barcelona

Vicente Guallart
Daniel Ibáñez
Michael Salka

The FURNISH programme aims to improve public urban spaces through tactical design interventions. This year's edition, FURNISH-KIDS 2022, was hosted in the creative hubs of Barcelona and Milan. In Barcelona, the design teams concentrated on the ever-changing area of Plaça de les Glòries Catalanes. Once the area with the highest traffic in the city, Glòries is transforming into a symbol of the Catalan capital's emergent future, one which is green, diverse, and citizen-centred. The selected site at the intersection of the avenue Gran Via with les Glòries presented an interesting challenge for its urban regeneration. Being originally intended for vehicular use, it lacked any amenities for people. Through a series of workshops with young students from a nearby school, it became clear that the hardscape would benefit from architectural elements enabling outdoor educational activities and musical performances. The goal was to implement an element that would both be a space for outdoor learning and music performance, while simultaneously reconnecting students in the city with nature.

DESIGN

The design put forward by IAAC's Valldaura Labs was developed to give new life not only to the place, but also to repurposed scrap materials such as locally-sourced pine logs and offcuts through the application of advanced techniques. These materials were catalogued, measured, 3D-scanned for virtual modelling and arranged by an algorithm. Scaled and life-size models were constructed to test and use ergonomic dimensions, methods of connection and aesthetic impressions. Prefabrication of the installed modules was completed at IAAC's Valldaura Labs using manually and digitally-driven Fab Lab tools.

Tree trunks form the base of the benches providing seating, shaping the gathering space, and anchoring the installation in place without mechanical connections to the hardscape urban surface. Offcuts from prior carpentry operations were repurposed as vertical slats, forming the backside of these tree trunk seating benches, also providing a sense of enclosure, protecting occupants from the surrounding traffic and encouraging focus on any classes or concerts held in the new outdoor venue. The exterior edge of these offcuts was left with its natural profile and bark of the tree, in order to emphasise the connection to natural ecosystems.

All elements were transported to the implementation site and assembled in one day with a small crane. The same young students who informed the design were invited to participate in the assembly process, during which, inspired by the organic shape, they nicknamed the project 'El Cargol' (The Snail in Catalan). The structure is open to the public, and, as a temporary intervention, it is foreseen to be eventually dismantled and disposed of, with no harm done to the natural environment where its materials came from.

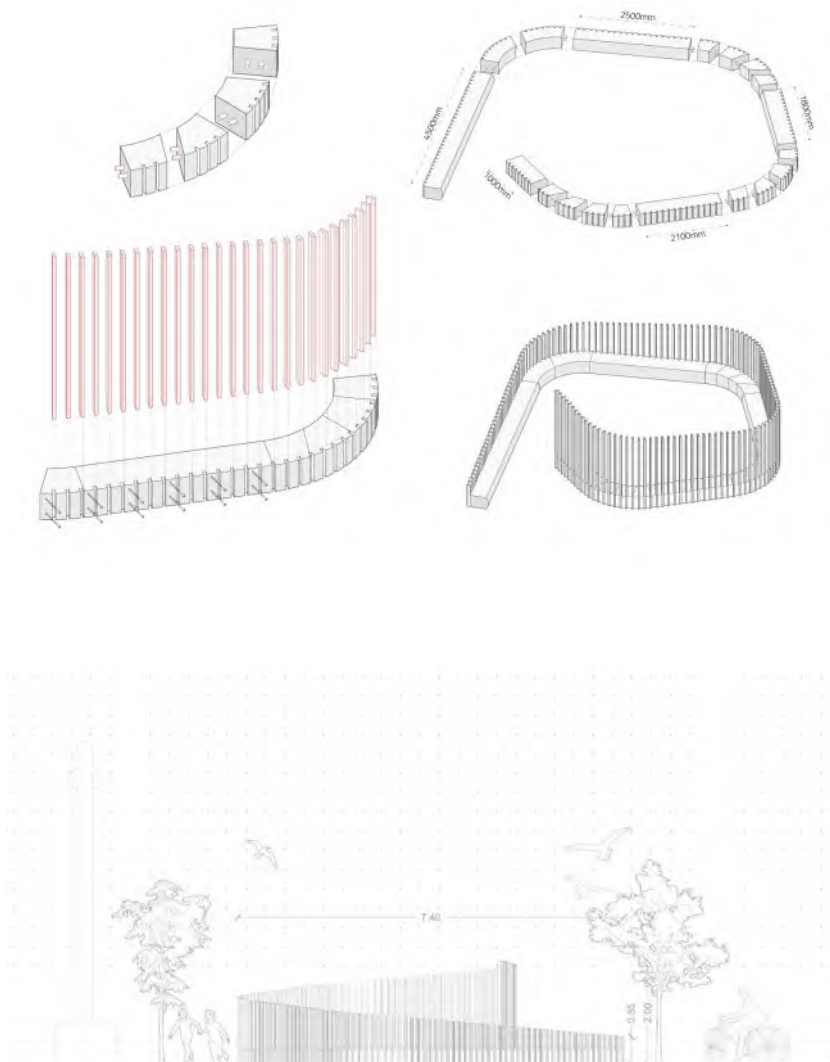


Fig. 59



Fig. 60

PROCESS

The methodology of engagement with local stakeholders, undertaken by the IAAC Valldaura Labs team, had a co-creation focus.

The methodology of engagement with local stakeholders, developed by the IAAC Valldaura Labs team, had a co-creation focus. Through conversations with the Escola Provençals community, it became apparent that musical performance was a strength and priority, along with outdoor learning and access to nature - considering the school campus is completely urban. Notably, the prospect of creating a place for musical performance in the Gran Via site was conceived not only as an opportunity to support the strength of the school's music programme, but also to promote engagement with the wider neighbourhood, by offering them the opportunity to listen and watch students perform. Understanding these priorities, the team then coordinated co-design sessions with two classes of 6th grade students at Escola Provençals. Each of these sessions involved three drawing exercises with the students: first, drawing themselves in order to kick-start the creative process with a familiar subject; second, drawing their vision for an outdoor learning space; third, drawing their vision of an outdoor music listening or performance space.

The element also had to be built with natural and lightweight materials, and joints that do not require dangerous tools. Material circularity was also a high priority. Not only was the prototype designed for easy removal and reuse, but its materials were upcycled from piles of scrap or waste wood from the Valldaura Labs estate.

Digitally-driven tools such as computer-numerical-control (CNC) routers were used to cut templates based on virtual models, in order to develop the organically-curved overall form of the prototype. A variety of hand-tools were also used to shape and prepare the surfaces of the tree trunk benches, to cut spaced notches for the insertion of the vertical offcut slats, to pre-drill holes for the wooden dowels used to secure the connections, and to cut the vertical elements to size. The lengths of the vertical elements were developed in a sequence, in order to achieve a gradient of height, inviting users to enter through the opening, at the shortest end, and providing a scaled backdrop for teaching or performing, at the tallest end.



Fig. 61



IMPLEMENTATION

This co-creation methodology is a logical extension of the “learning by doing” model promoted by IAAC and piloted during the prior FURNISH xKIC project of 2021, proving highly successful. In real terms, the installation process became a productive festival of both play and construction, in which students from Escola Provençals assisted the IAAC Valldaura Labs team in the assembly of the urban element, due to the lightweight non-toxic materials used and the modular hardware-free joinery design techniques. Beyond the pleasant memories associated with this playful happening, the children were empowered, creating a lasting impact on their urban space through the use of their own hands. They were also astonished at their own capacity to serve as change-makers and future leaders of the city.

The parts of the element were loaded onto a single six-metre truck at IAAC’s Valldaura Labs in Barcelona’s Collserola Natural Park and then driven to the installation site, where the IAAC Valldaura Labs team was met by the director, teachers and students of Escola Provençals. First, the tree trunk bench elements were set into place with a crane and arranged following the geometric scheme of the overall form. Then, the corner connection elements were set into place by the IAAC MAEBB students and attached to the tree trunk benches, completing the organically-curved footprint of the prototype. Then, the Escola Provençals students helped insert the vertical slats into the corresponding grooves along the back of the tree trunk benches and corner connection elements in a sequence of heights directed by the IAAC MAEBB students. Finally, the Escola Provençals students secured the vertical slats by hammering in wooden dowels with a soft rubber mallet. In some cases, standard metal screws were added for further reinforcement. The Escola Provençals students were also able to assist with these reinforcements working under close supervision of the IAAC Valldaura Labs team. During the implementation, due to the natural materials and organically-curved form of the prototype, the students of Escola Provençals gave the installation the name “El Cargol”, which means the snail in Catalan.

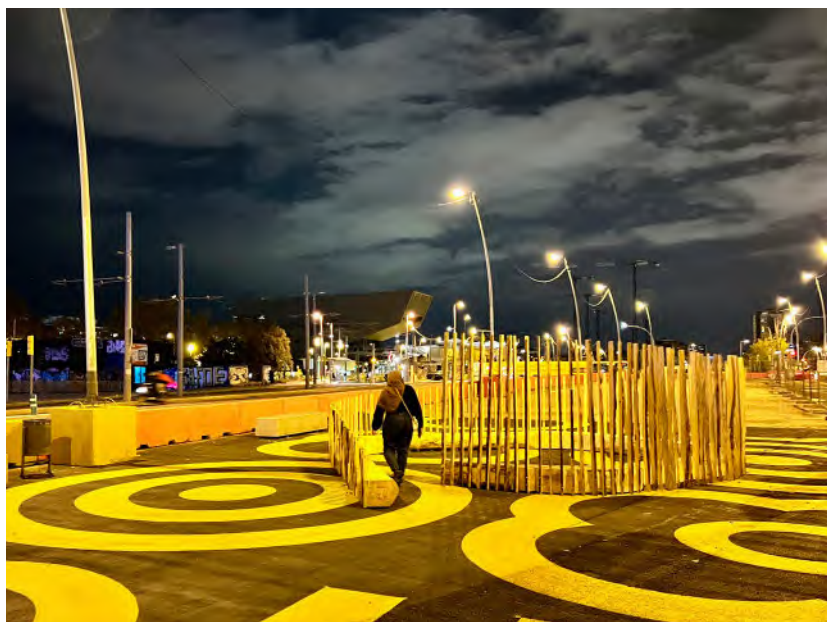


Fig. 62



Fig. 63

TEAM

The Master in Advanced Ecological Buildings and Biocities (MAEBB) is an immersive academic programme of the Institute for Advanced Architecture of Catalonia (IAAC), with an emphasis on using an applied practice approach to train professionals with advanced expertise in the design and construction of ecological buildings and biocities. The MAEBB is hosted at Valldaura Labs, a facility dedicated to the investigation of self-sufficiency located in Barcelona's Collserola Natural Park.

El Cargol was completed as a design + build studio within the 2022/23 MAEBB curriculum. The course was led by Michael Salka and Vicente Guallart, Co-Directors of the MAEBB.

MAEBB Directors: Vicente Guallart, Michael Salka

Valldaura Labs Operations Manager: Laia Pifarré

MAEBB Academic Coordinator: Esin Aydemir

Valldaura Labs' Green Fab Lab Manager: Bruno Ganem Coutinho

El Cargol Designers (MAEBB Students): Austin Gregory Brown, Basant Abdelrahman, Carla Susana Alvear Arízaga, Jacek Antoni Kostrzewa, Jackie Williams, Julia Aurora Guzman Conde, Larsen Bidstrup, Rafaelle Schiavello, Ruhani Adlakha, Sneham Pandey, Mariano Rodriguez Alonso, Sadegh (Ata) Raoufi Fard, Charles Louis Roger Casbolt, Aishwarya Shyam Balsekar, Disha Arora, Indraneel Ravindra Joshi, Laila Nabulsi, Nicolas Rotta, Nisanth Maheshwaran, Pradyumna Lalit Vikharankar, Prati Mahavir Jain, Rujuta Chauhan, Shruti Sahasrabudhe, Santwana Malakar

El Cargol Collaborators: CARNET, Ajuntament de Barcelona, Escola Provençals, EIT Urban Mobility

SHARED PLAYSCAPES

Elisava | Barcelona & Milan

Roger Paez

SHARED PLAYSCAPES is a co-designed system of mobile urban elements that promote collective play in public spaces. The project proposed temporary interventions in pacified spaces adjacent to primary schools in Barcelona and Milan, and involved the primary school students, the research team and the municipalities concerned. SHARED PLAYSCAPES' aim is twofold. On the one hand, it promotes the activation of public spaces contributing to the concept of playable cities through temporary installations. On the other hand, it constructs a meaningful relationship between children from different cities, using design protocols based on sharing and collaborating at a distance. The project explores the values of co-design at both the material level (informing design decisions for a temporary, adaptable and reconfigurable public space) and the relational level (establishing an operative, narrative and experiential exchange between participants).

SHARED PLAYSCAPES represents a commitment to co-designed temporary public spaces and an exploration of *medium design* - i.e., a design that proposes open and adaptable protocols for interplay in space over time.

DESIGN

SHARED PLAYSCAPES is fundamentally a playscape that promotes collaborative design, long distance interaction, material reuse, and temporary appropriation of the public space through play. The project uses different processes to develop a series of open-ended ephemeral transformations of pedestrianised spaces inside or around primary schools. SHARED PLAYSCAPES differentiates from and complements traditional urban design by focusing on temporary spaces, co-creation and performance.

The project's aim was to explore new forms of collaborative temporary space design, implicating end-users and based on co-creation processes driven by free appropriation, material reuse and playable public space. SHARED PLAYSCAPES proposes an intuitive design protocol led by a research team and developed by the end-users: primary school students between 10 and 12 years old from Barcelona and Milan. Developing a series of tools, interfaces and actions that facilitate a very intuitive design process, co-design work sessions in the schools were organised and the selected results were implemented and tested in the assigned public spaces.

Twelve urban mobile elements form horizontal wooden surfaces that are 70 cm wide, 420 cm long and 35 cm or 70 cm high. Re-used wooden planks (14 cm wide and 7 cm thick) are supported by a custom-made metallic structure, sitting on top of four wheels that allow the elements to be easily moved or fixed in any position. The geometric simplicity of the elements and their mobility constitute its main characteristics and allow SHARED PLAYSCAPES to become a system that can easily adopt multiple configurations reacting to changes in the public space.

The design process consists of three steps. First, the design team organised a co-creation session in each school, where students worked on the design of the basic system. Second, the research team collected, classified and selected the results of the co-creation process. Finally, the selected results were implemented and tested in specific locations by the students themselves. The project's result proves the capacity of children to identify and develop strategies of free appropriation of public space, as well as the capacity to work through long distance communication systems using game-based formats and playful logics.

Lines



Islands



Rooms

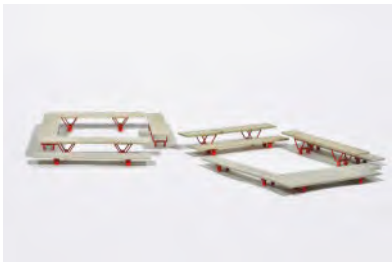


Fig. 64

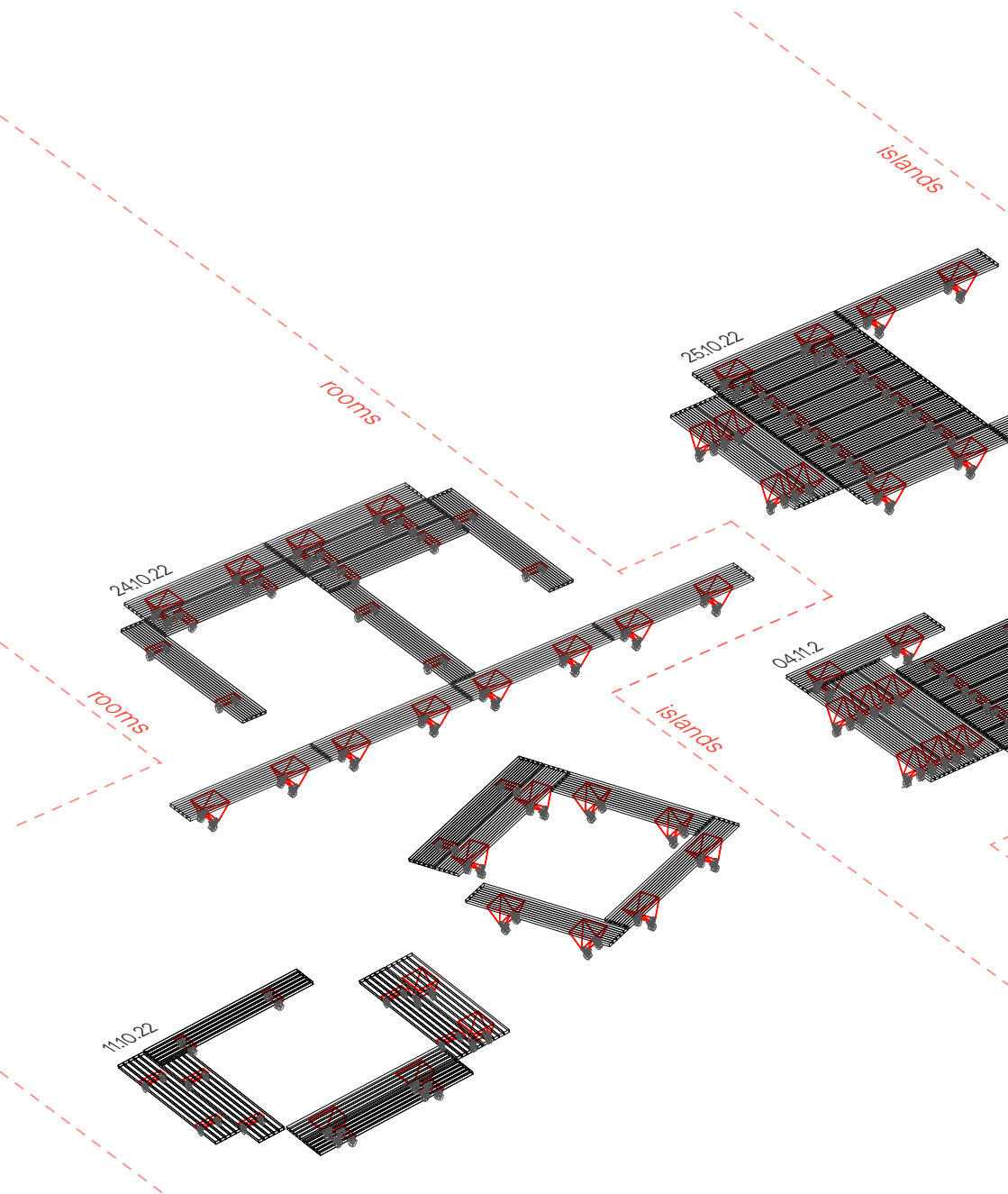


Fig. 65

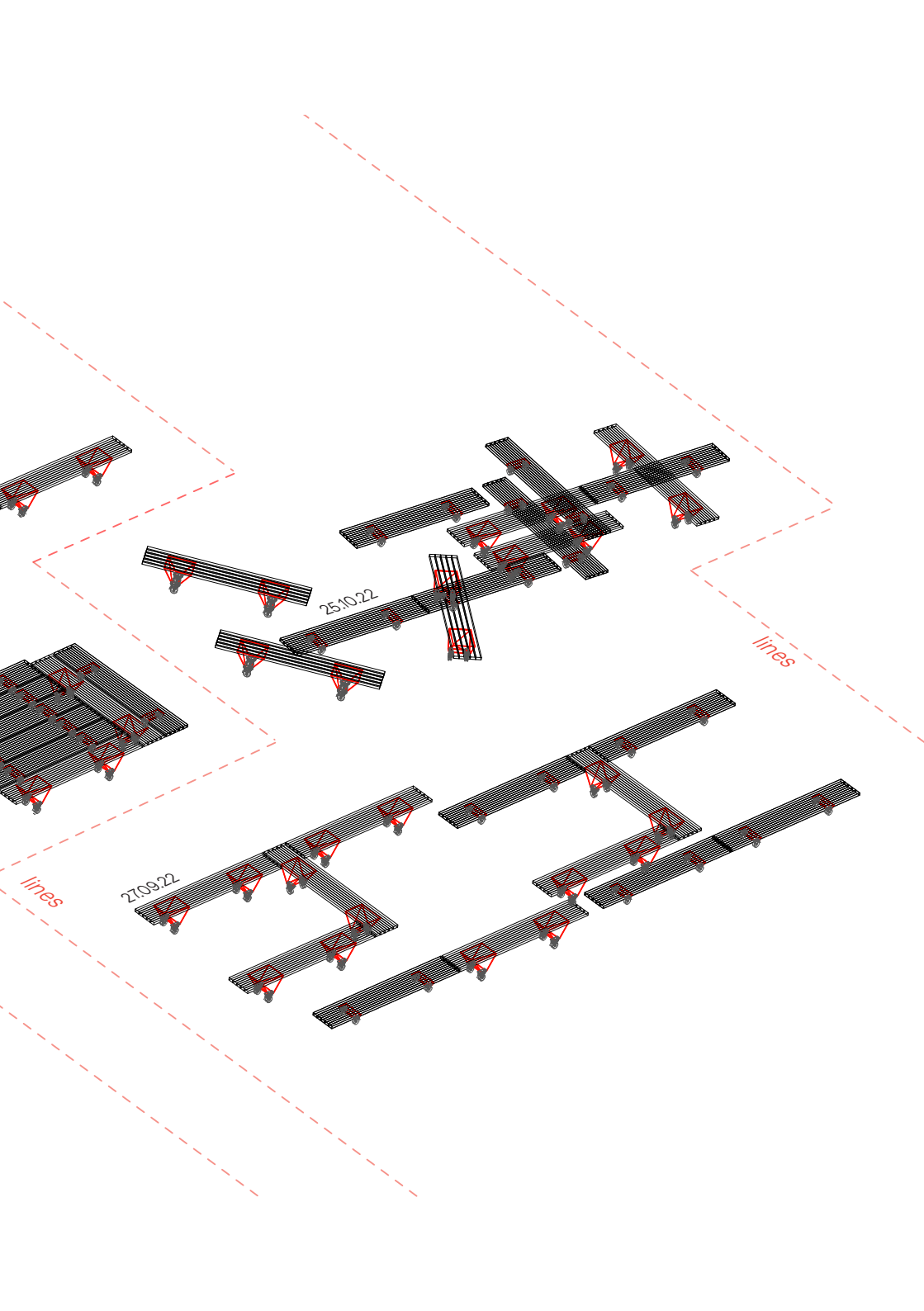




Fig. 66

PROCESS

SHARED PLAYSCAPES has the co-design process at the centre of the proposal. This process consisted of three different co-creation sessions with 10-12-year-old schoolchildren from Escola Casas in Barcelona and Scuola Tito Speri in Milan.

The process included a SPACE lab, a DRAWING lab, and a LANGUAGE lab, exploring different methodological approaches to co-design. The first six co-creation sessions were developed in Barcelona, and then four more were carried out in Milan. A written, photographic and video record of the sessions was taken. Once the co-creation sessions concluded, the results were collected, filed and organised. A total of 105 spatial configurations (58 in BCN and 47 in MIL) were proposed using scale models and 6 of these spatial configurations were set up in the public space (3 in BCN and 3 in MIL). As well, 60 drawings (30 in BCN and 30 in MIL) were made - corresponding to 20 full tripartite drawings - and 86 words (46 in BCN and 40 in MIL) were compiled - corresponding to 20 full word triads collectively generated.

In the Space lab, the students developed multiple spatial proposals, using a full 1:20 scale model of the mobile urban elements, which was built by the research team. With it the students explored ways to transform the space by setting the elements in multiple configurations, each prompting different playful possibilities.

In the Drawing lab, graphics played a crucial role as mediators of the long-distance relationship between the children from Barcelona and Milan. Participants explored the logics of co-creation through an exquisite corpse game, generating playful and spontaneous results, as well as accidental and automatic ones.

In the Language lab, words were used as a bridge between the schoolchildren. A collaborative word chain game was used to relate to the city as perceived by the children, generating a very evocative collective verbal landscape, based on the ideas and perceptions of the urban environments of the children from both cities.



Fig. 67



IMPLEMENTATION

As the project was developed with two schools, the implementation work plan was twofold: first in Barcelona (February to October) and then in Milan (June to December). The activities were focused on the design and fabrication processes, the citizen engagement activities (including co-creation workshops, presentations and participatory construction) and impact analysis. Out of the many spatial configurations developed by the children, we identified three main typologies: islands, rooms and lines. Each of these types characterises different logics of appropriation/activation of the public space. 'Islands' are configurations that foster the appropriation of the temporary element itself - they generate recognisable, autonomous and self-contained episodes that indirectly transform the existing public space. 'Rooms' are configurations that foster the activation of a bounded empty space defined by the temporary element - they define perimeters that build a space within the existing public space. 'Lines' are configurations that foster the appropriation of the space between the temporary element and the pre-existing limits of public space - they propose new boundaries that redefine the existing public space.

Within this classification, the research team selected three significantly different solutions from the Barcelona co-creation process and three more from the one in Milan, in order to prompt diverse activations of the same public space. The chosen configurations were subsequently implemented in the public space and tested by their co-authors and the rest of the community for at least one week per configuration.

The project's main material is reused wooden planks - originally used as supporting structures for ice-skating rinks in Catalonia and repurposed to build the temporary structures of SHARED PLAYSCAPES. Once the project finished, the structures were dismantled and the wooden planks repurposed again for their initial use in ice-rinks. The metal elements were custom made for this project and will be repurposed in a subsequent project. This is an example of radical reusing, where all the material of the project is reused - either before and after (wood), or after (steel) the project's life cycle.



Fig. 68



Fig. 69

TEAM

SHARED PLAYSCAPES is part of FURNISH-KIDS. Support was provided by CARNET, Barcelona City Council, Milan City Council, Escola Casas and Scuola Tito Speri.

The project was tested in Barcelona from September to October 2022 and in Milan from October to December 2022, and subsequently shared as open source so it can be implemented throughout Europe.

SHARED PLAYSCAPES was designed and fabricated by a team led by Roger Paez, PhD; including researchers, professors, alumni and students from ELISAVA Barcelona School of Design and Engineering (UVic-UCC); and teachers and schoolchildren from Escola Casas (Barcelona) and Scuola Tito Speri (Milan).

Elisava Research: Roger Paez (PI), Toni Montes, Mar Gené, Eloi Sànchez

Elisava Alumni: Clàudia Anguera, Livia Tili, Cristina Valarezo, Tiffany Whittaker, Amber Zhang

Schoolchildren: Escola Casas (Barcelona) 6th grade students, Scuola Tito Speri (Milan) 5th grade students

Collaborators: CARNET, Ajuntament de Barcelona, Comune di Milano, Escola Casas, Scuola Tito Speri, Brava Performing Arts

III.

CODA



FURNISH FUTURES

Dr. Inés Aquilué & Marina Ojeda

Universitat Politècnica de Catalunya · BarcelonaTech & CARNET

Reclaiming public space is a right in cities. There is a need for more spaces for gathering, socialising and growing as social beings. The necessity of more open space is not only a matter of size, but social quality and ecological sustainability have to be taken into account. We need spaces that are capable of ensuring a transition towards sustainability, one that facilitates mobility and global accessibility, especially for vulnerable groups, and incorporates the metabolism of spaces (water cycles, atmospheric conditions, green infrastructure, wildlife, etc.). This ecological transition must also not forget the important role that public spaces play in social cohesion in cities. Keeping in mind all these challenges, FURNISH is a possibility to gain more open space and re-shape it through these new patterns of change. FURNISH uses the social and material resources of specific places and introduces a creation cycle (ideation, design, fabrication and testing), replicating design elements and their implementation in public spaces through a holistic perspective.

The methodology presented in this book -which is a sum of different proposals within a common theoretical framework- reinforces the variable of space within decision making and the relevance of temporary interventions, which help to develop future necessary adaptations. The public space is often imagined as a static image, which is nothing further from reality. Public spaces should be designed as evolving sites, capable of absorbing the changing needs of society. Streets, squares, avenues and public gardens should be adaptable and liveable places. Thinking of space as a static image produces cities that do not include social and cultural behaviour. Reality is temporary and spaces should be reshaped and redesigned with time, especially enhancing co-creation in a broad and meaningful sense. The future of FURNISH continues experimentation through urban living labs to improve quality of life and socialisation.

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This publication has been possible thanks to the hard work done by CARNET and its fantastic team. CARNET also led the FURNISH project from 2020 to 2022, and was in charge of its management and success.

We would also like to thank all FURNISH partners. The city councils, Ajuntament de Barcelona and Comune di Milano, gave support and were directly involved in the management of the project. The municipalities participated in the decision making process, chose the public spaces to intervene and provided the permits to implement the FURNISH prototypes. The presence and collaboration among partners has been fantastic and we seek to acknowledge our research and design partners, which are Universitat Politècnica de Catalunya - BarcelonaTech (UPC), Elisava and IAAC. These partners had an active and central position in the development of FURNISH methodologies, especially related to co-creation, co-fabrication and impact analysis.

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FURNISH PROJECT PARTICIPANTS

Agarwal, Prachi	Estrada, Miquel
Alapont Ramón, Jose Luis	Fernandez, Inés
Anguera, Clàudia	Fernández, Marilia
Aquilué, Inés	Ferorelli, Rossella
Arias Reyna, Israel	Ferrer Masip, Xavier
Arora, Disha	Figueiredo, Bruno
Aydemir, Esin	Fontes, André
Baierwick, Rebecca	Gadolla, Máté
Ballbé, Andrea	Galindo González, Julián
Belloch Forestal	Galli, Paula
Berigüete Alcántara, Fanny Esther	Gamiz Sanchez, Marta
Blanes, Clàudia	Ganem, Bruno
Bono Cremades, Javier Alfonso	Garcia Ruiz, Marc
Bordonau, Josep	Garrido, Juan
Caicedo, Angélica	Gené, Mar
Camila Olaya, Maria	Gomez, Llúcia
Campos, Tatiana	Goula, Adrià
Capra-Ribeiro, Fabio	Grau, Jaume
Caradonna, Francesco	Guallart, Vicente
Carli, Paolo	Guilemany, Roger
Carrasco, Eduard	Hadley, Alexander
Carvalho, João	Hegyi, Fanni
Casamor, Carles	Herraiz G. de Guadiana, Pablo Rafael
Casbolt, Charles	Hofstadt, Anton
Casorrán, Silvia	Hörburger, Christa
Catalan, Paula	Ibáñez, Daniel
Chirag Shah, Roshni	Ibiyemi Awosika, Illeti Tutu
Choudhary, Prasad	Inés, Juan Carlos
Costa, Xavier	Kalaitzoglou, Liana
Crippe, Davide	Kenny Russe, Romain Jacques
Cruz, Paulo J.S.	Kerubo Gichuki, Zani
De Rossi Estrada, Marco	Kezes, Zsófi
Di Prete, Barbara	Kostandinovic, Neda
Díaz, Noel	Kostrzewa, Jacek Antoni
El Batrik, Mona	Kovács, Kristóf

Kruppa, Levente
Kurt, Selen
Labastida, Marta
Llopis, Mercè
Lonardo, Emilio
López Rancaño, Adrian
Maia, Carlos
Matilla, Xavier
Mayorga Cárdenas, Miguel Y.
Mehrez, Diana
Menon, Ranjit
Miquel, Ariadna
Modi, Shagun
Montes, Toni
Monticelli, Carol
Moreno, Emma
Moreno, Joan
Murphy, Eleanor
Najman, Bartłomiej
Nejatii, Fatemeh
Nieri, Paloma
Ojeda, Marina
Oliveira, Ivo
Olmos, Nicolás
Orlof, Dorota
Paez, Roger
Pagès, Laia
Paniagua Abreu, Patricia
Pap, Dávid
Penido, Jose
Perera, Iván
Pifarré, Laia
Pineda, Pedro
Poza López, Cristina
Prabhuram, Amritha
Procaccini, Giulia
Punjawayteglu, Pongpol

Pázmán, Dániel
Pérez Rivera, Mónica Irene
Queralto, Jordi
Quintela, Cláudia
Ramlal Sarote, Kshitij
Rebaglio, Agnese
Reyes Solis, Ignacio
Riba de Palau, Eduard
Ribeiro, João
Ribeiro, Samuel
Rijnieks, Krisjanis
Rodiqi, Engjëll
Rodprasert, Suwapat
Rodríguez, Jorge
Rodríguez Cantalapiedra, Inmaculada
Rubio Paredes, Andrea Paola
Salka, Michael
Santandrea, Chaira
Schiavello, Raffaele
Scrugli, Patrizia
Serra, Mia
Sevilla, Paulina
Shaban, Morgie
Sitges, Albert
Stanga, Davide
Sunil Mhamunkar, Akshay
Szklarczyk, Agnieszka
Sánchez, Eloi
Tian, Yangchuan
Tilli, Livia
Torrent, Francesc
Tremosa, Judith
Vad, Qhosha
Vakalopoulou, Daphne
Valarezo, Cristina
Vallecillo Riksheim, Leif-Andres
Valtchanova, Manuela

Vaneva, Leda
Verdugo Pelaez, Rachael Margaret
Wanjiru, Lillian
Whittaker, Tiffany
Wienkämper, Philipp
Xi Lim, Kevin
Zeima, Osama
Zhang, Amber

FURNISH PROJECT ENTITIES

Aalto Fablab
Aalto University
Agenzia Mobilità Ambiente Territorio (AMAT)
Ajuntament de Barcelona
Alberch
Brava Performing Arts
CARNET
Comune di Milano
Câmara Municipal de Guimarães
EIT Urban Mobility
Elisava Barcelona School of Design and Engineering
Escola Antoni Brusi
Escola Casas
Escola de Arquitetos da Universidade do Minho (EAUM)
Escola Entença
Escola Provençals
Escola Sagrada Família
Fablab Budapest
GLS Prefabricats
I+D+Arq R&D
Institute for Advanced Architecture of Catalonia (IAAC)
Ideas - Bit Factory
Instituto de Design de Guimarães (IDEGUI)
INS Barri Besòs
MAUSA
Politecnico di Milano
Scuola Tito Speri
Tallfusta
Universitat Politècnica de Catalunya - BarcelonaTech (UPC)
Universitat Politècnica de València (UPV)
UNPark

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FURNISH Project coordinator:



FURNISH Project partners:



Elisava Research



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FURNISH is the acronym of Fast Urban Responses for New Inclusive Spaces and Habitat, a project centred on transforming streets by repurposing them. The project was born during the COVID-19 pandemic, when the emergency triggered the need to creatively reframe the general understanding, not only of our behaviour, but also of our environment. Public spaces should evolve and become more inclusive places for everyone, especially for the most vulnerable. Under these challenging circumstances, FURNISH, a project led by **CARNET**, emerged to rethink the public space, while taking action in an inclusive and necessary manner. This book summarises the project since its inception in 2020, the new methodologies applied to intervene the public space, and the fantastic experimental results. Enjoy the book!



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