

# BUILD SOLUTIONS

## INTELLIGENT LIVING DESIGN

### Symposium and Exhibition REPORT

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## 1 – FOREWORD

### Building Urban Intelligent Living Design Solutions

Cities currently host more than half of the world population, which is projected to increase up to 70% by 2050 (UN, 2014). Already, cities account for 70% of global CO<sub>2</sub> emissions (C40). With the expected population growth, cities would hence be the source of an estimated 85% of global GHG emissions.

There is a growing recognition and awareness that nature can help to provide viable solutions by using and deploying the properties of natural ecosystems and the services that they provide in a smart and 'engineered' way (EC). These living solutions provide sustainable, cost-effective, multi-purpose and flexible alternatives for various objectives. Working with nature, rather than against it, can further pave the way towards a more resource efficient, competitive and greener economy. It can also help to create new jobs and economic growth, through the manufacture and delivery of new products and services, which enhance the natural capital rather than deplete it (EC).

With that in mind, the big question is, why are nature-based solutions not used more to address the global urban challenges?

The main answer would be that there's a distinct skill and financing gap in the biotechnology sector. While we currently have great researchers in biotechnology, too often the commercialization and hence the implementation of their discoveries stumble due to a lack of personal experience in entrepreneurship and cooperation with industry leaders (Fritsch, 2010).

And even when most of those skills are present in a team attempting to commercialize a technology, another obstacle rears its head: the lack of short-term funding available to biotech start-ups and spinoffs (Swamidass, 2008). Recently, the High-Level Group for the European Innovation Council published their first recommendations which state that funding for disruptive, market-creating start-ups with deep-tech solutions (like biotech) is severely fragmented and doesn't meet the needs of the start-ups for developing the technology ([http://ec.europa.eu/research/eic/pdf/eic\\_recommendations\\_set-1\\_2017.pdf](http://ec.europa.eu/research/eic/pdf/eic_recommendations_set-1_2017.pdf)). The lack of funding can be attributed to multiple factors, chief amongst them being the perceived risk and the huge capital expenditures necessary to develop sound biotechnology solutions.

Building Urban Intelligent Living Design Solutions (BUILD Solutions) project aims to set up transdisciplinary cooperation among universities and business, engaging students, teachers and researchers and providing them with the necessary entrepreneurial skills and connections to bring intelligent living solutions to the

market, by investigating biological systems, creating smart design prototypes, business plans, plans for start-ups and working with accelerators.

The project's objective is to develop an experimental transdisciplinary educational system linking biology, intelligent design and business through several kinds of activities, such as courses for students and trainers, symposiums, development of educational resources, the set-up of an accelerator programme, launching an international call for ideas and creating new networks.

The project is co-funded by the Erasmus+ Programme of the European Union.



Living design solutions provide sustainable, cost-effective, multi-purpose and flexible alternatives for several urban challenges.

## 2 – INTELLIGENT LIVING DESIGN Symposium & Exhibition, IAAC

### 2.1. Introduction

The Institute for Advanced Architecture of Catalonia (IAAC) organised and hosted BUILD Solution's final event, the Symposium and Exhibition from 11<sup>th</sup>-12<sup>th</sup> of November 2021 at the CaixaForum, Barcelona (Spain). The Symposium was conducted as part of IAAC's bi-annual, International Responsive Cities Symposium focusing on the future of cities.

The 2021 edition of the Responsive Cities Symposium focused on the theme "Design with Nature". The Opening Exhibition took place on the evening of the 10<sup>th</sup> of November 2021 in IAAC's Main Hall, Barcelona.

**RESPONSIVE CITIES SYMPOSIUM**  
DESIGN WITH NATURE

**11-12 NOVEMBER 2021**

**DESIGN** – bio-design | environmental feedback | collective intelligence  
**BUILD** – reintegrating nature | digital fabrication | new bio-inspired planning paradigms  
**ADAPT** – nature-based solutions | biotechnology | black ecologies  
**PERFORM** – living systems | increased liveability | ecosystem services  
**SHARE** – participatory design | novel virtual environments for co-design | symbiosis  
**LEARN** – new educational models | applied research | making

**Save the Date!**

More info at  
<https://www.build-solutions.org/responsive-cities-symposium-2021-design-with-nature/>

Logos: Co-funded by the Erasmus+ Programme of the European Union, BUILD'S, A. ERSILIA FUNDACIÓ, iaac, WU, UNIVERSITÉ DE LORRAINE, Plant-e, fundació Ersilia, GREENTECH, CITY FACILITATORS, econick

## 2.2. About the Organisers

The Responsive Cities 2021 Design with Nature Symposium and Exhibition was organised by the Advanced Architecture group of the Institute of Advanced Architecture of Catalonia (IAAC) within the framework of the BUILDs Programme.

Symposium Organization:

- General Chair: Areti Markopoulou
- Program Chairs: Chiara Farinea and Mathilde Marengo
- Symposium Coordination: Fiona Demeur

With the support of all BUILDs partners.

Exhibition Organization:

- Exhibition Curator: Chiara Farinea
- Exhibition Coordination: Mohammad Elatab and Fiona Demeur
- Exhibition Fabrication: Ilaena Napier and Mohammad Elatab

## 2.3. Symposium Keynote Speakers & Main Topics

The first day of the Symposium consisted of Keynote speakers from around the world contributing their projects, knowledge and ideas on the topic of Design with Nature. The speakers were divided into sessions based on their topics or expertise. Each gave a 12 minute presentation before engaging in a round table discussion moderated by an IAAC faculty and an invited guest. The presentations were very well received and the round table discussions sparked interesting conversations. Below is a list of the Keynote Speakers and the topics presented.

Session 1: Nature and Living Cities	
Elora Hardy, from IBUKU	Design with Bamboo
Ana Coello, from Ana Coello Paisaje y Arquitectura	Design with Landscape
Belinda Tato, from Ecosistema Urbano	Design with People

Session 2: Nature and Technology	
Mitchell Joachim, from TerreformOne	Design with Life
Petra Gruber, from Transarch	Design with Biomimetics
Chiara Farinea, from IAAC / Advanced Architecture Group and Head of EU projects	Design with Living Systems
Marcos Cruz and Brenda Parker, from UCL / Bio-ID	Design with Biology

Session 3: Nature and Symbiotic Ecosystems	
Skylar Tibbits, from MIT Self Assembly Lab	Design with Oceans
Feifei Zhou, coeditor of Feral Atlas	Design with Species
Daniel Christian Wahl, from Sustainability Consultancy Innovation Education	Design with Regeneration in Mind
Jonathan Minchin, from Valldaura Labs / E.I Ecological Interaction	Design with Ecology

The first day ended with a round table discussion with educators from across Europe in the field of design on the topic of Design with Nature. Each person gave a short statement on the topic before engaging in a discussion moderated by Mathilde Marengo and Angelos Chronis. Below is a list of all the participants in the Education Round Table.

Design with Nature Education Round Table	
Anna Ramos	Fundacion Mies van der Rohe
Areti Markopoulou	IAAC / Advanced Architecture Group

Claudia Pasquero	Universitat Innsbruck / The Bartlett UCL
Martha Thorne	Dean IE School of Architecture and Design / Black Spectacles / Society of Architectural Historians
Mette Ramsgaard Thomsen	Head of CITA / The Royal Academy of Fine Arts School of Architecture
Jose Pedro Sousa	Faculty of Architecture University of Porto / HRLT New European Bauhaus

The second day was dedicated to showcase the work of BUILDs and for those who submitted a paper in the Call for Papers to present their work. In the BUILDs session, each of the project partners gave a short presentation on their work or on the topic of nature-based solutions, before engaging in the round table discussion. The Call for Papers section was broken down into 4 sessions - Design & Adapt, Build, Learn & Share and Perform. More details about the Call can be found below.

## 2.4. Call for Papers

The Call for papers was launched at the beginning of August, asking for papers addressing the following topics:

- DESIGN:** bio-design | environmental feedback | collective intelligence
- BUILD:** reintegrating nature | digital fabrication | new bio-inspired planning paradigms
- ADAPT:** nature-based solutions | biotechnology | black ecologies
- PERFORM:** living systems | increased livability | ecosystem services
- SHARE:** participatory design | novel virtual environments for co-design | symbiosis
- LEARN:** new educational models | applied research | making

The Call was disseminated across different online platforms including the BUILDs Website, Responsive Cities Website, ArchDaily, Docomomo, among others.

The first phase included a submission of an extended abstract which was blindly reviewed by IAAC faculty. A total of 39 extended abstracts were submitted. After reviewing the extended abstracts, 26 participants were selected to submit their final paper, in addition to those IAAC invited to submit a paper for the symposium.

Those that submitted the final paper were asked to prepare a 5 minute presentation of their paper, to present at the symposium. Half of the participants managed to travel to Barcelona to present live at the symposium, while the other half

prepared video presentations, and then, participated live in the round table discussions.

The work presented demonstrated the vast ways in which we can design with nature and covered a range of topics from computational design to tree planting techniques. Participants included students, faculty, researchers and PhD candidates from each continent.

Call for Papers: Design & Adapt	
Filippo Nasseti (UCL & MHOX) & Vincenzo Reale (ARUP)	Thalassic Masks
Despina Linaraki (Columbia University & Griffith University)	Growing Living Bridges in Mumbai, Migration of the concept of the living bridge from Meghalaya to Mumbai
William Shivers (University of Virginia)	Preparing Periphery, Towards a Cultural Reparation Ecology in America's Empire
Bianca Andaloro (Università Degli Studi di Palermo)	The Role of Natural Complexity in Adaptive Architecture, Eco-based design: Nature as pattern and architecture element
Marantha Dawkins (University of Virginia) & Nicolas Azel (KPFUI)	Orders of Magnitude, Climate Change and Disequilibrium Design
Firas Safieddine (Neurotechx, Guallart Architects)	Electrical Ecologies, Architecting neural ecologies, from the cerebral to the planetary

Call for Papers: Build	
Nyan Linn Aung (Blue Temple)	CFD Design Solution in Drainage of Yangon, Myanmar, Drainage Upgrade
Kevin Matar (theOtherDada)	theOtherForest, A nature-based tool for ecological and social regeneration

Ioana Giurgiu (Griffith University)	Integrated Urban-Wetland Systems, A system thinking conceptual planning and design method
Ilaena Napier (IAAC)	Amber Luminaria, Additive Manufacturing of Seaweed as a Biocomposite Material
Raquel Lopes (ISCTE-IUL)	Hybrid Environments, A Timeline of Exploratory Nature Based Approaches in Spatial Practices
Jonathan Hernandez (IAAC)	Now AI, Data-driven web interface for inclusive & responsive cities
Kaitlin Reed (Wearable Technology Designer)	Beyond Biomimicry, Creating a balance between humans, computers and the natural world through wearable interfaces designed by nature
Fiona Demeur (IAAC & Advanced Architecture Group)	Nature-based Retrofitting Solutions to Provide Ecosystem Services, A Case Study of Plant Your Future

### Call for Papers: Learn & Share

Qiguan Shu (TU Munich)	Teaching computational approaches in Baubotanik, Developing a design-and-build workflow for a living architecture pavilion
Marcos Antonio Leite Frandoso (University of Passo Fundo)	2050 Scenarios for Cities, Perspectives and proposal of university architecture students in Brazil
Sander van Leusden (University of the Free State)	A holistic transdisciplinary ecofeminist framework: advancing urban South Africa towards more just and sustainable green developments
Stefania-Maria Kousoula & Alvaro Cerezo Carrizo (IAAC)	Rewilding Luxembourg, Collaboration between humans and beavers to fight wetland fragmentation in Luxembourg

Covadonga Lorenzo Cueva (CEU University & Fablab Madrid)	Experimental Participatory Design, Towards the Idea of Nature-Based Urban Environments
Adriana Aguirre Such (IAAC)	Healing Flows, Towards healthy mobility flows
Keshava Narayan & Pedro Manuel Arrozeiro Ribeiro (IAAC)	Urban (AI)D, Aligning Urban Development with UN Sustainable Development Goals using Machine Learning
Nariddh Khean (Austrian Institute of Technology)	Treemapper, A tool development for identifying potential areas for roadside tree planting

Call for Papers: Perform	
Rachel Armstrong (KU Leuven)	Immunological City
Riccardo Palazzolo Henkes (IAAC)	Flowerpowder, a new ecological corridor for pollinators
Hesham Shawqy & German Bodenbender (IAAC)	Farmscapes
Antonio Turanzas (Universidad Veritas Costa Rica)	The Adaption of a Coastal Community in Costa Rica to Climate Change
Katia Perini (Università degli studi di Genova)	ECOLOPES
Eve Nnaji (IAAC)	Water We Talking About? River Dialects

## 2.5. BUILDs Exhibition: Design with Nature Contest

The BUILDs Exhibition: Design with Nature showcased the work developed by the BUILDs Start-ups and other nature-based solutions prototypes. In addition, the

winning project posters from the Design with Nature Contest were also showcased in the exhibition. Below is a list of the prototypes exhibited in Exhibition:

- Epiclay Tile Wall
- aeroSQAIR Moss Panel Wall
- C:aire 3D Printed Column
- Worm Generation Installation
- PlayEco Visualisations
- Food Voltaic
- Root Membrane
- MYCO-Scape
- CGV Green Wall
- Winter Garden Pavilion Model
- Mutualism

The Design with Nature Contest was launched in August and asked participants to design innovative nature-based solutions for the future cities. The winning participant selected by BUILDS Partners would be offered a tuition scholarship for IAAC's MAA program and the top 10 will be published on the BUILDS Website and social media platforms, as well as in the BUILDS final exhibition.

39 submissions were received from around the world, showcasing a wide range of nature-based solutions. Primarily, the submissions came from university students. Submissions included façade systems, masterplans, floating gardens, architectural buildings and architectural elements. The quality of the submissions was outstanding and deciding on the winners was a tough process. In the end, it was decided to showcase 15 of the projects as the quality of projects was so high. In addition, two scholarships for an IAAC educational program were offered due to the quality of the work.

## 2.6. Attendees and Participation

### Exhibition:

The BUILDS Exhibition Opening was open to the public for anyone interested to pass by. There was a constant flow of visitors entering the exhibition for the entire duration of the opening. This included students, faculty as well as people passing by on the street. One of the winning participants from the Design with Nature contest, even travelled especially from Ireland to see her work in the exhibition.

### Symposium:

The Symposium was conducted in person, only connecting speakers virtually who were unable to travel for various reasons. In total, there were approximately 50 participants in the Symposium from across the world. This included Keynote Speakers, moderators, the participants from the call for papers and BUILDs Partners. We were also joined by a member of the IAAC Board of Trustees, a member from the Barcelona Municipality and the BUILDs project officer to kick-off the event.

Over 200 people registered to attend the in-person Symposium with more than 150 of those registered, attending the two day symposium. Attendees included students, researchers, designers, IAAC alumni and professionals. Due to regulations, the attendees were asked to register before the event using Eventbrite.

### 3 – OUTPUTS

#### 3.1. Programme

The BUILDs Exhibition: Design with Nature Opening was held on the evening of the 10th of November 2021, from 17.00 to 21.00.

The Responsive Cities Symposium was a two-day event starting on the 11th of November and finishing the 12th of November 2021. The two day program can be found below and [here online](#).

DAY 1 (11 <sup>th</sup> November 2021)	
8.00 - 8.30	Registration for the Symposium
8.30 - 8.40	Welcome Andreu Mas-Colell - IAAC Board of Trustees
8.40 - 9.00	Introduction Areti Markopoulou - Symposium Chair Eleonora Cavallero Brambilla - Erasmus + Programme Ramon Canal-Oliveras - Director of the Technical Cabinet for Programming the 2030 Agenda
9.00 - 10.30	Session 1: Nature and Living Cities Elora Hardy Ana Coello Belinda Tato Moderators: Mathilde Marengo Martha Thorne
10.30 - 10.45	Break
10.45 - 12.15	Session 2: Nature and Technology Mitchell Joachim Petra Gruber

	Chiara Farinea Marcos Cruz and Brenda Parker Moderators: Pedro Sousa & Alexandre Dubor
12.15 - 12.45	Lunch Break
12.45 - 14.15	Session 3: Nature and Symbiotic Ecosystems Skylar Tibbits Feifei Zhou Daniel Christian Wahl Jonathan Minchin Moderators: Areti Markopoulou & Olga Subiros
14.15 - 15.00	Education Round Table Anna Ramos Areti Markopoulou Claudia Pasquero Martha Thorne Mette Ramsgaard Thomsen Pedro Sousa Moderators: Mathilde Marengo and Angelos Chronis
16.00 - 17.00	Visit the BUILDS Exhibition
17.30 - 19.00	Visit the Valldaura Labs
19.00 - 11.00	Social Dinner at Green Leka

## DAY 2 (12<sup>th</sup> November 2021)

9.00 - 10.00	BUILDS Session Chiara Farinea - IAAC Laura Hohoff - WU Catherine Sirguy - UL Marite Guevara - Ersilia Gabrielle Michaudel - Econick Lasse Ankerstrom - GreenTech Innovation Martin Petersen - City facilitators Moderator: Mathilde Marengo
10.00 - 11.00	Session 1: Design and Adapt Moderators: Alex Mademochoritis & Lasse Ankerstrom
11.00 - 11.20	Coffee Break
11.20 - 12.30	Session 2: Build Moderators: Nikol Kirova & Marite Guevara
12.30 - 13.30	Session 3: Learn and Share Moderators: David Andres Leon & Martin Petersen
13.30 - 14.45	Lunch
14.45 - 15.45	Session 4: Perform Moderators: Andrea Conserva and Laura Hohoff

15.45 - 16.00

Closing Comments : Areti Markopoulou

### 3.3. Main results

#### The BUILDS Exhibition

The BUILDS Exhibition: Design with Nature had an opening for 4 hours which was open to the public. The exhibition lasted two days and was very well received. The exhibition showcased the designs and prototypes of the BUILDS Start-ups which drew a lot of attention and questions from the public. In addition, other nature-based solution prototypes from the Design with Nature Contest were also displayed creating discussions amongst attendees. Several people approached the organisational team asking for more information about a specific project and showed great enthusiasm for the work developed.

#### The Responsive Cities Symposium: Design with Nature

The Responsive Cities Symposium brought together attendees and participants from each of the continents of the world, with most participants joining us in-person in Barcelona. The two day event included keynote speakers, key educators and participants from the call for papers. The Symposium lasted 15 hours in total as well as additional activities for the participants who travelled to Barcelona. These additional activities included a visit to the BUILDS Exhibition, a visit to IAAC's Valldaura Labs in the Collserola National Park (Barcelona) and finally, a social dinner at Green Leka, a sustainable restaurant 5 minutes away from the Valldaura Labs.

It was clear that the theme of Design with Nature was very popular and the Symposium touched on many topics related to it. This showcased the opportunities we have as designers, biologists and entrepreneurs to push the boundaries and start impacting the cities and world we live in. Keynote speakers shared with us their wonderful projects from the biology scale to the scale of oceans. In addition, in the Call for Papers participants demonstrated their research and projects including computational design projects, tree planting initiatives to regenerate cities, and methods for teaching the new generations of designers. All the roundtable discussions proved to be a great way for the participants to elaborate and share their insights.

After the Symposium concluded, several attendees introduced themselves to the Symposium Organisational Team asking more information about the BUILDS Project as well as possible collaboration opportunities. The Symposium was a great networking opportunity for all those participating and attending.

### 3.4. Pictures



BUILDs Exhibition Opening Night



Responsive Cities Symposium –  
Day 1



Responsive Cities Symposium –  
Day 2

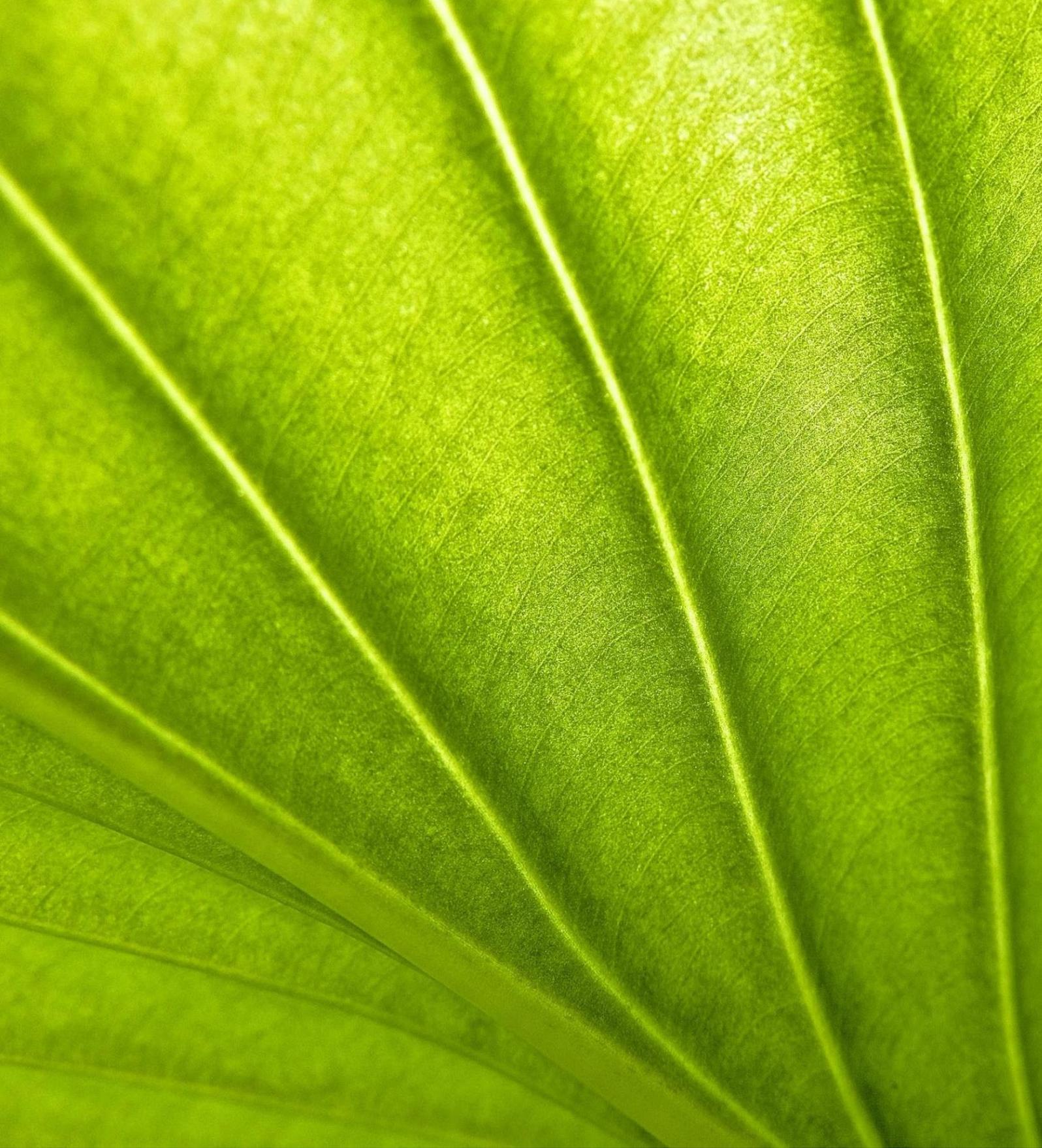
## 4 - CONCLUSIONS AND RECOMMENDATIONS

Both the Symposium and Exhibition were great successes. Attendees were very impressed by the prototypes displayed in the exhibition, especially the work of the start-ups. The Symposium was very well received by the attendees, as they felt the speakers provided great insights as well as the topic of design with nature being very relevant.

For many, this was the first in person event they have attended since Covid-19 international restrictions and therefore, there was also great energy and enthusiasm during the event. Including activities at the end of the first day, such as the visit to the BUILDs Exhibition and a visit to the Valldaura Labs with a social dinner in the Collserola National Park, allowed all the participants to socialise and network with each other. Furthermore, these activities all related to the overall theme of design with nature.



IAAC Valldaura Labs: taking nature as an inspiration for the design of responsive buildings and resilient urban spaces!



Building Urban Intelligent Living Design Solutions, 2018-2021

