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Design between Order and Chaos: rewriting Measure and Immeasure in contemporary architecture

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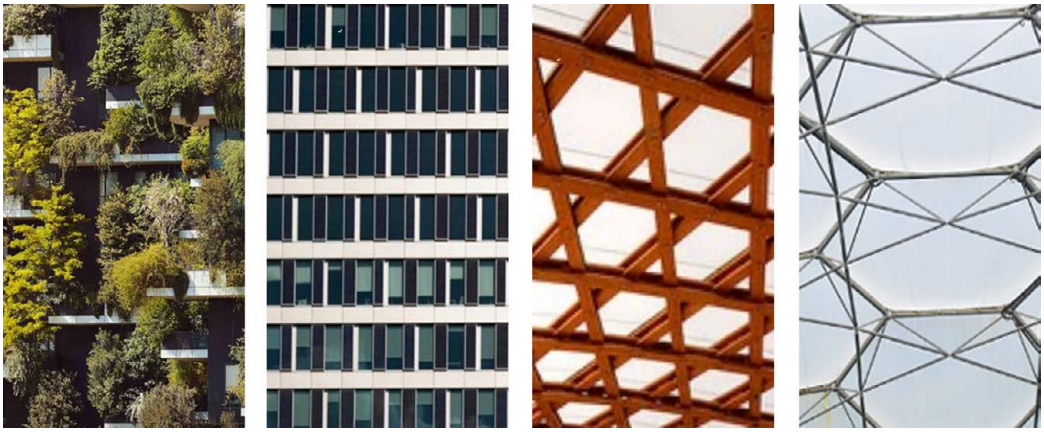
Abstract

The article explores the evolution of the role of design in architecture, focusing on the redefinition of measure in response to new ecological and technological challenges. Through critical analysis, the text traces the history of measure in architecture, emphasizing how past architects used the human body as a fundamental module and measure. However, in the contemporary context, architecture faces complex ecological dimensions and must harness advanced technologies to meet current design needs. Emblematic projects such as Stefano Boeri's Bosco Verticale, PLP Architecture's The Edge, Shigeru Ban Architects' Centre Pompidou Metz, and Sir Nicholas Grimshaw's Eden Project are examined, integrating ecological elements, advanced technological solutions, and sustainable materials. Design becomes the means through which architects address the balance between order and chaos. The article also explores new frontiers of design drawing in contemporary architecture, discussing the need to surpass traditional limits of measure and embrace a dynamic approach that adapts to changing environmental conditions. In conclusion, the main findings are synthesized, highlighting the importance of design drawing as a key tool in redefining measure and addressing present challenges for a sustainable and innovative architectural future.

Keywords
measure, immeasure, ecological dimensions, contemporary architecture



Patterns in contemporary architecture. Images by the authors.

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Introduction

In the exciting landscape of contemporary architecture, the notion of measure is central to creation, shaping our perception of the built environment and influencing how we interact with the phenomenal world. The current architectural context is permeated by an evolving dualism: on one hand, a long tradition that views the human body as the primary measure, while on the other, a growing need to explore new approaches, driven by inevitable technological progress and unprecedented environmental challenges [Smith 1987]. Over centuries, design has played a crucial role in mediating these seemingly conflicting forces, serving as a bridge between the traditional and the contemporary, between conventional measure and the immeasure of emerging complexity. Technological evolution has opened new horizons for architectural expression, but it also presents challenges that require redefining the architectural measure to address new ecological dimensions [Pickett et al. 2004, pp. 369-384]. What role does design drawing play in contemporary architecture to meet these challenges? Through a critical analysis of emblematic projects embodying the dialogue between historical measure and the need to embrace the immeasure of complex environmental and technological realities in the 21st century, this question is explored.

Evolution of the concept of Measure

In the evolutionary path of architecture, the concept of measure has organically fused with the essence of the discipline, creating a synergistic interweaving between designed dimensions and the human scale. This intrinsic link has crystallised over historical eras, and two architects who significantly shaped this concept were undoubtedly, among others, Le Corbusier and Giuseppe Terragni. Le Corbusier, a pioneer of the Modern Movement, introduced the Modulor concept in the 1940s. This measurement system, based on the proportions of the human body, emerged as an attempt to establish a universal link between the individual and architecture. In his works, such as the renowned Villa Savoye, the application of the Modulor is evident, transforming the human body into a measurement module to define spaces and proportions. Giuseppe Terragni, a key figure in Italian Rationalism, embraced the concept of human measure as the foundation of design. The Casa del Fascio in Como is steeped in this approach. The arrangement of spaces is closely tied to human dimensions, and geometric symmetry is emphasized to achieve harmonious proportions. Like Le Corbusier, Terragni incorporated the human body into the structure of his creations, emphasizing the centrality of this traditional measure.
The importance of the traditional approach goes beyond mere historical legacy.
In an era dominated by rapid technological evolution and new perspectives on architectural design drawing, the use of the human body as a measurement module retains its relevance .
The importance of the traditional approach goes beyond mere historical legacy. It represents a fundamental understanding of the relationship between humans and their built environment, an understanding that remains crucial even in contemporary architecture. In an era dominated by rapid technological evolution and new perspectives on architectural design drawing, the use of the human body as a measurement module retains its relevance. This approach reminds us that, despite the increasing complexity and scale of modern buildings, the most successful designs are those that remain attuned to human needs and experiences. The principles laid down by pioneers like Le Corbusier and Terragni continue to serve as vital references, guiding architects in creating spaces that are not only innovative but also profoundly human. Despite technological innovations and emerging environmental challenges, the lessons of Le Corbusier and Terragni invite us to consider traditional measure not only as a legacy of the past but as a fundamental starting point for exploring new approaches [Moore 1981, pp. 17-34]. Their work underscores the importance of maintaining a human-centered perspective in architectural design drawing. As we confront contemporary issues such as sustainability, urban density, and the integration of new technologies, the human scale remains a critical consideration. The lessons of the past provide a stable foundation upon which to build future innovations, ensuring that the core principles of proportion,

scale, and human comfort continue to inform architectural practice. In this way, the evolution of the concept of measure in architecture is not a linear progression but a continuous dialogue between tradition and innovation, between the timeless needs of humanity and the ever-changing possibilities of the built environment.
This fusion of past and present is crucial in addressing contemporary architectural challenges while maintaining a deep respect for the human scale that has defined successful architecture throughout history.

Exemplary Projects in Contemporary Architecture

In the vibrant fabric of contemporary architecture, certain works emerge as pioneers in exploring the interplay between measure and immeasure, addressing new ecological and technological challenges through a scientific and innovative approach.

Stefano Boeri's Bosco Verticale (Milan, Italy):
Stefano Boeri's Bosco Verticale (figs. 1, 2, 9), located in the heart of Milan, is a vivid testament to the symbiosis between architecture and nature, representing a paradigmatic case of how design drawing can integrate ecological dimensions and redefine architectural measure [Moore 1981, pp. 17-34]. The core of the project lies in the strategic use of vegetation, transforming two residential towers into a vertical ecosystem.
Vegetation, distributed on balconies and terraces on each floor, constitutes an expansion of architectural measure beyond traditional spatial limits [Gifford 2007, pp. 1-16]. The density of vegetation is not merely decorative but plays a key role in capturing carbon dioxide and producing oxygen. Here, measure is no longer simply a matter of square meters but a measurable ecological indicator of positive environmental impact.
The traditional measure of living spaces is enriched by the presence and variety of vegetation, offering a higher quality of life to residents [Gissen 2010]. In this context, design drawing becomes a key to understanding the connections between the built environment and the natural environment, opening an interdisciplinary dialogue that goes beyond mere architectural form [Kellert et al. 2008].

Fig. 1. Bosco Verticale in Milan (Italy). Image by the authors

Fig. 2. Bosco Verticale - façade. Image by the authors

PLP Architecture's The Edge (Amsterdam, The Netherlands):
The Edge in Amsterdam, designed by PLP Architecture, stands out for its unique ability to introduce dynamic measure into the architectural fabric, adapting in real-time to environmental needs through the advanced implementation of intelligent technologies (figs. 3, 4, 10).

Fig. 3. The Edge in Amsterdam (The Netherlands). Image by the authors.

The heart of this innovation lies in the integration of sophisticated technological systems into architectural design. Environmental sensors, climate control devices, and advanced lighting systems are all central components of an interconnected network that allows design to actively respond to environmental variables.

Technology in The Edge's design goes beyond mere automation; it introduces a dynamic measure capable of adapting to environmental needs in real-time.
Environmental sensors constantly monitor parameters such as temperature, natural light, and space occupancy.
This data is analyzed through advanced algorithms that dynamically adjust the interior environmental parameters. In this context, design drawing redefines the concept of static measure, allowing spaces to adapt to changing conditions instantly. For example, artificial light can be modulated based on the available natural light, reducing energy consumption and improving occupant well-being.
Heating and cooling systems can be adapted in real-time to respond to external climate variations, optimizing energy efficiency [Browning et al. 2014].
This new dynamic measure goes beyond simple space management, becoming a tool for sustainability and adaptation to user needs.The design of The Edge becomes a responsive system that continuously learns from its surroundings, establishing a real-time connection between the architecture and the external environment.
Scientific analysis of this interaction between technology and architecture highlights how design can be an active means in the sustainable management of buildings. Detailed studies on energy performance, air quality and occupant satisfaction show how this new dynamic measure can tangibly improve the sustainability and efficiency of built spaces. In conclusion, The Edge represents an illuminating example of how technology in architectural design can introduce a new dynamic measure, adapting in real-time to environmental needs.

Fig. 4. The Edge - façade. Image by the authors.

Shigeru Ban Architects' Centre Pompidou Metz (Metz, France):
The Centre Pompidou Metz, conceived by Shigeru Ban Architects, distinguishes itself through the pioneering adoption of innovative materials that not only positively influence the building's sustainability but also redefine the traditional perception of architectural measure (figs. 5, 6, 11). The core of material innovation in the design of this project lies in the extensive use of glued laminated timber. From a scientific perspective, the adoption of this material has several implications. Firstly, glued laminated timber is a renewable material, unlike some more traditional options such as steel or concrete This implies a reduction in the environmental impact resulting from the production of construction materials, contributing to the overall sustainability of the building. Secondly, from a structural point of view, glued laminated timber offers superior flexibility compared to more rigid materials. This allows for bolder architectural solutions, challenging traditional limitations of form and size.

Experimentation with the structural potential of wood introduces a new measure in architecture, where the material's plasticity allows for more fluid and organic solutions [Malnar et al. 1992]. Concerning the perception of measure, the use of wood contributes to creating a distinctive atmosphere within the Centre Pompidou Metz. The warm tone of wood and its natural texture offer a sense of welcome and connection to the environment, helping to blur the traditional boundaries between indoor and outdoor space [Pallasmaa 2014]. The perception of measure is no longer defined solely by the physical dimensions of spaces but also by the sensory quality and atmosphere generated by the materials used.

Fig. 5. Shigeru Ban Architects' Centre Pompidou in Metz (France). Image by the authors.

Fig. 6. Shigeru Ban Architects' Centre Pompidou - roofing from the inside. Image by the authors.

Sir Nicholas Grimshaw's Eden Project (St Blazey, Cornwall, England):
Sir Nicholas Grimshaw's Eden Project represents an extraordinary work in terms of architectural integration with the surrounding environment, offering a eloquent example of how design can extend architectural measure beyond traditional physical boundaries (figs. 7, 8, 12). At the heart of this connection between architecture and environment is the very conception of the project: a sequence of transparent environments housing various ecological communities within dome structures.
This revolutionary approach not only provides an entertainment and study space but represents a fusion of architecture and nature that goes beyond mere coexistence. Architectural integration with the environment begins with the choice to locate the Eden Project in a disused cave, contributing to environmental requalification [Kronenburg 2002].
The structure merges with the pre-existing topography, reducing visual impact and emphasizing the idea of "return to nature". The choice of location is not just a matter of physical positioning but a reflection on the role of architecture in the environmental and social context [Gehl 2011; Gehl et al. 2013].

Fig. 7. Sir Nicholas Grimshaw's Eden Project in St Blazey (Cornwall, England). Image by the authors.

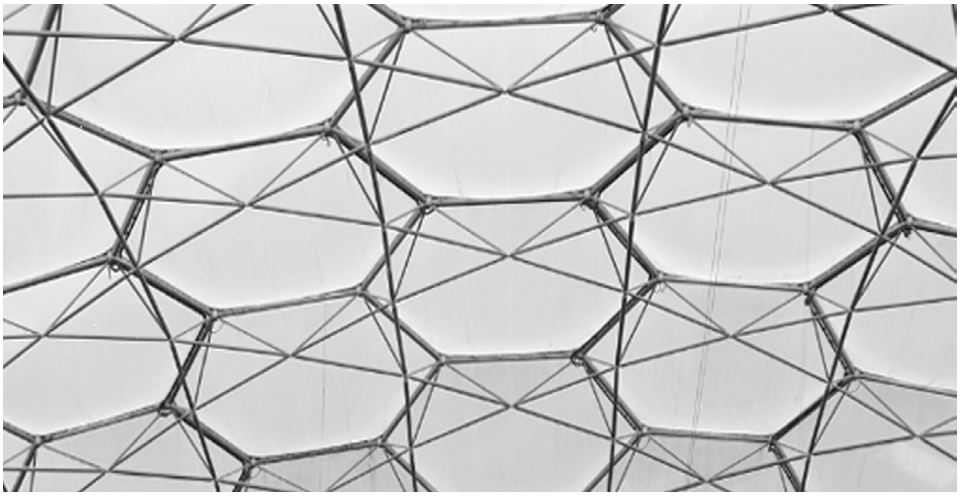

Fig. 8. Sir Nicholas Grimshaw's Eden Project - roofing from the inside. Image by the authors.

Architectural measure here extends beyond traditional parameters of size and space. The Eden Project broadens measure through the transparency of the domes, allowing continuous visibility between interior and exterior spaces.
The perception of measure is not limited by defined spaces but extends through transparent walls, blurring the boundaries between architecture and the surrounding nature.
The visual connection between indoor spaces and external vegetation is a tangible demonstration of how design can expand measure beyond conventional limits. The complex's design also considers the internal environment of the transparent spaces, carefully controlling temperature, humidity, and lighting to recreate ideal conditions for plant growth.
This not only emphasizes scientific attention to detail but demonstrates how design can become a tool for understanding and managing complex ecosystems [Kieran et al. 2003].
Through its integration and expansion of measure, the Eden Project invites visitors to explore the connection between humanity and nature experientially.
In conclusion, these projects represent an advanced synthesis of measure, immeasure, and scientific approach [Thackara 2005].
Design becomes a laboratory for experiments and innovations, incorporating ecological and technological challenges as integral parts of its measure. Scientific analysis demonstrates how the boundary between art and science narrows in the search for new measures that respond to the complexities of our contemporary world [Hensel et al. 2004].

New Frontiers of Design in Contemporary Architecture

Contemporary architecture finds itself navigating unprecedented challenges. In this context, design drawing plays a primary role, shaping creative solutions to address these challenges and outline the future of architecture. Design drawing plays a fundamental role, shaping creative and sustainable solutions for the future of architecture [Alexander et al. 1977]. Green architecture incorporates advanced resource collection systems and eco-friendly materials into architectural projects [Orr 1992]. At the same time, design leverages new technologies such as artificial intelligence and advanced sensors to create dynamic and adaptable buildings. Artificial intelligence, advanced sensors, and innovative materials become key elements of a design revolution. Buildings, no longer static but dynamic, actively respond to environmental conditions in real-time [Goldhagen 2017]. This dynamic adaptability, facilitated by interactive facades powered by algorithms, represents an expression of measure in responding to changing needs. The future of design may embrace biophilic architecture, using natural processes for environmentally-friendly solutions [Mostafavi et al. 2010]. However, challenges must be addressed, such as balancing innovation, sustainability, and ethics. Architectural education and technological security are other important issues to consider. Design represents an intelligent response to current needs, exploring ecological and technological dimensions of architecture. This opens up possibilities that once seemed to belong to science fiction.

Conclusions

Design stands centre stage in addressing contemporary challenges in architecture, translating ecological and technological challenges into concrete solutions. It is a score of creativity that adapts to the changing needs of our time. Measure and out of misure are two key elements: measure guides design with integrity and ethical responsibility, while out of misure challenges conventional limits, opening doors to bold solutions.
Design drawing is not just a tool for outlining physical forms but is the driving force of architecture that tackles environmental and technological challenges. Its evolution reflects a commitment to building a world in harmony with creativity and responsibility. In conclusion, design drawing serves as the helm steering architecture towards the future, perpetuating its role as a catalyst for innovation and reflecting our capacity for adaptation and growth.

Fig. 9. Bosco Verticale - collection of drawing. Collected and layout by the authors.

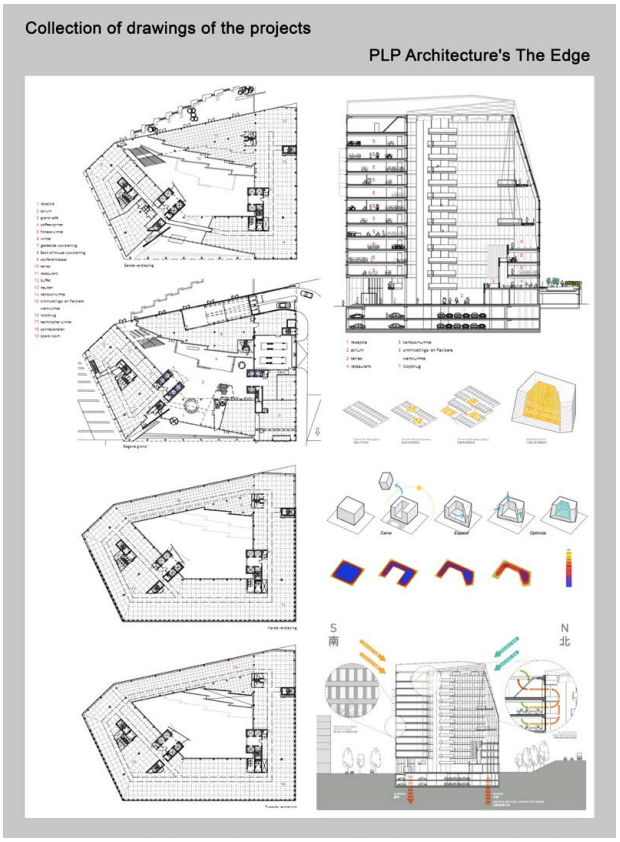

Fig. 10. The Edge - collection of drawings. Collected and layout by the authors.

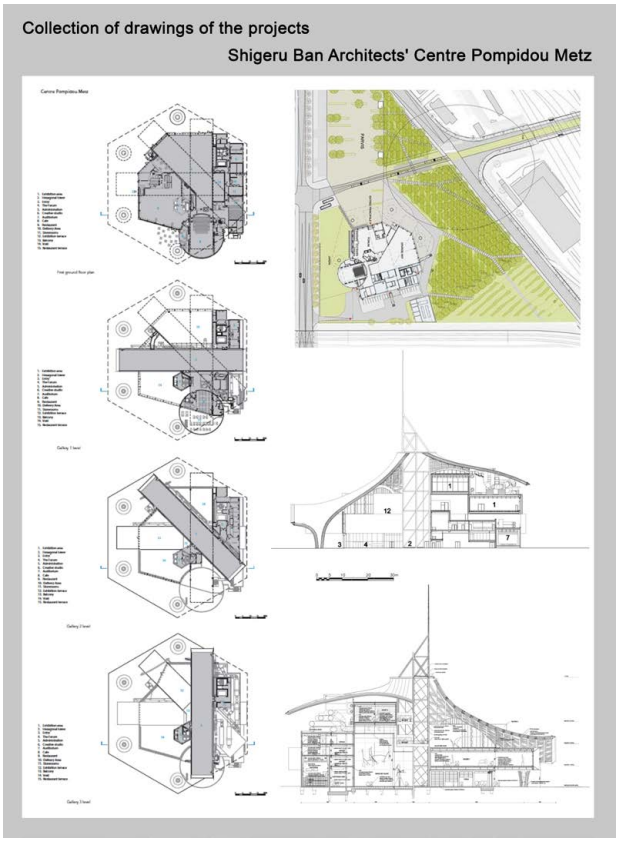

Fig. 11. Shigeru Ban Architects' Centre Pompidou - collection of drawings. Collected and layout by the authors.

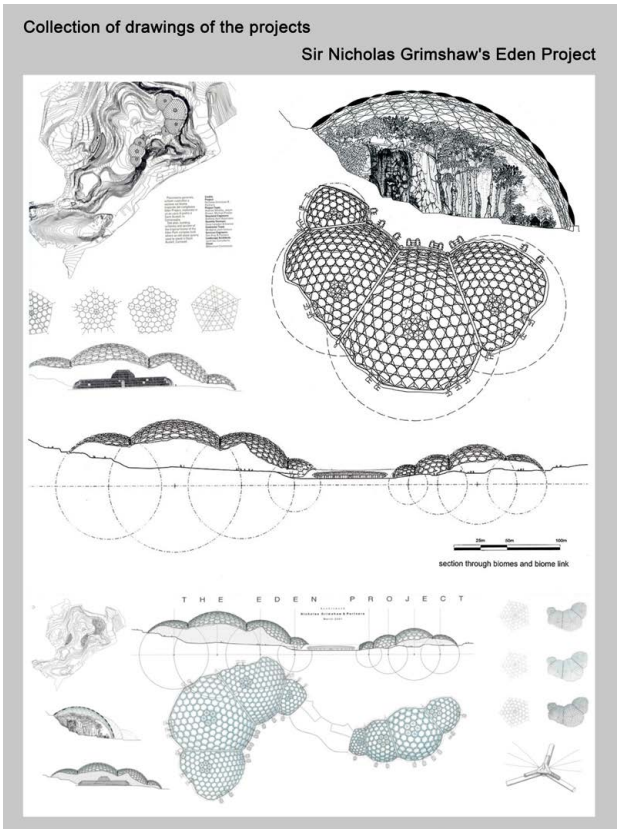

Fig. 12. Sir Nicholas Grimshaw's Eden Project - collection of drawings. Collected and layout by the authors.

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