BOOK OF PROCEEDINGS

INTERNATIONAL CONFERENCE
13th - 14th October 2023

ISSUES OF HOUSING, PLANNING, AND RESILIENT DEVELOPMENT OF THE TERRITORY

Towards Euro-Mediterranean Perspectives

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Issues of Housing, Planning, and Resilient Development of the Territory Towards Euro-Mediterranean Perspectives

Conference Theme and Rationale

Albania, along with other Western Balkan countries, has undergone significant economic, social, and political changes in recent years. As a result, housing, planning, and the resilient management of territorial development have emerged as critical issues. This is because these regions face significant challenges in providing affordable housing, addressing the impact of urbanization on the environment, fostering evidence-based decision-making on the territory, and bringing forth the commitments towards climate neutrality.

The organizers use the term "multi-modality" to define complex situations (in matters of territorial planning, management, architecture, housing, public space, technology, etc.) that have historically encompassed Western Balkans and Mediterranean cities in a logic of coexistence and value co-creation. A combination of knowledge and heritage that throughout time and history have given life to civilization in this region of Europe. The active involvement of Albania in the existing network of the Mediterranean Basin and the EU, through a joint action plan with UN / UNECE, and the Albanian and regional authorities, including reputable scientific bodies such as the Academy of Sciences of Albania, makes this conference even more intriguing to explore fascinating areas of research. The conclusions, to be considered as a stage for open innovation, will include recommendations for further scientific and applied research, projects, and events.

The geographical focus of the conference covers three dimensions: i) Albania; ii) the Western Balkans; iii) Euro-Mediterranean countries. POLIS University aims to focus on the above-mentioned research areas that are of common interest to both Western Balkans and Mediterranean cities, including, but not limited to: housing policies, urban history and architecture typology, innovation and digitalization in urbanism, energy efficiency, resilience and environmental sustainability, governance and smart technologies for city management, education and gender aspects in urban planning research.

In this regard the main aim of this international conference is to bring together scholars, policymakers, and practitioners to examine the pressing issues of housing, planning, and land development in these regions, in a context of transition fatigue, climate challenges and post-pandemic realities.

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Conference Aim

The main aim of this international conference is to bring together researchers, policy makers and practitioners to examine the urgent issues of housing, planning and land development in these regions, in a context of transition, climate challenges and post-pandemic realities.

Objective

-Consolidation of the cooperation network between Albanian and non-Albanian researchers, lecturers, managers, with the aim of participating in joint research projects at the regional and international level;
-Support of local authorities with contemporary data, on the state of housing issues, planning and sustainable urban and environmental management, as well as representatives of public and private institutions operating in this field.

The conference is organized by POLIS University (U_POLIS) in cooperation with the Academy of Science of Albania, and supported by other local and international partners.
In the framework of resilience, the main conference theme is devoted to Issues of Housing, Planning, and Resilient Development of the Territory from a Euro-Mediterranean Perspective, including Albania, Western Balkans and the Mediterranean Basin. This event aims to bring together academics, policymakers, researchers, experts, practitioners, and stakeholders from diverse backgrounds to discuss and address critical challenges related to housing, urban planning, and the development of resilient territories.

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Unveiling the Post-Digital Paradigm Cultural Implications in a Post-Human Design Ecology

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Abstract

In recent years, the concept of intelligence has become a popular term that accompanies various actions, practices, processes, and products. This prominent presence in contemporary discussions stems from two significant factors. Firstly, there has been a fundamental shift in our understanding of intelligence. It is no longer seen solely as a quality exclusive to humans but rather as a collection of emerging properties and conditions that can exist in both human and non-human entities. Secondly, intelligence is now viewed as a multi-layered relationship between a 'brain' (whether human or non-human), a body, and the environment(s) in which that body exists.

Presently, intelligence encompasses all aspects of design, introducing a new form of design intelligence that differs greatly from the human-centered approaches of the past. Similarly, creativity is no longer solely attributed to the human brain. Its definition has expanded to include the operational value of novel abstractions and pattern associations generated through machine-driven thinking processes.

Architects are now exploring various "intelligent" tools such as different AI languages, generative adversarial networks and text-to-image tools to understand how non-human intelligence can be applied to address contemporary issues in cities and urban centers, and considering also the expected benefits and the possible risks originating from their use.

The paper aims to investigate the emergence of a post-digital sensibility in architecture and seeks to delve– through theoretical and practical apporaches - the notion of creativity and intelligence in a post-human design ecology while demystifying the so-called 'risks' associated with the utilization of Neural Network processes in design. Furthermore, it aims to assess the extent to which these processes can inform architectural design for today's challenges.

Keywords
AI, GAN, Resilient City, Intelligence, Post-Human Design, Architectural Design

Introduction

In the span of a few years, the field of architecture is undergoing rapid transformation due to the incorporation of cutting-edge digital technologies, particularly the integration of artificial intelligence (AI) into various aspects of design, representation, and production. There exists a persistent inquiry into a range of "intelligent" instruments, incorporating diverse AI languages, generative adversarial networks, and text-to-image capabilities. These endeavors are aimed at understanding how artificial intelligence, in its various forms, can be effectively utilized to tackle present-day urban complexities and issues. Concurrently, deliberate attention is being devoted to evaluating the potential advantages and drawbacks stemming from the integration of these tools within urban centers and municipalities.

Considering the already substantial impact of AI – and that "AI is everywhere" (Del Campo, Leach 2022) in fields such as engineering, social sciences, and political sciences, it becomes imperative for architecture to adopt a critical approach in understanding and evaluating the implications of these transformative technologies within its own domain. By doing so, architecture can effectively navigate and harness the potential benefits while addressing any challenges that may arise from the integration of AI in its practices.

This scholarly article aims to delve into the growing prevalence of a post-digital sensibility within the realm of architecture. Employing a comprehensive investigation that encompasses both theoretical and practical methodologies, the study aims to explore the complex interplay between creativity and intelligence within a post-human design ecology (Anderson & Speed, 2008). Moreover, it seeks to demystify perceived 'risks' attributed to the incorporation of Neural Network processes in design (Oxman, 1999). Additionally, the research strives to evaluate the potential of these processes in informing contemporary architectural design to effectively address the challenges of today (Yoo et al., 2021).

Wandering through a Post-Human Design Ecology

A commonly used but already outdated definition of AI is that seeks to do what human minds can do (Boden 2016). In the last years, we have seen many cases in which human intelligence has been outperformed from the artificial one (the cases of Kasparov defeated by DeepBlue in 2016 and Lee Sedol by AlphaGo in 2016 are emblematic) and, besides the lack of consciousness still not present in any of the many existing AI tools, we feel the urge to face an intellectual leap where contemporary perspectives acknowledge that intelligence, whether exhibited by humans or artificial entities, exists in a state of dynamic interdependence. Indeed, all forms of intelligence, whether organic or mechanized, are viewed as constituents of a broader collective—an overarching alien intelligence that transcends individual boundaries (Voyatzaki 2016). These developments are intricately linked to the evolution of media and symbolic systems. The current imperative lies in augmenting both our individual and communal cognitive capacities through active participation in diverse intellectual collaborations. This engagement is vital for the conception, innovation, and creation of a novel human reality within the transformed and reterritorialized realm of cyberspace and the technologically infused cultural milieu characteristic of the post-human era (Lévy 2016).

Considering these premises, not by chance we have seen a growing interest in the architectural and design community toward the notion of Posthuman and Postdigital conditions where the relationship between science and architecture is intended in terms of its cultural production rather than in terms of technical possibilities (Del Campo 2018), and to isolate some enzymes through which science has – and will – be contributing, in continuity or discontinuity, to the lineage of architectural production. Posthuman design practices involve a shift away from centralized human

judgment and instead embrace the idea that creative capacities can be delegated to entities beyond the human realm. These entities may include objects, tools, materials, diverse species (whether organic or artificial), and environmental influences.
The term was coined by Kim Cascone, an electronic music composer by trade used the term Post-digital for the first time in his article The Aesthetics of Failure: "Post-digital" Tendencies in the Contemporary Computer Music (2017) where she points out a series of discipline where the interaction and interrelationship among human and non-human intelligences has become a standard practice and not just a kind of amusement or technical trick but, instead, contributes to the development of several of novel insights empowering the innate human condition of doing so and, innerly, mutating the relationship to the human condition.
The real question regarding these processes lies in the understanding of what techniques in human–machine interaction can we implement to stimulate creativity even more and how can we establish feedback loops between humans and machines, enabling the development of new workflows and technologies that, in turn, inspire and impact us. Indeed, the exploration of a post-digital sensibility in architecture involves investigating how natural language-based AI applications can transcend traditional boundaries, and through theoretical and practical approaches, delve into the realms of creativity and intelligence within a post-human design ecology. By utilizing Neural Network processes in design, this discourse seeks to dispel the perceived risks associated with such technological advancements and unlock new possibilities for architectural expression and exploration. By integrating AI-powered text-to-image tools with architectural practice, the exploration of a post-digital sensibility foresees a future where traditional boundaries between language, creativity, and design are eradicated. Through a deliberate understanding and destigmatization of AI's capabilities, architects can pioneer new avenues to influence the built environment in unprecedented and imaginative manners.
Furthermore, it is needed to outline that the Postdigital doesn't have to be literally intended as a moment after the digital, as the previous phase could be intended concluded and historicized, but rather the prosecution of an already existing a new paradigm shift within the digital culture realm, where the real object of studies are the implications and interferences. Using an Heidegerrian term we are witnessing a continuous slow transition from one state to the other, from Ereignis to Sein.
Having established the foundational ontological discussions, we now proceed to a comprehensive exploration of AI within the architectural domain. This journey entails a closer examination of pivotal technologies like diffusion models and generative adversarial networks, crucial in enhancing computational capacities and reshaping conventional paradigms of architectural innovation. Furthermore, we will illustrate a practical application of these technologies within the academic context of Polis University, offering insights into their tangible implementation and impact on architectural design and practice.

AI and Architecture – Models and features

AI, with all its branches and deviations, can be considered such a relatively new field. When it comes to computer science, there is an important distinction to be made when developing intelligent machines: expert systems and learning system.
The first one where quite famous at the end of the 80s-beginning of the 90s (Saggio 2007) and are computer-based programs designed to replicate and mimic the decision-making processes of human experts in specific domains. These systems utilize knowledge representation techniques to capture and store expert knowledge, along with reasoning mechanisms that enable problem-solving and decision-making based on that knowledge (Buchanan, Smith 1988). However, with the

growing complexity of the data and information to be elaborated, they showed themselves to be obsolete and not able to offer precise answers. Furthermore, their impossibility to learn – and to grow accordingly to the given inputs – confined them into a field of 'hardcore solutions' where there is the constant need of need a human 'expert' to input information into the knowledge base. In a few words, they operate but they do not learn and do not interpolate data increasing complexity; they related to the expert (the human) than send the inputs and critically extrapolate them.
Starting from 2006, we have seen the rise and diffusion of so-called learning system. Learning systems, often referred to as machine learning or artificial intelligence, involve algorithms and models that enable computers to learn from data and improve performance on a specific task over time. They rely on various techniques such as supervised learning, unsupervised learning, and reinforcement learning to analyze and adapt to patterns within the data. Supervised learning involves labelled data to train models, unsupervised learning discovers patterns without labelled data, and reinforcement learning involves making decisions based on trial and error. Learning systems are fundamental in modern AI applications, from natural language processing to computer vision. Researchers and practitioners continually enhance learning algorithms and frameworks to achieve better accuracy and efficiency (Bishop, 2006; Goodfellow et al., 2016).
Indeed, AI these days refers more and more to the field of deep learning as we intend a machine learning technique that teaches computers to do what comes naturally to humans: learn by example. Most modern deep learning models are based on multi-layered artificial neural networks such as convolutional neural networks and transformers and gets its name from the number of layers – in many cases more than 1.000 – in a neural network.

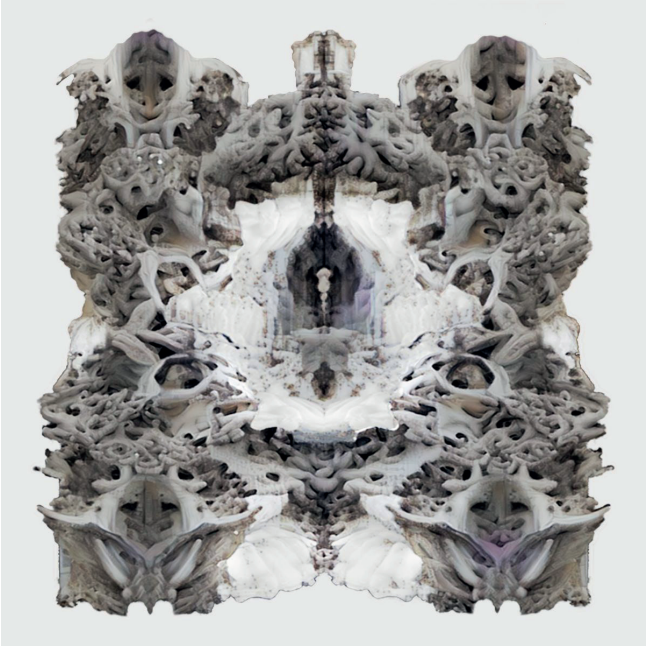

Fig. 1 - Hannah Daugherty, Mariana Moreira de Carvalho, and Imman Suleiman, Augmented, Imagining the Real, Taubman College of Architecture and Urban Planning, University of Michigan, Ann Arbor, Michigan, 2019).

The latter is comprised of interconnected artificial neurons, organized in layers imitating the functioning of the human brain (Input layer – hidden layer – output layer). Each neuron in a layer is connected to neurons in the subsequent layer, with weights assigned to these connections. During training, the network learns optimal weights by adjusting them to minimize the difference between predicted and actual outputs, using algorithms like backpropagation. When it comes to their usage in the discipline of architecture, neural networks possess the capacity to be trained in order to discern and encapsulate significant attributes present in particular architectural datasets. In this context, a neural network was specifically trained using diverse architectural features sets, including elements such as gates, domes, and columns. Additionally, the network's training process involved the integration of a dataset comprising renderings of architectural features designed by students. Through this training, the network was able to imbue the resultant images with the distinct design sensibilities encapsulated in the added dataset of the students' and teaching staffs' creations.

This integration of AI technology encompasses a wide array of functionalities, ranging from generating design renderings based on images to optimizing design solutions through vector-based approaches. By leveraging AI, the early-stage design inspiration phase is enriched with heightened creativity, while the efficiency of the overall design process is significantly enhanced.

Diffusion models, also known as diffusion probabilistic models or score-based generative models, are a class of generative models, and some of the most diffused in the field of architectural design. Diffusion models exhibit versatile applications encompassing image denoising, inpainting, super-resolution, and image generation. For instance, in the domain of image generation, a neural network undergoes training to eliminate gaussian noise from images, essentially learning noise removal techniques. Following this training phase, the neural network becomes proficient in image generation. It initiates the process by utilizing a randomly generated noisy image and subsequently denoising it.

These models find extensive utilization in the generation of diverse real-world data, notably within the domain of text-conditional image generation. Prominent examples of this application include Midjourney, DALL-E and Stable Diffusion.

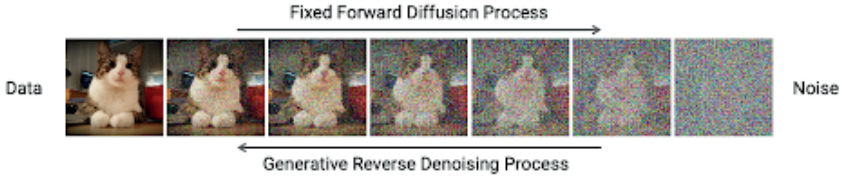

Fig 2. Diffusion model processes moving to and from data and noise

In the next section, we will analyse the implementation of such models in a pedagogy experience at POLIS University, showing the beginning of a proper methodology where architecture students can benefit from a postdigital approach and understand the conceptual and ontological implications of such tools within their design practice.

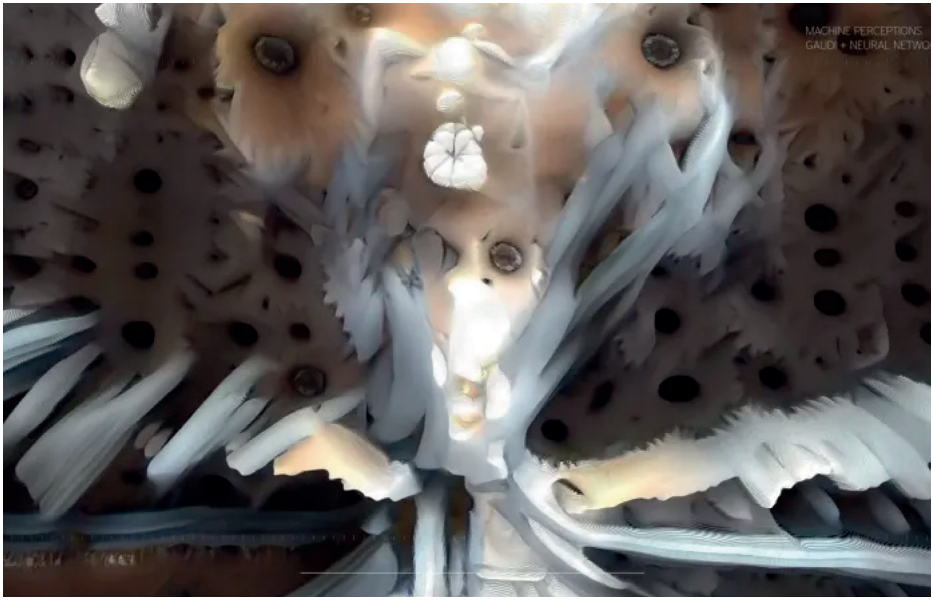

Fig 3 - Daniel Bolojan / Nonstandardstudio, Machine Perceptions: Gaudí + Neural Networks, 2021

The integration of artificial intelligence (AI) within architectural practices represents a significant advancement, opening avenues for innovative and more efficient design solutions, presenting a promising trajectory for the future of architecture.

Ludwig Wittgenstein, in his influential Tractatus Logico-Philosophicus (1922), introduced the notion that the boundaries of one's language delineate the boundaries of their understanding of the world. This philosophical standpoint suggests that if one lacks the linguistic capacity to articulate a concept, it is considered non-existent or incomprehensible. However, in today's context, Wittgenstein's assertion takes on a new significance as we observe the rise of natural language text-to-image applications propelled by artificial intelligence algorithms. This advancement prompts deep reflections on the concept of a post-digital sensibility in the realm of architecture.

This year, we started the implementation of Diffusion Models at our institution (POLIS University, Tirana, Albania) especially with the students of the Professional Master Program in Digital Architecture. The Studio in Advanced Architectural Design challenged the students to implement in their design process some AI-based tools. Being aware that these AI models, however sophisticated, are constrained in their capacity to generate content beyond the confines of the original dataset and consequently, their creative capacity, often described as "imagination," is bound by definite limits we involved the students in an explorative process where their ideas could be first drafted semantically and then tested through the chosen model. Doing so, we wanted to stress the importance of the semantic dimension of architecture through the power of learning how to extrapolate from a specific pre-trained dataset, the kind of features the students wanted to achieve and visualize future scenarios dealing with contemporary architectural needs and crises.

The process was composed from an analytical analogic part – where the students drafted their

prompts in the form of small written texts -, a second one where the drafted prompt is implemented in small portions to validate its validity in a form of growing complexity and then produced outputs are again interpolate and blended through a series of digital techniques with the diffusion model itself. These technological advancements raise critical inquiries regarding our established design and pedagogy methodologies, comprehension of our culture, and interactions with the surrounding world. Notably, two pivotal factors contributing to this substantial disruption are the immense volume of data generated daily and the remarkable speed at which computers can process this data, extracting valuable insights.
With the students we work on 3 different directions: from close-up to the urban environment; blending and re-interpolating; a matter of style.

1. From close-up to the urban environment: the students were given a directive to capture detailed close-ups of architectural elements during several explorations in Stable Diffusion – Midjourney and Dall-E2. Subsequently, employing the zoom-out and inpainting tool, they systematically resized and creatively reimagined the initial prompt until they achieved an urban scenario linked to the original image. This exercise served as a valuable method for comprehending how the specific features investigated in the original prompt could anticipate and exert influence on the urban environment concerning the proposed project (fig. 4-5).

2. blending and re-interpolating: the outcomes stem from diverse blending and interpolation processes applied to the identical Midjourney prompt across various versions and distinct characteristics. The ultimate image is an amalgamation of reconfigured and scaled images achieved through the utilization of blending tools (fig. 6).

3. a matter of style: the final exercise scrutinizes the occurrence of prompts affiliated with particular architectural styles within the framework of diffusion models. The underlying concept is to explore how AI can aid in the reintegration of distinct architectural styles into the discourse surrounding architecture. In doing so, it prompts critical inquiry into the influence of artificial intelligence on the contemporary urban environment, emphasizing the need to assess and comprehend its impact on architectural practice and design ethos (fig. 7).

Fig 4. close up dezeen photo of a building wooden biomorphic facade made of organic forms, wooden/ perforated, big windows, located in an urban scenario with people passing by, highly-detailed, hyperrealistic, photographed by Nick Knight –ar 9:21 (first 3 images) –ar 7:4 (final image) The result is obtained with a series of inpainting – zoom-out an remix features from the original image

Fig 5. close-up photo of a residential block parametric gothic facade made of white marble, environmental fog, cold side light, highly-detailed, –ar 1:1 – The result is obtained with a series of inpainting – zoom-out an remix features from the original image

Fig 6. Prompt 1: Moodboard model of a building made out of wood, surreal neuron city, by Wenzel Lorenz Reiner, refined spontaneity, ffffound, plurality, contorted limbs, soaring towers and bridges, by Weiwei, by Wolfgang Zelmer, technical sketch, artforum, notation –ar 3:2 –v 3
Prompt 2: A wooden model of a building that looks like a tree, in the style of abstract and conceptual sketches, fantastical machines, floating structures, intricate webs, columns and totems, organic forms, muted tones, panoramic scale –ar 128:73 –v 3
Prompt 3: blend 1+2 –v 5.2
Prompt 4 Photography of a private living room in a wooden model of a building that looks like a tree, in the style of abstract and conceptual sketches, fantastical machines, floating structures, intricate webs, columns and totems, organic forms, muted tones, photographed by Nick Knight –ar 128:73

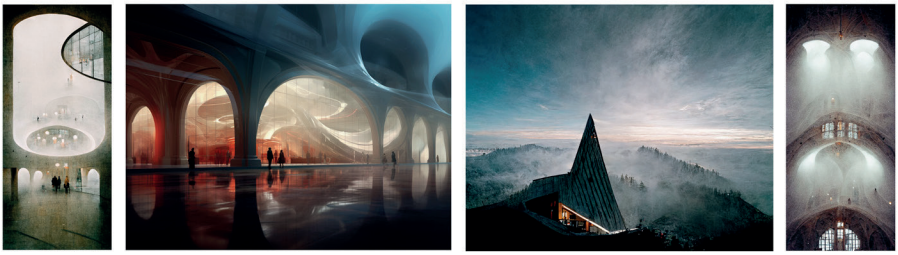

Fig 7. Several prompts based on the notion of style. Prompt 1 An open public space with a white floor and circular lights, in the style of gothic architecture, urban expressionism, distinctive noses, intricate ceiling designs, danish design, atmospheric fog, fujifilm eterna 400t, bold structural designs –ar 9:21
Prompt2 Full - Shot Angle of an exterior of triangular concrete cabin on top of a mountain, gravity - defying architecture, dimitry roulland, neue sachlichkeit, cornelis springer, iconic, high - angle, danish design, atmospheric fog, fujifilm eterna 400t, bold structural designs

Conclusion and further discussion

The methodology described above is just a starting point for the implementation of such tools and technologies within the pedagogy debate in the Institution. As designers, our creative processes often involve a mode of creativity characterized by interpolation and combination. Within this framework, we generate and construct interpolations by amalgamating and recombining preex-

isting concepts and ideas to challenge some of the outmost challenges in the architectural debate. Indeed, the main objective of this research is to offer the students new methodologies at-hand and to nurture them in the exploration of those at the forefront of a postdigital Ai-driven architectural debate. Such tools can be used to explore at the same different elements of the architectural discipline: formal, aesthetical, tectonically, etc. and to lead to the development of a further multimodal algorithmic, text-based, image-based and gradient-based inputs. When the system learns and evolves the connection between the human and the machine is definitely harbinger of innovation and complex dynamics within the two entities. Contemporary crises can be then drafted into specific scenarios that can be then analysed, evaluated, and actualize in the real world to test solutions which are enriched with a formal, technical, and visionary enzymes.

The agency of the design phase is split at the same time between the two exploiting at the same time the stochastic power of the machine and, the human capacity to discern novel design methodologies from the outcomes presented by neural networks is noteworthy. It underscores the ability to extract inspiration even from errors or deviations in the generated results. This discernment, accompanied by a nuanced sensibility, allows designers to imbue spaces with layers of meaning beyond the inherent materiality, thereby enriching the design process and the final architectural manifestations. Indeed, the convergence of AI-driven text-to-image tools with architectural practice represents a pivotal juncture. In exploring this post-digital sensibility, we envision a future where the traditional boundaries segregating language, creativity, and design are deconstructed. By embracing and unravelling AI's vast potential, architects can pave the way for groundbreaking approaches to shaping the built environment, transcending conventional limitations and venturing into unprecedented realms of architectural innovation.

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