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Design for All

Design for All: a Multifactorial Discipline

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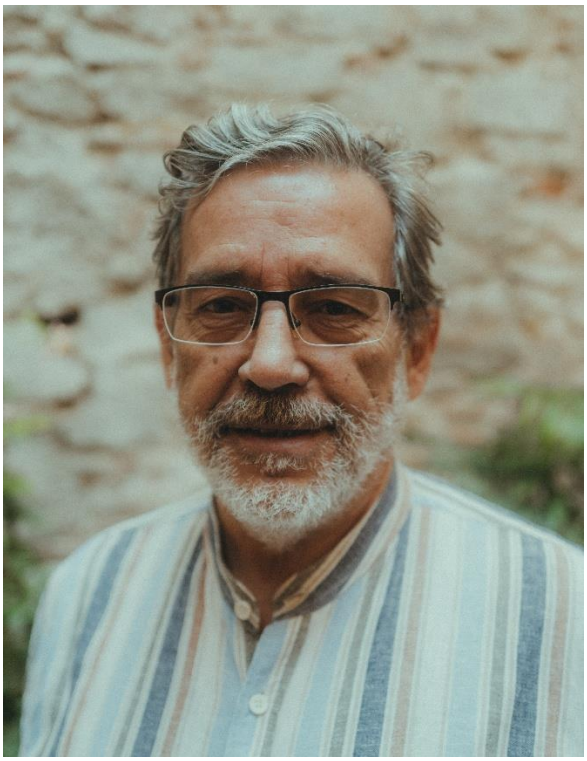

Francesc Aragall

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Expert in Design for All / Universal Design, with 30 years of experience as an international consultant in the areas of urban planning, mobility, tourism and services, ICT, industrial design and building.

Born and living in Barcelona, he began his professional career in the field of ergonomics and biomechanics. With early experience as a dancer and choreographer, he developed a deep, embodied understanding of the human body, movement, and human diversity as a lived reality rather than an abstract concept.

Throughout his career, he has promoted inclusive approaches that place people at the centre of design, education, and social

development. As a pioneer of Design for All and universal accessibility, he has worked internationally to ensure that environments, services, and systems respect human diversity across age, ability, culture, and social background. His work emphasizes that inclusion is not an add-on, but a core value that strengthens social cohesion and long-term sustainability.

After expanding his training in biomechanics, he obtained a degree in Philosophy and Education Sciences, in the branch of Therapeutic Pedagogy, at the University of Barcelona, to deepen his understanding of the psychological processes of learning.

He was Director for Accessibility at Barcelona City Council from 1990 to 1993, being responsible for the preparation of the city for the Olympic and Paralympic Games.

From 1994 to 2000 he designed and was the director of a public consortium responsible for accessibility Barcelona province. and developed the concept of Design for All, which was widely received in Europe and applied in Barcelona's Municipal Plans and subsequently in more than 300 cities in Spain, Portugal, France, and Luxembourg.

At international level, he was president of EIDD – Design for All from 1998 to 2001, in which he is still an honorary member, and participated in many conferences in Europe and America. In 1991, he became a member of the European Concept for Accessibility Network, of which he is still a part.

In 2000, he founded the company ProAsolutions SL in Barcelona, specialising in Design for All consultancy in urban planning and mobility, architecture, industrial design, and service companies. In 2008, he created ProAsolutions.pt Lda, a delegation in Porto, together with his partners Rafael Montes and Nuno Peixoto.

In 2001, he established the "Design for All Foundation", of which he was president, to spread theory, implementation, and good practices worldwide. In 2021, the foundation became the Design for All International Association.

He is also a patron of the Barcelona Creativity and Design Foundation, member of the Board ofIAUD(International Association for Universal Design), based in Tokyo, and member of ASEPAU (Spanish Association of Professionals for Universal Accessibility).

In addition to numerous municipal accessibility and mobility plans, his professional projects include the development of regulations and guides on Universal Design in the United Arab Emirates, Turkey, and Saudi Arabia; participation in the development of European standards; accessibility projects in historic buildings such as the Monastery of Montserrat or the Ramon Llull School; and the design of safety and emergency systems for Ferrocarrils de la Generalitat de Catalunya or Lake Baggerweier in Schengen.

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GUEST EDITORIAL

Happy spring—or happy autumn—to all.

It is a great honour to serve as Guest Editor of the March 2026 issue of *Design for All Institute of India*, and I would like to express my sincere gratitude to Dr. Sunil Bhatia for extending this invitation.

I would also like to acknowledge, with deep appreciation, the valuable contributions of my colleagues and friends—all of them distinguished professionals—who generously shared their expertise through the articles included in this issue.

Design for All, also referred to as Universal Design or Inclusive Design depending on geographical and cultural contexts, aims to ensure that all people, regardless of their individual characteristics, can participate equally in the activities that sustain life and promote both personal and collective development.

Achieving this objective requires a design approach that fully embraces human diversity and actively involves all potential users from the earliest stages of the design process.

Every environment, product, or service is conceived for use within a specific context. Consequently, it is essential to consider not only individual users, but also the interactions established with all the elements that make up that context.

Furthermore, humanity cannot be understood as a closed system.

We inhabit a planet in which multiple interconnected systems—such as flora, fauna, and climatic processes—coexist and continuously interact.

Human activity is undeniably exerting a profound impact on ecosystems, to the extent that the future of life on Earth, including our own existence, is increasingly at risk.

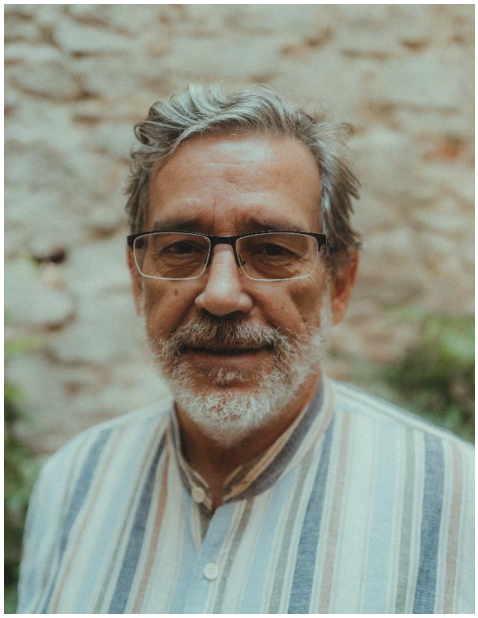
For these reasons, this publication highlights Design for All as a multifactorial discipline, one that integrates human, social, environmental, technological, legal, economic, and ethical dimensions.

While much of the existing literature on Design for All focuses primarily on interactions between individuals and their physical or technological environments, this issue seeks to broaden that perspective by addressing less frequently explored themes, including:

- **Pavement design from ethical and ecological perspectives**
- **Co-creation and participatory processes as drivers of positive change**
- **The transformation of the deeper culture of labour organizations**
- **Strengthening human–animal relationships to promote ecological balance**
- **Biophilic design as a source of well-being**
- **The selection of plant species to enhance emotional balance and user experience**

It is my hope that readers will find the articles in this issue both

insightful and thought-provoking, and that they will feel encouraged to engage further with the authors to explore these topics in greater depth.



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Learning from natural rock: sustainable urban paving

Francesc Aragall

Abstract

Current urban pavements for pedestrian use are the source of numerous safety, hygiene, accessibility, maintenance, ecological and economic problems. Based on a systematic analysis of these problems, the design team of the project, coordinated by the author, studied different types of materials and various manufacturing techniques to try to select a type of pavement and a street design that would solve the problems observed. The analysis of physicochemical characteristics concluded that none solved all the problems, however some types of minerals presented very interesting characteristics, although heterogeneous. This led the team to test the coalescence of mineral particles to create rocks with improved characteristics. From achieving a viable manufacturing method, its application as a sustainable urban pavement was studied.

Key words:

Urban design; pavements; sustainability; stone coalescence; accessibility.

Description of the problem

Access Safety is a company specialized in the development and marketing of technical flooring that was created in 2014. Its main

motivation since then has been to offer flooring that provides accessibility and safety in built environments.

Starting in 2017, the company undertook an in-depth research project on the necessary requirements in urban pavement.

This motivated it to undertake a systematic analysis of urban pavements for pedestrian use based on direct observation and interviews with citizens, urban planners; traffic and security; and construction companies, which allowed the preparation of the following table of problems:

Table 1. Problems in pedestrian pavements and their causes

Problem	**Possible causes**
Pedestrian, cyclist and motorcyclist falls.	**Uneven sidewalks, slippery and excessively sloping pavements are the cause of many pedestrian falls. Paint on crosswalks, especially when wet or poorly maintained, also causes accidents for pedestrians, motorcyclists and cyclists.**
Lack of accessibility in urban space. **In recent years, it has been observed that people who only used public spaces occasionally have now become regular users. The elderly, blind people,**	**The lack of tactile foot signage, poorly executed curb cuts and obstacles on pavements make it difficult for everyone to exercise the right to mobility.**

children, and people with intellectual disabilities or reduced mobility are some of these users.	
Noise pollution.	**Uneven pavements with deep engravings cause both vehicles and people carrying suitcases to generate noise. In addition, these types of flooring cause great discomfort to wheelchair users by causing vibrations.**
Dirty pavements.	**Oil stains, stuck chewing gum and animal droppings are the visible elements of dirt in public spaces, but even without seeing them, the urban space is home to countless bacteria that transmit diseases.**
Lack of adaptation to new modes of mobility. **Pedestrians, bicycles, wheelchairs and personal mobility vehicles of all kinds share the urban space with motorised vehicles for public and private transport, as well as for urban logistics.**	**The lack of compartmentalisation and signage of spaces entails a high risk for all people.**
Degradation of public space.	**Especially in old towns, the original materials degrade, worsening their appearance**

	every day, peeling off and breaking, affecting accessibility, comfort and aesthetics. All this leads to an increasing number of falls, greater noise pollution and less attraction for citizens and visitors.
Heat absorption.	**Dark and thick pavements tend to absorb solar radiation and therefore increase the temperature of the city in hot seasons.**
Excess water in pedestrian areas in case of torrential rains.	**Insufficient drains and slopes and an incorrect proportion between permeable and impermeable pavement, generate an excessive sheet of water in pedestrian areas.In the event of torrential rain, it contributes to street flooding.**
Aesthetic dissonance between the pavement and the environment.	**Use of low-quality or aesthetically unsuitable materials in historic settings and landscaping.**
Breakage of pavement pieces in shared spaces.	**The occasional or frequent passage of heavy vehicles in pedestrian areas causes the breakage of parts.**
Separation and progressive movement of the pavement	**Subbases that are too soft or that suffer from water**

pieces.	**infiltration, as well as the placement of parts without suitable adhesives generates these movements.**
High ecological, economic and labour impact.	**Although it is very different from each type of flooring depending on the origin of the materials and the type of extraction in their original environment, they all have in common a high environmental impact and a high weight, which involves significant efforts in their placement, and a relatively low useful life.**

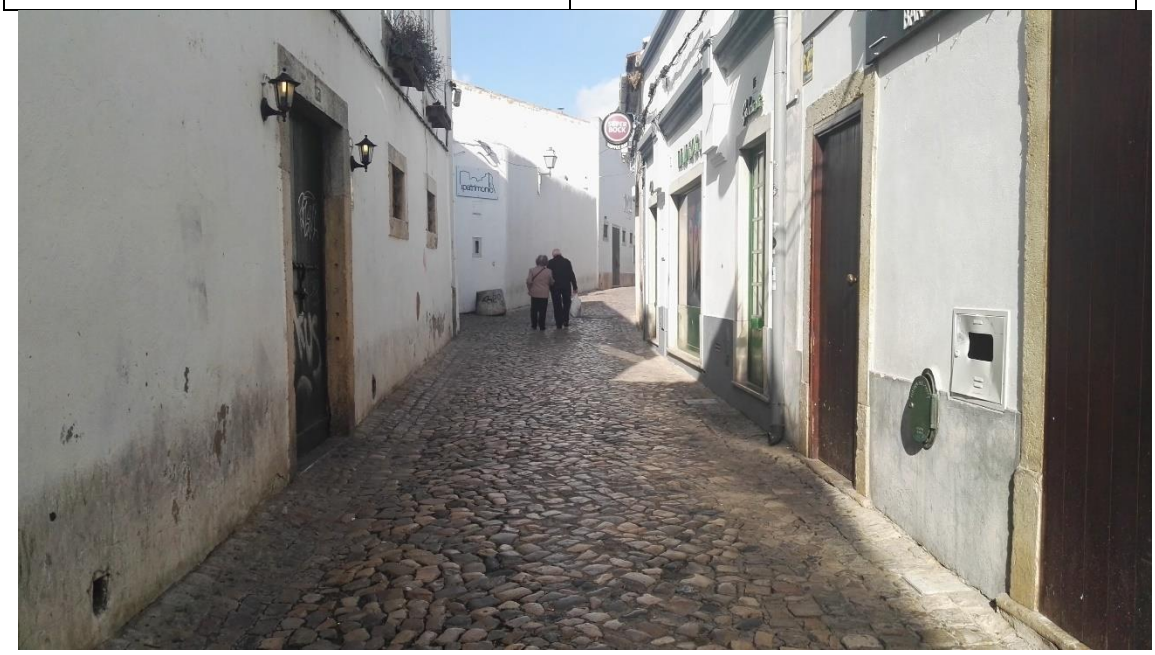

Image 1. Uneven pavement in pedestrian area
Source: Author's elaboration 2019.

Image 2. Uneven paving stones
Source: Author's elaboration. 2019.

Image 3. Pavement breakage due to heavy vehicles
Source: Author's elaboration. 2020.Wear and dirt

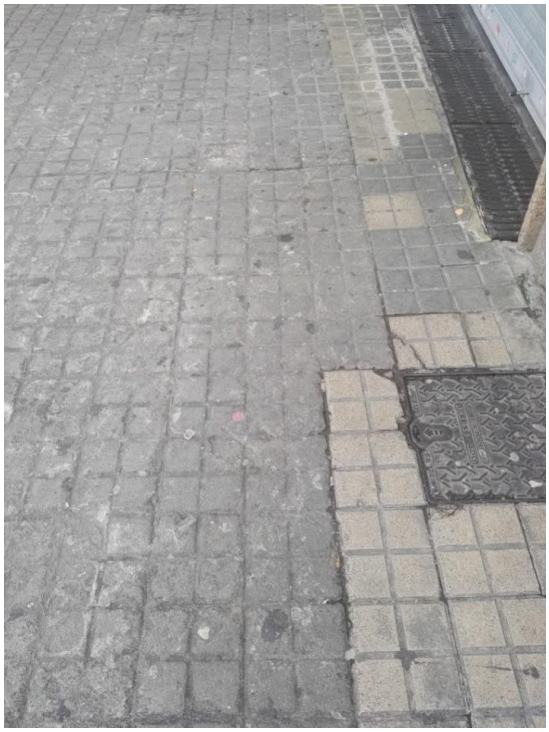

Image 4. Wear and dirt
rce: Author's elaboration. 2019.

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Image 5. Improper bike lane clearance
Source: Author's elaboration. 2020.

From the table presented we can classify the different problems into two groups:

- ***Problems related to the design of urban space.***

  Basically, these are those related to rain drainage, inadequate protrusions and slopes, the distribution of street uses, insufficient visual contrast between the pedestrian route and the rest of the pavement and the lack of visual and tactile signage and, obviously, the selection of inappropriate materials.

- ***Problems related to materials.***

  These are usually due to the use of materials that are not resistant to pressure, wear or stains, excessively absorbent of water and solar radiation; but also, to their placement on unstable basis or by means of inappropriate adhesives.

Although for the first group it is necessary to define a series of recommendations for the design of the public space, for the second it is necessary to analyse the physicochemical behaviour of the different materials used.

Approximation to pedestrian space design criteria

Although the objective of this article is not to delve into the design of urban space, it is proposed to provide here some of the elements that must be considered to guarantee accessibility, safety and drainage of rainwater:

- **All street furniture and signage should be aligned without interfering with the pedestrian route and be located on a strip**

of vegetation along the pavement, with a high capacity to absorb rainwater.

- **Lanes for bicycles and personal mobility vehicles must be located between the line of street furniture and the road, separated either by a change in height, or by physical obstacles.**
- **The longitudinal slope of the streets should not exceed 5% and the transverse slope should be between 1% and 2%.**
- **The pavement intended for the pedestrian route should have a minimum width of 1,8 meters, 1 meter width for each expected simultaneous user and have benches and shaded areas along the route.**
- **The pavement of the area intended for the pedestrian route should be light in tones and present a difference in light reflectance of at least 30 points with respect to the adjacent pavements.**

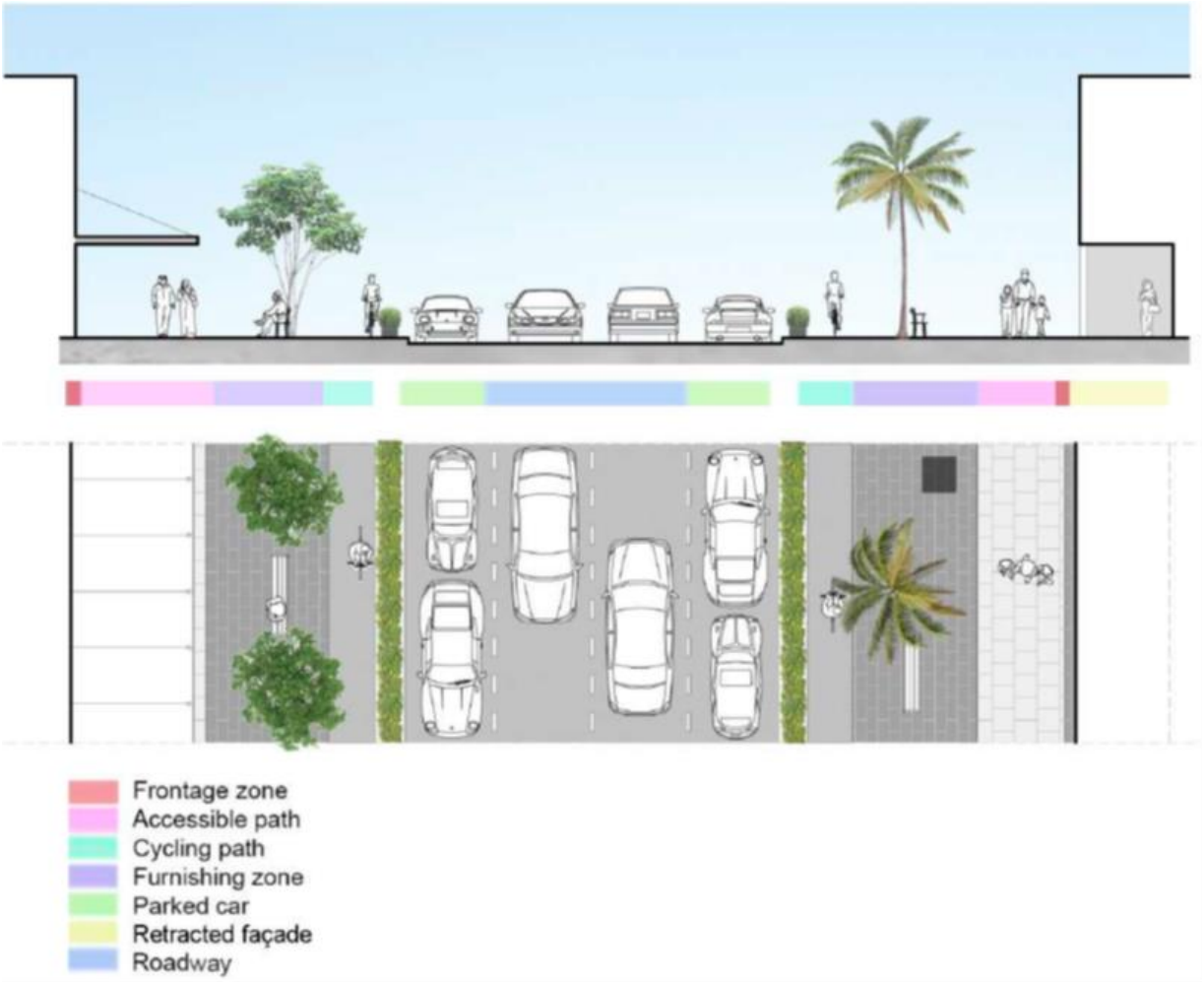

Image 6. Street section with benches and shaded area (UAE Universal Design Code) (UAE, 2020)
Source: Image by the author.

Analysis of the physicochemical characteristics of the installed pavements

When analysing the different materials used in urban pavements, asphalting and continuous concrete pavements have been discarded since, although they are economical, their useful life, in good conditions of cleanliness, preservation of their integrity and non-slip characteristics, is very short.

Pavements on unstable pavements, such as dry laying on a sand base, have also been discarded, since these usually deform and lose their integrity.

Thus, the most common materials for flooring have been grouped into four large groups:

- **Pressed concrete tiles.**
- **Slate slabs.**
- **Granite slabs.**
- **Limestoneslabs.**

To compare them, a set of characteristics considered important was analyzed, which are described below:

- **Mechanical resistance: quantifies the load it can withstand before breaking.**
- **Hardness on the Mohs scale: It measures scratch resistance, on this scale the mineral with the lowest value is talc (1) and the one with the highest value is diamond (10), iron has a value of 4.**
- **Abrasion resistance: Determines potential surface wear from use. The laboratory test determines the wear resistance on a scale of 1 to 5.**
- **Slip resistance: It determines the probability of slipping on a certain material in dry and wet conditions, using a test that simulates the movement of a shoe.**
- **Water absorption: Prevents breakage in the event of frost but also prevents the absorption of dirt.**

- **Stain resistance: Determines the ease of cleaning with different products on a scale of 1 to 5, subjecting the parts to different agents. The highest value indicates that it can be cleaned with water.**
- **Rubber adhesion: Analyzes the ease of adherence of chewing gum. Chewing gum is one of the products that contributes the most to deteriorating the appearance of floors.**
- **Coefficient of expansion: It determines the expansion and contraction movement of materials according to the ambient temperature. A higher value will require larger joints between the pieces.**
- **Medium density: It allows an approximation, among other things, of the necessary weight and thickness of the pieces, although especially in rocks, the density is not usually homogeneous throughout its volume.**
- **Lifespan: It expresses the number of years that the material fulfils the function for which it was created, as well as its appearance. In the case of pavement, it also expresses the number of years during which the pavement is maintained without being replaced.**
- **Albedo: Measures the percentage of radiation that any surface reflects with respect to the radiation that falls on it. A totally black body has an Albedo 0 and an absolute white one an Albedo of 1. The smaller the Albedo, the more the material contributes to global warming and radiates more heat to users.**
- **Resistance to bacteria: Analyzes their bacteriostatic capacity. Depending on porosity, the different materials may or**

may not be bacteriostatic, i.e. they prevent the proliferation of bacteria and, therefore, health risks and unpleasant odours.

Table 2. Physicochemical characteristics of the materials used as flooring

	Pressed Concrete Tile	Slate	Granite	Limestone
Mechanical resistance	300x300x45 8kN	300x600x40 7.9kN	300x600x40 5.5kN	300x600x40 4.7kN
Hardness in the Mohs Scale	4	3	5.5>7	3
Abrasion wear	CLASS 4	CLASS 4	CLASS 5	CLASS 3>4
Slip resistance	40>65	40>60	40>60	40>60
Water Absorption	<6%	0,4%>1,8 %	<1.6%	2%>6%
Stain resistance	CLASS 1>4	CLASS 2>4	CLASS 1>5 depending on the type of granite	CLASS 1>4
Chewing gum adhesion	Adheres	Adheres	Adheres	Adheres
Coefficient of expansion	± 11x10-6 °C-1	± 11x10-6 °C-1	± 10x10-6°C-1	± 12x10-6 °C-1
Density	2.4g/cm3	2.4>2.9g/cm3	1.7>2.4g/cm3	1.9>2.7g/cm3
Lifespan (years maintaining anti-slip	<15	>15	>15	>15

characteristic and appearance)				
Albedo	**0.10>0.35**	**0.10>0.20**	**0.12>0.18**	**0.30>0.45**
Resistance to bacteria	**No**	**No**	**No**	**No**

Source: Author'selaboration

As can be seen from the comparative table, in which the most favourable characteristics have been highlighted in green, no material satisfactorily solves all the problems described. So, what characteristics should urban pavement have to meet all the needs of users and installers?

Desirable characteristics in materials used as urban pavement

For a better analysis, these characteristics were grouped according to the three typical components of sustainability: social, environmental and economic aspects.

Social aspects:

- **Present and maintain a high resistance to slipping throughout its useful life. Therefore, a surface that remains above a value of 70, dry and wet, in the pendulum test.**
- **Guarantee the integrity of the pavement throughout its useful life (to prevent falls and deterioration of urban space). That is, an abrasion resistance of 5.**
- **Resist stains, gum and bacteria. Non-porous and easy to clean with water.**

- **Resist pressure from vehicles and heavy loads. Breaking strength greater than the 8 kN of pressed concretetiles.**
- **Reduce noise pollution. No surface roughness or need for major joints.**
- **Reduce installation and cleaning efforts.**
- **Lighter thancurrentfloors.**
- **Present and maintain an appearance compatible with any urban environment and design requirements. Therefore, allowing the application of different colors and textures.**
- **Improve accessibility for users with limitations. For example, allowing the inclusion of grooves or buttons for guidance and warning of hazards to people with low vision.**

Ecological aspects:

- **Prevent the deterioration of natural environments. Avoid materials extracted in natural environments.**
- **Maximize the use of recycled materials.**
- **Minimize the use of energy and water in its production, packaging, transportation, placement and maintenance.**
- **Minimize their contribution to global warming. Therefore, it should have a high Albedo.**
- **Maximize the useful life of the pavement. It should ensure that it maintains its characteristics and appearance unaltered, at least for 25 years.**
- **Minimize packaging and the use of plastic.**
- **Maximizere cyclability.**

Economic aspects:

- **Reduced installation and maintenance costs.**

- **Competitive price.**
- **Present great structural resistance to cold and hot climates. And, therefore, not be porous.**

Stone coalescence and its manufacture

After analysing and discarding various types of natural and artificial materials (improved concretes, rocks with high quartz content, metal pavements, asphalt agglomerates, ceramics, etc.) we observed that minerals in isolation have some of the desired characteristics and that their combination in some igneous rocks, such as some specific types of granite and basalt, have characteristics very close to desirable. However, both its location in specific parts of the planet and its lack of homogeneity led us to rule out this option.

In this selection process, we were struck by quartzite, a metamorphic rock consisting of recrystallized sandstone rich in quartz, very common in the Iberian Peninsula, more homogeneous and hard than granite, as well as less porous. In addition, we discovered that this was the rock used preferentially for the construction of Roman Empire roads (a large part of which still exist) in the Iberian Peninsula.

The fact that this rock is the product of recrystallization and that this means an improvement in its qualities, led us to study it more carefully and to investigate if there was any industrial process with similar characteristics.

This is how we learned about mineral particles coalescence, which consists of compacting several stone powders under high pressure

and, once compacted, performing a heat treatment, at a temperature lower than the melting temperature of the mixture, obtaining a consolidated and compact piece.

This manufacturing process provides great cohesion of the powders, creating strong bonds between the particles, which end up joining together in a single block in the shape of a mould.

The fact of knowing this procedure led us to study the possibility of obtaining rocks industrially, since, if their formation in nature is the result of compaction and heating over millennia, it might be possible to achieve the same result.

Since the industrial process of ceramics basically consists of pressing and firing clays, we established a collaboration agreement with several companies to test our hypothesis.

So, using their facilities, we analyze the quartzite components, formulate an analogous mixture of pulverized minerals, amalgamate them homogeneously, and subject them to high pressure and quasi-melting temperatures.

After several tests, the result was to obtain a rock almost identical to natural quartzite with improved physicochemical qualities thanks to the homogenization of its components and the balanced application of pressure and heat.

Once the size of the particles and the necessary pressure and temperature have been determined, we test with the components of other rocks such as granite, basalt and various types of sandstones, as well as the components of concrete. In all cases, the results were rocks similar in appearance to the original, but with improved

physicochemical characteristics. A thickness of 20 mm was determined for the manufacturing process because it was estimated that this would provide sufficient strength for heavy vehicles to travel on it.

Thus, samples of a set of rocks produced were taken and subjected to the same tests to which the pavements were subjected, obtaining the results shown in the following table, in which it should be considered that the samples examined had half the thickness of the pavements compared.

Table 3. Comparison of physicochemical characteristics of Induced Coalescence Stone with materials used as urban pavement

	Concrete Tile	Slate	Granite	Limestone	InducedCoalescencestone
Mechanicalresistance	300x300x45 8kN	300x600x40 7.9kN	300x600x40 5.5kN	300x600x40 4.7kN	300x600x20 14.18 kN
Hardness in the Mohs Scale	4	3	5.5>7	3	9
Abrasionwear	Class 4	Class 4	Class 5	Class 3>4	Class 5
Slip resistance	40>65	40>60	40>60	40>60	>70 wet and dry
Water Absorption	<6%	0,4% >1,8 %	<1.6%	2%>6%	<0.02%
Stain resistance	Class 1>4	Class 2>4	Class 1>5	Class 1>4	Class 5

			depending on the type of granite		
Chewinggumadhesion	Adheres	Adheres	Adheres	Adheres	Does notstick
Coefficientofexpansion	± 11x10-6 °C-1	± 11x10-6 °C-1	± 10x10-6°C-1	± 12x10-6 °C-1	± 6.5x10-6°C-1
Density	2.4g/cm3	2.4>2.9g/cm3	1.7>2.4g/cm3	1.9>2.7g/cm3	2g/cm3
Lifespan (years maintaining anti-slip characteristics and appearance)	>15	>15	>15	>15	>50
Albedo	0.10>0.35	0.10>0.20	0.12>0.18	0.30>0.45	0.10>0.35
Resistanceto bacteria	No	No	No	No	Bacteriostatic

Given the excellent results obtained, which showed that it met all the desirable characteristics in an urban pavement, the economic viability of the manufacturing process was analyzed. A first approximation allowed us to estimate that the manufacturing costs were slightly or much lower than the production costs of natural stone, depending on the type of stone and very similar to those of manufacturing concrete slabs.

Design and prototyping

Once the commercial viability of this new product was established, the design and production of samples was carried out.

When selecting the stones to be reproduced, their beauty and application in urban environments were considered, but also the impossibility of current extraction or the environmental impact that this would entail.

Thus, the rocks of Pamukkale in Turkey, the basalt of the Svartifoss waterfall in Iceland, the granite of Mount Rushmore in the United States, the sandstone used in the pyramids of Gizah in Egypt and the sandstone of Montjuïc in Barcelona, used from Roman times until its closure in the middle of the 20th century, were selected. both for the construction of buildings and for paving the old town. It was also decided to reproduce the pressed concrete slabs commonly used in the streets of Barcelona.

Image 7. Pamukkale Landscape
Source:Wikipedia. Antoine Tavenaux, available at https://es.wikipedia.org/wiki/Archivo:Pamukkale_30.jpg.

Image 8. Svartifoss Waterfall
Source: Wikipedia. Andreas Tille, available at https://commons.wikimedia.org/wiki/File:SvartifossSummer.jpg.

Image 9. Mount Rushmore
Source: Wikipedia. B.Badgett, available at

***https://commons.wikimedia.org/wiki/File:Mountrushmore.jpg*.**

Image 10. Pyramids of Gizah
Source: Wikipedia. Ricardo Liberato, available at
***https://commons.wikimedia.org/wiki/File:All_Gizah_Pyramids.jpg*.**

Image 11. Temple of the Sagrada Familia
Source: ***Wikipedia. Sagrada Familia, available at***

https://commons.wikimedia.org/wiki/File:Passion_Facade_of_the_Sagrada_Fam%C3%ADlia_(6).jpg.

Image 12. Tipicalpavement in Barcelona
Source: ***Wikipedia. Francesc Bonnin, available at https://commons.wikimedia.org/wiki/File:Panots_de_Barcelona.jpg.***

Subsequently, the components of all the selected materials were photographed and analyzed to reproduce them as accurately as possible.

In the case of pressed slabs, the design was improved, as the indentations on the surface, made to maintain a certain degree of slip resistance when the piece begins to wear, also generate noise when suitcases or trolleys are rolled over them. Since the new material made the indentations unnecessary, it was redesigned to prevent noise.

A system of indentations for Svartifoss basalt and Pamukkale limestone was also designed so that they could be used as a guide for blind people at pedestrian crossings. In this case, a usability test

was carried out to collect data on possible improvements before its final design.

Image 13. Usability test of the guide for blind people at pedestrian crossings Source: Photo by the author.

Finally, samples of the different models were manufactured from the designs, which, when subjected to the laboratory tests, described above, obtained identical results.

Image 14. Pamukkale Sample
Source: Photo by the author.

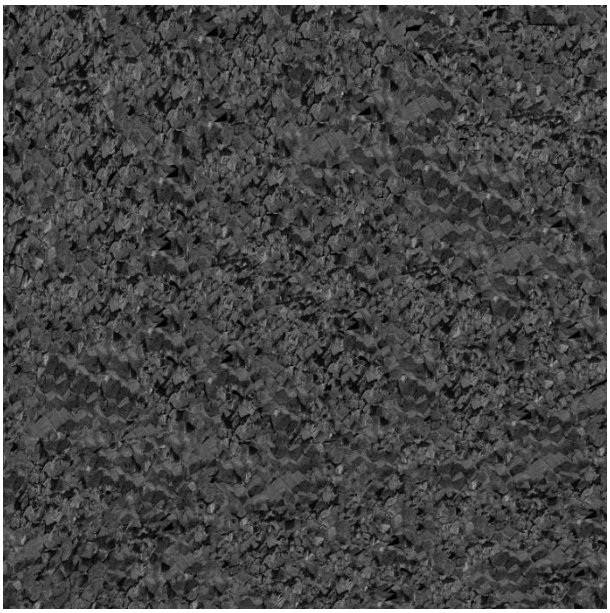

Image 15. Svartifoss Sample
Source: Photo by the author.

Image 16. Rushmore Sample
Source: Photo by the author.

Image 17. Gizah Sample
Source: Photo by the author.

Image 18. MontjuïcSample
Source: Photo by the author.

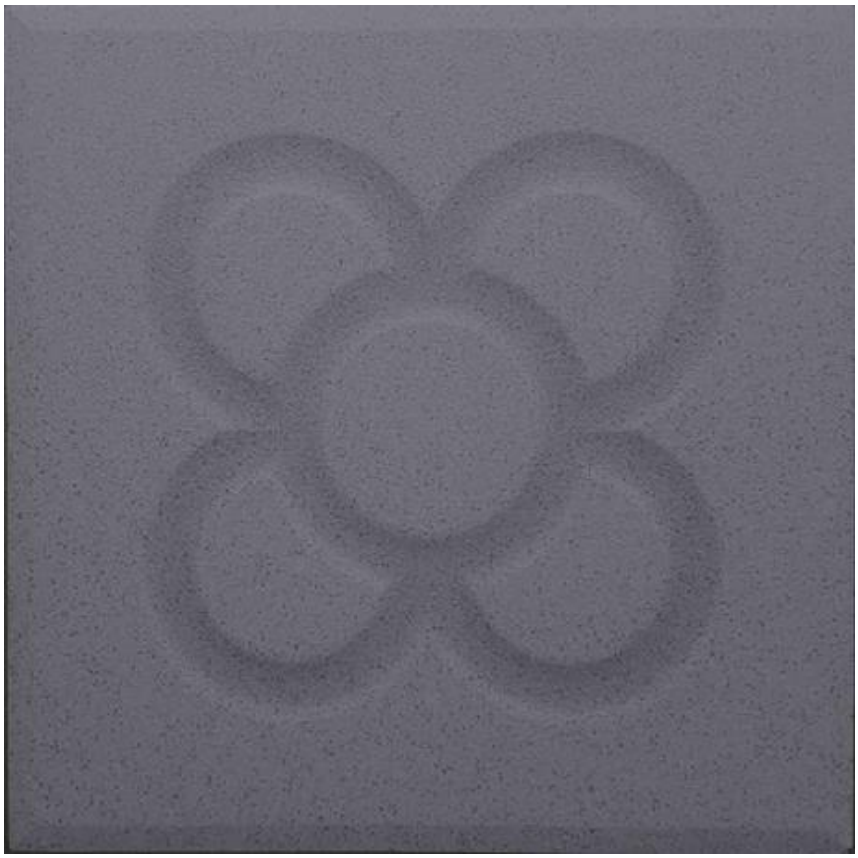

Image 19. Silent Sample for Barcelona
Source: Photo by the author.

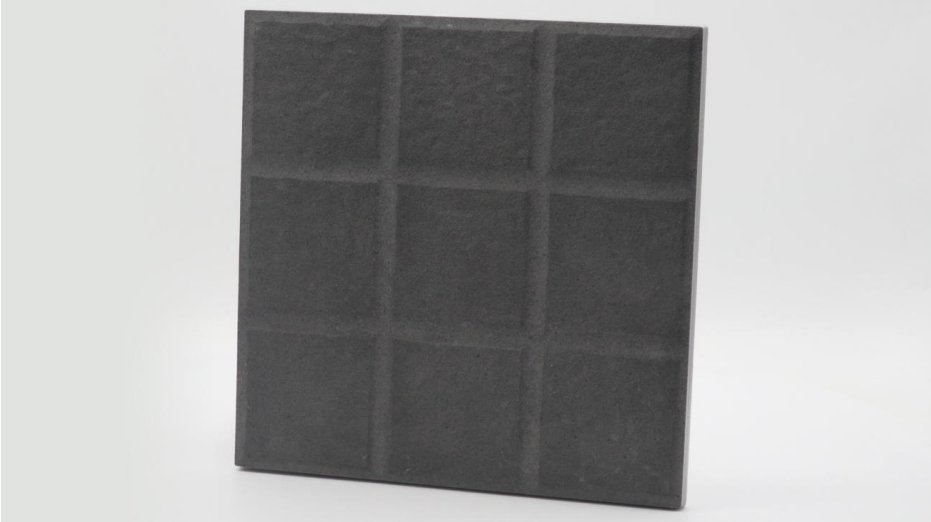

Image 20. Silent 9-squares sample
Source: Photo by the author.

Results

In view of the results, Access Safety decided to start marketing this new product.

To date, the materials have been installed in several municipalities, with excellent results, withstanding ice, steep slopes, intensive use and dirt.

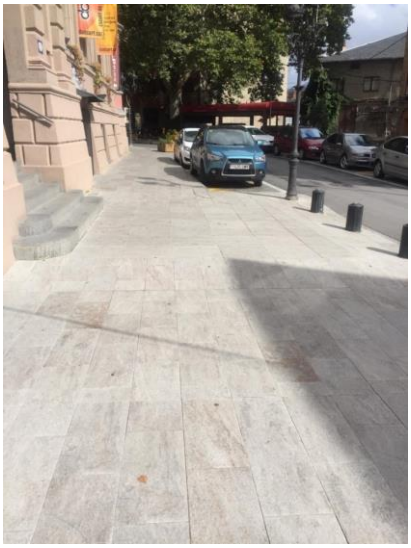

Image 21. Rushmore parts installed in urban space
Source: Photo by the author.

Image 22. Montjuïc tiles installed in a historical environment
Source: Access Safety.

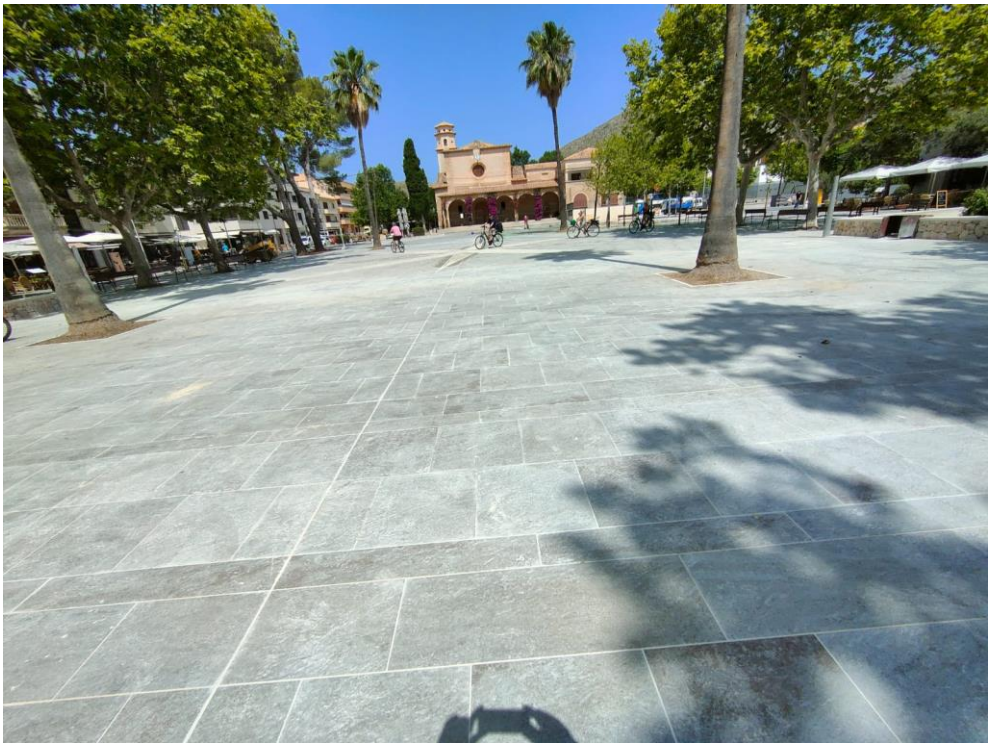

Image 23. Installation in Pollença Main Square in Mallorca
Source: Access Safety

When presenting the product, several municipalities made the demand to design induced coalescence stones**emulating the natural stone they had used to date. To do this, we studied and were able to verify that it is possible to meet this demand (to date one type of marble and two types of sandstone have been reproduced), verifying that the process of design and manufacture of specific stones is economically viable from about 3.000m2.**

In conclusion, it can be said that, inspired by nature, we have developed a product that helps to protect it, while improving cities for people, since:

At environmental level

- **Prevents erosion and waste that quarries produce in the natural environment.**
- **Achieves 0 waste in the production process.**
- **Integrates recycled materials and quarry waste as part of its components.**
- **Reduces the pollution produced by transporting them, because the material is produced in factories based in Fujian (China), Morbi (Gujarāt, India) and Modena (Italy) to reduce the distance to the clients and with the same energy consumption, it is possible to transport up to 5 times more square meters than other materials.**
- **Contributes to the environmental efficiency of urban space and buildings, since the long-life cycle of our products is more than 50 years and their recyclability is 100% at the end of their cycle.**
- **Avoids the use of detergents in urban space.**

- **Reduces the warming effect of urban pavements.**

At economic level

- **Reduces the time it takes to lay the flooring, as its lower weight facilitates the tasks of transport on site and its placement.**
- **Provides the same aesthetic qualities as natural stone with greater durability and lower cost.**
- **Drastically reduces maintenance and cleaning costs, for example in wages, machinery and detergent products.**
- **Ensures its durability in any climate, by increasing its resistance to cold and warm weathers.**

At social level

- **Helps prevent accidental falls of pedestrians, cyclists and motorcyclists, as well as collisions, traffic and work accidents.**
- **Reducesnoisepollution.**
- **Eliminates the presence of bacteria, stains and odors on urban pavement.**
- **Reduces the positioning efforts of operators.**
- **Improves the aesthetic aspects of public space and buildings.**
- **Adapts the product to local tradition and design criteria, bringing the aesthetic characteristics of our products closer to the customer's needs.**

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The Transformative Role of Design in Urban Development: The Case of the Ceará Design Center - Kuya

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ABSTRACT

The role of design in sustainable urban development is examined through the Ceará Design Center – Kuya, located in Fortaleza, the capital city of the state of Ceará, Brazil. Inaugurated in 2022, Kuya represents a public design policy aimed at promoting social inclusion, strengthening the creative economy, and fostering environmentally sustainable practices, directly impacting more than 35,000 people. The term Kuya derives from the Tupi-Guarani expression Mara Kuya, referring to the fruit that serves, symbolizing the center's commitment to serving society. The center operates as a platform connecting culture, innovation, territory, and public policy, highlighting the strategic potential of design in urban transformation processes. By integrating past and contemporary design policy frameworks, Kuya demonstrates how design can be strategically mobilized to support more inclusive, resilient, and sustainable

development models, in line with the United Nations Sustainable Development Goals (SDGs).

Keywords: ***Design; Sustainability; Innovation; Sustainable Development; Citizenship*.**

Introduction

Design for All has moved from a specialized concept focused on accessibility to a broad framework for inclusive development. Influenced by debates on social equity, human rights, and participatory governance, this approach situates design at the intersection of creativity, social justice, and urban policy. It challenges traditional hierarchies in design — transferring agency from experts to communities and prioritizing lived experience, diversity, and environmental stewardship. This shift echoes global commitments such as the UN Sustainable Development Goals (SDGs) and the New Urban Agenda, which emphasize inclusivity, resilience, and citizen participation in shaping urban futures.

Historically, design has been used to generate marketable artifacts, streamline production processes, or enhance user experience. However, the urgency of contemporary urban challenges — from spatial segregation to climate vulnerability — requires design to operate at systemic levels, redefining its purpose as a civic and public good. In this light, design becomes a means not only to solve discrete problems but to reframe how cities are imagined, governed, and lived.

In Brazil, this transformation began to gain institutional shape in the 1990s through the creation of state-level design centers under the Programa Brasileiro do Design (Brazilian Design Program). I had the

opportunity to actively participate in this program, contributing to public strategies that positioned design as a tool for regional development and social inclusion. That experience deepened my understanding of design as a vector for territorial regeneration and helped inspire the values that underpin the Ceará Design Center – Kuya[1].

This article focuses on Kuya, a pioneering public design initiative in Fortaleza. Positioned in the heart of the city, Kuya represents a sustained attempt to embed inclusive design within urban strategies that intersect culture, education, community participation, and socio- economic regeneration. By exploring its genesis, practices, and challenges, the article contributes to international discussions on design in public governance and offers a model for other cities in the Global South and beyond.

Figure 1 – Photo set of the Kuya Design Center – Photo by the author.

[1] *https://institutomirante.org/kuya-centro-de-design-do-ceara/*

2. Context and Origins: Fortaleza and the Historic Downtown

Fortaleza, the capital of the state of Ceará in northeastern Brazil, is home to more than 2.6 million people and is characterized by striking socio-spatial disparities. The historic downtown area, once the center of economic and cultural life, suffered decades of disinvestment during the late 20th century. As middle-class populations relocated to suburban developments, public spaces in the core became neglected, businesses closed, and cultural institutions struggled to maintain relevance. This pattern reflects broader trends in Latin American metropolises, where inner cities increasingly became arenas of exclusion rather than hubs of interaction.

Urban revitalization efforts in many contexts have prioritized real estate investment and infrastructure upgrades, often ignoring the needs and aspirations of existing residents. Such approaches frequently lead to gentrification, a process of socio-spatial transformation in which rising property values and the influx of higher-income groups displace lower-income residents. Against this backdrop, Fortaleza's downtown faced the risk of becoming a "beautified vacancy", a restored façade without social substance.

Recognizing these dynamics, policymakers and cultural actors in Ceará sought alternative pathways for regeneration — ones that foreground social cohesion, cultural memory, and inclusive economic participation. The rehabilitation of the Estação das Artes, a former railway station transformed into a cultural complex, marked a symbolic and material investment in the city's heritage. Within this broader initiative, the Ceará Design Center – Kuya emerged as a

vehicle for harnessing design as a socially oriented practice rather than a market commodification tool.

3. Kuya: A Public Design Policy Rooted in Inclusion and Participation

The creation of Kuya was not merely a cultural project; it was a deliberate policy innovation guided by principles of participatory engagement and territorial equity. The center was designed to serve multiple functions: as a laboratory, education space, production hub, and platform for cultural exchange. Its conceptual foundation rests on four interrelated axes:

- **Decolonial Design, challenging dominant paradigms by foregrounding local and Indigenous perspectives;**
- **Political Design, recognizing design as a practice embedded in power relations and civic life;**
- **Eco efficient Design, integrating environmental responsibility into design processes;**
- **Regenerative Design, pursuing restoration and renewal of ecological and social systems.**

This framework positions Kuya as more than a venue; it is a discursive and operational space where design intersects with civic values and territorial identities. Operating under public governance, the center employs transparent selection processes for its staff and leadership, emphasizing diversity, inclusion, and representation. Calls for participation in programs and courses include affirmative action provisions, ensuring that historically marginalized groups, Black, Indigenous, LGBTQIAPN+, and persons with disabilities, have

pathways to engagement.

Kuya's internal governance is designed to reflect its public mission. Unlike design institutions driven by commercial imperatives, Kuya operates with the explicit goal of redistributing access to cultural and creative capital. Its institutional arrangements, from funding structures to program selection, are oriented toward social purpose rather than market viability alone.

Figure 2 – Entrance of Estação das Artes (former Central Railway Station) – Photo by the author

4. Programs, Practices, and Impact

Kuya's activities span a wide range of formats, each designed to activate different dimensions of design practice and engagement:

- **Educational Programs: Courses, workshops, and seminars in areas such as editorial design, decolonial practice, political design, and eco-design. These programs have included both face- to- face and online modalities, ensuring broader access.**
- **Professional Development: Mentorship and portfolio review sessions aimed at supporting emerging designers and cultural producers in developing sustainable practices.**
- **Exhibitions and Events: Curated shows and dialogues that bring public attention to socially engaged design projects and stimulate critical reflection.**
- **FeirasKuya de Design Autoral: Markets and fairs that provide visibility, networking opportunities, and economic pathways for independent designers and artisans.**

Importantly, these initiatives operate through open public calls, with transparent criteria and selection processes. Participation is not limited to formal design professionals; community members, students, and cultural actors from diverse backgrounds are actively engaged. Through these programs, Kuya has reached more than 35,000 participants since 2022, including residents of rural and peripheral areas reached through outreach strategies such as mobile activations and local partnerships.

Data from participants and program assessments indicate that Kuya's approach fosters not only technical capabilities, but also collective agency and critical design thinking. Survey responses reveal increased confidence in civic engagement, heightened awareness of cultural heritage, and enhanced capacity to initiate community-based initiatives.

Figure 3 – Entrance of Kuya within Estação das Artes – Photo by the author.

Figure 4 – Interior of Kuya, reception area – Photo by the author.

5. Anti-Gentrification and Community Empowerment

A distinct element of Kuya's philosophy is its explicit resistance to gentrification as a by-product of cultural revitalization. Rather than acting as a magnet for private investment or reinventing the city center as a sanitized consumer space, Kuya centers its mission on community empowerment and territorial continuity.

This is visible in several aspects:

- **Co-Design Methodologies: Programs actively involve residents in shaping activities and outcomes, moving beyond consultation to *shared authorship*.**
- **Local Memory Practices: Exhibitions and research projects foreground narratives and spatial histories of long- term residents, affirming localized identity.**
- **Economic Inclusion: The *FeirasKuya de Design Autoral* provide structured opportunities for community- based producers to access markets without intermediary gatekeepers.**

By prioritizing *permanence over replacement*, Kuya aligns urban regeneration goals with social justice. Its projects build social infrastructure by strengthening networks, fostering intergenerational exchange, and amplifying local capacity for innovation.

Field observations and participant testimonies suggest that Kuya's presence has contributed to a reinvigoration of public life in the surrounding neighbourhoods, increasing foot traffic, strengthening inter-community ties, and enhancing local cultural production without inflating property speculation.

Figure 5 – Interior of Kuya, auditorium staircase – Photo by the author.

6. Embedding Design for All in Urban Governance

Kuya's relevance extends beyond localized practice; it signifies a paradigm shift in how design is integrated into urban governance. Traditional urban policy often separates design from planning, relegating it to aesthetic or technical concerns. In contrast, Kuya positions design as a systemic resource that connects policy areas such as education, culture, economic development, and environmental strategy.

The center's alignment with global frameworks like the UN

Sustainable Development Goals (SDGs) and the New Urban Agenda underscores its strategic orientation. By emphasizing accessibility (SDG 10), sustainable cities (SDG 11), and responsible production (SDG 12), Kuya demonstrates how design can operationalize global goals at local scales.

Its recognition within the UNESCO Creative Cities Network further situates Kuya within an international community of practice. Fortaleza's participation in this network amplifies local innovations, enabling South- South exchange and collective learning.

Embedding Design for All within governance requires commitment to continuity, adaptability, and reflexivity. Kuya models this by maintaining iterative feedback loops with stakeholders, conducting impact evaluations, and adjusting programs according to emerging needs and insights. This institutional reflexivity, common to effective public policy, enables Kuya to remain responsive to social dynamics and to evolve as contexts change.

Ensuring the continuity of inclusive design policies requires stable public commitment. Kuya's experience shows that lasting impact depends on long-term investment and institutional support.

7. Conclusion

The case of the Ceará Design Center – Kuya illustrates that Design for All can function as an operational framework for inclusive urban transformation. By engaging communities, democratizing access to design knowledge, and aligning with public policy objectives, Kuya transcends traditional boundaries of design practice.

Rather than pursuing superficial revitalization, Kuya enacts *regenerative processes* that prioritize human dignity, collective

agency, and environmental awareness. Its work demonstrates that design, when oriented toward the common good, can contribute to sustainable, just, and vibrant urban life.

Kuya's experience offers valuable lessons for other cities seeking to integrate design into development strategies — particularly in contexts where inequality, cultural fragmentation, and environmental challenges coexist. Ultimately, Kuya affirms that design's greatest potential lies not in objects or markets, but in its capacity to nurture inclusive systems, shared imaginaries, and civic futures.

As global cities face growing pressure to rebuild social trust and ecological balance, initiatives like Kuya serve as powerful reminders that inclusive design must become central to urban planning. Its model invites policymakers, designers, and civil society actors to co-create structures of belonging, cultural affirmation, and economic opportunity. By translating universal principles of accessibility and participation into locally grounded practices, Kuya expands what is possible in the field of public design — not only in Brazil, but globally.

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Human-Centered Employment Ecosystems:

CoSense Design as an Awareness-Based Framework for Inclusive Work Integration

Nebojsha Ilijevski

Abstract

This article presents CoSense Design, an umbrella methodology that integrates Social Mentoring, Theory U, Neuro-Linguistic Programming practices, and Design for All principles into a stakeholder-inclusive framework for employment integration. Developed in the Western Balkans, CoSense Design addresses a fundamental design flaw in traditional inclusion work: it includes all stakeholders—businesses, institutions, donors, and hard-to-employ persons—in designing inclusion processes from the beginning, not merely in implementation. Social Mentoring provides the mentoring backbone through six-month professional support from social workers and psychologists. In parallel, businesses and institutions participate in awareness-based leadership development that shifts their operating state from judgment to sensing. The article describes how CoSense Design uses a 'trojan horse' language strategy: entering corporate spaces through performance metrics while entering institutional spaces through social impact indicators. Once inside, awareness-based methodologies quietly open space for deeper transformation. Situated in a context of severe brain drain,

the model demonstrates how crises can become openings for systemic innovation.

Keywords

CoSense Design; Social Mentoring; awareness-based leadership; Design for All; Theory U; inclusive employment ecosystems; Western Balkans

Introduction

Across the Western Balkans, we live with a paradox that has become impossible to ignore. On one hand, large segments of the population remain excluded from meaningful employment: long-term unemployed persons, people with disabilities, single parents, older workers, and young people returning from migration without clear prospects. On the other hand, businesses increasingly struggle to find and retain workers due to devastating brain drain that has hollowed out entire sectors. Employers complain that 'no one wants to work,' while those excluded for years, experience the labor market as a closed door they are expected to be grateful just to knock on.

This paradox reflects what Theory U describes more broadly: "we collectively create results that none of us actually want". As C. Otto Scharmer frames it, key decision-makers often feel unable to redirect the course of events even when they recognize the dysfunction around them. In employment integration work, we have witnessed this pattern repeatedly. Well-intentioned inclusion projects reproduce exclusion in their own design, inviting businesses only at the end to 'hire the beneficiaries,' while keeping them distant

from the design of processes that prepare people for work. Institutional actors are asked to sign regulations, yet their operational realities are ignored. Donor organizations commission projects with ambitious social indicators, but the programs often bypass the very business metrics that determine whether companies will maintain these jobs once external funding ends.

Over time, it became clear that a different approach was needed—one that takes seriously the Design for All insight that systems designed around the margins improve life for everyone when accessibility and participation are integrated from the beginning. Applied to employment integration, this means designing processes in which all stakeholders are present from the start as legitimate co-owners of the challenge, not merely as implementers of solutions designed elsewhere. CoSense Design emerged from this recognition. It is an umbrella methodology that brings together Social Mentoring (developed by Public, Association for Research, Communication and Development from Skopje), Theory U (from the Presencing Institute and Otto Scharmer), NLP-informed practices for shifting inner states, and Design for All principles into a coherent framework for creating stakeholder-inclusive, awareness-based design spaces.

WHEN INCLUSION EXCLUDES KEY STAKEHOLDERS

When we first began working on employment integration, we were struck by how often inclusion projects were themselves built on exclusionary assumptions. The logic was familiar: businesses are driven by profit, institutions are slow and bureaucratic, donors do not understand operational realities, and long-term unemployed persons are fragile and difficult to place. The 'solution' was to create small, protected spaces where social workers or NGOs work

intensively with disadvantaged individuals, then present 'ready-made' candidates to employers at the end. On paper, everyone's role looked clear. In practice, we witnessed a cycle of disappointment.

From the perspective of hard-to-employ persons, this model often led to a painful experience of being 'parachuted' into workplace cultures that had not changed. They had worked for months with a mentor who respected their story and helped them rediscover their capabilities. Then, suddenly, they entered companies where line managers and colleagues had no understanding of this process, no time to adjust expectations, and no tools to respond to the inevitable learning curve. From the business perspective, employers found themselves pressured to hire people they had not helped prepare, within systems they had not helped design. When difficulties arose—and they always did—businesses felt tricked into social projects that undermined their operations, while job seekers felt abandoned in environments that had no real space for them.

From a Design for All perspective, the fundamental problem becomes visible: the 'user' of the employment system is defined too narrowly. Job seekers are treated as the main users, while other essential users—employers, institutional actors, donors—are treated mainly as constraints rather than co-designers. This violates a core Design for All principle: when you exclude stakeholders from the design process, you end up with systems that do not work well for anyone. The traditional inclusion narrative welcomes the 'good' stakeholders—NGOs, social workers, activists—while keeping the 'difficult' ones—profit-focused employers, bureaucratic institutions, budget-constrained donors—at a safe distance. The result is inclusion projects that structurally exclude the very actors whose participation is essential for sustainable integration.

COSENSE DESIGN AND SOCIAL MENTORING: INCLUSION OF ALL IN THE DESIGN

CoSense Design was deliberately constructed to address this design gap. As an umbrella methodology, it encompasses several interconnected components.

Social Mentoring provides the mentoring backbone: a professional, six-month program where certified social workers and psychologists accompany long-term unemployed persons toward the labor market, working on self-confidence, mindset shifts, and practical integration steps. Theory U provides the process logic for awareness-based leadership and systems change, helping participants move from 'downloading' habitual patterns to 'sensing' emerging possibilities and 'presencing' new futures. NLP-informed practices offer concrete tools for belief and state work, enabling people to shift from reactive operating states to more generative ones. Design for All provides the design lens that anticipates diversity among both people and perspectives, ensuring processes work for different types of users and stakeholders.

The crucial innovation in CoSense Design is that it treats inclusion as something that must itself be designed inclusively. This means that businesses, institutions, development agencies, and job seekers are all invited into the initiation and design of the employment process, not only into its implementation. In practice, this looks different from traditional models. When we begin work in a new context, we do not start by training unemployed persons and then approaching businesses. Instead, we convene representatives from all stakeholder groups and ask: What are the real barriers to

employment integration in this context? What would need to change for businesses to hire and retain people they currently overlook? What support do line managers and HR staff actually need? How can institutional requirements be met without overburdening either side? How can donor indicators capture both social and business outcomes?

The answers to these questions are not pre-given; they emerge through iterative co-design. But the stance from which we ask them—a stance of humble inquiry and radical inclusion—is what makes the difference. While Social Mentoring supports individual mentees through their six-month journeys, other parts of CoSense Design work in parallel with business leaders, institutional leaders, administrative staff, and development agency officers. These parallel processes help each group see their own role in the system and adjust their processes accordingly.

This is the application of Design for All to the inclusion process itself: all stakeholders become 'users' whose needs and constraints must be designed for.

THE TROJAN HORSE OF LANGUAGE: ENTERING BUSINESS AND INSTITUTIONAL WORLDS

One of the most powerful design elements in CoSense Design is what we call the 'trojan horse' language strategy. Different stakeholder groups speak different languages of value, and they open their doors to different kinds of arguments. Rather than insisting that everyone adopt the language of social inclusion from the start, CoSense Design deliberately translates between these languages while carrying a shared transformational logic inside.

When entering corporate spaces, we speak the language that business leaders care about: retention rates, time-to-productivity, performance metrics, and profit. We present data showing that companies with inclusive hiring practices combined with proper mentoring support see retention rates increase from 40% to 85% in the first year. We demonstrate how structured onboarding with external mentoring reduces time-to-full-productivity by 30-40% compared to traditional approaches. We show that teams with diverse backgrounds, when properly supported, outperform homogeneous teams on complex problem-solving tasks. These are not social arguments; they are business arguments. They open the door.

Once inside the corporate world with these performance-based entry points, awareness-based transformation begins. Through leadership development sessions framed as 'improving management effectiveness' or 'enhancing team performance,' line managers and HR staff encounter Theory U practices that invite them to examine their own assumptions about who can and cannot succeed in their organizations. They engage with NLP-based exercises that reveal how their internal states—whether they are operating from judgment, cynicism, or openness—shape the outcomes they create. They participate in co-sensing activities that help them see long-term unemployed persons not as 'charity cases' but as people with capabilities that the company genuinely needs. The business metrics that opened the door remain real and important, but the conversation has quietly expanded.

When entering institutional and donor spaces, we use a different language: employment rates of hard-to-employ populations, inclusion indicators, equity outcomes, and social participation

metrics. We present evidence showing that professionally mentored integration programs achieve placement rates of 60-75% for populations that traditional active labor market measures reach at only10-15%. We demonstrate how coordinated institutional support reduces administrative burden on employers while increasing compliance and long-term sustainability. We show that donor investments in awareness-based leadership development for businesses generate ripple effects that extend far beyond the initial cohort of mentees. These are social impact arguments. They open institutional and donor doors.

Once inside institutional and donor worlds with these social impact entry points, transformation again begins. Development agency officers who initially framed their work purely in terms of social indicators start seeing how business sustainability determines whether their programs have lasting effects. Institutional actors who thought of inclusion as a regulatory requirement begin understanding it as an opportunity to redesign active labor market measures in ways that actually work. Donor representatives who measured success purely by numbers of people trained start caring about the quality of internal company processes that determine whether those people will still be employed two years later. The social metrics that opened the door remain real and important, but the conversation has expanded to include business transformation and organizational development.

This 'trojan horse' strategy is ethically grounded in a simple recognition: the goal is not to trick stakeholders but to meet them where they are while inviting them into wider horizons. Businesses do need better retention and productivity; these concerns are legitimate. Donors and institutions do need measurable social

impact; these concerns are also legitimate. CoSense Design honors both sets of concerns by showing that when we design employment processes with all stakeholders from the beginning and support them through awareness-based development, we can achieve outcomes that are simultaneously good business and good social policy. The apparent contradiction dissolves when the design includes everyone.

FROM EXTERNAL SOCIAL MENTORS TO INTERNAL PROFESSIONAL MENTORS

A critical feature of CoSense Design is that it explicitly designs for handover from the beginning. From Social mentors to Professional mentors.

Social Mentoring's external to companies -Social mentors are trained social workers and psychologists that accompany long-term unemployed persons through their six-month journey into the labor market. This external support is crucial: it provides safety, builds confidence, works through trauma and long-term exclusion, and helps people navigate the complex transition from being outside the system to entering it. External mentors have the professional distance and expertise to do this work well.

However, if external mentoring (Social mentoring) were the only intervention, it would create dependency and fragility. The person enters the workplace, but the workplace itself has not fundamentally changed. When the external mentor exits the mentoring process after the employee is placed at the workplace, the mentee is left in an environment that may or may not understand or support their continued development. This is why CoSense Design includes a second layer: internal Professional mentoring inside companies,

carried out by trained HR staff and line managers who have participated in the parallel awareness-based leadership development process.

These internal mentors apply the same inclusive and Design for All principles that external mentors use, but now embedded within everyday organizational life. They understand that integration is not a one-time event but an ongoing process. They recognize that the new employee may need different onboarding rhythms, different communication styles, or different kinds of feedback than what the company habitually provides. Because they have gone through awareness-based development themselves—examining their own assumptions, practicing sensing rather than judging, learning to shift their operating states—they are capable of creating inclusive spaces within the organization that can sustain integration long after external support has ended.

This handover design reflects a Theory U insight: sustainable change happens when the 'operating code' of a system shifts, not merely when external actors compensate for systemic dysfunction. If we want employment ecosystems that are genuinely inclusive, the capacity for inclusion must live inside the businesses, institutions, and agencies that constitute the ecosystem. External mentors catalyze and model the process, but internal actors must eventually carry it. Social mentoring itself structures this transition deliberately, with external and internal mentoring running in parallel during the initial phase, then gradually shifting responsibility until the internal capacity is strong enough to stand alone.

THE BACK-END: THEORY U, NLP, AND OPERATING STATES

We refer to Theory U, NLP practices, and frameworks like Nadim Hamdan's 'Three Operating States of People in Organizations' as the back-end of CoSense Design. They are not presented to participants as separate theoretical modules; rather, they function as the underlying logic that shapes how facilitators design and guide processes. Understanding this back-end helps explain why CoSense Design works differently from conventional inclusion programs.

Theory U offers a process architecture for moving from unconscious reproduction of old patterns to conscious co-creation of new futures. The key insight is that our actions flow from an 'inner place'—assumptions, habits, emotional states—that we rarely examine. When leaders operate from judgment, they see problems as external. When they operate from openness and sensing, they perceive the system as it actually is, including their own role in creating outcomes they claim to reject. In employment integration, this might mean sensing that brain drain is not merely a threat but an opening for redesigning how we think about human capability.

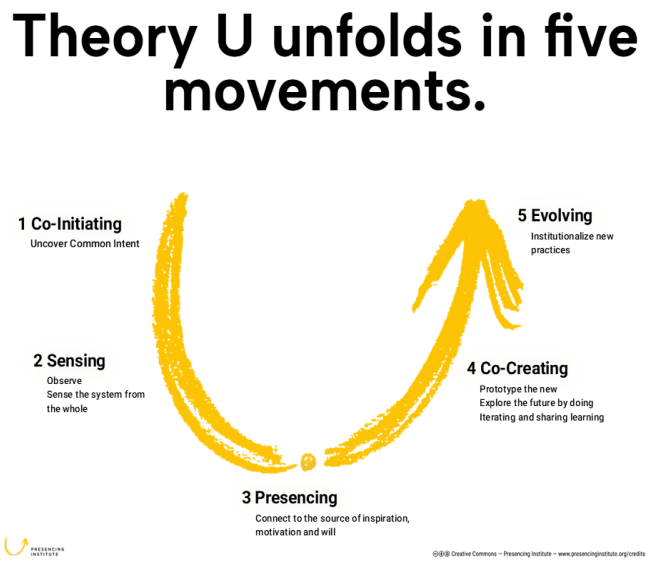

Figure 1. Theory U diagram

NLP-informed practices provide concrete techniques for shifting these inner states. Simple exercises in reframing beliefs or exploring different perceptual positions help people experience how their internal states shape perception and action. Hamdan's Three Operating States framework—distinguishing reactive, responsive, and generative states—helps participants recognize what state they are in and make conscious choices about shifting when needed. CoSense Design processes support movement toward more generative states, recognizing that sustainable change requires not just new structures but new capacities for awareness and choice.

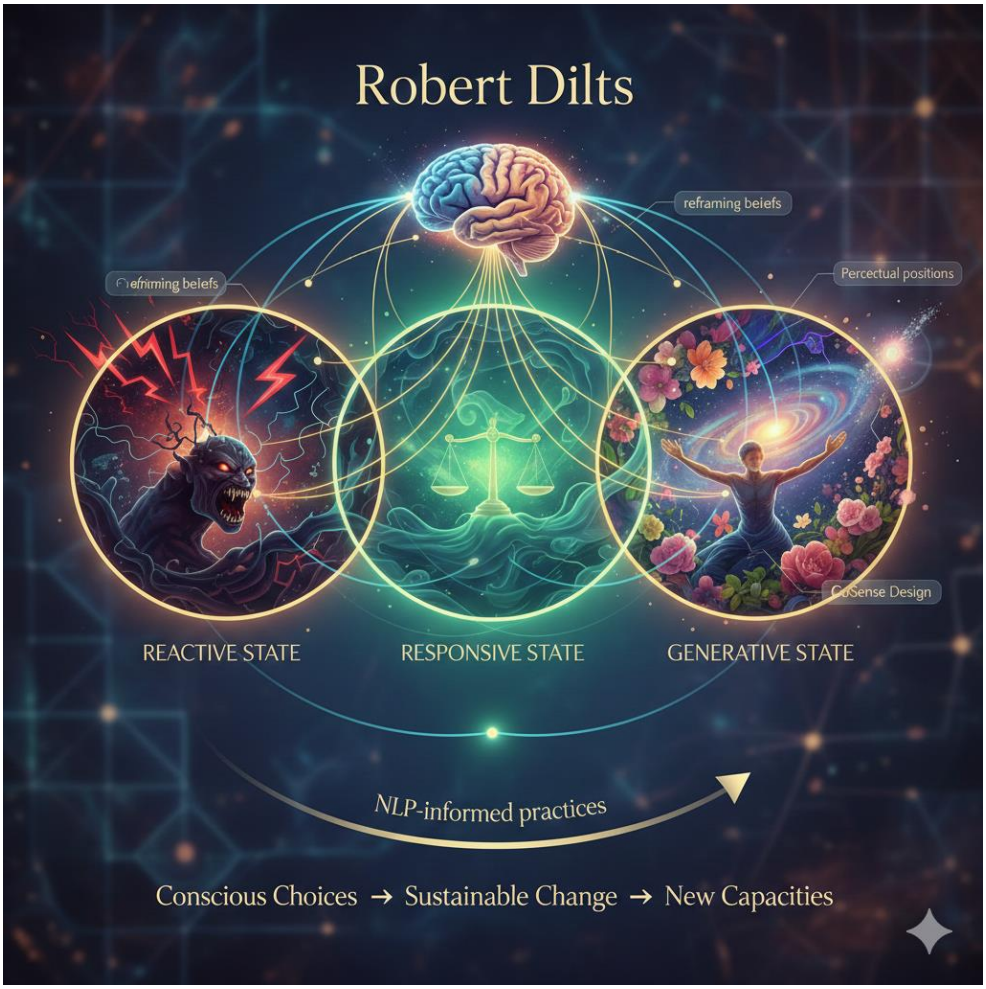

Figure 2. Hamdan's Three Operating States framework

These back-end processes operate quietly. Participants rarely hear lectures about Theory U or NLP. Instead, they engage in carefully sequenced activities—co-sensing exercises, stakeholder mapping, dialogue practices—that embody these methodologies. The facilitator creates conditions in which participants can experience shifts in their own awareness and discover that different ways of seeing and acting are possible.

REGIONAL DRIVER AND IMPLICATIONS FOR OTHER REGIONS

The Western Balkans context gives CoSense Design a particular urgency and a particular opening. Severe brain drain has created chronic labor shortages across key sectors, making employers more willing to hire from groups they previously overlooked—if they receive proper support. This crisis became the regional driver that opened space for the work. When business leaders say 'we are ready to hire people we would not have considered before if we have adequate support,' they are already halfway toward a new model. CoSense Design answers this readiness by providing a structure that makes the support real, reliable, and sustainable.

However, we do not present CoSense Design as limited to the Western Balkans or dependent on brain drain as the only possible driver. Every region has its own crises and openings: technological disruption displacing workers, aging populations creating care gaps, youth unemployment threatening social cohesion, migration creating both challenges and opportunities, climate change requiring rapid transitions. Not to mention the AI disruption. The question for practitioners in any context is: What is the crisis or opening in our region that could serve as an entry point for redesigning

employment and organizational systems? Once that driver is identified, the CoSense Design approach becomes relevant: convene all stakeholders, translate between their languages, design processes with everyone from the beginning, support awareness-based development, and build in handover from external to internal capacity.

Regions considering whether this approach might work for them can start by examining where their current inclusion efforts may be excluding key stakeholders. Are businesses treated primarily as donors or as genuine partners in co-design? Are institutions seen as obstacles to bypass or as co-creators of enabling frameworks? Are donors perceived only as sources of funding or as actors whose learning and evolution matter? Mapping these patterns honestly can reveal where the design of the process needs to change. As Theory U reminds us, "we collectively create results that no one wants" when we operate from unconscious patterns; the first step toward change is making those patterns visible.

CoSense Design also suggests that practitioners pay attention to language as a strategic design element. What is the 'trojan horse' that can enter corporate, institutional, or community spaces in your specific context? Which metrics, stories, or values open doors? How can you honor these entry points while carrying deeper transformational content inside? This requires ethical clarity—the goal is not to trick stakeholders but to meet them where they are while inviting them into wider horizons. It also requires sensitivity to local culture, history, and power dynamics. The trojan horse that works in the Western Balkans may look different in East Asia, Latin America, or North America, but the principle remains: start with

what stakeholders already care about, then expand the conversation once you are inside.

CONCLUSION

CoSense Design offers a replicable approach for moving from charity-based inclusion to performance-enhancing diversity utilization. By bringing together Social Mentoring, Theory U, NLP-informed practices, and Design for All principles, it creates stakeholder-inclusive design spaces where businesses, institutions, donors, and hard-to-employ persons co-create employment processes together. The fundamental insight is simple but demanding: if we want employment systems that are truly for all, we must design them with all.

This means inviting those previously excluded into the heart of the process: profit-focused business leaders, institutional officers, donor representatives, and long-term unemployed persons themselves. It means speaking multiple languages of value—performance metrics, social impact indicators, human dignity—without losing our ethical center. It means supporting stakeholders through awareness-based development so they can shift from judging to sensing, from ego-system to eco-system awareness, from unconsciously creating results no one wants to consciously design systems that reflect what we collectively care about.

Social Mentoring provides the professional mentoring backbone, with certified social workers and psychologists offering six-month support. But individual mentoring alone cannot transform employment ecosystems. Businesses participate in leadership development that helps them adjust practices. Institutions and donors engage in co-design that makes requirements more practical

and investments more sustainable. The handover from external mentors to internal professional mentors ensures integration becomes embedded in organizational life.

The 'trojan horse' language strategy makes multi-stakeholder design possible. By entering corporate spaces through performance metrics and institutional spaces through social impact indicators, while carrying awareness-based transformation inside both, CoSense Design respects each stakeholder's priorities while expanding what is considered possible. The apparent contradiction between business performance and social inclusion dissolves when we design processes that genuinely serve both.

We believe awareness-based, Design for All–informed approaches like CoSense Design offer a path toward employment ecosystems in which human diversity is recognized as strength rather than problem. When individual mindset shifts, organizational culture development, and systemic policy alignment move together, work integration becomes a core expression of how societies understand themselves. The real trojan horse may be the assumption that inclusion and performance are separate goals. Once we allow this assumption to dissolve through co-sensing and co-design, a new kind of employment ecosystem can emerge—one in which we no longer choose between doing good and doing well because we have designed our systems so that they reinforce each other.

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He has worked within wildlife rehabilitation centres, animal sanctuaries, and zoological institutions, contributing to the design, prototyping, and iterative adaptation of animal facilities, environmental enrichment systems, and care-related infrastructures. His practice also includes participation in rewilding and accessibility-focused projects, integrating inclusive design principles, practice-based research methodologies, and veterinary-informed welfare assessment. Jan Aragall is a founding member of the Design for All International Association.

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Ergozoonomics: Designing with all Life in Mind.

Jan Aragall García de Sola

Abstract

The design of environments, products and systems has made significant progress in adapting to human diversity. However, these advances have been developed mainly from an anthropocentric perspective, leaving in the background other species that constantly share our spaces and routines. Ergozoonomics emerges as an integrative approach that combines principles of ergonomics, zoology, design, ecology, well-being and ethics, with the aim of creating solutions that take into account all living beings. Based on personal and professional experience in wildlife rescue, rehabilitation and management centres, this article draws on practice-based insight. It explores how the application of Ergozoonomics can overcome the limitations of designs that are either overly general or, conversely, too specific. Through the analysis of variables such as locomotion, sensory perception, social structure and daily routines, various case studies are presented that illustrate the adaptation of spaces to individual needs, rehabilitation processes, emotional well-being, management of heterogeneous groups and changes associated with aging. Finally, Ergozoonomics is proposed as an operational framework that can be transferred to other contexts of human-animal coexistence, including homes, urban environments, and rural areas. We defend the design of shared living systems as a technical and ethical responsibility.

Introduction

When we think about design, whether for products, services, spaces or learning systems, we have made great strides in adapting environments to different ways of living and experiencing the world. We have become particularly good at analysing human needs, largely thanks to specification. In-depth knowledge of a specific field allows us to dissect our needs with greater precision and offer optimised solutions for every little detail.

However, the very success of this process has brought us to a point where many of these fundamental needs are now being met, albeit with varying degrees of effectiveness. As a result, attention can shift toward issues that are less narrowly defined and that call for more general, integrative solutions.

Fig.1 Ergozoonomics knowledge areas

These contemporary problems tend to lie between fields of study that have traditionally operated in isolation, and addressing them requires working within these intermediate spaces, where knowledge does not belong to any single discipline. One such integration is proposed by Ergozoonimics; an approach that brings together ergonomics, design, animal biology, ecology, well-being and ethics to create solutions that benefit both living beings and the planet.Although related ideas have emerged in fields such as animal welfare science, ergonomic design, ecology, and ethics, these contributions have remained fragmented and discipline-specific. To date, no integrated framework has explicitly addressed the design of environments, products, and systems that take into account all species within a shared environment through a combined analysis of the ergonomics and biology of human and non-human animals. Ergozoonomics is presented here as a novel, practice-based field that systematizes this intersection, providing a conceptual and operational framework for interspecies design. Rather than expanding on existing human- or animal-centered models, it reframes design as a multispecies process based on coexistence, well-being, and ethical responsibility.

At its core, Ergozoonomics asks a simple but far-reaching question: *What changes can be made so that a design includes all those who inhabit it? This question challenges anthropocentric assumptions, reframing design as an act that shapes relationships, behaviours, and opportunities across species.*

Where does ergozoonomy come from?

The term "ergozoonomy" comes from the combination of ergonomics, the science that studies how humans interact with their

environment, and zoology, the science that studies animals. The concept began to take shape with the design of facilities for animals in captivity. In this field, two opposing approaches are common. On the one hand, there are facilities designed in a highly functional and generalist manner, intended to facilitate human management and adapt to as many species as possible. These solutions, although practical, tend to be unstimulating and do not allow for the full expression of each species' natural behaviours. On the other hand, there are extremely specific facilities, designed almost exclusively with a particular species or even a typical individual in mind.

Although these could meet certain needs very well, they are difficult to adapt to other species, rare individual characteristics, veterinary procedures or routine cleaning tasks. Both extremes generate different but equally relevant problems. This led us to consider an alternative that did not prioritise a single point of view but rather integrated several. Designing from the individual and routine needs and expectations.

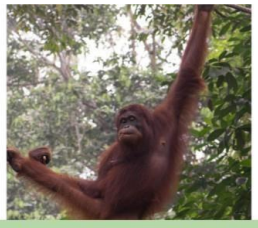
To address these limitations, we began to study the physical, cognitive, social and environmental characteristics of animals, both in the wild and in captivity, with the aim of ensuring adequate physical, social and cognitive development. This type of analysis was not too different from that carried out in highly specialised facilities.

The difference emerges when we systematically incorporate the study of human routines associated with these facilities. We can analyse daily and periodic tasks from an ergonomic point of view, taking into account the physical and cognitive abilities of the people responsible, the environmental conditions of the available space, and physical and biological safety aspects.

Once these two dimensions, animal and human, have been addressed, the next step is to bring them together using welfare and ethics as cross-cutting parameters (Morgan & Tromborg, 2007).

Key variables in ergonomic design

A common exercise within this approach is to compare species with very different characteristics. For example, let us imagine three animals: a king penguin, a scarlet macaw and an orangutan. The differences between them are obvious, especially in terms of locomotion. Penguins move by walking, swimming or sliding on their bellies; macaws combine standing, flying and climbing using their legs and beaks; orangutans use quadrupedal locomotion and brachiation, meaning swinging between branches.



Locomotion	Bipedal terrestrial, swim, slide	Fly, bipedal terrestrial, climb	Climb, brachiation, quadrupedal terrestrial, bipedal terrestrial
Activity	Day and night, low-active	Crepuscular, active	Day, mid-active
Senses	Vision, hearing, touch	Vision, hearing	Vision, touch
Feeding	Hunt, fish, seafood	Nuts, fruit, leaves, berries, seeds, invertebrates, clay	Leaves, fruit, vegetables, seeds, invertebrates, small vertebrates, flowers, bark
Social	High social, big groups	High social, couples, small families, big groups	Low social, solitary
Housing	ground nest, water	Static nests	Daily nest
Human interact	Fear, avoidance	Fear, aggression	Non-aggression, avoidance, interactive
Security	Non-dangerous	Neutral	Dangerous
Cleaning	Cleaning substrates, cleaning pool, cleaning windows	Cleaning substrates, cleaning nesting area	Cleaning substrates, cleaning nesting area
Feeding strategy	Scatter fish making sure everyone eats	Scatter or hang food items	Scatter or hang food items
Training	In group or solitary	In group or solitary	In group or solitary
Safety	Danger of tripping, slipping, temperature shock	Danger of tripping, slipping, fall from great heights, attacks	Danger of tripping, slipping, fall from great heights, attacks
Veterinary	Catch, isolation, quarantine	Catch, isolation, quarantine	Sedation, isolation, quarantine
Maintenance	Windows, pool, doors, ventilation, cooling system	Perch, nests structures, mesh, enclosure structure, doors	Structures, fences, electric fences, doors, heating system, ventilation, water systems

Fig 2: Simplified comparison table of needs for king penguins, red macaw and Bornean orangutans. Photo of the king penguins by Godot13, Photo of the red macaw by Quartl and photo of the orangutan by Thomas Quine.

The design of both horizontal and vertical plans must be adequate to allow for all of these (Alexander, 2003). Locomotion, diet, social group and sleeping arrangements are among the most obvious aspects to consider when designing a facility. Beyond these are aspects that are harder to identify, either because we cannot perceive them directly or because we are not present at all times. These include how animals receive and process sensory stimuli, and the activity patterns they follow when no workers are around.

An analogy to understand complexity

To illustrate this difference between obvious needs and more subtle needs, I often use an analogy with the design of a human dwelling. In an empty flat, as a general rule, we know that there must be at least one bed, a kitchen and a bathroom with a shower, sink and toilet.

These are the obvious needs. Then come the more complex ones, such as which room is best to put the bed in so that the sound from the building's hallway does not wake you up, if possible. It is fine to be able to cook, but it is also nice to have a place to sit down and eat. It is also interesting to have a curtain in the shower so you don't splash around, and probably on the toilet, when you shower.

Similarly, when designing animal facilities, meeting basic needs is only the first step. Well-being emerges when attention is paid to those details that are not always obvious at first glance (Brumm, 2013).

From general analysis to the individual

Once basic questions such as how the animal moves within its environment, how it eats and drinks, where it sleeps, how it experiences the world, how it relates to others, and when and how it carries out its daily routines have been addressed, it becomes possible to move on to a deeper level of analysis focused on the individual.

Just as ergonomics studies the full range of human capabilities, Ergozoonomics seeks to do the same with other animal species, understanding that there are individual differences directly influencing well-being.

Case studies

Adaptation to individual needs

One of the first cases I encountered was that of a parrot with a physical disability caused by an old injury that prevented it from flying. Initially, the enclosure was adapted to ensure its access to basic resources by means of structures that allowed it to climb up to feeders, resting areas and its nest. Continued observation revealed that these adaptations were not enough.

Fig 3: Representation of the enclosure for disabled parrots before.

The animal remained highly motivated to fly, which resulted in it jumping into the void at the risk of injury. This behaviour was not due to a lack of learning, but to unmet psychological and social needs (Buchanan-Smith, 2011).

Based on this analysis, the enclosure mesh was reinforced to make it a functional surface for locomotion, the wooden walls were covered with additional mesh, and tensioned ropes were incorporated in such a way that they did not interfere with the flight paths of other individuals. These modifications significantly increased the animal's autonomy and improved its interaction with the environment and with the group (Spruijt et al., 2001).

Fig 4: Representation of the enclosure for disabled parrots after.

Functional rehabilitation

Another recurring theme in my career has been working with animals rescued from illegal pet ownership. In this context, I participated in the design of furniture for caracals rescued after being kept as pets in unsuitable domestic environments. These animals often arrive with physical and behavioural disorders

resulting from restricted movement, lack of stimulation and the inability to express behaviours typical of their species. The aim was to create structures that would allow them to gradually recover physical abilities such as walking, running, jumping, climbing and maintaining balance, while respecting individual limitations. In this case, I chose to equip the facility with several levels of difficulty, which allowed the use of the space to be adapted to each individual's pace and created a greater variety of hiding places, which are essential for animals experiencing high levels of fear (Young, 2003).

Emotional wellbeing

I have also worked with animals whose past history had profoundly altered their behaviours, not doing the things we would expect from a fox. A representative case was that of a fox who, after years of domestic captivity, had developed an excessive dependence to human interaction. To address this situation, a structured environmental enrichment plan was designed.

Environmental enrichment is the practice of improving an environment to stimulate natural behaviours, such as hunting, exploring or digging. It improves physical and mental well-being. Some examples of this include: adding new objects to the enclosure such as logs, rocks, and natural vegetation; preparing areas where they can create burrows or, if that is not possible, providing spaces similar to burrows human-made; varied terrain; scents; hidden food or changing the presentation of food, such as giving bones, cutting food into smaller pieces and putting it in packages, and freezing food in summer.

Thanks to this plan, there was a significant increase in natural behaviours such as active foraging, digging, using their sense of smell and playing, gradually reducing their dependence on human interaction, and increasing their natural behaviours.

Heterogeneous groups

Working with large social groups poses additional challenges. In these contexts, the design must avoid both under-stimulating younger or more capable individuals and excluding those with greater limitations.

One example was working with a group of capuchin monkeys of different ages and abilities. For this case, I designed an adaptable enrichment item that could be edited to generate up to nine different variants, integrating nutritional, sensory, cognitive, and physical stimulation. This type of design promotes more balanced participation and reduces the occurrence of undesirable behaviours (Meehan & Mench, 2007).

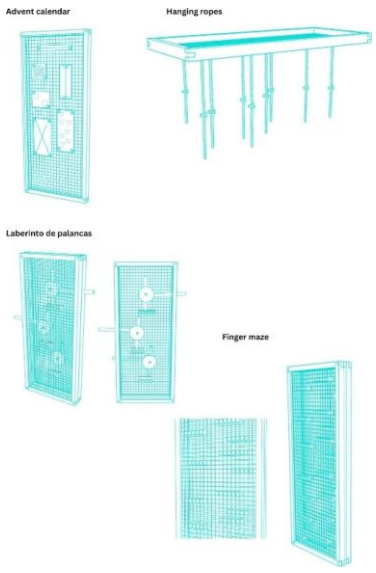


Fig 5: Enrichment for a group of capuchin monkeys

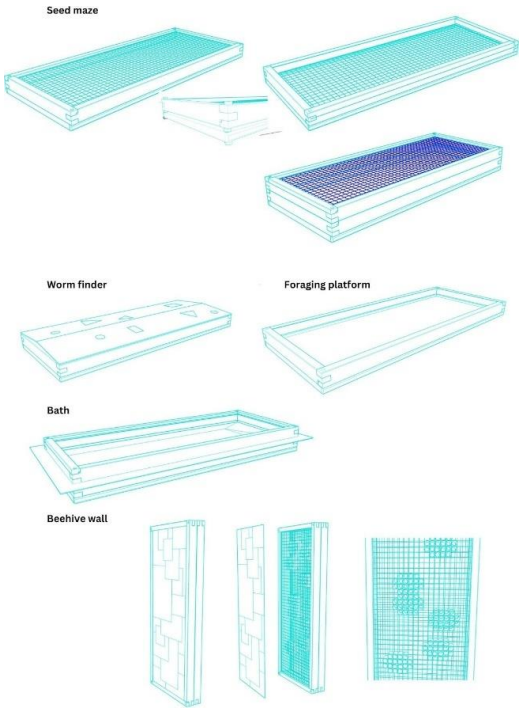


Fig 6: Enrichment for a group of capuchin monkeys

Adaptations over time

Finally, one of the cases that best reflects the importance of continuous assessment is aging and changes over time. I encountered a lion that began to show changes associated with age. In the wild, lions live for around 12 years, but in captivity they can live up to 25. That is why care in the geriatric stage, which is significantly longer, becomes key to ensuring their well-being over time.

Based on an assessment of these new needs, modifications were made to the facility, such as the addition of intermediate platforms to reduce the need for jumping. Other options can be considered depending on the condition of the animal and the species, for example, continuing with terrestrial animals, some examples that

can be considered, are: ramps to facilitate movement and more comfortable resting areas.

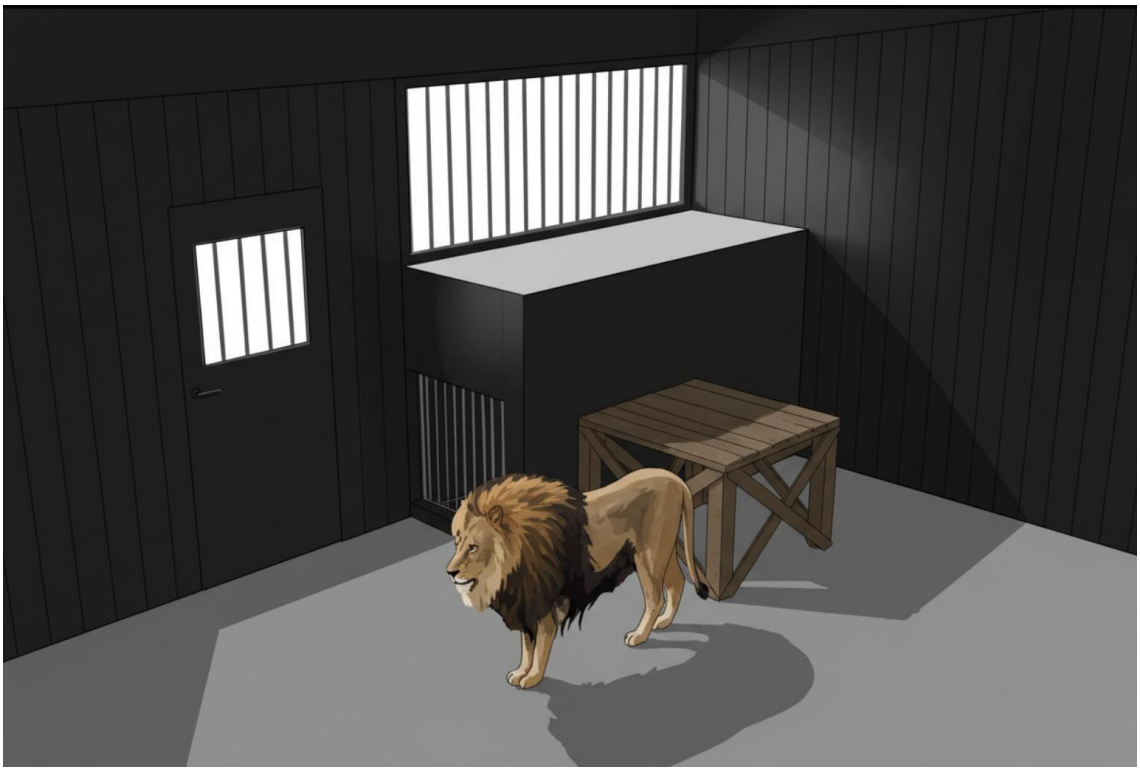


Fig 7: Representation of adaptation of a platform for a geriatric lion.

These adaptations allow the animal's functionality and comfort to be maintained, demonstrating that the design of the environment must evolve in parallel with the physiological changes associated with age (Whitham & Wielebnowski, 2013).

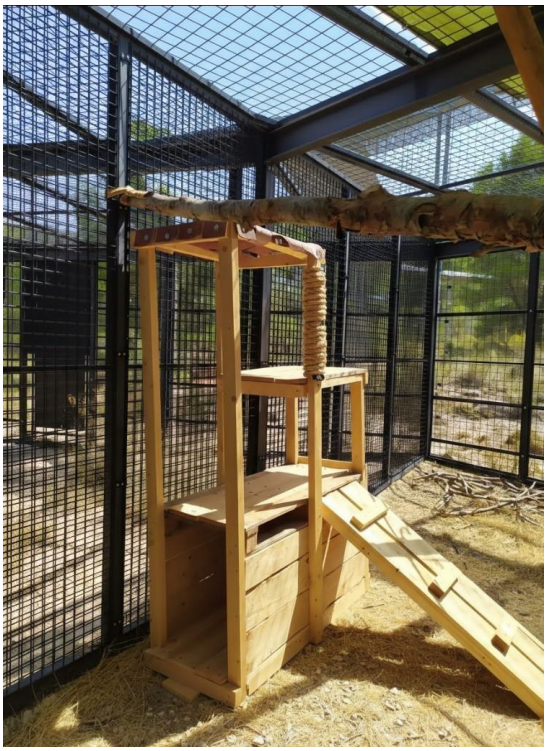


Fig 8: Adaptation for reduced mobility using a ramp.

Fig 9: Adaptation for reduced mobility using wide ramp-shaped walkways.

Beyond captivity

The presented cases are not to be understood as isolated situations. Principles of Ergozoonomy transcend specialised centres and can be applied wherever humans and other animals share space and routines.

For instance, millions of people around the world share their lives with companion animals such as dogs, cats, rabbits, birds, and small mammals. Yet within the field of companion animals, environmental design remains largely anthropocentric: homes designed exclusively for humans are only superficially adapted to animals, typically though the addition of isolated accessories such as beds, scratching posts, cages, or toys. This approach does not question the basic

structure of the space and how it conditions the animal's behaviour, mobility, cognitive stimulation or autonomy.

Ergozoonomics proposes going one step further, analysing the home as a shared ecosystem, in which every design decision affects both the people and the other animals living in it.

Applying ergozoonomic principles to these contexts means asking questions similar to those presented before, yet adapted to domestic realities. For instance, how does the animal move around the home, what limitations does the space present, what needed stimuli does the animal get and which ones lack, how are their daily routines organised in relation to humans', or which conflicts arise between the needs of both parties. These questions can lead to integrated solutions, such as the creation of three-dimensional pathways for cats that do not interfere with human use of space, rest areas for dogs strategically located to promote calm, or modular spaces that allow small mammals to explore, hide and choose when to interact (Ellis et al., 2013).

Fig 10: Human livingroom, Anthropogenic livingroom and Ergozoonomic livingroom.

Shared urban environments: coexisting in the city

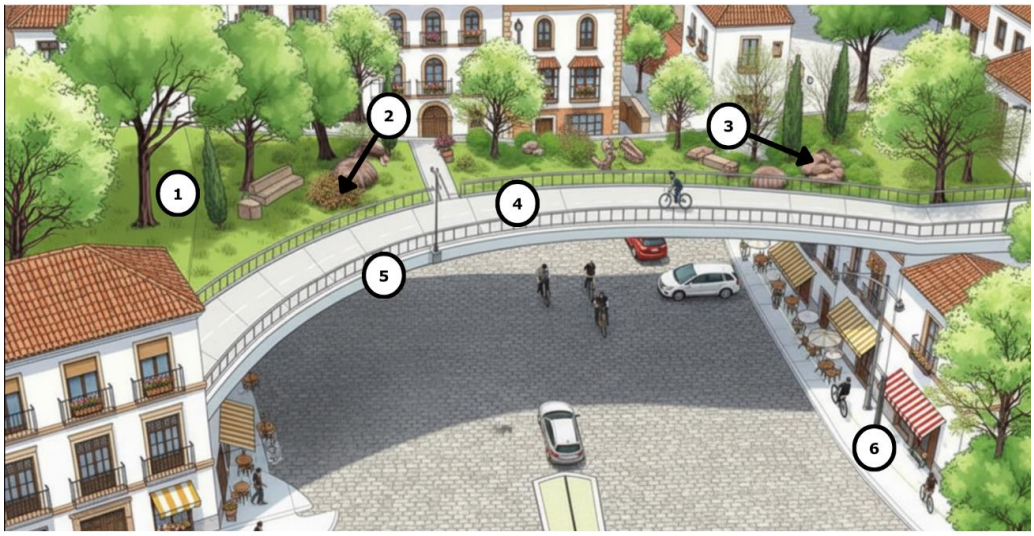


Fig 11: Ergozoonomic City: 1. Grass & green corridors connect the city's green areas, increasing shade and reducing heat buildup. 2. Plants prioritize native species and biodiversity over ornamental flowers, strengthening local ecosystems. 3. Rocks provide natural hiding spots and micro-habitats for urban wildlife. 4. Cycle lanes & pedestrian paths ensure safe, comfortable movement for people through the city. 5. Bridges & walking zones are designed to minimize street crossings, reducing risk and improving accessibility. 6. Pavements are made with materials that absorb less heat, helping cool the urban environment.

This same desire to create shared environments can be extrapolated to the design of urban spaces. Cities, traditionally conceived for human transit and activity, are also habitats for a wide variety of domestic and wild species. Birds, insects, small mammals, reptiles and plants coexist daily with people and pets, often in suboptimal or downright hostile conditions.

From an ergozoonomic perspective, urban design can be transformed to promote conscious and beneficial coexistence. Parks, squares and green areas can be conceived as multifunctional spaces that take into account patterns of human use, but also the needs of

other species for shelter, food and movement. Elements such as green corridors, vegetation cover, water sources accessible to urban wildlife, and street furniture that minimises risks to animals contribute to creating more resilient and vibrant cities (Rosenzweig, 2003; Hilty et al., 2019).

The presence of domestic animals in the city also poses specific challenges. Dog parks, safe walking routes, materials that reduce impact on joints or overheating, and adequate rest areas are design decisions that directly influence animal health and social coexistence. At the same time, these measures benefit people by reducing conflicts, improving the quality of public space, and fostering more respectful relationships with the environment.

Integrating wildlife into urban design does not imply naive idealisation, but rather informed planning. Understanding which species inhabit or can inhabit an area, how they move and what resources they need might prevent conflicts and encourage positive indirect interactions. In this way, the city ceases to be an exclusive environment and becomes a space for interspecific coexistence.

Rural and natural areas: designing with and for the communities

In rural and natural environments, applying these principles requires particular sensitivity. These areas are often home to human communities that depend directly on the land, as well as home of complex ecosystems with their own dynamics. In this context, Ergozoonomics can act as a tool to support peaceful coexistence between human activities, domestic animals and wildlife.

Measures such as the design of livestock infrastructure compatible with local fauna, non-invasive livestock protection systems, or land use planning that takes ecological corridors into account can reduce conflicts without compromising the economy or cultural identity of communities (Burkholder et al., 2018). At the same time, respect for local knowledge and the active participation of the people who inhabit these territories are essential for any intervention to be sustainable and ethical.

In protected natural areas, Ergozoonomics can contribute to the design of trails, viewpoints, or facilities for human use that minimise environmental impact and stress on wildlife, without compromising visitor education and experience. Once again, it is a matter of seeking balance, understanding that effective conservation involves integrating people as part of the system, not as external agents.

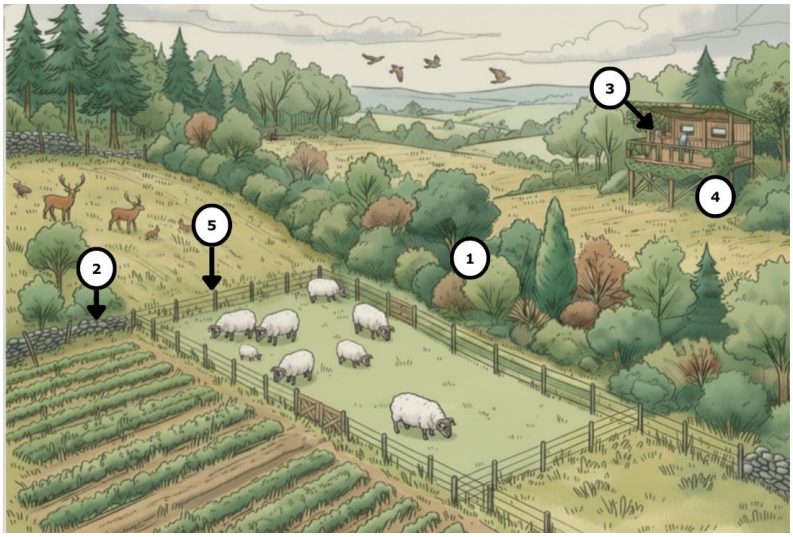


Fig 12: Ergozoonomic Rural Area: 1. Biological corridors connect natural areas while allowing human use without disrupting ecological flows. 2. Fences are strategically placed and permeable, guiding movement without blocking wildlife. 3. Tourism activities respect local culture and ecosystems, working in harmony with the environment. 4. Construction follows low-impact principles, minimizing land disturbance and resource use. 5. Animal separation maintains clear boundaries between domestic and wild species, protecting both ecosystems and livelihoods.

Conclusion

Ergozoonomy proposes a fundamental shift in how we understand design, away from solutions conceived for a single species, and toward environments understood as shared living systems. Rather than asking how spaces can be adapted *for* animals, it invites us to consider how they are experienced *with* them, by humans and non-human animals alike.

Throughout this article, we have seen how traditional design approaches tend to oscillate between two extremes. Highly generalised solutions prioritise efficiency and manageability, yet often fail to provide meaningful stimulation or autonomy. At the opposite end, highly specific designs may respond well to certain needs but lack the flexibility required to accommodate individual differences, changing routines, or long-term adaptation. Ergozoonomics emerges as a response to this, offering a framework that integrates ergonomics, design, animal biology, ecology, well-being, and ethics to produce environments that are both functional and responsive.

Central to this approach is the recognition that well-being does not arise solely from meeting basic needs. It is shaped by subtle factors like locomotion, how sensory information is received, how social interactions unfold in different animals, and how routines change over time. Designing for animals, much like designing for humans, therefore requires attention not only to species-level characteristics but also to individual differences, life histories, disabilities, and aging. The case studies presented, from rehabilitation enclosures to domestic interiors, illustrate how design must remain open-ended, capable of evolving alongside those who inhabit it.

Importantly, the relevance of Ergozoonomics extends far beyond captive or specialised settings. Homes, cities, rural landscapes, and protected natural areas are all spaces where multiple species coexist yet are shaped daily by human decisions. Whether through the configuration of a living room, the layout of an urban park, or the planning of agricultural infrastructure, design choices influence movement, behaviour, conflict, and opportunity for a wide range of species. Viewing these environments as shared ecosystems allows more integrated, resilient, and equitable solutions to emerge.

Ultimately, Ergozoonomics is not merely a technical issue, but an ethical one. To design is to intervene in the lives of others, often invisibly. Accepting this responsibility means recognising that well-being is not a limited resource to be distributed competitively, but a collective outcome that grows when systems are designed holistically. By embracing coexistence as a design objective, Ergozoonomics offers a path toward environments in which humans and other animals do not simply tolerate one another, but thrive together through mutual adaptation, respect, and care, thus creating richer, fairer, and more functional environments for all.

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Tzesika has over seven years of experience in inclusive design. She holds a Master's degree in Interior Architecture from Boston, USA, with a strong academic focus on inclusive design. Her master's research focused on improving the lives of people affected by Alzheimer's through inclusive design solutions. Her professional experience in the United States includes contributing to several impactful projects aimed at improving accessibility standards across both municipal and private sectors.

In the UAE, Tzesika co-led the development of an accessibility-focused certification system and has managed and delivered large-scale accessibility assessments across hospitality, residential, and public realm. She is supporting Expo City Dubai, where she conducts existing built environment assessments, develops and delivers trainings on accessibility and inclusive design, and provides design reviews across ongoing projects. Her work also includes master-plan-level accessibility reviews in Abu Dhabi and Expo City, in Dubai.

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The Role of Biophilic and Universal Design in Inclusive Master Planning.

Tzesika Iliovits, Inclusive Design Consultant

Abstract

At the master plan level, accessible and inclusive biophilic design integration is important to enhance community wellbeing and provide meaningful opportunities for all users. Biophilic design connects people to nature within the built environment, supporting mental and physical health, reducing stress, and alleviating sensory overstimulation. When inclusive design principles are integrated from the earliest stages. All users, regardless of age, ability, or background can benefit fully from these environments. Combining biophilic and inclusive design can take many forms, including enclosed or private garden areas, engaging experiences such as gardening, accessible pathways in public spaces, and barrier-free layouts, ensuring that the restorative and social benefits of nature are available to everyone.Without universal design principles, biophilic environments risk becoming exclusionary oroverwhelming rather than soothing.

Figure 1: Bosco Verticale, Milano

Introduction to biophilic design

Biophilic design is the connection between human and nature, integrating natural elements into physical spaces through architecture and design. (Neumann Monson Architects, 2022; Prasoon, 2023). It offers three key advantages: improved and enhances physical and mental well-being and enhances sustainability (Peverelli, n.d.). "Biophilic design can reduce stress, improve cognitive function and creativity, enhance overall well-being, and expedite healing" (Terrapin, 2014). Exposure to natural settings has been shown to enhance attention, memory, and cognitive performance, supporting both learning and everyday task execution. When thoughtfully designed, biophilic environments can also improve air quality and reduce noise pollution. (Peverelli, n.d.)

This article positions biophilic design as a complementary level to universal design, where nature-based elements enhance comfort and wellbeing when accessibility, sensory regulation, and legibility are addressed.

Figure 2: Isabella Stewart GardenFigure 3: Restaurant, Miami

Implementation of biophilic design

Biophilic design must be planned from the early strategic stages to create spaces where natural elements are fully integrated into a community's architecture and urban design. Design decisions are influenced by factors such as the local climate, which help determine the most effective solutions for the region (Terrapin, n.d.). These elements may include natural light, sustainable materials, and water features.

Figure 4: Expo City Dubai

"Indoor plants and organic materials may enhance indoor aesthetics and offer psychological benefits, but not all greenery is created equal." (Synktect, 2025). From an inclusive design perspective, the selection of non-toxic, and allergen free plant species is critical to ensuring that biophilic environments remain safe, usable, and welcoming for all users.

When carefully selected and integrated, these natural elements not only enhance aesthetics and well-being but also support a healthier,

more comfortable environment for all users. "Biomaterials such as wood, stone, and clay can be used in the design of structures in biophilic architecture.

These materials can create a warm and welcoming environment while also providing a link to the natural world"(Prasoon Design,2024).

Figure 5: Zoe Modern Greek Kouzina, Abu Dhabi

Benefits of universal and biophilic design

Universal and biophilic design must be studied hand in hand, considering the public realm and architecture simultaneously, and should be integrated from the earliest stages of master planning. "Inclusive biophilic design merges two fundamental approaches to human-centric spaces: the innate human connection to nature and universal accessibility" (Garden on the wall, 2025).

Environments that integrate natural elements and accessible design improve not only physical activity but also social interaction, fostering restorative experiences for all users. When these principles are embedded at early stages it creates a barrier-free community that is well connected with inclusive activities and circulation.

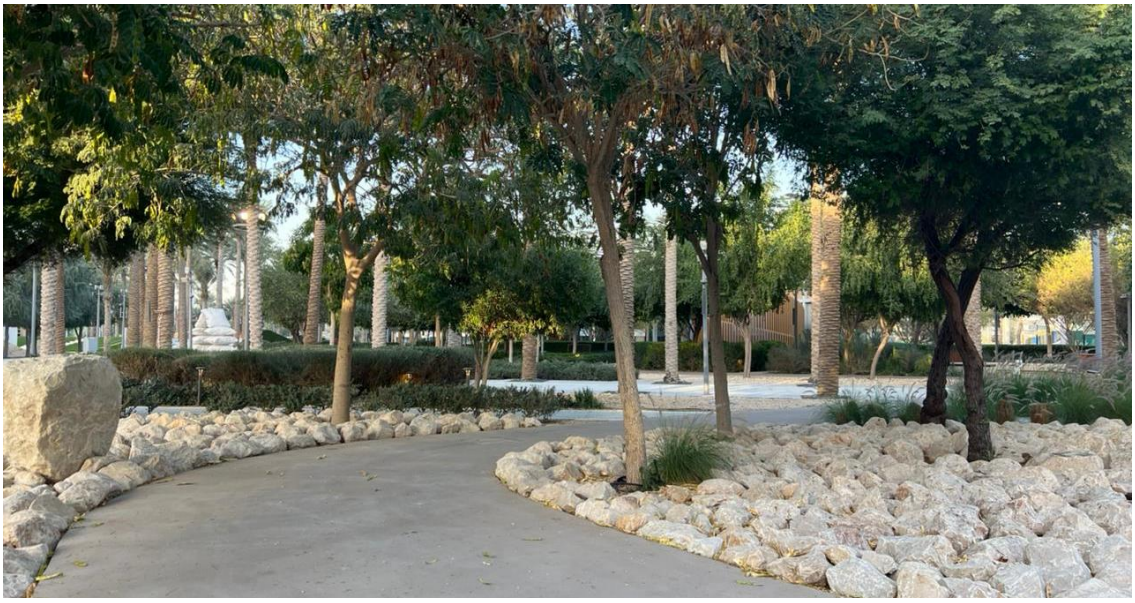

Figure 6: Expo City Dubai

Accessible communal gardens and outdoor areas are prime examples of spaces that enable individuals to participate in activities, stay active, and strengthen community bonds in a safe and natural environment. A clearly defined layout separating harvesting areas, work zones, and rest points supports spatial orientation for neurodivergent users (DCU, 2021). Design features such as operable elements within reach that can be used with closed fists, wide accessible paths, slip-resistant surfaces, raised garden beds with integrated seating, and appropriate toe and knee clearances for wheelchair users allow people of all ages and abilities to participate equally.

"Features like vegetation, water, sunlight, and natural materials create a more pleasing visual and tactile experience" (Neumann Monson Architects, 2022). Access to these spaces provides a restorative break from a busy world, enhancing both physical and mental well-being (Peverelli, n.d.).

When designing an inclusive biophilic space it is important that users can connect to their senses. (IJLAR, 2020) "Spaces around us are not just places to live and work; they deeply impact our thoughts, emotions, and overall well-being. Neuroarchitecture studies this interaction, revealing that certain designs can calm us down, make us happier, or even more productive." (Garden on the Wall,2024).

Figure 7: Expo City DubaiFigure 8: Don Carlo, Milano

The spatial layout is important to ensure minimum maneuvering clearances are maintained, while avoiding cluttered areas that could cause overstimulation for some individuals or hinder circulation for those with visual impairments.

Figure 9: Devocion Cafe, New York

The choice of materials plays a crucial role in shaping the mood and atmosphere of a space. "Colour perception is one of our senses that is directly related to our emotions" (IJLAR, 2020). Designing sensory-rich environments that allow all users, including those who are visually impaired, to explore, touch, and connect can include incorporating natural finishes, varied textures, and plants or greenery. These elements influence people's emotions and overall experience within the space. Research also shows that the sound of water has restorative and calming effects, fostering a sense of safety while reducing overstimulation (IBPA, n.d.). "Just as the sound emitted by the rain differs according to its intensity, the feeling it creates in the interior changes the atmosphere in the environment" (IJLAR, 2020).

Benefits of universal and biophilic Design on a master plan level

"Universal design is a significant social movement with the potential to liberate disabled people from disabling design and, in doing so, to contribute to broader objectives related to the eradication of disablism in society" (Steinfeld & Maisel, 2012). When inclusive biophilic design principles are embedded at the master-planning level, the integration of natural elements, such as trees and water features, further strengthens this approach by fostering connections with nature and local ecosystems. Features that attract birds and other wildlife contribute to positive sensory experiencessupport the creation of walkable communities that empower individualsto be active by enabling them to move independently in a barrier free public realm.

Figure 10: Expo City Dubai

Considering a master plan through the lens of biophilic and universal design at the earliest stages not only helps identify physical barriers but also supports recommendations that create a community beyond basic accessibility. "The intersection of biophilic and inclusive design represents a powerful opportunity to create environments that not only connect people with nature but ensure this connection is accessible to everyone."(Garden on the Wall,2025). This includes accessible routes connecting all buildings and outdoor areas, activity areas, playgrounds, nature elements as well as rest point pockets for users seeking privacy or quieter spaces.

Figure 11 Dubai Hills Park, Dubai

Inclusive play areas with accessible play components, green areas, and structured activities in a community allow children of diverse abilities and neurodevelopmenal profiles, including children on the autism spectrum, to explore, learn, and develop social and cognitive skills (Elsevier, 2019).

"Research shows that exposure to natural elements can reduce stress levels by up to 60%, enhance cognitive function by 20%, and significantly improve overall well-being – benefits that should be accessible to all occupants of designed spaces." (Garden on the Wall,2025)

Figure 12 Inclusive Playground, Massachusetts

Common issues when designing biophilic features on a master plan level

Although extensive research supports the benefits of universal and biophilic design, best practices and exemplary case studies are often neglected during implementation. Universal Design is frequently addressed at a late stage of the design process, rather than being embedded from the outset. Delayed integration of accessibility in planning leads to higher margin of errors, inaccessible design solutions, limit design flexibility, and often result in costly and complex corrective measures, particularly when infrastructure is already in place.

Beyond physical accessibility, sensory and material considerations also play a critical role in the success of biophilic environments. While visual and sensory connections to nature can enhance focus and well-being, excessive or poorly controlled stimuli such as dense planting, or layered natural soundscapes may lead to distraction or cognitive fatigue, particularly in learning, work, or high-use public environments (Synktect, 2025). This underscores the importance of balance in the selection and placement of amenities and natural features.

Figure 13: Restaurant, Beirut

Material choice further influences both inclusive and sensory experience. Natural materials such as wood, stone, and natural fabrics are recommended as they tend to reduce visual clutter and create calmer, more legible environments for autistic individuals. "The texture of the material not only affects the atmosphere of the space with its naturalness, but also every material used in the

interiorcontributes to the atmosphere with its effect on acoustics" (IJLAR, 2020).

Figure 14: Devocion Cafe, New York

Poorly selected surfaces and discontinuous pathways directly limit mobility and participation for diverse users, diminishing the potential physical, social, and mental health benefits of nature features in buildings and outdoor spaces.

Another overlooked issue in biophilic master planning is the insufficient provision of shade along paths and rest points, particularly in regions with extreme summer temperatures. Beyond thermal comfort and protection from heat stress, the absence of shaded pedestrian paths represents a missed opportunity to introduce layered vegetation that can also function as acoustic buffers, reducing noise impacts from the public realm to adjacent buildings and infrastructure while enhancing overall environmental comfort.

Biophilic and accessible design implementation on a master plan level

To successfully implement inclusive biophilic design at the master-plan level, several coordinated best practices must be applied from the earliest stages. Continuous, wide, and slip-resistant accessible routes should connect buildings, green areas, and community amenities, ensuring uninterrupted movement for users of all abilities.

Figure 15: Little Island, New York

Along these routes, rest points and viewing areas should be strategically integrated to support individuals who require pauses, quieter environments, or opportunities for recovery.

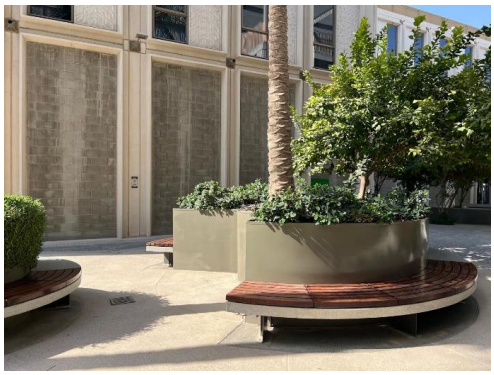

Figure 16 Rest Point Along An Accessible Route

Activity zones located along accessible routes such as inclusive play areas, gardening spaces, and adaptable outdoor facilities support participation across ages and abilities, promoting social interaction, learning, and engagement with nature (Prasoon Design, 2024; ScienceDirect, 2007).

Figure 17 Inclusive Playground, Boston

The integration of natural light along interior pathways and within communal spaces further enhances safety, visual comfort, and orientation, while supporting circadian rhythm regulation, which is particularly important for older adults (Neumann Monson Architects, n.d.). Carefully designed transitions between natural and artificial lighting reduce glare and high-contrast shadow patterns, ensuring environments remain legible, comfortable, and safe for all users.

In addition to these elements, specific design considerations are essential to support neurodivergent individuals and enhance overall community usability. Public spaces should be legible, uncluttered, and intentionally organized, using considered color palettes, visual contrast, lighting, and material finishes to reduce sensory overload and support orientation (DCU, 2021). "Built environments can be designed to create experiences similar to these found in nature. This

means reflecting the potential for active play, transitional spaces, refuge and spatial organization encountered in nature" (World Economic Forum, 2024).

Figure 18: Domino Park, New York

Figure 19: Hotel, Beirut

Accessible bicycle parking and car or van parking spaces should be positioned close to accessible building entrances, and both parking areas and entrances should be shaded to enhance thermal comfort, particularly in hot climates. In addition, clear, intuitive wayfinding

and signage are critical to support independent navigation, reducing confusion and frustration for neurodivergent users, older adults, and first-time visitors.

Figure 20: Expo City Dubai

Conclusion

At a policy and planning level, the development of inclusive andsustainable buildings is essential for ensuring equitable access and improving quality of life for all users. Well-planned accessible and biophilic environments enable people of all ages and abilities to navigate public spaces safely, engage in social activities, and benefit from enhanced physical and mental well-being (Prasoon,2023). Integrating these features from the earliest stages allows architects and planners to create communities that are not only barrier-free but also restorative, inclusive, and socially engaging.

Accessibility and biophilic design should be embedded as core planning principles rather than supplementary considerations. When incorporated strategically from the outset, supported by policies and coordinated frameworks, these principles reduce the need for costly retrofits, foster equitable participation, and promote safer, healthier,

and more sustainable built environments. As cities expand and populations age, inclusive biophilic design must move from aspiration to actual planning requirement. Ultimately, designing communities with accessibility and nature in mind transforms public spaces into inclusive environments where everyone can thrive, enjoy all spaces, and fully participate in community life.

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Growing Inclusivity: The Principles of Universal Plant Selection

Tina Merk

Abstract

This article establishes a practical framework for applying universal design principles to the selection and integration of plants, positioning horticulture as essential, health-promoting infrastructure. It argues that moving beyond aesthetic criteria to consider the full human experience is fundamental for creating equitable landscapes where the documented biophilic benefits of nature—spanning psychological, cognitive, physical, and social wellbeing—are universally accessible.

The proposed framework provides actionable, evidence-based guidance. It details critical selection principles addressing foundational safety (toxicity, allergens, sightlines), holistic sensory engagement across all modalities, and temporal dynamics like year-round seasonal interest. It further explains how planting can provide essential microclimatic and navigational functions, including shade, shelter, acoustic buffering, and wayfinding.

Each principle is analysed through the lens of primary user groups—including children, older adults, wheelchair users, and neurodivergent individuals—demonstrating how plant choice directly impacts accessibility, comfort, and independent use. The discussion connects strategic initial selection to long-term maintainability and cultural-ecological fit, ensuring spaces are sustainable, meaningful,

and resilient. This integrated approach empowers designers and planners to create inclusive environments where the restorative power of nature is a shared resource, actively cultivating equity, connection, and wellbeing for all.

Keywords:

***Universal Design; Inclusive Landscapes; Plant Selection; Accessibility; Sensory Design; Biophilia; User-Centered Design*.**

Introduction

The human connection to nature, or biophilia, is supported by extensive research. Integrating plants into our environments provides significant psychological, cognitive and physical benefits. This evidence establishes plants as essential infrastructure for human health, not mere decoration.

Exposure to nature reduces stress, anxiety and depression while improving mood and energy levels. Visual access to greenery can lower blood pressure and heart rate. Cognitive benefits include improved focus, creativity and academic performance (Stone, 2022; Augustin, 2023). For children, access to green spaces is linked to better attention spans (Kuo & Taylor, 2004).

These benefits are rooted in multi-sensory engagement. Biophilic design creates opportunities for sensory interaction. Views of nature lower physiological stress (Ulrich, 1984). Natural sounds like birdsong promote psychological restoration faster than urban noise (Alvarsson et al., 2010). Scents from plants can evoke positive memories, while tactile interaction promotes relaxation.

Plants also deliver direct physical health benefits by improving environmental quality. They act as natural bio-filters, removing pollutants like carbon dioxide and volatile organic compounds from the air (Smith, 2023). This is critical indoors, where air quality directly impacts cognitive performance. Plants can absorb toxins from building materials and increase oxygen levels (Smith, 2024). Living walls amplify this air-purifying capacity and can reduce noise pollution (Hutson & Hutson, 2024).

Vegetation also mitigates urban heat through shade and evapotranspiration. Living walls act as thermal buffers, reducing building cooling and heating needs (Sabin, 2023). Urban tree canopies save lives by reducing heat stress (O'Ceallaigh, 2023). Foliage also absorbs and deflects sound waves, buffering traffic noise in workplaces and residential areas (Palfreyman, 2024).

The therapeutic impact is clear in clinical settings. Roger Ulrich's seminal 1984 study found patients with a view of trees recovered faster and required less pain medication. This biophilic effect is now central to healthcare design, with therapeutic spaces shown to reduce stress for patients and families (Ulrich et al., 2020).

Socially, accessible green spaces strengthen community bonds and promote mental well-being (Wang et al., 2019). They serve as vital social infrastructure. Community gardening builds togetherness, while thoughtfully designed spaces can mitigate collective urban stress (Shepley & Sachs, 2023).

In summary, the benefits of plants are holistic, intersecting psychological, cognitive, physiological and social domains. This understanding elevates plant selection from an aesthetic concern to a core component of public health and universal design.

Integrating Plants into Lived Environments

The benefits of plants are activated by their intentional integration into daily environments, from public parks to interior spaces.

Beyond large parks, green infrastructure is deployed creatively across the urban matrix. Biodiverse tree canopies in streetscapes filter air, provide shade and buffer traffic. Green roofs offer insulation, manage stormwater and provide restorative views. In dense areas, living walls and green façades improve air quality, dampen noise and support urban biodiversity. Balconies become private oases and micro-corridors for wildlife.

Purpose-built sensory or therapeutic spaces in hospitals, schools and care settings use curated planting to reduce stress, aid memory and facilitate therapy.

The biophilic imperative extends indoors, where people spend most of their time. Here, plants address specific environmental and psychological needs.

In workplaces, plants are linked to improved mental health, creativity and productivity (Smith, 2024). They purify air of office pollutants and provide visual respite. Effective office plants include Philodendron, Aglaonema, Dracaena and Spathiphyllum (Smith, 2023). Areca palms release moisture and reduce dust, while Dracaena varieties remove chemical toxins (Bell, 2023).

In healthcare design, plants and nature views reduce patient pain and anxiety. Selection focuses on therapeutic goals, using plants like Monstera for engaging foliage or Soleirolia for calming texture. Practicalities are key, such as avoiding spore-producing ferns where sterile air is needed (Bell, 2023).

In educational settings, plants lower student stress and improve concentration. Easy-care, non-toxic plants like Golden Pothos, which remove chemical vapours, are ideal. Some plants, like the ZZ plant, can reduce CO_2 levels at night (Bell, 2023).

In residential and care settings, plants create calming atmospheres. For older adults or those with dementia, non-toxic, tactile plants stimulate senses and trigger memories. Raised planters ensure access for those with limited mobility, supporting emotional well-being (Yeo et al., 2020).

Plants are now essential, functional infrastructure for health, seamlessly integrated from public parks to interior spaces.

Why Accessibility and Universal Design Matter

The benefits of plants are universal, but access is not. Universal design creates environments usable by all people without adaptation, making it an ethical imperative.

A fundamental barrier exists between people and nature. For individuals with disabilities, older adults or parents with young children, obstacles like inaccessible pathways or lack of seating make green spaces an exclusive privilege. Accessible urban greenery is essential for well-being, recreation and social inclusion, supporting the human rights of people with disabilities (Pineda & Corburn, 2020). Universal design principles create spaces that are both physically navigable and socially equitable (Selanon & Chuangchai, 2024).

These benefits are often most needed where mobility is challenged. A tree visible from a hospital window delivers proven therapeutic advantages. In schools and offices, plants improve concentration

and satisfaction for all (Dravigne et al., 2008). For a child with ADHD, time in accessible green space can reduce symptoms significantly (Faber Taylor & Kuo, 2009). Without inclusive design, this potential remains untapped.

True universal design also embraces emotional, sensory and cognitive inclusion. A space must be not only reachable but resonant. This involves using nature's rhythms, textures and calming essence to foster safety and belonging. For neurodivergent individuals, it balances sensory stimulation with quiet refuges. For a person with vision loss, it prioritises auditory, tactile and olfactory cues. For someone with hearing impairment, it uses clear visual landmarks. This holistic philosophy ensures spaces are restorative for every user.

In conclusion, universal design in plant selection is the critical link between the existence of green space and the realisation of its benefits for everyone. It ensures these advantages are shared resources, nurturing difference through connection with nature.

Plant Selection Principles for Universal Design

Integrating plants into our environments holds great potential for enhancing wellbeing. To ensure these benefits are universally accessible, plant selection must be guided by principles that go beyond aesthetics. Universal design in horticulture requires seeing plants as dynamic, multi-sensory components of the living environment. Every choice carries implications for safety, sensory experience, accessibility and long-term usability.

This approach begins with appreciating the plant as a complete sensory entity. Effective design requires analysing all parts: its

overarching form, bark texture, twigs, buds, seasonal flowers, leaves, fruit and even root architecture (Tyznik, 1981). These elements collectively determine a plant's contribution in terms of line, form, texture, colour and density. The value of gnarled bark or vivid autumn foliage (Alabi, 2021) is not just visual beauty; it is potential sensory information and emotional trigger points for diverse users.

Plant selection for universal design is therefore an exercise in thoughtful balance. It harmonises visual interest with practical necessities like clear sightlines. It deliberately integrates diverse tactile elements—from hard barks to soft leaves—to provide sensory input that can stimulate or calm, a key consideration for neurodivergent individuals. It also demands anticipating how a plant will evolve through seasons and decades, and how its lifecycle impacts those who engage with it.

The following principles shift the fundamental question from the purely horticultural "what grows here?" to the human-centric: "Who is this for? How will they experience it?"

Principle 1. Seasonal Selection

In universal design, time is a critical consideration. A planting scheme that offers engagement for only a few months fails the principle of equitable use. Seasonal selection is a commitment to providing consistent, year-round access to nature's benefits.

A thoughtfully composed seasonal palette serves multiple purposes. For individuals with neuro-cognitive disorders like dementia, the changing landscape provides non-verbal markers of time's passage, reducing disorientation by grounding them in natural rhythms

(Delhanty, 2017). In educational settings, a garden that progresses through the seasons becomes an immersive classroom for learning about natural cycles.

As Tyznik (1981) outlines, each season highlights different attributes: structural form in winter, floral displays in spring, cooling greens in summer, and dramatic foliage in autumn. This progression actively prevents sensory monotony. By prioritising plants with multi-season interest and placing them within key views, the evolving spectacle remains accessible to those with limited mobility.

Designing for a sequence of interest means selecting species so that as one plant's display fades, another's begins. It requires looking beyond flowers to winter berries, ornamental grasses, trees with coloured bark, and persistent seed heads. By making seasonal variety a primary criterion (Finnigan, 2023), designers create landscapes that are truly engaging every day of the year.

Principle 2. Time and Growth Considerations

Universal design requires a forward-looking perspective that accounts for plants' dynamic nature. Considering temporal scales—from immediate engagement to long-term maturation—is essential for spaces to remain safe, functional and beautiful.

For some user groups, including children or those new to gardening, the slow pace of traditional horticulture can be disengaging. Incorporating fast-growing plants like annuals or sunflowers provides quick, visible results that sustain interest and reward participation (Gaudion & McGinley, 2012). This fosters an immediate sense of accomplishment.

A truly universal design must also plan for the mature size, form and habit of every plant. Failure to do so can compromise accessibility and safety: trees may block crucial sightlines or paths; shrubs can obstruct wheelchair access; root systems may heave paving, creating tripping hazards (Yazici et al., 2018; Atabeyoğlu et al., 2014). Designers must ask what a plant will look like in 5, 10, or 25 years, and whether its growth will alter the sensory quality or safety of the space.

Principle 3. Safety Considerations

At the heart of universal design is safe and equitable use. Risk minimization through informed plant choice is essential, particularly for vulnerable groups like children, the elderly, or those with sensory differences.

A. Inherent Toxicity and Texture

The most direct safety intervention is selecting species with benign properties. Avoid plants with toxic parts in areas where they may be touched or ingested, such as spaces for children or individuals with dementia. Plants like daffodils, rhododendron and yew pose serious risks (Beckwith & Gilster, 1996; Alzheimer's WA, 2020). Use only pesticide-free soil and non-toxic materials.

Plants with thorns, spines or sharply textured leaves, such as roses or cacti, should be avoided in reachable areas along pathways and seating zones. If used for security, they must be placed well away from public contact.

While supporting pollinators is important, dense concentrations of nectar-rich flowers should not be placed directly next to

playgrounds, entrances or narrow walkways. Position them in less frequented zones to support biodiversity without creating risks.

B. Sightlines: Balancing Enclosure and Visibility

Strategic management of sightlines is crucial for physical and perceived safety. People feel safer with clear, unobstructed views. Planting should favour taller trees with high, open canopies, while keeping the understory clear. Studies indicate this improves visibility and correlates with higher perceived safety (Mouratidis, 2019). This approach is especially recommended in therapeutic gardens and schools, where caregiver sightlines are essential (Yazici et al., 2018).

Near roads and crossings, low planting or high-canopy trees with trimmed branches are preferable to dense mid-level shrubs that obscure sightlines. Designs should aim for partially open layouts, using vegetation to define spaces without creating visual isolation (Baran et al., 2018).

The synergy between thoughtful design and consistent upkeep is critical. Well-pruned vegetation projects care and safety, while neglected landscapes provoke unease.

C. Allergies: Mitigating Pollen and Irritants

Universal design must address physiological sensitivities. With around 30% of the global population affected by pollen allergies, plant selection is a public health consideration (Pawankar, 2014).

Prioritise low-allergenic, insect-pollinated plants over wind-pollinated species. Wind-pollinated plants like Birch, Oak, Maple and many grasses release vast amounts of airborne pollen (National Asthma Council Australia, 2024). Insect-pollinated plants, like most

showy flowering perennials, produce heavier, stickier pollen that poses a much lower risk.

Consult local asthma and allergy organisation guides for tailored lists of low-allergenic species. Avoid planting high-pollen trees near building air intakes, open windows, seating areas or playgrounds. Some plants, like the London Plane tree, shed irritants and should be avoided in public, interactive spaces.

Creating an allergy-aware landscape is about informed, strategic substitutions. By choosing insect-pollinated, low-pollen alternatives and considering placement carefully, designers ensure green spaces are accessible to the widest audience, including those managing allergies and asthma.

Principle 4. Privacy and Shelter

After addressing safety, universal design supports psychological comfort and personal agency. Privacy and shelter, achieved through strategic planting, help users feel secure and in control. Plants can define boundaries, buffer environmental stressors and create intimate refuges, which is particularly valuable for neurodivergent individuals, children, the elderly and anyone needing respite.

The human desire for refuge—a sheltered spot to observe without being in full view—is a biophilic design foundation. Hedges, dense shrubs and overarching tree canopies softly define territory, establish visual privacy and create quiet zones. A bench nestled beneath a tree or within a semi-enclosed nook provides a crucial "retreat and reflect" space.

Shelter extends beyond visual privacy to physical protection. Effective windbreaks require dense, multi-layered planting from the ground up, as low hedging alone is often insufficient. Proper vegetative buffers reduce wind speed and associated noise, addressing a significant issue for sensory-sensitive users (Xu, 2023).

Planting also acts as a living buffer against intrusive noise and undesirable views. A well-designed strip of vegetation between a pathway and a roadway creates vital physical and psychological separation, enhancing the walking experience.

For neurodivergent individuals, the ability to self-regulate is crucial. Escape spaces—clearly defined, quiet areas—should offer enclosure without isolation. Designs might use translucent elements like willow dens or bamboo screens to create separation while maintaining visual connection for safety (Gaudion & McGinley, 2012). The goal is to offer choice and control.

Planting should create a gradient of spaces, from open and social to semi-private and sheltered. This allows users to select their preferred level of engagement. Successful design ensures these spaces are inviting, legible and safe, using plants as tools for empowerment within the shared landscape.

Principle 5. Shade

Shade is fundamental for comfort, accessibility and public health. In universal design, effective shade is a necessity for equitable use, protecting users from UV radiation, reducing heat stress and creating comfortable microclimates. Strategic shade creation

through planting must be intentional, as not all vegetation provides meaningful protection.

Adequate shade safeguards vulnerable populations, including children, the elderly and individuals with increased photosensitivity (Delhanty, 2017). Without it, outdoor areas can become unusable during sunny hours. Shade also supports thermal regulation benefits, making outdoor engagement viable during warmer months.

A common design pitfall is conflating greenery with functional shade. Low shrubs and ground cover provide negligible protection (Xu, 2023). Effective solar protection requires considering plant form and placement.

For shaded corridors along pedestrian routes, utilise tall trees with broad, dense canopies. These create a high, leafy ceiling that filters intense summer sun while allowing air circulation at ground level.

Over seating areas, pergolas with climbing vines or trees with lighter foliage create dappled, softer light. This reduces glare and heat without creating enclosure, making spaces more inviting for socialising (Delhanty, 2017).

Shade is essential for sheltered refuges. A seating area achieves full restorative potential when under a mature tree's canopy. Shaded canopies at building entrances also moderate abrupt visual and thermal shifts between exterior and interior, reducing disorientation and anxiety.

Shade provision should be program-driven. Designers must identify where people walk, wait or linger, and map shade as deliberately as pathways. This ensures outdoor comfort and protection are fully and equitably accessible.

Principle 6. Wildlife Attraction

A truly universal environment recognises that human wellbeing intertwines with ecosystem health. Prioritising plants that attract wildlife serves a dual purpose: enhancing biodiversity and creating dynamic, multi-sensory experiences for people. This interaction provides educational, therapeutic and emotional benefits.

Selecting native, nectar-rich, berry-producing and host plants sustains local food webs and biodiversity. In urban environments, gardens serve as stepping stones for wildlife movement. Features like mature trees, dense shrubs and seasonally blooming flowers create critical stopover points. Even living walls can become micro-habitats, offering shelter and food (Sabin, 2023).

Wildlife transforms a static garden into living theatre. The flash of a butterfly's wing, the hum of bees and birdsong add captivating sensory layers. In therapeutic environments like dementia care gardens, wildlife can spark curiosity, stimulate conversation and support memory recall.

For children, a garden teeming with life is a powerful outdoor classroom, making ecological learning tangible and engaging. Spontaneous wildlife encounters can elicit joy, wonder and peace, deepening the restorative experience.

While attracting wildlife is desirable, it must be managed thoughtfully. Plants that attract stinging insects should be placed in peripheral beds or designated pollinator gardens, not immediately adjacent to high-traffic playgrounds or entryways.

The goal is to create a shared habitat. Plant selection should contribute to local ecology while enabling safe, delightful human-

wildlife interaction, creating richer environments that benefit all species.

Principle 7. Wayfinding and Rhythm

A universally designed landscape must be legible and predictable, allowing intuitive navigation. Wayfinding is influenced by visual and sensory patterns created by planting. Rhythm and repetition can provide comforting order and clear guidance, but can also cause sensory distress if misapplied.

Rhythmic planting applies visual perception principles to aid navigation. The Gestalt principle of Continuation suggests aligned elements are perceived as a continuous group. An alley of evenly spaced trees creates a strong visual line guiding movement along a path, helpful for individuals with hearing impairments who rely on visual cues (Yazici et al., 2018).

Similarly, the principle of Similarity creates intuitive navigational cues. A distinct landmark—like a tree with a unique silhouette or a cluster of fragrant shrubs—against a uniform backdrop naturally stands out, signalling key locations like decision points or entries.

True universal wayfinding engages multiple senses. For individuals with visual impairments or dementia, other senses become primary navigational tools. Strongly scented plants like rosemary or lavender at key junctions create unmistakable sensory markers that can trigger memory and aid orientation. Dense hedges or buffer planters define zones, preventing disorientation by making layouts more comprehensible (Xu, 2023).

However, rhythm misapplied poses serious sensory hazards. The flicker effect occurs when evenly spaced vertical elements are

viewed from a moving vehicle or by walking individuals with visual sensitivities. This rapid strobing of light and shadow can trigger sensory overload, dizziness or seizures in susceptible individuals (Finnigan, 2023). Therefore, avoid simple monotonous repetition along high-speed routes. Break patterns with varied spacing, grouped plants or different species and heights.

Planting should create a hierarchy of cues. Use rhythmic, repetitive planting for guiding corridors where predictability helps. Then intentionally introduce sensory "events"—a unique tree, a scent garden, a textural change—to mark key locations. Always evaluate rhythmic patterns from the user's perspective in motion to eliminate dangerous flicker effects, creating landscapes respectful of neurological diversity.

Principle 8. Sensory Support Through Plant Selection

The principles of universal design find profound expression in thoughtful sensory engagement. Plants deliver rich, multi-sensory experiences that can calm, stimulate, orient and heal. For individuals with dementia or neurodivergent individuals with distinct sensory processing styles, a well-designed sensory landscape can mean the difference between exclusion and connection. Therefore, curating sensory experiences is a cornerstone of inclusive design.

A holistic approach involves two parallel strategies: providing stimulating, accessible sensory input and preventing harmful sensory overload.

Effective sensory areas are not uniformly stimulating. They are carefully zoned:

- **Alerting Zones: Areas with brighter colours, stronger scents and dynamic elements to engage and energise.**
- **Calming Zones: Areas with soft textures, muted colours and gentle sounds to promote relaxation.**
- **Transition Spaces: Neutral areas with minimal sensory input, allowing users to decompress between zones.**

This zoning creates choice and control, balancing stimulating 'sensory spaces' with quiet 'escape spaces'—a critical consideration for preventing overwhelm (Fors et al., 2026; Kinnaer et al., 2016).

Sensory design must accommodate both hyper-sensitive and hypo-sensitive users (Gaudion & McGinley, 2012).

- **For those easily overstimulated, design should employ gradual introductions of stimuli, group similar textures and manage scent intensity carefully.**
- **For those who seek sensory input, design should offer a varied mix of textures, touch-reactive plants, bold colour contrasts and diverse tactile and auditory experiences.**

Equally important is avoiding sensory triggers that cause distress. For a universally accessible garden, common triggers must be managed (Sustainable Gardening Australia, 2025; Mostafa, 2021). These include overpowering smells, jarring sounds, unpleasant tactile textures, visually chaotic patterns and dangerous flickering light effects.

The following sections explore how to harness each specific sense through plant selection and placement.

A. Sight/Visual

Vision is a primary sense, but visual perception varies dramatically. Universal design for sight must address a spectrum, from creating high-contrast environments for those with low vision to managing colour intensity for the visually hypersensitive.

Colour theory is a practical tool. Bright, warm colours (red, orange, yellow) are more easily detected by individuals with low vision, as cooler tones like blue can appear muted (Polat et al., 2017; Souter-Brown, 2015). Using these warm, saturated colours for key focal points creates high-contrast visual cues for navigation. Warm colours appear to advance, making spaces feel intimate, while cool colours recede, creating an illusion of depth (Gray, 1999).

Colour also influences psychological state. Alerting zones benefit from energising warm palettes, while calming zones should employ muted tones and cool colours to promote tranquility (Wagenfeld, 2025; Sustainable Gardening Australia, 2025).

Beyond colour, other visual characteristics aid legibility. Creating strong visual contrast—such as light foliage against a dark wall—defines edges and shapes. For individuals with partial sight, a plant's clear silhouette often provides more crucial navigational information than fine details.

Employing plants with varied sizes, shapes and textures builds a rich visual tapestry. To sustain interest, incorporate a mix that ensures

succession of bloom, foliage colour and structural form across all seasons.

Visual details must be placed where they can be seen. For wheelchair users or those with a stooped posture, intricate textures and colours should be featured at or below eye level. Raised planters, hanging baskets and low-growing, colourful ground covers are excellent for this (Polat et al., 2017; Yazici et al., 2018).

Universal design avoids overly bright, clashing colour patterns and unpredictable, fast-moving shadows, which can cause visual chaos and overstimulation.

Plants (examples)

- **High-Contrast Blooms: Sunflower (*Helianthus annuus*), Zinnia (*Zinnia elegans*), Snapdragon (*Antirrhinum majus*), Purple Coneflower (*Echinacea purpurea*), Geranium (*Pelargonium*)**
- **Seasonal Interest – Spring: Crocus, Tulip, Flowering Dogwood (*Cornus florida*), Magnolia**
- **Seasonal Interest – Summer: Phlox, Bellflower (*Campanula*), Yarrow (*Achillea*)**
- **Seasonal Interest – Autumn: Fothergilla, Serviceberry (*Amelanchier*), Smokebush (*Cotinus coggygria*)**
- **Seasonal Interest – Winter: Red-twig Dogwood (*Cornus sericea*)**
- **Foliage Interest: Coral Bells (*Heuchera*), Fountain Grass (*Pennisetum*)**

B.Sound/Auditory

The acoustic environment is a powerful, yet often under-designed, layer of sensory experience. Universal acoustic design has a dual objective: to introduce pleasant natural sounds and to mitigate unpleasant external noise.

Intentional planting creates a tapestry of desired sounds. Species with specific structural qualities produce characteristic noises. Ornamental grasses, bamboo and trees with large leaves create a soothing rustle in the wind, providing gentle auditory stimulation (Kopeva et al., 2020). Dried seed pods add subtle rattling textures.

A primary source of pleasant sound is wildlife. By planting nectar-rich flowers and berry-producing shrubs, a garden attracts birds and insects, whose songs and hums create a vibrant soundscape that enhances mood and supports focus.

A key function is to buffer intrusive noise from traffic or machinery. Dense, multi-layered plantings of trees, shrubs and groundcover act as effective living sound barriers. Evergreen hedges and living walls provide consistent, year-round acoustic buffering, fundamental to creating the "quiet refuge areas" necessary for sound-sensitive individuals.

An inclusive soundscape also considers those with limited or no hearing. Sound should be paired with complementary visual and tactile-vibrational cues.

Design the auditory environment with intention. Use peripheral plantings as acoustic buffers to shield calm zones. Within those zones, orchestrate natural sounds through strategic plant selection. Always ensure key auditory information is not masked, and provide

visual or tactile alternatives. The goal is a balanced soundscape where nature's sounds are pleasant and outside noise is softened.

Plants (examples)

- **Rustling: Ornamental Grasses (*Miscanthus*, *Calamagrostis*), Clumping Bamboo**
- **Rattling/Popping: False Indigo (*Baptisia australis*) pods, Balloon Flower (*Platycodon grandiflorus*) buds**

C. Smell/Olfactory

The sense of smell has a direct pathway to the brain's limbic system, the centre of emotion and memory. This makes scent a potent tool in planting design. For individuals with dementia or low vision, fragrant plants can provide unparalleled cues for orientation and trigger reminiscence. However, scent is subjective and can easily overwhelm, making its management critical. The goal is to offer gentle, pleasurable and controllable olfactory experiences.

Scented plants serve several key functions. Strategically placing a fragrant plant like rosemary at a path junction creates a distinct, non-visual wayfinding cue. Familiar scents from herbs or flowers can trigger personal memories and reduce anxiety. Scents also shape emotional quality; lavender can define a restorative zone, while citrus may energise an active area.

Because sensitivity varies, design must prioritise user control. Make scent optional by using plants that release fragrance only when touched, such as lemon verbena. Establish scent-free zones in quiet

seating areas where the air is clear of strong aromas (Wagenfeld, 2025; Gaudion & McGinley, 2012).

For those who enjoy scent, plant fragrant species along pathways, near seating and at nose-level in raised beds. However, some scents can trigger asthma or migraines. Plants with pungent odours should be used sparingly and placed away from seating (Xu, 2023).

Treat scent as a delicate seasoning. Zone fragrances deliberately—concentrate them in specific areas and ensure clear, scent-free refuges are available. Prioritise gentle, familiar and non-allergenic scents, giving users the choice to engage with or retreat from fragrance.

Plants (examples)

- **Floral/Sweet: Viburnum (*Viburnum carlesii*), Phlox, Sweet Autumn Clematis (*Clematis terniflora*)**
- **Herbal/Fresh: Lavender (*Lavandula*), Rosemary (*Rosmarinus officinalis*), Mint (*Mentha*), Lemon Balm (*Melissa officinalis*), Pineapple Sage (*Salvia elegans*)**

D. Touch/Tactile

Touch is the most immediate sense, connecting us directly to the physical world. In universal design, tactile engagement is non-negotiable. It provides essential information for individuals with visual impairments, offers grounding for those with cognitive conditions and is a primary source of exploration for neurodivergent individuals. The goal is to provide a rich, safe tapestry of textures users can engage with on their own terms.

For users relying on non-visual cues, touch is a primary navigation tool. Plants with distinctive textures—like the furrowed bark of an oak or the soft leaves of Lamb's Ear—can serve as recognisable markers along a path (Kopeva et al., 2020; Yazici et al., 2018). Touching different textures can also stimulate sensory cognition and trigger memories (Rappe & Kivelä, 2005).

A universal tactile environment offers a balanced gradient of experiences. Create dedicated zones with a varied mix of safe textures: velvety, smooth, rough and bristly (Gaudion & McGinley, 2012). The priority is predictability and control, requiring clear, wide paths that prevent accidental brushing against foliage (Finnigan, 2023).

The principle of "safe to touch" is paramount. All interactive plants must be non-toxic and non-thorny. Varied textures must be positioned within comfortable reach using raised planters, hanging baskets at accessible heights and low-growing plants with interesting textures. Grouping plants with similar textures helps hypersensitive users navigate comfortably (Yazici et al., 2018).

A touch-inclusive design offers clearly defined zones—from boldly textural exploration areas to smooth calm spaces—connected by safe pathways. This empowers users to control their tactile interaction, transforming touch into a source of discovery and connection.

Plants (examples)

- **Soft/Fuzzy: Lamb's Ear (*Stachys byzantina*), Woolly Thyme (*Thymus pseudolanuginosus*)**
- **Smooth/Waxy: Stonecrop (*Sedum* sp., non-toxic varieties), Swedish Ivy (*Plectranthus verticillatus*)**

- **Rough/Textured: Paper Birch (*Betula papyrifera*), Soft Ornamental Grasses (*Pennisetum*)**
- **Crinkly/Brittle: Honesty (*Lunaria annua*) seed pods**

E. Taste/Gustatory

The sense of taste offers the most direct interaction with a plant. Incorporating edible plants is a powerful strategy for universal engagement, fostering learning, sparking memory and encouraging social interaction. However, safety and clarity are paramount. A taste garden must be an unequivocally safe zone where every plant is non-toxic and easy to harvest.

Edible gardens serve multiple purposes. For children and newcomers, the cycle of planting, nurturing, harvesting and tasting delivers hands-on education about life cycles and ecosystems. Familiar tastes from herbs and fruits can evoke powerful memories, especially valuable in dementia care or community gardens (Gray, 1999; Sustainable Gardening Australia, 2025). For neurodivergent individuals who may engage in sensory-seeking oral behaviours, providing a designated safe space for tasting is a positive design response (Finnigan, 2023).

The primary rule is absolute: every plant in a tasting area must be non-toxic and safe for consumption, with soils free from pesticides. Edible plants must be physically easy to locate and harvest, using raised beds, containers and vertical planters to bring produce to a comfortable height. Incorporate plants with distinct taste profiles—sweet fruits, sour leaves, savoury herbs and mild greens—to engage a range of palates.

A tasting garden should be celebratory and unambiguous. It must be visually and physically distinct, with 100% of its contents being safe for consumption. This empowers users to explore confidently, turning passive observation into active participation.

Plants (examples)

- **Fruits/Vegetables: Cherry Tomatoes, Strawberries, Snap Peas, Pole Beans, Lettuce, Radishes, Pumpkins/Squash**
- **Herbs/Edible Flowers: Nasturtium, Basil, Chives, Mint, Sunflower seeds**

F. Movement, Balance & Proprioception

Beyond sensory qualities, plants support proprioception—the body's sense of its own movement and position. Their selection and arrangement directly influence this internal sense, creating topography, spatial definition and navigational challenges that engage users physically.

Strategically designed planting can create gentle slopes for climbing, establish clear edges with varied textures for balance feedback, and use shrub density to create spaces that feel expansive or enclosed. Sturdy, low-branching trees offer natural supports for leaning, while varied pathway surfaces bordered by planting provide underfoot cues that aid spatial awareness.

The physical environment can provide organising input for the nervous system. Incorporate opportunities for strong physical feedback, such as stepping stones of varying heights or areas for lifting natural materials like logs. These activities provide grounding

sensory input that can help regulate energy levels and improve focus.

Use "soft" visual dividers like low planting to define spaces without creating confinement. A predictable layout with clear landmarks reduces anxiety related to movement (Gaudion & McGinley, 2012).

For individuals with challenges in depth perception or spatial awareness, use strong visual contrasts to define edges and establish unambiguous boundaries. This creates a predictable spatial framework supporting confident movement.

Incorporate simple, safe elements that develop gross motor skills at an accessible scale, such as low climbing structures designed for use by people of all ages and abilities (Polat et al., 2017).

Design the landscape as an active partner in movement. It should offer a graduated series of physical experiences—from calming pathways to optional motor challenges—within a framework of spatial clarity. By supporting the body's sense of itself in space, the garden promotes physical accessibility, confidence and the joy of movement for every user.

4. User Group Considerations

Universal design principles are applied in service of people. Successful planting is woven from an understanding of specific user groups—children, older adults, wheelchair users, neurodivergent individuals and the broader community. By considering these groups holistically, designers create layouts and selections that are both accessible and deeply engaging.

Physical access is the foundational layer of inclusion. Attention must be paid to changing needs across the lifespan, from the low vantage point of a child or wheelchair user to the reduced mobility of an older adult.

A primary intervention is the strategic use of raised beds and containers. Elevating the planting surface brings soil, plants and gardening activity within comfortable, independent reach. Sensory plants with interesting textures and fragrances must be positioned so their most engaging features are accessible at or below standard eye level.

The circulation network is equally critical. Pathways must be wide, smooth, firm and level to accommodate wheelchairs, walkers and strollers. They should form a clear, intuitive loop. Planting alongside these routes should adhere to a "high-branching and low-planting" scheme to maintain vital sightlines for safety, supervision and a feeling of openness.

An accessible garden naturally becomes multi-generational. A child can sow seeds in a raised bed alongside a seated grandparent, fostering connection through shared activity. Including plants with nostalgic value, such as old-fashioned roses or fragrant herbs, can trigger reminiscence in older adults and spark intergenerational conversation (Gray, 1999).

True universality also respects cultural specificity. Plant selection should be rooted in local context. Consulting with community members to include culturally significant species fosters a sense of ownership, belonging and intergenerational knowledge sharing (Beckwith & Gilster, 1996).

Designing for user groups is an integrative process. Viewing each decision through multiple lenses—physical ability, sensory engagement, cultural context—creates landscapes that are universally meaningful.

5. Maintenance Considerations

The long-term success and inclusivity of any planted environment depend on a realistic maintenance strategy. Maintenance is a critical design parameter that must be addressed from the outset through plant selection, material choices and spatial planning.

The most significant maintenance decisions are made during design. Selecting low-impact plants can drastically reduce long-term labour and cost. Avoid species known to be invasive, susceptible to pests, or that generate excessive debris. Particular attention should be paid to plants that drop slippery leaves, messy fruits or hard seeds onto pathways, creating persistent hazards and increasing cleanup burdens. Consider root control barriers for large trees near paved areas to prevent costly damage (Wojnowska-Heciak et al., 2022).

Maintenance must preserve safety and accessibility. Poorly maintained greenery can render spaces inaccessible or unsafe.

Routine, strategic pruning is a critical safety practice. Its primary functions are to maintain clear sightlines, prevent vegetation from obstructing pathways or signage, and ensure tree canopies remain high and open. Pathways must be kept meticulously clear of debris and surface irregularities to ensure safe passage.

For allergy management, mow lawns regularly to prevent pollen release, or replace high-pollen grass areas with shrub beds or other

ground covers (Asthma Society of Ireland, n.d.; Green et al., 2018). Proactively clean leaf litter and fruit fall from walkways.

For neurodiverse users, consider the impact of maintenance noise. Providing advance notice of noisy activities and scheduling them during quieter times can make spaces more usable. Involving users in safe, appropriate tasks like watering or light weeding fosters ownership and therapeutic engagement.

Anticipating growth involves planning for succession, pruning and eventual replacement. Selecting plants with appropriate growth rates and final sizes minimises future burdens and prevents spaces from becoming inaccessible due to overgrowth. Designing for growth ensures the enduring and equitable usability of the space.

Maintenance is the ongoing dialogue between design and real-world use. By selecting appropriate plants and establishing routines that prioritise safety, accessibility and ecological health, we preserve the universal benefits of planted environments for the long term.

6. Conclusion

The principles of universal plant selection reveal a profound truth: integrating nature into our environments is a powerful act of inclusive design. This is about thoughtfully weaving the multi-sensory, evolving qualities of plants into shared spaces to support the vast spectrum of human need.

The deliberate application of universal design principles actively shapes planting into a therapeutic instrument. This connection is formalised in Horticultural Therapy, which systematically harnesses engagement with plants to enhance holistic wellbeing.

The evidence is compelling: a well-designed space can help a neurodiverse child regulate emotions, provide a person with anxiety a focus for mindful engagement, or offer someone with memory loss a tangible connection to their past through scent and touch. These outcomes are the direct result of intentional choices about safety, sensory zoning, seasonal interest and accessible engagement.

The ultimate goal is to facilitate profound joy and meaningful engagement with the living world. True accessibility extends beyond level pathways and reachable heights to encompass the deeper accessibility of experience—the universal capacity to form personal connections, navigate via multi-sensory cues, feel secure and welcomed, and participate in nurturing life.

This framework gains its true power when adapted to local and cultural context. The most resonant and inclusive planting reflects the community it serves, incorporating plants of cultural significance and selecting species ecologically suited to thrive.

Universal design in plant selection is an invitation to reimagine our relationship with nature as one that actively includes everyone. It is a philosophy that views human diversity as the essential inspiration for creating more empathetic and vibrant landscapes. By embracing these principles, we cultivate far more than plants; we cultivate equity, nurture wellbeing and grow shared joy.

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Letter from the Chairman's Desk

By Sunil Bhatia PhD

My early years of life were spent in a rural area where trees grew randomly, following their own natural course. Unlike trees, we humans manage crops and fruit gardens according to our wishes because of land ownership. In doing so, we have often distorted the value system that once respected others' share and balance in nature. The modern obsession with profit and the urge to grow financially as much as possible have introduced a commercial mindset that has harmed the lives of all living beings on planet Earth. No one remains untouched by this cruel approach.

Although rural life is not perfect, it still functions through a better ecological mechanism compared to urban spaces. Living there once shaped my philosophy that plants grow wherever they find a conducive environment. In our region, it is a popular belief that plants communicate and maintain their own network. Wherever they sense the possibility for another plant to grow, they assist in spreading seeds.

Sometimes their decisions go wrong. Certain creepers manage to convince other plants to allow them space to grow. Later, these creepers turn parasitic, interfering with the growth of the very plants that once supported them. In their selfishness, they may even destroy the plants that helped them survive. Those supportive plants

become enslaved under the creepers. At times, human intervention saves them by removing these parasitic growths.

The same character can be found among humans. Those who once showed kindness and allowed us to survive may later become victims of our selfishness and greed. In pursuit of personal gain, we sometimes harm the very people who supported our growth and survival.

My first experience in urban areas was quite different. Everything appeared well organized and picturesque. Trees were planted in neat rows, exactly where human planners thought they should be, and everything was carefully maintained. For me, it was shocking to see trees forced to grow in straight lines against their natural tendency to grow randomly. They appeared stressed, disciplined by human authority. Any branch that grew beyond the planned design was treated as disobedient or rebellious and punished by pruning or cutting.

This pruning resembles the human tendency to control nature using the first weapon ever designed—the axe. We forget that plants only need a place to stand; the rest of their growth depends on air, water, and light. Through photosynthesis they produce food, a process fundamental to life on Earth. Along with the microbial processes in living organisms that convert food into energy, these systems have sustained life on this planet for billions of years.

Urban landscaping often follows the human idea that symmetry defines beauty. Yet asymmetry and randomness also possess their own attraction. Nature itself is built on randomness, and this randomness has contributed to the stability of Earth by forming mountains, rivers, forests, and water systems. Trees cannot be

designed in isolation. They existed long before humans appeared and have developed better mechanisms of survival over billions of years without human intervention.

A single tree alone is not a system, and a row of trees is not a forest. Real ecosystems emerge from groups and interactions rather than isolated elements.

A forest contains many species that grow in coordination with surrounding plants through subtle sharing mechanisms. Plants do not grow because they consume soil alone; they grow tall mainly through air, water, and light. If plants actually grew by consuming soil, the Earth would have been exhausted long ago. Instead, trees operate with an extraordinary natural system capable of drawing water from deep underground and lifting it to the highest leaves—something no human-made pump has been able to replicate fully.

A forest is a diverse community where plants grow where they feel suited, not in decorative rows created by human design. This small shift in thinking changes everything.

In other words, when trees are used merely as decoration, they become part of urban infrastructure rather than living ecosystems. The future of green cities will not come simply from planting more trees in lines. It will come from allowing trees to grow naturally by creating conducive environments. Such natural ecosystems attract migratory birds, animals, plants, and even humans through their own communication systems.

Birds traveling thousands of miles somehow receive signals guiding them to safe habitats. Even the life of bees reflects this mysterious natural intelligence. A queen bee may live for one to five years,

while worker bees live only five to seven weeks. Yet together they travel long distances and establish beehives in specific plant environments, often in remote places they have never seen before. This remarkable navigation remains a mystery to humans.

Therefore, I humbly request the human community not to encroach upon the living spaces of other beings merely because we believe ourselves to be superior. I do not know whether plants experience greed for survival, but I am certain they do not desire interference driven by human greed. Such interference does not support natural growth; instead, it often becomes a catalyst for further exploitation.

Human greed has no limits. We exploit animals such as hens, cows, and horses. Artificial light is used to force hens to lay more eggs. Animals are confined to restrict movement so they accumulate more fat for human consumption. Male calves are often killed because raising them increases commercial costs.

During the 1970s and 1980s, the term "smuggling" was commonly heard, and smugglers became household names. In one coastal region, a smuggler planted palm trees randomly across kilometers of land. The intention was to slow down police vehicles chasing them. The random placement of trees forced vehicles to reduce speed and sometimes crash into trunks. The problem was not solved; it was only shifted temporarily to another place.

My philosophy is simple: move along with nature—do not disturb it, threaten it, or destroy it. The stability of planet Earth already exists within nature itself. Mountains and rivers existed long before humans and do not require our support to survive. This stability emerged after the cooling of the once-hot planet, when mountains and water reservoirs helped regulate the Earth's climate.

Disturbing these natural systems may weaken the planet's ability to adjust to new developments. I once heard that the construction of an enormous dam on the Brahmaputra River in China is so massive that its weight might slightly affect the Earth's rotation. Whether this claim is scientifically accurate or not, it illustrates how large human interventions can influence natural systems.

I strongly object to landscape designs that disturb natural environments simply to create visually pleasing spaces. Designers sometimes rearrange elements from different places—building artificial waterfalls, small hills, and decorative plant arrangements—only to satisfy visitors' aesthetic expectations.

One day, I noticed that the trunks of some trees were painted white, which made me curious about the reason. When I asked a worker nearby, he explained with traditional wisdom. He said that the area had a severe problem with termites, which could destroy healthy trees within a few days. The trunks were painted with a mixture of lime and copper sulfate pentahydrate diluted in water. This coating is harmless to the plant but acts as a protective layer against termites and fungi, functioning like a shield.

During my struggling period of establishing this publication of 'Design for All', Ms. Imma Bonet, the President of the Design for All Foundation, Spain, supported me by accepting our invitation to contribute articles without hesitation, despite not knowing my background in journal publishing. Later, I came to know that Mr. Francesc Aragall is the husband of Ms. Imma Bonet. He became both a guide and a friend to me and kindly invited me to serve as a jury member for the first Design for All Foundation competition, where

we selected the first and second positions from among many project entries submitted by designers from around the world.

I sincerely thank them for helping and guiding me during my difficult and challenging days.

Enjoy Reading.

With Regards

Dr. Sunil Bhatia

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Forthcoming Issues

April 2026 Vol-21 No-4

Cristina Căluianu

Cristina Căluianu is the co-founder of Asociația CED România Centrul de ExcelențăprinDiversitate, a Romanian non-governmental organization, and the founder and director of Accessible Romania by Sano Touring, a tour operator specialized in accessible tourism. She has over 25 years of experience in the tourism sector and more than 10 years of focused professional experience in accessible tourism, working at the intersection of accessibility, social innovation, and inclusion of persons with disabilities.

She coordinates strategic initiatives in Romania, including the national accessibility resources hubRomânia Accesibilă and Audara, a structured accessibility assessment tool aligned with national, European, and international standards.

Cristina serves as the National Expert for Romania within the European Accessibility Resource Centre AccessibleEU, is an evaluator for the "accessibility" criterion in the European Commission's European Capital of Smart Tourism competition, and lectures on accessibility and accessible tourism within the Erasmus+ ProjectWeNaTour.

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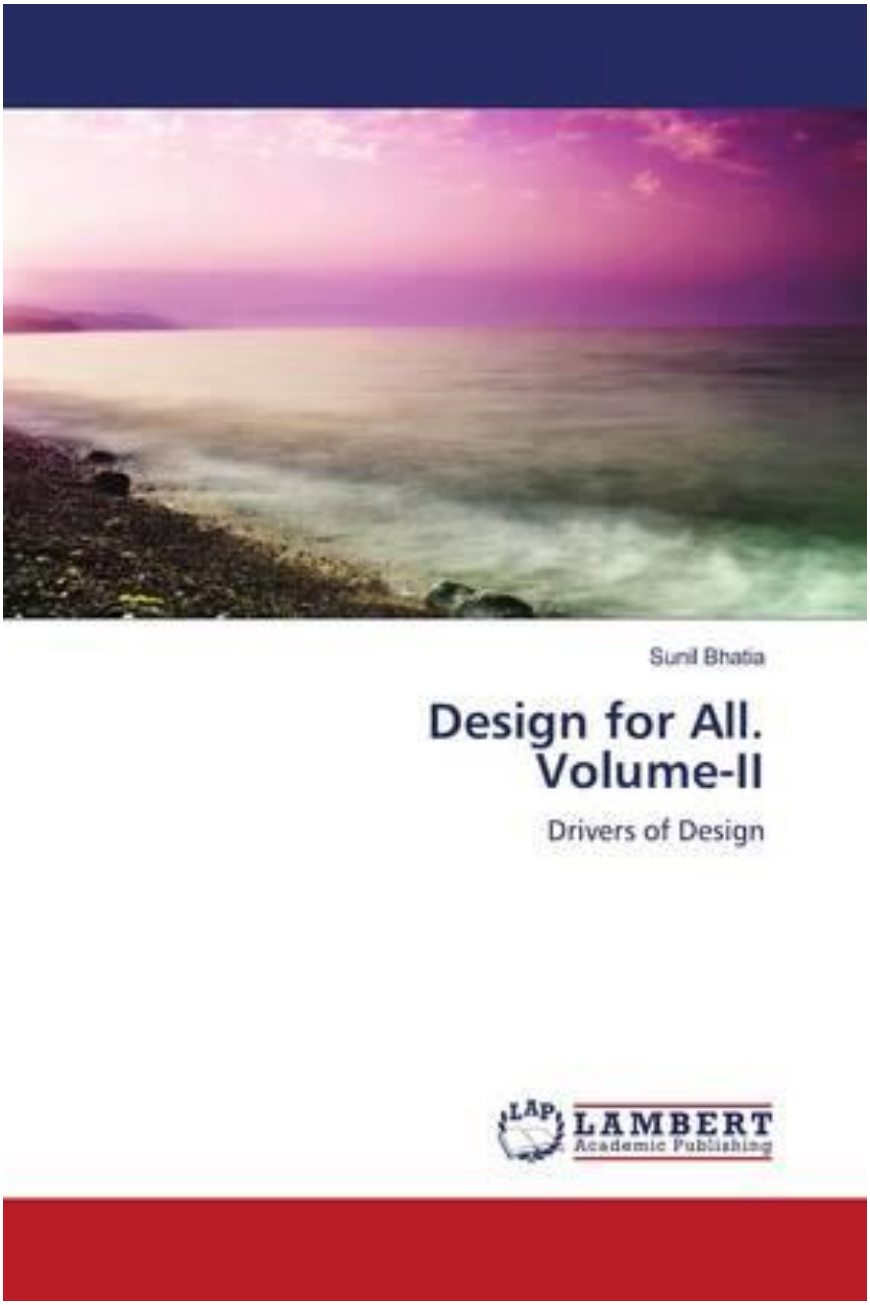
New Books



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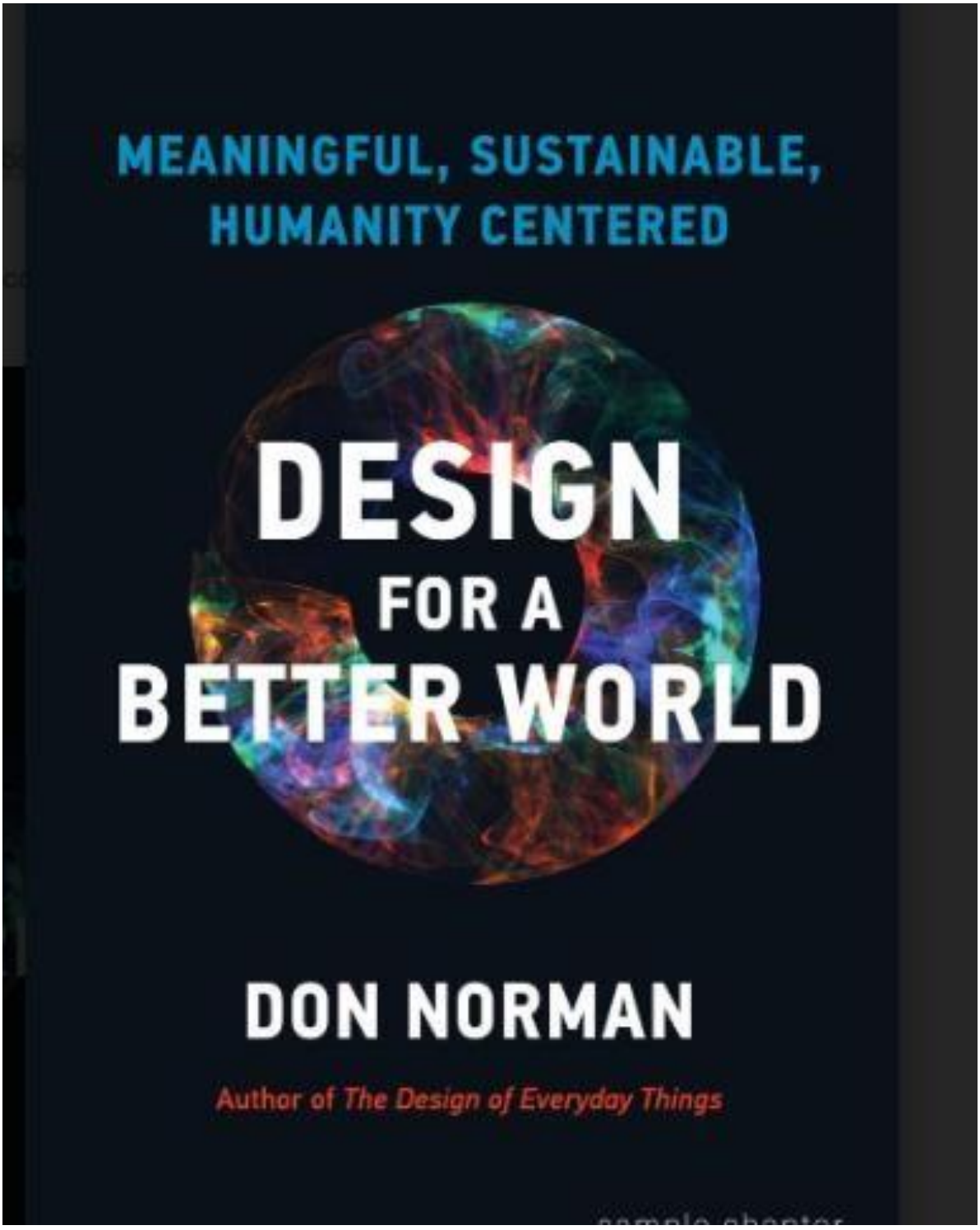

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News

1. SUNY New Paltz Prepares for Updates to ADA Regulations

Members of New York Association on Independent Living advocate for disability rights in Albany. Photo Courtesy of New York Association for Independent Living

On April 24, new federal Americans with Disabilities Act regulations regarding digital accessibility will be put into effect — as that date

approaches, SUNY New Paltz and other state- or federally-funded institutions are preparing for a new wave of standards in the digital landscape.

To best support faculty in this transition, SUNY New Paltz has released an asynchronous training module for faculty and has put together a social media and digital accessibility checklist. The focus of this checklist is making sure websites can accommodate screen readers, which allow those with visual impairments or blindness to easily read websites. Website designers are encouraged to include alternative text on images, capitalize the first letter of each word in a hashtag, provide audio descriptions and closed captions, maintain a proper contrast ratio, limit use of emojis and type out all visual data or QR codes in captions.

Faculty also have access to the Accessibility Fellows Program, a pilot program that selects six faculty members to train to become experts in accessibility in their departments. These faculty members will then mentor their colleagues in accessibility to ensure students with disabilities have their needs met.

"We live in an increasingly digital world, and higher education is no exception," said University Spokesperson Andrew Bruso "Striving for full accessibility is our goal, but some accommodations will still be necessary – not every technology can be made 100% accessible for every student. That's why the work of our Disability Resource Center remains so important, helping fill in gaps that cannot be addressed through technology best practices alone."

The new rules come as part of Title II of the ADA, which states that state and local governments must make their programs, services and activities available to people with disabilities. This includes all digital

resources provided by the government. If these websites are not made accessible, then people with disabilities may have difficulty with or be unable to order mail-in ballots, find tax information or utilize other necessary digital resources.

"Accessibility benefits everyone, because if we implement universal design, whether that's in physical spaces or digital spaces, that means everyone is able to use them," said Blaise Bryant, the communications specialist for the New York Association on Independent Living. NYAIL is a nonprofit organization that advocates for civil rights and independence for people with disabilities.

As these accommodations roll out, if a student or faculty member notices that these regulations are not being upheld, Bruso said that students and faculty should first have a conversation with their professor about the issue. If that does not resolve it, they can contact the Office for Information Technology or the Disability Resource Center.

"Accessibility takes a village to make it work," said Bryant. "It takes patience on the part of the people who are making the changes, it takes patience on the people doing the testing, and it really is critically important that everyone comes together for this."

(Courtesy: The Oracle)

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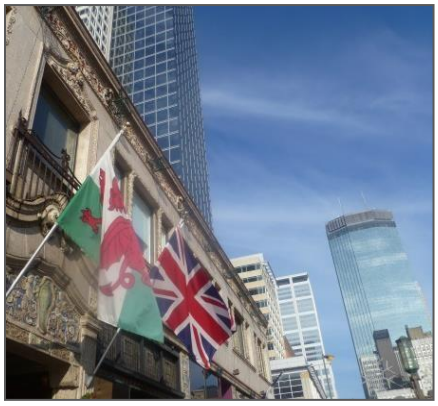

Programme and Events

Spark Student Design Awards: Any current University-level (or above) student, in any design category. (All entries in this competition must be student work, not professional work. Entries may be submitted from any time period of the student's study–could be a piece from last year).

Best of KBIS Awards Now Open for 2026 Entries

Best of KBIS Awards Now Open for 2026 Entries.jpg

The Kitchen and Bath Industry Show (KBIS) has opened applications for the premier awards program, Best of KBIS, that will spotlight industry excellence in 2026.


CRAFTING FURNITURE IN THE GLOBAL SOUTH: CONTEMPORARY PRACTICES, HISTORIES AND FUTURES
Furniture occupies a distinctive position at the intersection of craft, design, architecture, and everyday life.
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2026 AWARDS ENTRIES OPEN

2026 AUSTRALIAN GOOD DESIGN AWARDS: ENTRIES NOW OPEN

The 2026 Australian Good Design Awards officially open for entries, inviting the nation's most forward-thinking designers, architects, engineers, strategists and business leaders to submit projects that exemplify this year's theme: **Design that Leads.**

Key Dates:

Submissions: January 1 – March 15, 2026 (submission fee: 23 USD)
Results: Late March 2026
Award Ceremony at ADI Design Museum : April 21, 2026 (Milan Design Week)

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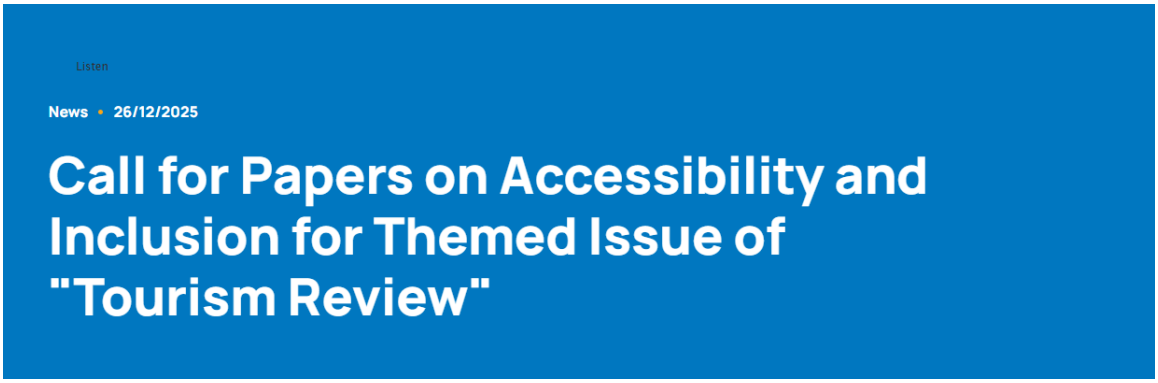

Call for Papers on Accessibility and Inclusion for Themed Issue of "Tourism Review"

https://www.accessibletourism.org/?i=enat.en.news.2446

Ivor Ambrose, Managing Director

ENAT - European Network for Accessible Tourism a.s.b.l.

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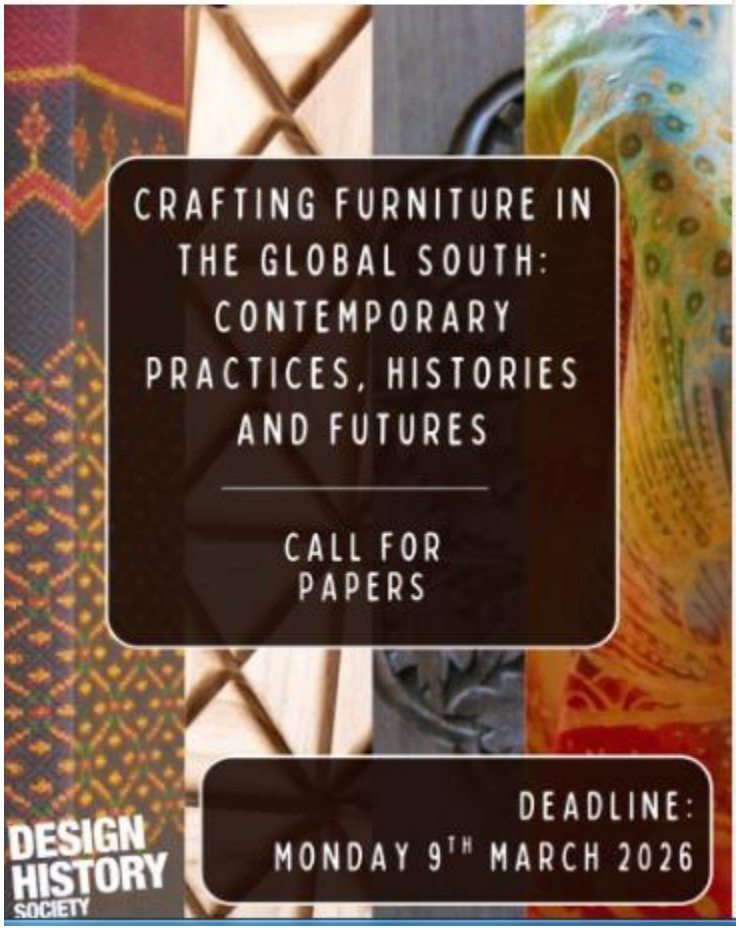
ART OF RESEARCH 2026

The ninth **Art of Research conference** will be held during **25-27 November 2026** at Aalto University, Espoo, Finland.

Brand new! Call for Papers: Crafting Furniture in the Global South: Contemporary Practices, Histories and Futures

This symposium, co-convened by Dr. Rukmini Chaturvedi and the DHS, invites proposals that critically examine contemporary furniture design through the lens of craft, with particular attention to practices, objects, and discourses emerging from South Asia, Southeast Asia, and the broader Global South. It seeks to foreground furniture as a site where questions of authorship, labour, material knowledge, identity, modernity, and global circulation are negotiated and contested.

Find out more: https://lnkd.in/eYQmwFSj

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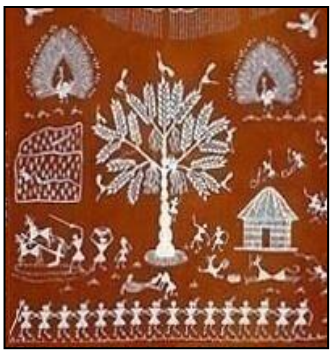

Job Openings

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