



The pre-design phase in the post-catastrophe intervention process.

The case of Chamanga, Ecuador^[1]

La fase de prediseño en el proceso de intervención post-catástrofe.

El caso de Chamanga, Ecuador

A fase de pré-projeto no processo de intervenção pós-catástrofe.

O caso de Chamanga, Equador

La phase de pré-conception dans le processus d'intervention post-catastrophe.

Le cas de Chamanga, Équateur

Fuente: Autoría propia

Recibido: 06/06/2023
Aprobado: 23/08/2023

Cómo citar este artículo:

Rocchio, D.; Domingo-Calabuig, D. (2023). The pre-design phase in the post-catastrophe intervention process. The case of Chamanga, Ecuador. *Bitácora Urbano Territorial*, 33(III): 10.15446/bitacora.v33n3.109378

Autores

Daniele Rocchio

Universidad UTE

daniele.rocchio@ute.edu.ec

<https://orcid.org/0000-0002-0414-8681>

Débora Domingo-Calabuig

Universitat Politècnica de València

dedoca@pra.upv.es

<https://orcid.org/0000-0001-6020-3414>

[1] This article results from independent research within the context of a doctoral thesis already completed at the Universitat Politècnica de València (Spain).

Abstract

This article examines the concept of pre-design as a preliminary phase of a research-by-design methodology. The aim is to reveal the importance of this first stage in the development of an architectural project process and to provide new information on the relationships that occur with the rest of the design phases and, ultimately, with the result. The research is carried out experimentally through on-site action in a post-disaster environment. The case study took place in the town of Chamanga, Ecuador, after the seismic event of 2016, which required a reconstruction process. The situation was conducive to applying pre-design methods and reflecting on the results. The research results highlight the importance of establishing the criteria for action and how these must be selected based on successive 'observation-projection' iterations. It also shows how the pre-design is already a determining part of the final design due to the decisions taken during the process. This research contributes to identifying the variables and characteristics of a pre-design phase and provides new insights into understanding the architectural project as a research process.

Keywords: research-by-design, pre-design, reconstruction, earthquake, Ecuador

Autores

Daniele Rocchio

Daniele Rocchio is an architect, urban planner, and master in energy efficiency and renewable energy from the Università Sapienza di Roma. Ph.D. in Architecture, building, urban planning, and landscape from the Universitat Politècnica de València. He is the architect responsible for the prevention and protection service of the Italian Embassy in Quito. Since 2014 he has been a professor and researcher of Architecture at the Faculty of Architecture and Urbanism of the Universidad UTE in Ecuador, where he has held the position of Dean since 2018. His research field focuses on the dynamic processes of post-catastrophe reconstruction.

Débora Domingo-Calabuig

Débora Domingo-Calabuig is an architect PhD and professor at the Universitat Politècnica de València. Her interests include the methods, means, and impact of architectural research. Her research focuses on the social consideration of architecture and urbanism, particularly on the open design processes of the 60s and 70s. She is a member of the Research Academy of the European Association for Architectural Education. Currently, she holds the position of Vice-rector for Sustainable Development of Campus at the UPV and is responsible for planning and launching the university's ecological transition project to achieve carbon neutrality.

Resumen

Este artículo examina el concepto de prediseño como una fase preliminar de una metodología de investigación por diseño. El objetivo es poner de manifiesto la importancia de esta primera etapa en el proceso de desarrollo de un proyecto arquitectónico y aportar nueva información sobre las relaciones que se producen con el resto de las fases del diseño y, en definitiva, con el resultado final. La investigación se lleva a cabo de forma experimental a través de la actuación in situ en un entorno post-catástrofe. El caso de estudio se llevó a cabo en la localidad de Chamanga, Ecuador, tras el evento sísmico de 2016, el cual requirió un proceso de reconstrucción. La situación era propicia para aplicar métodos de prediseño y reflexionar sobre los resultados. Los resultados de la investigación evidencian la importancia de establecer los criterios de actuación y cómo estos deben ser seleccionados en base a iteraciones sucesivas de 'observación-proyección'. También muestran cómo el prediseño ya es una parte determinante del diseño final debido a las decisiones tomadas durante el proceso. Esta investigación contribuye a identificar las variables y características de una fase previa al diseño y proporciona nuevos conocimientos para entender el proyecto arquitectónico como un proceso de investigación.

Palabras-clave: investigación a través diseño, prediseño, reconstrucción, sismo, Ecuador

Résumé

Cet article examine le concept de préconception comme phase préliminaire d'une méthodologie de recherche par la conception. L'objectif est de souligner l'importance de cette première étape dans le processus de développement d'un projet architectural et d'apporter de nouvelles informations sur les relations qui s'établissent avec le reste des phases de conception et, finalement, avec le résultat final. La recherche est menée expérimentalement par l'action in situ dans un environnement post-catastrophe. L'étude de cas a été réalisée dans la ville de Chamanga, en Équateur, après l'événement sismique de 2016, qui a nécessité un processus de reconstruction. La situation était propice à l'application des méthodes de pré-conception et à la réflexion sur les résultats. Les résultats de la recherche font évidente l'importance d'établir les critères d'action et comment ceux-ci doivent être sélectionnés à partir d'itérations successives d'« observation-projection ». Ils montrent également comment la pré-conception est déjà une partie déterminante de la conception finale en raison des décisions prises au cours du processus. Cette recherche contribue à identifier les variables et les caractéristiques d'une phase préalable à la conception et apporte de nouvelles connaissances pour appréhender le projet architectural en tant que processus de recherche.

Resumo

Este artigo examina o conceito de predesign como uma fase preliminar de uma pesquisa por metodologia de design. O objetivo é destacar a importância desta primeira etapa no processo de desenvolvimento de um projeto de arquitetura e fornecer novas informações sobre as relações que ocorrem com as demais fases do projeto e, em última instância, com o resultado final. A pesquisa é realizada experimentalmente por meio de ação in situ em um ambiente pós-catástrofe. O estudo de caso foi realizado na cidade de Chamanga, Equador, após o evento sísmico de 2016, que exigiu um processo de reconstrução. A situação era propícia para aplicar métodos de pré-design e refletir sobre os resultados. Os resultados da pesquisa mostram a importância de estabelecer os critérios de ação e como eles devem ser selecionados a partir de iterações sucessivas de 'observação-projeção'. Mostram também como o pré-projeto já é parte determinante do projeto final devido às decisões tomadas durante o processo. Esta pesquisa contribui para identificar as variáveis e características de uma fase anterior ao projeto e fornece novos conhecimentos para entender o projeto arquitetônico como um processo de pesquisa.

Palavras-chave: pesquisa por design, preprojeto, reconstrução, terremoto, Equador

The pre-design phase in the post-catastrophe intervention process.

The case of Chamanga, Ecuador

Mots-clé : recherche par design, préconception, reconstruction, sisme, Equateur

This study focuses on the pre-design phase as an early stage of a research-by-design methodology. The aim is to reveal the importance of this first stage in the development of an architectural project process, providing new information on the relationships that occur with the rest of the design phases and, ultimately, with the final design result. The importance of pre-design has been recognized in multiple architectural design applications.

Understanding the link between theory and practice in architectural design, as in any area of knowledge, is vital for advancing the discipline's development and achieving more efficient results for final users. For decades, research in architecture, with particular reference to project processes, has constantly been reflecting on its object and the definition of its frontiers. No one doubts the usefulness of technological innovations in building a more resistant, efficient, and sustainable architecture; no one denies the value that the study of architectural history brings to contemporaneity; however, recognizing that a particular architectural work contributes to the progress of the discipline because of its design values usually opens a debate among experts. Many acknowledge that research exists in professional activity, but not all professional practices involve knowledge creation (Till, 2007). Still, if researching refers to systematic methodological processes that provide comprehensive knowledge of the discipline or new ways of approaching a problem (Archer, 1995), in that case, design can be understood as such when linked to holistic and exploratory modes of doing that result in real-world applications (Foqué, 2011). Thus, research-by-design is recognized as the 'way of doing' architectural research related to professional practice in which different stages are identified with the architectural design steps (Hauberg, 2011).

This study focuses on the pre-design phase as an early stage of a research-by-design methodology. The aim is to reveal the importance of this first stage in the development of an architectural project process, providing new information on the relationships that occur with the rest of the design phases and, ultimately, with the final design result. The importance of pre-design has been recognized in multiple architectural design applications. Still, few studies show an approach from a realistic perspective, such as the one resulting from the post-catastrophe context in Chamanga, Ecuador, after the seismic event of 2016.

Therefore, regarding the methodological aspects, this research moves between the qualitative and the experimental of a single case study. Chaman-ga's experience allowed the reflection on the post-catastrophe intervention process in qualitative terms. The approach phases (first on-site visits), the observation (pre-design), and the projection (pre-design and design) represent the experimental facts from which the theoretical reflections are framed.

Theoretical Principles

In 2012, the Research Academy of the European Association for Architectural Education devoted a section of its "Architectural Research Charter" to the concept of "Research by Design" (EAAE, 2012), thus highlighting this essential aspect of the discipline that was as much a part of professional practice as it was of research. The text emphasized that: "In research by design, the architectural design process forms the pathway through which new insights, knowledge, practices or products come into being. It generates critical inquiry through design work. Therefore, research results are obtained by and consistent with experience in practice." Also called "Research through Design" or "Research with Design",

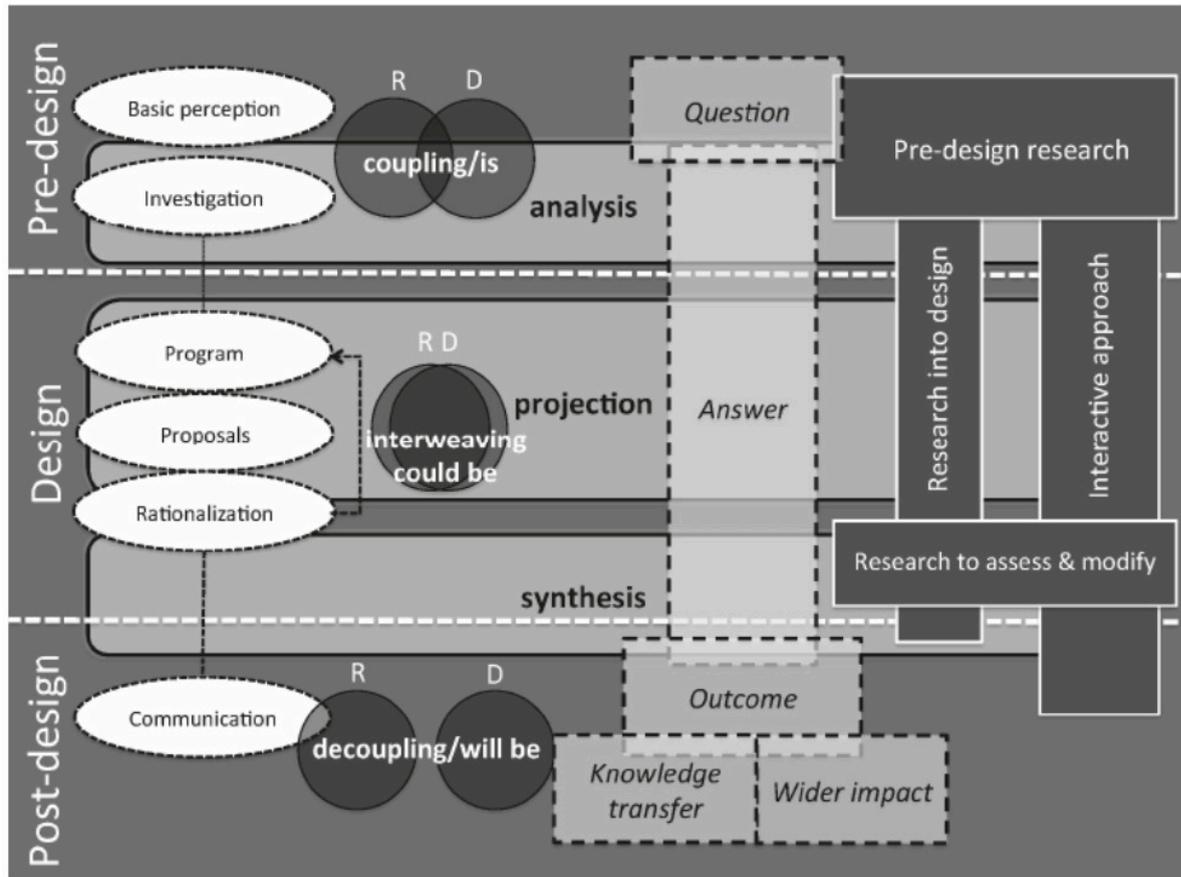


Figure 1. Combined approaches of Research by Design

Source: Rob Rogemma

Research by Design: Proposition for a Methodological Approach.

but conceptually differentiated from “Research for Design” (Frayling, 1993), the term has now acquired the broader name, “Design Driven Research”.

For a complete and comprehensive overview of the background that gave rise to the concept, it is necessary to refer to the well-known article by Rogemma (2016), which, in addition to offering a definition, outlines a methodological approach to the process. Assuming that design is an exploratory and reflexive pathway that is constructive in nature and depends fundamentally on the context, Rogemma identifies three critical phases in any design process –analysis, project, and synthesis– and combines different strategies and methods to arrive at a comparative scheme (Figure 1). What it is (the analysis, the existing) determines what could be (the project, the ideal) and becomes what will be (the synthesis, the reality).

Pre-design corresponds to the first stage, that of analysis, and is so named because it involves basic perception and preliminary research: data are collec-

ted, and the first critical reflections, problem formulation, selection of priorities, etc., are carried out. In fact, the term pre-design is widely used in the professional field of architecture and is associated with services related to feasibility studies that investigate the knowledge of the terrain, the compilation of current urban planning legislation, and the programming of the client’s needs, among other possible topics. Likewise, in the educational context, pre-design usually corresponds to tentative studies of the volume or sketches of an approximation of the architectural object.

In general, and no matter what the field of knowledge, design methods are strongly linked to their context, and thus, the pre-design phase is a kind of research that will determine the evolution of the rest of the process: it involves some conceptualization and is part of the design process itself.

In the case of architecture and urban planning, and on the multiple scales that the disciplines address, pre-design can be considered more than a prelimi-

nary study: it is a fundamental phase in developing a project. Pre-design is, in fact, already a project. In the before, during, and after of a natural or anthropogenic event, it is necessary to look at the project as multi-scaled and, therefore, at pre-design as constant processes of observation and projection in the short, medium, and long terms.

In this sense, building or rebuilding without criteria or context would probably be synonymous with eliminating pre-design from the practice of the project and entering an already limited design process. Additionally, some research also points to the ethical aspect of architectural practice in the pre-design phase. Even though architecture usually makes the aesthetic question of its design evident, the role of ethics during the architectural process is especially relevant in the analytical phase of observation-projection. The problem is constantly monitored at this stage of work to find solutions that take shape with the least possible impact on the social, spatial, and environmental contexts (Jusselme et al. 2016).

Similarly, other studies on the design process have a bearing on the plurality of the pre-design authorship. Linked to observation, this phase of work involves multiple viewpoints and actors, from groups of architecture professionals to students, users, and governmental and non-governmental associations and institutions, among others. Somehow, collaboration is a reality at this design stage, and pre-design is co-design (Nigten, 2014) because it is found in a participatory context generally linked to bottom-up developments.

The participation of the community and ethics as the basis of design processes and as an approach to improving the context are elements that characterize the pre-design phase because, following the methodological approach of research-by-design, in the analytical phase, we already begin to answer the questions and problems that derive from the observation of the design process. These preliminary responses are the future projection of the design process (interactive approach) and delineate the main intentions of the intervention. All actors are part of the process and must work for the common good without letting personal interests prevail. The role of academia is key here, as a partner guide in the pre-design phase, a principle that also defines and manages the process as research.

Case Study: A Fishing Town

On April 16, 2016, an earthquake measuring 7.8 on the Richter scale was recorded in the coastal area of Ecuador. The event was immediately perceived with all its gravity due to the magnitude and seriousness of the events. There was immense material and immaterial damage and a significant number of deaths. The fragile construction reality was undoubtedly evident, and the inability to respond with adequate disaster management worsened an already difficult situation. The provinces of Manabí (the epicenter was in Pedernales) and Esmeraldas were the worst affected. Between these two provinces, a village was almost destroyed: Chamanga, a town that, until then, hardly anyone knew or considered relevant (see Figure 2).



Figure 2. Chamanga, 2016
Source: Daniele Rocchio.

A few days after the event, a group of professors and students from UTE University in Quito left the Ecuadorian capital for the coast to carry out a humanitarian mission to mitigate the disastrous consequences of the events. Once they arrived in the city of Esmeraldas, the team decided to follow a walk-through in a southerly direction, although without defining a destination. The exercise of continuous observation of the environment led the academic group to travel more than 130 km in the affected areas until they reached a fishing village in the estuary of the Cojimíes river, Muisne canton, Esmeraldas' province, a few kilometers from the region of Manabí. It was Chamanga, a town of just over 5,700 inhabitants, according to the 2016 census, who make their living from fishing and the production of shrimp farms in the neighboring territory.

San José de Chamanga, the full name of the parish, covers an area of just over 147 km², 65% of which corresponds to the Mache-Chindul ecological reserve. It must be said that Ecuador is a diverse country characterized by a high level of biodiversity, with a high percentage of the environment catalogued as natural heritage: San José de Chamanga is no different in this respect from the rest of the territory.

As collected in the “Plan de Desarrollo y Ordenamiento Territorial 2016-2025 (2016)” (PDyOT) (Territorial Development and Organization Plan, 2016), approximately 27% of the parish is covered by native forest, shrub and herbaceous vegetation, forest plantations, bodies of water, and land for pasture and crops. A little more than 6.5% corresponds to areas where mangroves used to exist and have been replaced by shrimp farms, this being a grave fact because of the environmental and landscape damage. The populated place represents only 0.2% of the entire territory of the parish, covering an area of approximately 0.3 km².

The climate of San José de Chamanga is subtropical semi-humid, with an average annual temperature of 25°C, relative humidity varying between 70% and 90%, and annual rainfall reaching 1700 mm in the ecological reserve area while fluctuating between 1300 mm and 1500 mm in the populated place. These data show the location's two main conditions: a constant high heat sensation all year round and the risk of flooding due to heavy rainfall.

The PDyOT includes relevant data regarding infrastructure, facilities and production likewise. Chamanga has seven educational establishments, from primary to high school. This is because more than 60% of the population is under 30, and the most significant number of inhabitants is concentrated in the 1 to 10 age group (approximately 25%). However, only 88% of the population attends primary school, and this value drops to 46% for high school, with only 3% attending university. Education rates are significantly lower than national rates, ranging from 5 percentage points for initial education to almost 20 percentage points for higher or university education. This situation leads to a high illiteracy rate of around 15%. In terms of medical facilities, there is only one health center for general medicine, obstetrics, and dentistry, in addition to two private clinics. The medical staff is insufficient to meet the population's needs, which is forced to move to other centers close to the parish. Both the educational and medical centers were affected

by the 2016 event. Medical care and education for children and adolescents were temporarily housed in makeshift tents until a safe space could be found.

At the economic level, about 33% of the activity is carried out in the primary sector, with agriculture, livestock, and fishing making up most of the productive force. Manufacturing, wholesale, and retail trade are the other two economic fields that distinguish the sector's production. Since before the earthquake, the presence and steady increase of shrimp trawlers have continued to diminish shellfishing in the mangroves. This limits the product's productive capacity and sale, which generally occurs in the fishermen's own homes.

The 2016 earthquake highlighted the severe lack of essential services that already existed. 90% used water from a motorized delivery truck or directly from the river, and 20% of the inhabitants drank it without any purification process, with the severe health consequences that this entailed. Regarding sanitation, 38% had no septic tank or connection to the mains, and 26% discharged directly into the river. This situation has mostly stayed the same after the earthquake, despite interventions by the government and non-governmental organizations. The figures remain the same in the case of electricity access, where around 30% of people had no access to the grid before and after the earthquake. The precariousness is similar in the case of rubbish collection, where only 60% disposed of garbage in collection carts; the rest threw it in the river, buried it, or burnt it in the ground.

Concerning the built-up stock, even before the earthquake, around 30% of dwellings were unfitted for habitation. After the catastrophic event, the percentage of affected houses rose to approximately 50%, in addition to the 240 homes destroyed, representing 25%. Post-earthquake interventions by governmental agencies focused on the study of existing buildings and the realization of mass housing for those who were left homeless. However, solving the housing shortage for all those affected was impossible. This situation and the long implementation times forced many people to continue living in temporary tents (see Figure 3).

As a result, and starting from a context that was already complicated before the earthquake, where almost all of the inhabitants had no access to a telephone network or the internet, nor did they have computers or adequate means of public transport, arriving in Chamanga meant entering a devastated context with no connection to the outside world.

It was immediately apparent that all human activities –essential, necessary, voluntary, and social (Gehl, 2012)– were severely limited. This observation was decisive in the first assessment of the context, as this was what existed and would define the analysis phase. In a post-disaster situation, the activities people can continue carrying out have priority. This was the first point of the pre-design from which the planning processes began to be outlined with a short-, medium-, and long-term time frame. Thus, the imagination was projected toward a scenario of compensation for damage and the configuration of identity spaces because of the healing processes.

The fundamental elements in the pre-design operation were the question of identity, its relationship with memory, and the need to recognize it in its essential traces. Indeed, these elements were more than mere premises because they led to a decision, and the conclusion, once made, became necessary based on the specific characteristics of a given context. An apparent dichotomy thus emerged between “what I am” and “what I want to be”, in which a dual essence of the place is evident. In this sense, Chamanga was not only a fishing town; it was the platforms’ wood that caressed the river’s water and the fishermen’s houses and shelters that stood on wooden pylons. It was this, in essence, but it was also everything that wanted to move away from this to make room for “new” constructions in reinforced concrete made of sea sand. The cultural context and socio-economic reality showed a clear and defined face of the inhabitants’ customs and their day-to-day work as a means of subsistence. Furthermore, the future projection was different, supposedly better, at least in the collective imagination: a future of tourism and tertiary work. This “dream of a different future” was also beginning to be reflected in the architecture, with “noble” concrete instead of “poor” wood.

The eye of the person who observes, intending to project a particular context (both of the specific element and the multi-scale environment), is an eye that analyzes from a diagnostic point of view and, inevitably, constructs new contexts. From that moment on, the impossibility of considering the pre-design as something alien or distant from the project itself, as if it were a cold description of reality, was noted. The pre-design was then a projection into the future based on what was observed in the present. Indeed, in this phase of the design process, the premises of what was to come were embedded. These premises had a double value: on the one hand, they described reality, and on the other, they projected it into the future.

Consequently, the importance of pre-design concerning the study of the identity of the place became evident. The design phase had to be based on a coherent analysis of the identity context to respect the users and the spatial value. This was only possible if the duality of the pre-design also considered the tradition, the memory, and the future projection of those who lived in that particular context.



Figure 3. The reconstruction process: housing under construction with the same deficiencies as those destroyed by the earthquake and emergency shelter provided by the government, Chamanga, Ecuador

Source: Daniele Rocchio.

Discussion: Academia and Reality

The link with society is a substantive activity in the academic curricula of university degrees in Ecuador. Completing a certain number of hours of practical training is necessary for obtaining a degree in the country. Ecuadorian legislation distinguishes between two types of internships, one aimed at the professional field and the other at the social area. In the first case, these are hours of professional practice aimed at helping students acquire skills and abilities specific to the profession; in architectural training, practical hours must be carried out in drawing, projects, and site residencies. The second case refers to the valuable hours spent in liaison with society. In this case, the objective is to give back to society the knowledge acquired in the academic program. Specifically, students must intern in the territory to benefit a specific community. This work must be based on bilateral agreements between the higher education institution and the governmental or non-governmental bodies, autonomous governments, municipalities, or associa-

tions working in the territory with which collaboration is required. The aim is twofold: to improve the situation of environments or complex contexts due to their underdevelopment and vulnerability and to enable future professionals to put their knowledge at the service of society.

There is no professional qualification examination to practice the profession after graduation in Ecuador. All required is to obtain a degree and register with Senescyt, the Secretariat of Higher Education, Science, Technology, and Innovation. In this sense, it is evident that training through pre-professional internships and community service, as well as the academic walk-through, is essential to adequately prepare architecture professionals to relate to the labor market and social context from the moment they obtain their degree.

The 2016 seismic event, in all its tragedy, was also the opportunity to carry out fieldwork with a specific focus on pre-design and to go beyond bureaucratic compliance. The link with society in Chamanga was a space for professional and personal growth for hundreds of students and their teaching guides. This space made it possible to connect two worlds that often speak different languages or speak to each other with needs that do not coincide and show different times of action. In substance, the linkage provides an opportunity for the academy to assess its true impact in the context.

Since the year of the seismic event, numerous site visits and observation, analysis, and projection activities related to Chamanga have been carried out. In the same year, two months after the catastrophe, a workshop entitled "Reporting from Chamanga" was held within the framework of WinAReQ, an annual event of the FAU-UTE, in collaboration with three other universities (Politecnico di Milano, Pontificia Universidad Católica de Chile, and Technische Universität Berlin) and three professional architectural studios (Antithesis, ifDesign, and Gritti Architetti) (see Figure 4). This event made it possible to approach the context from an analytical-projective point of view and to benefit from numerous international experiences. In synthesis, the analysis-project/projection binomial represented the idea of what to do in the pre-design.

From immediate observation, the intuitive projection into the future was the central focus of the work carried out by more than 700 students. The result was utterly framed in the pre-design phase, addressing the relationship between need and operability in

the short term. Considering many students and the consequent possibility of obtaining qualitatively and quantitatively relevant results, three macro-groups were created, focusing on three specific aspects of the post-disaster situation in Chamanga.

The first group was composed of final-year students, who built a prototype of a temporary structure within which they presented a macro-urban analysis project through video mapping on a model of the territory. The results were relevant and considered the fundamental contribution of the academy in the drafting of the 'Plan de desarrollo y ordenamiento territorial' (PDyOT, 2016) of the Parish of San José de Chamanga; they served as input for the definition of the human settlements projects necessary for the implementation of an urban design plan. Specifically, the PDyOT defined the need to carry out two types of projects; the first is based on the strategy of relocation of the inhabitants through specific projects: primary and secondary infrastructure, housing projects, parish land terminal, construction and expansion of the health center, addiction care center, educational infrastructure, center for the community police unit, library park equipment, parish management center, children's center and a senior citizens' center, bio-plaza, etc. The second comprises projects to consolidate existing settlements: primary and secondary infrastructures, a boulevard, and a small-scale fishing port.

The second group, composed of intermediate-level students, was in charge of defining emerging housing projects. The definition of these projects was very preliminary. However, it served as a basis for the work developed successively in the projects linking with society, which were presented in 2017.

Finally, the third group was composed of first-year students who worked on what was defined as "UTE, the Chamanga 2016 Newspaper", a printed newsletter about the local human settlements. The work carried out was transcendental because it was framed in the phase of observation and characterization of the status quo of the parish under analysis. The content of the "newspaper" was so important that it served as the analytical basis of the PDyOT in the "Human Settlements Component" section and is constantly cited as a source of information for the analysis of population, infrastructure, access to housing, risks, and hazards, among other aspects.



Figure 4. 2016, WinAReQ – Reporting from Chamanga.
Source: Daniele Rocchio.

A few months after the workshop, in September, more in-depth contextual mapping studies had already been carried out, which led to the definition of six identity zones in Chamanga itself. This zoning highlighted their fragmented territorial structure.

As previously mentioned, the following year, in 2017, and after numerous visits to the coastal town, an exhibition of the progress of the observation-projection work was held in Quito. Some citizens of Chamanga also attended and participated in this event. The pre-design needed the users' constant participation to feed the process iterations: it was fundamental to maintain the principle of bottom-up participatory relationship.

In this case, a study was presented on an urban scale and another on a specific hierarchy of the dwellings of San José de Chamanga, categorized by construction typology: wood, concrete and mixed. Specifically, at the urban level, the criticalities and urban potentiality, the subdivision by zones, and the characteristics of each one of them were shown. This exercise made it

possible to project the urban layout according to the indications of the development and land-use plans and the continuous dialogue with the inhabitants. At a specific level, the analysis of the dwellings focused on the construction characteristics, the errors of self-building (especially in concrete and the mixture with sea sand), and the constructive potentiality of wood, especially in self-building. In addition, the need to configure the residential living space with the commercial space became evident. The work highlighted the importance of pre-design as a future projection focused on learning from mistakes.

Thus, in little more than a year, the university became part of the support process to overcome the catastrophe. The linking project became an observation-projection project and an architectural and urban project in its pre-design phase. In a post-disaster reconstruction process, there is a time delay that is inherent to the emergency. The short, medium, and long-term care planning stages are according to the need for action. This means the multi-scale vision is

constant; therefore, the reconstruction project cannot be considered static and relegated to a single object or element. Because of the inherent properties of reconstruction process times, pre-design is a constant even during the construction of one or more architectural elements, necessitating a multi-scale vision.

Consequently, pre-design can be defined as a meaningful relationship between the status quo and what will be. The “what” is described as a ‘what’ that is the observed reality, like the tectonics (Campo Baeza, 2016) in Chamanga, and a ‘what’ that is what needs to be done. The discussion should focus on the ‘how’: how to be objective and manage the balance? How to put complacency aside (especially in extreme post-disaster situations)?

The ‘how’ is central in a changing world in which timing depends on each reality. Some realities can wait and speculate on answers, while others cannot. So, the ‘how’ in pre-design is also experimentation, which includes the possibility of error. If the facts can be shaped by flexibility, everything is fine. In this way, the decision-making process can always be relative.

Results: Pre-Design and Research

So far, we have observed how the experience of Chamanga corroborates that pre-design is a part or phase of research-by-design, understanding the project or design process as a research process.

The case of the post-disaster context analyzed here requires a continuous processual approach. The constancy of observation and projection work establishes development criteria that must be evidenced in concrete actions to avoid error in highly vulnerable situations. In this sense, it is also essential to focus on the dynamic processes of the events to frame the risk/disaster from a processual and non-eventual perspective.

“Recognizing the disaster phenomenon as a process rather than an event allows us to assimilate the idea that we live with uncertainty. We are at risk every day, from the simple fact of a domestic accident to the terrible event of a probable meteorite impact on Earth. Processes build up over time and are catalyzed or slowed down by the daily accumulation of events. The interdependence of all phenomena in nature, however insignificant they may seem, is what weaves the behavior of systems over time and constitutes their dynamics” (González Mora, 2008).

Let’s look at the architectural objects in the post-disaster scenario. In this pre-design phase, fundamental issues such as landscape observation and morpho-typological aspects must be constantly monitored. In Chamanga, this specific work mainly defined the basis for the site’s ‘Territorial Planning and Development Plan’ (PDyOT). We have seen how academic work contributed to the drafting of the document. The PDyOT of San José de Chamanga, drafted in 2016 and valid until 2025, is the instrument resulting from the collaboration between the decentralized autonomous government of Chamanga, the decentralized independent government of Pichincha, the consortium of provincial governments of Ecuador, the UTE university, the Puce university, the decentralized autonomous government of Esmeraldas, the decentralized independent government of the Ministry of Economic and Social Inclusion, the Ministry of Urban Development and Housing, the Public Housing Company, the Ecuadorian Red Cross, and other institutions and NGOs. The document consists of four sections: the characterization of the parish, the main contents of the development and territorial planning plan (biophysical, risk, socio-cultural, economic-productive, human settlements, mobility, energy and connectivity, institutional policy, and citizen participation), the urban territorial model and the management model.

In addition to the collaboration and drafting of the PDyOT, the constant monitoring also served to constantly educate the inhabitants about the risks of self-construction without technical or ancestral knowledge. Both issues were fundamental to promoting territorial development on the part of governmental bodies. In this sense, the collaboration with the academic sphere was decisive in the results: leading the pre-design phase in a post-disaster context resulted in several advantages.

Regarding the observation of the landscape, a dynamic and flexible phase within the pre-design process, the experience of the earthquake made it possible to define two variants: the consecutive and the subsequent (Rocchio and Moya, 2017). The evident temporal issues and the social and spatial scenarios describe both landscapes. However, beyond definitions, showing the reality of the landscape (urban, natural, social, etc.), signifying it in temporal terms highlights how pre-design is ongoing research.

Furthermore, morpho-typological studies are recognized as a fundamental tool in urban analysis, mainly in Western educational contexts. This study assumes

relevance in the post-catastrophe scenario, and especially in contexts with high levels of built spontaneity, if it is carried out from a perspective of continuity or discontinuity with the pre-event, with that which precedes. It can be noted how time continues to be a determining factor in the observation process and how pre-design is a phase in constant development.

The morpho-typological study of a post-disaster scenario is a study of the continuity/discontinuity of the context. It is necessary to observe what remains in permanence and what is destroyed (by the event's effect or subsequent decision), what is realized spontaneously through bottom-up processes, and what is realized with top-down decisions or attitudes (Porreca and Rocchio, 2018). Consequently, the study goes beyond a spatial question and relates to the social context. Therefore, pre-design also encompasses the study of the self in the multi-scalar architectural context.

Since the observation of context occurs in changing reality, it is necessary to use methods that guarantee information and provide the appropriate data as they are produced. Therefore, in Chamanga, the fieldwork was carried out with drones, making it possible to compile visual documentation of primary relevance. Walks, interviews, and close observation were also used and were fundamental to documenting the work, but the technology was essential to obtain the necessary data.

At a macro scale, drones may be considered opportunities for a spatial rebalancing (at local, urban, and regional scales) by making single places (which are network nodes) equipotential, independently of their practical spatial location. Furthermore, the in-process manual is based right on the drone information and allows interpret both the building environment and specific landscape with its natural resources; moreover, it complements the basic information with the data provided by the manual survey in the indicators not covered by the drone. (Porreca et al., 2019, p. 627)

Therefore, fieldwork is once again a fundamental aspect of the pre-design phase, including all types of data collection techniques, both traditional and the most technological and innovative. In this case, the drones made it possible to gather accurate information quickly, which could mean improving or even saving lives in an emergency.

All these considerations result from observational work defining analytical-legal frameworks in the PD-yOT that are still in force today. At the same time, they are part of an investigative vision that serves as a basis

for micro- and macro-scale individual and governmental projects. The numerous meetings with the community and governmental bodies allowed for a direct dialogue with academia, which also obtained an enormous benefit: providing practical training to its students in pre-design issues in a post-catastrophe situation. In Chamanga, the university did not build something physical: instead, it created and transferred knowledge by contributing to the planning process (embodiment in design and post-design) through observation.

Conclusions

The experience in Chamanga is particular to the pre-design phase of a research-by-design process. Still, it also allows us to introduce new categorizations derived from the actions carried out.

Firstly, it is essential to highlight the suitability of a pre-design approach in a post-disaster context as a fundamental stage of a project's process. In Chamanga, the pre-design phase was somewhat independent of the subsequent steps because it was the stage at which data was collected and the context was analyzed in the first instance without the entire project being commissioned. Pre-design is a kind of preliminary study over which others will develop other projects at a later date. In this sense, pre-design lays the foundations of knowledge that will be used and will grow in the hands of others.

Because of its particularly open character, pre-design in Chamanga is defined as a continuous, reiterative, consequential, and structured process identified as "research through design." This process involves observation and planning, and its multifaceted temporal character allows us to reflect on the initial identification of the limits between the phases. Here, the Roggema's scheme has evolved and cannot be rigid anymore in saying what it is (the analysis, the existing), determining what could be (the project, the ideal) and becoming what will be (the synthesis, the reality) (see Figure 5).

Time is crucial in observation since the environment changes rapidly and constantly in a post-disaster context. Consequently, data collection becomes a diary in which all actions and modifications must be recorded. Time is also embedded in the planning process, as it will contain the past and traditions and aspire to a better time in the future.

**RESEARCH BY DESIGN IN
POST-CATASTROPHE PROCESS**

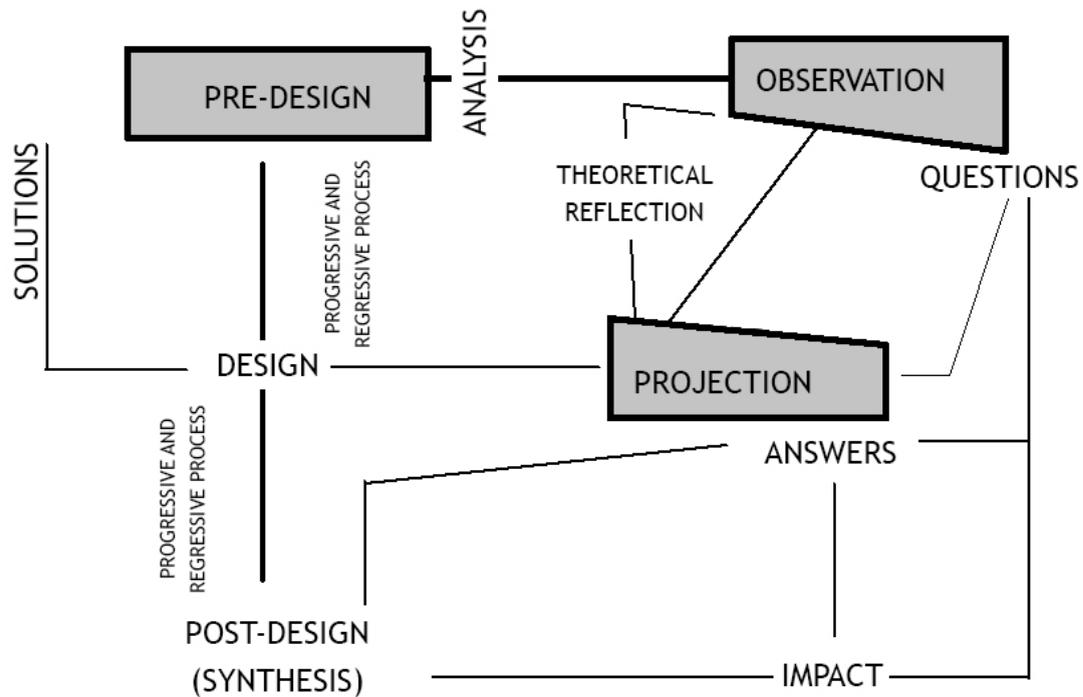


Figure 5. Reflecting on the "Combined approaches of Research by Design of Rob Roggema, in *Research by Design: Proposition for a Methodological Approach*"

Source: The authors.

Thus, the analysis that the pre-design develops is determined by the interpretation and quality of the data. The subsequent project will always be indebted to the previous stage. In this case, the perspective of the academic collaboration that initiates the project process confirms the plurality of authorship and the ethical-professional character of an approach to a built environment that needs to solve pressing problems.

Finally, the validity of the results –as in any evaluation of research-by-design methodologies– is not based on single parameters or linear visions. The impact of the research does not lie in a given output –a document, an urban planning intervention, an architectural object– but rather in consideration of the potentiality of the whole. Open design processes deal with “wicked problems” and undefined outcomes and lead to innovation by identifying gaps and collecting context-specific practices. In this sense, the case analyzed here stands halfway between academic

research and professional practice and will have served to find explorative strategies for intervention and to facilitate policy development for the administration. In this sense alone, the methodology employed has already proven valuable, as it has been able to be applied in particular and determined contexts while still being recognized as a processual tool.

References

- ARCHER, B. (1995).** The Nature of Research. *Co-Design, Interdisciplinary Journal of Design, January 1995*, 6–13. <https://ia800201.us.archive.org/21/items/TheNatureOfResearch/Archer1995Codesign.pdf>
- CAMPO BAEZA, A. (1996).** Caja, cajitas, cajones. Sobre lo estereotómico y lo tectónico. In *La Idea Construida* (pp. 34–39). General de Ediciones de Arquitectura.
- EUROPEAN ASSOCIATION FOR ARCHITECTURAL EDUCATION EAAE. (2012).** Charter on Architectural Research. EAAE. <https://www.eaae.be/about/statutes-and-policypapers/eaae-charter-architectural-research/>
- FOQUÉ, R. (2011, JUNE 1).** *Building Knowledge by Design. 4th International Meeting on Architectural and Urbanism Research, Valencia, Spain.* https://riunet.upv.es/bitstream/handle/10251/15030/FOQUE%20R_Building%20Knowledge%20by%20Design.pdf?sequence=1
- FRAYLING, C. (1993).** Research in Art and Design. *Royal College of Art Research Papers* 1(1), 1-5. https://researchonline.rca.ac.uk/384/3/frayling_research_in_art_and_design_1993.pdf
- GEHL, J. (2012).** *Vita in Città*. Maggioli Editore.
- GONZÁLEZ MORA, A. (2008).** El fenómeno de los desastres. Perspectiva transdisciplinar con el enfoque de los Sistemas Complejos. *Humanidades Médicas*, 8(1). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1727-81202008000100008
- HAUBERG, J. (2011).** Research by Design - a research strategy. *AE... Revista Lusófona de Arquitectura e Educacao*, (5), 46-56. <https://adk.elsevierpure.com/en/publications/research-by-design-a-research-strategy>
- JUSSELME, T., COZZA, S., HOXHA, E., BRAMBILLA, A., EVEQUOZ, E., LALANNE, D., REY, E., AND ANDERSEN, M. (2016, JULY 11).** *Towards a Pre-Design Method for Low Carbon Architectural Strategies*. PLEA2016 conference, Los Angeles, USA. <https://infoscience.epfl.ch/record/214876>
- NIGTEN, A. (2014).** The Design Process of an Urban Experience. In N. Streitz and P. Markopoulos. (Eds.) *DAPI 2014: Distributed, Ambient, and Pervasive Interactions* (pp. 575-582). Springer International Publishing. https://doi.org/10.1007/978-3-319-07788-8_53
- PLAN DE DESARROLLO Y ORDENAMIENTO TERRITORIAL 2016-2025 (2016).** *Gobierno Autónomo descentralizado de la parroquia de San José de Chamanga*. <https://www.prefecturaeesmeraldas.gov.ec/web/assets/pdot-san-jose-de-chamanga.pdf>
- PORRECA, R. AND ROCCHIO, D. (2018).** Factores de (dis)continuidad morfológica en la reconstrucción post-catastrofe a San José de Chamanga. *Urbanistica Informazione* (special issue), 247–251.
- PORRECA, R., GEROPANTA, V., BARBERÁ, R.M., AND ROCCHIO, D. (2019).** Remote Sensing Drones for Advanced Urban Regeneration Strategies. The Case of San José de Chamanga in Ecuador. In P. Vasant, I. Zelinka, and G.W. Weber (Eds). *Intelligent Computing and Optimization. ICO 2019. Advances in Intelligent Systems and Computing* (vol 1072). Springer. https://doi.org/10.1007/978-3-030-33585-4_60
- ROCCHIO, D. AND MOYA, R. (2017).** Del objeto al proceso: el paisaje de la reconstrucción post-catastrofe. *Eídos. Revista científica en arquitectura y urbanismo*, (10), 1–18. <https://revistas.ute.edu.ec/index.php/eidos/article/view/342>
- ROGGEMA, R. (2016).** Research by Design: Proposition for a Methodological Approach. *Urban Science*, 1(1), 2–19. <https://www.mdpi.com/2413-8851/1/1/2>
- TILL, J. (2007).** What is architectural research? Architectural Research: Three Myths and One Model. *Building Material*, (17), 4-10. https://jeremytill.s3.amazonaws.com/uploads/post/attachment/34/2007_Three_Myths_and_One_Model.pdf