
Research Paper

Habitat 5.0 – Towards affordable and sustainable housing in the developing world

“Brick-Chain” – a pattern- and blockchain-based approach to build communities

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Abstract

“Habitat 5.0 – Towards affordable and sustainable housing in the developing world” strives to build communities by following urban design patterns for sustainable settlements and goes beyond the mere production of individual housing structures. It is a blockchain-based approach that leads to “disruptive innovations” in order to achieve “quality good enough”¹ to upgrade informal settlements. The key approach relies on the secure and verifiable transfer of existing, qualified know-how that enables residents to participate in the process. The self-building of houses with ecological materials is safer, cheaper, faster, sustainable, and supports the vision of “Glocalization.”

Habitat 5.0 is a need-based approach: The need is the lack of affordable and adequate housing which leads to the surge in informal settlements. The idea is to improve informal housing in situ.

This need is aggravated when disasters strike, as informal settlements are the most vulnerable when heavy rainfall, floods, storms or earthquakes hit unstable land and unsafe structures. Apart from informal housing, many other cheaply built structures are usually affected and destroyed by natural disasters. Therefore, disaster relief housing is another major potential of this approach.

Keywords

Affordable housing, sustainable and secure structures, informal settlements, urban design patterns, blockchain

¹ “Quality good enough” comes from Clayton Christensen of the Harvard Business School, who coined this term and the related concept/theory—based on insights stemming from real world cases—starting in the nineties (*The Innovator’s Dilemma, Seeing What’s Next, The Innovator’s Solution, The Innovator’s DNA, Competing against Luck*). In this case, it refers to providing adequate, safe and sanitary housing, but avoiding exaggerated levels of quality and excessive provisions to save costs and assure affordability.

1. Introduction

1.1. Urgency of addressing housing crisis & improving informal settlements

Informal settlements are a problem, as they are unecological, unsafe and lack adequate social and technical infrastructure. Through the absence of planning and architectural expertise, land is densely built-up with no public spaces and proper streets. As a result of continuous urbanization, this problem will keep growing.

The UN Special Rapporteur Leilani Farha stated in her 2018 report² to the General Assembly: “Currently nearly one-quarter of the world’s urban population lives in informal settlements or encampments, most in developing countries but increasingly also in the most affluent countries. Living conditions are shocking and intolerable. In many cities in Africa, more than half of the population lives in informal settlements. In Asia, there are 520 million residents of informal settlements.”

The urgency of this problem has been known since a generation. In his iconic book, *Architecture for the Poor*, Hassan Fathy writes that “at least one billion people will die early deaths because of unsanitary, uneconomic and ugly housing” (Fathy 1989). The situation of the world’s poor population has worsened dramatically in the last 30 years due to continuous urbanization and growing inequality.

The need for sanitary and safe housing is aggravated when disasters strike, as informal settlements are the most vulnerable when heavy rainfall, floods, storms or earthquakes hit unstable land and unsafe structures. Apart from informal housing, many other cheaply built structures are usually affected and destroyed by natural disasters. Therefore, disaster relief housing is another major target of this approach. The situation is exacerbated by the climate change which leads to more frequent occurrences of natural disasters.

1.2. Problem classification

The following is an attempt towards a classification of the major problems of informal settlements that will be addressed with the Habitat 5.0 approach. Therefore, this is not a complete list of all the numerous problems that occur in these areas devoid of planning, regulations or administration, but a focus on the most urgent ones:

Illegality and exploitation: Often, settlements are built illegally on land not zoned for construction, e.g., unsafe slopes, waste dumps, etc. Other settlements are built illegally on agricultural land with permission of the land owner, who makes a profit through the arrangement. This is detrimental to the environment, as natural resources are diminished, agricultural land is reduced and the built-up surface is increased.

Dangerous hygienic and sanitary conditions: The aforementioned lack of appropriate zoning means inadequate or missing infrastructure, water, sewer, electricity, etc., which causes dangerous hygienic and sanitary conditions. This has negative consequences on the environment due to pollution and illegal waste dumps.

Missing structural safety: Existing informal settlements are increasingly densified either by extensions or additions to already unsafe buildings and therefore further reduce the

² “UN Special Rapporteur on the Right to Housing.” <http://www.unhousingrapp.org/>.

structural safety of the original construction, which was never calculated in the first place. Rooftop additions are often only accessible via dangerous stairs.

Vulnerability to disasters: These conditions make these settlements particularly vulnerable to natural disasters. Heavy rainfall causes landslides that wipe unsafely built structures away. In general, the terrain and the morphology of the land underneath are not stable enough to withstand unexpected or extraordinary climatological occurrences.

Endangering women: The absence of infrastructure makes densely built-up settlements without public spaces and safe streets particularly dangerous for women, who have to walk long distances when public transport does not serve the area. Gender mainstreaming goals appear utopian under these conditions.

Lack of public transport: This forces people to commute by car and encourages environmentally damaging forms of transport that are also a big burden for the household budget of low-income families.

Low quality of life: Far away from their workplaces and their social network, people become isolated and cannot participate in city life. This is especially disadvantageous for the children who need access to schools, libraries and recreational facilities.

1.3. The megacity Cairo as a demonstrative example

The megacity Cairo can serve as a case study and illustrate the various forms and building types of informal settlements. 7 percent of Cairo's inhabitants cannot afford to live in an apartment, based on the supply of the official housing market, but have to refer to the informal market with all its negative consequences. This market bases its supply on illegal land or construction, following three different strategies: (1) Farmers transform their land zoned for agricultural use into building sites without providing adequate infrastructure, i.e., public transport and utilities (sewers, water, electricity, etc.). (2) Already densely-built up residential areas are further densified with illegal buildings or additions. (3) Illegal structures are added onto the roofs of historic buildings (mainly on buildings from the late 19th and early 20th century in Downtown Cairo) without structural reinforcement or safe access.



Figure 1: Illegal construction in existing residential neighborhoods³

The government and nearly all private developers, in contrast, focus on the development of new towns in the desert (Sims, 2012) on the outskirts of Cairo to accommodate numbers that have more than tripled since the 1970s, far from public transit and current living quarters. New town developments in the desert are negative for the environment, because the desert is a place difficult to inhabit. Previously undeveloped open spaces are built-up and

³ <http://www.mei.edu/content/informal-areas-cairos-silent-urban-revolution>

large efforts are needed to provide the desert with appropriate infrastructure, especially water. Moreover, the peripheral locations encourage unecological commuting patterns, reduce the quality of life and have a negative impact on the household economy of the workforce and their families, who are separated from their workplaces and social contacts. That is the reason why many of these new housing developments have failed to be accepted and are struggling with high levels of vacancy.

1.4. The effect of climate change on housing

In his keynote speech at ISOCARP,⁴ Jeremy Rifkin focused on climate change: “Real-time climate change is not only affecting the way of life in the industrial world, but threatening the livelihood of millions of people in the developing world. [...] We need to arrest the climate crisis quickly; we need to be completely off the carbon deposits [...] in order to avoid the abyss [...] Three defining technologies will emerge across the civilization and converge to create a general purpose technology platform and infrastructure that fundamentally changes how society manages, powers and moves economic and social life and governance.”

The three mentioned technological revolutions are: information and communication technologies, new sources of energy, and new modes of mobility in transportation and logistics. Rifkin encouraged participating planners and architects to take swift action and apply all the innovations of the digital world—especially blockchains. He argued that instead of individual pioneering projects, the entire planning and construction industry should be adapted to the requirements of climate protection. A special focus should thereby be set on the retrofitting of the entire existing building stock. Concluding, he showed the path from globalization to glocalization through decentralization.

1.5. Structure of the paper

The paper is structured as follows: Part 1, 1.1-1.4 focuses on the problem description. Part 2, 2.1-2.2 gives an international background of goals, declarations and efforts so far. Part 3, 3-4 offers potential solutions with the proposed “Habitat 5.0” approach.

2. Background and related work

2.1. International declarations and future commitments give direction

Following the initiative of UN Habitat,⁵ states have committed under Goal 11 of the Agenda for Sustainable Development to upgrade all informal settlements and ensure adequate housing for everyone by 2030. The Agenda aims to build upon the inherent capacities of informal settlement communities and recommends supporting and enabling residents to participate in the upgrading processes. Goal 11.1: *By 2030, ensure access for all to adequate, safe and affordable housing and basic service and upgrade slums. Proportion of urban population living in slums, informal settlements, or inadequate housing.*

The UN Habitat Goal 11 serves as a guideline and as an inspiration of our approach.

2.2. “Best practice” so far to support residents in situ

Some positive efforts have been made, but they always rely on individual initiatives by NGOs or socially responsible architects and planners. Selected examples are the work of Alejandro

⁴ <https://isocarp.org/2018congress>

⁵ <http://habitat3.org>

Aravena/Elemental in South America, who created intelligent design solutions for building new and better houses in situ, and the work of Balkrishna Doshi, India's architect for the poor. They both succeeded in activating the residents and engaging them in a participatory way to create and upgrade their homes while at the same time achieving excellent design standards. Aravena realized that in order to significantly ameliorate the world-wide housing crisis of the poor, much higher numbers of quality housing need to be produced and people have to be activated to build themselves. His concept of building only "half a house" took a large step in that direction. Aravena was convinced that when faced with a limited budget, it would be better to build only half a good house and leave the other half for the residents to be completed at a later point themselves. The first half contained all of the necessary infrastructure, the kitchen, the bathroom and the structurally safe shell. The second half would contain additional bedrooms on an upper level or in a carefully calculated gap adjacent to the neighboring building. Afterwards he even offered his designs for free so they could be replicated by housing developers or governmental authorities without a sufficient budget for hiring architects.



Figure 2: Quinta Monroy Concept, Elemental⁶

ELEMENTAL is a Chilean based architecture practice that focuses on architecture work of public interest and social impact. They became well-known through Quinta Monroy, a social housing project on a valuable, centrally located site in Iquique, Chile that had been illegally occupied. After the land had been purchased, the budget was nearly used up. Thanks to an intelligent plan by Elemental, it became possible to rehouse the 97 families on the same site by building only half a house for each family, consisting of the basic infrastructure, which provided residents with a shell they could later add to themselves.

ELEMENTAL's director, Alejandro Aravena, was awarded the Pritzker Prize⁷ in 2016 for ELEMENTAL's social and humanistic approach to architecture, which shows how architecture at its best can improve people's lives. Following the honor, he released several of his low-cost "incremental" housing plans free to the public as open source designs to provide the material to government agencies and developers to help tackle the global affordable housing crisis.⁸ Although this is a most laudable effort, there are no reports yet of the designs having

⁶ <http://arquittetando.com.br/wp-content/uploads/2018/03/5.jpg>

⁷ <https://www.pritzkerprize.com/>

⁸ <http://www.elementalchile.cl/en/>

been replicated. As the director of the Venice Architecture Biennale in 2016, he focused on projects that engage citizens in poor communities world-wide and on affordable housing for the most disadvantaged.



Figure 3: Settlement in Aranya by architect Doshi, for which he was awarded the Pritzker Prize⁹

The internationally noted champion of housing for Indian's poor, Balkrishna Doshi, was awarded the Pritzker Prize⁷ in 2018, in large part for the Aranya low-cost housing project in Indore. It accommodates 80,000 people with houses and courtyards linked by a maze of pathways in the city of Indore. Architect Doshi believes that a large part of Aranya's success lies in the fact that instead of presenting those who would live there—often in a purpose-built house for the first time—with a ready-made design, the development allows residents the space and opportunity to adapt and improve their homes. Beyond aesthetics, Doshi argued that architecture and urban design—done right—can and should be socially transformative for the world's poor.¹⁰

2.3. Summary

These laudable efforts nonetheless remain hand-tailored, one-time solutions that cannot be easily replicated elsewhere—not even in their own countries, because they were created for specific situations and user groups. In general, these one-time solutions fall short because they cannot become parametric and be broken down into individual components and rearranged in different situations. This means the designs are a complete oeuvre that cannot be taken apart, separated into individual components, organized by theme and rearranged in other circumstances. But they could be used and developed further to fulfill these requirements in the process of developing “Habitat 5.02.”

3. Our vision to improve the situation is termed “Habitat 5.0”

The UN Habitat Agenda recommendations serve as a foundation for our strategy entitled “Habitat 5.0,” an approach with social aspects comprising the appropriate urban development, design, planning and construction processes. The major goals include: affordable living for everyone; using existing strengths, infrastructures and buildings; inclusion of current technologies; regard for world-wide expertise; consideration of ecological aspects (CO₂ emissions and energy self-sufficiency); flexibility to enable future adaptations by the users; and gender equality. The guiding principles to achieve these goals are:

⁹ <https://www.architectureindevelopment.org/project.php?id=401#!prettyPhoto>

¹⁰ <https://www.theguardian.com/global-development/2018/mar/12/low-cost-housing-needs-dignity-indian-architect-balkrishna-doshi>

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- The recognition of the right to remain in situ, so that residents retain their social connections.
 - Access to serviced land.
 - The self-construction of homes by inspiring residents to get actively involved in upgrading their neighborhoods and dwellings and providing them qualified know-how for that.
 - Usage of economical building materials, preferably from the local region.
 - The participation of residents at all stages by integrating their skills and labor capital into upgrading programs.
 - A scalable and replicable approach that can be easily adapted to new situations.
 - A sustainable business model that supports all these social aspects.

The uniqueness of our approach lies in its potential for further development, adaptation and replication. The repeated use of a “flexible toolkit” creates multiple benefits and makes it economically attractive to a large group of potential beneficiaries.

4. Proposed approach for Habitat 5.0 based on digital transformation, design patterns and blockchain

Habitat 5.0 foresees a close integration of the digital and real worlds. The latter refers to spaces for housing, resources and involved communities. The former refers to the employment of digitalization concepts to disseminate and reuse existing architectural expertise in a practical way, in near-time, in a fair and secure fashion, and free of corruption. The know-how shall be collected and structured in so-called “design patterns” that include designs, required skills, experience reports and useful solutions. The approach relies on an organically growing infrastructure where architecture and planning experts all over the world are motivated to contribute.

Hannah Arendt writes: “Basically we are always educating for a world that is or is becoming out of joint [...] To preserve the world against the mortality of its creators and inhabitants it must be constantly set right anew. The problem is simply to educate in such a way that a setting-right remains actually possible, even though it can, of course, never be assured. Our hope always hangs on the new which every generation brings; but precisely because we can base our hope only on this, we destroy everything if we so try to control the new that we, the old, can dictate how it will look” (Arendt, 2000).

Habitat 5.0 aims to address the shortcomings of the previous efforts and take the next step building upon the experiences of Doshi and Aravena. The reasons why this approach makes a difference are the wider range of its applicability and the world-wide network of people who shall become involved. It follows the ethics of sharing knowledge and experiences in a fair and transparent manner and avoiding corruption. The cornerstones are:

- The housing projects would stay in-situ so that the residents can remain within their existing social networks.
- A democratic participatory process enables their equal and fair participation.
- The affordability of the new or upgraded homes shall be guaranteed and gentrification prevented through the participation of the residents who work on the improvements of their community and thereby gain a right to remain there.

- Ecological responsiveness is regarded through the use of local materials and labor.
- Know-how is transferred in a fair way to other countries and communities, authorities, NGOs, experts and laypersons.
- Collective intelligence leads to innovative and unexpected solutions. There will be an open call for interested experts, so that people who want to contribute to this effort with their knowledge and experience as well as potential beneficiaries have a chance to participate.

4.1. Urban design pattern language

“Patterns” are a recognized approach that promotes learning from proven solutions in a highly usable way. Especially in the described setting we do not assume that the involved stakeholders, especially the inhabitants of informal settlements, have the respective know-how to build their “cities” and not to be “fooled” by corrupt exploiters. This indeed is a core root of the problems described in Section 1.2.

Each successful, well-used public space, regardless of its time of creation, has specific, inherent qualities. These can be abstracted so they obtain a less specific and more general meaning. Christopher Alexander was the pioneer in that respect (Alexander et al., 1977). This know-how shall be identified and generalized in the form of such parameterizable patterns, leading to a global, open knowledge base of architectural expertise, including expertise about (new) materials and their gray energy. The starting point is, therefore, the identification, selection, collection and provision of patterns for the design of urban spaces. This objective refers to “learning from” a multitude of comparable projects and from tested and proven solutions, including those mentioned in Section 2.2. The patterns provide design modules that allow different combinations and ensure future flexibility and adaptability.

The idea is that the building of public spaces relies on such pre-defined design patterns created by professional planners and architects. Such patterns are developed based on proven experiences and quality solutions. They form a kit of parts that laypersons can use without detailed knowledge. On one hand, they allow these laypersons to create functioning and aesthetic solutions by reassembling, enhancing and transforming existing urban design patterns in different ways. On the other hand, they shall leave enough freedom for individual parametrization and creativity. The art is to nevertheless guarantee good and “quality enough”¹ solutions.

The result is a “pattern language” with examples and rules for different applications that we are currently developing based on our experiences in re-using designs in Architecture (Silja Tillner and Sabine Pollak developed a pattern language for self-build projects (Tillner, Pollak, 2017)) and Informatics (Kuehn, 2016). As the name “language” suggests, it has a highly usable interface that allows even non-experts to query and navigate through the patterns using simple language artifacts. The solutions are presented in an understandable and comprehensive way and are illustrated with practice reports. The language also encourages the giving of feedback so that the quality can be continuously improved.

The pattern language serves to collect and generalize the patterns and their solutions in the form of a “handbook” with a respective set of rules that can be applied in different situations. This means that the pattern language also includes process patterns beyond the mentioned design patterns. Sharing and reusing processes implies a better usage of resources. Professional planners and architects provide know-how about urban design strategies and methods for the urban spaces, as well as information on sustainable building

materials through patterns. Besides the conscientious and saving use of materials and the reduction of waste, there will be a pedagogical benefit, too. The verification that the patterns are ecological shall alleviate the climate problem. In addition, the patterns will be verified consensually to support gender mainstreaming and the mentioned striving for qualities like fairness, etc. All patterns shall be digitized so that they can be easily disseminated, developed further, combined in various ways, shared and licensed.

Clearly, the coordination of all these activities and processes requires a respective IT platform. We propose a new kind of blockchain termed “Brick-Chain” (see Section 4.2) for this.

4.2. The “Brick-Chain” toolkit

The “Brick-Chain” concept introduces transparent, decentralized and cooperative processes. It is inspired by the principles of blockchain. The notion of a blockchain was introduced in the seminal article about Bitcoin (Nakamoto, 2008), a blockchain-based cryptocurrency. Since then, the idea of a blockchain has been proposed for many different business applications. A blockchain pursues a radically new philosophy beyond current IT approaches. It relies on a “distributed ledger technology” (Kuehn, 2019) without any central “man-in-the-middle.” Instead, the trust is achieved and the rules for cooperation are agreed upon in a consensual way by equal, distributed “peers.” Data and transactions are replicated to all peers, who independently verify their accuracy. Business processes become automated and thus faster, tamper-proof and transparent. The peers do not have to trust each other, but can still enter into secure business relationships.

As the paradigm of a blockchain fits the principles of Habitat 5.0, we propose the usage of a new blockchain-based infrastructure called “Brick-Chain,” which allows the participative, self-organized collection of patterns and their distribution in a fair and decentralized manner. The digitalization of patterns facilitates further and flexible development, combinations, sharing, community building and licensing models via the Brick-Chain. The proposition is to create a toolkit of consistent quality that consists of proven, generic design elements and plans that can be used firstly by NGOs, local authorities and experts to produce well-functioning layouts of the settlements and, secondly, by the people for building in-place. Residents use a pattern language-based interface to search for the most suitable solutions and for real-time collaboration with experts. The distribution of the pattern-based designs as well as all interactions is accomplished by the “Brick-Chain.” The Brick-Chain infrastructure provides licensable pattern toolkits including the respective support, incentive and donation models. The pattern toolkits themselves will be provided to the end users, who can be NGOs, citizens, etc.

Following the blockchain philosophy, the kit for parts, as well as for the entire infrastructure, shall be open source. The patterns can be adapted and expanded for the different continents to respond to the different climatic conditions and support environmental protection. Examples for further developments contain ecological qualities such as information on the preferred use of local materials and building techniques, the length of transport and the gray energy of the building materials.

As a consequence of applying the Brick-Chain toolkit, a world-wide network of creative people, practitioners, local authorities, NGOs and end users who support the exchange of knowledge and ideas will continue to grow naturally. The modular nature of the approach allows for flexibility and extensibility. Such a flexible and adaptable toolkit shall offer quick

solutions to local authorities and NGOs, especially for disaster relief housing after cyclical catastrophes.

4.3. Long-term perspectives

In addition to the digitalization and dissemination of expertise in the form of pattern-based toolkits, industrial 3-D printing technology will be used. By combining the design patterns with 3-D printing utilizing high-performance 3-D printers, a “design and build” situation will be supported without the need of experts. The pattern language software would enable end consumers to download a building kit and 3-D print certain parts for the house. Since 3-D printing is still a fairly slow process, the goal is to combine it with local building expertise so that the simpler forms of assemblage can still be performed manually while the more complicated connecting links and complex joints will be 3-D printed. Following an “IKEA” type of assembly, untrained people will be able to use prefabricated corner elements and joints and connect them with wooden beams or other locally available building materials. Each form of implementation shall use the resources at-hand most efficiently and effectively.

On the other hand, the modular and digitized approach provides the end customers, designers and builders with enormous flexibility in terms of design and materials used—enabling the use of locally sourced and environmentally friendly building materials. The main modular building blocks could be universal across the international network. Multiple uses of proven and certified modules would offer substantial cost savings as well as better designs. A potential combination of the 3-D printers with robots offers another level of technical accuracy and efficiency.

5. Evaluation of the approach

5.1. Support of the Habitat III goals

The claims of Habitat 5.0 are aligned with the Habitat III New Urban Agenda. Its main impacts comprise: new forms of know-how and IPR licensing in the form of patterns of architects and planners; new, gender-sensitive processes for collaboration and sharing models; verification of process and design patterns to conform to the Gendered Innovations methods of the EU; collaboratively designed urban spaces that contribute to the health and well-being of people and foster nature-based approaches.

Through the use of predefined yet developable patterns, citizens will be enabled to engage themselves in a meaningful way. The patterns distributed by the Brick-Chain will serve as “tools” that complement the citizens’ lack of expertise, thereby balancing the role of experts and laypersons. This ensures sustainability of the approach because the newly gained skills will be applied by the empowered citizens in the future.

5.2. Contribution to alleviate the problems of informal settlements

The Brick-Chain could contribute in the following ways to alleviate the problems of informal settlements (see section 1.2):

Illegality and exploitation: The transparent process of planning and building and the traceability through the blockchain will prevent illegal land transactions and speculation.

Dangerous hygienic and sanitary conditions, missing structural safety and endangering women: Since these conditions are caused by the absence of responsible planning and illegal constructions, the provision of technically correct design patterns will allow authorities, NGOs and laypeople to create urban design plans with safe streets and public spaces, adequate infrastructure and building plans with sufficient technical equipment.

Vulnerability to disasters: The construction on unstable land in combination with unsafely built structures causes the high levels of risk. These risks will be reduced by the same transparent processes that help to prevent illegality and exploitation.

Lack of public transport: Although the Brick-Chain cannot substitute a public bus service the blockchain technology will support the planning these services as well as stimulate self-organized ride-sharing and shuttles.

Low quality of life: The participation in the design and build process will plant the seeds for a resilient social network. People will get to know their neighbors and more actively participate in city life. The blockchain technology could support learning networks, e.g. the creation of study groups, book-sharing etc.

6. Conclusion

The advantage of the suggested pattern-based approach is to reach beneficiaries on a large scale and therefore make a bigger impact than previous, isolated initiatives by applying “disruptive innovations.” The patterns lift the concept of modular design to a higher level: They transfer modular design principles to public urban spaces through parametrizable design and planning, which is cheaper and more effective than tailoring. Patterns enable a replication of know-how and selling of IPRs in an emerging market. Environmental protection patterns will inform the citizens and also ensure sustainable processes in the future thanks to their replicability.

The motto is “quality good enough”¹ to encourage the self-building of houses with appropriate ecological materials—safer, cheaper, faster and sustainable, supporting the greater vision of “Glocalization.” The secure, fair and fast distribution of the know-how is guaranteed by the application of a blockchain-based IT platform called “Brick-Chain.” Through the flexibility and reusability of this approach, substantial cost-savings compared to traditional, one-time aid efforts are offered. Owing to the geographically dispersed applications of an easy-to-use pattern language, the system can also be applied directly by the end users, providing not only additional cost savings, but also a further education aspect.

The following facets of the approach make it unique from a business and innovation perspective: The long-term perspective is to develop a “business venture with a social aspect, which would be based on a modular approach, leveraging modern, industrial 3-D printing technology and a unique design pattern approach in order to enable the use of local, sustainable materials for the rapid replacement of inadequate housing with new, safe, and sanitary dwellings.” The pattern language is an answer to establishing validated and tested modules that encourage laypersons to get creatively involved and can be rearranged and re-used in numerous ways, which is unfeasible with traditional design techniques, and then applied elsewhere. Habitat 5.0 is a flexible model that can be transformed and developed continuously, as the needs of the citizens and the conditions of the cities vary.

The main goal and the ethics of the project are to achieve affordability in “housing for all” in the developing world in a sustainable way, namely to achieve a resilient ecological city with active and engaged citizens who are part of the process and therefore feel responsible for safeguarding the environment. On one hand, this means the application of innovative knowledge and practices related to social inclusion and participatory self-regulating processes. On the other hand, the efficient use of resources, technological innovation and community services guarantee a lasting impact. All development processes shall be understandable and transparent.

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