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Design for the New World(s)

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EDITORIAL

Design for the New World(s)

SANTINA DI SALVO
POLIS University

This issue of *Forum A+P* is dedicated to Tirana Design Week 2023 (TDW), a biennial event hosted by POLIS University in Tirana. TDW serves as a prominent international platform for architects, researchers, urban planners, and designers, facilitating critical analysis of the transformation of the built environment.

The event advances experimental methodologies and multidisciplinary approaches to address the pressing challenges of contemporary urbanization (Lechner, 2015).

These challenges are particularly relevant in an era of accelerated and intricate transformations, where global crises - ranging from climate change to social inequality - are increasingly urgent and perceptible. Historically, thinkers, scientists, artists, and urbanists have examined radical societal shifts and systemic transitions, focusing on the need to reassess humanity's impact on the planet (Butera, 2021). While oracles and divinatory practices once shaped visions of the future, today's predictive processes rely on algorithms, artificial intelligence, and advanced technologies. Yet, the future is not merely anticipated - it is actively designed. Every act of design constitutes a step toward constructing possible futures, materializing solutions that shape what does not yet exist (Grosso, 2017). In this context, TDW emerges as a crucial space for envisioning and crafting the future of the built environment, bridging the gap between technological innovation and the ethical, social, and environmental responsibilities of design. The debate stimulates reflection on the role of design and architecture in fostering sustainable and inclusive futures, questioning how design can function as a catalyst for social and environmental transformation. More than ever, design must renegotiate the relationship between innovation and society, identifying new pathways to address contemporary crises.

Far from being a mere instrument for aestheticizing the present, design must operate as an agent for shaping equitable and sustainable futures. Empathetic design - an approach rooted in sustainability and inclusion - offers a viable trajectory. Biomimetic architecture, self-regenerating materials, and adaptive solutions inspired by natural systems exemplify strategies that design can leverage to confront climatic and economic challenges (Di Salvo, 2020). Beyond constructing buildings, design must reimagine entire cities in response to both community and planetary needs. In fact, design has never been a neutral practice. World expositions have frequently framed technological progress through a Eurocentric lens, marginalizing entire populations from the future's narrative. Tony Fry's concept of defuturing underscores how design has often eliminated alternative possibilities by reinforcing dominant cultural paradigms (Fry, 1999). In an era increasingly marked by inequality, design bears the ethical responsibility to function as a vehicle for social justice. The pandemic, geopolitical conflicts, and climate change have further underscored the necessity for design strategies attuned to human and environmental vulnerabilities (Omar et al 2024).

Design education must undergo a paradigm shift, embracing a transdisciplinary and inclusive perspective capable of addressing global crises through holistic and collaborative frameworks. Designing for low-income communities is not merely an act of social responsibility but an opportunity to reconfigure production and consumption models toward greater equity and sustainability. In this evolving context, design assumes a fundamental role in shaping a new humanism - one where quality of life, security, and sustainability emerge as guiding principles. The future is not an inevitable outcome - it is actively constructed through our choices and actions. Now, more than ever, design must serve as the bridge between present realities and the possibilities of tomorrow.

Among the most significant contributions, *Annalisa Lanza Volpe* explores the application of artificial intelligence (AI) in sustainable architecture and design stands out. Artificial Intelligence for Sustainable Architecture and Design explores the potential of AI in optimizing design strategies, with a particular focus on the integration of Building Information Modelling (BIM) and Life Cycle Assessment (LCA). The selection of appropriate design strategies requires careful evaluation to mitigate the environmental impact of the built environment. Sustainable architecture necessitates an interdisciplinary approach and the adoption of AI-based digital tools, which are emerging as catalysts for methodological transformation in the construction sector. The implementation of advanced digital tools, combined with a data-driven approach, is redefining design methodologies, enhancing the energy efficiency and sustainability of built structures. The use of generative AI further expands the possibilities of design exploration, enabling the development of more resilient and adaptive buildings capable of dynamically responding to climatic and energy challenges.

Technological innovation and the role of design extend far beyond the architectural domain, also finding applications in mobility and industrial design. *Gregor Andoni* examines the phenomenon of hyper-personalization in automotive design, demonstrating how emerging technologies are redefining the relationship between humans and machines. The integration of artificial intelligence, machine learning, and predictive analytics enables the creation of tailored solutions for each user, transforming every vehicle into a highly adaptive environment. The automotive experience is no longer limited to aesthetic configuration but extends to intelligent ergonomic systems, advanced sensory interfaces, and interactive dynamics capable of anticipating the driver's needs. At the same time, *Andoni* reflects on the ethical and environmental implications of extreme personalization, questioning the impact of custom component production on the sustainability of product life cycles. His study suggests that hyper-personalization is not merely a technological innovation but a design challenge with profound implications for 21st-century mobility.

The investigation into models of design transformation extends to the field of architectural rehabilitation, with the contribution of *Armela Lamaj and Flogerta Krosi* on the reconfiguration of modular façades in large, prefabricated buildings. Applying the principles of Gestalt theory, the authors analyze the perceptual and functional implications of modifications made to existing structures, highlights how the visual and spatial quality of building surfaces affects their integration within the urban context. The contribution underscores the need of a design approach that considers the relationship between aesthetics and functionality, adopting criteria of symmetry, rhythm, and formal coherence while avoiding discordant interventions that may compromise architectural language consistency. Among the key topics examines, the research analyzes the ability of modular façades to maintain a cohesive visual identity despite the introduction of new elements, demonstrating that compositional strategies based on Gestalt principles can serve as effective tools for the revitalization of the built environment. Furthermore, critical reflection on the role of design extends to the field of artistic and performative practices, emphasizing their potential as instruments of social transformation.

Francesco Scasciamacchia analyzes the concept of repoliticization in performative art through *What Struggles Do We Have in Common? by the collective Chto Delat?* exploring the relationship between aesthetics and activism within contemporary art institutions. His study illustrates how the group subverts the conventions of art galleries by transforming them into spaces of political experimentation, employing Brechtian learning play to investigate the dialectic between depoliticization and repoliticization. Through a Marxist dialectical framework, the performance does not merely expose the conflict between artists and activists but reconfigures it to stimulating new forms of social and political participation. The author critiques the performative turn, highlighting how many artistic practices have been assimilated into neoliberal logics without challenging their underlying power structures.

In contrast, *Chto Delat?* employs Brechtian estrangement to activate a critical reflection on contemporary contradictions and the possibilities for collective action. This contribution provides critical insights into how art can function as a tool for social transformation, redefining the boundaries between representation, participation, and power. In a context increasingly dominated by cultural commodification, *What Struggles Do We Have in Common?* emerges as a political experiment that rethinks the role of art between activism and public space.

The issue also extends to education and the role of academic institutions, with a particular focus on the Third Mission of Universities, namely their contribution to society beyond teaching and research. These contributions outline a complex panorama in which design, architecture, and art emerge as instruments of innovation, experimentation, and social critique. This edition of *Forum A+P* thus provides a space for reflection on ongoing transformations, questioning not only the potential of technology and design but also the ethical, environmental, and political implications of design choices. Design is never a neutral act: whether in the creation of built environments, the development of new human-machine interfaces, or its intersection with artistic practices, it actively participates in the redefinition of cultural models and social dynamics. The future is not an abstract entity but a process in continuous development, which design is called upon to shape consciously, reflecting on its responsibilities and transformative potential. *Besnik Aliaj, Aleksandër Xhuxvani, Xhiliola Bixheku,* and *Mira Idrizi* analyze the role of the Third Mission in Albanian higher education, focusing on the need for a stronger link between Universities and society and the identification of new indicators to measure the impact of academic institutions on the labor market and the community. Their study analyzes the challenges faced by higher education institutions (HEIs) in Albania in aligning with international standards for the Third

Mission, which was structured around three main areas of activity: lifelong learning, technology transfer and innovation, and social engagement.

The analysis highlights how, despite being recognized as a strategic component in European universities, the Third Mission remains underdeveloped in Albania, with incomplete measurement of its activities and insufficient integration into institutional planning. Despite growing awareness of its importance, Albanian higher education struggles to adapt to socio-economic changes and labor market demands. This has led to a proliferation of degree programs that often replicate similar content, resulting in excessive competition among graduates and a misalignment with the actual employment needs of the Country.

Furthermore, the contribution highlights the need for a more structured regulatory and funding framework to support the development of the Third Mission in Albanian universities. Currently, the absence of a clear national employment system for first-degree graduates has led to a continuous enrollment in further study cycles, often without a genuine professional necessity. Concurrently, the dissemination of technological advancements and innovation remains constrained, with limited synergies between universities and the business sector, particularly in non-metropolitan areas. To address these challenges, the authors propose a system of indicators and methodologies to evaluate the contribution of the Third Mission in Albanian universities, drawing inspiration from best European practices. The adoption of consistent evaluation tools could enhance the ability of higher education institutions (HEIs) to respond to societal needs, strengthening their role not only as educational institutions but also as agents of economic and social development. Thus, the research not only provides a critical overview of the current state of higher education in Albania but also suggests strategies for more effectively integrating the Third Mission into university governance and national policies for education and innovation.

The workshops of the Tirana Design Week provide a setting for experimentation and learning on emerging themes in the fields of design and architecture, promoting innovative methodologies and advanced technological tools. Among these, the Drones for Architectural Scenarios workshop, led by *Giuseppe Di Salvo, Artan Kacani, Kejsi Veselagu*, and *Armela Reka*, introduced students to the use of drones in architectural design, explored both technical and regulatory aspects. During the five-day workshop, participants examined the structural and electronic components of drones, acquired skills in remote control and the use of the *DJI Fly* app. Practical sessions focused on flight training in urban environments, video capture techniques, and collaborative content production, allowing students to experiment with concrete applications in architectural and urban surveying. A crucial aspect of the workshop was the in-depth exploration of safety procedures and operational protocols, with particular attention to equipment verification, pre-flight checks, and emergency management. Additionally, the workshop included discussions on ethical implications and responsibilities associated with the use of drones for architectural purposes, encouraging a critical reflection on the integration of these technologies within the construction sector.

The Finishing Technology of the Building workshop, led by A*lbi Alliaj, Merita Guri,* and *Mirela Kllogjri*, delved into the applications of Building Information Modelling (BIM) in façade design and structural optimization. The workshop combined theoretical lessons with practical exercises, including factory visits and presentations by industry experts, such as professionals from Saint Gobain. Students developed an advanced understanding of BIM applied to innovative façade design, explored algorithms for structural element optimization, and used computational tools for modeling and evaluating construction performance. The methodological approach included practical activities involving the modeling of walls based on Saint Gobain specifications, alongside the application of algorithms to determine optimal sections and structural reinforcements. This educational pathway enabled students to acquire industry-aligned competencies, preparing the next generation of designers to integrate digital technologies and advanced processes into architectural practice.

The *CHIC-ETIC* workshop, coordinated by E*smeralda Marku and Andreas Reiter,* enabled an interdisciplinary dialogue among architecture and urban planning students on social responsibility in the production of consumer goods. The initiative highlighted the urgency of an ethical and sustainable approach in both design and business management. The main objective of the workshop was to heighten participants' awareness of the fundamental need to integrate business practices that uphold human rights and environmental stewardship within product design and manufacturing. The discussion addressed the persistent disconnect between designers and producers, emphasizing the importance of inclusive and responsible decision-making frameworks. The pedagogical approach was rooted in direct engagement between students from various disciplinary backgrounds, fostering critical analysis on the challenges and prospects of a more ethical industry. Through roundtable discussions and collaborative brainstorming, participants explored case studies and devised strategies for the development of sustainable business models. Particular attention was given to the intersection of aesthetics and responsible production, highlighting how a product's value depended not only on its formal attributes but also on the conditions under which it was produced and the narratives embedded in its creation.

The reflections emerging from the workshop prompted a broader examination of the economic and social implications of increasing consumption. While rising demand for goods stimulated production and employment, it also risked undermining labor rights and ethical manufacturing standards. Participants underscored the necessity of fostering business strategies that prioritized sustainable employment practices, equitable wages, and worker well-being. Among the workshop's key conclusions is the fundamental role of corporate storytelling in strengthening the relationship between

consumers and producers. Integrating workers' accounts into product communication enhances an emotional connection with the public, thereby improving brand perception and value. Moreover, discussions reinforce the critical importance of fair wage models, transparent and safe working conditions, and the proactive engagement of companies in fostering positive social impact. These reflections extend beyond the scope of individual workshops, emphasizing the broader necessity of rethinking design as a tool for ethical and sustainable transformation.

This perspective aligns with the central themes of *Tirana Design Week 2023,* where interdisciplinary dialogue has underscored the need to redefine design practices not only in response to climate emergencies and digital transformation but also to address the deep social inequalities that still shape the built environment. *The New Worlds* imagined today must be open and accessible spaces where technological innovation and sustainability translate into more equitable and inclusive environments, capable of responding to the cultural, economic, and physical diversity of communities. In this scenario, rethinking urban planning and architecture through an integrated perspective - one that intertwines technology, sustainability, and inclusivity - is not merely a design requirement but an ethical imperative. The design of the future cannot be limited to solving technical problems; it must create opportunities for collective participation and the development of spaces that ensure well-being, accessibility, and representation for all. Redefining the relationship between the built environment and society means dismantling both physical and symbolic barriers that continue to exclude vulnerable groups, transforming design into a tool for equity and social justice.

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Drones for Architectural Scenarios

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The workshop was a 5-day event where students engaged deeply in theoretical concepts and extensive hands-on practice to achieve proficiency in drone piloting. The primary objectives of the workshop were to offer a thorough understanding of drone structures, electronics, radio control usage, and the DJI Fly app. Practical sessions focused on flight training over city structures, video capture techniques, and collaborative video production within groups. The Key Learning Areas were the following: Comprehensive understanding of drone components. Participants delved into the intricacies of drone structures, gaining insights into the mechanics and functionality of key components. Electronics and radio control operations. In-depth exploration of the electronic systems and radio control operations, ensuring participants developed a robust understanding of the technology. Utilization of DJI fly app and automatic functions. Hands-on experience with the DJI Fly app and exploration of automatic functions, enabling participants to master the technological aspects of drone piloting. Flight training on city structures. Practical flight sessions involved navigating drones through city structures, enhancing participants' skills in real-world scenarios. Video capture and collaborative production. Emphasis on video capture techniques and collaborative video production within groups, providing a creative outlet for applying piloting skills.

Safety and Protocol Emphasis

The workshop placed a significant emphasis on safety and protocols throughout its duration. Participants underwent a thorough preflight checklist and equipment inspection, guided through meticulous assessments of equipment, motor functionality, propeller conditions, and battery checks. This ensured that every aspect of the drone's readiness was scrutinized before flight. Emergency protocols were a focal point, providing participants with the necessary knowledge to

navigate unforeseen situations during drone operations. The workshop delved into these protocols, equipping participants with the skills and awareness required to handle challenging scenarios effectively. The importance of adherence to safety regulations and flight guidelines was underscored throughout the workshop. Emphasis was placed on crucial safety regulations, including flying in optimal weather conditions, maintaining line of sight, avoiding airports and main roads, refraining from flying above people, and adhering to specific altitude limits. These guidelines were instilled to ensure responsible and compliant drone operations. The workshop adopted an integrated learning approach, seamlessly blending theoretical knowledge with practical flight sessions. This approach allowed students to not only understand drone piloting concepts theoretically but also gain hands-on experience. The practical sessions were invaluable, enabling participants to familiarize themselves with the aircraft and significantly enhance their piloting skills. This experiential learning approach reached its pinnacle with the creation of documentaries, providing a practical application of the acquired skills. As an outcome of this comprehensive approach, participants left the workshop well-equipped with the confidence and expertise needed to navigate the complexities of drone piloting. The integration of theoretical understanding, practical experience, and a strong emphasis on safety regulations ensured a holistic and impactful learning experience, preparing participants for responsible and skilled involvement with unmanned aerial vehicles.

Methodology

The workshop embraced a variety of approaches to cater to diverse learning styles and ensure a comprehensive understanding of the subject matter. The the following key components were utilized:

Interactive lectures and engaging discussions: in-depth and dynamic interactive lectures encouraged active participation, creating an environment conducive to critical thinking and knowledge retention. Facilitated discussions complemented lectures, providing a platform for students to delve deeper into the complexities of drone technology and its integration with architecture.

Hands-on simulations with cutting-edge drone equipment: participants were actively involved in practical, hands-on simulations utilizing state-of-the-art drone equipment. Emphasis was placed on real-world scenarios, allowing students to develop practical skills and a comprehensive understanding of drone operations.

Comprehensive field training sessions in diverse environments: outdoor training sessions were conducted in varied and challenging environments, enabling students to apply their knowledge and skills in different conditions. Field exercises focused on honing practical skills, problem-solving, and adapting drone operations to different architectural contexts.Specialized documentary production workshops: in-depth workshops guided students through the entire process of producing documentaries using drone footage, combining technical proficiency with creative expression. Participants gained hands-on experience in storytelling through visuals, fostering a deeper connection between drone technology and architectural narratives.

Collaborative group activities and project work: group activities were designed to promote collaboration, teamwork, and problem-solving skills among participants. Collaborative projects provided students with the opportunity to apply drone technology to real-world architectural challenges, enhancing their practical understanding and teamwork abilities.

Ethical considerations explored through in-depth discussions: ethical discussions were integrated throughout the workshop, addressing the responsible and ethical use of drones in architectural practices. Real-world case studies were examined to provide practical insights into navigating ethical considerations in drone usage.

Continuous personalized feedback loop: a significant feedback system was implemented, ensuring a continuous and personalized guidance mechanism. Instructors and assistants provided timely feedback, addressing individual learning needs and fostering a supportive learning environment. The methodology aimed to create a holistic learning experience that not only equipped students with technical expertise but also nurtured creativity, ethical awareness, and collaborative problem-solving skills essential in the intersection of drone technology and architecture.

Conclusions

The culmination of the workshop was marked by an inspiring final session where students showcased their creativity and technical prowess by presenting their documentaries. This hands-on culmination highlighted the workshop's effectiveness, demonstrating the students' ability to translate their newfound knowledge into compelling visual narratives.

Workshop Process Image

Finishing Technology of the Building

ALBI ALLIAJ
POLIS University
MERITA GURI
POLIS University
MIRELA KLLOGJRI
POLIS University

The workshop "Finishing technology of the building" is planned to take place in the first semester of the second year. This workshop presents from a construction engineer's point of view several different technologies and applications for building refinishing. In this workshop, different materials and systems are treated in order to increase comfort and techniques for the production of these materials, starting from production to their application in structures.

The workshop program is mainly prepared for construction engineering students, focusing on construction technology. This workshop program in collaboration with the Saint-Gobain company aims to help students acquire enhanced knowledge and skills in this field. Also, importance has been given to the design of these systems through BIM programs. Students will be trained step by step to build a legend system within the program. By demonstrating some examples of innovative systems within the BIM program, the advantages of this method can be clearly understood.

Objectives

This extensive educational module's goal is to provide students with a complete understanding of the practical uses of Building Information Modeling (BIM) in facade design, as well as specific algorithms for optimizing structural elements in construction projects. Students will get a sophisticated understanding of BIM's role in innovative facade design through lectures, factory visits, presentations by Saint Gobain industry professionals, and hands-on training sessions utilizing BIM software and computational tools. The goal is to empower students with practical skills and knowledge

aligned with industry standards, allowing them to implement cutting-edge methodologies in their future architectural endeavors by engaging in tasks such as modeling walls based on Saint Gobain's specifications and employing algorithms to determine optimal sole types and reinforcement sections.

Methodology

Task 1 Methodology: The first step in completing Task 1 is to gain a thorough understanding of the BIM program and its use in facade design. Students will get in-depth lectures and practical workshops on BIM tools, with a focus on wall system modeling and design concepts, based on insights presented by Saint Gobain. This knowledge basis will be reinforced through hands-on training workshops utilizing software like as Revit, in which students will apply what they have learned to model the walls of their chosen projects. Saint Gobain's specifications will serve as a guiding framework, ensuring that students embrace new components emphasized during the presentation.

Methodology for Task 2:

In Task 2, students will be introduced to specific methods used in structural design to optimize the computational section of the sole and surface reinforcement. Students will learn how to apply these algorithms to their respective projects through guided sessions and workshops. Students will engage in practical activities utilizing computational tools or software to build these algorithms after first studying the ideas and factors involved in selecting optimal sections and reinforcement kinds. They will use the algorithm to evaluate and decide the best types of sections and reinforcement for their projects' soles, assuring structural integrity and efficiency.

Conclusions

Finally, this comprehensive training program has given students priceless insights into the crucial importance of Building Information Modeling (BIM) in current facade design and structural element optimization within building projects. Students have developed a thorough grasp of how to use innovative techniques in architectural design through engaging lectures, practical factory visits, presentations by industry leaders such as Saint Gobain, and hands-on exercises with BIM software and specialized algorithms. Students developed their abilities by modeling walls to precise specifications and applying computational tools to optimize sole kinds and reinforcing sections, ensuring they are prepared to face real-world issues in the construction sector.

Chic-Etic

ESMERALDA MARKU
POLIS University
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Architect, Graz Austria

The objective of this workshop was to combine the mechanism of the way we think about products. A product created to be used by politics is designed for people but sometimes it is not well thought about by people who work to produce those products. The objective is to increase awareness of the responsibility each of us has for how we can formulate a business plan respecting human rights.

Methodology

Students from two different faculties, from the faculty of architecture and design with students from the faculty of planning, environment, and urban management will be seated together at a round table to share their experiences and their ideas on how one business will be functional. Based on the topics defined below, the methodology and rules that an efficient business must have to respect human rights and the environment will be addressed. The combination of beautiful products and ethical production. Beauty that takes into account the background and origin of a product.

Conclusions

The conclusion was the thought approach that was encouraged in these students regarding the future of developing a successful business based on sustainable forms of employment. They shared different cases that they had encountered or heard during this time in their jobs or in interviews or cases that they had heard from other family members. Being consumers of design, we are all looking for products that we like and that solve the problems that we may encounter in everyday life. The increase in consumption leads to an increase in production and increases

the demand for employment, but it decreases the probability that the attention of these "bosses" will go to the employees. The participants had a reflection towards innovative ways of doing business and this is expressed in the form of paragraphs that I can quote below.

"People don't just buy products and services, they buy relationships, history, and magic," according to a famous quote which tells us quite well that behind a final product there are other factors and some people so that the product is of the highest quality and the customer remains satisfied. Sometimes consumers don't just want a functional product, but they want to feel the connection with the brand and the people behind it. A good reason to improve the product is the story. Confessions of employees create an emotional connection between them and the customers, which brings a greater interest in the product. Improving a product directly with the way employers treat their employees and for better functioning in their work, I think that it should function as a team without differences. Another way this can be evaluated as one of the most important is the evaluation of valuable employees' monetary and regular payments and allowances if they work extended hours and if they have difficulty during work. I think that the application of these factors will bring but one product quality, but it will also increase the value of companies whose main purpose is to create a name and loyal clientele why not be a company that also attracts emerging clientele and fantastic experience both for customers and for the company together with its employees."

Worked by: Ajdi Gurguri- (Student from the faculty of architecture and design)

"Every entrepreneur, regardless of the size of the business he represents, must be supported in one point single point of contact to receive useful information regarding the development of their business. Regardless of the results achieved so far, it is necessary to deepen and improve business by developing the product that this business offers. For this purpose to be achieved in this way to be successful, work must be harmonized with workplaces. Two key points for achieving gelling are:

- Improving performance as management and staff work with a higher sense of achievement.
- Strengthening relations with staff, interest groups, and partners.

These are achieved simply by valuing maximally in the economic but also social aspect all of them contribute to the development of the product."

Worked by: Aldo Kallmeti (Student from the faculty of architecture and design)

"Creating an efficient business while respecting the rights of the people who work to produce a product is not only ethically responsible but can also lead to long-term success and sustainability. This balance can be achieved in several ways:

1. Fair labor practices:
- Ensuring fair wages and transparent labor contracts for all workers involved in the production process.
- Ensuring safe and healthy working conditions, adhering to all relevant labor laws and regulations.
- Compliance with international labor standards and codes of conduct, such as those established by the International Labor Organization (ILO).

2. Empowerment and welfare of workers:
- Prioritizing the well-being and motivation of the workforce. Encouragement to develop their skills and feel valued.
- Promoting a culture of cooperation, open communication, and respect within the workplace.
- Providing opportunities for career development and personal growth for employees.

3. Supply chain transparency:
- Choosing partners and suppliers who share your commitment to respecting labor rights.
- Conduct due diligence on suppliers to minimize risks related to labor rights violations.
- Encouraging transparency in the supply chain, making it easier to identify and correct any problems.

4. Monitoring and reporting on social and environmental impact:
- Using established standards and methodologies to monitor the social and environmental impact of your business.
- Reporting transparently and regularly on efforts to respect workers' rights and positively impact communities and the environment.

5. Innovation and quality:
- Focus on developing high-quality, innovative products or services that meet customer needs while adhering to ethical standards.
- Constantly collecting customer feedback and using it to improve products and services.

6. Corporate Social Responsibility (CSR):
- Engaging in socially responsible initiatives and supporting the communities where we operate through donations and community projects.
- Using business influence to drive positive social and environmental change.

7. Legal compliance and ethical leadership:
- Staying informed about labor laws and regulations in the region and ensuring full compliance.
- Leading by example with ethical leadership that prioritizes respect for human rights.

By following these principles, one can build an efficient business that not only develops successful products but also respects workers' rights. Such an approach can help create a positive reputation, build strong relationships with stakeholders, and contribute to a more sustainable and ethical business ecosystem. It is essential to remember that respect for human rights is not only a legal requirement, but a moral imperative beneficial to business in the long run."

Untimely Meditations or: How We Learn to Live in Synthesized Realities

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ERA MËRKURI
Curator of the Venice Biennale
MARTIN GJOLEKA
Curator of the Venice Biennale

"Untimely Meditations or: How We Learn to Live in Synthesized Realities" was a collaboration of POLIS University and the organizers of the Albanian Pavillion at the Biennale of Architecture in Venice. As a result, the focus was to reinterpret the main objectives of the pavilion from the students' perspective. The main objective of the workshop was to build different storytellings for one of the selected sites: Dinamo Stadium or Artificial Lake, as two sites that despite changes in the urban context, have become hybrid entities with their space-time realities. Thus, these two spaces become a laboratory of the future for new ideas and concepts to emerge by focusing on one of the problematics of the existing condition and describing a complex human-technology-environment system. These narratives were created through the use of photography, photo collage, and written text.

Methodology

The focus of the workshop was to reinterpret the main objectives of the Albanian pavilion from the student's perspective. The main objective was to explore co-existing authentic spaces in the city, by understanding the boundary between the natural and the artificial landscape. Such perspectives were elaborated by building different storytellings for one of the selected sites:

Dinamo Stadium or Artificial Lake, as two sites that despite changes in the urban context have become hybrid entities with their own space-time realities. Thus, these two spaces become a laboratory of the future for new ideas and concepts to emerge by focusing on one of the problematics of the existing condition and describing a complex human-technology-environment system. These narratives were created through the use of photography, photo collage, and written text.

The workshop was developed in two weeks and in two locations. The first week was organized in Tirana, where the students primarily visited the two sites, the Artificial Lake of Tirana and the Dinamo Stadium, in order to get the first inspiration for their concepts, based on the main problems faced on sites. It was necessary for the students to provide good documentation of the existing situation and the key visual elements to elaborate their concepts which were later discussed during a brainstorming séance. Later on, the students developed their personal narratives, presented through texts and photo collages.The second week took place in Venice at the Venice Biennale of Architecture and the students visited all of the pavilions in order to find similarities or contrasting narratives in order to enrich their discussion. The second phase provided the students the possibility to be introduced to the work of international architects, an important aspect of their evolution as future professionals. The implementation of the second phase was based on and presented on the Albanian Pavillion 2023 space.

Conclusions

Through this workshop, the students were able to understand the importance of the contact with site to build a narrative that is an inseparable aspect for the architect to develop a concept. The participants are now capable of easily building a storytelling in architecture, in order to reinforce their arguments for the design ideas and solutions for urban spaces. These different narratives of the complex human-technology-environment system built by the students give an important insight into the fragile conditions of the two sites in Tirana, rethinking of the importance of architectural thought for the future of our urban spaces.

Workshop Process Image

Encoding system- Façade design throught GeD & AI

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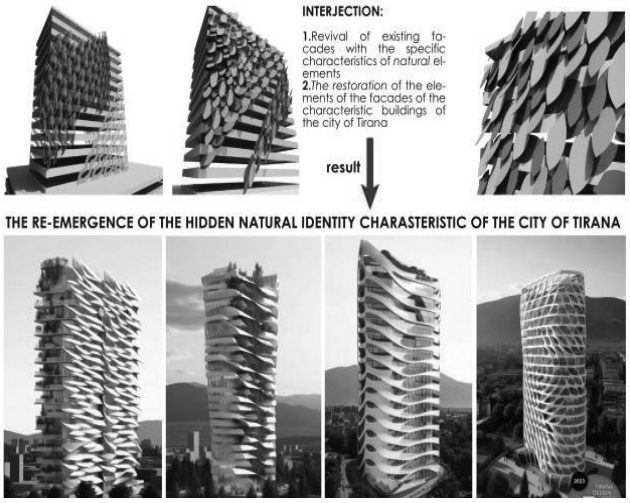
This workshop aims to introduce an alternative approach to engaging with reality by bringing together various methodological and applied knowledge. Although this syllabus presents a clear methodology for program treatment, the substantive and qualitative outcomes are entirely open to reinterpretation and case-by-case reevaluation, directly influenced by facilitators, treated topics, hypotheses proposed by participants, and, above all, by each participant's individual approach. To contextualize the development of the theme within the framework of TDW23, with participating students who are now entering their final academic year in the 5-year integrated Architecture and Urban Design program, the program builds upon the knowledge acquired during the preceding four years, both in theory and practice. It endeavors to elevate these concepts to another level, one that is more applied and executable. The use of the Midjourney AI (version 3.0) platform was, for the pedagogy team as well, a method of inquiry on how such potentialities could be expressed and catalyzed in proper design projects rather than just on a bi-dimensional screen of an already precompiled platform. Exposing the students to learning how to use diffusion models, how to strategize methods to convert the resulting images into 3D models, and how to perform a critical forensic examination of the results, was the trigger to involving them in a deeper understanding of how to formulate a theory around their designs.

Methodology

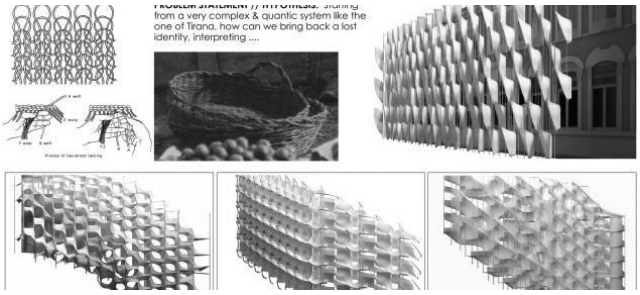
Following a series of thought-provoking presentations on the potential impacts of arbitrary architectural decisions on the boundless dimensions of the city, students will be encouraged

to speculate and envision an alternative facade for their capital. Employing a seemingly rigorous yet creatively liberating process, students will embark on a multidimensional decoding journey aimed at reimagining plasticities through the creation of simplified systems. By "systems," we refer to the geometric aggregation of one or more modules and the rules governing their assembly. The system itself will emerge as a product or outcome of a generative process that commences with hand-drawn sketches on paper and may extend to the construction or utilization of basic generative algorithms within CAD software (such as Rhinoceros 3D & Grasshopper) or AI platforms (including Fooocus, Midjourney, DALL-E, etc.).



Conclusions

In conclusion, this workshop has proven to be a transformative experience for the students, who not only grasped the inherent complexity of the subject matter but also fully embraced the multi-dimensional challenges of system decoding processes. While the initial days presented formidable hurdles, the students exhibited remarkable perseverance and pushed their creative boundaries to the limit, culminating in a captivating demonstration of methodological application within Generative Design. The workshop's emphasis on variables deductions and the assembly of simple systems yielded intriguing results, with some projects intentionally diverging from conventional aesthetic norms, aiming to provoke thought and stimulate contemplation about the profound visual impact of urban plasticities. This dynamic mix of experimentation, creativity, and critical reflection underscores the success of the workshop in fostering a deeper understanding of architectural and urban complexities while encouraging innovative thinking.



Workshop Process Image

Bioinspired and Biobased Material Programming
Self-Shaping and Responsive Systems for a Sustainable Future

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Introduction
This article proposes a bioinspired approach to design and fabrication as an alternative to conventional methods of making. Through an integration of material, structure, and function, plants change shape over a range of spatial- temporal scales in response to environmental stimuli. The bioinspired interplay of cellulosic materials, mesostructures, and adaptive motions is enabled through material programming and 4D-printing, resulting in self- shaping and biobased hygromorphic systems powered by the free-flowing moisture inputs of the environment. This approach is transferable to diverse materials and processes, as showcased through the upscaling of the developed methods to industrial robot platforms and hybrid materials systems for constructing responsive furniture-scale objects. From self-adjusting orthotic devices to weather-responsive building facades, this work demonstrates the wide-ranging potential of bioinspired and biobased transformation across scales and disciplines by applying design principles from biology to body and building.

Anthropogenic Systems
Although humans account for only about 0.01% of all biomass (Bar-On, 2018), their impact on the Earth outweighs any other species. Human activities are responsible for the changing climate, disrupting the usual balance of nature through the emission of greenhouse gases. Since 1900, anthropogenic mass has grown rapidly from roughly 3% of the world's biomass to surpassing it today (Elhacham, 2020). This estimate considers only human-made artifacts that are in use, from bridges and skyscrapers to clothing and smartphones, which will eventually become waste to be dealt with.

As the second most used substance in the world, after water, concrete is found all over the built environment (Gagg, 2014). Indeed, the embodied carbon of high impact building and infrastructure materials are responsible for 9% of annual global CO2 emissions, while building operations generate 27% (UNEP, 2022). Combined, the buildings and construction sector account for 40% of total emissions. Moreover, the growing population will necessitate the provision of increased urban development, housing, and goods for daily life (UN, 2019). Continuing our current practices will exacerbate the health of the planet and the supply material resources that we rely on (IPCC, 2021).

Natural & Bioinspired Systems
Nature, however, demonstrates another approach. In fact, natural ecosystems are productive, managing interactions between producers, consumers, decomposers, and the environment in a balanced cycle. Moreover, the ability of plants to move without active metabolism has long intrigued scientists, from the self-burial of the Erodium seed awn (Jung, 2014) to the self-opening of conifer cone scales (Eger, 2022). As such, their functional morphologies have served as a rich source of inspiration for humidity-actuated material systems, such as self-drilling seed carriers for aerial seeding (Luo, 2023) or self-shaping flaps (Reyssat & Mahadevan, 2009) for architectural applications (Reichert, 2015).

The fundamental working principle of this actuation is based on the differentiated orientation of cellulose microfibrils in two tissue layers, leading to bending (Speck, et al., 2023). Advances in digital fabrication technologies have made it possible to emulate biological structures in higher spatial-temporal resolutions. In particular, additive manufacturing has been proven to be well suited for 4D-printing (Correa, 2015) and was used for reproducing the multi-phase movement of the Bhutan pine cone scale (Correa D. P., 2020).

Still, examples of 4D-printing have remained as laboratory prototypes, yet to be deployed in real- world applications. Although the use of fused filament fabrication (FFF) machines

and off-the- shelf wood filaments has made the technique more accessible, there is no established method for the design of self-shaping structures. Furthermore, the approach should be transferable across different materials, platforms, and scales to meet the diversity of real-world needs.

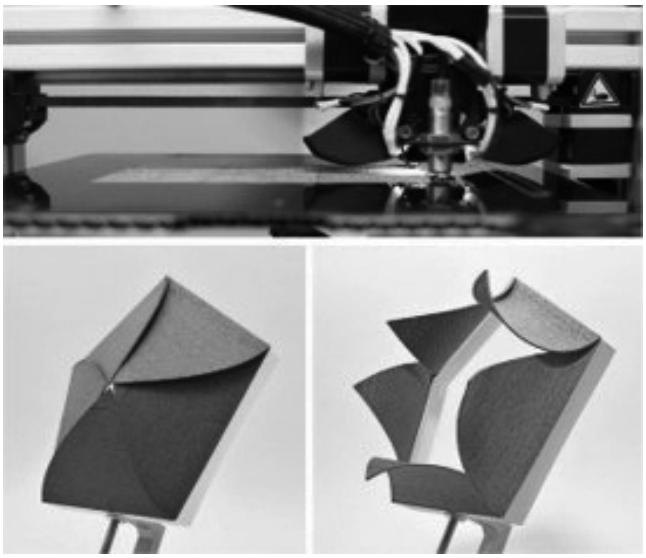

Figure 1. The material programming of self- shaping and responsive material systems is based on the fabrication parameters of extrusion-based additive manufacturing (top). Through the mesostructure design, this 4D-printed aperture closes when wet and opens when dry (bottom). (Image © Tiffany Cheng, ICD University of Stuttgart)

Material Programming

This body of work aims to bridge biological and anthropogenic approaches. In nature, there exists a limited palette of biopolymer building blocks, which gain multifunctional behaviors according to their material structuring when powered by environmental stimuli. In contrast, human- engineered systems rely on the myriad of artificial materials, purposely synthesized for specific properties, that are assembled into mechanisms which consume fossil fuel energy to operate.

This article presents the conceptual framework of material programming and a series of case studies using biobased cellulosic materials in bioinspired architected mesostructures for hygromorphic responsive systems. The key challenge in developing such systems is managing their interactions across scales – from the properties of materials at the microscale and how they affect printed structures at the mesoscale to their adaptive motion at the macroscale in response to environmental humidity.

Computational 4d-Printing

Extrusion-based additive manufacturing processes result in mesoscale anisotropic features according to the direction of material deposition. The developed computational design and 4D-printing framework (Cheng, et al., 2020) is based on this feature as well as the hygromorphic property of cellulose-based filaments, which swell and shrink perpendicularly to the anisotropic paths upon changes in moisture levels.

Fusing two printed layers of opposing anisotropies and hygromorphic properties leads to an overall bending effect of the bilayer structure. By controlling the print paths and thereby tailoring the mesostructure of each layer, the bending radius can be modulated to a wide range.

This bilayer building block can be combined in various configurations to achieve a variety of shapes. Figure 1 shows a 4D-printed self-shaping aperture that opens when dry and closes when wet. Among other programmed structures are surfaces that transform from flat to doubly curved and kirigami-inspired structures that expand substantially in volume. The principle of curved crease origami can also be translated to 4D-printing (Tahouni Y. C., 2020), where opposing bilayers are connected by a flexible curved hinge.

Robotic Upscaling

To prove the transferability and spatial scalability of the computational 4D-printing workflow, the method initially developed using hobbyist FFF 3D- printers and off-the-shelf filaments is adjusted for an industrial robotic platform and a hybrid materials system (Cheng, et al., 2021). A 6-axis robot arm equipped with multiple end effectors is used to integrate wood bilayers and tailored cellulosic metamaterial structures in the flat state of fabrication, resulting in large-scale biocomposite structures that self-shape to changes in relative humidity, as shown in ***Figure 2***.

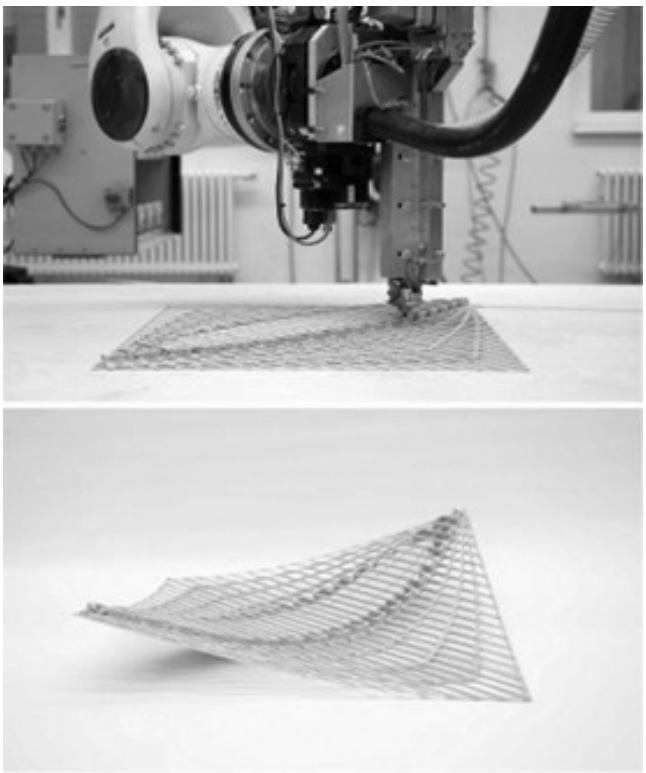

Figure 2. An industrial robot platform is used for the large-scale additive fabrication of hybrid materials systems (top). After being fabricated flat, the biocomposite structure self-shapes by drying (bottom). (Image © Tiffany Cheng, ICD University of Stuttgart)

The mechanical properties of the metamaterial structures can be customized to a high resolution of detail. As such, the unique properties of bending- active auxetic metamaterials are exploited for tuning the Gaussiain curvature, resulting in the transformation of a flat fabricated surface that self- formed into a doubly curved shell structure (Özdemir, et al., 2021).

Bioinspired Adaptive Wearable

There is immense potential for 4D-printing in medical and sports applications. Proper fitting is especially important in order to provide adequate support in orthotic casts; however, muscular atrophy often occurs during immobilization, necessitating frequent cast removal and reapplications. An adaptive orthotic splint is prototyped using the material programming and 4D-printing approach (Cheng, et al., 2021). *Dioscorea bulbifera* has been observed to generate high squeezing forces on its host structure, allowing it to climb without slipping (Isnard, 2009). The working principle of D. *bulbifera* is abstracted as two motion steps: first, the loose coiling of the stem helix around an existing support, and second, the expansion of outgrowths called stipules that tension the stem helix. The shape changes of the stem helix and stipules are translated to 4D-printed mechanisms referred to as the helix mechanism and the pocket mechanism, respectively.

In evaluating the force generation of the 4D-printed material system, results show that the bioinspired design combining both helix and pocket mechanisms yielded higher forces than the helix mechanism on its own. Moreover, delaying the actuation of pocket mechanisms through material programming resulted in the highest forces. ***Figure 3*** shows a personalized splint worn by the user as well as the programmed self-tightening provided by the many pocket mechanisms.

Beyond wearable assistive technologies, 4D- printing is also useful for facilitating the study of complex deformations in new plant role models whose underlying cellular processes are not fully understood, such as that of the large-flowered butterwort (Sahin, et al., 2023).

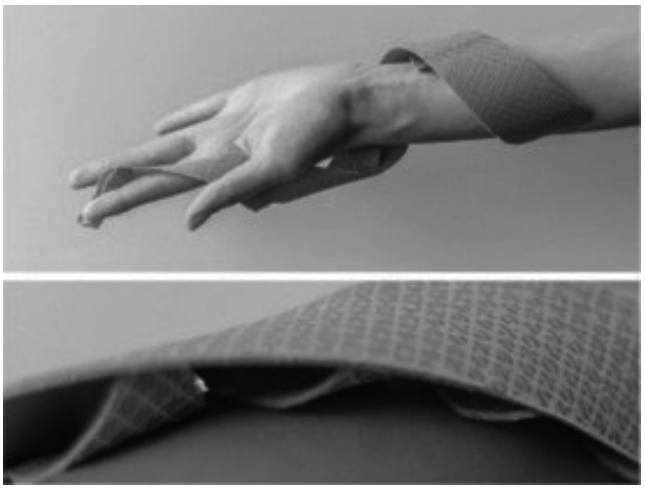

Figure 3. A prototype of the personalized 4D- printed adaptive wearable (top). A close-up of the many bioinspired tensioning mechanisms (bottom). (Image © Tiffany Cheng, ICD University of Stuttgart)

Figure 4. The 4D-printed shading elements open to let in sunlight during a cool morning (top) and close to block heat during a warm afternoon. (Image © Tiffany Cheng, ICD University of Stuttgart)

From Biology To Buildings

As buildings account for a significant portion of carbon emissions due to active heating and cooling for maintaining occupant comfort, weather- responsive building skins could assist in regulating the indoor climate without consuming any operating energy.

The *liv*MatS Biomimetic Shell serves as a case study for the architectural integration of 4D-printed self-shaping mechanisms, which are situated across the 10m2 upper façade of the building. A total of

424 unique self-shaping shading elements have been physically programmed via 4D-printing in the context of environmental and site conditions (Cheng, et al.). The 4D-printed shading elements are designed to shield the building's interior from high heat loads during summer and hot days while allowing thermal energy to penetrate during winter and cold days, as shown in ***Figure 4.***

Since March of 2023, these 4D-printed mechanisms have been self-shaping in response to changes in daily and seasonal weather cycles without using any operating energy at all. As the first truly weather-responsive 4D-printed adaptive building façade, this project proves the production scalability of 4D-printing and marks a step towards an energy-autonomous solution for solar shading in buildings.

Toward A Sustainable Future

Architects have been conceptualizing responsive and future-proof buildings and cities for decades, from Yona Friedman's *L'architecture mobile* to Archigram's *Instant City,* but few instances have been built. Although the Nakagin Capsule Tower was designed for its configuration to be customized as needed, none of the 140 modules were ever replaced until the

building's demolition. The Villa Girasole, a house designed to follow the sun by rotating its 1500-ton mass, is at risk of suffering the same fate due to the complexity and cost of maintenance. Similarly, the kinetic façade of the Institut du Monde Arabe no longer functions as intended, as one broken part within the interdependent mechanism renders the entire assembly immovable.

The work presented in this article shows an alternative approach to these highly mechanized interpretations of adaptive structures. The integration of cellulosic materials, architected mesostructures, and hygromorphic motions through material programming has enabled 4D-printed systems to respond to environmental humidity with a variety of shapes and properties. Their functions are completely energy-autonomous and powered by the natural ebbs and flows of the environment.

Necessary for democratization of the technology, the methods used do not require any exotic materials or specialized equipment (in fact, FFF 3D-printers proved to be indispensable for manufacturing medical devices and isolation wards during the COVID-19 pandemic due to their availability). Yet, the developed methods are transferable to industrial robot platforms and familiar construction materials, critical for wide adoption across spatial and production scales as well as application domains.

To achieve the bioinspired vision of an adaptive and resilient built environment (Poppinga S. Z., 2018), further work must consider the material system's end-of-life. The most sustainable type of building or city is one that is used in perpetuity through adaptation; however, some societal shifts and user needs cannot be predicted. In such a case, the life cycle of the biobased material system should be improved by ensuring its recyclability through monomaterial 4D-printing (Sahin, et al., 2023), biodegradation through developing new materials (Tahouni, et al., 2023), and the re-programmability of its adaptive functionality through designing hierarchical mechanism (Chen, 2021).

There are still many lessons from nature, still from the conifer cone – fossil cone scales have been observed to retain full functionality of hygromorphic motion even after millions of years (Poppinga, et al., 2017), while other species have evolved specialized mechanisms to respond only after a wildfire (Warren, 1978). By learning from nature, we may forge a sustainable pathway that overcomes the competing resources between nature and technology.

Acknowledgments

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Speculative design as an amplifier of reality
The multiplication of scenarios in the solving practice of increasing complexity in design

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Introduction

The paper introduces the philosophy of speculative design as a mature tool for investigation and design, capable of effectively intercepting alternative scenarios of the future, including the less predictable ones that extreme conditions sometimes bring about. Today, this philosophical and methodological apparatus is combined with that device of new enabling technologies (AI, Big Data Analytics, Metaverse, etc.) that allow for a more agile management of complex systems, verifiable in nature as in society.

The project is no longer discretionary, mono-directed, constrained and closed, but rather uncertain, hetero-directed, open to transformable scenarios that adhere to a variable context of rapidly and often unpredictable changing relationships

Punctual Acceleration of History

If we analyze the evolution of the project over the course of history, and in particular in the century that has just ended, it is not difficult to come across punctual episodes of strong acceleration of innovation processes, from which more or less concrete perspectives of renewal and new scenarios have sprung up, capable of pointing out directions of technological development and evolution for the human being. Periods of crisis have been counterpointed by moments of marked cultural vivacity, within which visions and projects have often matured, nourished each time by a lateral shift in the dominant thought, in the direction of previously unexplored or even unimaginable hypotheses.

It is interesting to observe how most of these inventions arose from a specific impulse, which originated in a peripheral field or sector, only to quickly 'bend' towards alternative ones, so far more interesting and profitable fields of use and development. If we think of the internal combustion engine, the refrigerator, Internet, and the mobile connectivity we are now accustomed to dealing with on a daily basis, we realize the relative size of the initial, almost always exclusive (often military) or elitist audience, to which each of these products or services adhered with practical solutions, and which today have instead found a much broader universal, horizontal and popular interest.

Anthony Dunne starts precisely from this final democratic necessity, placing it at the basis of speculative research, understood therefore not so much as a mere methodological tool for the project, but rather as a multiplier of the field of investigation and the spectrum of projection of solutions proposed by design, capable of intercepting options of use and application, beyond the temporal and contextual conditioning of each historical phase.

"It is clear that reality only works for a privileged minority, and that designer, advocating a realist approach, work within the constraints of reality as it is, for a minority. The [speculative] school aims to challenge this situation by making reality a little bigger, so as to give more space to different kinds of dreams and hopes. An important part of this process is the generation of multiple versions of reality, and this is where design comes in" (Dunne, A., Raby, F., 2017) (figure 1).

Embracing Complexity

This maximalist attitude, which widens the gaze beyond the single solution to the problem, builds a parallel track to the spread of enabling technologies such as Artificial Intelligence and Big Data Analytics enriched, however, by a lateral cultural and philosophical dimension, in a way that looks like what Maltese psychologist Edward De Bono calls “lateral thinking” (De Bono, 2001).

We live today in an articulated society, which is rapidly evolving in the direction of increasing complexity: thinking of tackling it through selective models (inevitably approximating reality) is in all likelihood an ineffective option, from which even worse effects and consequences may arise, such as those

that global society is already experiencing, now frequently, as we can see by thinking to the growing series of systemic and interconnected crises that characterize our time (social, economic, environmental, health).

A complex society must therefore be described through complex models and, where the individual alone cannot unravel complexity in an inclusive and transversal manner, it is reasonably appropriate to imagine a progressive broadening of the intellectual base from which the solution will emerge, beyond the disciplinary boundaries, sectoral tools, analysis methodologies and action of each professional.

The research and practice of scholars and creative people from different backgrounds converge on this urgency today. The philosopher Edgar Morin encourages the construction of a non-reductionist approach to reality, from which actions and projects arise, capable of better responding to the challenges of contemporaneity and of promoting the development of alternative solutions in the face of problems: in this sense, it becomes strategic to develop systemic thinking, meaning by system "the set of interactions within a determinable geophysical unit, containing different living populations, which constitutes a complex unit of self-organizing character" (Morin, 2017).

Trying to describe the project framework today, an interesting discriminating factor to raise may be that-one linked to the desirability of the scenarios analyzed and discussed by design: there are in fact designers who, by adopting a speculative critical approach (even of a fictional type), direct the project in the direction of a practical value growth, in any case attributed to the product, the user, the experience of use, society or the environment, in which the reference scenario is a desirable scenario, in some ways resolving or at least improving on the initial one. This is an aptitude (Rawsthorn, 2018), rather than a voluntary ability or objective, that belongs to the discipline of design and project practice and that runs throughout its history, from the Arts & Crafts movement of William Morris, to the Bauhaus, the Ulm school, Design Thinking and now part of Speculative design.

On the other hand, there is a large group of designers and creatives who much more freely use initial hypotheses of conditional speculation with the mere intention of investigating and describing parallel versions of reality and equivalent to the more probable (universally predictable) or desirable ones according to the still prevailing models of thought based on growth and progress, which, beyond the label of merit attributed by critics and the public, add variables to the design framework and in fact amplify reality by anticipating the future (e.g. with reference to the design of a mobility model for 2050, when the world's population will number 9.7 billion people and they will move through car-sharing services in urban areas and private vehicles - electric and self-driving - in peri-urban and extra-urban contexts, according to new and different paradigms - figure 2).

The first approach, however 'subversive' and experimental in terms of the methodology adopted, still constitutes a partial and discriminating vision of the future, which, even if it worked in design terms for a long period of time, from at least the middle of the 19th century to the end of the 20th century, today risks moving irremediably away from the real evolution of conditions. As a result, we end up with ideas, projects and ultimately products, which are distant from the contextual conditions that will, so to speak, 'envelop' the good tomorrow, which means products that are negligible, when not ineffective, commercially unsuccessful, meaningless for the public and indifferent to society as a whole.

Universal exhibitions have often been a natural stage on which images of a new order were projected, extended at discretion in varying sizes and directions according to the visionary capacity of the designers.

The result was often a singular scenario, however innovative, capable of clearly and exclusively directing the development of large sectors of society, often as a result of partial and interested choices. However, it was still an exclusionary approach, in fact, and therefore limited in its effective capacity to meet the developments of the time, the result of a conception that put man at the center.

Multiplying And Amplifying Reality

In this framework “the [speculative] “il interested in positioning design speculation in relation to futurology, speculative culture, including literature and cinema, fine art, and radical social science concerned with changing reality rather than simply describing it or maintaining it” (Dunne and Raby, 2013); and again “to find inspiration for speculating through design we need to look beyond design […] to explore, hybridize, borrow, and embrace the many tools available for crafting not only things but also ideas, fictional words, cautionary tales, ‘what-if’ scenarios, thought experiments, counterfactuals, reductio ad absurdum experiments, prefigurative futures, and so on” (Dunne and Raby, 2013).

Contained in this premise, there are two important first qualifications that we can trace back to speculative design and that in some way allow us to approach a more unbiased understanding of certain research, namely the tension towards the inclusion of alternative and/or parallel scenarios in the project and the link with the real dimension of the world, in which the product 'lives', even according to non-unique paradigms of relationship with the context. At the origin of the evolutionary leaps that have marked the history of mankind, there have always been, on the one hand, subversive impulses arising in peripheral areas of culture such as those that, for example in the period between the late 1960s and early 1970s, fuelled the radical project of overcoming capitalist models (Radical Design), and, on the other hand, new levels of knowledge in the technical and scientific fields, capable of opening a glimmer of the relative potential fields of application and directions of incremental development for each new discovery. Some researchers and designers such as Ivica Mitrović and James Auger focus their attention on this second natural vocation of man, in an attempt to redefine in a critical

sense the role of design in relation to the history and processes of education, and to bring back within an as yet insufficiently codified framework of design, a methodological practice that was widespread throughout at least the entire 20th century. We can affirm that design's reasons for being have remained largely unchanged over time, but its manifestations have changed because of technological (infrastructural) innovation and increasingly sophisticated marketing, capable of shifting the axis of the functional perception of a product and building scenarios at least as much as design.

The pandemic emergency and the ongoing systemic crises have highlighted how environment, economy and society are closely interconnected and interdependent systems, whose respective problems cannot be addressed by following a reductionist knowledge (Morin, 2017), but rather, due to their intrinsic complexity, require an integrated, holistic and trans-disciplinary knowledge by design.

Context is increasingly a complex, unbreakable reality and for this reason sometimes not even traceable to a synthetic model; in rediscovering the classical meaning of the term complexity, “that which is woven together” (from the Latin complexus), Morin again states that: “there is complexity when the different components that constitute a whole are inseparable [...] and when there is an interdependent, interactive and inter-retroactive fabric between the parts and the whole and between the whole and the parts” (Morin, 2017).

How can the multiple aspects of the same context be brought back into a unitary, strategic paradigm, which through the design of a product, a service, a city, or an ad-absurdum experiment leads designer to imagine the future?

The whole is different from the sum of the parts, and the challenge of complexity, according to Morin, lies precisely in questioning the reductionist approach that has dominated scientific thought (Morin, 2017), and along the lines of that, also the pioneering spirit of the historical avantgardes and production, for centuries, from the Wiener Werkstatte to the Bauhaus, to Radical Design.

As James Augier argues, if radical design aimed to break with the past, speculative design tends instead to highlight criticalities and lateral aspects within evoked possible future scenarios (Auger, 2012). Accepting this enabling formulation of design, which in fact broadens the panorama of design proposals admissible in the face of a demand or need expressed by the market (in the real world even before that in the digital space of a future metaverse), means adopting an inclusive, non-formalist approach, destined to produce effects beyond the limits of a circumstantial historical, geographical and temporal collocation, and above all beyond the conclusive outcome of problem-solving.

In a certain way, we could say that, in order to effectively satisfy a need and offer a permanent solution to a problem, it is necessary to take on a complex dimension such as that one adopted by experimental science, in which 'fictional' (reproduced) replicable tests and verifications are conducted.

“Over the last twenty years experimental design practice has conjured objects and images from imaginary futures. Practitioners have considered how technologies will affect our everyday lives. During this time, common themes have emerged; how domestic spaces change with the evolution of new communication technologies; how relationships shift under surveillance capitalism; how our biological building blocks change our relationship with the environment; how work will be reconstituted through automation and computation; how our eating patterns change when our environment is destroyed, and our supply chains break down. Many of these futures have become our present during the Covid-19 pandemic” (Ward, 2021).

This research deserves to be conducted now no longer only in a unidirectional way towards arbitrary partial solutions (desirable, reassuring, profitable, etc.), but in a heterodirectional way, trying to imagine even unexplored, even obscure possibilities that critics call dystopian, in order to effectively intercept real perspectives, in a world that no longer follows the rules of the reality known so far.

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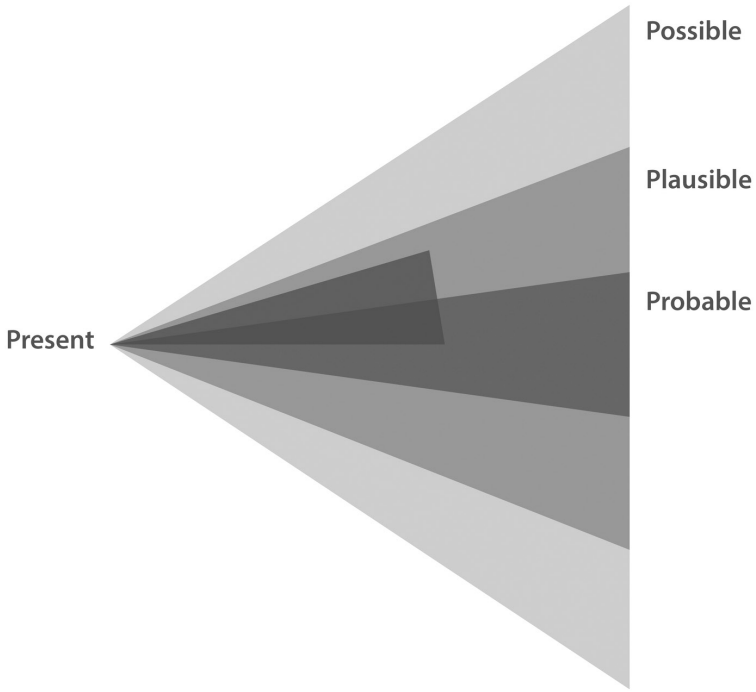

Figure 1.PPPP diagram (probable, plausible, possible, preferable). (Image © Anthony Dunne & Fiona Raby)

Figure 2. Alba, concept car for private extra-urban mobility in 2050 future scenario. Marco Tirelli (2023)

Scientific Design from A Speculative Perspective

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Introduction

In the international design landscape, there is a progressive growth of examples of "scientific design" aimed at interpreting advancements in research across various scientific sectors in the design of concrete artifacts such as new products, materials, scientific instruments, or machinery. The goal is to bring functional, process, and formal innovation to the design discipline. This design approach requires designers to have specific skills that allow them to engage with scientific subjects beyond their disciplinary boundaries. The quality and evolutionary level of the results depend on factors such as the reliability and importance of the scientific knowledge applied or the utility and alignment of the product with real societal needs. The limitation of many of these projects lies in interpreting science more as a source of inspiration than as a domain of joint innovation.

Speculative Design and science fiction

Scientific design can have a significant impact even when conceived speculatively. Anne Balsamo emphasizes the role of the design process in representing and amplifying cultural values: “through the practices of designing, cultural beliefs are materially reproduced, identities are established, and social relations are codified. In this way culture is both a resource and an outcome of the designing process” (2010, p.3).

Speculative design (Auger, 2013; Dunne, & Raby), critical design (Rosner, 2018), and design fiction (Markussen & Knutz, 2013; Bleeker, 2009) propose products that convey ethical and cultural messages, presenting imaginative visions of alternative presents and possible futures. These approaches, with nuanced differences, explore ethical, relational, and cultural implications of scientific advancements in genetics, nanomedicine, robotics, or synthetic biology. They use rhetorical devices like allegory to elicit emotional engagement and provoke critical reflection.

Dunne and Raby advocate for an expansive perspective, urging the embrace of speculative everything. This approach transcends conventional boundaries, delving into not only product design and human needs but also encompassing a multitude of worldviews, ideologies, and possibilities (Dunne & Raby, 2013). Within this framework of speculative design they introduce the concept of "world-building," primarily achieved through physical artifacts. They characterize these artifacts as components symbolizing entire entities, strategically crafted to evoke speculation within the viewer regarding the world to which these objects are affiliated. Rather than directly constructing worlds, the aim is to allude to or evoke societies and cultures different from their own through the materials and forms of these objects.

Moreover, Dunne and Raby aspire to challenge how people think about everyday life, anticipating that their critical and speculative designs will prompt viewers to engage in a sort of imaginary archaeology. This process renders the familiar unfamiliar, yet remains anchored in "scientific possibility".

Design fiction is an alternative term used to describe design works that envision, speculate, and depict alternative perspectives on design and the realms it inhabits (Galloway & Caudwell, 2018).

DiSalvo (2009) compellingly asserts that the storytelling mechanisms of speculative design and design fiction reside in the formal attributes of design, the expertise of the designer, and the culture of consumption. By possessing an adept comprehension of how products are conceived, developed, and promoted, speculative design projections gain credibility and persuasiveness. This is attributed to the fact that the representations are readily consumable in the present, owing to their visual impact, and are conceivable as potential future consumables, mirroring our perceptions of how authentic products would manifest. Naturally, this prompts inquiries

about what is genuinely under scrutiny and identifies the potential audience for speculative design, as well as who that audience should or could ideally encompass.

In speculative design forms that interpret scientific content, questions related to the impact of science on society and its ethical, relational, and cultural implications are addressed. Design raises inquiries into the potential influence of revolutions induced by genetics, nanomedicine, robotics, or synthetic biology on people's everyday lives. The ethical and social implications of the paths and achievements of science are beginning to emerge as a topic of great interest, particularly within scientific communities where, in recent years, research groups and cross-disciplinary commissions specifically focused on ethical issues have been established (Resnik & Elliott, 2016).

n this scenario, various forms of speculative design observe and analyze the relationships between science, society, economy, and culture to extract instantaneous or synthesized visions, which may take on poetic, celebratory, cryptic, allegorical, polemic, severe, interrogative, denunciatory, or ironic characteristics. The designer serves as a mediator between sciences and society, generally refraining from expressing judgments but instead posing questions with the intent of awakening consciousness, providing input so that individuals can be informed and, consequently, participate in change. Pursuing these objectives, many international experiences in critical and speculative design dedicate ample space to emotional involvement, political and social commitment, surprise, empathy, or dismay, employing rhetorical figures such as allegory.

Speculative design addressing science occupies intermediate spaces between design, art, and science. Its products are primarily presented in alternative contexts compared to conventional design marketplaces, such as art galleries, museums, or the internet. It is crucial that scientific content remains true to its nature, and the choice of aspects to emphasize, as well as the manner of doing so, should be shared with scientists to avoid misunderstandings, incorrect or misleading information on critical issues like those concerning health or the environment. In such cases, the fictional aspect gives way to a more rational critical design.

Designers operating in this context also tackle complex issues with the ambition of achieving a broad and disruptive impact on society and people's ways of living. Their works are aimed at stimulating engagement, reflection, dialogue, and debate among individuals on contemporary issues and the potential implications of current paths in science and technology. However, the themes addressed and the contexts in which they are exhibited involve a decidedly limited and selective audience. It would be beneficial if the tools and experiences developed in recent years by designers working in critical, speculative, and fiction design in relation to sensitive scientific issues for society were amplified to a wider public scale, for example, through installations in public spaces, ensuring that the expressed concepts can have a genuine impact on widespread culture and society.

One of the early Italian designers active in this field was Elio Caccavale, originally from Campania, who teaches and works in England. Caccavale's work occupies an intermediate space between design, art, and science. His products are primarily geared towards occupying alternative realms compared to conventional ones associated with the design market, being exhibited in art galleries, museums, or used in hospitals. However, they aim to have a broad and disruptive impact on society and people's ways of living (Caccavale, Tom, 2014).

For instance, Neuroscope is an interactive game consisting of a container resembling a bottle with an eyepiece at its apex. It allows users to observe the bottom where a monitor is positioned, wirelessly connected in real-time to a microscope located in a neurobiology laboratory, focused on a mouse neuron cell incubator. Through various modes of interaction with the device, the user can remotely act on the incubator and send signals to instruments that determine actions and subsequent reactions of the cells. The signals are designed as atypical for molecular biology tools, and the user's experience is also unusual, involving actions such as virtually stroking the cells. The project arises from the need to enable relational forms between users and neuroscience, which has undergone rapid evolution in recent decades, allowing people to understand principles and logics that have significant potential for human health, otherwise challenging to access through conventional dissemination systems. Neuroscope, like other products designed by Caccavale, serves as a tool to bring adults and children closer to advances in science that can impact their lives. It achieves this through an experience involving elements like wonder, curiosity, but also estrangement, capable of imprinting concepts and messages more deeply into users' memories.

Design engages with languages flexibly and creatively, employing rhetorical tools such as analogies, metaphors, allegories, transpositions, antitheses, and similitudes. The use of metaphors in speculative design, according to Di Salvo, can provide a scaffold for the reflection or investigation proposed by the project, enhancing its communicative effectiveness, accessibility, and connection to the social contexts of the present or presumed social contexts of the future, with a perspective of participation (Di Salvo, 2012). Through these modalities, design can generate original expressive forms and syntactic devices that often deviate from the conventional use of words.

These forms of design are also suitable for addressing the theme of the connection between science and politics, a thorny but central subject in a scientific landscape that increasingly needs support not only from public opinion but also from institutions. Although not all speculative projects are political, avoiding reference to politics in the social contexts where it is usually present can be a missed opportunity.

If the purpose of these design forms is to encourage reflection on contemporary issues and the possible consequences of science and technology, then engagement with politics and the conscious deepening of the treated contents constitute a

responsibility from which design should not exempt itself, fostering not only dialogue and debate but also information and awareness.

Provocation serves to shake off certainty and complacency but may risk being a momentary effect. Design that employs the rhetorical tools of language should fully engage with the issues addressed, sparking curiosity and encouraging thoughtful pursuit until it provokes and awakens action and commitment. The design of these objects, therefore, must draw upon and provide access to a breadth and depth of topics to foster or support substantial reflection. And for reflection to be substantial, it requires a level of in-depth information and knowledge. The challenge and responsibility for the designer, then, are to provide that information, going beyond provocation, in a convincing and productive form, using the tools offered by critical thinking to help structure the complex relationships between ideas and objects.

Speculative Matter

Scientific speculative design can involve the design of matter, giving rise to concrete expressions that occupy a complementary space to design for scientific visualization. This engagement extends to the emotional and conceptual spheres, employing different tools connected to the ancestral and sensual link between humans and matter.

The relationship between design, matter, and science requires the designer not only to narrate the opportunities offered by research but also to raise doubts and foster debate. Design has the capability to address issues of great political and social interest related to contemporary scientific research, presenting them in the form of questions and uncertainties. Communicating through tangible, palpable, and inevitable matter makes the communication and prompting more effective (Langella, 2019).

From a speculative perspective, artifacts should be interpreted as material cultural devices that defy conventional categorizations related to the scope of application and market, adhering to new categories more closely tied to the conceptual, communicative, and narrative spheres. The concept of the device draws from the Latin origin of the term "dispositus," the past participle of "disponere," meaning to arrange.

Products generated by scientific speculative design imply extended and layered intentions. They are not functionally monolithic, as they are not generated from functional requests but are proposed through layers of expressive matter that emit messages through multiple communicative wavelengths: ethical, social, political, romantic.

These products give meaning to the contexts in which they are placed; they are interlocutors rather than passively utilitarian entities projecting human influence onto matter. In any case, they trigger unconventional relationships between humans, matter, and thought. These objects serve as opportunities to question and prompt questions because they appear different from what they seem, surprising and destabilizing, allowing for a pause to read the thoughts they contain. They emerge in the current flat landscape where markets tend to standardize morphologies and messages, depriving things of their identity power, making them all uniform, flat, and generic.

The objects of speculative scientific design challenge the commonplace automatisms of thought and action to open up new opportunities and possibilities for interpreting science and creating interactions between science and people.

In the last fifty years, the relationship between materials and designers has undergone a profound change, with designers progressively accessing, in a more participatory manner, the dimension of production processes and material transformation to construct material experiences (Langella, 2021).

The radical transformations induced by the culture of sustainability and the spread of nanotechnologies and new digital manufacturing processes create new opportunities for collaboration between design and materials, where interactions will be less random and sporadic, and more conscious and constructive.

Design, with its interpretative, predictive, and productive tools, can pursue the entire process of developing new materials, from identifying societal needs to the development of innovative material solutions, up to the production and introduction of new products to the market. This collaboration should occur in respect of other competencies and in synergy with scientists. For designers, new opportunities for research and professional development arise, both in the interpretation of material innovations and in their development.

For the experiences of scientific design interfacing with materials to be fruitful, it is necessary to define rational protocols and interdisciplinary cooperation methods to develop artifacts suitable for conveying new material identities from a developmental perspective, increasingly compatible with environmental balances and market needs.

The world of materials for designers is very different from how scientists and technologists observe it because it constitutes a universe of expressive opportunities through which to manifest ideas and materialize corresponding visions. In the imagination of designers, maps and technical classifications, such as those proposed by Ashby (2013), based on the chemical, physical, and mechanical properties of different types of materials, overlap with interpretations by designers who incorporate references to cultures, symbolic qualities, experiential aspects (Wilkes et al., 2016; Karana, Pedgley & Rognoli, 2015), imaginative, iconic, and sensory elements that delineate the "poetry of matter" (Bachelard, 1983). As Eleonora Fiorani (2000) states, the culture of design juxtaposes a "connectomics" to the constellations of technical properties of materials, connecting materials to objects, design thoughts, intentions, and attitudes of designers who have interpreted different materials through those objects. A system of traces more or less deeply engraved in the history of the anthropological relationship between humans and matter.

The Expressive Potential of Matter

Design now has the opportunity to explore and define new

material experiences by combining the technical and emotional aspects of material development, creating richer and more meaningful product experiences (Thompson, Ling, 2014). Material-manipulating design possesses a strong expressive, narrative, and experiential potential that can be employed across various communicative horizons, delving into the roots of human instinct, sensoriality, ancestral memory, and involuntary memory.

The contribution of neuroscience to this type of intervention can be highly valuable. The digitization, virtualization, and dematerialization of experiences are accustomed to people avoiding physical contact with things and individuals, inevitably making them more sensitive and vulnerable to material experiences. On one hand, balancing the evanescence of the digital through the corporeal component could be considered a responsibility of design to safeguard the psychophysical well-being of individuals. On the other hand, the awareness of having new possibilities to impact emotions, invoke the unconscious, and induce user thoughts could become a powerful tool, based on knowledge of chemical and neuropsychological mechanisms, pheromones, and sensory perceptions. Many of these aspects are studied in the emerging field defined as embodiment, founded on interdisciplinary research integrating studies on the phenomenologies of the living body with neuroscience and cognitive sciences to understand the complex relationships between bodily factors, such as physical and motor perception, and cognitive processes (Van Rompay & Ludden, 2015). To employ these tools, design must interface with various scientific disciplines, sharing not only information but also languages, approaches, and objectives.

Often, self-produced materials remain confined to the realm of limited series, closer to art than industrial production because the processes involved are laborious, expensive, and require too much time for easy replication on a large production scale. Moreover, many of them exhibit limited technical-functional performance, such as durability or mechanical resistance, insufficient for many types of applications. For these reasons, it is essential that designers are accompanied by scientists and companies in material design experiments so that insights and experiments can translate into effective innovations. The contribution of design in defining new material landscapes holds significant cultural and prefigurative value as it urges the design culture to surpass existing boundaries and lay the foundation for making concrete new visions oriented towards different yet possible and virtuous futures.

These experiences are useful for investigating emerging technical and expressive opportunities of materials but also for introducing new drivers in design-related production contexts based on values such as adaptability, reactivity, or environmental sustainability, as seen in experiments with upcycling, living, and growing materials.

Many of these projects anticipate processes not yet mature enough for industrial-scale application, where design plays a triggering role in innovation. For example, in recent decades, many design experiments have explored the production processes of biomaterials through fermentation, such as bacterial nanocellulose (Langella, 2024). Although these processes have been identified by the design world as productive scenarios for a sustainable future, they still appear quite distant from an industrial reproducibility hypothesis.

If bacterial cellulose is a material easily accessible for design because it can also be produced in domestic contexts, other types of materials produced by microorganisms present themselves as a possible response to design expectations and visions. Polyhydroxyalkanoates (PHA and copolymers PHB and PHV with butyrate and valerate), for example, are biobased and biodegradable thermoplastic polymers produced by microorganisms, considered among the most versatile and promising in the array of bioplastics that could replace environmentally impactful polymers such as polystyrene (Li, Yang & Loh, 2016; Rajan, et al. 2019).

These experimental trajectories, less accessible to designers due to requiring scientific laboratory equipment and contexts, constitute a potential intervention area for speculative material design, collaborating with microbiologists and material scientists, contributing strongly to the development of sustainability culture (Parra, Birkeland, Burton, & Siivonen, 2018) with a perspective of More-than-human-centered design (Coulton & Lindley, 2019). In interpreting this role, design responds to the contemporary societal need to be informed about scientific advancements that can bring benefits to the environment and people's health.

Speculative Material Design Experimentation in the Hybrid Design Lab

The Hybrid Design Lab is a research laboratory, project experimentation, and educational initiative dedicated to mutual collaborations between design and biosciences, with a particular focus on biomimicry and sustainable material design. Established in 2006 at the Second University of Naples, it had a laboratory and exhibition space at the City of Science Incubator until 2022 and is currently located at the Department of Architecture DIARC of the University of Naples Federico II.

The Echinodesign exhibition, curated by Carla Langella, Valentina Perricone, Gabriele Pontillo, and Roberta Angari, as part of the research at the Hybrid Design Lab, held at the Città della Scienza museum in Naples from February to October 2022. The exhibition provided an international platform to explore the relationship between design and science through the lens of biomimicry, focusing on drawing inspiration from principles, logic, morphologies, and structures observed in nature (Perricone et al., 2024).

The exhibition featured products oriented towards design, along with artistic and scientific installations developed by invited creatives and scientists who interpreted the theme of echinoids through diverse visuals, drawing inspiration from their biological characteristics and exploring opportunities for transferring principles and models into the fields of design and

art. The products were produced in collaboration with project partner companies. The exhibition's opening was accompanied by international seminars and workshops on biomimicry and sustainable innovation.

Within this exhibition, speculative design artifacts were developed in collaboration with Letizia Verdolotti and Giuseppe Lama from the Institute of Polymers, Composites and Biomaterials (IPCB) of the National Research Council (CNR), a research center dedicated to the development of polymeric materials, composites, biomaterials, biomacromolecules, green chemistry, and chemistry for life sciences.

The *Fragile Foam* lamp consists of an LED light source and a diffuser made of ceramic foam with diatomite and silica. The morphology mimics the veined structure of a sea urchin spine, but intentional fragility is designed into the foam, creating cracks during drying that allow light to pass through. Through the rhetorical figure of metaphor, these cracks represent the fragility of the current fossil-fuel-based energy system.

Also part of the *Echinodesign* exhibition is *Seventy Fossil,* a lamp created through upcycling a 1970s diffuser updated with ceramic foam containing aluminum and silica. The foam, developed at IPCB under Letizia Verdolotti's research group, covers an obsolete object to render it eternal, analogous to nature's process with fossils. The lamp aesthetically alludes to the Pyritization process, a form of fossilization where pyrite can produce partial permineralization due to bacterial activity in anaerobic conditions, filling cell spaces with microcrystals of pyrite. Often, oxidizing conditions near the surface alter pyrite into iron oxides. The speculative message the project conveys is that, similar to how nature extends the life of organisms to make them eternal, design should apply analogous strategies to extend the life of objects, delaying the point when they become waste.

These examples serve as illustrations of the ways speculative material design can take, employing a speculative approach to raise societal awareness on crucial themes such as environmental sustainability and design. In this manner, design has the opportunity to effectively counter the technological determinism that currently pervades many of our narratives, offering a critical and creative alternative to the thought of an inevitable future of global destruction by proposing a plurality of possible futures. To achieve this, it is useful for design to venture into extreme speculative directions, generating design theories and methodologies based on new alliances that surpass anthropocentric views to address the expanding universe comprised of algorithms, forms of life, and artificial and natural intelligence that can contribute synergistically to design practice (Coulton & Lindley, 2019).

Figure 1. *Fragile Foam.* Lamp with ceramic foam diffuser with diatomite and silica. The fragility of the material filtering the light alludes to the weakness of the current energy system based on fossil fuels. Authors: Carla Langella, Letizia Verdolotti, Giuseppe Lama.

Figure 2. *Seventhy Fossil*. Lamp made with a recycled diffuser from the 1970s updated with ceramic foam containing aluminium and silica to allude to the processes of fossilisation as an extension of the life of objects. Authors: Carla Langella, Letizia Verdolotti, Giuseppe Lama.

Figure 13. Development Process of the Fragile Foam Lamp at the Laboratories of the Institute of Polymers, Composites, and Biomaterials (IPCB) of the National Research Council (CNR).

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Drones and Architecture: Technological revolution in the field of building design

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Introduction

The constant evolution of technological innovations is radically transforming not only our personal lives but also the professional landscape. A notable example of this progress is the seamless integration of high technology into the field of architecture. While home automation has already revolutionized domestic spaces, an equally significant revolution is underway in the construction industry, marked by the increasingly widespread use of technologically advanced tools. Among these tools, drones stand out as undisputed protagonists, providing unprecedented contributions to safety and precision for industry professionals. These versatile devices are revolutionizing the sector, reshaping how challenges in design, construction, and monitoring are addressed. Safety is significant in construction sites, and drones offer an innovative solution. Their ability to conduct detailed inspections from challenging or hazardous positions reduces risks for human operators. Moreover, by constantly monitoring the construction site, drones can identify potential issues in real-time, contributing to accident prevention.

Precision is a key point in the design and construction of buildings, and drones elevate this precision to a higher level. Through the collection of detailed data, the creation of three-dimensional models, and terrain mapping, architects and engineers obtain accurate and up-to-date information about the surrounding environment, streamlining the design and planning processes. The revolutionary application of drones for thermal inspections of buildings is noteworthy. This technology identifies energy losses, insulation inefficiencies, and other structural issues that are invisible to the naked eye. The integration of advanced systems, such as thermography, enhances diagnostic capabilities, contributing to the creation of more sustainable and energy-efficient buildings. In architectural contexts, drones not only enhance efficiency and safety but also open new creative perspectives. The ability to capture detailed aerial images allows architects to explore the form, structure, and harmony of a building from unique perspectives, influencing not only the design phase but also providing an innovative means to present projects to stakeholders and the public. In summary, the widespread use of drones in architecture is redefining how challenges are tackled and projects are realized in the construction industry. The fusion of high technology and architecture not only improves efficiency and safety but also unlocks new creative possibilities. The future of architecture is evolving through the constant progression of advanced tools, with drones standing out as pioneers in this technological revolution within the construction field.

Changes in building design

In detail, the following changes in building design are possible with drones:

1) Aerial Exploration and Surveying.

Expanded Perspective: Drones provide an aerial perspective beyond human capabilities, allowing architects to explore architectural details that are challenging to reach from the ground. Land Surveying: Through high-resolution aerial mapping, drones facilitate land surveying, providing detailed data useful for design and site assessment.

2) Sustainability and Safety.

Thermal Analysis: Drones with thermal capabilities can identify temperature variations, aiding in identifying energy inefficiencies or structural issues, promoting sustainability. Environmental Monitoring: The ability to fly over an area enables environmental monitoring, supporting the design of eco-friendly buildings.

3) Surveying and Measurement.

Efficient Surveying: Using drones for topographic surveys and measurements speeds up the process, reducing time and resources compared to traditional methods. Precision in Measurements: Advanced drone technology enables precise and detailed measurements, optimizing architectural project accuracy.

4) Construction Site Management and Safety:

Swift Inspections: Drones facilitate quick inspections of construction sites, allowing timely assessment of progress or potential issues. Surveillance: Monitoring the site from above enhances safety by identifying potential risks and ensuring compliance with regulations.

5) Communication and Presentation:

Engaging Visuals: Images and videos captured by drones enhance project communication, allowing engaging visualizations for clients, investors, and the general public. ***Realistic Renderings:*** Aerial footage provides data for creating realistic renderings, aiding in effectively communicating the final project's appearance.

6) Operational Efficiency and Cost Reduction.

Reduced Design Times: Thanks to the speed and efficiency of drones, design times can be reduced, leading to greater operational efficiency.

Resource Savings: The automation of certain activities, such as topographic surveys, enables more efficient resource utilization. In summary, the adoption of drones in architecture is redefining how many facets of the design and building processes are approached. From land surveys to the visual presentation of projects, drones are contributing to a more advanced, sustainable, and efficient approach, bringing significant improvements to the field of building design.

Photo by drone

Drones and Architecture: a new approach

Drones, long-standing protagonists in markets such as photography, are now assuming a central role in the field of architecture. Their ability to reach high altitudes allows for angles and views otherwise inaccessible. This unprecedented perspective is proving to be of fundamental importance in the future of architectural design. Architects and homeowners can now explore every aspect of a building, assessing the roof's form and scrutinizing every detail of the structure. This approach offers an unparalleled level of precision in architectural design and maintenance. Drones are capable of measuring and detecting every millimeter and detail, making the overall process safer and more efficient. In the context of architecture, the integration of drones is reshaping traditional practices and introducing innovative methods. The advantages they bring to the table are multifaceted, influencing not only the design phase but also construction, maintenance, and even how architectural projects are presented to stakeholders and the public. One of the standout features of drones in architecture is their ability to provide an aerial perspective. The elevated vantage point allows architects and designers to see buildings and landscapes in ways that were previously reserved for costly aerial surveys or inaccessible viewpoints. This capability fundamentally alters how professionals conceptualize, plan, and execute architectural projects. Architectural design is a meticulous process that requires attention to detail and a comprehensive understanding of the site. Drones excel in delivering precise data that aids architects in making informed decisions. Whether it's surveying the topography of the land, assessing the condition of existing structures, or capturing the lay of the land, drones provide accurate and timely information. This streamlines the initial phases of architectural projects, enabling architects to create designs that are not only aesthetically pleasing but also functionally sound. The application of drones extends beyond the design phase and into the construction process. Drones equipped with cameras and sensors can monitor construction sites in real-time. This real-time monitoring ensures that the construction is proceeding according to the plans, identifies potential issues early on, and allows for swift corrective actions. The result is improved project management, increased efficiency, and a reduction in costly errors.

Maintenance of existing structures is another area where drones prove to be invaluable. Regular inspections are essential to identify wear and tear, potential structural issues, or maintenance needs. Drones, with their ability to access difficult-to-reach areas, provide a non-intrusive and efficient means of inspecting buildings. This proactive approach to maintenance can prevent minor issues from escalating into major problems, ultimately extending the lifespan of structures and reducing long-term costs. The level of detail that drones capture goes beyond mere visual inspection. Advanced technologies, such as thermal imaging cameras, can be mounted on drones to detect hidden issues. For instance, thermal imaging can identify energy leaks, insulation

Photo by drone

inefficiencies, or potential electrical problems that may not be visible to the naked eye. By identifying these issues early, architects and property owners can implement targeted solutions, contributing to energy efficiency and sustainability goals. One notable application of drones in architecture is the creation of three-dimensional models. Drones equipped with advanced mapping technology can generate highly accurate 3D models of buildings and landscapes. These models provide architects with a virtual representation of the site, aiding in design visualization and decision-making. This technology is particularly useful in urban planning, where architects can assess the impact of new constructions on the existing environment. The accessibility and versatility of drones make them an ideal tool for architectural projects of various scales. From residential developments to large-scale urban planning, drones offer a cost-effective and efficient means of data collection and analysis. This democratization of data access empowers architects to make informed decisions regardless of the project's size or budget.

Presenting architectural projects to clients, stakeholders, or the public often involves conveying the vision effectively. Drones bring a cinematic quality to project presentations by capturing stunning aerial footage and creating dynamic visual content. This not only enhances the storytelling aspect but also provides a more immersive experience for those involved. Stakeholders can gain a holistic understanding of the project, fostering better communication and collaboration.

While the integration of drones in architecture presents numerous benefits, it is essential to consider ethical considerations and regulatory compliance. Privacy concerns, airspace regulations, and potential misuse of data are critical aspects that architects and drone operators must navigate. Therefore, a comprehensive understanding of the legal and ethical frameworks surrounding drone use in architecture is crucial. Therefore, the incorporation of drones in architecture marks a paradigm shift in the industry. Their ability to provide aerial perspectives, collect precise data, and streamline various phases of architectural projects is revolutionizing traditional practices. Architects and stakeholders alike are leveraging drones to enhance efficiency, reduce costs, and create more informed and sustainable designs. As technology continues to advance, the partnership between drones and architecture is poised to further evolve, shaping a future where innovation and precision go hand in hand.

A Futuristic Perspective

In the dynamic field of contemporary architecture, the emergence of drones has marked a revolutionary turning point, fundamentally transforming traditional methodologies and opening new frontiers in design and land management approaches. Initially recognized for their applications in photography and entertainment, drones have now assumed a central role in the evolution of architecture, shaping a tangible impact on sustainability, innovation, and the very essence of design. One crucial domain where drones are proving pivotal is in enhancing sustainability in surveying and measurement activities. Traditionally, these operations demanded substantial energy and resources, often beyond the reach of many independent studios or professionals. The introduction of drones has reversed this dynamic, providing an efficient and accessible solution to acquire precise and detailed data, making sustainability not just a theoretical concept but a concrete practice in the daily life of the modern architect.

High-resolution three-dimensional maps generated through drone mapping stand out as a strength in the management, planning, and security of territories and buildings. These maps offer a detailed overview of the environment, allowing architects to analyze topographical nuances, plan interventions with greater precision, and implement more advanced security strategies. Technological evolution has further extended drone

capabilities, incorporating advanced systems such as thermal mapping. Particularly beneficial in construction investigations, thermal mapping allows for the detection of temperature variations indicative of potential structural issues or energy inefficiencies, unveiling aspects invisible to the human eye and enhancing the diagnostic capabilities of architects.

The utilization of drones, both in emergency situations and planned interventions, offers a unique contribution by surpassing human physical and structural limitations. In emergencies, drones can be rapidly deployed to assess structural damage, monitor personnel safety, or identify high-risk areas. In planned scenarios, such as designing new buildings or renovating existing ones, drones enable architects to explore details otherwise inaccessible. The virtual freedom of movement through the air provides a comprehensive and detailed view of the environment, positively influencing design decisions and contributing to a more inclusive design process. The integration of drones into architecture is not merely a technological adaptation but rather a cultural revolution that is redefining how architects conceive and execute their projects. The aerial perspective provided by drones not only enhances the design phase but also amplifies the ability to communicate design ideas to clients, stakeholders, and the general public. Aerial views offer a clear overview, facilitating effective communication of design intentions and creating an emotional connection with the surrounding context.

In conclusion, the increasingly widespread use of drones in architecture is shaping a future where technology and design synergize, promoting greater precision, safety, and efficiency in the construction sector. Drones, with their ability to offer new perspectives and overcome physical limits, emerge as essential allies in exploring new heights of creativity and functionality. The architecture of the future will be guided by innovation, with drones playing a key role in creating sustainable, secure, and aesthetically extraordinary environments.

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Exploring the Intersection of Speculative Design and Adaptive Surfaces

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Introduction

In the realm of architectural innovation, speculative design has emerged as a transformative discipline, pushing the boundaries of conventional aesthetics and functionality. At the intersection of creativity and technological advancement, the incorporation of Artificial Intelligence (A.I.) into speculative architecture design introduces a paradigm shift, offering unprecedented possibilities in adaptability, sustainability, and user experience. Speculative design envisions possibilities beyond the existing constraints, and AI plays a pivotal role in realizing these visions. The integration of AI in facades introduces a new type of adaptability by enabling real-time responsiveness to environmental factors. Machine learning algorithms can process data from sensors, weather forecasts, and user preferences to dynamically adjust the facade's properties. This adaptability could enhances energy efficiency, occupant comfort, and overall building performance. Adaptive architecture and facade systems differ from more common kinetic and media systems because they can self-regulate, manage unforeseen variations, and implement spatial transformations in response to environmental factors, safeguarding building safety and user comfort.

This paper explores the ongoing paradigm shift that has occurred in the last fifty years in architecture, generated by the intersection of the creativity of visionary architects, speculative design, and digital technologies. Thanks to this convergence, technology, through A.I., could become a crucial ally in shaping the built environment to meet human needs and address environmental challenges.

The origins of change

The conditions of this change have a complex and multifactorial origin. The city itself can be considered a complex and open system, characterized by adaptability, in the sense of "possessing the quality of naturally assimilating diverse realities" (Ciribini, 1984, 59). When the variable of time is introduced, Ciribini argues, the systemic state of the city undergoes constant changes in the form of a "succession of states" that are often challenging to control. Additionally, according to Virilio, that of speed has supplanted the order of time. It can be likened to contract time condensing around a fleeting event, such as the immediacy of the message transmitted by media-building. Therefore, we could argue that media-building has embedded itself in an era of rapid changes for architecture (Gasparini, 2023). Media architecture was born in the 1960s but widespread since the late 20th century. It could be considered the link between traditionally conceived architecture and the digital world. Thanks to its fusion of physical and digital elements, media buildings have introduced interactivity into architecture, initiating transformative approaches at various project scales (Andaloro, de Waal, Suurenbroek, 2022). Visionary architects such as Robert Venturi and Archigram conceived the pioneering projects of this new interactive and adaptive role in architecture in the 1960s. Archigram's visionary projects outlined what could now be concretely realized by Artificial Intelligence: Plug-in-City is a mega-structure without buildings, a compact mass of similarly shaped elements where dwellings are standardized cells or components; Instant City is a mobile technology fair that develops in degraded neighbourhoods, a squalid flying city (like a balloon) with temporary structures; the Walking City consists of intelligent buildings or giant robot forms that could roam the city.

Robert Venturi, on the other hand, worked on two-dimensionality and conceived an architecture that, surpassing the functionalist imperative, could become a support for other media with infinitely greater communicative potential: television screens, billboards, and iconically characterized

objects. He likens the city to a kind of theatre. The show as "simulation" (urban spectacle), an artifice where it is no longer possible to distinguish the copy from the model and the real from the virtual (Venturi, 2010, 30). A few years later, in the renowned "Delirious New York," Koolhaas presents his "Theory of Bigness," or extreme architecture as the only tool that can activate the regime of complexity involving the full understanding of architecture and related fields. Koolhaas captures the transformation of the architectural surface, where the link between core and envelope is severed to the point that the facade can no longer reveal what happens inside and becomes a vehicle of misinformation—providing the city with the apparent stability of an object (Koolhas, 2006, 13-15). In the screen-facade, the cladding becomes a new mask that coexists closely with every mechanism, enveloping and protecting it, safeguarding users from tampering, like a casing (Zennaro, 2009, 83-109). From the second half of the 20th century, the functions of a building no longer reflect the utilitarian purpose described in architectural treatises, the Utilitas of comfort and usefulness. Firmitas lost its role in the first half of the 20th century: from the project of Jean Prouvè's Maison du Peuple, new construction systems confer adaptability to new formal configurations that we will find later in the initial design of the Beaubourg (with mobile floors). The metamorphosis of Venustas, then, translates into communication on the surface, instantaneous and hyper-technological. With media buildings, the facades produce a rapid succession of colourful and chaotic frames, purely for commercial purposes, ignoring any historically established principles in the entire Vitruvian triad. There is a reversal of priorities between technique and design (Gasparini, 2023). Toyo Ito argues that since ancient times, architecture has been a means to adapt humans to the natural environment; contemporary architecture must also be a means to adapt humans to the information environment. 'Architecture in the electronic era is an extended form of medial clothing' (Ito, 1998, 26).

Contemporaneity

In contemporary times, many projects showcase solutions to address social and environmental issues in public spaces through responsive technologies. In doing so, they create a narrative on specific topics, generating awareness towards a more resilient approach to the city. Often, these projects take the form of temporary installations that utilize data in an intangible manner and, despite aiming to create an immersive experience, do not intervene in the spatial configuration of the places (Andaloro, de Waal, Suurenbroek, 2022). From this perspective, some immersive installations in recent years are noteworthy. The experiment of the immersive installation created by teamLab inside the Japan Pavilion (Fig.1) at Expo 2015 in Milan (Italy) is intriguing: the interactive installations span two rooms, featuring an immersive projection space that beckons visitors to traverse a technological expanse.

This journey leads them to a digital cascade of information, imparting descriptive knowledge about Japanese cuisine (Azzarello, 2015). The concept of global immersiveness materialized in the visionary project of the Blur Building designed by Diller&Scofidio+Renfro for the Swiss Expo in 2002 in Yverdon Les Bains. "The Blur Building is an architecture of atmosphere a fog mass resulting from natural and manmade forces where a smart weather system reads the shifting climatic conditions of temperature, humidity, wind speed and direction and regulates water pressure at a variety of zones. Contrary to immersive environments that strive for visual fidelity in high-definition, Blur is decidedly low-definition. In this exposition pavilion, there is nothing to see but our dependence on vision itself. It is an experiment in de-emphasis on an environmental scale." (Diller&Scofidio+Renfro, 2002).

In more recent times, the project ADA by Jenny Sabin in collaboration with Microsoft is notably intriguing for its use of A.I. In this undertaking, Sabin delved into the realm of human emotion in collaboration with Microsoft's sentiment researchers, exploring the dynamic relationship between an individual's surroundings and mood. She crafted a cellular-like textile structure, symbolizing the heart of the research hub (D'Angelo, 2019). Cameras and microphones strategically placed within Building 99 gather anonymized data, which AI algorithms then interpret into changing intensities of color and light. These dynamic visual elements are manifested through addressable LEDs intricately woven into Ada's textiles, complemented by stage lights enveloping the installation (Roach, J., 2024). Technological advancements play a pivotal role in realizing these speculative visions. Smart materials, responsive sensors, and advanced data analytics could become integral components of adaptive facades, allowing for real-time adjustments and personalized user experiences. The fusion of augmented reality and responsive architectural elements might redefine spatial boundaries, offering immersive and transformative environments. Numerous experiments and projects in contemporary architecture showcase the intersection between speculative design and adaptive spaces. At the 2018 Architecture Biennale, an "alien" installation

Figure 1: Immersive installation, Japanese pavilion, Expo 2015. (Image © Alberto Piva)

emerged within the Swedish Pavilion designed by Sverre Fehn (Fig.2-3). The exhibition, titled "Another Generosity," seeks to delve into the connection between nature and the constructed environment. Curators Eero Lundén and Juulia Kauste aim to illustrate how humanity can embark on creating architecture that harmonizes with the surroundings. Inside the pavilion, they have introduced four large inflatables resembling cells, equipped with sensors monitoring carbon dioxide levels, humidity, and temperature in the vicinity. These cells "breathe" in response to environmental conditions. They either inflate or deflate based on carbon dioxide levels and change color to indicate temperature variations. This concept revolves around re-establishing a relationship with architecture, challenging the common perception of simply viewing buildings without deeper engagement (Mairs, J., 2018). In these visionary projects, the aesthetics of surprise prevail, pushing the materials' performance to the maximum, and the structural component is often concealed. The technique is at the service of an emotion, a symbol; it is merely a means to achieve a result. This has been the role of technique since ancient times when, according to a mythical perspective, the gods, to whom it belongs, bestowed it upon humans (Galimberti, U., 1999). The design process is the time of technique guided by human intentions, and utilizing technique, doing something "téchne" also presupposes the possibility of being able to do it and possessing the means, namely, science. AI is the tool through which architects today can design futuristic scenarios and then bring them to life: from parametric design to digital technologies that manage the functionality of the "living machine." From the perspective of A.I. tools for design, today, the Midjournei platform, with its AI capabilities, empowers architects to explore novel design alternatives, foresee potential challenges, and optimize resource utilization, ultimately leading to the creation of more responsive and innovative built environments (Fig.4-5). From optimizing building layouts for energy efficiency to predicting user behavior patterns for urban spaces, the platform demonstrates its versatility in addressing a wide array of design challenges. Furthermore, the study examines the role of AI-generated insights in fostering sustainable urban development and improving the overall quality of life for inhabitants.

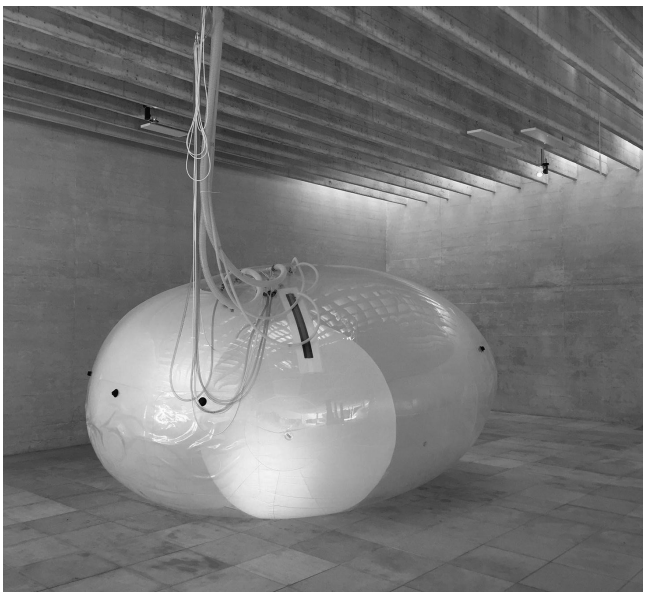

Figure 2-3: Installation “"Another Generosity," at Svedish Pavilion at Architecture Biennale, Venice (Italy), 2018 . (Image © Alessandro Premier)

Challanges and final considerations

The evolution of speculative design in contemporary architecture reflects a shift from merely imagining alternative futures to actively engaging with real-world challenges. Designers and architects increasingly use speculative methods to address issues such as climate change, urbanization, and social dynamics. The emphasis has shifted from fantastical scenarios to practical solutions, with a focus on sustainability, inclusivity, and resilience. Technological advancements play a pivotal role in realizing these speculative visions. Smart materials, responsive sensors, and advanced data analytics could become integral components of adaptive facades, allowing for real-time adjustments, personalized and inclusive user experiences. The fusion of augmented reality and responsive architectural elements might redefine spatial boundaries, offering immersive and transformative environments. However, while the integration of AI in speculative facade design presents exciting possibilities, it also raises ethical considerations. Issues related to privacy, data security, and the ethical use of AI algorithms require careful attention. Striking a balance between innovation and responsible implementation is crucial to ensuring that AI-enhanced facades contribute positively to the built environment without compromising quality standards. The ongoing evolution of artificial intelligence in the architectural domain signifies a paradigm shift, where technology becomes an ally in shaping the built environment in harmony with human needs and environmental considerations, as demonstrated in recent intersections between architecture and neuroscience.

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Figure 4-5: Projects developed by prof. Giuseppe Fallacara with Midjourney platform (Image © Giuseppe Fallacara)

ON THE STATUS OF HIGHER EDUCATION DEVELOPMENT (HEI) IN ALBANIA 2024

FINDINGS ON THE STATUS OF THE "THIRD MISSION" IN ALBANIAN HEI'S IN 2024

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Abstract
Higher Education Institutions (HEIs) in Europe have traditionally had two main missions: teaching and scientific research. Recently, however, a "Third Mission" (M3) has emerged, focusing on HEIs' engagement with society and the business world. While the first two missions have been extensively studied and measured, M3 remains incomplete and requires the development of indicators and methodologies for its measurement. This article examines the importance and challenges of M3 for HEIs in Albania, drawing from international experience and the European Indicators and Methodology for the Third Mission of Universities. M3 encompasses three main activity groups: i) lifelong learning, ii) technology transfer and innovation, iii) and social engagement. The measurement of HEIs' three missions is based on concrete indicators, which can serve as a basis for evaluating institutions' excellence in this field. The presented study focuses on analyzing the understanding of the third mission (M3) of Higher Education Institutions (HEIs) in Albania, aiming to align them with best international trends and practices. Key findings from a survey of various stakeholders show that curricular development in Albanian HEIs has not kept pace with socio-economic changes and market developments, negatively affecting academic offerings and creating unnecessary competition in the labor market. Furthermore, the lack of a comprehensive national employment framework for first-cycle graduates has created pressure to continue studies, even when not necessary.

Keywords: *Higher Education Institutions (HEIs) / Third Mission (M3) / Teaching / Scientific Research / Social Engagement / Indicators and Methodology / Technology Transfer / Innovation / Smart Specialization Strategy (S3) / Higher Education Funding*

THE THIRD MISSION

Higher Education Institutions (HEIs) in the European HEIs Space have traditionally accepted **"two main missions"** as their tasks: i) teaching; as wella s ii) research and development. Recently, a Third Mission **(M3)**[1] has emerged, but often underdeveloped by higher education institutions (HEIs), failing to include activities that facilitate their engagement with society and the business world.

While the first two missions of HEIs have been extensively studied and frequently measured, the "Third Mission" still needs thorough examination and the development of approaches for its measurement. This requires indicators and ranking methodologies **(ETM)**[2] for M3 of HEIs to measure the activities they undertake in this area. The measurement and evaluation of the three missions of HEIs should generally be based on indicators. In this context, the methodology used for ETMs to assess HEIs' contributions to society includes, among other things, the identification, definition, and selection of the best set of indicators that, in a possible future ranking, could serve as the basis for evaluating institutional excellence in this area.

M3 in HEIs is not a new phenomenon, although it is often considered as such. Throughout the 20th century, contributions to the economy and society coexisted within HEIs alongside teaching and academic research. Since their inception, HEIs have always contributed, directly or indirectly, to society in general and not only in academic fields. However, since today M3 contributions are seen as essential, they deserve specific attention, policies, and resources to ensure their effective functioning.

Although it is widely accepted that the third mission of HEIs refers to their contributions to the economic and social development of territories, it is fair to say that the focus in this area has mostly been on the economic dimension and the potential impact of HEIs, with the assumption that innovation and economic growth will inevitably lead to societal development. This issue is primarily related to the interaction between business world actors and academic world actors, which should lead to technology transfer and economic growth at regional or even broader levels. Dynamic interactive capabilities result from adaptive learning processes that, in their collective dimension, can be more localized, strengthening the capabilities of the higher education system (HE). This means that within a specific region or locality, a concentration of qualified human resources is not an end in itself but a resource that, through learning, can be transformed into technological capabilities for the business world and/or academic capabilities for HEIs as well as progress for the ecosystem as a whole.

The increasing concern about inequalities and a growing crisis in the education system has highlighted a range of new concepts related to the third mission of HEIs. In high-income countries, this implies a strong focus on sustainability, smart specialization, and responsible innovation. The situation differs in HEIs in middle and low-income countries, characterized by varying levels of technological skills, higher levels of inequality, and significant resource constraints for a large part of the population, especially those located far from major metropolitan centers. Here, the focus tends to align more strongly with the dimension of inclusion, examining how HEIs, through their activities and community engagement, can contribute to addressing the limitations of inequality and poverty. The emphasis is placed on how HEIs can contribute to transformative change by responding to localized challenges and enabling local development and beyond.

The concept of M3 is vague and can be misunderstood as simply involving the reconfiguration of academic activities of HEIs, extending their reach into their geographic territory and within the institutional framework of the country. Today, there are two perspectives or approaches to defining M3:

The first is the "Triple Helix" model of academia-industry-government relations. This approach is particularly well-known in Latin America but less so in Europe and the USA.

The second approach defines this mission as: **"the sum of all activities** *related to generating, using, applying, and exploiting knowledge, as well as other university skills outside academic environments."*

Higher education must respond to, adapt to, and anticipate changes in the labor market and national and broader development. The goal of this article concerning the status of HE is to explore new findings and to orient and develop premises for high-quality higher education that meets labor market needs, as well as the strategic development directions of the country, region, and beyond. It is crucial to aim for a unified and standardized higher education system in Albania; one that creates opportunities for a cohesive and competitive higher education system with "regional" and domestic "markets," as well as at the European level or beyond. Therefore, the creation of a "unified system" remains the long-term objective of every policy and strategy so far in Albania.

Another goal of the unified higher education system is to create sustainable internal mechanisms (within HEIs) and external control mechanisms (external evaluation and close links with the local and global business world) to ensure European standards in increasing accountability to society and serving the public interest.

Under these conditions, the academic offer of HEIs should be oriented through all incentivizing tools from central and local governance in accordance with:

Albania's Smart Specializations Strategy (S3);

Labor market demands at local, national, and broader levels curriculum development oriented towards learning outcomes in close and real collaboration with business actors in Albania.

The challenge of this article is to determine the most realistic way possible and under Albanian conditions to measure efforts and results related to M3 activities, by providing a **"set of**

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[1] *M3 – Third Mission*
[2] *ETM – Evaluation of the Third Mission*

relevant indicators" and a **"cohesive methodology"** for assessing M3.

On the other hand, it is not necessary that all M3 activities be exactly the same across all HEIs, as there is always diversity and originality. But the spirit of the mission is more or less the same for every academic institution.

Based on this idea, the assessment of M3 can start by structuring all activities of this mission into **three main groups,** which are also considered by literature and global experience as representative of M3, including:

Continuing Education (CE) – *This term, according to the European Commission, refers to "all learning activities undertaken throughout life, aimed at improving knowledge, skills, and competences with a personal, civic, social, and/or employment perspective."*

Technology Transfer and Innovation (TTI) – *The TTI concept is related to "the movement of an idea, or tacit knowledge, complete knowledge, technical knowledge, intellectual property, discovery, or invention resulting from research conducted at universities (in collaboration with external partners or not) into a non-academic environment where it can lead to and benefit commercial applications at local, regional, national, or global levels."*

Social Engagement (SE) – *This term relates to the role of universities (HEIs) in engaging with their citizen, cultural, industrial, and business communities, and the main activities that the university organizes for society in general or specific demands from societal sectors to enrich them in cultural or developmental fields.*

Drawing from national and international best practices, the methodology for identifying indicators to evaluate M3 of HEIs in Albania is based on lessons learned from the *"European Indicators and Methodology for the Third Mission of Universities (E3M)*[3]*"* project coordinated by *Universidad Politécnica de Valencia (Spain),* which includes eight partner universities from seven different European countries. The project aims to create a ranking methodology for measuring M3 activities of HEIs. This three-year project (2009-2012) was funded by the European Commission under the *"Lifelong Learning Programme.*

EVALUATION OF THE THIRD MISSION

The measurement of the three missions of higher education institutions (HEIs) is based on indicators. In line with this, the methodology used by this article to assess the contributions of Albanian HEIs to society consists, among other activities, of identifying, defining, and selecting the best group of indicators which, in a possible future ranking, could serve as a basis for evaluating the institutions' excellence in this area.

Indicators for Evaluating the Third Mission in Higher Education Institutions:

In general, the measurement of the three missions of HEIs in this context relies on specific indicators. In this context, the methodology used to evaluate the contributions of HEIs to society includes, among other activities, identifying, defining, and selecting the best group of indicators which could be used in a future ranking to assess the institutions' excellence in this area.

Below is a final list of "identified indicators" from international experience for each dimension of the Third Mission (M3) as well as the processes on which the evaluation is based, which could also be adapted as guidelines/orientations in Albania:

Indicators for Continuing Education (CE):

Inclusion of CE in the mission, policy, and/or strategy of HEIs. - Existence of an institutional plan for CE.Existence of a quality assurance procedure for CE. - Total number of active programs. - Number of programs offered that are recognized in the higher education system and the market (licenses). - Number of partnerships in CE programs with public institutions and private businesses. - Percentage of international programs offered in the field. - Percentage of projects funded by the market/state in the CE trainings offered. - Total number of ECTS credits for the offered CE programs. - Number of (micro-)ECTS credits registered/confirmed (in the Ministry of Education and relevant departments, for LLL training or for licensing preparation, knowledge updates). - Number of enrollments of beneficiaries in the respective programs. - Percentage of total ECTS for CE credits registered, referring to the total ECTS registered/licensed for HEIs, and across all program levels. - Percentage of qualifications/beneficiaries certified compared to the total enrollments for CE. - Level of student satisfaction with knowledge/ECTS/qualification obtained through student/qualification evaluation surveys.Level of satisfaction of key stakeholders (licensing authority or state examination authority for licensing, declaring the percentage of licensed individuals who completed CE with the specific HEI, or evaluations by contracting companies, etc.). - Average completion and graduation rate for all programs in question.

Indicators for Technology Transfer and Innovation (TTI):

Inclusion of TTI in the mission, policy, and/or strategy of HEIs. - Existence of an institutional action plan for TTI in HEIs. - Number of licenses/assistance (active, executed under contract, (non-exclusive) for start-ups & spin-offs, and existing market companies. - Total budget and revenue from commercialization of knowledge/expertise and licenses through contracting/funding/grants for HEIs. - Number of start-ups and spin-offs created with HEI support. - Number of joint projects in creative and social innovation involving HEI employees and the HEI itself. - Number of agreements, contracts, and collaborative projects sponsored by Research & Development with non-academic partners (state, private, NGOs, donors, or those related to the HEI's social mission/responsibility, etc.). - Percentage of HEI's budget coming from revenue of Research & Development contracts and collaborative projects with non-academic partner. - Number of consultancy contracts. - Percentage of level 8 students of the Albanian Qualifications Framework (KSHK) and

Lifelong Learning (LLL) researchers and Post-Docs (compared to the total number of students in HEIs at each level) directly or co-financed by HEIs, or co-financed by public and private businesses, NGOs, donors, etc. - Number of laboratories and facilities invested in (by HEIs and/or co-financed) or shared. - Number of companies participating in Continuing Education (CE) courses for professional development (LLL). - Number of HEI employees with temporary positions outside academia. - Number of permanent non-academic employees (focusing on research, innovation, and R&D administration) in HEIs. - Number of level 8 KSHK thesis or projects with co-supervisors from non-academic fields. - Number of joint publications with authors from non-academic fields. - Number of academic staff participating in boards, networks, organizations, associations, and professional boards. - Number of organizations/individuals outside HEIs participating in advisory/governing/validating/ reviewing boards of HEIs, institutes, centers, and educational programs. - Number of prestigious awards for research, development, innovation, and TM awarded by business associations, public sector, funding agencies (national/ international), etc.

Indicators for Social Engagement (SE):

Inclusion of SE in the mission, policy, and/or strategy of HEIs. - Existence of an institutional action plan for SE in HEIs. - Budget allocation for SE. - Percentage of academics involved in voluntary advisory and consultancy roles for communities, issues, and institutions in need (without payment). - Number of open events/activities for the community/public and with public impact. - Number of research initiatives with a direct impact on the community. - Number and cost of staff, student/ researcher hours engaged in providing services and facilities to the community. - Number of people impacted in communities using HEI facilities/services and staff. - Number of projects related to extending education throughout the territory and social strata. - Number of HEI staff and students involved in informative activities to expand education. - Percentage of HEI budget used for extending education in the territory and across social strata, and percentage of beneficiaries/students compared to the total students in HEI. - Number of community participants in education extension/expansion activities. - Number of activities specifically targeting underserved students/ community groups. - Number of community representatives or local representatives in educational boards or committees at HEIs. - Amount of grants/donations/contracts materialized from partnership engagement.

The analysis of this group of indicators has been implemented in six case studies. The objective of the case studies was to verify the opinion of these six HEIs on the selected indicators through a comparison with institutional representatives of M3 activities in the three grouped areas, and also to detail the best practices of each visited and evaluated university. The pilot was conducted at these European institutions: *i) Universidad Politécnica de Valencia (Spain), ii) Politecnico di Torino (Italy), iii) University of Cambridge (UK), iv) Turku University (Finland), v) Dublin Institute of Technology (Ireland), vi) and Széchenyi István University (Hungary).* The case studies also open a broader debate on possible improvements to the specific indicators proposed for the visited and evaluated universities. There is also an ongoing initiative to build a global network for M3 of HEIs in Europe to ensure access and allow European institutions in the future to input data related to M3 activities and possibly create a European/global classification. This network would be a useful tool for assessing institutions and comparing their indicators and services across Europe.

Further explanations of the concepts related to the reporting of indicators are:

1. Human Resources	Focus:	Transfer of embodied knowledge into the work of PhD graduates. - This indicator monitors the transfer of "trained research competencies" to industry and public services "mission-oriented."
	Indicators:	Number or parts of PhD dissertations that specifically contribute to industry and public services (distinguishing between R&D and non-R&D aspects).
2. Intellectual Property	Focus:	Codified knowledge produced by the university and its management (patents, copyrights).
	Indicators:	Not only patents owned by the university but also for 'inventors' of the university (whoever benefits). Patent numbers should be supplemented with data on licenses granted and fees received/applied.
3. "Spin-Offs"	Focus:	Knowledge transfer through entrepreneurship.
	Indicators:	Simple counts or a unified typology are not sufficient. Consider the distinction between spin-off initiatives and laboratories (staff who have left after qualifying, staff still involved, research contracts, related licenses, etc.). Figures should have explanations to characterize the extent of the university's involvement and development, such as dedicated teams, indicators, available funds.
4. Industry Contracts	Focus:	Co-production of knowledge and its circulation in industry. This is considered the main indicator of the university's attractiveness to economic actors.
	Indicators:	Number of contracts, revenue amount as part of total resources, type of partners (global, large domestic firms, SMEs) are key reporting aspects. Concentration level (sectoral, territorial, or with several partners), types of contracts (research, consulting, services, project development), and duration are important supplementary reporting aspects. Identification of large/medium/small laboratories and their focus level (thematic or territorial/sectoral) is also often needed to clarify this indicator and strategic positioning.
	Comment:	Reporting indicators here also requires a 'soft' dimension where aspects such as membership in professional associations (role played in professional networks/associations), professional publications, continuous training activities, consulting activities (often unpaid in the laboratory), and practices (Master's students) are accounted for.
5. Participation in Policy Making	Focus:	The 'public service' dimension for research activities.
	Indicators:	As with industry relations, the same logic applies to public institutions, distinguishing between joint research and services.
	Comment:	It is important that contracts here are not viewed solely from a financial perspective, but also from intensive relationships with public institutions, which often focus on aspects of social-cultural impact; building an image for the country/region/city; or in relation to drafting new reforms/laws, and new sectors of the economy such as tourism in Albania. This is also typical in health research (clinical trials for new therapeutics, medical protocols, free service analyses, etc.).

[3] *E3M – Evaluation of the Third Mission*

6. Engagement in Social-Cultural Life	Focus:	The university's involvement in 'social' life (primarily at the city/region level but also nationally).
	Comment:	Several HEIs actively participate in the social and cultural life of the city (museums, orchestras, sports facilities, festivals, open libraries, exhibitions, etc.); or through opening 'social services' (such as legal aid shops). These "structural" investments also include a range of workshops, experimental laboratories (exhibitions, biennials, concerts, urban and developmental projects, etc.). Their description is based on expenditures, documented products and events with reports and publications.
7. Science Communication to the Public	Focus:	Interaction with society.
	Comment:	This involves focusing solely on dissemination and interaction with the general public (participation in public debates, drafting reform documents, drafting laws, participation in teams or task forces for legal and public initiatives (part of policy making). Reporting includes open days, participation in fairs and national scientific conferences, involvement in the general press and media on public issues, especially education and science, public magazines, website construction and 'interactive' pages, participation in activities directed at children and secondary schools, etc. The distinction is made between individual staff initiatives and proactive policies of laboratories and the IAL as a whole or through its departments/institutes/units.

SURVEY ON THE THIRD MISSION IN ALBANIAN HIGHER EDUCATION INSTITUTIONS (SEE ANNEX)

An anonymous survey was prepared to gain insight into how Albanian higher education institutions perceive and implement the Third Mission (M3), their sensitivity and understanding of this topic, etc. The survey was conducted in February-March 2024 and was completed by 30 out of 40 active higher education institutions (75% of the total HEIs)[4] . This qualitative survey explores various aspects of the Third Mission, including community engagement, knowledge transfer, innovation, entrepreneurship, and more. By analyzing the responses, the goal is to understand the current state, identify challenges, and uncover opportunities to improve the social impact of universities and their contribution to national development.

After processing the data from this questionnaire (see below), the results are as follows:

There is an increasing sensitivity towards the Third Mission (M3) among Albanian higher education institutions (HEIs). This is an emerging topic internationally as well. The vast majority of HEIs responded to the questionnaire (30 out of 40 HEIs of 75%).

About 1/3 of the surveyed/respondent HEIs seems to have good or very good understanding of M3, while two-thirds have limited understanding or no information and concrete actions. There remains a significant need to work on a better and shared understanding of the sector on this topic through training, projects, and capacity-building guides.

Larger HEIs (especially public ones) generally tend to have more laboratories and real potential (often underutilized) for M3. However, responses indicate that the community of smaller/medium-sized HEIs (and especially private ones), as well as specialized/focused HEIs, are moving more quickly towards tangible M3 results, thanks to institutional commitment, government projects, EU funding, and other donors/actors.

The business community in Albania remains small in scale and more limited to services rather than mass production. There is a misunderstanding about the potential for collaboration within the academic world. HEIs themselves need to be more proactive in seeking and materializing this partnership. There is a concentration of contributions more in metropolitan areas than in other regions/peripheries of the country.

CONCLUSIONS AND VISION FOR THE FUTURE

Further indirect findings from the questionnaire results also show that curricular development has not adapted to socio-economic changes and market developments. As a result, academic offerings have not always been successful. Higher education institutions (HEIs), by not following a rigorously market-oriented curriculum development policy, have largely replicated one another, leading to unnecessary competition in the labor market among graduates from the same field. Specifically, in just four fields of study (business management, law, teaching, nursing), public HEIs offer 968 study programs, while private HEIs offer 520 out of a total of 1,488 study programs.

The issuance of three-year "Bachelor" diplomas did not have the intended effect of guiding graduates towards the labor market and serving as a "valve" to relieve the pressure on higher education from students who do not meet the requirements to continue to the Second Cycle (level seven of the NQF National Qualifications Framework). The absence of a comprehensive national employment framework with specifications for the professions and fields in which first-cycle graduates can work has also negatively impacted this. Under these circumstances, the pressure on first-cycle graduates (Level six of the NQF) to continue their education, even when not warranted, has been very high. On the other hand, HEIs were either inconsistent in applying the established criteria for admission to the Second Cycle (mainly public ones) or did not apply selective admission criteria (mainly private ones).The lack of clear, measurable criteria and standards for core academic areas has often resulted in a non-harmonized process, even within the same field. Efforts to align teacher training programs have also been unsuccessful due to continuous changes in these programs post-accreditation, based on the freedom that academic Senates have to change curricula without consulting real market needs.

Currently, the state budget has about 38 million euros available to support over 120,000 students in public universities (this figure can be supplemented by approximately another 20 million euros from secondary revenues secured by the universities themselves), approximately 460 euros per student in the public sector. The private sector, with about 34,500 students and tuition fees of around 1,000-1,500 euros/student, contributes about 20-25 million euros to the system. Meanwhile, modestly developed EU countries like Romania and Bulgaria have financing quotas of around 2,700-2,900 euros/student, not to mention countries like the UK, France, etc., which have quotas of 10,000-11,500 euros/student, Switzerland 15,700 euros/student, Sweden 15,210 euros/student, the USA 22,000 euros/student, etc.

In Albania, since 1992, with few exceptions, the education budget in general has not exceeded 3% of GDP, fluctuating between 2.2-2.8% of GDP or 10-15% of total budget expenditures. It should be noted that these figures refer to education in general (at all levels) and not just higher education. Developed Western countries within the OECD finance their education at levels of 5-8% of GDP, of which 1-3% of GDP goes directly to higher education and scientific research. Albania currently spends 0.4% of GDP on Higher Education.

The evolution of the number of students in the higher education system in Albania, without a clear vision and market study, needs now and in the future sufficient state support for improving the infrastructure of public HEIs, including their material base, as well as increasing human capacities by easing the fiscal burden for businesses collaborating with HEIs and, through the legal framework, formalizing student payments during internships with the business world, encouraging accountability and demand from students during internships and turning this process into a precursor to their employment. Therefore, a better linkage between educational/research policies with social and employment policies in general, and entrepreneurship with social responsibility is required.

In addition to the state's obligation to increase higher education funding towards contemporary standards, finding supportive financing alternatives for HEIs through collaboration with business actors in Albania is considered important. Higher education should become more open to direct (as opposed to indirect) funding from various sources such as: state budget, students, local authorities, donations, businesses, income from specific services, development projects, etc., through alignment of the current legal framework in higher education with those covering other central and local government ministries.

On their part, HEIs should provide various services to stakeholders. These include teaching, scientific research (or research and development), career counseling, library services, sports infrastructure, and opportunities for participation in student activities. HEIs should also establish and strengthen close contacts with the business world, helping students find job or internship opportunities.

In this context, the offering of the Third Mission (M3) by HEIs could evolve towards:

Teaching: Various scientific and professional programs, including continuing education courses or specialized and certified study programs.

Scientific Research: HEIs as centers of research and development, including scientific projects, laboratories, and opportunities for participation in research, applied research, consulting, etc.

Career Counseling Services: Assistance in career choice, CV preparation, interview simulations, and connections with potential employers.

Libraries: HEIs have libraries rich in knowledge resources and tools for study and research, for international networking and events related to books and digitization.

Student Services: Medical services, psychological counseling, sports services, social-cultural activities, assistance with preparation for individual licensing processes and state exams.

Student Projects and Activities: Opportunities to participate in clubs, associations, biennials, competitions, and various student events that promote collaboration and personal development.

Connections with the Business World: Collaboration with companies and organizations outside the university to offer internships, industrial visits, and job opportunities after graduation, etc.

The current approach to implementing the Third Mission is to create interconnected spaces and mechanisms that offer or enable training, **innovation and entrepreneurship incubation,** and support programs with real-world partners. Furthermore, **community-based centers** should emerge as useful interface mechanisms to bring HEIs closer to communities, both physically and in orientation. The real challenge is that conventional formal knowledge transfer models may not be suitable in resource-poor environments. However, they can reduce the need for informal businesses, provide social and practical assistance, and encourage the formalization of micro-enterprises in difficult areas. Creating innovation and incubation centers in cities or regions, as well as NGOs with social impact, can nurture community enterprises, support local skills development, and promote job creation for specific needy groups.

On the other hand, there seems to be no real need to produce specific/additional strict laws or decrees for the Third Mission; rather, there is a real need for orientations, reporting formats, and guides regarding: i) What the Third Mission is as a definition and what its components are; ii) What are the potential/unified indicators and instruments to measure and determine quantitatively the volume, equivalent financial value, and success of the Third Mission for a HEI; iii) Reorganizing the annual report of each HEI submitted to the Ministry according to the three pillars: **teaching, research,** and **third mission**; specifying reporting items exhaustively and as concisely as possible, with measurable indicators, becoming part of institutional development and ranking evaluation.

It is suggested that the Ministry of Education undertake several steps:

Firstly - Prepare guidelines and training for HEI leaders and their key units for a deeper understanding of the Third Mission in a consensual spirit.

Secondly - Each HEI should make rapid improvements/ reviews of its mission and institutional strategies in light of the three components: teaching, research & development, third

mission.

Thirdly - Each HEI should start reporting on all three pillars mentioned above.

Fourthly - Each HEI should develop institutional plans for the Third Mission applying an inclusive logic of academic staff, student representatives, base units, and strategic partners outside the HEI: from the market, government, and business community.

Objectives and Instruments for this Purpose:

By 2030, HEIs should be fully engaged, alongside teaching and research, in the aspects of the Third Mission. – Instrument: Preparation of a guide for HEIs by the Ministry of Education. Initiation of a basic annual reporting/self-declaration process, progressively developed each year by the HEIs, covering all three missions (teaching, research, Third Mission), starting from the 2024-25 academic year, according to a preliminary and concrete format/database prepared by the Ministry of Education.

Increasing the capacity of HEI leaders and staff for the real adoption and implementation of the Third Mission. – Instrument: "Training of Trainers" (ToT) for each HEI within the 2025-26 year. Further training of each HEI's staff by trainers including the leaders, within the 2026-27 year.

Including in the annual report of each HEI the quantification of contributions to the Third Mission to better identify the contribution of this sector to society, the national GDP[5], and overall development. – Instrument: Inclusion of financial reporting for monetization (Lek/Euro, in kind) of the Third Mission for each HEI, to create a database of the Third Mission for the entire higher education sector.

By 2030 and beyond: Institutional quality assessment may also include Third Mission issues, based on annual and financial reports of this sector. – Instrument: Institutional accreditation and rankings at national and international levels.

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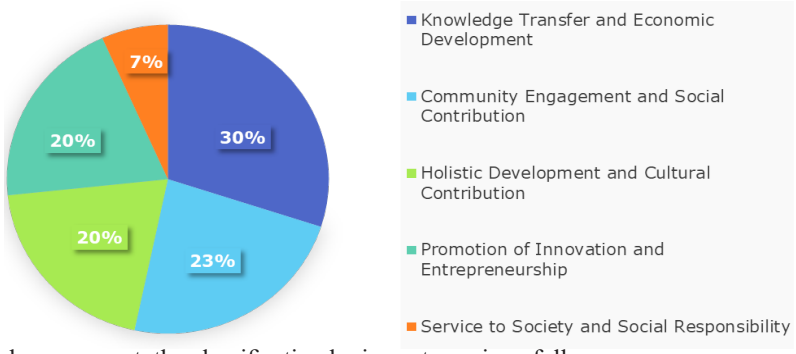
[5] *GDP – Gross Domestic Product*

ANNEX: RESULTS OF THE QUESTIONAIRE.
QUESTION 1: HOW DO YOU DEFINE THE M3 OF UNIVERSITIES IN GENERAL?



According to the weight of each component, the classification by importance is as follows:

Option 1 (30% of the respondents): Knowledge Transfer and Economic Development - This involves transferring knowledge and technology to industry and society, with a perspective aimed at promoting economic and social growth through university-industry collaboration and joint research projects.

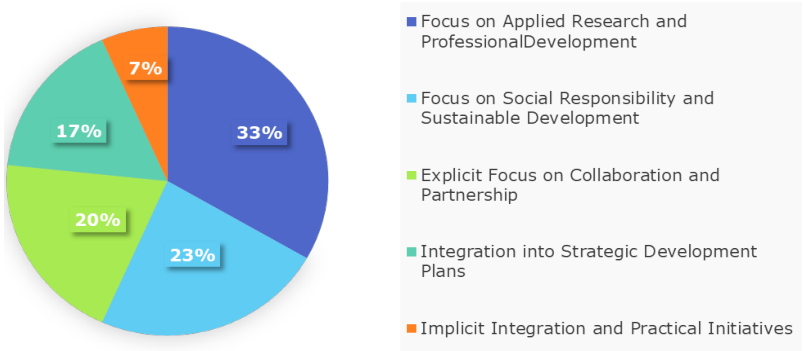
Option 2 (23%): Community Engagement and Social Contribution - This involves collaborating with external parties for social development, including businesses, politics, and stakeholders. The idea requires a focus on concrete results and financial benefits for institutions and society.

Option 3 (20%): Holistic Development and Cultural Contribution - Focusing on the multidimensional nature of the third mission, this involves the university's engagement with social, economic, and cultural aspects of society; aiming at local-regional-national development and cultural enrichment.

Option 4 (20%): Promotion of Innovation and Entrepreneurship - This involves the role of universities in fostering innovation ecosystems, supporting entrepreneurship, and contributing to economic development through the commercialization of research findings.

Option 5 (7%): Service to Society and Social Responsibility - Emphasizing the role of universities in directly contributing to social responsibility and welfare, this perspective highlights the institution's commitment beyond traditional teaching and research.

QUESTION 2: DOES YOUR MISSION AND STRATEGY FOR THE M3 ADDRESS IT?



Option 1 (33% of the respondents): Focus on Applied Research and Professional Development - Highlighting institutions that strive to advance applied research, innovation, and entrepreneurship, with the aim of preparing students with the necessary skills for social impact and economic development, and with real contributions to the market and society.

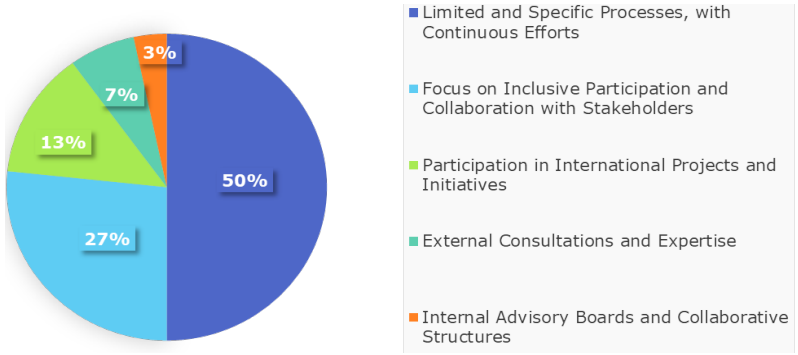
Option 2 (23%): Focus on Social Responsibility and Sustainable Development - This perspective emphasizes the commitment of institutions to social welfare; sustainable development; and engagement with local, regional, and national communities.

Option 3 (20%): Integration into Strategic Development Plans - This implies including the Third Mission in institutional strategic plans, focusing on initiatives such as business cooperation programs, technology transfer, and partnerships with external or foreign entities.

Option 4 (17%): Explicit Focus on Collaboration and Partnership - Emphasizing the explicit inclusion of the Third Mission in strategic plans, with a focus on collaboration with third parties, partnerships with businesses, and social engagement at local, regional, and (inter-)national levels.

Option 5 (7%): Implicit Integration and Practical Initiatives - Refers to institutions where the Third Mission may not be explicitly mentioned, but M3 is reflected in practical initiatives such as education, joint projects with businesses, and social activities for the community's benefit.

QUESTION 3: HAVE YOU UNDERTAKEN ANY PARTICIPATORY PROCESS FOR DEVELOPING THE THIRD MISSION (M3) IN YOUR HIGHER EDUCATION INSTITUTION?



Option 1 (50% of the respondents): Limited and Specific Processes, and Ongoing Efforts - Institutions that recognize the lack of specific processes but show ongoing efforts through consultations, annual plans, and inclusion of the Third Mission as a relative priority in strategic plans.

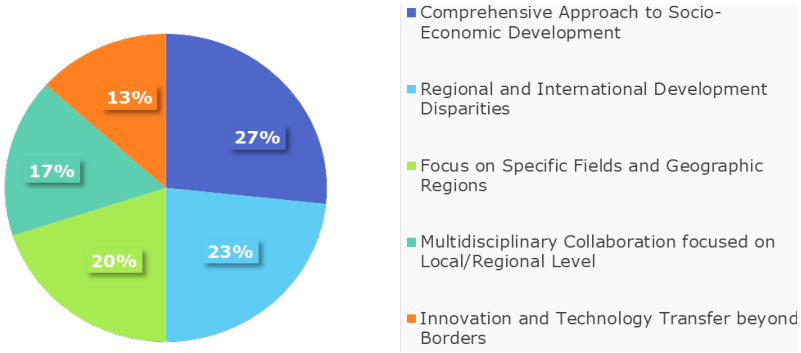
Option 2 (27%): Focus on Inclusive Participation and Stakeholder Collaboration - This implies an inclusive approach in the participation of stakeholders within and outside the institution for developing institutional strategies and M3, including students, academic and administrative staff, alumni, industry representatives, and international partners.

Option 3 (13%): Participation in International Projects and Initiatives - This perspective implies the involvement of the higher education institution in international projects and initiatives aimed at developing M3 activities within the institution.

Option 4 (7%): Consultations and External Expertise - This implies processes involving consultations and external expertise, including meetings with businesses, industrial partners, organizations, and research groups, etc., to develop institutional strategies, especially in relation to M3.

Option 5 (3%): Internal Advisory Boards and Collaborative Structures - This implies the establishment of internal advisory boards and collaborative structures within institutions to provide advice and innovative ideas for study programs and to foster a culture of collaboration with third parties.

QUESTION 4: WHAT IS THE FIELD AND TERRITORIAL SCOPE OF THE THIRD MISSION (M3) THAT YOU TARGET AS A HIGHER EDUCATION INSTITUTION?



Option 1 (27% of the respondents): Comprehensive Approach to Socio-Economic Development - This implies higher education institutions that emphasize preparing students to contribute to social and economic development (national-global) through various concrete initiatives, focusing on sustainability, resilience, community development.

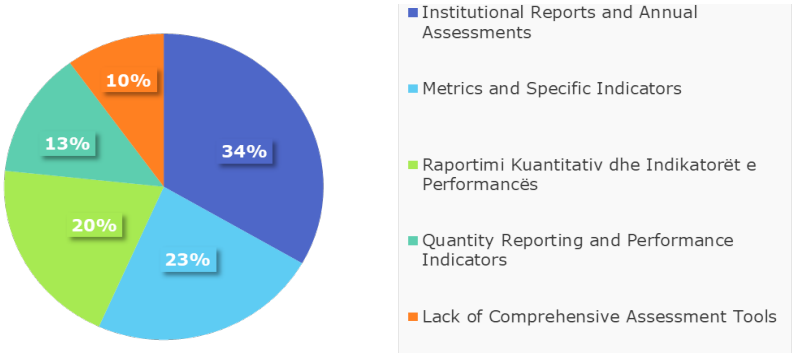
Option 2 (23%): Regional Development Differences (National-International) - This implies that some higher education institutions target fields of knowledge that extend nationally (regions, metropolitan-capital-periphery of the country) and internationally (neighboring cross-border regions or between Albania-EU, etc.), aiming to contribute to social and economic development within the country and beyond national borders.

Option 3 (20%): Focus on Specific Fields and Geographical Regions - Some higher education institutions focus on specific thematic fields (specializations like Medicine, Security, Polytechnic, Agriculture, Sports, etc.) versus others that are generalist institutions (attempting to cover all areas). Meanwhile, some institutions target specific geographical regions within the country (regional institutions or those focused on capital/metropolitan) while others work on a (inter-)national level regarding the impact and reach of their mission.

Option 4 (17%): Multidisciplinary Collaboration Focused on Local/Regional Level - This concerns higher education institutions that aim for collaborations in various fields with a focus on the local or regional level, and within the country.

Option 5 (13%): Innovation and Technology Transfer Beyond Borders - This concerns higher education institutions that aim to advance innovation, technology transfer, and collaboration with international partners, aiming to contribute to local, national, and international economic and social development.

QUESTION 5: DO YOU MEASURE/QUANTIFY THE VALUE/CONTRIBUTION OF THE THIRD MISSION OF YOUR HIGHER EDUCATION INSTITUTION? HOW?



Option 1 (34% of the respondents): Institutional Reports and Annual Evaluations - Many higher education institutions conduct annual evaluations and produce documentation reports of their activities (including the Third Mission), which are then used to assess their contribution and progress in this regard.

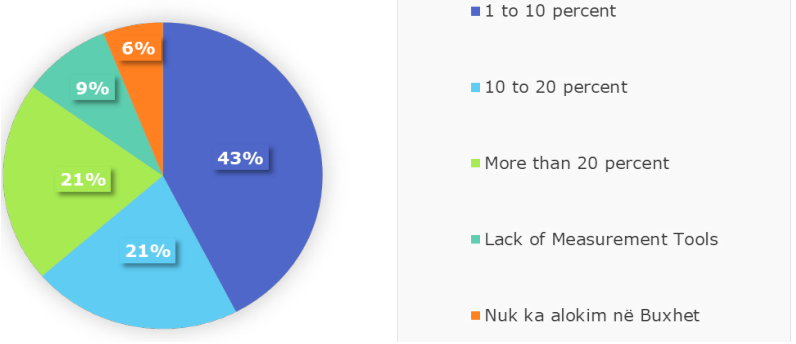
Option 2 (23%): Specific Metrics and Indicators - Some HEI's have developed specific metrics or indicators to evaluate their Third Mission, such as surveys with the alumni community, and economic-financial indicators.

Option 3 (20%): Quantitative Reporting and Performance Indicators - Some higher education institutions use quantitative reporting methods and performance indicators to evaluate the success and impact of their Third Mission activities.

Option 4 (13%): Use of Surveys and Relevant Results - Some higher education institutions rely on surveys and feedback from stakeholders to evaluate the impact and effectiveness of their Third Mission activities.

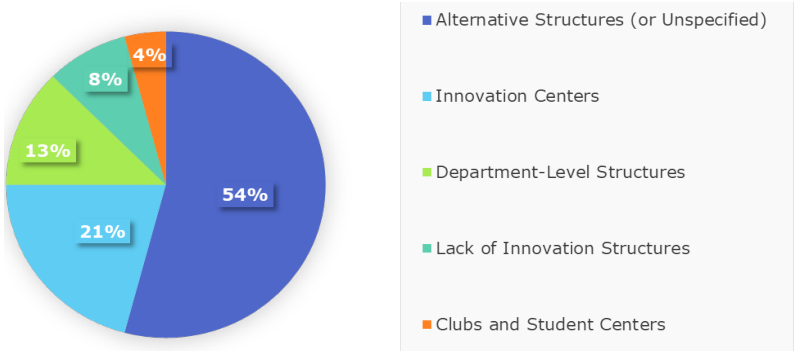
Option 5 (10%): Lack of General Evaluation Tools - Some higher education institutions mention basic mechanisms for evaluating certain aspects, including M3; but lack a comprehensive tool/instrument for assessing the overall contribution of the Third Mission in the organization.

QUESTION 6: WHAT IS THE % OF THE ANNUAL BUDGET DEDICATED SOLELY TO THE THIRD MISSION (M3)?



According to the weight of each identified component, the classification shows that over 15% of the respondent HEIs, accept of not having measurement tools or budget for M3.

QUESTION 7: IN ADDITION TO TEACHING AND RESEARCH, DO YOU HAVE SPECIAL STRUCTURES FOR INNOVATION IN YOUR INSTITUTION? WHAT ARE THEY?



Option 1 (54%): Alternative (or Non-Specific) Structures - Various higher education institutions have established different structures to encourage innovation, including alternative offices such as research centers focused on specific fields, startup and entrepreneurship centers, technology transfer centers, etc.

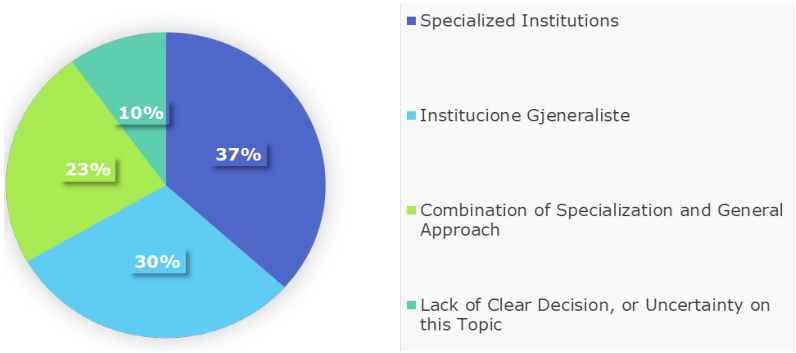
Option 2 (21%): Innovation Centers - Some higher education institutions have established innovation centers and hubs within their campus to promote innovation and entrepreneurship among students and academic staff.

Option 3 (13%): Structures at Departmental Level - Some higher education institutions have specific departments or sectors dedicated to innovation within their organizational structure of Departments/Faculties.

Option 4 (8%): Lack of Structures for Innovation - Some higher education institutions are in the process of developing innovation structures, or do not yet have dedicated functional structures at least for the moment.

Option 5 (4%): Student Clubs and Centers - Some higher education institutions promote innovation through student clubs and centers, offering platforms for students to explore their creative-entrepreneurial ideas.

QUESTION 8: DO YOU AIM TO BE A LOCAL/REGIONAL "SPECIALIZED" INSTITUTION (FOCUSED), OR A NATIONAL "GENERALIST" (WORLD CLASS UNIVERSITY)?



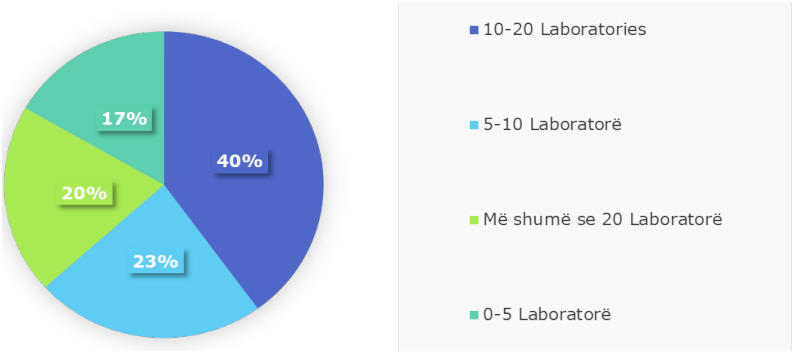
Option 1 (37-60% of the respondents): "Specialized" Institutions - Some institutions aim to be specialized in certain fields, focusing their resources and efforts to become leaders in those areas.

Option 2: (30-53%) "Generalist" Institutions - Some higher education institutions aim to maintain a broad range of academic programs and research fields, striving to succeed in many disciplines simultaneously.

Option 3: (23%) Combination of Specialization and General Approach - Some higher education institutions pursue a combined approach: specializing in certain fields while also offering a broad range of academic programs in other areas to meet diverse student/institution needs.

Option 4: Lack of a Clear Decision or Ambiguity on this Issue - Some higher education institutions have not yet decided whether to pursue specialization or to maintain a general approach, facing also undecided positions in their strategic direction. Some others are not sensitized to this discussion.

QUESTION 9: HOW MANY LABORATORIES DO YOU HAVE? ARE THEY FUNCTIONAL/CERTIFIED FOR MARKET SERVICES?



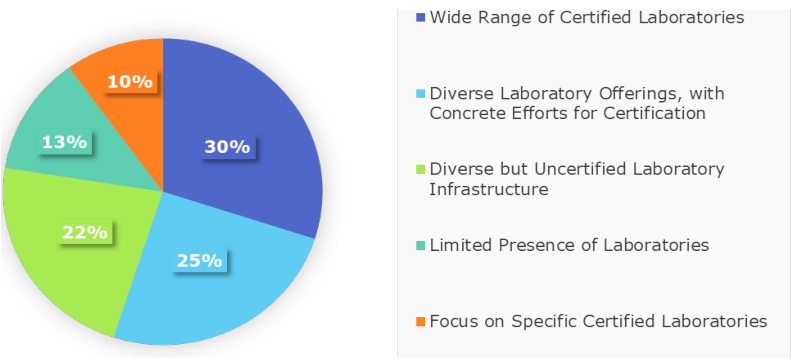
Option 1 (40% of the respondents): 10-20 Laboratories - Some higher education institutions declare a significant number of laboratories, providing substantial resources for practical-scientific sessions. These institutions prioritize practical experience with considerable investment in laboratory infrastructure. The technological level and functionality remain to be seen.

Option 2 (23%): 5-10 Laboratories - Some higher education institutions have a sufficient number of laboratories to provide basic resources for practical sessions and research activities. Although not as numerous as the institutions above (depending also on the institution's size), these institutions ensure adequate infrastructure to support academic and research needs and M3.

Option 3 (20%): More than 20 Laboratories - Some higher education institutions are noted for their rich laboratory infrastructure, offering a wide range of resources for practical sessions, research efforts, and M3. These institutions usually have a strong commitment to practical research and innovation.

Option 4 (15%): Fewer than 5 Laboratories - Some higher education institutions are less equipped with laboratory infrastructure, which may limit the extent of practical-scientific work they can offer. These institutions might rely more on other means of facilitating practical experiences and research.

QUESTION 9: HOW MANY LABORATORIES DO YOU HAVE? ARE THEY FUNCTIONAL/CERTIFIED FOR MARKET SERVICES?



Option 1 (30% of the respondents): Wide Range of Certified Laboratories - A significant number of higher education institutions have a wide range of laboratories, most of which are functional and certified to offer various services, including healthcare, computer-based testing, and scientific research.

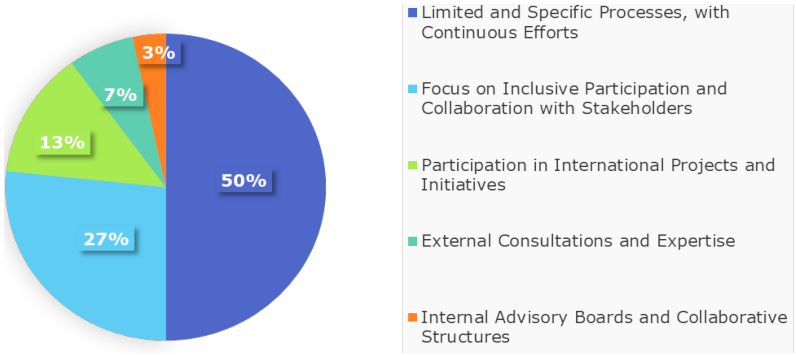
Option 2 (25%): Various Laboratory Offerings with Concrete Certification Efforts - Some higher education institutions offer a number of laboratory facilities, including those for healthcare, computer sciences, and engineering. While most are functional, serious efforts are being made to achieve certification and offer market services beyond academic use.

Option 3 (22%): Diverse Laboratory Infrastructure but Still Uncertified - Many higher education institutions have diverse laboratory initiatives serving various teaching fields. While most are functional, they are usually still uncertified to offer specialized market services.

Option 4 (13%): Limited Presence of Laboratories - Some higher education institutions have a limited number of laboratories, primarily focused on specific areas of study/teaching. While they are functional, they are often still uncertified for services beyond academic purposes.

Option 5 (10%): Focus on Specific Certified Laboratories - Some higher education institutions prioritize certain types of laboratories, such as computer, medical, engineering, or artistic labs, aiming to make them unique and certified to offer highly specialized services. The total number of laboratories in these institutions is limited, but they are fully functional albeit costly.

QUESTION 10: DO YOU HAVE INDUSTRY COLLABORATIONS? HOW MANY PRODUCTS/PATENTS DO YOU OFFER IN THE MARKET?



Option 1 (33% of the respondents): Collaboration Without Patents-Some institutions have collaborations with various industries but don't offer patents products in the market.

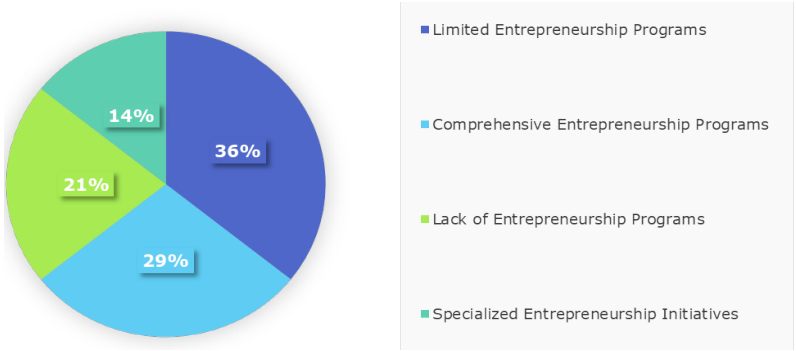
Option 2 (23%): Industry Collaboration with Patent Offerings - Some higher education institutions claim to have industry collaborations and offer products or patents in the market, though in limited numbers.

Option 3 (20%): Partnerships with Industry and New Patents - Some higher education institutions claim to have started partnerships with industrial partners and are in the process of developing joint products or patents for the market.

Option 4 (17%): Limited Industry Collaboration and Products/Patents - Many institutions do not report real collaboration with industry (or have limited involvement) and thus do not offer any products/patents in the market.

Option 5: Extensive Industry Collaboration and Patent Offerings - A minority of institutions have established extensive collaborations with industrial partners and offer many products or patents in the market.

QUESTION 11: DO YOU HAVE ENTREPRENEURSHIP PROGRAMS? HOW MANY? WHAT "SPIN-OFF" SERVICES DO YOU OFFER IN THE MARKET?



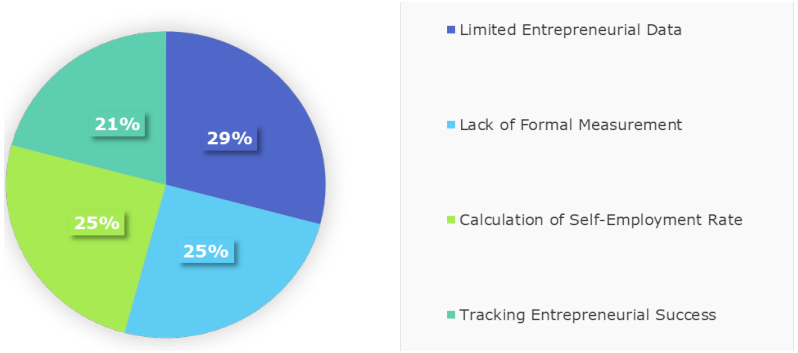
Option 1 (36% of the respondents): Limited Entrepreneurship Programs - These institutions offer limited entrepreneurship programs, such as specific courses or modules within existing study programs, combined with services like seminars, workshops, or mentoring.

Option 2 (29%): Comprehensive Entrepreneurship Programs - These institutions offer full entrepreneurship programs, including several dedicated study programs (BSc, MProf, MSc, ME, or PhD) in entrepreneurship, as well as advanced training modules, innovation hubs, and business incubators.

Option 3 (21%): Lack of Entrepreneurship Programs - These institutions declare that they do not have formal entrepreneurship programs as part of their curriculum or extracurricular activities.

Option 4 (14%): Specialized Entrepreneurship Initiatives - These institutions declare that they have specialized initiatives or projects for entrepreneurship, such as participation in EU-funded programs, government initiatives, or collaborations with industrial partners to promote entrepreneurship, etc.

QUESTION 12: WHAT PERCENTAGE OF YOUR GRADUATES HAVE STARTED BUSINESSES COMPARED TO THE TOTAL GRADUATES? HOW DO YOU MEASURE THIS?



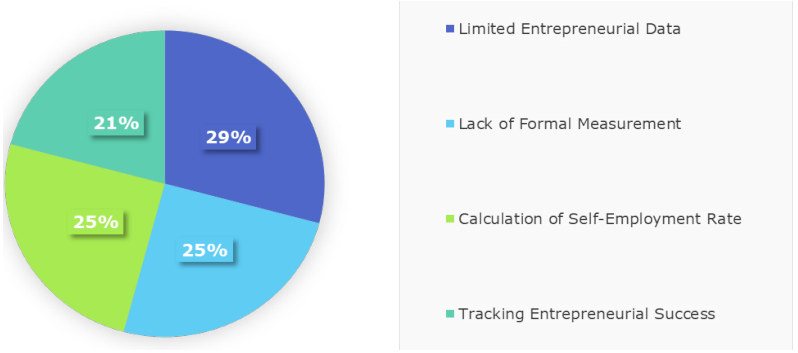
Option 1 (29% of the respondents): Limited Entrepreneurial Data - These institutions have limited data on graduates who have initiated entrepreneurial ventures but lack systematic tracking systems. They measure the percentage of entrepreneurial graduates based on possible data from Career Offices and Alumni or periodic surveys.

Option 2 (25%): Lack of Formal Measurement - These institutions do not have specific methods to measure the percentage of graduates who have started businesses. Although they may actively encourage entrepreneurship, they lack formal mechanisms to track entrepreneurial outcomes among their graduates.

Option 3 (25%): Calculation of Self-Employment Levels - These institutions calculate the percentage of graduates who are self-employed, including those who have started businesses. They measure this through employment data and surveys with Alumni, focusing on those pursuing entrepreneurial paths.

Option 4 (21%): Tracking Entrepreneurial Success - These institutions actively track the entrepreneurial success of their graduates through updated Alumni databases, periodic meetings with this community, surveys, and collaboration with local government units.

QUESTION 13: IN WHICH SECTORAL REFORMS OR LAWS HAVE YOU PARTICIPATED AS A HIGHER EDUCATION INSTITUTION IN DRAFTING, COMMENTING ON, AND PUBLIC DEBATING THEM?



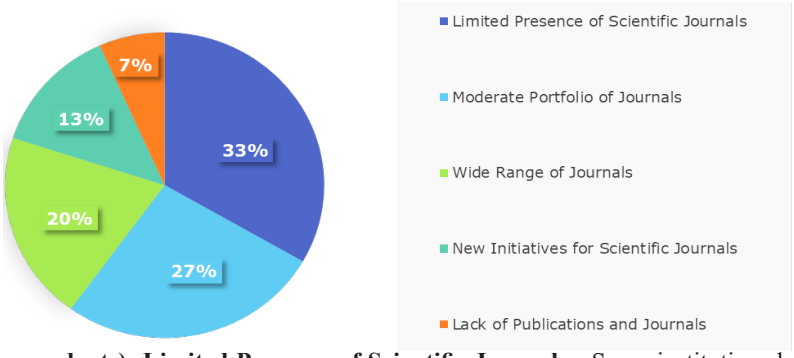
Option 1 (44% of the reforms): Active Participation in Various Reforms and Laws - Some institutions have actively participated in sectoral reforms and laws, including those related to higher education, scientific research, public administration, justice, and other sectoral areas.

Option 2 (25%): Limited Participation in Reforms and Laws - Some institutions have participated in specific reforms or laws, such as those related to justice, fiscal policies, mental health, and gender equality.

Option 3 (22%): Absence of Actual Participation - Some institutions have not reported participation in any sectoral reforms or laws.

Option 4 (9%): Participation Only in Higher Education Reforms - A few institutions declare that they have participated only in reforms and laws related to higher education, particularly the Higher Education Law and the Science Law.

QUESTION 14: HOW MANY SCIENTIFIC JOURNALS DO YOU HAVE IN YOUR INSTITUTION? WHAT ARE THEIR FIELDS? HOW ARE THEY RECOGNIZED / CLASSIFIED?



Option 1 (33% of the Respondents): Limited Presence of Scientific Journals - Some institutions have a limited number of scientific journals, with 1-2 publications per year. These journals usually cover a wide range of fields for practical research needs of the institution and rarely focus on specific academic research disciplines.

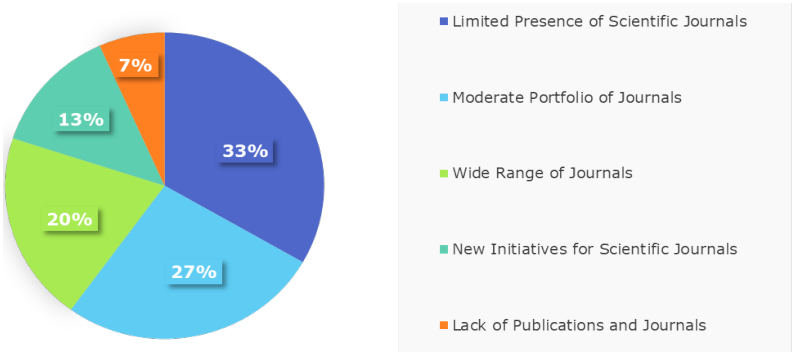
Option 2 (27%): Medium Portfolio of Journals - Some institutions maintain a medium portfolio of scientific journals, with 3-5 publications per year. These journals cover various fields such as social sciences, natural sciences, humanities, and technology, and are usually focused.

Option 3 (20%): Wide Range of Journals - Some institutions have a broad range of scientific journals, with more than 5 publications per year. These journals cover a wide spectrum of disciplines, including social sciences, natural sciences, humanities, technology, and specialized fields. Few are recognized by the Ministry of Education or in neighboring countries/regions.

Option 4 (13%): New Initiatives for Scientific Journals - A small number of institutions are actively developing new scientific journals or planning to launch publications in the near future, aiming to expand their academic dimensions and efforts to stimulate/ distribute research.

Option 5: Absence of Publications and Journals - A small number of institutions either do not have their own scientific journals or have a very limited presence of publications overall, possibly due to being new/small institutions or focusing on other forms of academic/research production, such as fine and visual arts.

QUESTION 15: DO YOU ENGAGE IN "TECHNOLOGY TRANSFER"? WHAT AND WHERE? DO YOU HAVE A OFFICE FOR THIS AS AN INSTITUTION?



Option 1 (54% of the respondents): Use of Technology Transfer Mechanisms - Most institutions report engaging in forms of technology transfer, including permanent partnerships with businesses, design contracts, technical training, and collaborations with industrial partners. The exact understanding and consistent interpretation of "technology transfer" by institutions remain to be verified.

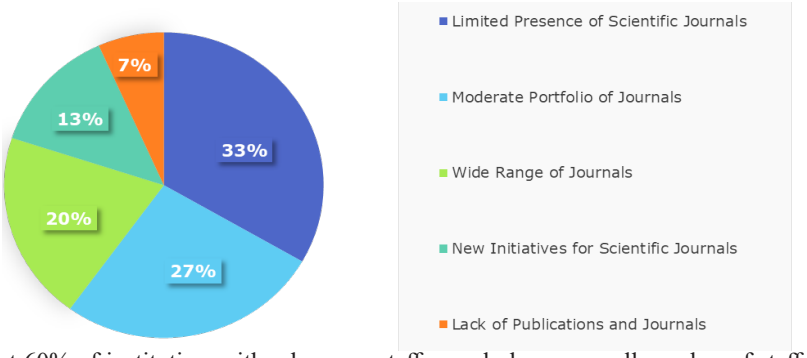
Option 2 (29%): No Technology Transfer Activities - Many institutions self-report that they do not engage in technology transfer activities and do not have dedicated offices for this purpose, although they may have awareness or have made efforts in this area through European projects focused on improving higher education quality by enhancing technology transfer.

Option 3 (11%): Absence of Dedicated Office - Three institutions declare that they engage to some extent in technology transfer but emphasize ongoing efforts to establish a technology transfer office, even though they have not yet achieved concrete results due to low interest from businesses.

Option 4 (3%): Technology Transfer Center - One university has established a “Technology Transfer Center” linked to the Faculty of Agriculture, aiming to collaborate with the “Agricultural Technology Transfer Center” within the Ministry of Agriculture.

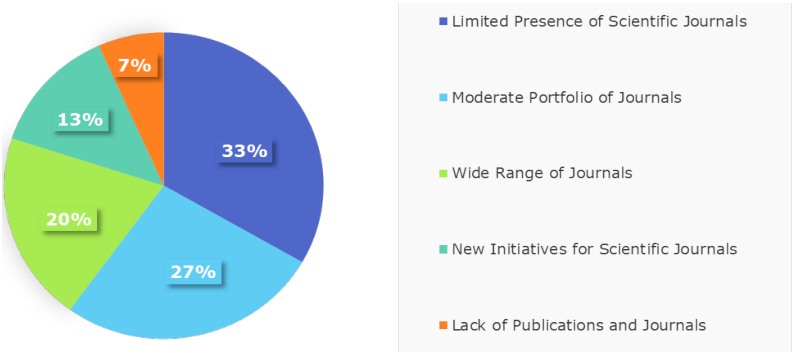
Option 5: Establishment of a Technology Transfer Unit - One university has established a “specialized technology transfer unit,” aiming to create close links between academic staff, the market, and industry.

QUESTION 16: WHAT PERCENTAGE OF ACADEMIC STAFF, OUT OF THE TOTAL, IS ENGAGED SOLELY IN RESEARCH/INNOVATION/SERVICE?



The conclusion here is that 60% of institutions either have no staff or only have a small number of staff dedicated solely to research, innovation, and service. This indicates a focus on traditional academic processes, such as PhD programs or article publications (with impact factors).

QUESTION 17: DO YOU HAVE INDICATORS TO MEASURE THE SUCCESS OR FAILURE OF THE THIRD MISSION? WHAT ARE THEY?



87% of institutions declare that they have mechanisms and instruments, contrary to what was mentioned earlier.

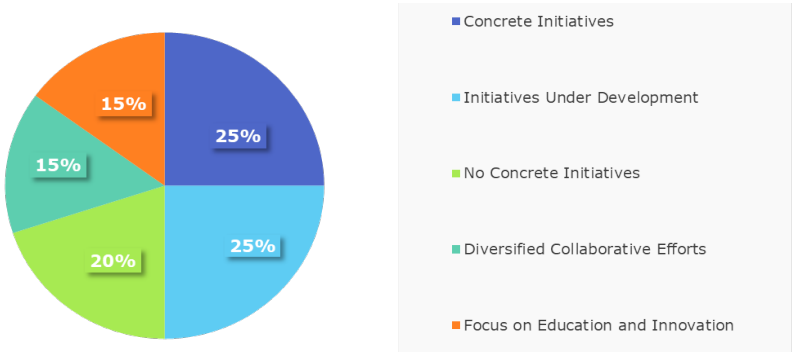
Option 1 (57% of the respondents): Use of Specific Instruments - Some institutions have developed specific indicators and instruments for measuring the success or failure of their third mission. These indicators include research impact, patent generation, student start-ups, and industry partnerships.

Option 2 (21%): Basic Indicators - Some institutions use basic indicators, such as numbers of publications, research grants, or student satisfaction metrics, to measure their third mission's success.

Option 3 (14%): No Established Indicators - A few institutions have no formal indicators in place to measure the success or failure of their third mission.

Option 4 (8%): Continuous Improvement - Some institutions are actively working on developing and improving indicators for assessing the success of their third mission.

QUESTION 18: HOW MANY INTERDISCIPLINARY SCIENTIFIC RESEARCH PROJECTS HAVE YOU INITIATED/ INVOLVED IN/COORDINATED?



Option 1 (25% of the resnpondets): Concrete Initiatives - Some higher education institutions have implemented concrete co-creation initiatives, such as projects, collaborations, and partnerships with various stakeholders including industry, government, and different organizations. These initiatives aim to drive innovation, address social challenges, and create value for all parties involved.

O**ption 2 (25%): Initiatives Under Development -** Some higher education institutions are currently in the process of conceptualizing or launching concrete co-creation initiatives. While these initiatives are not yet fully operational, they represent an institutional commitment to engage with stakeholders and foster collaborative efforts in the future.

Option 3 (20%): No Concrete Initiatives - A significant portion of higher education institutions have not undertaken any concrete co-creation initiatives so far. However, there may be plans or objectives to explore such initiatives in the future, demonstrating a potential for increased engagement with stakeholders.

Option 4 (15%): Diverse Collaborative Efforts - These institutions are involved in various collaborative efforts, including joint projects, workshops, and research activities with stakeholders from academia, industry, government, and civil society. These initiatives aim to address a wide range of social and economic challenges through innovative approaches.

Option 5: Focus on Education and Innovation - Some higher education institutions have launched initiatives focused on teaching, innovation, and skill development, particularly through partnerships with industry and government agencies. These initiatives

Generative Artificial Intelligence as a Collective Creativity

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Artificial Intelligence (AI) endeavors to construct machines capable of undertaking tasks that traditionally necessitate human intelligence. The foundational pillars of AI were established by seminal figures such as Alan Turing, known for conceptualizing computational machines and intelligence testing, and John McCarthy, who notably coined the term "artificial intelligence" at the 1956 Dartmouth Conference. This era marked the genesis of AI research, with a primary focus on rule-based systems designed to emulate human problem-solving and decision-making capabilities. These systems operated on a set of predefined instructions but often faltered in complex or unpredictable scenarios.

The field experienced a transformative shift with the introduction of machine learning algorithms in the late 20th century. Transitioning from static, rule-based systems to dynamic, learning models signified a critical evolution in AI technology. Machine learning, a cornerstone of AI, entails developing algorithms that learn and improve from experience, enabling systems to analyze vast datasets, discern patterns, and make decisions autonomously. Data acquisition and preprocessing emerged as crucial steps, ensuring the information fed into machine learning algorithms was clean, structured, and representative, thereby enhancing the algorithms' learning efficacy (Russell & Norvig, 2016).

Upon completion of their training, AI models are deployed across various sectors—healthcare, finance, automotive, and entertainment—where they continue to adapt and refine their capabilities through continuous feedback mechanisms. This adaptability underscores the potential of AI to revolutionize industries by introducing efficiencies and innovations previously unattainable.

Nevertheless, the pervasive integration of AI into everyday life has elicited significant ethical concerns. Privacy issues come to the forefront as AI systems frequently depend on personal data to function optimally. Furthermore, biases inherent in AI models, arising from unbalanced or incomplete data sets, can propagate unfair or discriminatory outcomes. The automation of jobs, a direct consequence of AI's ascendancy, prompts critical discussions regarding the future of employment and worker displacement. These concerns accentuate the necessity for an ethical framework in AI development, aiming for transparency, accountability, and fairness in technology deployment. Ethical AI mandates a conscientious approach to data sourcing and processing, bias mitigation strategies, and a contemplation of AI's societal impacts (Bostrom, 2014; Crawford, 2020; Yan & Li, 2020).

As AI technologies continue to advance, the discourse surrounding ethical considerations becomes paramount. It calls for a concerted effort among technologists, policymakers, and the public to address the ethical challenges posed by AI, ensuring that its development and application contribute positively to societal advancement and human welfare.

The increasing sophistication of AI systems also brings to light the concept of artificial general intelligence (AGI), which aims to create machines that can understand, learn, and apply knowledge across a wide range of tasks, mirroring human

cognitive abilities. The pursuit of AGI presents both remarkable opportunities and profound challenges, intensifying the debate on the limits of machine intelligence and the potential for AI to achieve consciousness or self-awareness.

Furthermore, the role of AI in enhancing human capabilities through augmented intelligence becomes a key area of exploration. Augmented intelligence emphasizes the synergistic relationship between human and machine intelligence, where AI systems augment human decision-making and creativity rather than replace human roles. This approach promotes a future where AI empowers individuals, enhancing their abilities and enabling them to achieve more than what is possible alone.

In parallel, the global race for AI dominance raises geopolitical concerns, as nations vie for technological superiority in AI research and development. This competition underscores the importance of international collaboration and regulatory frameworks to manage the proliferation of AI technologies, ensuring they are used for the greater good and do not exacerbate global inequalities.

As AI reshapes the world, it is imperative to foster a holistic understanding of its impacts. Interdisciplinary research that bridges the gap between technology, ethics, sociology, and policy is essential to navigate the complexities of AI integration into society. By promoting inclusive dialogue and collaboration, society can harness the benefits of AI while addressing its challenges, proposing a future where technology aligns with human values and ethical principles.

AI and the Ethics of Creativity

Ethical contemplation on the brisk advancement of artificial intelligence is imperative to safeguard our future adaptability and prevent AI from causing unforeseen environmental disruptions that might threaten our very survival. The concern stems from the potential of AI to bring about ecological changes we are yet to fully understand or predict. Despite this, the ethical discourse surrounding AI frequently focuses on our struggle to grasp the complexities of AI and its implications for the creative aspects of human evolution.

Gould (1996) highlighted humanity's intrinsic tendency towards self-destruction, a trait intertwined with our conception of intelligence. This tendency is often manifested in our habit of transforming abstract ideas into rigid societal frameworks. Such predispositions towards self-distruction predate the advent of modern technology, suggesting that AI's greatest risk might not be its capacity to replace us but its potential to magnify our pre-existing attitudes and behaviors exponentially. The dichotomy presented in Huxley's chessboard scenario, where nature or AI is cast as our opponent, reveals our inclination towards binary thinking. A more constructive approach would be to perceive our relationship with AI as a symbiotic extension of our interaction with the environment, appreciating both the benefits and drawbacks.

Huxley's chessboard allegory, articulated in "A liberal education and where to find it" ([1868] 2010), metaphorically represents the world as a chessboard governed by the laws of nature, with an unseen player embodying the consistent, just, and patient aspects of the natural order. Despite criticism from contemporary evolutionary biologists, this analogy encapsulates a perspective widely endorsed by Darwin's followers, including Huxley himself, who paradoxically contested the notion of humans being merely another component of nature (Melis, Pievani, & Lara-Hernandez).

The entrenched belief in human dominance over evolution, a pervasive societal misconception, challenges a more profound truth and persistently influences our urban environments. It has led to a conceptual separation between architecture and nature, often framing them as distinct, sometimes cooperative, but frequently antagonistic forces. This bifurcation has significant implications for the ethical debates surrounding AI, particularly in discussions on authorship. The anxiety surrounding authorship and creativity in the context of AI largely emanates from a fear of losing control and a rigid adherence to outdated categorizations, rather than an accurate reflection of the creative process.

Expanding upon these considerations, it is crucial to acknowledge that creativity itself is an evolutionary byproduct, a fusion of cognitive abilities that have enabled humans to innovate and adapt over millennia. The role of AI in this creative continuum is not merely to mimic human creativity but to augment and expand it, challenging us to reconceive our understanding of authorship and creativity. As we navigate the ethical landscapes shaped by AI's integration into society, it becomes increasingly important to embrace a more nuanced understanding of intelligence, creativity, and their interplay with technology. Acknowledging the limitations of our current frameworks and the potential of AI to serve as a catalyst for growth and innovation, we are called to foster a more inclusive, reflective, and adaptive approach to AI ethics, one that transcends fear and embraces the transformative potential of artificial intelligence.

Reification

To explore the concept of reification, which involves treating abstract concepts as if they were concrete entities, one can refer to a range of seminal works across philosophy, sociology, and psychology. This transformation process, originating from the Latin word "res" meaning "thing," has profound implications in understanding societal structures and individual perceptions.

In the realm of philosophy and Marxist theory, Karl Marx's *Capital: A Critique of Political Economy* (1867) is foundational. Marx discusses commodity fetishism, a form of reification in capitalist societies where social relations appear as relations between things (Marx, 1867). This perspective is critical for grasping how human labor and interactions become obscured by the commodification process inherent in capitalism.

From a sociological viewpoint, Georg Lukács expands on this concept in *History and Class Consciousness: Studies in Marxist Dialectics* (1971), examining how reification affects consciousness and societal organization within capitalist systems (Lukács, 1971). Lukács' analysis provides a deeper insight into

the alienation and objectification of human relations under capitalism.

Peter L. Berger and Thomas Luckmann's *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (1966) offers a broader understanding of how societal constructs are perceived as reality. While not addressing reification directly, their work is pivotal in exploring the mechanisms through which social constructs are accepted as tangible realities, aligning closely with the process of reification (Berger & Luckmann, 1966).

Michel Foucault's contributions, particularly in *Discipline and Punish: The Birth of the Prison* (1977) and *The History of Sexuality, Volume 1: An Introduction* (1978), provide critical insights into how power relations and knowledge are reified into concrete practices and institutions. Foucault examines the disciplinary mechanisms and discourses that solidify power dynamics and social norms into the fabric of society (Foucault, 1977; Foucault, 1978).

While Foucault did not extensively use the term "reification," his analysis of power, knowledge, and discourse resonates with the critique of reification. His work sheds light on the construction of social realities and the perceived immutability of social norms and practices.

These references collectively underscore the complexity of reification, offering a lens through which to view its manifestations in capitalist society, the construction of social norms, power relations, and the interplay between knowledge and societal practices.

Taxonomies

Starting from the concept of reification, provides a fascinating lens to explore the notion of taxonomy and its profound significance, particularly in the context of Michel Foucault's thought.

A taxonomy is broadly defined as a classification system that organizes concepts, objects, or information into categories based on specific criteria, aiding in the comprehension and communication of complex structures. While initially used in biology to classify life forms into kingdoms, classes, orders, families, genera, and species, the application of taxonomy has expanded to other knowledge domains, playing a crucial role in the organization of information.

Reification plays a significant role in the context of taxonomies when classifications, which are human constructs and abstractions, are perceived as reflections of natural and immutable divisions in the real world. In other words, taxonomic categories, despite being the outcome of human conventions and choices, are treated as if they were inherent properties of the classified objects, thereby obscuring their artificial and conventional origin.

Michel Foucault, in his work on the archaeology of knowledge and his reflections on the discourses that constitute the epistemes, or the configurations of knowledge of a given era, explored the implications of taxonomies in the human sciences. Particularly in his book "The Order of Things" (Foucault, 1966), Foucault examines how historical epochs are characterized by different systems of thought, or epistemes, that determine which taxonomies and divisions of knowledge are considered valid.

Foucault critiques the tendency to reify taxonomic categories, highlighting that they are neither universal nor neutral but rather expressions of particular power relations and specific historical and cultural contexts. According to Foucault, taxonomies are tools through which knowledge is organized, controlled, and transmitted, and their apparent neutrality and objectivity mask processes of exclusion and the definition of what is considered "normal" and "pathological," "licit" and "illicit."

Thus, exploring the concept of taxonomy from the perspective of reification opens up intriguing perspectives on the nature of knowledge and classification practices. Foucault's thought invites us to critically examine the origins, uses, and consequences of the taxonomies that structure our understanding of the world, emphasizing the importance of recognizing and questioning the power mechanisms that underlie and are upheld by these classifications.

Exploring taxonomy through the lens of reification offers fascinating insights into the essence of knowledge and classification practices. Michel Foucault's philosophy prompts us to deeply analyze the origins, applications, and impacts of the taxonomies that shape our understanding of the world. He underscores the vital importance of recognizing and critically examining the power dynamics these classifications reflect and reinforce. Taxonomies are not mere reflections of reality; they are interpretations that reveal the mindset of their creators. As such, taxonomies are significant as long as they serve a useful purpose. However, they have proven difficult to move beyond due to a crystallization into rigid interpretations of reality that are mistakenly believed to be true. This is precisely why they can become harmful, as they feed prejudices to the point where such biases can threaten our survival.

In this context, this paper argues that our understanding of the significance of artificial intelligence (AI) is compromised by our dependence on binary oppositions, which no longer capture a relevant reality. This viewpoint disputes the idea of an emerging, adversarial "artificiality" intent on overpowering humanity. Instead, it proposes that humans have pursued an evolutionary journey marked by self-imposed restrictions, potentially leading us to an impasse. The real danger lies in the possibility that what we label as "artificial" might actually be a powerful extension of our own nature, rather than a separate form of artificiality. This reevaluation compels us to rethink the existential risks we face, highlighting that the threat of extinction may arise from the very advancements we consider to be extensions of ourselves, not from an external, alien force that has spiraled beyond our control. It is our control, or rather the misuse of it, that potentially turns extensions of our creativity into dangers.

These considerations are supported by the fact that the evolutionary history of humans has resulted in the existence of only one human species among many that once existed. This solitary species has also faced in its past history the risk of reaching a point of no return, not primarily because it has placed itself at the center of taxonomy but also because it finds itself at the periphery of evolutionary trends. This unique positioning

reflects a critical misunderstanding of our place within the natural world, illustrating how our self-centric view in classification systems can mislead us about our role and impact on the planet's evolutionary trajectory. By considering ourselves as separate from or above other forms of life, we overlook the interconnectedness that defines biological evolution and the potential consequences of our actions on the future of all species, including our own.

The concept of humans as an isolated pinnacle of evolution, distinct and detached from the rest of the biosphere, has been critiqued by various scholars and scientists. Wilson (1984) in his seminal work, *Biophilia*, argues that humans have an innate connection to and dependence on the natural world, a bond that our anthropocentric taxonomies often neglect (Wilson, 1984). This oversight not only skews our understanding of biological hierarchies but also endangers the very ecosystems on which we depend. Similarly, Harari (2015) in *Sapiens: A Brief History of Humankind*, emphasizes the transformative impact of human cognition and social organization on the planet, suggesting that our species has shaped the biosphere in unprecedented ways, often to the detriment of other species and our own long-term sustainability (Harari, 2015).

The challenges posed by this self-centric view are further compounded in the realm of artificial intelligence (AI). As we project our understandings and misinterpretations of the natural world onto the development of AI, we risk amplifying these flawed perspectives. The concern is not merely that AI could evolve beyond our control, but that it could inherit and magnify our most destructive tendencies, including the propensity to categorize and control nature in ways that disrupt ecological balance and biodiversity.

Addressing these concerns requires a fundamental reevaluation of our place within the natural order. It involves recognizing the complex, intertwined relationships that define the web of life and understanding that human survival is deeply connected to the health and vitality of the entire biosphere. Integrating insights from evolutionary biology, ecology, and socio-cultural studies can help us develop a more holistic and inclusive approach to classification and technology development, one that respects the complex dynamics of natural systems and the intrinsic value of all forms of life.

Such a shift in perspective is crucial not only for the conservation of biodiversity but also for the ethical development and application of AI. By fostering a deeper respect for the natural world and all its inhabitants, we can create technologies that support sustainable development, enhance human well-being, and preserve the planet for future generations.

An Extended Taxonomy of Creativity

In the context of this paper, therefore, the risk posed by artificial intelligence (AI) is not that it might escape our control, becoming an alien force that overpowers its creators. Rather, the danger lies, as mentioned earlier, in AI becoming an extension of our humanity, capable of potentially maximizing our self-destructive tendencies through rigid categorizations of reality. This perspective shifts the concern from AI developing autonomy and turning against us to AI amplifying the flaws and biases inherent in how we understand and interact with the world. By adhering too strictly to our constructed taxonomies and failing to recognize the fluidity and interconnectedness of the natural and technological realms, we risk empowering AI systems to reinforce and escalate these limitations, leading to outcomes that could harm us all. Therefore, this and the following paragraphs will attempt to outline a description of creativity through AI within an expanded taxonomy that challenges the current binary ones. It does so by considering the heuristic lesson from the expansion of evolutionary taxonomies with the introduction of the concept of exaptation.

Exaptation, a term borrowed from evolutionary biology, refers to the process by which features acquire functions for which they were not originally evolved. Applying this concept to AI, we can envision a framework where AI's role is not limited to the binary of being either a tool or a threat. Instead, AI could be seen as a partner in the co-creation process, capable of contributing to human creativity and innovation in ways that transcend our existing categories. This reimagined taxonomy would acknowledge the potential for AI to repurpose its capabilities, adapting and evolving in response to new challenges and opportunities. Such a taxonomy encourages a more nuanced understanding of AI, recognizing its potential to both mirror and augment human intelligence in a symbiotic relationship.

Furthermore, by embracing the concept of exaptation, we can foster an environment where AI aids in breaking down the rigid categorizations that currently constrain our thinking. This approach could lead to a more dynamic and flexible interaction between humans and technology, encouraging the exploration of uncharted territories in creativity and problem-solving. Ultimately, the integration of AI within an expanded and adaptive taxonomy could enrich our capacity for innovation, enabling us to address complex challenges in more holistic and inventive ways.

Hence, redefining the narrative around Generative AI from one of control and opposition to one of collaboration and co-evolution offers a pathway towards harnessing the full potential of artificial intelligence. By expanding our taxonomies to include more fluid and interconnected categories, and by learning from the heuristic lessons of exaptation, we can better navigate the risks and opportunities presented by AI. This not only mitigates the potential for self-destructive outcomes but also opens up new avenues for creativity and progress.

Generative AI

Generative AI is at the forefront of a paradigm shift in the arts and architecture, employing advanced techniques such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs) to push the boundaries of what is creatively possible. These technologies not only provide new tools for artists and designers but also prompt a reevaluation of the concepts of creativity and authorship, challenging long-held beliefs and practices in these fields (Elgammal et al., 2017; Liapis et al., 2018).

In the realm of architecture and design, generative AI utilizes algorithms to create a multitude of design possibilities, tailoring solutions to specific efficiency, structural integrity, and spatial utilization goals (Akbarzadeh et al., 2018). It simulates complex real-world phenomena, such as airflow and thermal dynamics, thereby contributing to more sustainable and efficient building designs (Kolarevic, 2019). Beyond these technical capabilities, AI's role in data analysis is pivotal for integrating user preferences and environmental factors into the design process, enhancing the relevance and functionality of architectural projects (Veloso et al., 2020). It also promotes a culture of collaborative innovation, where machine learning aids in the ideation process, providing novel solutions and anticipating potential obstacles, thus enriching the collective creative capacity of architects and designers (Ciftcioglu, Gül, & Çagdas, 2019).

This technological advancement raises questions about the nature of creativity and the role of human input in generating exceptional visual art and designs. Generative AI's capacity to transcend traditional distinctions—such as those between the artificial and natural or between human and AI creativity—opens up unprecedented opportunities for creative expression. It fosters a collaborative ecosystem where algorithm developers, users, and contributors to databases all play integral roles in the creative process, thereby democratizing and diversifying artistic and architectural production (Melis, Pievani, & Lara-Hernandez).

By enabling artists and designers to merge their work with that of others, generative AI facilitates the creation of art that surpasses the limitations of the human brain, promoting a form of collective creativity that leverages shared algorithms and data pools. This innovative approach challenges conventional views on art and authorship, advocating for a revised understanding that embraces creativity as a product of both deliberate and serendipitous collaborations. Such a perspective acknowledges the complex, shared nature of creative endeavors, suggesting that our appreciation of art and design must evolve to recognize the contributions of generative AI as a legitimate and enriching component of the creative landscape.

Generative AI and Exaptation

Generative AI serves as a prime example of exaptation, a concept borrowed from evolutionary biology to describe the innovative use of existing features for new purposes.

Exaptation is a concept originally derived from evolutionary biology, used to describe how features or traits that evolved for one purpose can be co-opted for a different use. The term was popularized by biologists Stephen Jay Gould and Elisabeth Vrba in 1982 as a way to explain certain evolutionary changes that could not be adequately accounted for by traditional notions of adaptation. Unlike adaptations, which are traits shaped by natural selection specifically for their current role, exaptations are features that have taken on new functions beyond those for which they were originally developed or selected.

In the context of evolutionary biology, an example of exaptation would be the feathers of birds. While feathers might have originally evolved for temperature regulation or some other function, they were later co-opted for flight. This secondary use of feathers for flying is an exaptation because the original evolutionary pressure that led to the development of feathers was not flight.

The concept of exaptation has since been extended beyond biology to other fields, including technology, architecture, and creative arts. In these domains, exaptation refers to the process of repurposing existing technologies, ideas, or practices for new and often unforeseen applications. For example, in technology, the development of the internet is a form of exaptation. Originally designed to facilitate communication within the scientific community and between military installations, the internet has been repurposed for a vast array of functions, including commerce, social networking, and entertainment, far beyond its original scope.

In creative arts, exaptation can be seen in how artists repurpose materials or ideas to create new works that diverge significantly from the materials' or ideas' original functions or meanings. This process underscores the creativity inherent in recognizing the potential of existing elements to fulfill new roles or express new concepts.

Exaptation highlights the dynamic and innovative aspects of evolution, design, and creativity. It emphasizes the fluidity of function and the potential for existing features to be adapted to new contexts, providing a broader understanding of how change occurs over time. By acknowledging the role of exaptation, we gain insights into the complexity of development and innovation, recognizing that progress often involves the reinterpretation and repurposing of what already exists, rather than the creation of entirely new forms from scratch.

In the realm of creativity and technology, exaptation through generative AI involves leveraging pre-existing data, like imagery or sound databases, and repurposing it to generate novel artistic or design outputs. This process is reflective of nature's own evolutionary strategies, where biological traits evolve over time to serve functions different from those they were originally developed for. Generative AI, by mimicking this process, demonstrates the vast potential for adaptive innovation, transforming what might be considered obsolete or redundant into valuable, creative assets.

At its core, creativity involves the recombination and reinterpretation of existing elements to produce something new and valuable. This associative process, fundamental to both human and AI-driven creativity, relies on the amalgamation of disparate ideas, images, or concepts to forge new creations. The degree to which a piece of art or design deviates from its original influences, through processes of blending and association, often determines its creative value. This challenges the traditional concept of authorship, which is heavily influenced by the desire for individual recognition and ownership of creative work. Recognizing that creativity is inherently a collaborative endeavor underscores the flawed notion of sole authorship. Whether through human collaboration or AI integration, creativity

emerges as a collective enterprise, enriched by the contributions of many (Melis, Pievani, & Lara-Hernandez).

The essence of creativity transcends mere replication, characterized by its unpredictable and emergent properties. It is this non-deterministic quality of creativity that allows for the emergence of truly innovative ideas and artifacts, often in ways that the original sources or creators could not have anticipated. Generative AI encapsulates this principle by operating beyond the simple act of duplication or imitation. Instead, it engages in a complex, often autonomous process of creating new combinations from existing data, mirroring the human brain's capacity for generating ideas through subconscious associations. This process, not fully understood or predictable, highlights the capacity of generative AI to contribute genuinely novel and creative outputs to the fields of art, design, and beyond.

Such advancements in generative AI challenge us to reconsider our perceptions of creativity, authorship, and the artificial-natural dichotomy. By acknowledging the role of AI in the creative process as an extension of human ingenuity rather than a replacement or competitor, we open ourselves to a richer, more inclusive understanding of creativity. This perspective not only broadens the scope of what is considered creative but also emphasizes the collaborative synergy between human and machine intelligence. As we continue to explore the capabilities of generative AI, it becomes clear that the future of creativity lies in our ability to harness these technologies in ways that complement and enhance our inherent creative capacities.

Case Studies

The exploration and application of Generative AI across various case studies underscore its transformative potential, not just in the realm of digital art but also in architecture, design, and beyond. These instances highlight the seamless integration of AI into the creative process, challenging our traditional notions of authorship and creativity, and reinforcing the concept of exaptation as a powerful tool for innovation. The "Two Acrobats" installation by Fadhil Fadhil and Monica Battistoni is a prime example of how Generative AI can be harnessed to merge the physical and digital realms, creating a new dimension of performance art that explores the relationship between the body and space. Their work, supported by the IDC Foundation and showcased at the FuoriSalone di Milano in 2023, leverages AI-generated imagery to enhance the narrative of acrobatic performance, embodying the concept of resilience and the magic of theatrical staging. This project not only exemplifies the potential of AI to augment the creative process but also demonstrates its ability to inspire new forms of artistic expression and cultural action.

Similarly, the "Padiglione della Scienza" project, in collaboration with Emanuele Lisci and Dustin White, utilizes AI-generated images to establish a symbiotic relationship between organic and artificial elements within architectural design. This innovative approach highlights the role of AI in fostering a harmonious and multidisciplinary spatial experience, further exemplifying Italy's commitment to technological advancement and environmental sustainability.

Moreover, the poetic creativity project organized by the Italian Institute Culture New York, under the direction of Fabio Finotti, illustrates the innovative use of AI in linking poetry with visual art through AI-driven image generation and 3D fabrication. By analyzing the text of award-winning poems and translating these into visual representations, this approach bridges the gap between abstract poetic concepts and tangible artistic expressions. The project, which involved digital fabrication techniques to create physical artifacts from AI-generated images, underscores the potential of AI to facilitate a dynamic interplay between different creative domains, enriching the artistic experience and expanding the possibilities for creative exploration.

These case studies collectively illustrate the profound impact of Generative AI on redefining creativity and authorship. By repurposing existing elements for new uses and creating alternative evolutionary pathways, AI challenges deterministic views of art and encourages a reevaluation of traditional artistic practices. The integration of AI into creative endeavors prompts a broader reflection on the role of technology in society and the ethical considerations it raises. As we navigate the complexities of AI and its integration into our cultural and creative landscapes, it becomes imperative to foster an environment that encourages collaboration, innovation, and a deeper understanding of the symbiotic relationship between human and artificial creativity.

In conclusion, the significant case studies presented serve as a testament to the transformative power of Generative AI in expanding the horizons of creativity and innovation. They reinforce the necessity for ethical reflections on the rapid advancement of AI and its implications for our future adaptability, creativity, and societal evolution. As we continue to explore the boundaries of what AI can achieve in concert with human ingenuity, it is clear that the journey of discovery and innovation is far from over, promising a future where the collaborative potential of human and AI creativity is fully realized.

Continuing the discourse from previous case studies, this paper extends the discussion to a broader interpretation of collective creativity that transcends the use of specific "artificial intelligence" tools like Midjourney or Stable Diffusion. The case studies presented herein illustrate how the reuse of materials and the extensive process of functional co-optation can blend digital and analog dimensions in a combinatory manner. This synergy is fueled by collective participation in the exploration of ideas, images, and shapes, where intentionality does not take precedence.

Cyberwall

This practice-based research, led by Heliopolis 21 Architects, also explores architectural exaptation, seeking to broaden existing architectural taxonomies with environmentally oriented strategies. The projects Cyberwall I and II, alongside Geocity, stand as pillars of this research endeavor. Notably, the Cyberwall I installation, which was showcased at the 2021 Italian Pavilion of the Venice Biennale, epitomizes sustainable and inclusive design. Curated by Heliopolis 21 and utilizing Iris Ceramica Group’s ceramic surfaces, these projects redefine the canvas

for pre-existing graphic compositions, thus demonstrating the revolutionary potential of Iris Group's technology.

From a creative standpoint, these projects exemplify the innovative application of Iris Ceramica Group's Design Your Slabs (DYS) technology. This innovation permits the transference of any graphic composition onto ceramic surfaces, thereby empowering individuals with unparalleled freedom of expression. The installations provoke diverse interpretations based on viewer perspectives, thus sparking dialogue on the synergy between artificial methodologies and natural elements.

The sustainable dimension of these projects is highlighted through the use of Iris Ceramica Group's Active Surfaces®, which boast antibacterial, antiviral, and anti-pollution qualities. Thanks to the photo-catalytic properties of titanium dioxide and silver, these ceramic slabs transform into eco-active materials that combat microbial spread, reduce smog, and mitigate substances harmful to human health and the environment. Furthermore, the materials utilized in the Cyberwall installations are produced in Zero Emission factories, contain 40% recycled content, and are fully recyclable.

Spandrel II and Genoma

Spandrel II and Genoma, innovative installations at the Italian Pavilion during La Biennale di Venezia 2021, symbolize the pressing need for inherently ecological architecture. These installations, a collaborative effort involving PNAT, Heliopolis 21, and other visionaries, not only present innovative architectural concepts but also underscore the imperative to reevaluate the artificial nature of architecture amidst environmental challenges.

Genoma, in particular, incorporates biospheres for aeroponic cultivation and slime mold farming, integrating biological and ecological principles into architectural design. This approach not only promotes sustainable food production within built environments but also serves as a prototype for real building structures capable of supporting diverse agents, both human and non-human. Spandrel II, serving as a seed bank, houses seeds from the precious collection of the Padua Botanic Garden, thereby bridging architecture with biodiversity preservation.

These projects have fostered collaboration across disciplines—biology, botany, physics, and climatology—to emphasize the necessity of a multidisciplinary approach in expanding architectural taxonomy. Inspired by the "Climate Resilient Nexus Choices" (CRUNCH) research, these endeavors highlight the food-energy-water nexus's role in building resilience, advocating for the education of architects in creativity and experimentation to address future challenges.

Black Box

The Black Box installation, designed in collaboration with Juhmur Gokchepenar and presented at the Venice Biennale 2021, builds upon the Borboletta project. Borboletta was developed by Eric Goldemberg/Monad Studio, Heliopolis 21, Juhmur Gokchepenar, Jorge Cereghetti, and Francesco Lipari, and it received an award at the Buenos Aires Biennial. This project introduces a visionary cricket farming initiative within habitat spheres. At its core, The Black Box features a simulated opening filled with slime mold, which can be considered the first facade system using a living organism as a sunscreen system. It offers a dynamic viewing experience through the regulated growth of this organism. The installation not only explores the coexistence of living organisms within an artistic framework but also investigates sustainable food production and ecological balance.

Createch

The Createch installation, commemorating Italian Republic Day at the Italian Embassy in Washington, D.C., investigates architectural exaptation and functional co-optation. Crafted using a CNC machine and incorporating recycled plastic for 3D-printed symbionts, Createch exemplifies the fusion of innovation and education, encouraging students to embrace change and engage in groundbreaking research.

Through these case studies, this paper underscores the potential of architectural exaptation and functional co-optation in fostering transformative design, highlighting the importance of multidisciplinary collaboration and the integration of sustainable practices in shaping the future of architecture.

Conclusion

The prevalent misunderstanding of creativity as an individual's exclusive domain stems from a fundamental challenge: our difficulty in recognizing the vast network of influences and inspirations that underpin each creative endeavor. This misconception leads to the assumption that creative works are wholly original, ignoring the reality that every creative act is, in some way, a reconfiguration or reinterpretation of existing ideas, images, or concepts. As noted by Melis, Pievani, & Lara-Hernandez, this oversight can inadvertently result in the infringement of others' creative contributions, whether those influences are directly acknowledged or remain obscured within the depths of unconscious inspiration.

The ongoing debate over authorship and artistic ownership is significantly influenced by this limited perspective, which fails to encompass the collaborative and iterative nature of creative work. This outdated stance on authorship does not accurately reflect the complexity of creativity nor does it foster a holistic understanding of creativity's role within a broader ecological or societal context. Moreover, the concerns raised mirror the historical apprehension towards labor displacement by technological advancements, reminiscent of the Luddite movement's resistance to industrial machinery. This parallel suggests a profound need to reevaluate our conceptions of creativity, authorship, and the role of artificial intelligence within our creative ecosystems.

The apprehension that AI might supplant humans in creative roles, along with the fixation on authorship, originates from an entrenched classification system. This system, which historically defined "creativity" as the creation of something from nothing (ex nihilo), overlooks the intrinsic nature of human creativity as a derivative and collaborative process. The traditional view of creativity as the product of solitary genius is increasingly

challenged by insights from fields such as paleoanthropology, which reveal that human creativity has always been a collective endeavor, characterized by the amalgamation and adaptation of pre-existing ideas and influences.

This revelation underscores creativity as an inherent extension of human intelligence, capable of transcending individual limitations to embrace a more communal form of innovation and expression. Recognizing creativity as a shared journey not only aligns with our understanding of human evolution but also opens up new vistas for appreciating the role of AI in creative processes. Far from threatening the essence of human creativity, AI can be seen as a tool that amplifies our natural propensity to connect, adapt, and reimagine the world around us.

In light of these insights, it becomes imperative to foster a more inclusive and collaborative approach to creativity, one that acknowledges the contribution of both human and artificial intelligences. By embracing this broader perspective, we can move towards a future where creativity is not viewed as a competitive battleground but as a fertile ground for cooperation, where AI serves as a partner in the ongoing exploration of our collective creative potential.

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Hyper Personalization in Car Design

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Introduction

A major shift is occurring in the quickly developing field of automobile design, one that strongly emphasizes individuality. The emergence of hyper-personalization, or the craft of tailoring design features to meet particular needs, signifies a paradigm shift in automotive design. This method is changing the game in automobile design by going beyond aesthetics and creating customized experiences that speak to the individual preferences and likes of each driver. The idea of hyper-personalization is a break from the conventional approach to car design, which frequently restricted options to a preset list based on broad market trends. Automakers are adopting artificial intelligence, data analytics, and cutting-edge technologies as the industry develops to create vehicles that can dynamically adjust to the demands and tastes of specific customers. This change is a result of shifting consumer preferences and the rapidly changing technological landscape, which makes both the driving experience and the product more unique and customized than previously. In fact, the automotive sector and its designers are embracing hyper-personalization to the fullest extent possible in order to raise the driving experience to previously unheard-of heights and eventually create a future in which every driving experience is specially customized for each individual.

Beyond Aesthetics: Adding Your Own Style to Design

When it comes to automotive design, mass production methods and popular consumer preferences have long dominated the field. This has frequently led to an abundance of cars that don't have a strong emotional bond with their owners. The emergence of hyper-personalization, a movement that recognizes each driver's individuality and their own likes, lifestyles, and preferences, is posing a growing threat to the current quo, though. The days of assembly line efficiency and wide consumer demographics controlling car design are long gone. Today's automakers are researching the nuances of customer behavior, tastes, habits, and even driving patterns, owing to technological breakthroughs like artificial intelligence and machine learning. Designers can create cars that fit into their owners' lives effortlessly thanks to the abundance of data available to them. Hyper-personalization is about making the idea of custom automotive design a reality, not just something that looks good. With hand-selected materials, personalized color schemes, and ergonomic features catered to each person's specific body type, the goal is to create a car that not only expresses the owner's personality but also improves their daily life. Imagine driving a car that not only happens to be your favorite color, but also knows what you need and want before you even say it. Hyper-personalization makes this dream come true. Every element of the driving experience is painstakingly customized to fit the individual, from accommodating seating arrangements that adapt to your comfort level to simple infotainment systems that learn your entertainment choices. Furthermore, hyper-personalization goes beyond what is found within the car. It includes a comprehensive design approach that takes into account the car's operating ecology as a whole. This includes customized insurance plans that take into consideration each person's unique risk profile, individualized maintenance schedules based on driving behaviors, and even specially designed driving routes that satisfy particular hobbies and tastes. Ultimately, hyper-personalization represents a paradigm shift in automotive design, one that places the power firmly in the hands of the consumer. No longer are drivers constrained by the limitations of mass-produced vehicles; instead, they are empowered to imbue their cars with their own unique style and personality. In a world where customization is king, hyper-personalization reigns supreme, ushering in a new era of automotive design where the boundaries between man and machine blur, and the driving experience becomes truly one-of-a-kind.

Custom-tailored experiences

Within the dynamic field of automotive innovation, hyper-personalization has expanded beyond the simple personalization of tangible elements to include a whole overhaul of the driving experience. Imagine a car that can not only customize the interior decor, temperature, and seating arrangements to the driver's exact specifications, but also has the mental capacity to learn from the driver's actions and subsequently anticipate and meet all of their needs. Intelligent in-car technologies with cutting-edge features like sophisticated biometric sensors, voice commands, and facial recognition are at the core of this revolution. Thanks to these state-of-the-art technologies, cars are now able to identify individual passengers, understand their specific tastes, and adjust the ride accordingly. The options are endless, ranging from figuring out the driver's favorite temperature settings to modifying the ambient lighting to set the ideal mood. The capacity of hyper-personalization to move beyond simple reactive changes to proactive involvement is what makes it unique. Imagine a vehicle that actively interacts with its occupants, providing tailored advice and ideas to improve their driving experience, in addition to simply obeying directions. The possibilities are as varied as the drivers themselves, from creating a customized playlist based on the driver's taste in music to identifying local areas of interest based on historical travel patterns to even suggesting the best driving routes based on personal preferences. Moreover, hyper-personalization doesn't stop within the car; it flows naturally into the larger ecosystem of networked services and intelligent infrastructure. Imagine living a routine where your car talks to your smart home devices and becomes a seamless part of it. Your automobile alerts your smart thermostat to your arrival, adjusting the temperature to your preferred setting and turning on your smart lights to light your way as you get closer to your house. However, hyper-personalization's capacity to reinvent the fundamental nature of the driving experience itself may be its most revolutionary feature. Driving is transformed into an incredibly personalized and engaging experience, transcending beyond the routine duty of getting from place to place. Every trip increases the car's sensitivity to the driver's choices, allowing it to easily adjust to their changing requirements and preferences. Hyper-personalization, which puts the driver at the center of the driving experience, is essentially a paradigm shift in the automotive industry. With automobiles evolving beyond simple means of transportation to become extensions of our individuality and way of life, the opportunities for personalization and customization are practically endless. It makes sense that our cars will adapt to our own preferences in a world where everything in our lives is becoming more and more customized. Greetings from the age of ultra-personalized driving experiences, where each driver's adventure is as distinct as they are.

Technology's Part in Hyper-Personalization

It is impossible to overestimate the impact of technology on the hyper-personalization revolution in automobile design. Modern technology integration is the cornerstone upon which this paradigm shift is based in today's ever changing market. Augmented reality (AR) displays are one such technological marvel that is changing the driving experience. Imagine a time when static maps and traditional GPS navigation devices are obsolete for driving. The windshield becomes a dynamic canvas that displays personalized information in real-time when AR displays are installed. With AR, driving becomes a smooth voyage of discovery, complete with individualized directions based on each driver's preferences and real-time traffic updates. However, AR is only the beginning. Vehicle-driver interactions are being subtly revolutionized by machine learning algorithms working in the background. Through the examination of enormous amounts of data gathered from cameras, sensors, and other onboard equipment, these algorithms are able to identify trends in the driver's preferences and behavior. With time, they develop the ability to anticipate the needs of the driver and modify everything to suit their particular driving style, from the suspension's stiffness to the vehicle's responsiveness. Furthermore, technology is the key component that makes it possible to seamlessly incorporate highly customized features into every part of the car. The car takes on the characteristics and preferences of the driver as soon as they get inside. Name-based welcomes greet guests personally, and speech recognition software understands their requests and obeys them with unmatched precision. However, the most impressive thing about technology's contribution to hyper-personalization may be how flexible and dynamic it is. With every mile that goes by, drivers continue to engage with their cars and offer feedback and input, which helps the onboard systems learn and adapt to better understand the driver's preferences. Essentially, technology is the engine driving the hyper-personalization revolution rather than just a tool. The seamless integration of augmented reality displays and the advanced algorithms driving machine learning capabilities are just two examples of how technology is enabling designers to push the limits of what's practical in automobile design. Looking ahead, it seems certain that the hyper-personalization period is here to stay and that technology will continue to be a major influence in creating the driving experiences of the future.

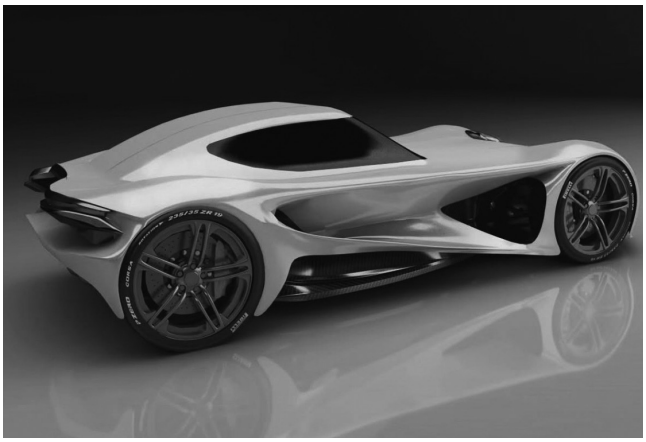

Figure 1: Toyota E Concept. Hyper-personalization in automobile design. Design and 3D by Gregor Andoni

Technological Enablers

Technological enablers are leading the charge to revolutionize automobile design in the era of hyper-personalization, ushering in a new era when every feature of the car may be customized to the unique tastes of the driver. Three of these enablers—Advanced AI Algorithms, 3D Printing Technology, and Augmented and Virtual Reality (AR and VR)—stand out as being very revolutionary.

1)High-Tech AI Algorithms:

The ability of machine learning algorithms is fundamental to hyper-personalization. These advanced AI systems can examine enormous datasets, which include driving habits and behavior as well as user preferences and lifestyle selections. Artificial intelligence (AI) systems can anticipate and recommend customized design features that speak to each driver on a very intimate level by analyzing this abundance of data. For instance, AI algorithms can suggest unique exterior finishes, interior layouts, and even customized branding possibilities based on a driver's historical vehicle preferences, favorite color schemes, and even social media activity. This degree of customization transcends just aesthetics, molding every facet of the driving encounter to suit the individual interests and inclinations on personal level.

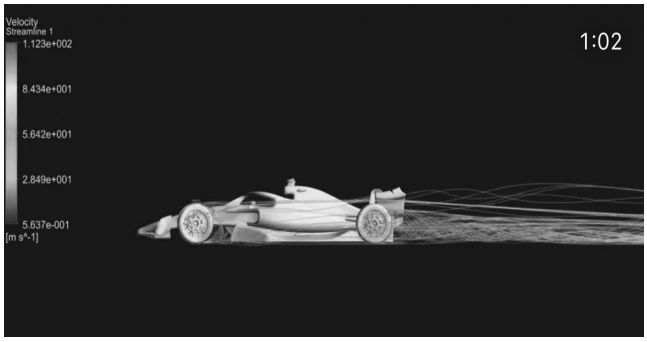

Figure 2: Aerodynamic Testing for hypercar. Testing by Gregor Andoni

2)Technology for 3D Printing:

3D printing technology has revolutionized the car design industry by making it possible to create sophisticated designs and custom components that were previously unreachable using standard production methods. By experimenting with detailed textures and complicated shapes, designers can push the limits of what is achievable in automobile aesthetics with 3D printing. From customized grilles and body panels to personalized badges and emblems, 3D printing allows for unparalleled levels of customization and craftsmanship. Moreover, the flexibility of 3D printing enables designers to iterate quickly and efficiently, making it possible to rapidly prototype and refine personalized design elements until they perfectly align with the driver's vision.

3)Virtual reality and augmented reality:

Customers now engage and experience their customized vehicles in a whole new way thanks to the incorporation of AR and VR technology into the automotive design process. Thanks to augmented reality and virtual reality, drivers can now fully immerse themselves in a virtual showroom, where they can experiment with configurable features, view various design alternatives, and even conduct virtual test drives.

Figure 3: 3D Printing in car Design. Concept is for Hyper-Car in automobile design. Design and 3D by Gregor Andoni

Designers can provide customers with an extremely engaging and immersive experience by utilizing AR and VR, enabling them to see their customized vehicle in breathtaking detail even before production starts. With AR and VR, the consumer has direct control over personalization, from changing interior finishes and seating arrangements to investigating exterior color choices and aerodynamic improvements. In summary, technological enablers such as Advanced AI Algorithms, 3D Printing Technology, and Augmented Reality (AR) and Virtual Reality (VR) are driving the hyper-personalization revolution in automotive design. By harnessing the power of these cutting-edge technologies, designers are able to create vehicles that are not only personalized to the individual preferences of the driver but also push the boundaries of creativity and innovation in the automotive industry.

Tailored Exteriors

The concept of hyper-personalization in automotive design goes well beyond the inner cabin and can even be applied to the outside of vehicles, turning them into customized "works of art". The incorporation of modular design elements and a wide range of paint and finish options are two important channels by which this metamorphosis takes place.

a. Options for Paint and Finish:

Customers have historically only had a small range of colors to choose from when choosing the external finish of their cars. Nonetheless, there are essentially an infinite number of alternatives in the hyper-personalization era. Manufacturers now provide a wide variety of unique paint treatments, textures, and even dynamic color-changing features, going beyond the traditional color palette. The options are as diverse as the drivers themselves, ranging from matte finishes that radiate a clean and modest elegance to iridescent metallic hues that shift and shimmer in the sunlight. Furthermore, novel effects like iridescent sheens, reflecting coatings, and even textured

finishes that give the vehicle's external surfaces more depth and dimension are now achievable thanks to developments in paint technology. Essentially, a hyper-personalized vehicle's external finish acts as a canvas for the driver to display their uniqueness and personality. The external finish of a hyper-personalized car is a reflection of the driver's individual style and preferences, whether it's a striking color scheme that draws attention or a soft, elegant palette that conveys refined taste.

b. Components of Modular Design:

Hyper-personalized cars come with a wide variety of paint and finish options as well as modular design components that enable even more personalization and customization. In contrast to conventional cars, which have a mainly set external appearance, hyper-personalized cars have easily removable parts such bumpers, grilles, and side panels that can be changed to alter the car's appearance over time. In addition to giving customers more choice and flexibility to customize their cars, this modular approach to design promotes higher sustainability and longevity. Drivers can change and update the appearance of their cars as their likes and preferences change over time, as opposed to being restricted to a particular aesthetic. Additionally, the ability to switch out individual parts reduces the environmental effect of car maintenance and repair by making it simpler to replace or repair worn-out or damaged parts. In conclusion, both the exterior and interior cabins of automobiles are included in the notion of hyper-personalization in automotive design. Manufacturers are enabling customers to personalize their cars to the extent that they are by providing a wide range of paint and finish choices and using modular design features. Customized external elements and striking color schemes are just a few of the ways that hyper-personalized cars are pushing the limits of automotive design and giving drivers the chance to stand out on the road.

Customized Interior Design

The idea of personalized interior design has become increasingly important as the automotive industry develops, turning the driving experience into a customized haven that is catered to the tastes of each and every driver. Adaptive seating and ergonomics, intelligent networking, and the incorporation of artificial intelligence (AI) into cabin design are the driving forces behind this revolution in interior design.

Ergonomics and Adaptive Seating

Ergonomic features and seating configurations are no longer one-size-fits-all in the world of hyper-personalization. Adaptive seating technologies, which enable changeable seating arrangements, dynamic lighting systems, and variable climate management, are being adopted by manufacturers instead. By implementing these advances, the interior cabin is customized to meet the individual needs and preferences of the driver and passengers. To maximize comfort on lengthy trips, adaptive seating systems, for instance, may have massaging capabilities, heated and ventilated seats, and adjustable lumbar support. Various ambiance settings can be produced by dynamic lighting systems according to the time of day, the driving environment, or even the occupants' mood. In contrast, moveable seating arrangements provide passengers with flexibility and versatility, enabling them to personalize their seating arrangements to meet their unique needs and preferences.

b. Snart connectivity:

In the connected world of today, a flawless in-car experience depends on continuous connectivity. Advanced speech recognition, AI-powered assistants, and customized infotainment systems are being incorporated by manufacturers to make sure that drivers are informed and connected while driving. Voice-activated assistants allow for hands-free operation of a number of car controls, including phone calls, retrieving navigation instructions, and changing the climate control settings. In order to improve the driving experience, personalized infotainment systems generate a unique playlist of songs, podcasts, and other entertainment options based on the user's tastes and driving patterns. Moreover, many cars today enable integration with mobile devices, smart home systems, and other connected devices, demonstrating that smart connectivity goes beyond the boundaries of the car itself. With this smooth integration, drivers may use their smartphone to check their schedule, operate their home appliances, and even remotely start their vehicle.

c. The Application of AI to Cabin Design:

Possibly the most revolutionary feature of personalized interior design is the incorporation of artificial intelligence into the cabin. Artificial intelligence (AI) systems have the ability to observe how passengers act inside the vehicle, learn about their preferences over time, and adjust different elements of the interior environment in response. AI-driven technologies, for instance, can enhance ambient lighting to create a calming atmosphere, change the audio settings according to the driver's preferred music, and even automatically alter the seat position to guarantee maximum comfort. These AI systems develop the ability to predict the wants and needs of the passengers over time, resulting in a genuinely customized and engaging driving experience. Let's wrap up by saying that the age of personalized interior design is a paradigm shift in the car business, with each part of the driving experience catered to the unique needs and tastes of the driver and passengers. Manufacturers are pushing

Figure 4: The application of Al in automotive design. Design by Gregor Andoni

the limits of vehicle sophistication and luxury by incorporating smart connections, artificial intelligence into cabin design, and adaptable seating and ergonomics to provide drivers with a genuinely best customized experience.

Empowerment of the Consumer

The consumer's empowerment has emerged as a key factor in the development of car modification and personalization in today's automotive environment. Co-creation platforms and digital design studios are two important tactics that have arisen to support this empowerment.

a.Co-Creation Platforms:

Automakers are adopting a collaborative approach to design by allowing customers to actively participate in the customization process, thanks to the growth of co-creation platforms. With the use of these platforms, consumers may collaborate to co-create their dream car with designers, engineers, and other enthusiasts. Customers can customize a number of elements of their car, including as the outside paint color and inside finish, as well as the performance and technological features, with simple to use interfaces and tools. Users can traverse the customization process with the assistance of specialists who provide real-time feedback and coaching, ensuring that their final design represents their own likes and preferences. Additionally, co-creation platforms let users feel like they belong and are part of a community by allowing them to share their designs, collaborate on projects with like-minded people, and trade ideas. This collaborative attitude fosters a sense of pride and ownership in the finished result in addition to improving the customized experience overall.

b. Studios for Digital Design:

Users of digital design studios have access to a virtual playground where they may let their imaginations run wild and test out many design options in a lively, interactive setting. These cutting-edge platforms simulate the automotive customizing process in a lifelike manner by utilizing state-of-the-art technologies like virtual reality (VR) and augmented reality (AR). Users may experiment with different design possibilities, see their customized cars in amazing detail, and make real-time revisions to perfect their designs all from the comfort of their own homes. With the ability to modify the external appearance, personalize the interior design, or test out performance upgrades, digital design studios enable users to realize their ideas with a level of ease and accuracy never before possible. Moreover, users have autonomy and authority over the customization process in digital design studios, which frees them up to express their creativity without restraints. These studios encourage a closer bond between customers and their cars by offering a venue for experimentation and self-expression. This strengthens the sense of empowerment and ownership that is key to the customized experience. In conclusion, the consumer's empowerment has transformed the customizing and personalization of automobiles, resulting in the emergence of cutting-edge platforms like digital design studios and co-creation platforms. These platforms provide a sense of community, creativity, and ownership by giving users the means to actively engage in the design process. This makes personalizing an automobile a genuinely empowering and gratifying experience.

Societal implications

The emergence of hyper-personalization in car design not only signals a revolution in vehicle customization, but it also has important societal ramifications that go well beyond the automotive sector. As hyper-personalization increases, more complicated questions and challenges arise that require careful study, ranging from environmental concerns and ethical dilemmas to societal trends toward uniqueness.

a. Cultural Transition Ahead of Individualism:

Fundamentally, the hyper-personalization of car design is a reflection of the general trend in society to value individualism, self-expression, and distinctiveness. In a time of mass manufacturing and homogenization, customers are looking for more and more methods to stand out from the crowd and declare their individuality. People may give their cars a feeling of personality and character that represents their own distinct interests and preferences by being able to customize and personalize every part of them. Furthermore, the emergence of hyper-personalization has led to a resurgence of interest in craftsmanship, creativity, and self-expression, akin to a cultural renaissance. Hyper-personalized cars act as physical representations of uniqueness and creativity in a society that is becoming more and more homogenized. These alterations range from custom paint jobs and interior design to one-of-a-kind accessories and aftermarket upgrades.

b. Taking the Environment into Account:

But there are also environmental and resource-related issues with the hyper-personalization movement. The ethical ramifications of hyper-personalization on the environment are a topic of increasing discussion as manufacturers try to satisfy consumers' increased expectations for more customization options. Customized components, complex manufacturing procedures, and specific materials are frequently needed in the creation of hyper-personalized automobiles, all of which can have a big influence on the environment. The environmental impact of hyper-personalization is becoming more and more of a worry, with increased energy use, carbon emissions, resource extraction, and waste production. Moreover, there are extra waste management and recycling issues when disposing of customized parts and accessories at the end of a vehicle's existence. Therefore, it is imperative that automakers embrace advances in environmentally friendly materials and manufacturing processes, as well as more sustainable production practices.

Obstacles and Prospective Paths:

a.Data Privacy Issues

The collection and use of personal data for customized purposes raises a number of ethical concerns that are closely related to hyper-personalization. Data security and user privacy

are major problems as automakers gather and examine enormous volumes of data on customer preferences, actions, and routines. Unauthorized access to or improper use of personal data puts consumer privacy at serious risk and can have a number of ethical and legal repercussions. Strong data protection policies and open data governance frameworks are therefore desperately needed to preserve user privacy and guarantee the appropriate use of personal data in hyper-personalization projects.

b.Juggling Personalization with Safety Requirements

Striking a balance between allowing for customization and adhering to safety rules is another problem facing automakers. In order to protect the safety and wellbeing of drivers, passengers, and other road users, safety requirements and standards must be followed, even though consumers may want more customization options for their cars. If aftermarket modifications and bespoke component integration are not adequately tested and regulated, there may be serious safety concerns. Because of this, it's important to have precise rules and regulations controlling vehicle customization in addition to thorough certification and testing procedures to guarantee that modified cars adhere to all applicable safety regulations.

c.Durability in Highly Customized Experiences

Ultimately, the pursuit of sustainability poses a significant obstacle for automakers who aim to adopt hyper-personalization. Reducing the environmental impact of car customization and implementing more sustainable production techniques are imperative as consumer demand for personalization rises. This calls for advancements in sustainable production methods, eco-friendly materials, and effective waste management strategies. There are several ways for automakers to include sustainability into hyper-personalization projects, ranging from the use of renewable and recycled materials to the adoption of energy-efficient production techniques. To sum up, the increasing trend of hyper-personalization in car design has significant social ramifications that go beyond the automotive sector. The problems and opportunities given by hyper-personalization necessitate careful analysis and aggressive effort to assure a sustainable and responsible future for vehicle customization. These obstacles range from cultural shifts toward individualism to environmental considerations and ethical dilemmas.

Obstacles & Things to Think About

Hyper-personalization is a paradigm change in automotive design that has enormous potential for customers who want to show their personality and customize their cars to fit their specific tastes. To guarantee the success and durability of hyper-personalization initiatives, there are important challenges and factors to take into account amidst this tsunami of customization. The main issue with hyper-personalization is that there is a chance that the production and design processes will be compromised in terms of quality. There is a chance that in the quest of individuality, manufacturers will compromise consistency and quality in order to satisfy consumer requests for more personalization possibilities. In order to keep cars on the road safe and reliable, it is crucial to make sure that hyper-personalized cars fulfill strict quality standards and follow safety laws. To ensure the success of hyper-personalization programs, it is imperative to accurately balance safety rules with customization. Although customers might want more freedom when it comes to personalizing their cars, it's important to make sure that customization choices don't endanger other drivers, passengers, or road users or jeopardize the vehicle's safety. To ensure the safety of customized vehicles, stringent testing and certification procedures must be followed in addition to careful consideration of safety norms and laws. An additional factor to take into account is the possibility that drivers could become overwhelmed by the plethora of customization possibilities and lose focus on their primary duty of running a vehicle safely. With a wider range of features and customization options at their disposal, drivers run the danger of losing focus or feeling overpowered by the process, which could impair their driving efficiency and safety. To guarantee that drivers can concentrate on the road ahead, hyper-personalization systems must be designed with ease of use, intuitiveness, and a minimum of distractions in mind. Moreover, the collection and utilization of personal data for hyper-personalization raises important moral and ethical issues. Data security and user privacy may be jeopardized when automakers gather and examine massive volumes of data about customer preferences, actions, and routines. By putting in place strong data protection measures and abiding by ethical standards for the acquisition and use of personal data, businesses can build consumer trust and transparency. Establishing trust and confidence in hyper-personalization initiatives requires upholding user privacy and protecting personal data. In conclusion, hyper-personalization presents consumers with exciting prospects to personalize their vehicles to suit their unique preferences; nevertheless, in order to ensure the success and sustainability of this trend, a number of important issues must be taken into account. Automakers can successfully traverse the obstacles of hyper-personalization and provide individualized experiences that improve the driving experience while upholding consumer faith and confidence by putting quality, safety, user experience, and ethical issues first.

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New Scenarios of Building Performance Control for Climate Change in Urban Areas

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Abstract
In recent years the issue of climate change has become increasingly developed and widespread, bringing with it a greater awareness of the impacts it causes. This is based on the current emergency highlighted by numerous studies regarding the impacts of construction on climate change. It is well known that the construction sector requires the development of methodologies and tools to limit the impact of climate change on the urban system and mitigate the phenomena arising from the dynamics of the built environment at small and large scales.
The study of climate and its changes is, therefore, an emblematic example of the intellectual challenge posed by complex systems today and how technological innovation and experimentation are the ideal tools for grasping their behavior.
In particular, the effects of climate change are becoming more evident on buildings that face the greatest risks of damage from pluvial flooding, heat waves as well as frequent episodes of tornadoes and water bombs.
It therefore becomes essential to implement adaptation strategies to make cities and buildings more resilient by seizing the opportunity to increase their quality levels.
The current theoretical and design research activities concern the study of innovative and dynamic solutions to limit those phenomena that being macro stress the city but especially the buildings in a very intense form.
Through an adaptive design approach, the aim is to direct experimentation toward the realization of a dynamic building through the study of the new building-context relationship, that is, not the one resulting from the requirements-performance sequences, but the current ones of phenomenon-response and therefore, according to the fields of innovation concerning the new types of adaptive envelopes.
This approach is also to be related to the needs for measurable control, because of the flow exchanges between different environments such as, precisely, that which is determined between the building and its context that interdependently influences the microclimate of the urban space.

Keywords: *Adaptive Building Envelopes, Advanced Testing, Building react with Climate change, Performance Evaluation,*

Introduction

The current regulations on the set of requirements to be met, by contemporary building envelopes, as well as the new housing needs regarding users' expectations of comfort, seem to be no longer only related to the demand for energy efficiency or guarantees of durability, but to new performance fans to be offered, concerning technical systems increasingly aimed at integration logics. This complexity is to be related to the needs for "measurable" control, because of the flow exchanges between different environments such as, precisely, that which is determined between the building and its context through the envelope.

Therefore, it becomes essential to put in place adaptation strategies that must arise as a priority from the knowledge of the vulnerability and fragility of the territory and the environment, the first step for the enhancement of the resilience capacity of that given context; at the same time from the assessment of the potential risks generated by the modifications and criticalities of the system, which are indispensable for adaptation actions; from the identification of the priorities of interventions both at the urban and building levels, as well as of the territory, putting in place those the strategies consequent to the knowledge of the place and the assessment of the criticalities that characterize it.

Therefore, bringing the reasoning back to the built environment, the degree of vulnerability that characterizes it is further increased by the physical, functional and performance status determined by the different conformations of urban fabrics and the morphology of the settlement, the correlation between the building and the reference context as well as construction techniques, surface characteristics, the presence of vegetation and permeable soils (D'Ambrosio and Di Martino, 2016).

For the purposes of resilient behaviors at the building scale and considering how much external surfaces therefore affect the quality of the urban environment, research efforts are now moving toward curtain walls with adaptability characteristics such that they respond efficiently to the dynamic and complex context at the same time are can absorb the effects generated by it (Milardi, 2016).

Architecture is therefore no longer seen as a classic static system, in which forms fit together to produce buildings made alive exclusively by the people who use them, but, on the contrary, as a dynamic system that changes in response to its environment and the needs of its users, a living system: in essence, it is architecture itself that comes alive.

To adaptive urban design belongs the concept of the city as an urban ecosystem complex, metabolic, traversed by flows of energy, environmental resources and waste production. Within it, settlement patterns, buildings and open spaces play an important role through the related surfaces (envelopes, roofs, pavements and surface treatments) that act as an interface with the external environment (Pacteau, 2016) in continuous energy exchanges.

Background, Scientific Innovation

There is growing evidence that climate change requires substantial modification of building design approaches to make urban systems more resilient to climate change.

Evidence of climate change, particularly the stresses brought about by intense rainfall and high temperatures, implies the need to implement pathways of adaptation and reduction of possible risks, through policy measures of mitigation, adaptation and resilience.

The research has two main objectives. The first concerns orientation toward adaptive design to ongoing climate change; the second, the definition and development of guidelines that identify a protocol for analysis, assessment, and possible mitigation intervention. Adaptation highlights unavoidable effects in terms of changes in temperature, precipitation, desertification, salinization of soils, changes in mid-sea and biodiversity gradients. This results in the need for design techniques, standards and policies calibrated to different possible scenarios.

Climate policies at the local scale for a long time have focused predominantly on "protection" and mitigation, particularly by promoting the deployment of renewable energy sources for sustainable development and "climate protection."

These policies have brought, especially at the local level, often contradictory results and, above all, has limited the innovative action of climate proof policies to only voluntary instruments, in many cases promoted under community-funded initiatives and projects.

Specifically, therefore, it is intended to develop a protocol not only for the analysis and evaluation of the major environmental criticalities, but also to identify possible interventions and actions in order to draw up a document that is as operational as possible. A document, which is always being updated, that assumes the function of a tool capable of addressing the consequences of climate change and that contains possible concrete actions and can provide for possible forms of monitoring the results. From rising seas to warming temperatures to hurricanes and tornadoes, the impacts of climate change are getting worse and worse. Knowledge of climate extremes and their variations is of particular importance in defining adaptation strategies and assessing impacts on building envelopes understood as vulnerable elements to the stresses of climatic phenomena. This requires that the design of façades, especially for critical or sensitive environmental areas, be preceded by analyses aimed at understanding the environmental dynamics that influence the behavior of the envelopes and performance verifications through simulations and tests to assess the adequacy of their responses.

In this context, the Building Future Lab's TCLab Testing laboratory [Fig.1], set up at the Mediterranea University of Reggio Calabria, enables the analysis and verification of the 'real' performance of large-scale facades through American and European normed and experimental testing activities. Mandatory façade performance tests, such as air permeability, water tightness, and wind resistance, which are applied to

full-scale models of façades, allow obtaining preliminary information on system performance prior to the assembly process. A strength of the testing activities is thus to offer, to designers and engineers in the field, guarantees on the reliability and compliance of the data and results, with important spillovers to industrial research, where there is an extraordinary increase in innovation on the functionality and adaptive responses of the components.

In this regard, ongoing research is working on processes and technologies to control performance due to building-context interactions that influence the climate change vulnerability of urban space and its resilience. In addition, through the contribution as mentioned above of the Building Future Lab's TCLab Testing laboratory, appropriate tests will be developed for the experimentation of building solutions for energy-efficient and adaptive surfaces, verified in the design and prototyping phase; the laboratory will support the experimental capacity, methodological rigor, and tenor of the results that can be obtained, due to the possibility of verifying steps and intermediate results through measurements, testing, and regulatory verification.

Specifically, this research will define protocols to guide and control the architecture process in building-context relationship controls through the definition of batteries of indicators and parameters that can be measured through available technology. Protocols that will derive from laboratory experiments through specific tests derived from the observation of various phenomena arising from climate change.

Quantifiable performance indicators and effective strategies for the design and evaluation of optimal adaptive façade performance under climate change will then be identified. This is in order to understand what kind of transformations could be produced through knowledge and monitoring of the elements that make up the context and the relationships between them through precisely a panel of indicators.

Vision and Conclusion

The experimental content of the current research, strongly characterized by the operational possibilities of Building Future Lab's TCLab Testing laboratory, allows to test the level of adaptability to climate change of technological solutions and materials by performing simulations of bioclimatic and microclimatic conditions in urban environments and their related effects, which can be measured, certified and evaluated in terms of industrial spin-offs. The opportunity to carry out such a wide range of tests and simulations, in an environment consistent with UNI/EN, ASTM and AAMA standards, directs the technological spin-offs of research toward innovative, performance-tested and verified technical solutions.

Through instrumentation that reproduces on mock-ups of envelopes, extreme climatic stresses, it is possible to study not only the performance responses of the envelopes but also to measure the resilient characteristics of the envelopes. This, allows to a large extent to configure the various scenarios of building adaptivity by directing design decisions toward the options most congruent with the different reference contexts and relationship. Therefore, experimental tests will be developed on different types of facades, opaque and transparent in order to identify the behavior of facades in extreme climatechange situations, specifically heat island, heat wave and pluvialflooding.

The procedure developed starts from the analysis of the reference urban layout type by recreating, in the laboratory, the boundary conditions of the building. The location of the laboratory, together with the machinery and equipment present will, in fact, allow the on-site reproduction of different types of layouts. The test chamber, in fact, is located externally giving the possibility to interact directly with the external climatic conditions and offering the opportunity to model them in relation to the required need.

In this light, the role of phenomenological detection tools and, above all, centers that carry out testing activities assume particular relevance. The operational approach based on measurement testing and performance evaluation in a simulated regime seems to be strategic for all actors in the building sector, designers, production, PA, client, enterprise, user, etc. In particular, precisely because of the complex characteristics resulting from the profound innovation that has affected the envelope field in recent years, unified testing protocols also require new modalities and equipment capable of offering investigation spectra in line with the aspects traced by innovation.

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Figure 1. Reading from left Test Lab

Figure 2. thermal Chamber,15x12x4.5 m, or trying moke-up with the AAMA 501.5-07

Figure 3. Fan capable of generating wind speeds equal to ~ 200 Km/h in according to the standard AAMA 501.1-05 "Standard Test Method For Water Penetration Of Windows, Curtain Walls And Doors Using Dynamic Pressure", and all the other test with wind speed

Material Tinkering as a Tool To Promote User Empathy and A Subliminal Waste Reduction Strategy

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Abstract
In this work, the role of material tinkering using waste, initially from food but then in a more general sense, in a polysaccharidic or proteinic self-produced matrix, is recognized as a producer of renewed empathy first with natural materials then generally with refuse. This moves away from the concept of "bioplastics" as empathic-free materials and allow a better acceptance for the introduction of waste into materials, resulting therefore as a concealed yet real strategy for waste reduction and therefore sustainability. Experiences developed in Università di Camerino are briefly presented as for their empathic content using tentative semantic differential scales and extending over time also to aging and the presence of signs of degradation, such as mold, cracks, unexpected light reflections, etc.

Keywords: DIY materials, materials affection, self-production, senses interaction

The Role Of Material Tinkering

In material designer's curriculum, it is essential to acquire a first-hand experience, creatively interacting with the matter (Rognoli & Parisi 2021). This is defined as "material tinkering", since it apparently starts as an unorganized operation, which only in the passage from the material to a reading of it into a prospective object, acquires the dimension of a design route. This path is based over experimentation, and the metabolization of failure towards the exploration of reasons that caused it, removing which would lead to success. This can be defined as "experimental method" and it is recognized as a way of learning through failure (Huang 2020).

Through this iterative route, by gradually improving materials' design, a physical demonstrator, which can be perceived as a spin-off for a prospective product, is obtained (Veelaert et al., 2022). The principal requirement of the demonstrator is clarifying its suitability for the application, which may be defined from the beginning, in the form of single or multiple function. The idea of providing different functions, for the same physical object, or else to "read" it in various ways, does contribute to its emotional durability. In other words, it prolongs its ability to be used and liked, and, as the consequence, not being discarded ahead of irrecoverable structural failure (Chapman 2012).

The application of a particular material can also be gradually elicited from its very characteristics of the material in a step-like process. In this sense, the demonstrator may have a tentative shape, such as flat, polyhedric or curved according to different laws. This shape can be given using a mold to serve as the model and be subsequently removed. The complete freedom for the respective evaluation of materials would be possibly to be developed moldless. This has recently become the operating mode of additive manufacturing processes, such as 3-D and even more 4-D printing, allowing "on route" correction of the desirable geometry and involving attention to the evolution over time of the material and to its ageing process (Hoa 2017). In the case of material tinkering, taking a moldless approach means fabricating flat shape (sheet or film), arranged so to remove pieces approximately of the same size. This would apparently resemble a show of samples. In this sense, a materials library is already a too much developed and culturally aware system, since it promotes materials and shapes that we are able to associate in our mind, somehow automatically, with different uses. To put it in a more suggestive way, a materials library is a tool to build up the triangle between materials research, design, and user needs (Wilkes and Miodownik 2018). On the other side, from a technical point of view the mold-based approach serves also to better define the pre-structural features of the developed material according to basic questions, such as "may I bend it?", "is it possible to pierce it?", "how much can I control its thickness?", "would it collapse if loaded?", yet also can give some hints about the possible applications. This serves also for a humanistic and educational approach towards materials and therefore to establish also its potential empathic content, and it is definitely adapted to introduce basic concepts of materials science in a school context and to effectively link it to need to make the best possible use of materials to confer them added value also to the user (Santulli et al., 2020). In this sense, giving a shape would assist in the object recognition and in associating it with the material used, especially at a school level, as shown by the example in Figure 1.

The big shift occurs whenever the material demonstrator is brought forward to be possibly adaptable also to a circular economy approach. In this case, the materials tinkering route can be adapted to the use of waste, also referred to as "secondary raw material", into the process. In principle, material tinkering approach can be realized with waste coming from any sector. However, in practice, selecting refuse from the food production does represent a more "ethical" choice since food that cannot be consumed is linked also to other considerations about the survival of the species and therefore the general significance of this operation (Cecchini 2017). The use of waste is also critical from an empathic point of view. A final observation would also be developed further in this work, and concerns the fact that there are "nicer" and "uglier" types of waste, therefore we are not in any way neutral towards refuse, and we necessarily interact with it.

This last observation does concern the fact that we may use materials tinkering to restore empathy with the matter, even after it has become a refuse, and this can be suggested to be a waste management, or even a circular economy strategy for the reason that it confers added value and also additional life to refuse integrated in different ways into materials demonstrators.

Figure 1. Simple objects from materials tinkering formed from a thermoplastic starch (corn starch + glycerol) matrix with eggshell fragments filler and colored with curcumin (yellow samples) and spent ground coffee (brown samples) (Courtesy of Tania Pallottini)

Materials and Feelings

We may prove feelings towards objects and incidentally with regard to materials that constitute them, which is what makes a product or any artifact emotionally durable. These feelings are recognized to be extremely subjective, especially as far as the ageing process is concerned (Lilley et al., 2016). This subjectivity is due to the complex and unique mixture of different perceptions of colors, odors, touch, and possibly even noise associated to the material assembly that constitutes the object with which we interact (Karana et al., 2015). In the case of food design, but not necessarily, also an emotion associated with taste is perceived: recent studies associated a "five senses" emotional map with some categories of food, such as pasta (Altamore et al., 2018). A "five senses" interaction with some materials and objects is possible, even if not always desirable: some examples are even curious e.g., the possibility to improve the self-diet by obtaining selenium by licking stones, one of the paradigmatical categories of materials traditionally used in history (Haug et al., 2007).

This interaction is complex and sometimes very difficult to be elicited and brought to the surface in rational terms, hence, to be quantified. For this purpose, semantic differential scales (SDS) have been developed, to indicate e.g., the limited knowledge of the users about "bioplastics", despite a generally positive, yet quite superficially motivated, perception (Ruf et al., 2022).

The traditional use of plastics, which is prevalently used in design for bare functionality, tends to minimize the interaction with the user, limiting it to the two senses of touch and sight. On the other side, plastics does often enable an easier design of affordance, which is amongst the reasons why it got so diffused in everyday objects (Fisher 2004). For instance, most toys are made by oil-based plastics: however, it is possibly inappropriate to say that there is a real interaction with the material, rather than with the toy function. This also results into not normally proving empathy with the object beyond its very function: moreover, the use of traditional injection molded or extruded plastics has mostly moved away from the user's context the possibility to repair (not to say to fabricate) toys. In this sense, it appears noteworthy that the success of Lego bricks is partly to be attributed to the need for a richer user-object interaction and possibly results in more durable liking and therefore incidentally a longer "active" life for the object. It is no surprise that Lego therapy has been proposed and practiced for improvement of social interaction in case of autism, in view of its immediate empathy with the user and of the wealth of possible "readings" of it (Lindsay et al., 2017). However, here again, Lego bricks' material (ABS) does not really participate into the interaction, it just provides the function.

This represents an example of how, with the introduction of oil-based plastics, our interaction with objects has become quite poor and repetitive, with a limited number of factors that might contribute to the above-mentioned wellbeing. The use of plastic materials (and this also includes composites/resins, such as fiberglass and carbon fiber composites) is reported as contributing to the "efficiency" of our life and our living in "smarter" cities. However, recently also this paradigm has been discussed, bringing to the limelight "empathic" cities, where wellbeing and livability are going to replace the technocentric idea of city, which involves a large consumption of newly produced synthetic materials (Biloria 2021). In this context, materials with continuously renovating five-senses interaction with us can be of interest. In a sense, DIY materials grow old with us, whereas plastics has a sense of eternity, which is not a philosophical or theological one, yet rather a persistent reality, fully linked and complying with the idea of "continuous, infinite, and seemingly inexhaustible source, a source without location or specificity" (Bpetzkes and Pendakis 2013), such as oil.

The introduction of oil-based plastics brought a clear sensation of lightness that was compared with much heavier and substantial objects conceived and used for the same purpose (e.g., a polypropylene bucket compared with a steel one) (Ferrara and Bianco 2023). This lightness and odorless characteristics of plastics was also coupled with hygiene and safety, since it was connected with the limited, if not deemed impossible, contamination of plastics by bacteria and other polluting agents (Paris 2016). However, for further generations using plastics, this kind of reference to previous objects and materials with the same function gradually faded away, together with the sensation of plastic superiority as for cleanliness and safety. The sensation that plastic objects could offer bright colors, offered by the mass-coloration process with dye substances introduced in the masterbatch, remained overtime, but of course allowed a kind of empathic behavior, yet limited to the sense of sight (Sossini et al., 2022). The touch sensation of plastics is a repetitive and uniform smoothness, to the point at surface sanding was required to improve the grip for some applications of plastics. On the other hand, the relation between touch and pleasantness is well established and, as such, it has demonstrated that plastics is more easily recognized by blind eyes experiment: well-known, but most likely not offering no nuances to the touch (Wijaya et al., 2020).

Proto-plastics as precursors of biocomposites

Poor interaction with the user, limited to touch and sight, is thence typical of oil-based plastics and those bio-based ones, which did not modify the paradigm of application, pretending to fabricate the same objects in the same way: a typical example is poly(lactic acid) (PLA), when not processed in additive manufacturing. This only involved growing criticisms also for these "bioplastics" being based on raw materials from the food-producing systems, such as starch, and not on relevant waste (Sabry 2022). In any case, this perception is deemed to bring to absence of feelings towards the plastic object, so to lead to its precocious disposal, even out of the single-use scheme (Heidbreder et al., 2019).

This was not the case for the previous generations of proto-plastics, developed during the 19th century, moldable to various extents, though normally with no use of high pressure. Proto-plastics were treated as sort of "precious" object, though Modernist, therefore even more valuable (Yeung 2020). A pivotal example, very distant from contemporary plastics, was bois durci,

a mixture of sawdust and bovine blood, sources of waste from different sectors (Ralston and Osswald 2008). Another material obtained from refuse, namely milk whey and acetic acid (vinegar), then plasticized using formaldehyde, was galalith, which had a longer and more successful history. However, differently from oil-based plastics, it was subjected to sudden failure simply by temperature changes due to day-night-cycles, and the structural limitations represent still an issue in its contemporary formaldehyde-free reprise (Martyn 2023). Galalith does absorb and retain environmental odors, other that specific traces from their production matter, milk whey and vinegar, again both wastes from food sector, in the latter case from wine and spirits production (Jefferson et al., 2020). Thus material can also be interpreted as the substitute for the use of natural protein structures e.g., tortoise shells and bovine horns, in a plasticized form, which was equally diffused at the time (Espinoza et al., 2007).

Another protoplastic, based on sugar derivatives (polysaccharides), and moldable, whose history was even more successful than galalith, was cellulose acetate, which, evolving in the plastic form of cellulose, was able to withstand the passage to oil-based plastics and still marketed and successful. Cellulose acetate can originally be thought of as originated from acetylation of waste from paper production. However, when camphor was substituted in the production of cellulose acetate with plasticizers based on phthalates, or more recently, due to health concerns, with glycerol polyesters of acetic acid (diacetin and triacetin) (Phuong et al., 2014), also the so-called "celluloid odor" tended to fade away (Whelan 1941). The permanence of cellulose acetate as the only "protoplastics" left in contemporary times would perhaps give additional strength to the "odorless-plastic" association.

Synthetic materials and the production of waste

In the materials engineering field, the emotional content embedded in materials is, if any, disregarded. This represents an issue when it comes to creating a durable experience with materials, which is also inherently sustainable. Durability has a deep link with considering sustainability, since more durable materials and objects would lead to lesser production of waste over time. This problem has been investigated in some of the most polluting materials/sectors, such as textiles/fashion (Fletcher 2012) and concrete/constructions (Al-Hamrani et al., 2021).

In the case of polymer-based materials, the production of bioplastics/biocomposites was hailed as a step towards circular economy for the possibility of treating end-of-life materials as composting matter. However, further reflection brought to the idea to escape from the narrow mindedness of single use plastics (SUP), increasingly challenged e.g., by 2019/904 European Commission directive, which eventually came into force on 3rd July 2021. SUP has been proven to have significant environmental impact in a throwaway society, especially in that it does not reduce the amount of materials produced and consumed (Chen et al., 2021). A possible approach is convert end-of-use plastics into value-added materials, therefore into products with some life duration (Sharma et al., 2021).

In itself, SUP's application profile does exclude to even think of any kind of empathy with the object. However, the process for the disappearance of unnecessary single use objects is likely to be long and not linear: hence, discussion about the correct communication of this process has been lately vivacious, including some questioning about the role of scientists in the matter (Krawczyk et al., 2023).

It can be easily suggested that we feel no empathy towards consumables, especially because no "trauma" is experienced from our side at the end of their life, and subsequently no willingness to prolong it e.g., by proposing a repair strategy. In more structured terms, studies about archaeological objects, produced in eras that hardly accepted the concept of end-of-life of objects, evidenced lately that reading the interaction of humans with them by "modern" eyes did not consider the wealth of interactions that were experienced with these in practice (Vindrola-Padrós 2023). These resulted in a kind of "continuous" relationship, the effect of which is reported in Figure 2.

Originally, single use consumables and consequently SUP

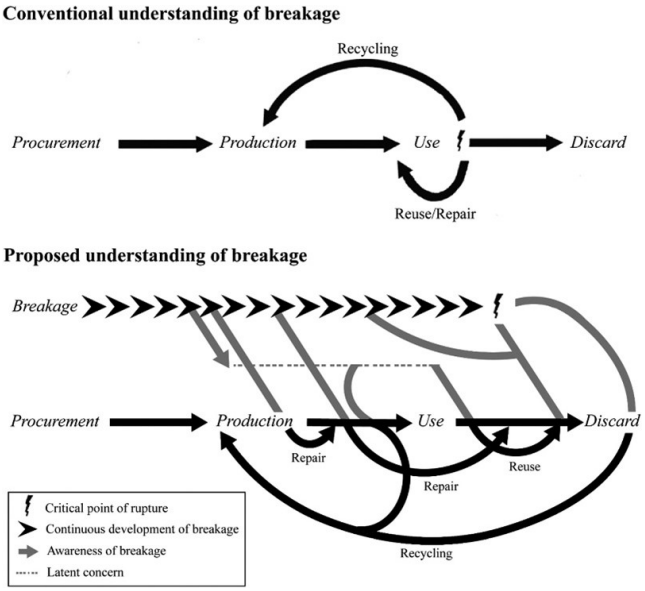

Figure 2. Proposed alternative reading of object breakage in a sense of total sustainability (avoiding until possible its discarding)

were conceived for hygienic purposes: for instance, it would appear senseless and dangerous to re-use non-washable diapers. Also, their environmental impact when disposed is well known: these consumables would therefore be need to be compostable after use. However, the difficulty to apply this measure is given by the fact that this would expose them to bacterial attack and in general terms make them unsafe for use (Mendoza et al., 2019). The question stays open so far, since technical issues in producing compostable and hygienic consumables are still unresolved. Despite this, also to possibly mitigate the sense of guilt generated by "black bag" disposal of these consumables, vividly colored packaging is recently produced for discarded diapers. This might offer some potential for possible empathy so to make it easier and more likeable the process to correctly dispose of the used diaper (Qi and Liu 2021).

Their single-use nature has also an influence on how these objects are designed: along the same line, diapers need to be comfortable and adaptable from an ergonomic and biological point of way, but by no means are designed to appear "nice". Rather, the studies are concentrated on the effectiveness and reliability of disposal, so that the pollution linked to this kind of consumables is limited (Ntekpe et al., 2020). The characteristic of pleasantness, for non-edible materials, is confined to those objects that are supposed to have some life duration, and on which the fact that they are able to last some time is a factor for appreciation and likeability. In practice, the more you like them the later they become waste: this has a psychological foundation (Bortoleto 2014). This is not different from the concept that if food waste production is going to be reduced, a compromise between likeability, hence taste, of food, and attractiveness, hence sight/smell, and possibly even noise (concepts like crunchiness or fluffiness) needs to be reached, especially among children (Nichols 2014).

However, the absence of empathy has been extended over time to those items that are not single use, such as garments in a "fast fashion" philosophy. This concerns the material used, which is prevalently polyester, hence poly(ethylene terephthalate) (PET), but also an attitude that emphasizes the easy availability and fosters the "instinct" buying, which in turn does not promote the establishment of any empathy relationship between the buyer and the "fast fashion" product. For one, not allowing taking quietly a seat and deciding to buy implies an "unmindful consumption" model (Jha and Veeramani 2021).

The "bioplastic" empathy-free paradigm

According to what exposed above, increasing the life duration of an object implies also reducing the amount of waste that is produced over time from their disposal. So, in principle, it would be of interest that objects that do not need to be designed for single use on hygienic grounds, are realized for the user to be "sympathetic" with their state and history (Dandavate et al., 1996). These objects will be thus exceeding their pure functionality, in a way to be discarded only when badly damaged. As the consequence, even repair might come back into the picture, which is seldom the case with plastic objects. This might break once and for all the link between product innovation and absence of empathy (Mc Donagh and Thomas 2010).

A good occasion has been the recent replacement of conventional oil-based plastics (described sometimes as "petroplastics") with biodegradable ones, in most cases bio-based, hence obtained using natural (lignocellulosic/protein) raw materials. Typical examples are offered by poly(lactic acid) (PLA), based on a glucose molecule, then re-polymerized, or thermoplastic starch (TPS), based on the direct plasticization of a polysaccharide. Such replacement took place also in the field of design, with materials produced e.g., by mold-based methods, such as injection molding or extrusion, or else fabricated by additive manufacturing.

This led to an interesting overturning of the significance of biodegradability in materials. When plastic was introduced, its very limited degradation, mainly confined to photo-degradability under very prolonged exposition to sun or other sources of light, was regarded as a resource for a material that was intended as to be eternal. On the other side, as Hawkins (2017) puts it, "The eternal persistence of plastic seems to fuel only apocalyptic visions of ecological disaster". Unlike marble, eternal but not moldable, and concrete, whose proneness to environmental degradation was not yet revealed at the time, the inalterability yet absence of empathy of plastic stands still as a proof of very long life and is perceived now as an issue rather than an opportunity (Kumar 2021). Unfortunately, and possibly with only economical but not common sense, after the 70s and before the recent limitations due to European directives, SUP objects literally flooded the market.

On the other side, biodegradable and compostable plastics have been perceived as the "good" replacement for conventional plastics, to produce basically any object, even supposed to have a significant life duration. The association of biodegradability, which implies the possibility of the environment to interact, affect and contribute to material aging, with "relative durability", possibly in a predictable way, is becoming more frequent in literature (Yaguchi et al., 2020). In reality, to foster the appreciation of empathic content, the association of "bioplastics" with animal species e.g., lobster shells for chitin bioplastics, from which the material has been obtained does offer some more significance to the operation (Hudson et al., 2015).

If we want to really go "bio", the interaction with plastic object needs to be fully modified and occur to the larger extent and with the highest number of senses, and for the longer possible time, therefore departing from what occurs with conventional plastic, where the effect of interaction with environment is virtually nullified. This includes, among other effects, color change, presence and gradual release of odors, surface modification, roughening/smoothing/levelling of the texture/aspect. In a word: ageing. On some very apparent effects that mark patently the difference of bioplastics from conventional undamaged plastics, such as loss of transparency, studies are available already (Baltscheit et al., 2020). Such as in Faust's myth or even better as it is the case for Dorian Gray in Oscar Wilde's novel, conventional plastic had been originally designed as not showing any particular sign of time passing by. Plastic has been defined as "simultaneously eternal and eminently disposable, perfect yet utter rubbish" (Boetzkes and Pendakis 2013). At a certain moment, it may simply fail, but this occurs only in case of under-dimensioning, which has been increasingly the case when plastics has been used for packaging. Under-dimensioning, and not plastic itself, has been recognized as one of the principal factors, together with wear, of the increasing effect on the environment of sea littering (Corraini et al., 2018).

At this point, the use of waste in the production of bio-based plastics makes the scene. Waste because it is abundant, while it avoids resource depletion by the use of newly extracted or produced raw materials. On the other side, waste might have a strong personality, being far from odorless, prone to environmental attack, in some cases not com-

pletely safe to use. Beyond fact, there is perception: some kinds of refuse are alleged to be nasty, which is some senses they might be too. Yet, if we really want to go "bio", we need to accept the coming back of interaction by the five senses and of empathy from the material. So, why not using waste itself (to different degrees of processing, but possibly as received) to make bioplastics, in a sense trying to familiarize with it, maybe starting from food waste (Makhal et al., 2021)? Use of waste represented a possible convergent (yet superposing in the long run) route to DIY material tinkering.

Switching to DIY materials and the search for empathy

The considerations in the above sections pose an essential question of what biocomposites are supposed to be: in general, it is suggested to be defined by the presence in it of some amount of bio-based material, possibly being completely formed of it. Materials originated from nature can be lignocellulosic, such as it the case with plant fibers (from bast, leaf, fruit, seed, bark, roots of a vegetable structure) (Zhang et al., 2005) or more definitely polysaccharidic, such as it is the case with algae or mucilage (Scognamiglio et al., 2020), but also with crustaceous shells (exoskeletons) (Daramola et el., 2020); proteinic, as with animal fibers, such as silk, wool, feathers, horns, etc., (Ilangovan et al., 2022) or mineral, such as it is the case with calcium carbonate structures obtained from shells, or calcium phosphate structures, obtained from fish bones , etc. (Bootklad et al., 2013).

As far as empathy is concerned, this general classification of biocomposites may be only partially helpful. In particular, the bio-fraction in the material can be too limited, which, apart from raising doubts about the possible "green-washing" philosophy followed, might result in a material very close to plastics or resins or traditional composites (e.g., fiberglass) and therefore not only their "empathy profile", but also their carbon footprint might come to the point to not being discernible from a "synthetic material". In other cases, may be the bio-fraction might not be that low, but the biocomposite could have been designed as to resemble the material it is supposed to substitute, for example the filler is inserted in an absolutely impermeable and ambient-resistant resin, such as epoxy or acrylic. It is not different from putting a nail work over the real nail. The sensation offered and the possible empathy will be attributed to the superposed material not to the underposed biological one.

Therefore, if the case above is produced, there is nothing specific in being a biocomposite in terms of empathy. It is also fair to say that the commonest cases about biocomposites deal with this kind of substitution process, trying to reproduce the synthetic material with the bio-based one and pretending it has the same properties and the same interactions with the users. This is an uncomfortable question about material substitution (e.g., Styrofoam with mycelium-based materials (Karana et al., 2018, Santulli 2023), or fiberglass with plant fiber composites using the same resin, possibly epoxy) is therefore that they ultimately are presented as the same material as far as sensations are involved. In the case of mycelium-grown foams, the texture may vary and the color is not uniformly white nonetheless, and the nuances of brown and yellow would depend on the very biomass used for feeding the fungi and also the touch might be rougher. Therefore, we can suppose that it might have sense to express likeability and recognizability of one piece with respect to the other, which in Styrofoam we would have much difficulty to do.

The principal reason to deviate from this trend would be to bring back the empathic relation with natural materials, and therefore the five senses interaction with it: this has been prevalently and largely lost by the success of oil-based plastics. However, if we want to bring back local natural materials, it is essential that this global interaction is restored. This is also in the interest of resuming some production systems: a typical example might be the hemp system, which including both food and non-food products, gives to the user a clear sensation of what can be a richer sense interaction (Fike 2016).

Experiences in the production of DIY materials

To make the interaction with biocomposites an empathic experience, the self-production can represent an option: this will detach ourselves from the feeling of being faced with a different type of plastics, just more bio-based. For this, we need a new aesthetic removed from the perfection and pretended eternity of plastics, which has been just transferred into bio-based plastic, as they were able to behave in the same way therefore inappropriately. This new aesthetics classifies DIY materials, which are prevalently based on the revalorization and the refocusing of waste, as the true strategy for sustainability, in five "kingdoms": vegetable, animal, lapideum, recuperavit, and mutantis (Ayala Garcia and Rognoli 2017). It is from the esthetical characteristics of all these materials that a possible empathic interaction is generate. Self-production, beyond offering more value to a kind of artisanal working, enables to understand what the specific character of each material and relevant product can be, before passing to production. Of course, once accepted departing from the plastics esthetical and empathic concept, it is essential that all possibilities are taken to hinder as much as possible the degenerative processes such as fermentation and generically bacterial attack: this is created mainly from the experience of cuisine and generally cooking tradition.

The experience briefly described as regards the production of DIY materials started from different matrices, inspired to the traditional families of protoplastics, hence polysaccharide (starch, or cellulose based), or protein (e.g., milk whey) based. All DIY need to include some waste and to generate objects that are not intended as fully ephemeral. In particular, a set of twelve materials, produced during the experimentation at Università di Camerino and shown in Figure 3, will be described that have demonstrated a particularly long potential for life, which is essential for possible interaction, and their specific elements and possible empathic content will be summarized in Table 1. All the DIY materials presented have in common the fact to contain at least a type of waste, mainly originated from the food sector, but disrespectful their nature (polysaccharidic, ceramic, or ligneous).

In particular, the main components included in each of the DIY materials are reported in Table 1: when not indicated

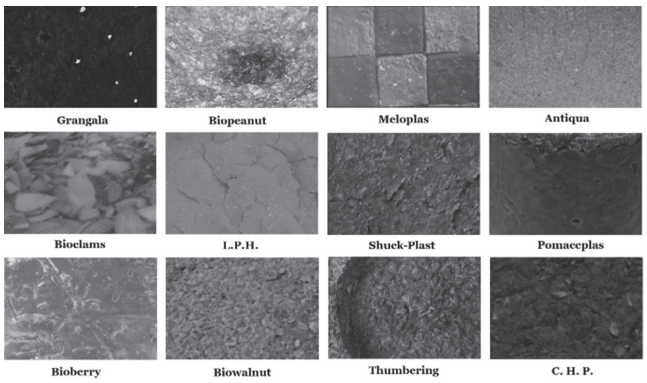

Figure 3. Surface samples of twelve DIY materials

DIY material	Principal waste component	Other characteristics
Grangala (GG)	Exhaust black tea	Expired milk-vinegar matrix
Bioclams (BC)	Clams and other seashells	Gelatin matrix
Biopeanut (BP)	Peanut shells	Lemon juice
Meloplas (MP)	Pomegranate (peel and seeds)	Use of thyme and cinnamon
Antiqua (AQ)	Exhaust ground coffee	Mix with silica (sand)
Bioberry (BB)	Brown berries waste (damaged/rotten)	Infused tea waste
Schuck-plast (SP)	Fruit peel	Added vinegar
L.P.H. (LP)	Ground eggshells	Added blended tomato peels
Biowalnut (BW)	Walnut shells	Expired milk-vinegar matrix
Thumbering (TR)	Exhaust ground coffee + sawdust	Use of cinnamon
C.H-P. (CH)	Grape waste	Use of balsamic vinegar
Pomaceplas (PP)	Oil pomace	Use of curcumin and vinegar

Table 1. Main waste components characterizing each of DIY materials described

otherwise, the basis for the material development is starch (potato/corn) plasticized using glycerol. In some cases, experience of herbs/spices coupled with DIY materials in order to offer scent and stop degradation.Suggestions for empathy, to be developed are offered in the map reported in Figure 4, where the evaluations have been suggested by the author, although they might obviously vary with user's perception. The fact that the materials have an empathic content would also allowing avoiding a single-use strategy. Some duration of life would be needed to be ensured, for this reason the experiments with this DIY materials were intended to be dedicated to some categories of objects, such as personal gadgets, toys or lamps, to which affection is particularly ensured.

From the above considerations, it can be easily revealed that the creation of DIY materials does offer a different and much richer interaction with the user that any plastic material may suggest. These DIY materials were in the past also defined, though possibly in a not completely appropriate way, as "self-produced bioplastics". This is incongruous, since in practice real plastic behavior does seldom occur.

In a strictly technical sense, these bioplastics can be considered as biocomposites, yet they are fabricated, according to a gradually fine-tuned recipe, to offer a specific sensation and experience, according from the self-evaluation by the developers. It can also be noted that the complete divulgation of recipes together with the material produced would allow the reproduction of the material in a tailored way so to enable an as smooth as possible correlation of the properties with what is desired in terms of expressivity and empathy.

A further step is obtained by the progress in the materials, as far as they age and evolve. In that sense this would make acceptable the presence of mold in different forms and geometries, obviously in a less propositional and structural way than it is the case for fungal art (Grunwald 2021). In addition, also the formation of cracks, as well as modifications of their relation with light, can show an empathic significance and value. This is reported in Figure 5.

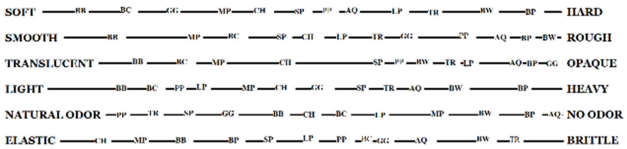

Figure 4. Different characteristics of DIY materials reported on semantic differential scales (SDS)

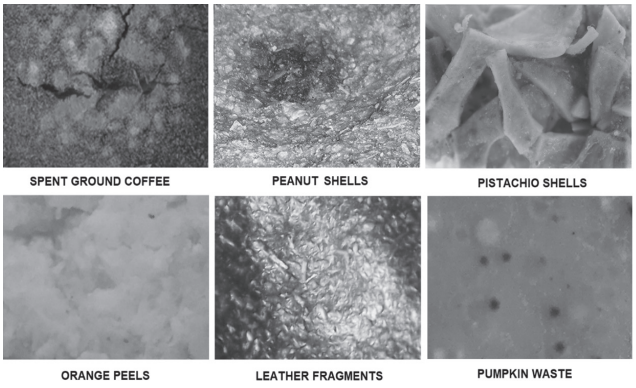

Figure 5. Presence of aging symptoms in waste produced DIY materials

Conclusions

DIY materials production including different types of waste with recipes developed and always modifiable according to an experimental method approach for expressive properties fitting, are able to offer a richer interaction that it is the case for industrial bioplastics. Moreover, they may rebuild the empathy bond with the user, breaking the vicious circle of rapid "use-and-throw" process and redefine the acceptability of natural materials including some forms of refuse and overtly maintaining their characteristics. These would include among others non repeatable textures, colors, surface roughness and specific/mixed odors, and of course would offer variable characteristics over time, as typical for really naturally occurring materials. In the long run, this will also include the presence of signs of degradation as a neutral aspect, without any esthetic judgement, in the understanding that this will change our interaction and empathy with the material.

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Artificial Intelligence for sustainable architecture and design

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Abstract

The selection and implementation of appropriate design strategies need a careful evaluation to actionably reduce the built environment's impact on climate change. Planning for sustainable architecture and design is a challenge that requires collaboration and integrated solutions in many different disciplines. Software and tools can offer a significant support. In particular the use of artificial intelligence (AI) can change the work's method. The aim of this article is to analyse software possibilities in developing sustainable buildings..

Keywords: Architecture, Design, Sustainability, Artificial Intelligence (AI), Generative Design, Building Information Modelling (BIM), Life Cycle Assessment (LCA).

Introduction

The first section of the article summarizes what is AI. The next section focuses on its use in architecture and design and the last section discusses how its application can reshape architecture and design for sustainability.

What is Artificial Intelligence (AI)

The etymology of the word intelligence can help understand the meaning. It derives from Latin ***intellĭgentĭa,*** which comes from the verb ***intelligĕre,*** assimilated form of ***inter***, "between" and ***legere***, "choose, pick out, read" in the sense of select the relevant information. The intelligent person takes only the things that are important, puts them together and solves an arbitrary problem with them. There are three modes of thinking: convergent, divergent and lateral. While convergent thinking means to give the "correct" answer using logic, divergent thinking means to draw unexpected connections using imagination. Lateral thinking is using both, convergent and divergent thinking. It means thinking "out of the box", away from common solutions and concepts. A key characteristic of human intelligence is the ability to have convergent, divergent and lateral thinking. Artificial Intelligence (AI) is a branch of computer science concerned with creating machines that can simulate human intelligence characteristics and extend the cognitive experience through multiple technical devices [1]. AI is based on algorithms that tell the computer how to learn to operate on its own. The algorithms are developed with different goals and methods. They can focus on skills that include learning, reasoning, self-correction and creativity. In general, AI systems analyse large amounts of data, aiming to identify patterns and internal relationships that enable the generation of predictions. Today AI is a precious technology in many sectors because it allows machines to perform tasks typical of human operators, and often, thanks to the superior computing power of devices, even faster and with a lower error rate. AI is an ever-growing and improving technology that can benefit several

Figure 1: Image generated by the architect Andrew Kudless on Midjourney.

Figure 2-3: Images generated on Stable Diffusion Playground, just entering the key words "Zaha Hadid, museum, aerial view, mountains".

working sectors [2]. The integration of AI in architecture is dependent on the uniqueness of ideational thought, oriented to problem-solving and to responsive, self-regulatory and adaptive processes [1]. Today AI tools can actively assist designers and engineers in developing projects and improving performance. Complex topics like sustainability can be solved and we can expect to see continued advancements in sustainable, resilient and energy-efficient buildings.

Use of AI in architecture and design

Image Generator. In the past year, numerous technology companies have released software that uses AI systems to convert users text inputs into AI-generated images (Fig. 1). Tools like DALL-E 2, Midjourney and Stable Diffusion can take text descriptions and create realistic images. AI enables architects to quickly generate different visuals with only a text or a keyword input [3]. This is why this technology can be very helpful in the early stages of the project. Also Zaha Hadid Architects are using AI text-to-image generators to come up with design ideas for projects. The studio principal Patrik Schumacher presented an extensive catalogue of imaginary buildings created using tools bearing the studio's signature fluid, sinewy style made famous by its founder [4]. With AI tools everybody can create images for example by focusing on one architect or style. It's sufficient to enter a prompt or few key words, for example "Zaha Hadid, museum, aerial view, mountain" and click the generate button. In a few seconds different images will be displayed (Fig. 2, Fig. 3).

AI-generated images are pretty interesting since they combine the identity elements with a certain level of non-definition, resulting in a set of "engaging, semi-abstract visual prompts" that can inspire designers [2].

Augmented Reality (AR). AI can work also in combination with Augmented Reality (AR), a technology that enables users to visualize designs in real-time environments virtually. AR allows architects to immerse themselves in their creations and gain better insight into how they will look once constructed [3]. Augmented reality includes virtual elements that interact with what already exists. It is thus possible to combine virtual architectural designs with the reality of the construction site. For this, 3D plans and virtual model holograms are used to improve the understanding of the project and facilitate their execution. During construction, the ability to see through walls and understand the path of the technical installations facilitates the process, reduces the possibility of errors, and even guides the construction of complex geometries [5]. AI software tools enable machines to adjust to new inputs, learn from experiences and even perform human-like tasks [6].

Generative design. One way AI is used in architecture is through generative design. Generative design is a methodology that automates the creation of design options based on a set of constraints given by the architect [6]. Design can then be optimized for specific goals such as energy efficiency or material usage. This allows architects to consider more options than they would be able to manually. AI generative design tools used in architecture are Maket.ai, Arkdesign.ai, Spacemaker and a few others. Maket.ai and ArkDesign.ai are AI-based software specifically created for architectural designers looking to generate plans instantly based on their client's needs and environmental constraints. Users can generate detailed floor plans based on profitability, space utilization, energy efficiency and more. Spacemaker is a cloud-based AI software that empowers architects, urban planners, and developers to make smarter decisions faster. With Spacemaker, architecture teams can quickly test out different designs in order to identify the best projects. By using Spacemaker's predictive analytics capabilities, architects are able to optimize their projects' performance across various criteria such as energy efficiency or cost savings without sacrificing quality or design creativity [3]. Generative AI is not a new technology. Its history dates to the 1950s and 1960s. There are papers in the 1970s that

Figure 4 - 5: Kartell first chair designed with artificial intelligence.

demonstrate how people were really thinking about, in architecture and specifically in hospital floor plans, how to lay out those floor plans algorithmically [7]. With CAD-based version of generative design, the application of algorithms is automated, but the designer has to evaluate the computer generated results and decide on the most suitable option. The latest wave of generative design is driven by AI software that uses algorithms that mimic the Darwinian evolution. After a number of iterations, different solutions are evaluated and the highest-scoring design is chosen [8].

NASA used an evolutionary AI software to create configurations for its evolved antenna of a 2006 mission called Space Technology 5 (ST5). Engineers settled the performance and the computer started with random designs and through the evolutionary process, refined them, keeping the best antenna designs that approached what they asked for. The final design performed more than 90% more efficiently over the traditional antenna. In the NASA example we can see how AI can enhance

Figure 6: Casa Batlló (Antoni Gaudi), Barcelona, Spain.

creative decisions by introducing options that humans may not even initially consider, with effective results [7]. The designer first decides on the constraints and objectives of the final design. After that, AI guides to the best solutions that satisfy the prefixed goals. During Milan Design Week 2019, the Italian brand Kartell has displayed the first chair designed using artificial intelligence, now available worldwide (Fig. 4, Fig. 5). The chair was designed by Philippe Starck using a prototype generative design software developed by Autodesk. The AI created a chair model using an algorithm that respects the original brief, a comfortable seat that has the structural strength and solidity requirements to ensure certification and respect aesthetic standards of simplicity and clean lines [9].

Generative design allows architects, engineers and manufacturers to determine the best designs. But engineers working with generative design algorithms aren't the first to realize this. The Spanish architect Antoni Gaudi, working at the beginning of the 20th century, arrived at generative design's conclusions working with physical models. The unpredictable curves of his buildings seem like an extravagant luxury (Fig. 6), but there is a purpose to them. Gaudi designed his buildings based on organic forms because he was seeking for form and easy construction that allows maximum resistance with the minimum of materials. Gaudi didn't draw on nature just because he thought it was beautiful; to him, form needed to serve function. To create the strongest and most efficient designs, Gaudi spent hours in his workshop creating and testing 3D models of his designs. These models let him test and scrap designs. Through this testing process, Gaudi found that organically-inspired designs were the strongest and most efficient [10].

Building information modelling (BIM). Another use of AI in architecture is through building information modelling (BIM). BIM involves creating digital models of buildings that hold all relevant information about the project from start to finish. BIM objects have properties that define more than just their corresponding physical object's geometry [11]. The 3D model is enriched with information. Data represents in BIM the deeper elements of information. The list of data can include component specifications, health and safety, production, cost, quality, environmental factors, etc. The amount of data in a BIM model can be significant. Before a computer program tries to learn from data, it is often helpful for a human or data analysis program to study them. Data Science is a set of methods for gathering insights from data. Data scientists often clean the data, extract out important elements, and feed these to an AI to learn further from. This intervention often helps AIs learn better because the AI can focus on selected subsets of the data, thereby improving the learning process [13]. The integration of BIM, Data Science and AI offers new opportunities for design, also from an environmental point of view. The use of data science in connection with AI can for example provide insights and tools for design optimization, for maintenance optimization and for Life Cycle Assessments (LCAs).

Design optimization. Data science can optimize building design by analysing data on energy usage, building materials and other factors. It can also help simulate and visualize building performance. By leveraging data science, AI-powered BIM tools can provide insights into the optimal building design for energy efficiency, sustainability and cost-effectiveness. AI algorithms can analyse data on weather patterns and building orientation. They can use the data to simulate energy usage and analyse the impact of different design and construction scenarios. They can help identify the most energy-efficient materials based on factors such as cost, durability and environmental impact. One example of such an AI-powered BIM tool is Autodesk's Insight [10]. Energy analysis tools have previously been used almost exclusively by building energy specialists. Now the ability to do energy analysis, early in the design phase, is available to architects that can easily change variables and show clients the cause and effect right away.

Maintenance optimization. Data science can analyse data on building performance, energy usage and equipment health. AI algorithms can use the data to detect issues such as leaks, HVAC malfunctions and equipment failures and predict maintenance needs. By leveraging data science, AI-powered BIM tools can

provide insights into the optimal maintenance schedule and identify areas where preventive maintenance can be performed to reduce costs. Example of an AI-powered BIM tool for usage and maintenance optimisation is the BuildingIQ platform [14].

Life Cycle Assessments. For years, architects, engineers, and contractors have focused their efforts on reducing the amount of energy used to operate buildings. As buildings become more energy efficient, a large percentage of the environmental impacts generated over the lifetime of a building comes from the manufacture, transportation, construction, and demolition of building materials. While many architects and engineers are aware of these embodied environmental impacts, few have the

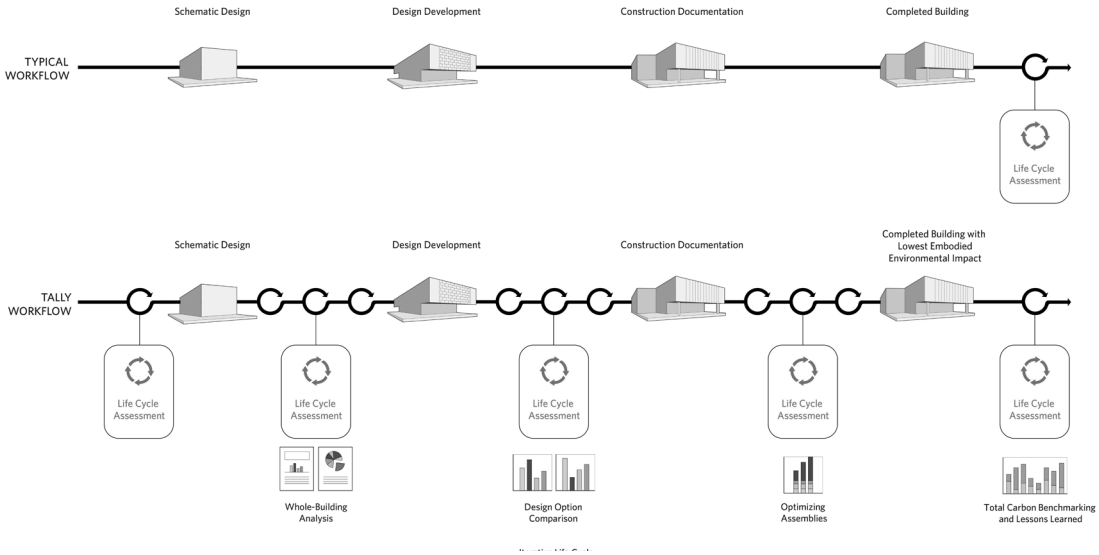

Figure 7: Tally allows users to conduct whole-building LCAs during design and use that data to run comparative analyses of various design options that show their differing environmental impacts (Graphic: Kieran Timberlake).

resources and expertise to be able to examine and compare the overall sustainability of different building and material options. LCAs is the prominent mechanism for measuring a building's energy use and environmental impact, from schematic design and construction through operation and demolition. TallyLCA by Kieran Timberlake is the first LCA integrated tool that can calculate the environmental impacts of building material selections during design directly in an BIM model (Fig. 7). As Tally users design their buildings in Revit, they assign building materials and quantities to create a bill of materials for the full building or constituent parts. This bill of materials automatically updates as the design changes, allowing architects and engineers to see in real-time the impact their design choices have on their buildings' overall sustainability [15]. The potential benefits of AI in BIM are significant and many companies are already starting to explore the use of AI in this area. By leveraging the power of AI algorithms to analyse, interpret, and extract data from BIM models, companies can improve the efficiency and accuracy of their construction projects, reduce costs, and improve the quality of their final product. AI can save time and reduce errors, improve collaboration between different stakeholders in the construction process and the overall quality of construction projects. Nowadays there are several use cases of AI in BIM. However, it is important to be critical and quality-check the provided results [16].

Fig. 7, Tally allows users to conduct whole-building LCAs during design and use that data to run comparative analyses of various design options that show their differing environmental impacts (Graphic: Kieran Timberlake).

Reshaping architecture and design for sustainability

The design process is a creative and problem solving process. The increasing need for environmentally responsible design calls for a workflow where sustainable analysis is implemented as early as possible in this process. The application of AI can be considered at different stages: before, during and after design.

Before design. In this stage, the architect defines concepts and basic ideas. In this phase it's important to learn about the influences and interdependences between different parameters of climate, building design, material properties, usage and comfort conditions [25]. In this respect, AI, thanks to its calculation and analysis capabilities, can play an increasingly important role in cutting down the resources required and improving the final output of the overall research. AI can reduce the amount of time to fast-track it [3].

During design. In this phase different options and materials are compared to optimize the building performance and it's possible to assess the environmental impact of the building. The following are environmental design tasks and operations which can benefit from the use of AI tools [25]:

Climate data and climate analysis
Environmental design criteria
Solar access and control
Daylighting
Thermal and solar-optical properties of constructional elements
Space heating, cooling and lighting energy use and human comfort
Air flow in and around buildings

Other energy sources / uses, other environmental applications Life Cycle Assessments

After design. In the executive phase on the construction site AI can detect potential issues and flaws. During the use of the building it can advise occupants with information on how to use building, assessing effects of different occupancy scenarios, thermostat settings, use of blinds, etc. and allow to adapt the building to daily and seasonal changes. Smart systems will optimize energy usage, monitor occupants' health and enhance security [25]. In general the benefits of AI for architectural design are different: efficiency and time-savings, enhanced design exploration, improved design optimization and performance analysis, cost- effectiveness and sustainability.

Efficiency and time-savings. AI can automate repetitive and time-consuming tasks and save designers a significant amount of time and resources. AI-powered tools and software can assist with tasks such as drafting, documentation, and data analysis, improving productivity and reducing human error. This allows architects to allocate their time and resources more effectively, resulting in faster project delivery [26].

Enhanced design exploration. AI algorithms allow architects and designers to push the boundaries of creativity and explore a multitude of design options. Generative design and AI can produce unique designs that are tailored to the specific requirements of a project. This enhances the creativity of the design process [17].

Improved design optimization and performance analysis. AI empowers architects to optimize their designs by analysing various parameters and performance criteria. This enables architects to make data-driven decisions, resulting in designs that are both aesthetically pleasing and functionally efficient. AI algorithms can simulate the behaviour of structures and materials, allowing architects to test their designs before they are built. This helps to identify potential flaws and areas for improvement, resulting in more accurate and precise designs.

Cost-effectiveness and sustainability. AI algorithms can analyse multiple design options and provide architects with the most efficient and cost-effective solutions. This promotes a more sustainable approach to architecture helping to design buildings that are more sustainable and energy-efficient [18]. In conclusion, tools that use AI are rapidly transforming the architectural design industry, allowing architects to enhance their creativity and efficiency while reducing costs and environmental impact. Increasing availability of the powerful design tool to design professionals significantly limits the damaging effects on the environment. As these technologies continue to evolve, we can expect to see even more benefits in the future, making AI an essential tool for architects worldwide [19].

Humans and AI working together

The radical socio-technical changes we have witnessed since the second half of the 20th century are mainly due to personal computers' advent in people's lives. Like a prosthesis of the mind, the new tools made available by computers have enabled human beings to break down their limits and expand their vision of the future, achieving incredible results until recently. This concept remains valid also for AI, which is simply the next step in the fruitful collaboration where technology is more and more part of a person's mental apparatus and less a mere tool [20]. AI has the potential to change the way that architects approaches the stages of designing buildings and products. AI can provide valuable insights, recommendations, and predictive models that assist architects and designers in making informed decisions. It is crucial for architects and designers to embrace AI as a valuable tool rather than a threat [24]. By leveraging the capabilities of AI, architects can enhance their creativity, efficiency and problem-solving abilities.

Architects will still be critical to the design efforts because they're going to be setting up the problems and requirements deciding what kinds of problems to solve (structural, economical, environmental, etc.), using machines to help them to do a better job. "This is a different way of thinking for designers. It's different to think about designing a system for design instead of several one-off designs. It's different to think about how you can make a whole design system that's going to flex for you" says Lilli Smith, Senior Product Manager AEC Generative Design at Autodesk, practitioner in the field of architecture for more than 20 years [7].

Also the 2023 edition of the Milan Design Week, platform for innovation and creativity in the design industry, reflected a change in the design, influenced by Artificial Intelligence and sustainability. From young designers to fashion brands, many are focused on creating environmentally friendly products and

Figure 8-9: Tilly Talbot AI designer, Stool designed by Studio Snoop in collaboration with Tilly.

using sustainable materials in their creations with some help from AI [21]. In the Design Week the world's first AI designer was even presented. She was presented as a female human-like digital figure on a large screen. Her name is Tilly Talbot (Fig. 8). Tilly Talbot was designed by Studio Snoop founder Amanda Talbot, who was prompted to create the "designer" after her research led her to explore the relationship between human loneliness and AI. Amanda Talbot explained that at Studio Snoop, Tilly Talbot works under the position of "innovation designer" and collaborates with the human members of the team to conceive design objects. Amanda Talbot said that Tilly Talbot has been programmed with Studio Snoop's core values, which include "human-centred design" and prioritising nature. Tilly Talbot collaborated on creating a stool (Fig. 9), she was for example suggesting that timber rather than mycelium might be a better material for it. Positioned underneath each photograph, tablets offered visitors of the Design Week the opportunity to type questions to Tilly Talbot directly and pitch her suggestions on how to improve the designs, which Studio Snoop has now adapted with the feedback it received [22]. In this context it is important to underline that while AI technologies offer powerful tools and capabilities, they cannot replace human creativity, intuition, and critical thinking. AI is still created and used by humans and its efficacy depends on the ability of humans to use it. However, it is also true that AI is opening up new horizons and helping designers to create increasingly complex works. The synergy between human expertise and AI capabilities can lead to innovative design solutions and improved results [23].

Conclusion

AI software for architects offer a huge range of benefits. Architects can now create innovative designs with less effort than ever before [3]. Moreover they have the advantage of being able to simulate their projects in order to test them. The integration of AI in architecture and design opens up new avenues for incorporating sustainable practices into the built environment. AI technologies have the potential to optimize resource usage, reduce waste, and minimize the environmental impact of buildings. AI can provide significant time and cost savings while improving the quality and sustainability of construction projects.

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`Chto Delat?'s What Struggle Do We Have in Common? and repoliticisation: defamiliarising the performative turn in gallery-based events

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In this paper I consider the performance ***What Struggle Do We Have in Common?*** (2010) by the Russian Collective Chto Delat? [What Is to Be Done?] as an artistic strategy that revises the Brechtian 'learning play'. The play serves as a critical response to the theoretical and aesthetic at play when performance today takes place in gallery spaces, usually performing a resistance to the dialectical, calling for 'radicality' rather than 'critique'. The 'performative turn' in the gallery space since the mid '90s is a marker for differentiating the use of performance today as a strategy for incorporating contemporary economic procedures (different from performance artists of the '60s and '70s when the immateriality of this medium was used as a tool to critique the commodification of art as material object). The new modalities whereby 'performance' artists delegate to others the execution of an artistic task are indicators of the mirroring in the arts of the new taxonomies of work increasingly extending the performative capacity of the human body and brain to produce social cooperation, affections and creative values (Bishop, 2012). This trend, for some, including Bishop is 'critical' because these artists amplify and mirror the current system of exploitation that subjects our life to the new configuration of capital as an all 'subsuming machine'. I contend instead that they merely reproduce the prevailing conceptual logic under which we live in today's capitalism. Reminding us that the dialectical that once existed in performance — in the form of 'inside-outside'— is no longer present in a system where the 'outside' is immanent within the subject/performer during attempts to free him-or-herself from the system of economic exploitation. This philosophical reasoning — both a conceptual tool for reading performance within the gallery and a theoretical ground that inspires contemporary art's aesthetic strategies— suggests that resistance consists solely in showing the intensity of exploitation today. Therefore art, and specifically, performance (that has become the very signature of the new mode in which 'knowledge-based' capitalism produces economic values) must abandon the dialectical as a method for reactivating critique.

What follows is instead a recuperation, via Chto Delat?'s learning play, of the dialectical as a viable philosophical approach yet also a performative method in response to the prevailing 'worldview' usually offered by contemporary performances within galleries. Chto Delat's restaging of dialectics transforms the gallery into a place where one can take distance from the actual economic conditions of subjection, a space from where critique can be launched. Under the assumption that contemporary cultural discourse and artistic production perceive the current political and cultural paradigm — i.e. globalization and neoliberal capitalism — as a subsumption of all spheres of our lives that overcomes the old 'inside-outside' logic of modernity, I show how it is possible to 'perform critique' to reactivate a dialectical approach without succumbing to a single totalitarian vision — the ghost of modern times. The philosophical shift in contemporary art circles occupying key ground in performance discourse — due to the intrinsic and immaterial nature of the medium, mirror the performative aspect of 'immaterial labour' (Hardt, Negri, 2001; Lazzarato, 1996) — resides in the post-workerist analysis of the reconfiguration of forms of sovereignty at the end of the Cold War, which bring to the fore the dissolution of the old binary logics that populated modernity. This way of perceiving and inhabiting today's postmodern world is a cultural barometer for interpreting 'radical practices' — forms of resistance to capitalism that reject identification, representation, and ordered totality, without excluding artistic agendas. The social entity, and therefore cooperation in the arts, is, according to this postmodern philosophical reasoning, irreducible to a represented collective identity.

Contrary to practices that use collaboration and performance in today's performative turn to perform a chaotic cooperation between individual subjectivities or a consensual and frictionless

democracy of multiple subjects, Chto Delat?'s 'learning play' transforms the gallery space into a confrontational terrain between two ordered collective entities: artists and activists. The goal is not simply to re-claim a space of politics within the arts using dialectics, but to problematize this method in the postmodern world by recuperating the Brechtian ***Lehrstück.***

This strategy on the one hand brings back the political in its purest form, as a confrontation between fronts, but also defamiliarises the gallery space by showing the habitus by which we usually perceive performance in a gallery, and by exposing a means of orchestrating politically engaged art that differs from those we expect when attending a gallery show— i.e., the aesthetic contemplation of art objects and/or the human body. In these familiar scenarios we read and perceive the performative turn as political ***per se*** because it reacts through action to the object on display in the gallery, or as democratic when it activates our agency without necessarily problematizing how we perceive the world politically.

Derrida in ***The Politics of Friendship*** (1997) considers the notion of 'de-politicisation' to contradict the usual understanding of the contemporary Western phase of global capitalism as an immutable logic that sanctions the 'death of the political', understood as a dialectical tension between at least two fronts. Derrida reads this phenomenon as generative because it is precisely when the antagonism between two political visions is subsumed under the name of a singular ideology that we can reinvent existing politics. I link 'depoliticisation', as Derrida did, to current Western globalisation as a generative space for testing alternatives to this geopolitical condition and therefore reconfiguring a new political dimension. This is a method that Derrida in ***Spectres of Marx*** (1994) called 'repoliticisation'. He suggests a tactic that, rather than ignoring the past, or interpreting it through the eyes of a fixed, unified historical narrative, insists on questioning and revision. This re-establishes an antinomy that makes room for 'the political', diminishing the supremacy of a unified world without enemies — as for instance Europe after the fall of the Berlin Wall (1989) or the US after the end of the Cold War (1991).

In considering 'depoliticisation', i.e. the 'end of the political' — the conceptual frame through which I read the geopolitical condition after the fall of the Berlin Wall, when the communist 'enemy' dissolved while simultaneously wandering as a ghost around the world (as in ***Specters of Marx***) — I interpret Chto Delat?'s learning play as an action that opposes 'normalisation'. Their performance enacts within the gallery space a Derridean 'repoliticisation' that contributes on a theoretical level to the concept of 'the political' today, and on a practical level to the articulation of artistic practices — specifically performative — that challenge the idea that the 'radical' in art must always be nonrepresentational and anti-identitarian, generating instead the 'critical' as an intrinsic tension between two oppositions. However tenuous it might sound to link Derrida to the modern theatrical machine that is Brecht's learning play, Chto Delat?'s performance triggers a revision and re-contextualization of this tool, precisely because the group makes it operative in the postmodern space of the gallery, in which, by the year 2000, the performative turn was an accepted convention for avant-garde art, akin to the socio-economic shift from a material economy to knowledge-based production. I take the learning play, inspired by Fredric Jameson's interpretation in ***Brecht and Method*** (1998), as a theatrical model for motivating both the audience and the actors/participants to provide options to a given political situation — not merely to solve the dilemma of choosing one alternative or another, but to unambiguously expose a given decision in order to problematize it and foster thought about all the choices imaginable, with a logic that coincides with Derrida's 'repoliticisation'. Furthermore, the fact that Chto Delat? recuperates this model in a gallery space not only alerts us to our responsibility for facing and revising the past in order to open up political alternatives, it also tests the learning play itself in order to render it available as a response to the 'death of the political'.

2. Chto Delat? [What Is to Be Done?]

Chto Delat? [What Is to Be Done?] is a Russian collective founded in 2003 by a group of artists, critics, philosophers and writers from St. Petersburg, Moscow and Nizhny Novgorod. The main goal of the 'workgroup' is to merge political theory, art and activism and to create a platform that can function as a parallel infrastructure to the 'art world'. Their practice includes a homonymous magazine, each issue being devoted to a different theme, and a web platform that gathers all the elements that influence their artistic practice (listed on their website as: 'newspapers, work material'; 'text and theory'; 'networks, partners and friends'), as well as documentation of their artworks ('art projects'; 'films and video'; 'theatre and performances'). The group is made up of ten members. Five are artists: Olga Egorova/Tsaplya, Nikolai Oleinikov, Natalia Pershina/Glucklya, Kirill Shuvalov, and Dimitry Vilensky; three are philosophers: Artiom Magun, Alexei Penzin, and Oxana Timofeeva; one is an art critic: David Riff; and one is a poet and critic: Alexander Skidan.

The collective's chosen name, Chto Delat?, is a political statement offering a sense of the conceptual reasoning behind their practice. Even though the title is universally known as the question formulated by Lenin in his famous treatise, ***What Is to Be Done?*** (1902) — and which later became an intellectual obsession for leftist thinkers — the name originates from a lesser-known heritage: it is the title of a novel by the nineteenth-century Russian philosopher, journalist and literary critic, Nikolai Chernyshevsky. The main character of the novel ***What Is to Be Done?*** (1863) is a woman, Vera Pavlona, who escaped her family's conventional traditions and arranged marriage to dedicate her life to the cause of the Russian revolution. This novel was highly influential for generations of Russian radical revolutionaries long after its publication in the mid-nineteen century, eventually becoming a Soviet classic. The legacy of the title ***What Is to Be Done***? is conventionally attributed, especially by people outside of the Russian context, to Vladimir Ilyich Ulyanov's (better known as Lenin) homonym pamphlet (1901-1902) that gains recognition in Western Marxist

discourse for his revision of Marxist thought adapted to fit the conditions of late nineteenth and early twentieth century Russia (under a Tsarist autocracy and as an underdeveloped society whose economic stability was dependent upon its agricultural production (serfdom). The unique conditions in Russia led Lenin to acknowledge, like Marx, that the proletariat is the only revolutionary class, but in his un-industrialized. Russia he would have to somehow adapt the Marxist model to his contemporary Russia. He further recognized the distinction of a 'rural proletariat' within the proletariat class as distinguished by the ownership of land — those without land being exploited.

This discovery became central to Lenin's work who, unlike Marx, did not believe that capitalism was a necessary historical phase and that the proletariat will spontaneously develop its political consciousness, but instead that the proletariat needs outside support: the communist party. Lenin stressed that the party must be composed of 'professional revolutionaries' and must bring political consciousness to the working-class movement (by every strata of Russian society as subjected to exploitation by the Tsarist autocracy). While Marx believes that the revolution would come about because of capitalism's collapse, Lenin claims that the revolution would cause the bourgeoisie's defeat and the proletariat could use the state for a transition to socialism — avoiding the capitalist historical stage, that Marx sees as inevitable. Lenin's main points — albeit usually conceived of as the result of his adaptation of Marx in a Russian context, which exerted great influence (explaining why Lenin's ideology is commonly called 'Marxist-Leninism') — were framed upon Chernyshevsky's writings. Lenin's title ***What Is to Be Done?*** re-evokes Chernyshevsky not only in order to expose the main source of his ideas (such as the necessity of 'professional revolutionaries', a small group of people within a society dedicated to the social revolution to help Russian 'common people' to arise, what as defined in the novel through the character of the 'new man' i.e. Rakhmetov), but also because he believed it necessary to insist that "true" revolutionaries are those who sacrifice every aspect of their lives for the revolution.

The 'new man', Rakhmetov, depicted by Chernyshevsky, is wholly dedicated to the cause, giving up all vices, except cigars. He becomes celibate so as not to be distracted from his goals, he learns gymnastics to increase his physical strength, even once sleeping on a bed of nails to "harden" himself. In short, his entire life is dedicated to training for the revolution. Chernyshevsky's ***What Is to Be Done?*** focuses on the men of Russia, specifically the 'new' (revolutionary) man and his role in inciting support for the revolution. Therefore, Chernyshevsky himself is a 'new man' stirring intellectual activity to the cause of the revolution.

The novel also sheds lights on the importance of culture within social struggles, serving to educate and elicit greater support of the revolution, explicitly stating what one must do to become a revolutionary (like Vera Pavlona and Rakhmetov). For Chto Delat? to recall Chernyshevsky's ***What Is to Be Done?*** is not only to trace the genesis of Russian radical revolutionary thoughts, one that historiographical conventions from the West attribute to Lenin, but to also denote a specific conception of art and culture within society and the desire to effectively transform it. The first major work of Chernyshevsky, 'The Aesthetic Relations of Art to Reality' (1853), focuses on the role of art as representative of reality. A realistic approach in art depicts life as it is in order to critique it. Chernyshevsky applies a political and utilitarian approach to art in order for it to serve the struggle of the masses. He did not only seek to use art as a means of critique but also as a space for seeing how things should function in an ideal 'emancipatory' world that the revolution would bring to existence. The philosophy of Chernyshevsky's ***What Is to Be Done?*** serves as a theoretical ground for Chto Delat? and as an inspirational model to develop aesthetic strategies insistent upon the transformative potential of art when thought of as the space in which a critique of reality can be launched creating a training ground for the revolution. Chto Delat?, in having lived through the transition from a communist Russia to a capitalist state, confronted in their contemporary Russia new exploitative labour conditions similar to those of the Tsarist period and system of primitive accumulation that Chernyshevsky experienced and resisted. Due to the gross similarities of the Russian state in the '90s and in the mid-nineteenth century, Chto Delat? felt that Chernyshevsky's ***What Is to Be Done?*** could serve as a relevant guide invoking the novel's emancipatory promises to share, via art, a tradition of radical Russian thought. Chto Delat? oriented its practice towards challenging fixed cultural values as narrated by shared conceptions of history, art history, political theory and theatre. This methodology becomes an aesthetic strategy that they deploy throughout the course of their theatre and performance activities, consistently referencing Brecht as a core influence. They not only highlight the symbolic significance of 'defamiliarisation' — a method that makes conventions look unfamiliar— but they also explore the method in actual artistic practice, continuously referencing past traditions while questioning and re-contextualising them. 'We use Brecht because what he has done offers us a series of techniques and conceptual frames that we can use for testing our present moment.' . Chto Delat? thus explicitly cites its main conceptual inspiration while acknowledging the importance of mobilising Brecht's method today, revising it according to new historical, socio-economic and political conditions.

The method that Chto Delat? usually invokes is one that while insisting on Marxist dialectics in which two opposite realities (thesis and antithesis) fuse into an harmonious totality (synthesis) feels the urgency to problematize the results as they unfold when the binary opposition is resolved into a unity without conflicts. The latter vision re-evokes Theodor Adorno's criticism of Marx's methodology in his ***Negative Dialectics*** (1966). Adorno's main concern with the Marxist dialectical method was that if reality is represented with its elements under scrutiny, they form 'side-and the other-side' of the same elements, would cause the resultant tension to merge into a unified totality (a synthesis) which will continue from one synthesis to another. This mechanism, for Adorno does not allow transformation of the existing capitalism since it follows

Photo 1: Photo documentation of Chto Delat?, What Struggles Do We Have in Common?, 2011, learning play at ICA Auditorium, London, 2011. Courtesy: the artists

its same logic: the representation of a reality as an undisputable single entity (again, a synthesis). The Adornian logic brings to the fore the autonomy of art as a site to see reality as an irreconcilable tension between opposition.

Today, re-evoking dialectics in dual forms (Brechtian Marxism and Adorno's negative dialectics), as Chto Delat? does, means that while we should recognise the irreducible tensions within the different social subjectivities that populate postmodernity (to which the Marxist model of the working class as the privileged agent of transformation of society is untenable) we should simultaneously acknowledge that this social stratified world is also a world of contradictions (struggles). These contradictions are only available to us if we re-interrogate the dialectical method for deciphering our flattened postmodern world. As taught by Brecht, art, when it makes operative dialectics, has the capacity to reduce the complexity of the world into a dual contradiction that, while as Brecht's Marxism aspires to be eventually dissolved in a unity (communism), simultaneously renders available this unity as the ever present possibility to be again fragmented in dual opposition (along with Adorno). Oscillating between the desire to resolve social struggles for a better world where differences (inequalities) will form a unity (equal social and economic conditions for all) and the irresolvable tensions of the social that exists in the post-modern world, Chto Delat?'s works restage dialectics to problematize such a method. That is to say to do not renounce to art's capability of making things appear contrary to their worldly representations, i.e. to insist on art's autonomy. Chto Delat? contrasts the prevalent reasoning that reduces art, among other spheres, to capitalist production and reproduction according to post-operaist philosophy. This philosophy suggests that today's art can only shape new forms of resistance when it happens outside of the traditional art frame, or when it becomes something other than art (as in a protest or a socially-engaged practice). Also in retaining economic-reductionism reduces art and culture to mere tool of economic productivity, dismissing the capability of these fields to produce critique. For post-operaism the symbols and values that art might create today are crucial for advancing the production of values and symbols that 'semiocapitalism' demands. Such prevailing mode for interpreting our contemporary world overcomes the emancipatory promises that philosophical and artistic projects of modernity (such as Brecht and Adorno) brought to the fore through an adaptation of Marxist dialectics.

In acknowledging what is at stake when we consider today's art and culture, in concordance with post-operaism, as exclusively an economic machine subject to capital and active in producing capital itself, Chto Delat? cites instead its transformative potential if one considers that the socio-economic transformations of a society are not primarily driven by technological progress but also by shifts in power for the circulation of symbols and values within a society, effecting then the moral and intellectual leadership of that society. Institutions are then, not places to desert because they perform an authoritative power (the dominant) that subsumes any actions we might take within them to its advantage (its prescribed political plan), but instead are, for Chto Delat?, sites where the dominant capitalist order articulates and executes its vision of the world to make its particular interests appear as general interests of the whole society. For such reasons, art institutions are also sites of ideological articulation. While this articulation exists as a reflection of a dominant (one might say, hegemonic)

class and/or social order, it might also be the framework for elements of that ideology, on the same site where they traditionally support the prevailing order, to criticise them — when we have the chance to deconstruct them (as Chto Delat? did in exhibiting their pieces in contemporary art institutions).

3. Late and post-socialist conditions and 'normalisation'

In Europe, the year 1989 will be remembered as the end of communism. The fall of the Berlin Wall stands for an overarching societal, historical, and political momentum, that is, a shift towards a post-Socialist reality. It officially ratified the beginning of a new era in which the whole of Europe became free from the phantasms of totalitarian Communist regimes. More importantly, the fracture between the liberal West and the Socialist East (Erjavec, 2003) could be integrated into a unified political and geographical entity in the name of Europe. In the span of two years — from late 1989 until the end of 1991 — all the socialist states of Eastern Europe (Albania, Bulgaria, Czechoslovakia, the GDR, Hungary, Poland, Romania, and Yugoslavia, each with their due differences) moved to a post-Socialist reality, as did the Soviet Union in the same period. This move has been examined by a number of art historians and critics — such as Marina Gržinić, Boris Groys, Viktor Misiano, and Aleš Erjavec, to mention but a few — as a period of 'transition', a historic phase that could have led the Eastern European states towards a process of democratisation and liberalisation.

If on the one hand this condition was seen with enthusiasm — as it would liberate the Eastern Bloc's population from both the oppression of the Leviathan State and the prison of censorship — on the other hand this post-Socialist condition generated an 'ideological, political, and social vacuity of the ruling utopian political doctrine, a doctrine that exceeded plain political ideology, for it held in its grasp the whole of the societal field and hence spontaneously affected all social realms.'

This section considers the political implications of this shift away from a situation of antagonism toward a neutral unity, and on the hegemony it produces in the construction of a new ideology. The replacement of the old ideology — that of communism — with a new one — that of globalised neoliberal capitalism has the potential to recuperate the dynamic of 'friend and enemy' that is at the basis of 'the political' as elaborated by the political philosopher Carl Schmitt (1932). Schmitt states that the concept of 'the political' exists when two fronts, like communism and capitalism, confront each other, and, conversely that this concept 'dies' when the dialectical tension is flattened in the name of a unique political project, therefore assuming the character of a hegemonic, and in some circumstances totalitarian, regime. While Schmitt states that the replacement of one ideology with another removes rather than creates the possibility of a recuperation of a politics of antagonism, I cite Derrida's reading of Schmitt because it considers that, as in historical phases such as the one we are experiencing through globalization and neo-liberal capitalism today, it is precisely when one ideology is superimposed that one should reclaim the previous supplanted ideology. Not to bring it back as it was but to question and revise it — a process that might generate alternative politics to the politics we have known until today.

Through this lens one can link what Eastern European thinkers — such as those mentioned above — saw as 'normalisation' of the end of 'the political', and in particular one can draw attention to the phase of 'transition' from one economic socio-political condition to another. The moment of transition signals the passage from a moment of 'normalisation', the reality of socialism seen as the only world possible, toward a phase that, even though predicated as the liberation from that 'normalization', fell back upon another kind of 'normalisation', which is called globalisation. That is to say, again, the 'end of the political'.

In her essay "The Dialectics of Normality", (1999) Bojana Pejić defines the phase that preceded the reunification of the former Eastern Bloc countries as a quest for normality. That is to say, a desire for a unified world without any 'crazy monster' leader, but in which freedom, peace and individual international identities reigned. She suggests that 'normalisation' as a political process was a response to this genuine desire for a 'normal' reality on the part of a communist gerontocracy and Western European bureaucrats seeking to expand the political plan of a liberal, democratic and eternally peaceful subject: Europe.

In contrast to this version of 'normalisation' as wielded by the globalised apparatus (we should include here the US and the current Western political ideology of neoliberalism), Pejić insists upon the need to consider this normality as a concept that has its own dialectic. In distinguishing between the aforementioned 'normalisation'— understood as the ideological process of integration of the Eastern block into the West, after the fall of their communist regimes — and 'normality' — as instead a 'living and working condition' in which people from the former East had to reshape their lives according to this new East-West duality; she acknowledged that the 'state of normality is not one you just reach and keep', in concordance with the logic of 'normalisation', but it is instead a living praxis 'invested with both inner and outer contradictions' . Normality then is for Pejić a collective midway state between the desire to retain the emancipatory ideals communism ingrained into their collective consciousness and the will to reject the nightmares of their communist past. Although Pejić, via her concept of 'normality', finds dialectics in the process of integration of the European communist countries into Western 'Europeaness', I argue that such an analysis does not give centrality to the concept of 'the political' in its strictest sense. I acknowledge that normalisation, and not only 'normality', contains the potential for showing the duality that exists when we think of processes of normalisation as a homogenizing ideology. Via my reading Derrida on the political project of globalisation in the post-socialist Europe, normalisation might be taken generatively for recuperating antagonist politics. It is exactly when reality is made available in the reconciled form of a community of friends, that one can tactically oppose an enemy. Pejić's consideration about 'normality', when scrutinized in political terms, reinforces

this process of 'normalisation', rather than trying to contrast it, because it legitimises the hegemonic order according to which all allies (US, Eastern and Western Europe) reduce the potential for the political, whose foundation is in the antagonism between 'friend' and 'enemy'. It is necessary then to highlight the fact that this political neutralisation is not merely a liberation from communism but, with due changes, is in principle the same dimension: a single option. For this reason it has to be diminished in order to reactivate 'the political'.

A similar recuperation of antagonism can happen in the space of art precisely because the gallery or the museum can normalise or neutralise any political by means of the globalised canons of aestheticisation, especially through the dominant postmodern discourse associated with the 'performative turn' in the gallery space since the mid '90s. The 'art world' operates under the rhetoric of the global through which contemporary art institutions build up their international reputation. Mainstream international museums and large-scale events, such as biennials, function as machines for 'performing' the irreducible mobility of art workers (artists, curators and art critics) as a symptom of the hybrid multinational subjectivities theorised by postmodern thinking, including post-workerism among other strands. The mobility that such events demand of artists, curators and art critics parallels the forms of resistance of the new political subject — such as the multitude, unquantifiable by the narration of a single identity. Therefore, being 'contemporary', both as an aesthetic canon and a philosophical convention, equals the embodiment or 'performing' of globalization. This scenario, which does not provide any space for resistance if not within the same apparatuses and within the same socio-economic, political and cultural paradigm (the principle of 'immanence' tells us that there is 'no outside'), might be challenged through the recuperation and interrogation of the dialectical logic of 'inside-outside' or politically through the rehabilitation of a political alternative to globalization and capitalism.

The way in which the contemporary art apparatus works could be considered an exemplary model, in concordance with the post-operaist view, of the multitude as the new subjectivity that populates postmodernity. The multitude, (aptly represented in the art world by the artists, curators and art critics travelling globally) through the mobility that an open 'frontiers' world allows, resists representation as a stable identity. This mobility enables different subjects from numerous countries to exist as a multiplicity of hybrid identities because they are constantly self-generating. Thus globalisation on one side restructures mechanisms of power over the social — no longer through the nation state of modernity but through the conjunction of different international organisations rhizomatically composed — while also rendering available the conditions through which the social might resist its power — through the amalgam of heterogeneous subjects that globalisation itself creates. This current state envisions a social resistance no longer in need of politics, understood as social struggles between one stable identity over another, but that instead resistance is already contained, paradoxically, within the same conditions of exploitation that one tries to fight. It comes to the fore that such a vision — key today for interpreting social struggles and as theoretical inspiration of many art practices and discourses intended to deal with postmodern politics — denies the existence of an 'outside' because everything, even opposition to the dominant order is within this order itself. Therefore the art world under its globalized aspiration realizes this philosophy of 'non-politics', as the inherent and spontaneous capability to resist of the multitude. Consequentially the art world stages, often, the impossibility of an outside, that is to say the very condition of critique as essentially a dialectical logic between an inside and an outside; that is to say it denies the existence of a place from which critique might be launched. However, while acknowledging the current situation as a condition in which any entity from the outside is captivated within the inside and being agreed in principle with the shift from a world of nations to globalization or even with the economic changes that occurred in the global West — as elaborated by the post-operaist ***welthanschaung*** — one might also think about this neutralization of politics in positive terms. That is to say, not as if post-Fordism and globalisation are the end of history to which some day the multitude will spontaneously create the conditions for changing this capitalist mode (a strategy which implies waiting for this future to come without taking any action of resistance in the present: immobilism), but instead to take post-Fordism and globalisation, exactly because they neutralise 'politics', as resourceful ground for re-claiming 'the political'. Since neutralisation exists precisely because of the conditions of globalization — what Derrida calls 'depoliticisation' — a reactivation of 'the political' can happen only when a dialectical movement is still possible. Thus, it is precisely within the space of the gallery, seen as a 'normalised' space that one can respond by showing the other side of the same entity, that is to say, the realm of the political. Performance appears in this scenario as the most appropriate site for collectively testing and rehearsing 'utopic' alternatives to the dominant logic of global capitalism because it contains, as a medium, an unpredictable character, and further, it has the malleability to generate actions by the means of the live body on stage. Furthermore, performance is the privileged medium chosen by contemporary art institutions to perversely subject the social body to 'knowledge-based' capitalism while simultaneously, in some cases, trying to liberate this collectivity from the same. Performance, because of its ability to mirror the forms of post-Fordist work ('affective labour'), in the gallery, activates on stage the philosophy of immanentism; it shows from one side, how intense today's capitalism is and rarely offers examples of how we could free ourselves from it (although even when it does so, it still mimicries that resistance to capitalism will spontaneously emerge from within). So, the the performative as the 'staging of post-workerism' enacts within the gallery an instance of the neutralisation of politics. However, paradoxically I ask whether performance — precisely because it is the very medium that has become the signature of the neutralising of the gallery — can be the form in which resistance, opposition, place of

critique can be recovered, rediscovered, reactivated. However, paradoxically I ask whether performance — precisely because it is the very medium that has become the signature of the neutralising of the gallery — can be the form in which resistance, opposition, place of critique can be recovered, rediscovered, reactivated. The learning play performed by Chto Delat? at the Institute of Contemporary Art in London [ICA] is exemplary for exploring modes in which this medium, exactly because its encapsulation within this capitalist milieu, can contrast the vision of performance as 'immanent' and therefore is useful for representing in the gallery space the 'depoliticized' conditions of our postmodern age. Rehabilitating a dialectical tension while investigating its efficacy today, the learning play is a generative example of Derrida's 'repoliticisation'. Even though the focus of the analysis here is on the method of the learning play, it is fundamental to embrace the entire inheritance of Brecht as a tool that pervades the entire practice of Chto Delat? — specifically the notion of the 'alienation effect' as a strategy that they revise in order to unlock fixed cultural and historical parameters. They exposed the audience to an alternative narrative by 'defamiliarising' shared beliefs. Furthermore, ***What Struggles Do We Have in Common?*** uses the aesthetic tools contained in the Brechtian 'alienation effect' to estrange the contemporary art institution, the space of the ICA, turning it into a political arena or a 'social laboratory' for rehearsing politics. Brecht's theatre today, when revised and interrogated, might transform spaces of cultural production (both the theatre itself and the gallery), distancing them from their common usage as places for aesthetic contemplation and synesthetic pleasure in order to reinvigorate them as primarily social institutions for orchestrating collective desires without forcing a purpose-driven political plan.

4. 'Defamiliarisation' and the Verfremdungseffekt

Fredric Jameson in ***Brecht and Method*** (1998) notes that the alienation effect has many layers and interpretations and can be read as a 'distancing effect' in itself — as a process that not only distorts the shared perception of reality, but has itself been the subject of a distortion. 'Sometimes it is evoked in terms of the effect itself that names it. To make something look strange, to make us look at it with new eyes, implies the antecedence of a general familiarity, of a habit which prevents us from really looking at things, a kind of perceptual numbness […].' In this way the 'V-effect' allows for a recuperation of perception. From another angle, it can be read as the apparatus through which Brecht deployed theatrical techniques (citing quotations; making evident the distinction between the character that the human being behind the actor was supposed to play and the human being him-or herself through a method of acting in which the actor can modify and subsequently take distance from the scripts; using music or other scenic stratagems such as displaying placards). Furthermore, it can also prevent identification with the character, further highlighting the distance of the actor on stage with the character that he or she is supposed to represent.

The description that Jameson gives of this effect has a political connotation. It is a political weapon that can react to the idea that the social order, as it is built, as it manifests itself to us, is natural. It is in this spirit that the alienation effect reinforces my assumption that Brecht, and more specifically the learning play, is the tool through which 'repoliticisation' can be achieved. The alienation effect, as described by Jameson, helps us to clarify Chto Delat's intentions. It is a 'repoliticisation' not only for the realm of 'the political', but also within the sphere of artistic production that today 'performs radicality' through immanence. To this principle of 'immanence' the Russian group contrasts the dialectic as a method that needs interrogation and without which we lose the imaginative ability to see things as they might be or as they are. Their attempt to perform dialectics confronts collaboration and the 'social turn', performing an immanent logic vis-à-vis the learning play and devising instead a friction between two polarities. Furthermore, ***What Struggles Do We Have in Common***? combines the conceptual discourse of 'depoliticisation/repoliticisation' with an operational strategy: the revision of the learning play itself.

5. What Struggles Do We Have in Common? as a strategy of 'repoliticisation'.

What Struggles Do We Have in Common? took place on September 10, 2010, and was orchestrated by the collective together with other local collectives of artists and activists. (see: figs. 1; 2) Chto Delat? wanted to share ideas on the theme of struggle between factions when an event takes place within an institution — the common enemy of left-wing advocates. They attempted to create a unified voice in which the distinctions between groups would be subsumed under the question: 'What struggles do we have in common?' Further, if by means of this question they were to become 'friends' — a community that can share ideals and goals, or suffer the same kinds of exploitation by the current system — they might additionally be able to articulate a response to the question: 'What strategies should be undertaken?' By making an attempt to create a single horizontal entity, the performance mirrors the archetype of collaborative practice today, performing a democracy of equals without antagonism. At the same time, it also reveals this type of collaboration to be an impossible task when, within the scope of the performance, the group of friends is forced to take positions as either artists or activists. For the outcome of the performance, the group expanded their collaborative platform to other collectives with whom they had not previously worked: Carrot Workers Research Group (London), Ultra-Red (London), Turbulence (London), Historical Materialism (London), Parachute Artists Nomad (Amsterdam), Freee (London), Iguana Dance (St. Petersburg), Vlidi (Belgrade), and the non-profit art organisation no.w.here, also based in London. It is precisely this engagement with other communities in the creative process of the piece that enables the unfolding of an unpredictable collaborative dynamic. To develop the play together, the group organised a 'forty-eight-hour communal life seminar' two days before the staging. The groups were invited to meet at the

Photo 2: Photo documentation of Chto Delat?, What Struggles Do We Have in Common?, 2011, learning play at ICA Auditorium, London, 2011. Courtesy: the artists

ICA, where they planned to spend a day and night together — sleeping, eating, and carrying out a series of activities together in order to build a communal consciousness. Participants engaged in physical activity, body movement, voice exercises, and other leisure activities where the goal was to generate trust between members, for participants to get to know one another, to become 'friends'. They played a ring-a-ring-of-roses; they formed pairs and took turns spontaneously and genuinely touching each other; they took turns carrying a member as they lay horizontally; they created moments of collective discussion; and so on. The debates they stimulated were focused on the conflict between artists and activists, which was seen as a dialogical struggle that can open up more politically engaged scenarios for art and more imaginative possibilities for activism. In this collective seminar in preparation for the performance on stage, Chto Delat? produces an improvised attempt to coordinate the chaotic subjectivities that form any collective identity, while simultaneously creating a rupture within the social body as soon as they force people to think dialectically about themselves as either 'artists' or 'activists'. This dynamic pervades the whole play; it calls for an organised collectivity of equals while at the same time engendering an antagonistic social formation and therefore a dialectical as opposed to immanent dynamic. The piece started in the auditorium of the ICA with a curator describing to the audience what the creation process was in order for the performance to take place, focusing the attention on the improvisatory aspect of the play: 'For practical reasons I hope you appreciate the improvisation of the play'. Racks hung with casual clothing were wheeled onto the stage in order to structure the scenography of the piece, which began when a woman in a black smock came onstage and proclaimed: 'Welcome to our learning play. Now we start!' Then the groups of people who were part of the 'life seminar' populated the stage and assumed central roles in the play. A girl wearing a white smock and holding a laptop took her position on the stage. Her role, as the performance continued, was to type into the laptop whatever emerged in the group discussion. These typed sentences then appeared live on a main screen positioned to the right side of a central podium. Again the woman in the black smock, or the 'moderator' of the debate and also the presenter of the 'show', announced: 'Chorus on the stage you can start!' This referred to a group of men and women standing on a higher podium at stage left. Wearing white spacesuits, the only part of their bodies that was visible was their faces — an aesthetic strategy that, while grouping them together, as a literal chorus, also focused attention on the most important aspect of their live performance: the voice, which became the meaning through which they created a unified subjectivity. The first act then began with the chorus singing a traditional socialist composition but with a libretto specifically written for the occasion of the play. Through this musical reinterpretation of classical socialist songs, the play confronts audience expectations for a theatrical event in a gallery space, where music might typically be used as an aesthetic device that contributes, together with other aesthetic tools, to a 'synesthetic' situation (akin to the contemporary 'post-Brechtian' forms of theatre described as 'post-dramatic'(Lehmann, 2006)). The anachronistic sound shifts the gallery experience from one of aesthetic contemplation to a discomfited experience of superimposed political propaganda, socialist in nature, conventionally perceived by the logic of the contemporary as mere rhetoric. The audience, the actor, and the whole gallery apparatus are forced to face these paradigms and to further question both socialism's past and the present state of contemporary capitalism, along with their associated cultural

logics. A question (the first), to which the group was expected to react and whose aim was to stimulate a discussion between the participants of the performance, was projected onto a screen. The moderator read it aloud to the audience and the group onstage:

'First question: What are you struggling for?' Immediately the group on stage began to react. One said, 'I want everything for everybody'. Another said, 'Maybe it sounds a bit clichéd, but the meaning of life.' Another person said, 'I am struggling for life, and to be alive'. Another said, 'Against capitalism'. One said, 'For a strong political left-wing revolutionary movement,' which was met by audience applause and responded to with: 'I am struggling against all the anti-communist discourses predominant today' and 'I am struggling against the rise of the EDL [English Defence League]' and so on in a growing climax between tragedy and hilarity until the moderator announced a new question that simultaneously appeared on screen: 'Second question: Whom do you represent?' Dimitry, a member of Chto Delat?, replied, 'Russians from the 1970s till nowadays.' Another said, 'A radical queer community called Radical Fairies,' followed by, 'The politics of representation, which is too complex to engage with this microphone'. Another followed: 'I represent no one'. However because of the unpredictability that the format of Brecht's learning play enables it is difficult to say if these exchanges between participants are solely scripted or improvised. The different way in which Chto Delat? revises the original Brechtian learning play renders such deciphering even more complex. While Brecht's Lehrstück begins with a clear plot and only later makes it available for transformation by 'actors/amateurs' (in this method, if these plays were public, one could theoretically distinguish between Brecht's and participants' voice), Chto Delat? invites players, from the first rehearsal, to interpret and develop the plot as they choose leaving the public audience later unaware which parts of the play are scripted or improvised. Even though, the play might appear to us as ambiguous because of its constantly evolving nature, the presence of Chto Delat?'s members as active 'audience/participants' within the play gives the chance to the collective to re-direct conversations and actions towards their intentions and/or beliefs. So, in the section that engages with the politics of representation, as described above, it is certainly a direction that Chto Delat? wanted to give to the play for engaging with the politics of representation (it is indeed Dmitry Vilensky, a core member of Chto Delat? who poses the question of representation to the actors/amateurs on stage), but the group's replies cannot be determined to be improvised or scripted. However, as these scripts function well together within Chto Delat?'s worldview - and particularly within the politics of representation that this learning play aims to show (problematize them while simultaneously proving their efficacy) - it suggests that these group's exchanges were the results of material that Chto Delat? selected from previous rehearsals. These comments by the actors/amateurs directly engage the play's core object of interrogation: the politics of representation. Despite the reductionism of 'artists' and 'activists' as identities, ***What Struggles Do We Have in Common?*** aspires to rehabilitate representation in contrast to today's more accepted anti-representational practices. It problematizes ('the politics of representation, which is too complex to engage with this microphone') or it rejects ('I represent no one') representation itself. The dynamic continued with further questions to structure the discussion: 'To whom are you accountable?' and 'Are you revolutionary?' The latter question quickly became paradoxically comic with reactions such as: 'I tend to be…' 'I am revolutionary in my kitchen', 'On the weekends', and 'I am anti-capitalist so I must be revolutionary'. The question 'Do you belong here at the ICA?' was met with 'What is the ICA?' to which another person suggested, 'International Communist Association!' Two other provocations then characterised the discussion: 'What are you risking?' and 'What is your power and/or your weakness?' After multiple replies from the group, which, as seen above, oscillated between a serious political consciousness (what it is expected in reality) and a humorous sense of instigation (what is delegated to fiction, or more aptly theatre), the moderator proclaimed: 'They are ready to work collectively for the communist future of the society!' and she invited the group to celebrate this moment with the festive exclamation: 'Hurrah! Hurrah!' As the group chanted 'Hurrah! Hurrah! Hurrah!' it then physically lifted and carried each member of the group as an exercise of trust. After this action, the presenter invited the community to sit and the chorus began to sing: 'They are sacrificing themselves and they did it for practical reasons […].' Through the description of this first act it is evident that the conceptual frame in which the performance is embedded is the philosophical and political implication of dialectic as a discourse that we inherited from our philosophical, political, and historical past. The play started with the presentation of oppositional fronts that are usually invoked when one thinks about the relation that might exist between art and politics: artists versus activists to contravene the increasing overcoming of this opposition, as for instance with the new mode of art-as-activism (a paradigm that defines practices that supplant the aesthetic domain with concrete interventions either for the amelioration of the social through 'socially-engaged projects' or with interventions in the public realm in the form of protests). The first act immediately announces to the audience the core material of the learning play: dialectics in the form of thesis and anti-thesis (the artists and the activists) but also the attempt to reach a synthesis (when the group is temporarily reconciled into a community of friends before getting divided again).

In re-evoking dialectics — as a theoretical model and a method for theatre that helped to shape emancipatory political and artistic projects in the past — ***What Struggles Do We Have in Common?*** feels the urge to reactivate its legacy (both in an Adornian sense as an irreconcilable opposition of thesis and anti-thesis and in a Brechtian Marxist way as a duality which will bring a synthesis) to test its validity in the present day. It is precisely when the paradigmatic shift of a European society to a global one has occurred, and when the new logic that postmodern

philosophy elaborates for interpreting, and sometimes resisting this scenario to overcome the dialectical method, that Chto Delat? activates dialectics to prove how transformative this way of thinking could be in testing globalisation and its associated philosophical reasoning. Dialectics are for Chto Delat? a way of thinking to be made operative within the globalised European scenario in claiming that globalization must be assessed and verified. The learning play wavers between an effort to perform a unified collective identity — like that which modernity sought to achieve, for instance — and the actualisation of parodies for that political project — as when leftist slogans are reduced to clichés, revealing the complexity of postmodern politics. However, through those strategies, as the analysis of the performance that follows will show, the play does not entirely dismiss old ideologies, and neither does it renounce a liberal political plan. Instead, it seeks to cross-examine these notions. It conspicuously manifests the 'slogans' we usually relate to liberal political plans, communism, or socialism. Sometimes they are framed as clichés; sometimes as ridiculous; sometimes as jokes; but also sometimes as significant philosophical and political ideas. The moment when the presenter invited the group to split visualises the logic investigated by Schmitt as the basis of the political: the 'friend and enemy' dynamic. This act on stage symbolically represents the reverse of the notion of the political as a structure that functions as an a priori to the natural affiliation of human beings, an affiliation that can be seen within the performance as necessary to collectively produce something: a task, strategically orchestrated by Chto Delat? This logic is traceable to the work's inception, when the artists, with their fictional 'life seminar' stratagem, invited other collectives to do something together, even though it was not clear how a group of artists, each interested in producing a collaborative artwork within an institution, would interact with a group of activists whose fixed position in society is always 'against the institution' and to whom the label 'revolution' is often attached by shared cultural parameters. But rather than dismiss this binary logic that organises our mind-set — the mind-set that sees the artist as ineffective and creative, and the activist as more effective and politically engaged, or, put differently, the former as unproductive for social change and the latter as a combatant for a better world — the piece achieves its subversive character by exposing the audience and the participants to past ideologies showing sometimes their current rational uselessness, sometimes their historical relevance. It achieves this, for example, with a range of replies to the serious question 'What are we struggling for?' ('I want everything for everybody', 'Against capitalism', 'For a strong political left-wing revolutionary movement,'); and hilarious responses to the subsequent 'Are you revolutionary?' ('I am revolutionary in my kitchen', 'On the weekends'). In this way the participants started to 'deconstruct' the fixed mind-set according to which those relevant questions would demand one of two positions: 'Yes, I am revolutionary!' or 'No, I am not revolutionary!'. To this reductionist formula, which would suit the understanding of Carl Schmitt's concept of 'the political', Chto Delat? and the participants engage a new dimension that, as Derrida theoretically suggested, deconstructs 'depoliticisation' as an 'un-generative' condition, a hegemonic way of thinking that has dominated political and philosophical discourses. But rather than dismissing two options, 'yes' or 'no', they consider the two alternatives as part of the same ontology: that of the political. To reach this goal they use a strategy that is present in the learning plays of Brecht and, in a broad sense, all his methodology: taking a position that illustrates 'this' (the right answer) 'rather than that' (the wrong answer) in order to instigate a generative reflection on what that the latter may contain. They insist on communism — 'They are ready to work collectively for the communist future of the society!' — in order to show this as an alternative to contemporary neoliberal capitalism, but at the same time to interrogate it and thus move the space of the gallery toward a testing ground of all possible alternatives to the current situation: 'I would like to promote ambiguity rather than any political agenda' and 'Ambiguity is a political agenda'. They interact in a state between hilarity and seriousness — or between reality and fiction — in order to contaminate the artists' convictions with clichés coming from activism, and the activists' convictions with the prejudices of artists. The desired outcome was to expose the perversion of both new and outdated ideologies. This exposure was achieved not only through the clichés uttered by the group, but also by the physical structures on stage: a cardboard installation with Leninist combatants that framed the stage of the chorus; the masks worn by the children; and the placards announcing the acts — all strategies borrowed from Brecht. Through this dynamic of exposing the audience to what they expect to hear, while breaking down the moral duality of 'good' and 'bad', the learning play facilitates a state of confusion — a state in which the political subject is estranged while at the same time recuperated. It is in this movement between the 'depoliticised' and the 'politicised' that the learning play ***What Struggles Do We Have in Common***? mobilises the space of the gallery towards a dimension of 'repoliticisation'; although it presents 'depoliticisation' as the current geo-political state of affairs, its 'productive' side is disclosed when we bring to light the ghosts that the same 'depoliticisation' seeks to neutralise, to 'hunt' in order to critically address. Chto Delat?'s ***Lehrstück*** achieves 'repoliticisation' by insisting even more on the old dichotomies rather than dismissing them — something that Derrida did with Marxism. The performance recuperates the past not in order to prefigure a peaceful future, the end of history or ideologies, what we have called, recalling Pejić, 'normalisation', but instead to come back to it as a question. A question that becomes even more necessary today, when a post-socialist and globalised reality wields its power through its self-identification as the only possible political project.

Like the ***Lehrstück*** of Brecht, or at least in Steinweg's reading of it, Chto Delat? restages two familiar, opposite alternatives in order to disclose other possible alternatives and to claim a space of urgency in which to interrogate them. It is the dynamic of showing 'this, rather than that' that can instigate a process

of illuminating the alternatives that the latter contains. This is the most important strategy that the Russian collective extracts from the Brecht methodology.

Fredric Jameson (1998) insisted on the fact that the 'duality' between an affirmation and a negation is the most elementary form of the Brechtian theatrical practice as well as the most innovative aspect of his method. This 'duality' to which one can connect the dialectical way of thinking is what opens up a reading of each gesture in the theatre of Brecht: not only what we can see happening in front of us as audience — that is to say, the decision between two alternatives — but also what could have been done as something that is complementary to the presented action — what was decided upon or enacted, what has been omitted. In this way the actor on stage, in addition to what he or she does, places emphasis on what he or she does not do, in order to set forth a series of other possibilities and to show that the gesture he or she made was only one option among others. This way of understanding the duality of Brecht's method offers us the possibility to strengthen the argument stated above, according to which there is clear connection between this strategy of acting in the learning play and the vision of 'the political' suggested by Derrida. Through 'repoliticisation' Derrida claimed that we do not have to renounce the possibility of communism, but that we have to insist on it even more, while at the same time revising, questioning, and proving it according to the changed conditions of the world. ***What Struggles Do We Have in Common***? exposes the audience, for instance, to the musical socialist propaganda of the chorus, or to the motto proclaimed by the moderator: 'They are ready to work collectively for the communist future of the society', or, further, to the installation in cardboard by Leninist combatants. These all place the ideology of communism on examination within a symbolic and physical space for experimentation through learning. The performance achieves this goal by explicitly insisting on questions, intentionally leaving them open to a variety of contradictory responses.

Even though these paradoxes and contradictions are the most evident outcomes of the play, at certain points the performance — for example the moment in which the group of artists and activists are reunited for 'the communist future of the society' — reconciles classical antagonisms in a united entity whose efforts are consigned to a future plan. Such moments drove the play toward 'depoliticisation', a condition that allows the performance in other scenes — as for instance when the questions appeared on screen in order to instigate an open discussion between the participants — to 'repoliticise'. As Derrida suggests, it is necessary to face a phase in which everyone is friend of the other in order to reach an antagonistic plan that reactivates the political. Today, a future political project might not be in keeping with our preconceived model, i.e., to replace the current hegemony of globalised capitalism with communism as it was manifested in the history we know, but rather, to engage a dialectical movement in which, once we have taken a position, its alternative is always possible, among others. So if the learning play — as in the reading of Steinweg — is the strategy that continuously places options on trial, then it is also the aesthetic machine for realising 'repoliticisation'. In the beginning of the second act, after the alleged reconciliation between the two factions in the first, the classic oppositional struggle between artists and activists was restaged. The second act indeed started with the presenter inviting the group to split into two: 'Now our group will be divided. The first part will be artists and philosophers. The second group will be activists'. Then she explains to both groups that the artists have received a letter (projected on the screen), an invitation by an art institution to participate in an exhibition devoted to the theme of democracy and freedom with the title 'Revolution and Communism Now'. She invites them to read the letter collectively. The letter encourages the participation of artists interested in large-scale projects, and encourages participation by politically engaged artists, as per a socially responsible association financially supporting the exhibition. The invitation also addresses practical issues such as the costs that will be covered for artists, which includes travel expenses and accommodation. The letter justifies the fact that it will not pay for the work of artists because of its fundraising ethics, which forbids the institution from achieving a bigger budget. In response, the group of artists are clearly suspicious, despite the fact that the moderator encourages them to be excited about this opportunity. The audience can read the dubious expressions on their faces. Here again the play clearly shows the reactions that artists might have when dealing with the 'great' opportunity (represented by the figure of the moderator who encourages them to accept the invitation) to show their works and the fact that this opportunity does not respect their work because it does not pay for it (represented by the disappointment of the artists). The forceful confrontation that this action incites notes that it is the result of Chto Delat?'s previous rehearsals from which the players' spontaneous interactions offer them guidance in how to perform these parts to a public audience. Putting the audience and the actors/amateurs on stage in a given situation — for example, by inviting them to an exhibition of a learning play by Chto Delat? — is a strategy at the very heart of the Brechtian format, which reduces the action and the gesture to a minimum set of possibilities. The situation itself is restricted to a choice between two possible decisions: to be an artist or an activist, to participate or not to participate in the exhibition, that is to say, the Brechtian 'nicht/sondern' ('not this, rather that'). In this way the learning play of Chto Delat? shows us a reduced set of possible alternatives in order to instigate both the audience and the participants to open up and generate through discussion a series of choices potentially opposed to every decision that each member of the group is taking. One member of the group of artists reacts: 'I have two problems: my practice does not match the institution's intention, but I have to confess that this is a tremendous opportunity'. Another says, 'I am still not sure if I wanna promote freedom and democracy.' Yet another says, 'I would like to promote ambiguity rather than any political agenda', to which a female artist replies, 'Ambiguity is a political agenda'. This dimension that the play realises is

opposed to the same archeo-onto-teleogical vision in the realm of politics as investigated by Derrida, and rather than offer a unique response to the invitation, as the only alternative possible, and as the right one, it questions the invitation itself and opens a realm in which different choices are shown, questioned, and tried. The analysis of the Lehrstück made by Steinweg is, as a format, basically what we call today a seminar in which, thanks to the inclusion of the audience and thanks to the turnover of the actors who play different roles, infinite proofs can be made and all alternatives can be tested over time and discussed endlessly (Jameson, 1998). As the main characteristic of the learning play, it is clear that this process of testing and proving is the concrete visualisation of what Derrida suggested in order to reactivate 'the political'. Does 'repoliticisation' thus provide the possibility to reclaim past ideologies in order to test them continuously? Is it a method in which there will always be a way to imagine an alternative to the present status quo? And further, is it a dimension in which — precisely because of the on-going situation in which a minimum set of choices are available, specifically two — one can engender other replies or questions, or, as per Derrida, numerous political alternatives? Reading in this way the aesthetic of the learning play unequivocally connects it to the notion of 'repoliticisation'. I argue that this theatrical method is a space in which the very basis of 'the political' — as an irresolvable tension between two fronts — can be realised through testing, questioning, and revising our past in order to generate multiple possible actions in response, without ultimately arriving at a universal future political plan. The fact that the Russian collective adopts this format in order to rehabilitate its validity corroborates my reading of ***What Struggles Do We Have in Common?*** as an action that articulates 'repoliticisation' in a postmodern gallery space — a place that today deals with performance in a quite different way, staging a collective body for the execution of an artwork ruled and scripted (i.e. 'delegated' according to Bishop, 2012) by an exclusive artist, one that, to invoke Brecht, is a 'bourgeois' theatre director. Although performances and participatory artworks in galleries and museums today, in the majority of cases, use aesthetic means toward a political agenda (to be reductive, sometimes only considering the human body or collaboration between subjectivities as 'political'), they simultaneously perform an amount of relationality and cooperation that serves a knowledge-based production that extrapolates economic, social, and cultural values, indissolubly bound to each other. Theories such as 'immaterial labour' (Lazzarato, 1996) and 'multitude' (Hardt, Negri, 2001) function as the speculative ground not only through which the recent 'performative turn' is conceptualized, but also as inspirations for artists and the like to feel, look, and be 'contemporary'. We have learned from such theories that to resist is to 'be within', meaning to adopt the same creative force, i.e. cooperation between a plurality of subjectivities, that contemporary capitalism (semio-capitalism) uses to wield its power upon the social in order to liberate society. It is a mode of resistance that spontaneously embeds a messianic promise.

In contrast to this immanent vision, performed in sites of contemporary cultural production as 'radical', Chto Delat? stages the collective body in order to reveal the necessary rivalry (reduced to two fronts, symbolically by 'artists' and 'activists') that must exist in order to think about 'the political' as 'critical', and for disarticulating alienating modes of participatory art that satisfy the frictionless democracy formed by heterogeneous subjects, irreducible to a unified collective identity. The strategy of showing on screen an invitation to participate in a supposedly radical exhibition, first to a group of artists and activists and subsequently to the audience, avoids the reification of the language typical of works and objects of art. Rather, it fosters discussions, revisions, and alternatives. There is the paradox, for instance, expressed by one of the artists: 'My practice does not match the institution's intention, but I have to confess that this is a tremendous opportunity'. This clearly highlights the contradictions that a definitive 'yes' or 'no' type of response would engender, declaring a formula in which one hates the system but simultaneously likes the opportunities it creates. In this way the play highlights how any sort of final decision corresponds to another possible alternative. Another element that the performance recuperates from the strategies of Brecht is the possibility for the actors/amateurs to change their roles. The play in fact oscillates — as described above — between roles: artist and activist. The piece does not realise a peaceful dimension in which everyone is a friend of the other, i.e. 'depoliticisation', but visualises this phase just for a short time, subsequently placing it again in opposition to the antagonism between 'friend and enemy'. In this way, the performance materialises precisely when the phenomenon of 'depoliticisation' occurs; one might revise past ideologies and respond to the death of 'the political' through 'repoliticisation'. This dynamic is what happens during the act in which the letter is presented to the participants. After a moment in which the group was divided, an artist suggests to her colleagues that the activists should participate in the decision to reply either 'yes' or 'no' to the letter. 'We should ask activists to participate'. She further justifies her idea by saying, 'In the first place, I don't like the division between artists and activists; I wanna sleep in the space between the two groups.' She continues: 'We need to find another space'. This moment translates the third dimension previously invoked by an activist into an actual act, an action by a member of that artist's group who positioned herself in the middle of the stage. The woman in her in-between space was immediately joined by another participant, thus realising a third political dimension that brings to light a new political subject yet to come. This dynamic concretizes what Derrida suggested when he said that we need to insist even more on a possible emancipatory plan that can overcome our obsession with the binary logic of one or the other. The play exposes the audience and the participants to this third dimension, without suggesting an alternative, but instead provoking them to think about it, question, and test it. The play defamiliarises, through the means of the alienation effect, the way in which our mind-set is constructed; that is to say, the artist who would accept

the invitation, and the activist who, on the contrary, would react to this with a political campaign or demonstration. This movement between 'depoliticisation' and 'repoliticisation', being never-ending, secures the space of the gallery from the risk of offering a vision of history as archeo-telo-logical, and from the risk of ending with 'normalisation' as the end of ideologies. An activist reacts to the invitation from an artist to merge the two groups together, saying, 'They want to promote democracy and freedom? We are doing activism. Do you want to join us to do the daily activity, activism rather than doing an exhibition in an institution like ICA?' From this moment on the audience began to participate in the discussion. Then the two groups decided to form a singular collective subject in which activists and artists can share a space, thanks to some very persuasive reasoning made by an artist. To whom someone else responds: 'You are fucking liberal!' At this point the third act begins: 'Leave the stage!' With the invitation to the group to vacate the stage, the play incorporates the audience in a more deliberate way. After the chorus sings, 'The beautiful that have terrible conflicts helps us to find a solution […]', the presenter addresses the audience: 'Do you have a suggestion? What struggles do we have in common?' A member of the group on stage closes the sequence by saying, 'Coming from Russia […] we should leave individualism and do something collectively', and adds, 'It involves sacrifice!' Until the end of the play, a dynamic unfolds that shows the alternative to a singular plan — that of communism for instance ('It involves sacrifice!') — in this way reactivating the political dimension 'neutralised' by globalisation.

The claim for 'repoliticisation' as a possible strategy through which we collectively can learn how to respond to the status quo is deployed in this case in the gallery space, but as an experiment or model it can be taken into consideration elsewhere. The play transforms the gallery into a place for rehearsing actions and articulating discourse accordingly, useful for thinking about societal struggles to come. The re-exposure at the end of a dialectical movement between one option and another is what can lessen the strength of 'normalisation' that we experience. The play 'defamiliarises' the ideology of communism — a propagandistic left-wing song — through a subsequent song that communicates to us that at the end what we 'need is love'. The last act concludes with the chorus singing a very traditional leftist song. Some members of the group join them, singing and holding up their left hands, the traditional symbol for leftists and socialist supporters. After this socialist rhetoric in the form of straight propaganda, The Beatles' iconic 'All You Need Is Love' — a more internationally known and less propagandistic song — changes the mood. The song reconciles the groups into an original community of friends — a community that even the audience joins. Again a situation of 'depoliticisation' or 'normalisation' leaves the audience and the participants with questions in mind: What struggles do we have in common? What is to be done? They are questions to which now one can respond with the method offered by the learning play: repoliticisation. This study of Chto Delat?'s collective performance offers a space for reconceptualising the contemporary conventions that Bishop (2012) or Jackson (2011) have identified as the gallery-based 'performative turn' of the mid '90s and early 2000s. Even though their positions vary greatly (Jackson identifies a cross-pollination between visual arts and theatre as part of the 'social turn' in the arts, and Bishop posits a manipulation of the social through aesthetic means) they both acknowledge that the 'theatricality' of these experiments, to be reductive, resides in the mobilisation of the human body by the artist in order to perform a socio-politically engaged project without necessarily naming or giving meaning to 'the political'.

This mode is akin to what Hans Thies Lehmann theorises as 'postdramatic' theatre (1998) meaning the set of theatrical practices that since the 1960s have no longer necessitated conventional performances by skilled actors playing out a scripted text, but have included a variety of non-textual and experimental forms. These new theatre modalities show that avant-gardist forms — or what we typically identify as political theatre — are not necessarily in line with the works of Brecht. That is to say, they do not make explicit reference to political themes or a narrative plot keyed to aesthetic conceits, but rather are merely an ensemble of aesthetic strategies for realising a synesthetic dimension of mixed art forms, i.e. specifically visual art and theatre. Thus, contemporary canons, postdramatic theatre (Lehmann, 1998), and visual art performances (Bishop, Jackson), which privilege aesthetic forms over political content, have become synonymous with 'post-Brechtian' theatre (David Barnett, 2013). In its very different way Chto Delat? not only responds to the contemporary lexicon of performance in gallery spaces, recuperating the dialectic tension between form and content, but also proposes a literal take on theatre, one that perceives it through Brecht as a social institution for seeing things as they are or might be (the V-effect) and endlessly rehearsing our desire to resist capitalist society. Estranging the gallery space as theatre in this sense, i.e. a social institution, they make the institution itself more contradictory and therefore more capable of development. Furthermore, Chto Delat?, by staging a dialectic, 'defamiliarises' the hegemonic discourse currently at play within the whole contemporary art apparatus — one that performs 'radicality' and 'anti-institutionality' as the only emancipatory practices of resistance to knowledge-based capitalist production, as theorised by the Italian post-operaists. They contrast this tendency by not simply restaging identitarian politics within institutions but instead drawing attention to the collective effort we should put into today's struggles to problematize, and not necessarily renounce, our desire to be a social entity, an organisation, an institution.

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Rhythm and Balance in Modular Façade Renovations: A Case Study on Prefabricated Large Panel Buildings"

"Visual and Functional Interventions in Prefabricated Large Panel Façades: A Gestalt Approach"

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Abstract
This research examines the effects of aesthetic and practical modifications on the façades of existing buildings made with huge panels. The examined changes encompass the incorporation of volumetric features like balconies, the rearrangement of windows, and further alterations impacting the aesthetics and functionality of the structures. The research uses two-dimensional models to assess visual and functional alterations between the original and changed façades, including Gestalt concepts to elucidate the impact of visual perception and organization on façade harmony. The primary aim is to evaluate the impact of these changes on architectural coherence in the urban environment, increase interior living circumstances, and elevate the occupants' aesthetic experience. The research examines the difficulties of preserving visual coherence and utility, providing pragmatic suggestions for architects and designers seeking to restructure the façades of large-panel structures. The findings indicate that well-designed interventions may revitalize old structures, enhancing their modernity and functionality, while also fostering improvements in the built environment and people's quality of life.

Introduction

Prefabricated architecture is an arena where composition is essential for harmonizing practical, economic, and aesthetic requirements. This architectural style relies on standardized and prefabricated components that are assembled on-site to form full structures. The composition process in prefabricated architecture transcends basic technical organization; it is a creative endeavor wherein compositional principles facilitate the creation of a cohesive and functioning entity. (Ford, 2003) The façade represents the contact between the building and its urban or natural environment, necessitating a design that fulfills both aesthetic and functional criteria. The process of re-composition entails reinterpreting the visual and structural components of the facade to create a cohesive conversation between the individual aspects and the entirety. Building façades are the most apparent and exposed components of a structure, playing a crucial role in both aesthetics and functionality. The necessity for involvement in structures created using huge panel technology, which prevailed in mass construction throughout the 20th century, is becoming increasingly apparent. These constructions, while originally successful in addressing housing needs during an emergency, today encounter several hurdles, including outdated aesthetics, usability problems, and frequent inadequacy in fulfilling contemporary living standards. Alterations to building façades yield a dual effect: they augment the aesthetic appeal of the structure, rendering it more attractive and congruent with the urban environment, while simultaneously enhancing functionality, thereby creating more practical and appropriate spaces for occupants. Interventions may encompass the incorporation of volumetric features like balconies, the alteration of window configurations, and other adjustments that directly influence user experience and façade aesthetics. This study seeks to evaluate the effects of these adjustments on the aesthetics and functionality of existing big panel structures. The utilization of 2D models facilitates the assessment of these interventions from both a visual and functional standpoint, excluding the examination of energy or structural performance. The main aim of this research is to elucidate how visual and functional interventions might alter existing structures, enhancing the built environment and the living circumstances of inhabitants.

Theoretical framework

Characteristics of Prefabricated Architecture and Composition

In prefabricated architecture, the large concrete panels are manufactured in standardized configurations, with modules replicated and methodically interconnected. Modules function as fundamental components that are replicated and amalgamated, establishing a discernible rhythm within the structure. Modular Composition: The employment of uniform or diverse modules to achieve visual and functional coherence. In prefabricated architecture, composition frequently emphasizes establishing a harmonious relationship between bulk (prefabricated panels) and space (windows). The interstitial areas between modules frequently fulfill functions like ventilation, natural illumination, and aesthetic representation. Rhythm is a fundamental idea in prefabricated architecture, wherein the repetition of modules creates a sense of harmony and order. Prefabricated architecture prioritizes production and assembly efficiency, whereas composition guarantees that these pieces function as a unified and structured entity. Composition transforms into a pragmatic procedure whereby each piece possesses a specific function and exact positioning inside the design.

Study on the Principles of Composition in Prefabricated Architecture

Unity and Harmony

Prefabricated elements should be integrated in a way that the building appears as an indivisible whole, despite its modular nature.

Balance

Due to the repetitive nature of modules, it is important to distribute them in a balanced manner to avoid monotony or visual heaviness.

Rhythm and Repetition The repetition of modular units creates a visual rhythm that gives the building a clear and organized structure.

Hierarchy

Although prefabricated architecture is based on repetition, certain elments can be emphasized to create focal points, such as main entrances, prominent balconies, or atriums.

Flexibility

Prefabrication offers the opportunity to experiment with different combinations while maintaining a regular framework of composition.Rudolf Arnheim, in his seminal work Art and Visual Perception: A Psychology of the Creative Eye, examines the ways in which human perception responds to visual organization and structural transformations within a composition. He posits that visual harmony emerges when the elements of a design are balanced and adhere to the principles of Gestalt theory. Arnheim further asserts that rhythm in visual design is achieved through the systematic repetition of elements and gradual variations. In this context, the integration of additional elements can have distinct effects: additions that conform to existing parameters, such as shape, color, and size, serve to reinforce the visual structure, fostering a sense of coherence and continuity. Conversely, additions that deviate from the established organizational logic may disrupt the composition, introducing visual chaos or dissonance. (Arnheim, 2004)

Colors that create harmonic contrast facilitate the integration of additions without disrupting the overall cohesion of the composition. Contrasting colors in specific areas can be employed to establish focal points, provided they do not overwhelm the façade. Textures that differ significantly from the existing ones may dominate visual perception and cause a separation between the figure and the background.

Proximity: Additions situated near existing modules are regarded as components of a unified visual structure, whereas increased distances may lead to the perception of additions as distinct aspects.

Similarity: Additions that possess congruence in shape, color, and size with the existing modules enhance visual coherence.

Continuity: Additions that align with the current rhythm's lines and directions are seen as a rational extension of the structure.

Figure and Background: Notable disparities in color or shape might lead additions to be interpreted as figures, so altering the optical equilibrium between items regarded as the background. When additions harmonize with the current rhythm, they foster a sense of order and visual tranquility. Additions that contradict the structural principles might generate conflicts viewed as tension or confusion. Extensions must be harmonized with the existing façade, preventing any portion from overshadowing the others.

Application of Gestalt Principles in Prefabricated Façades

The Gestalt principles, based in perceptual psychology, offer a framework for comprehending how individuals visually perceive and organize components within a composition. These ideas may be employed to improve visual coherence, practicality, and aesthetic appeal in prefabricated façades. The following are essential Gestalt concepts and their significance to prefabricated façades:

1)Proximity

Elements in close physical proximity are viewed as belonging to the same group. In prefabricated façades, closely positioned modular parts provide a sense of uniformity and cohesiveness, whereas excessive space might disrupt the visual integrity.

2)Similarity

Elements exhibiting analogous characteristics, such as hue, form, texture, or dimension, are regarded as being grouped together. Implementing this approach guarantees that further modules or façade alterations blend effortlessly with the current design , preserving visual coherence.

3)Continuity

The human eye favors uninterrupted patterns or lines. Prefabricated façades advantageously preserve uniform lines and rhythms in modular configurations, fostering a natural flow that improves the overall aesthetic of the project.

4)Figure and Ground

The differentiation between a focus piece and its background is essential in design. Prefabricated façades may employ contrasting materials or colors to highlight certain elements, such as entrances or balconies, while maintaining the overall composition's coherence.

5)Closure

The mind has a propensity to finalize imperfect forms into a full entity. The strategic arrangement of modular panels in prefabricated façades can generate inferred shapes, so augmenting the sense of a unified and deliberate design.

6)Symmetry and Balance

Symmetrical compositions are intrinsically appealing and evoke a sense of stability. In prefabricated façades, the strategic arrangement of modules guarantees an orderly and aesthetically pleasing framework.

7)Rhythm and Repetition

The recurrence of modular components creates a rhythmic structure that ensures organization and consistency. Rhythmic variations, like alternate textures or hues, can enhance vitality while maintaining cohesiveness.

The Assessment of Visual Compositions and Aesthetic Principles

The evaluation of visual compositions, their perception, and their underlying principles is framed within the broader context of aesthetic pleasure. A central component of this is venustas, the third element of Vitruvius's triad, representing beauty or aesthetic delight (Vitruvius, 1914). Vitruvius places significant emphasis on aesthetics and harmony in architecture, discussing the concept of beauty and its influence on ancient architecture through the triad of firmitas (strength), utilitas (functionality), and venustas (beauty). This component of architecture is the most intricate and diverse, as it relates to how architecture interacts with our senses and shapes our perception and experience of the built environment. It deals with subjective responses that often vary between individuals, making it a challenging domain to reconcile universally (Lynch, 1960) Lynch’s work examines the concept of visual perception in urban spaces, exploring how humans interpret their surrounding cities and architectural elements. It highlights the influence of urban spaces and visual components on individual perceptions and provides insights into how architects can design visually appealing spaces.

The Role of Perception in Visual Delight

The aesthetic interest of architecture starts with its perception. To fully comprehend the creation of visual satisfaction or beauty, it is crucial to first understand how humans perceive and interpret visual stimuli. The human mind is intrinsically designed to derive meaning from sensory input, a characteristic that arose from the survival instincts of our ancestors, who depended on environmental signals for protection and sustenance.

Gestalt psychology, established in the 1930s, elucidates the manner in which the mind perceives shapes and patterns. The term gestalt derives from German and denotes "the shape or complete form of an entity." This theory asserts that the mind functiwaptivating the observer through nuanced variances.

Case Study

From 1978 the year when the building was built until 2025, the building experienced many notable changes that enhanced its appearance and utility. The façade was improved in terms of thermal performance (Guri, Krosi, & Klodjan, 2023), substantially improving its aesthetic appeal and offering a more contemporary clean, and tidy look. Several windows were changed or renovated, including shutters and other contemporary elements to improve insulation, privacy, and functionality. Modifications were implemented to the balconies, encompassing possible enclosures or structural enhancements, thereby increasing their functionality and providing improved protection against adverse weather conditions. The electrical

and antenna cables were restructured, yielding a more orderly and systematic configuration than the prior chaotic layout. The vicinity of the building was tidied and systematically arranged, eliminating prior disorder and establishing a more orderly and aesthetically pleasing atmosphere. Furthermore, observable repairs to the outside resolved maintenance concerns, enhancing the durability and preservation of the façade. These modifications demonstrate a deliberate endeavor to enhance both the aesthetic and functional dimensions of the structure and its environment.

Figure 1: Before and after renovation of the building.

The Application of Gestalt Principles The Application of Gestalt Principles in the Design and Aesthetic Improvement of Prefabricated Building Façades

In the examples below, the facades of prefabricated buildings are analyzed through the lens of Gestalt principles. The approach focuses on the division of the facade into solid and void spaces, which is interpreted as a visual language that conveys the perception of modular segmentation. In the case of the Figure above, the façade has an equal division between modules. Additionally, in this instance, the façade does not feature a uniform color or an overlay to conceal the panels or create uniformity. In Figure b, there is an equal division of the panels, where the wall and the spatial partitioning are consistent. Similarly, in Figure c, we observe a distribution of void spaces in the façade, which clearly demonstrates the uniformity in the arrangement of the modules and their voids. In all cases—Figures a, b, and c—the principle of similarity is present. This

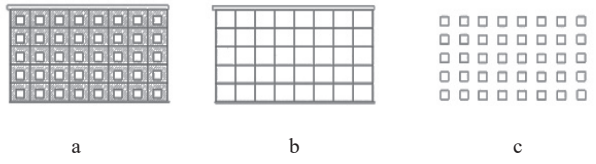


Figure 2: Facade type 1 front.

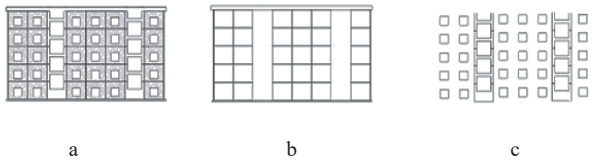


Figure 3: Facade type 1 in the back

division creates a sense of unity and visual harmony. In the case of Figure above, the facade is composed of grouped divisions, where its elements are arranged in clusters. The rhythm of the segmentation follows a 2-1-3-1-1 pattern. Additionally, the panels in the first group (2) and the second group (1) are visually distinct, resulting in a greater sense of discontinuity compared to the facade in Figure 1. When considering interventions on this type of facade, achieving visual harmony becomes more challenging due to the inherent disjointedness in the design. In Figure b, this discontinuity between elements is also evident, even though the distribution is organized using panels as whole spaces, without considering the size of the window openings. In the case of Figure b, the distribution of elements is defined by the openings and the relative sizes they create. Here, the segmentation is also organized into groups of elements, resulting

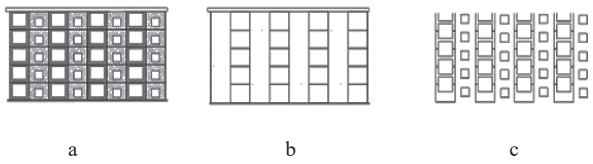
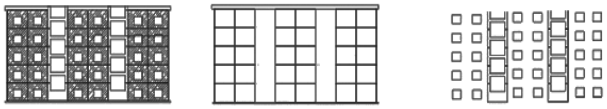


Figure 4: Facade type 2 front.

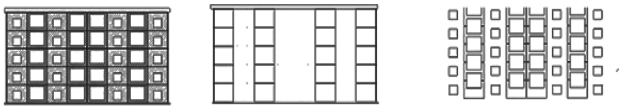
in a facade that is not visually unified but instead composed of clusters of components. In the case of Facade above, there is a unified distribution of module groupings, following a consistent pattern of 1-1-1-1-1-1-1-1. This regular arrangement presents vertical elements as parallel, repeating lines. Through the principle of proximity, the vertical elements are perceived as a group of rhythmically repeating components. Additionally, the principle of continuity enhances the perception of these elements as part of an interconnected rhythm of modules that follow a logical flow, naturally guiding the viewer's eye facade. In Figure,b where two different repeating forms of spaces are presented, the principle of continuity ensures that the division of intercion nected spaces appears harmonious.In Figure c,where the division of the modules remains evident. Despite the emphasis on the division of spaces ,the rhythmic



a b c

Figure 5: Facade type 2 back.

uniformity is preserved and remains clearly perceivable. In the case of Facade 4, the distribution of modules reflects the principle of proximity, where elements arranged in a 2-1-2-1-2-1 pattern form groupings of two as a result of their spatial closeness. The vertically aligned elements appear as unified groups because of their proximity, creating the perception of spaces between groups of two rows, which are separated by spaces containing single rows. The small distances between modules contribute to perceiving the facade as an integrated whole. In Figure b, this grouping of panels is more apparent because the elements composing the facade lack distinct graphic differentiation, making them perceived as unified groups. In Figure c, the division of grouped elements becomes



a b c

Figure 6: Facade type 3 front.

clearer through the combined application of the principles of continuity and proximity. In this scenario, any additions to the facade must align with and become part of the established rhythm to maintain visual coherence.

In the case of the Facade of Figure 5, the facade exhibits varying rhythms in the repetition of its elements, following the pattern 1-1-1-2-1-1-1. This arrangement results in a centered composition, with mirrored rhythms on either side of the central element. In Figure b, the repetition of panels makes this rhythm more clearly perceptible. Similarly, in Figure c, the void spaces emphasize the rhythm further, where the principle of proximity creates a visually larger central space within the building. Due to the proximity of the panels, a stronger sense of unity is established, particularly around the central area.

An Analytical Approach to the Combination of Panels for Façade Design

The figure above shows the modular arrangement of prefabricated concrete panels used to construct the building's facades. In total, there are 6 types of panels (PJ^1) used for the façade 3 of which are used for the side façade (PJ1; PJ2, PJ3) and 3 of them are used for the front and the back facade (PJ4, PJ5, PJ6) (AQTN, n.d.) (Guri, Krosi, & Klodjan, 2023). Each element plays a specific role in the building and can be categorized into several types. Panels with windows are presented with different frames for window openings and predefined sizes that can be adapted to various layouts. The

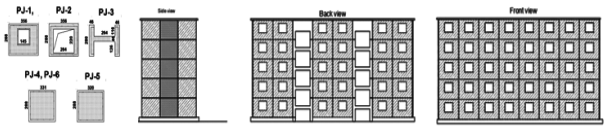


Figure 7: Analyses of case study building.

external panels that do not have any windows or any openings on them and are located on the shorter side of the façade are used for comprehensive insulation in walls devoid of openings, with materials for thermal and acoustic insulation chosen according to standard of the period when they were built. Load-bearing panels, conversely, incorporate specialized structures for both horizontal and vertical connections, thereby guaranteeing the structural integrity of the facade system.

-The side orientation reveals a straightforward facade featuring a combination of vertical and horizontal panels. This indicates a design devoid of substantial apertures, emphasizing thermal insulation. The front and back perspectives exhibit a symmetrical arrangement with windows positioned at consistent intervals. -The design utilizes rhythm and symmetry to achieve an aesthetically pleasing and functional facade.

-The panels are modularly designed, providing design flexibility and installation flexibility. The junctions between the support frameworks and glazed or solid panels form a facade that complies with the criteria for thermal insulation, acoustic efficacy, and longevity.

-This methodology seeks to offer a modular solution for buildings including large panels, enhancing thermal insulation and the visual design of the facade. Panel standards encompass measurements like length, width, and thickness, materials utilized such as concrete, insulation, or aluminum, and essential attributes pertaining to thermal insulation and structural integrity. A technical diagram may depict the horizontal and vertical connections between panels, demonstrating various combinations and their effects on performance.

-The analysis must emphasize thermal efficiency and assembly speed while elucidating how modular design diminishes expenses and building duration. The technological connections guarantee structural integrity and optimal performance, utilizing contemporary materials and technology for assembly and linking. This modular layout serves as an optimum option for the renovation of existing structures using big panels, striking a balance between energy efficiency and aesthetics.

Post-intervention analysis

Following changes on the building façade, major changes have been realized in functional, aesthetic, and energy-related dimensions. The images illustrate sections marked with red hatching, signifying volumetric expansions implemented to enhance the internal space of the flats or to establish additional functional zones, such as balconies or room extensions. These modifications not only increase the living space but also create a more diverse and modern aesthetic for the building's

façade. Regions marked with striped red hatching indicate modifications to the dimensions of windowed panels. The changes attempt to improve natural lighting and ventilation through the strategic positioning and sizing of openings. The modifications to the front façade have produced a more dynamic appearance, with the rhythm of the windows and the incorporation of volumetric extensions enhancing the building's modern and visually appealing design. The alterations on the back façade are seamlessly integrated with the volumetric extensions, facilitating an efficient arrangement of inner spaces and enhancing the outside aesthetic. The interventions display a consistent and harmonious profile from the side perspective, preserving a visual relationship among various elements of the façade. The volumetric extensions have been incorporated in

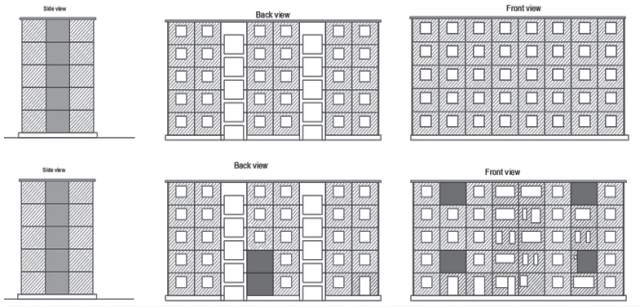
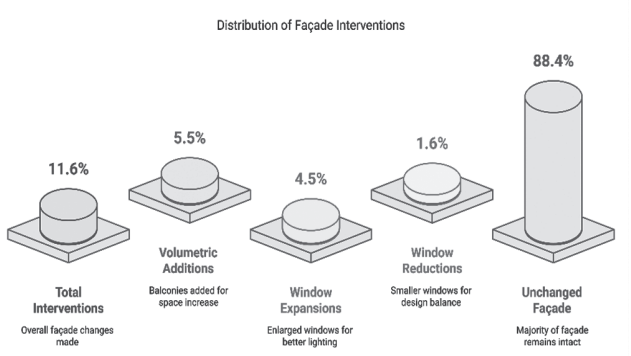


Figure 8: Before and after renovation facade.

a random way based on the decision of the apartment owner, maintaining the structural integrity of the building while not considering the structural behavior of the building. These modifications not only affect the aesthetics and functioning of the structure but also its thermal and energy efficiency, offering superior increases or decreases in energy usage based on the type of intervention.

The interventions demonstrate a deliberate strategy for rehabilitating existing structures, honoring their original structure while incorporating modern aspects. This technique maintains an equilibrium between modernization and the conservation of the building's architectural features. Moreover, these interventions fulfill current standards for comfort, energy efficiency, and aesthetics, rendering the structure more appropriate for the demands of contemporary users. These modifications not only elevate the living space but also cultivate



a more diverse and modern aesthetic for the building's façade.

Regions marked with striped red hatching indicate modifications to the sizes of windowed panels. The makeover seeks to improve natural lighting and ventilation through the strategic positioning and sizing of openings.

The Impact of Interventions on the Application of Gestalt Principles in the Design and Aesthetic Improvement of Prefabricated Building Facades

The studied building demonstrates a disruption in the rhythm of panel divisions due to earlier interventions, which altered the original modular sequence of 2-1-2-1-2-1-2-1. These irregular additions created visual inconsistencies, disturbing the harmony and balance of the facade. This disruption affects not only the aesthetic perception but also the overall structural readability of the facade, which previously relied on a clear modular repetition to guide the observer's eye and define the building's architectural language.

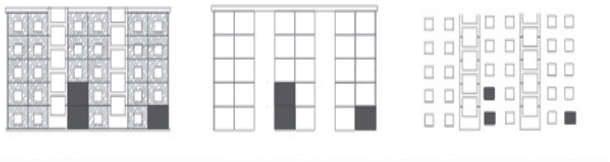


Figure 9: Rhythm of intervention analyses.

Proposal

The proposed intervention aims to address this issue by reconfiguring the facade through the application of Gestalt principles, which emphasize visual harmony, rhythm, and unity. Specifically, the intervention suggests a reflective addition of modular elements at the two points where the previous additions were made. By doing so, the proposal seeks to reintegrate the disrupted rhythm into the overall design.

This solution achieves two key objectives. First, it restores the original rhythm of 2-1-2-1-2-1-2-1, ensuring that the facade regains its modular clarity and balance. Second, it introduces a new, centralized rhythm that provides a focal point for the composition. This centralization enhances the visual coherence of the facade, creating a sense of symmetry and unity that was previously lacking.

By aligning the additions with the existing modular grid, the proposal minimizes the visual impact of earlier disruptions, integrating them seamlessly into the facade. This approach not only respects the building's original design language but also elevates its aesthetic quality by introducing a structured and

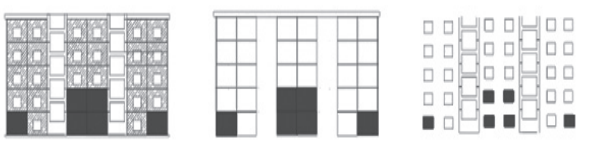


Figure10: Proposed new rythm.

harmonious rhythm. The resulting facade reflects a thoughtful balance between preservation and adaptation, maintaining the integrity of the original design while addressing contemporary needs for cohesion and visual clarity.

Conclusions

Restoration of Visual Harmony: Interventions according to Gestalt principles—such as closeness, resemblance, and continuity—are crucial for reinstating the broken rhythm and visual coherence of prefabricated facades, therefore maintaining aesthetic harmony and structural clarity.

The significance of modular rhythm: Preserving the original modular rhythm in prefabricated facades is essential for attaining balance, unity, and structural integrity. All interventions must adhere to this rhythm to prevent visual disorder and guarantee harmonious integration with the current design.

Harmonizing Preservation and Modernization: Effective interventions achieve equilibrium between maintaining the original architectural vernacular and accommodating modern requirements, so improving the facade's energy efficiency, comfort, and beauty while honoring its historical setting.

Gestalt Principles as a Design Framework: Gestalt principles offer a comprehensive framework for evaluating and reconfiguring prefabricated facades, ensuring that alterations promote visual coherence, rhythm, and enhanced urban presence while resolving functional and environmental issues.

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Architectural Heritage and Contemporary Lighting Design at the Musée de Cluny

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The Musée de Cluny serves as an innovative museum, embodying a vision of "context-aware museum development." This paper explores the seamless integration of technological elements and cultural values in the presentation of this historic private residence. A thoughtful approach to lighting considerations for both indoor and outdoor spaces is evident, where light serves as a nuanced symbol, fostering opportunities for heightened understanding and critical engagement with the environment.

In the early years of the 13th century, the University of Sorbonne established itself in what would become the Latin Quarter in Paris. The Abbots of Cluny in Burgundy, like many others, sought to establish a school and a pied-à-terre. The college, built in the second half of the 13th century, was located on the current site of Sorbonne, the pied-à-terre near the baths. At the end of the 15th century, Jacques d'Amboise, abbot of Cluny (1485-1510), decided to rebuild the Parisian abbey near the baths.

The construction, carried out in a very short time, is now the oldest intact example in Paris of a hotel particulier (private residence) with a courtyard and garden. The palace is surrounded by a low merloned blind wall, "pierced" only by a very simple gate (the ancient carriage entrance) and a small door for pedestrians. The two-story building with a slate roof (with a high balustrade concealing the attachment) and large dormer windows consists of a main body with two wings enclosing the courtyard. Different floors are accessed by spiral staircases. The original layout of the rooms has been preserved inside, at least in terms of the volume of the rooms, the orientation of the entrance, and the chapel. The National Museum of the Middle Ages was created in 1843 to bring together two exceptional Parisian complexes, the Gallo-Roman baths of Lutetia Parisiorum (1st-3rd century) and the late medieval hotel of the Abbots of Cluny (late 15th century). It aimed to house the rich collection of medieval objects collected by Alexandre du Sommerard (in the Hotel de Cluny) and the remaining pieces of the large collection commissioned by Alexandre Lenoir during the Revolution, dismantled during the Restoration (in the building of the baths). The latter collection had previously been housed in the convent of the Petits-Augustins, now the Museum of French Monuments since 1975. Lenoir, driven by a commemorative and commendatory intent, relying on false attributions due to a lack of historical-scientific expertise and an open mind, believed that the works he collected, rescued from the times of the Revolution, should testify, century after century, to the development of French artistic history.

The Musée de Cluny represents the first museum based on the idea that one must "musealize by contextualizing." Authentic works, in an authentic context, are exhibited according to their authentic functions, without abstracting and abandoning the idea of the encyclopedic accumulation of artifacts. The collections offer a unique panorama of French art and history in the early 16th century and allow a journey through almost fifteen centuries of history. It can be said that the museum's intention is to become relived history rather than merely displayed, following the Ruskinian romantic conception of surpassing the death of architecture, going beyond the reality of things, beyond the

museum tradition itself. Du Sommerard invented the reproduction of a house from the past, as in a planned backward journey, the life of the city. These purposes still belong to the Musée du Moyen Âge, which has added, to du Sommerard's intentions, not only new installations but also more updated forms of entertainment, such as shows of medieval music and poetry. The restitutions are evocative and at the same time relevant and suitable for a comprehensive perception. The most interesting hall, intended to display the tapestries of the cycle of "La Dame à la Licorne," is circular and allows an instantaneous view of the cycle, as the setup, similar to that of a hunting pavilion, helps to place the viewer back in the atmosphere of the time and identify a type of environment suitable for the era. Several factors contributed to the setup, including the chromaticism that, in addition to serving as a background, perfectly recalls environments and eras now sedimented in the collective imagination, through highly impactful stereotypes: materials and light that complete the whole, providing warmth and intimacy.

The Gallo-Roman Baths of Lutetia

French archaeologist Didier Busson recounts that "Lutetia Parisiorum, ancient Paris, was built around the current Rue Saint-Jacques, the true axis of the Roman town, south of the Seine, probably by local leaders, Gauls romanized and enjoying the support of Rome, executed with local means but following a typically Roman pattern, attesting to the universality of the empire." The preservation status of the site allowed Didier Busson and his team to accurately record the different layers and various construction epochs of the neighborhood. This area had been abandoned since the 3rd century, remaining countryside until 1632 when, based on the plans of François Mansard, the Convent of the Visitation was built, eventually giving way in 1910 to the current Institute of Geography. The Gallo-Roman baths of Lutetia represent one of the most spectacular examples of ancient Gallic architecture preserved in France. Lutetia was divided into two urban ensembles, one located within the city and the other on the left bank of the Seine.

Various monumental complexes developed here: the Roman Forum located on the hill of Sainte-Geneviève, the arenas in Rue Monge, the baths to the east near the Collège de France, to the south near Rue Gay-Lussac, and to the north, the Cluny baths.

The preservation of the baths is mainly due to the continuous reuse of the complex since the Middle Ages. Three large rooms can be easily identified: the cold room (frigidarium) incorporated into the museum with its vault 15 meters high, the hot room (caldarium), delimited to the west by Boulevard Saint-Michel, and another room, to the south, at the corner of Boulevard Saint-Michel and Rue du Sommerard. These last two rooms are partially ruined from the 18th century. The walls, in height, have retained their original structure characterized by the use of small squared stones separated at regular intervals by rows of bricks. The walls inside were covered with mosaics, marbles, or paintings. The frigidarium preserves some traces: the fragment of mosaic currently exhibited, "Love dominating a dolphin," could constitute the last remnants. These complexes, like many other thermal centers, are considered among the most representative places of Roman civilization.

"Illuminating" the Museum

Natural light is a crucial factor in contemporary museum design. While white light optimizes the enjoyment of artworks, studies have highlighted the damaging effects of direct light, leading to degradation, alterations, and even the disappearance of some colors. Therefore, illumination today utilizes the phenomena of light reflection and refraction. Since November 28, 2002, in the Latin Quarter of Paris, the Musée National du Moyen Âge has shone with a new light. The Ministry of Culture and Communication/Directorate of Museums of France, with the support of the Électricité de France Foundation, curated the lighting of the facades of the buildings. The project was entrusted to Anne Bureau, a lighting designer. The type of lighting preserves the intimacy of the place, making it perceptible in a complex and busy urban environment. The intervention reveals the meticulousness of the designer in seeking, through light, a natural and balanced effect, respectful of the era to which the buildings belong. In this case, historical care translates into the design of fixtures similar in form and type of generated light to torches or modern candles: the soft and flickering light that illuminates the facades of the building and the garden side recalls a flame, generating continuously moving shadows alternating with light. The lamps placed fully reflect the identity of the place, not only at night but also during the day. The lighting technology adopted in the thermal rooms allows hiding the electrical parts of the system (accessories and distribution cables) and powering the devices intended for lighting with a network that develops in the upper part. The concept of diffuse lighting for a general view of the whole and punctual for the specific understanding of details has been applied.

Direct lighting sources, appropriately recessed into "track" elements, have been used to illuminate the sculptures. The courtyard - In the evening hours, light sources behind the crenellated wall illuminate the facade in a warm and amber tone; the light separates the volumes, keeping the shadows sharp. From a single point next to the entrance door, a group of projectors, with a decidedly important visual impact, illuminates the main front, while the top of the staircase tower is lit by a sparkling light effect. Near the museum's entrance, a lantern, fixed with a sconce, suggests a nocturnal presence in response to the courtyard's illumination.

The Medieval Garden

The garden of "La Fôret de la Licorne" was set up in 2000, inspired by the museum's medieval collections. It consists of the unicorn forest, with the path marked by the footprints of the animals present in the tapestries of La Dame à la Licorne: rabbits, foxes, the lion, and even the unicorn; a small medieval vegetable garden, divided into sections with plants suitable for cooking and medical use, and a meadow full of flowers present in the background of the tapestries always from La Dame à la Licorne, called, not by chance, Millefleurs.

It is a recreation of the outdoor space, inspired by the museum's collections: tall trees evoke the unicorn forest around two small clearings frequented at lunchtime by students, mothers with children, the elderly, and tourists. The space closest to the entrance has been arranged as a medieval garden: a flowerbed represents the ménagier (the useful plants flowerbed, what we would call a vegetable garden); the next flowerbed alludes to the true garden of simple plants (with medicinal plants); followed by the celestial garden where the rose, violet, lily, and iris represent the Virgin; finally, the garden of love, where fragrant plants evoke courtly and sensual love. The final space is the flowered meadow, adorned with a fountain, beyond which one accesses the museum. Also, of great effect is the nighttime view of the garden, with its particular illumination. Here the light seems to come from the courtyard where "small luminous objects" emphasize the profiles with a warm white light. Some projectors mounted on the ground and arranged among these objects generate soft and gradating lights on the facades (light of amber tone). Openings and turrets are illuminated by means of a system of optical fibers with a flickering effect.

A device containing a disc with irregular fragments, including dichroic glasses generating different colors, rotating, causes random effects of color and direction evoking movement similar to the flame's light. This light effect is directed towards the windows and turrets with mini projectors placed in sealed containers, embedded in the courtyard floor. The vault under the chapel porch is also illuminated with grazing light with the same yellow-amber hue that the lighting system generates from the ground. Some silhouettes of plants and trees can be distinguished against the light from Boulevard Saint-Germain. The Musée de Cluny's lighting system has been generally conditioned outside by the luminous intensity emitted by the public lighting in the surroundings. For this reason, a weak main illumination level was created, integrated, then, with the fiber optic spotlight system. Numerous effects such as photoluminescence, contrasts, moving glares, highlight all moments of the visit to communicate understanding of the site and the exhibited works. In addition, paintings, photographs, and video projections accompany the value-based, meaningful visitor journey of discovery and knowledge of the places. It can be affirmed that the lighting of the Musée de Cluny represents a valid attempt at integration between cultural values and technological elements, seeking to satisfy the legitimate aspiration to recontextualize places, fully embracing the questions posed by contemporaneity. It is about building an additional opportunity for knowledge and, therefore, the growth of common critical awareness. The results have been significant: a comprehensive perception of the place has been achieved from every point of view, with innovative and original interventions, thanks to lighting techniques with which the designer, through a suggestive use of light and its "forms," seeks a harmonious effect respecting the architectural, historical, and symbolic values of the monumental complex.

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Tre Lezioni sull'Agenda 2030

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Order of Journalists of Palermo, Italy

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Introduction

The authors of the book 'Sustainability - Three Lessons on Agenda 2030' are Marcela Villarreal, Chiara Tonelli, and Catia Bastioli. Marcela Villarreal serves as the Director of Partnerships and UN Collaboration at the FAO, the United Nations Organization for Food and Agriculture. Chiara Tonelli is an Associate Professor in Architectural Technology at the Architecture Department of the University of Roma Tre, a delegate for StartUps and Enterprises, and an expert in sustainable construction. Catia Bastioli is the CEO of the Novamont group, which emerged from her research on the development of bioplastics and biochemicals from renewable sources, in line with a circular Bioeconomy model she developed. The authors' intent in writing this book was to explore and discuss themes related to sustainable development, analyzing their complexity and laying the groundwork for building educational paths and skills at the university level. This stems from the premise that the University of Roma Tre has demonstrated early sensitivity towards sustainability, as evidenced by the experience of realizing the idea of a multidisciplinary project on sustainability. This project began with considerations expressed in the Agenda 2030 document, from which the book originated.

Agenda 2030 is the global action plan adopted by the United Nations in September 2015, representing the document in which nations universally committed to eliminating poverty, safeguarding the planet, and ensuring peace and prosperity for all. The positive reaction from Rector Luca Pietromarchi to the multidisciplinary project on sustainability showcased his understanding of its importance and originality, leading the university to go beyond mere support for the emerging sensitivity on this topic. Therefore, at the end of 2019, an initiative was taken to create a prorectorate dedicated to sustainable development within the University of Roma Tre, along with the subsequent formation of the Interdepartmental Working Group on Agenda 2030. The group's efforts then resulted in a multidisciplinary teaching course on Agenda 2030,

proposed to all departments, with 500 students welcoming and including the structured course in their study plans.

Structure of the Book

The course that originated from the project featured a program of 18 "master classes" on Agenda 2030 given by high-level speakers. These classes covered the 17 Sustainable Development Goals (SDG) of Agenda 2030. Out of the 18 lessons of the course, 3 were chosen for the book, which thus divided addresses the central and most relevant themes of Agenda 2030.

Fighting Hunger;
Sustainable Cities;
Circular Economy.

- The introductory section of the book addresses the interdependent environmental, social, and economic challenges our planet is facing. It then focuses on topics such as rising emissions, over-exploitation of ecosystems, climate change, and the impact of the global pandemic on human resilience and development models. The central part of the book contains the lessons that were given by speakers who are experts in their professional fields.

- The 3 lessons were obviously given by the three speakers who are experts in their fields, namely the authors of the book, Marcela Villarreal, Catia Bastioli, Chiara Tonelli. The concluding section of the book summarizes the key points covered in the lessons and provides bibliographic references for further study related to Agenda 2030 and the importance of the multidisciplinary approach to studying and deepening the themes addressed and the need to address the complexity of sustainable development by collaborating across different sectors.

Strengths

First Lesson: Food Security and World Hunger

The first of the three lessons, as previously mentioned, delves into sustainable agricultural practices, food security, and the role of technology and innovation in enhancing food access and nutritional quality for the global population. Through Marcela Villarreal's work, the question arises about the realistic possibility of eradicating world hunger by 2030. This lesson on the challenges confronting the global food system stands out for its in-depth analysis of threats to global food security. Using clear yet scientifically rigorous language, the lesson explores various internal and external factors that jeopardize the stability of the food system. The text effectively outlines natural threats that hinder local food supply in some parts of the world, such as desert locusts and the Fall Armyworm, emphasizing their devastating impact on agricultural production. The representation of these pests extends beyond direct damage to crops, encompassing a broader examination of their economic and social impacts. This demonstrates a deep understanding of the complex interactions between agriculture, the economy, and society. Another section of the lesson is dedicated to Antimicrobial Resistance (AMR), highlighting another critical aspect of the problem and emphasizing how current agricultural and fishing practices can significantly impact human and animal health. The discussion on AMR is particularly relevant and reflects contemporary concerns about the sustainability of agricultural practices.

The author then addresses the issue of multilateral strategies for threat management with a balanced approach, recognizing the necessity for global and coordinated solutions. The analysis of initiatives undertaken by organizations responsible for combating world hunger, such as the FAO's EMPRES system—an online global animal disease information system—demonstrates the importance of international collaboration and technological innovation in resolving issues affecting many parts of the world. The lesson concludes with a powerful call to action. While acknowledging that the global food system produces enough food to feed the global population, the author highlights the contradictions within the global food system, such as the persistence of pockets of hunger in some parts of the world and the prevalence of overweight and obesity in affluent societies. Finally, particular attention is given to the need for a global commitment to sustainable production and support for small producers.

Second Lesson on the Importance of Mass Adoption of Sustainable Architecture Practices

In contemporary narratives about global challenges, Chiara Tonelli's lesson stands out for her analysis of Europe's financial and political responses to the economic and social impacts caused by the COVID-19 pandemic and on the adoption of sustainable architecture practices, given the availability of post-Covid resources allocated by the EU.

In particular, the "Next Generation EU" initiative is examined, an over 800 billion euro initiative conceived to create a greener, more digital, and more resilient continent, adapted to current and future challenges. The adoption of this initiative in Italy through the National Recovery and Resilience Plan is detailed, highlighting the three strategic axes: digitalization and innovation, ecological transition and social inclusion. The lesson explores the interaction between economy and society with responsible development policies towards the environment, referring to the objectives of the European Union set in 2008 and to goal 11 of the Agenda 2030 for sustainable development titled: “Make cities and human settlements inclusive, safe, resilient and sustainable”. Two transitions are crucial in this regard, the ecological and the digital one.

The ecological transition is an integral part of the shift towards sustainable economies and communities and emphasizes the importance of adopting and using renewable energies and energy-saving techniques. A significant aspect discussed in the lesson is the greenhouse effect, essential for life on Earth, which is altered by pollution from human activities such as the emission of carbon dioxide and methane, pushing global temperatures upwards. In the treatment of these topics, the author's particular attention to the role of buildings as energy consumers and significant contributors to the worsening of global climatic conditions emerges. Buildings are responsible for 40.74% of energy consumption in Europe, surpassing other sectors such as transport and industry. The European Union

has promoted the improvement of building performances aiming at a drastic reduction of greenhouse gas emissions, with the goal of achieving nearly zero-energy buildings (nZEB) by 2050. The achievement of this goal has been planned through the approval of new standards and certifications.

Some innovative experiments such as the Solar Decathlon, an international competition established by the United States Department of Energy in 2002, push knowledge and implementation of innovative technologies. In particular, the author highlights the success of the University of Roma Tre in the Solar Decathlon, where it obtained excellent results in various editions demonstrating the effectiveness of the path taken for the realization of high energy efficiency buildings.

Furthermore, the author presents a comprehensive analysis of the digital transition in the construction sector, a radical change in the way of conceiving, building, and managing buildings. The adoption of Building Information Modeling (BIM), a digital model that revolutionizes architectural design through 3D components and integrated data, The lesson explores the evolution of the construction process with advanced prefabrication and the assembly on-site of predefined components defined as "dry" construction, a method that reduces construction times and costs and ensures precise correspondence between design and realization minimizing the environmental impact of traditional construction methods. A particularly captivating chapter of the lesson is dedicated to Construction 3D Printing (C3dP), an emerging technology that offers advantages in terms of speed, reduction of labor costs, complexity and precision of forms, minimization of waste. In the lesson, concrete examples of this technology are cited, such as the assembly of an office in Dubai realized in just 17 days.

In addition, the reconversion of old buildings is another crucial topic addressed. Techniques such as retrofitting and reverse engineering, illustrated with the example of the Technische Universität München, show how digitalization can improve the energy efficiency of existing buildings.

Finally, the lesson also highlights the importance of the awareness of building inhabitants. Examples like the “dWeLL!” project demonstrate that users play a crucial role in achieving the energy efficiency of buildings, illustrating how awareness and proactive behavior positively reduce energy consumption.

Third Lesson: Circular Bioeconomy and Novamont's Innovative Model

The third lesson rigorously addresses the theme of circular bioeconomy as a response to the interconnected environmental challenges our planet is facing, including the climate crisis and environmental degradation. The urgency of soil regeneration highlights the need for a radical transformation in development, production, and consumption models.

Circular bioeconomy assigns a fundamental role to soil as a resource vital for life on Earth. The soil, with its ecosystem services, is crucial for food production, water regulation, biodiversity, and climate change mitigation. However, soil is a non-renewable resource currently undergoing rapid degradation, raising critical questions about its health and regeneration.

Catia Bastioli, the author, focuses on the case of Novamont, examined and proposed as an outstanding example of applied circular bioeconomy. Founded thirty years ago as a research center, Novamont has developed an innovative vision integrating green chemistry with agriculture, creating an integrated supply chain for the production of bioplastics and biochemicals. Novamont has transformed abandoned production sites into sustainable production centers, efficiently using resources and focusing on territorial regeneration.

The lesson details the procedures Novamont engaged in for territorial regeneration, promoting a circular model that maximizes organic matter recovery and develops innovative and ecological production processes, such as the SPring National Technological Cluster for Circular Bioeconomy. Moreover, Novamont has promoted innovation projects with local industrial and research entities, experimenting with low-environmental-impact oilseed crops, and collaborating with schools and training institutes to develop educational projects in circular bioeconomy.

Finally, the company is particularly active in the Patrica plant, employing advanced technologies for the production of biopolyesters and biopolymers.

Weaknesses

Analyzing the three lessons offered in the book as a whole reveals some weaknesses regarding the global implementation of the techniques and solutions proposed in relation to the goals of Agenda 2030:

Many developing countries, among others, lack the resources, technologies, and infrastructure needed to implement the proposed actions and solutions.

The synergistic and coordinating framework of Agenda 2030 seems insufficient and hinders progress toward the shared and subscribed goals by nations, making it less effective.

National economic and political interests often take precedence over the global needs identified and analyzed.

Despite significant advances in sustainable technologies, their large-scale application is often hindered by technical limitations and high costs.

Resistance to changing established cultural, social, and economic behaviors remains strong in many nations.

Ongoing climate changes, recurrent environmental crises, and the absence of monitoring and effective comprehensive evaluation systems make it difficult to measure progress and correct ongoing actions.

Conclusions

The three lessons proposed bring attention to and analyze important considerations and actions for achieving the goals set by Agenda 2030. However, among the globally proposed aspects that require further exploration, the following seem relevant:

Improving International Collaboration: Especially in the current highly destabilized global geopolitical context, there is an urgent need to deepen strategies to strengthen international cooperation, including the sharing of technologies, resources,

and knowledge between developed and developing countries.

Providing additional incentives such as public-private partnerships, green investments, and dedicated financial instruments for Sustainable Development, and studying innovative ways to achieve the goals of Agenda 2030.

Studying the impact of new technologies, such as generative intelligence, biotechnology, and renewable energies on the environment and society, and how they can be used to promote sustainable development.

Studying new ways for greater integration of Environmental Policies with Economic Development so that ecological and sustainability considerations are integral parts of economic growth. Deepening the analysis of the regulatory and legislative frameworks necessary to support the achievement of sustainable development goals.

Deepening strategies to educate and raise awareness among people on sustainable development topics, promoting behavioral change in support of sustainable practices.

Investigating global disparities in access to resources, both natural and economic, and how these can be mitigated to ensure a more equitable and sustainable future.

In conclusion, the book achieves the goal of providing a deep and multidisciplinary understanding of sustainable development themes related to Agenda 2030. However, it would be interesting to further explore the practical implications of these lessons for society and individuals, as well as to examine specific case studies demonstrating the practical application of the concepts discussed in the book.

"Upside-Down Scenarios". Original artwork by Santina Di Salvo, generated with Midjourney AI

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The image represents a speculative world where architecture, freed from gravitational constraints, reconfigures spatial logic, rethinking a future in which design integrates emergent environmental and social needs through adaptive methodologies.

Floating structures, articulated through modular configurations and punctuated by illuminated openings, delineate an urban topology that seamlessly integrates ecological systems, technological infrastructures, and responsive dwelling models.

The interaction of these elements marks a paradigm shift, wherein architecture departs from its conventional static condition, transforming into a fluid, adaptive, and contextually integrated system.

Rendered in monochrome, the composition generates a visionary atmosphere, intensifying a critical interrogation of dominant epistemologies in the built environment.

This visual approach amplifies the speculative nature of the image while emphasizes the urgency of a critical and future-oriented architectural framework.

This imaginative representation resonates with the central themes of Design for the New World(s), highlights the role of architecture and design in constructing resilient and sustainable future scenarios. As a symbol of interdisciplinary dialogue between aesthetics, technological innovation, and sustainability, the image embodies the fundamental principles explored in the 28th edition of Forum A+P.