

Multispecies architecture and systemic complexity: towards a relational model of habitat in the transition from the Anthropocene to the Symbiocene

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Abstract: Contemporary architecture faces an epistemological crisis stemming from the anthropocentric paradigm, which has privileged the human being as the sole actor in design, excluding the complexity of socio-ecological relationships. In a context of environmental crisis, accelerated urbanization, and the transformation of ways of living, the need to integrate multispecies cohabitation, particularly between humans and animals, as a constitutive part of the habitat emerges. The central problem lies in the absence of theoretical and methodological frameworks that allow for the incorporation of this systemic complexity into architectural design.

The objective of this work is to propose a multispecies architectural approach based on systemic complexity, enabling a transition from the Anthropocene to the Symbiocene through the integration of interspecies relationships in the design process. The research adopts a qualitative, systemic-relational methodology, structured around the identification of the multispecies user, the analysis of their interactions, the definition of interdependent needs, and their translation into design variables and strategies, culminating in the construction of a systemic graphic model.

The results show that habitat is not a product of design, but rather an emergent property arising from networks of relationships between society, space, practices, and multispecies agents. The developed model allows us to understand architectural design as a relational, adaptive, and nonlinear process, where architecture acts as a mediator of interactions and not as a dominant entity. It is concluded that systems thinking is a fundamental tool for reconfiguring architectural design toward more inclusive, resilient models that are coherent with the Symbiocene paradigm.

Keywords: Multispecies architecture - complex systems - Anthropocene-Symbiocene - socio-ecological cohabitation - Architectural Design

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Introduction

In the contemporary context, the global socio-ecological crisis has overwhelmed the traditional frameworks from which architecture has conceived, produced, and managed space. Climate change, the accelerated loss of biodiversity, the fragmentation of ecosystems, and the growing instability of urban systems not only highlight an environmental problem but also a structural crisis in the thinking that has underpinned the discipline. In this sense, the Anthropocene should not be understood solely as a geological era but as the material expression of an epistemological paradigm that has placed humankind at the center and as the measure of all things, legitimizing the appropriation, transformation, and control of the natural environment.

Under this logic, architecture has historically operated as a device for organizing territory, exclusively serving human needs and reducing other forms of life to decorative, functional, or dispensable elements. This situation has led to the consolidation of urban and architectural models that fragment ecological systems, disrupt biological flows, and systematically exclude the non-human from the design process. However, this vision is becoming increasingly unsustainable in the face of the complexity of contemporary systems, where the social, ecological, and technological dimensions are deeply intertwined.

Contemporary architecture faces the challenge of responding not only to new ways of inhabiting the world for human beings, but also to the non-human ways of inhabiting it that coexist with them. Over time, the human capacity to relate to and create bonds with non-human intelligences has transformed how we inhabit spaces, generating physical and social changes in our environment that allow us to create symbiosis with everything non-human that surrounds us and generate mutual benefit with these non-human intelligences with which we coexist. In turn, these transformations of space and its adaptability to changes in the way humans inhabit it allow for continued changes in the habitat in a cycle that does not stop, but is constantly evolving as a living system.

In this sense, contemporary architecture has begun to decentralize the human being as the sole actor and beneficiary of the discipline, providing conditions for symbiosis and cohabitation among different species. It is through this multispecies habitability that the paradigmatic transition from the Anthropocene to the Symbiocene is introduced into contemporary habitats, through architecture conceived as a complex adaptive system capable of reconfiguring the relationships between the human and the non-human based on logics of cooperation, cohabitation, and coevolution. This is achieved through a living, open, adaptive, and relational architectural system that can articulate flows of energy, matter, information, and life.

The architectural design process has been considered an exercise in formal, functional, and technical synthesis to solve problems posed in different scenarios, both in academia and in the real world. However, contemporary phenomena such as climate change, social fragmentation, heritage degradation, and unprecedented urban sprawl demand new visions, perspectives, and ways of thinking, teaching, and designing. Under this principle, systems thinking emerges as an epistemological and methodological tool that allows us to rethink the complexity of urban and architectural phenomena through a lens of relationships that form a conceptual framework for addressing ways of inhabiting the world.

In this context, the need arises to radically rethink the foundations of architecture and design, moving toward approaches that recognize the interdependence between species and ecological systems. The concept of the Symbiocene, proposed as an alternative to the Anthropocene, suggests a paradigm shift toward relationships of coevolution, mutualism, and interspecies coexistence. From this perspective, architecture ceases to be a device of territorial domination and becomes an interface for ecological and social mediation through design itself.

From a complexity perspective, architectural spaces are analyzed as nodes within socio-ecological networks where organisms, climates, soils, water, microorganisms, fauna, vegetation, and human cultures interact. This necessitates a transdisciplinary approach that integrates systems theory, ecology, and posthumanist thought, among many other disciplines, to model themselves as autopoietic systems that co-produce habitability conditions for multiple species and allow for the continuity of relationships and kinship between species, transforming urban environments into symbiotic spaces where the human and non-human create networks.

In contrast to this disciplinary persistence of anthropocentrism, everyday reality reveals a significant transformation in ways of inhabiting: the emergence of multispecies configurations as a constitutive part of the social fabric. Cohabitation between humans and other species, particularly companion animals, has ceased to be an incidental phenomenon and has become a structural condition of contemporary life, achieving a majority presence in homes globally. This fact implies not only physical proximity between species, but also the construction of affective, cultural, and symbolic bonds that redefine traditional notions of family, community, and society.

The human-animal relationship, far from being static, is configured as a dynamic process of coevolution in which both parties transform their behaviors, morphologies, and forms of interaction according to their coexistence. This process, historically mediated by domestication, has led to the consolidation of what various theoretical currents call *companion species*, where the human and the non-human mutually constitute each other in a relational framework that transcends the binary categories of nature and culture.

Within this framework, the figure of the *multispecies user* emerges as a key analytical category for understanding the complexity of contemporary habitation. This user cannot be understood as an isolated individual, but rather as a system composed of interspecies relationships, daily practices, affectivities, social networks, and sociotechnical assemblages that configure the inhabited space. Thus, the habitat ceases to be a passive container and becomes both a product and a producer of meanings, practices, and relationships that are dynamically constructed over time.

However, despite the growing evidence of these multispecies configurations, architecture continues to operate under conceptual and normative design models that neither recognize nor integrate this complexity. Urban and architectural spaces continue to be designed from a single-species perspective, generating tensions between the actual practices of cohabitation and the material conditions of the built environment. This disconnect manifests itself in the absence of adequate infrastructure for interspecies coexistence, in the lack of consideration of non-human needs in design, and in the persistence of regulations that conceive of animals as objects or extensions of humans, rather than as social actors.

This gap between reality and project design reveals a central problem: architecture lacks the theoretical, methodological, and design tools to address the systemic complexity of multispecies cohabitation. Consequently, the discipline faces a double challenge: on the one hand, to overcome the anthropocentric paradigm that has historically guided its development; On the one hand, it seeks to construct new frameworks of thought that allow for the integration of non-human elements as active participants in the configuration and design of space. On the other hand, it seeks to build new frameworks of thought that allow for the integration of non-human elements as active participants in the configuration and design of space.

Therefore, the concept of the Symbiocene emerges as a paradigmatic alternative that proposes a reconfiguration of interspecies relationships based on coevolution, interdependence, and mutual benefit. Unlike the Anthropocene, the Symbiocene does not merely describe a condition, but rather proposes an ethical and operational horizon oriented toward the construction of balanced socio-ecological systems.

From this perspective, multispecies architecture positions itself as an emerging field capable of articulating these transformations, proposing a design practice that not only incorporates the non-human but also recognizes its agency in the production of space. This implies understanding architecture as a mediating interface between biological and social systems, capable of generating conditions for coexistence, adaptation, and resilience.

In short, contemporary architecture continues to operate, to a large extent, under linear models of space production and consumption that ignore the complexity of socio-ecological systems. This condition manifests itself in the fragmentation of habitats and the loss of biodiversity resulting from extensive urbanization, the disconnection between urban infrastructure and ecological processes, the reduction of nature to an ornamental or residual element within architectural design, and the lack of integration of scales (from the micro-biotic to the territorial) in design decision-making. The central problem lies in the discipline's inability to incorporate a systemic and multispecies vision that allows it to respond to the complexity of the contemporary environment. In this sense, the question has been raised: How can architecture integrate principles of systemic complexity and multi-species cohabitation to move from the anthropocentric paradigm towards the Symbiocene?

From the Anthropocene to the Symbiocene: paradigm shift

The concept of the Anthropocene has allowed us to recognize that human activity has reached a geological scale, irreversibly altering planetary systems. However, beyond its descriptive utility, this term reveals a profound epistemological crisis: the persistence of a civilizational model based on the separation between nature and culture, where human-kind positions itself as the dominant agent of the Earth system. In the field of architecture, this condition translates into a design practice focused on efficiency, environmental control, and the optimization of resources for human well-being, without considering the ecological interdependencies that sustain life.

Several studies have indicated that the Anthropocene requires a reformulation of the relationships between nature, technology, and culture within the built environment, proposing adaptive architectures capable of responding to changing environmental conditions (Januszkiewicz *et al.*, 2021). However, these approaches, although relevant, continue to operate in many cases within an expanded anthropocentric framework, where the inclusion of nature responds mainly to the mitigation of impacts or the improvement of human comfort.

In contrast, the Symbiocene emerges as a proposal that transcends this logic, suggesting a radical reorganization of interspecies relationships based on coevolution, mutuality, and interdependence. This paradigm does not simply seek to reduce human impact, but rather to reconfigure the dynamics of coexistence toward systems where multiple life forms can thrive together.

From this perspective, architecture ceases to be an instrument of domination and becomes a practice of ecological mediation. This implies recognizing that design can no longer operate under an extractive logic, but must instead integrate into broader ecological processes, fostering the regeneration and resilience of socio-ecological systems.

The transition from the Anthropocene to the Symbiocene, therefore, is not merely a conceptual shift, but an ontological and operational transformation that redefines the very foundations of the architectural discipline. In this sense, the incorporation of multispecies approaches should not be understood as an emerging trend, but as a structural necessity for addressing contemporary challenges.

Having said that, Grobman *et al.* (2023) analyze multispecies design as an emerging paradigm, pointing out the inadequacy of the anthropocentric approach and proposing the integration of ecological knowledge into the architectural process. This work demonstrates the symbiosis or systemic articulation between buildings and the conditions of multispecies coexistence through negative or positive valuations that influence coexistence between the two.

However, understanding symbiotic relationships in architecture cannot be limited solely to interactions with fauna or animal species, as has commonly been the case in multispecies cohabitation studies. Therefore, it is necessary to broaden this perspective toward a truly systemic vision that incorporates other living organisms, particularly plants, as fundamental agents in habitat configuration. In this sense, as Grobman *et al.* (2023) point out, multispecies design must transcend an approach focused on charismatic species or those closely related to humans, to integrate broader ecological networks where flora plays a structural role in life support processes, environmental regulation, and the construction of habitable environments.

From this perspective, plants should not be understood as passive or decorative elements within the architectural project, but rather as active organisms that participate in dynamics of energy, water, and atmospheric exchange, contributing to the generation of microclimates, carbon sequestration, thermal regulation, and the provision of habitats for other species. Thus, architecture, in the transition from the Anthropocene to the Symbiocene, requires incorporating an expanded interspecies vision that recognizes the interdependence between humans, fauna and flora as part of the same socio-ecological system.

In this broadening of the multispecies approach toward a more holistic understanding of living systems, the work of Bijari *et al.* (2025) is particularly relevant, proposing an interpretation of architecture from the perspective of adaptive systems inspired by plant organisms. Unlike approaches that understand nature as a formal reference, Bijari *et al.* (2025) argue that plants operate as highly efficient systems of continuous adaptation, capable of responding dynamically to environmental variations through processes of growth, self-regulation, and resource optimization. This allows us to rethink architecture not as a static object, but as an open system that exchanges matter, energy, and information with its environment, adjusting its behavior according to changing conditions.

From this perspective, the incorporation of plant principles into architectural design implies not only biological integration, but also an epistemological transformation in how design is conceived within the project. Plants, as decentralized and resilient systems, offer organizational models that challenge the rigid hierarchies of traditional design, proposing instead flexible, redundant, and adaptive structures. Within the framework of the Symbiocene, this approach allows us to think of architecture as a living assemblage, where humans, flora, and fauna co-participate in co-evolutionary processes, generating habitats capable of sustaining life at multiple scales and responding sensitively to the complexity of the socio-ecological environment.

Continuing with this understanding of architecture as an adaptive system, the work of Rabi & Sawalmeh (2025) provides an integrative framework that links sustainability, technology, and well-being within a broader relational logic. Their approach suggests that the built environment should not be conceived solely as a functional container, but as a dynamic system capable of responding simultaneously to environmental, social, and cultural variables. This vision reinforces the need to abandon linear design models in favor of approaches that recognize the constant interaction between multiple factors, where architectural performance emerges from the system's capacity to adapt and evolve in changing contexts.

In this sense, Rabi & Sawalmeh's (2025) contribution expands the multispecies approach to an operational dimension, where the integration of technologies, green infrastructure, and context-sensitive design strategies enables the construction of more resilient and inclusive environments. Under the Symbiocene paradigm, this approach takes on particular relevance, as it raises the possibility of articulating architectural systems that not only optimize human well-being but also integrate the needs of multiple species within a single socio-ecological framework. Thus, architecture is configured as a mediating platform capable of balancing energy flows, biological dynamics, and social practices, advancing toward habitability models that respond to the inherent complexity of contemporary living.

To achieve the separation of the Anthropocene, some examples are considered that have shown that architectural design intended for diverse ecosystems must start from a multi-species method that is based on the principle of *Nature Placemaking*, which

reconoce las configuraciones espaciales y las interacciones entre humanos y la naturaleza. Su objetivo es mantener el equilibrio ecológico entre el hábitat humano y más que humano. Esto implica una dinámica en la que los organismos vivos o diversidad biológica, (...), participan en un sistema biótico equilibrado con

beneficios mutuos [It recognizes spatial configurations and interactions between humans and nature. Its goal is to maintain ecological balance between human and non-human habitats. This involves a dynamic in which living organisms, or biological diversity,(...) participate in a balanced biotic system with mutual benefits] (Benjumea Mejía, 2025, p. 122).

The concept of the multi-species method applied to architectural design is

una mirada desde lo posthumano, en donde el cuerpo deja de reconocerse como un sistema cerrado de límites impenetrables, y pasa a ser parte de un sistema simpoiético de relaciones que trasgreden la separación entre lo orgánico y lo artificial, lo humano y lo no humano, lo creado y lo dado, la naturaleza y la cultura, abre nuevas posibilidades de pensar la urbanidad [A posthuman perspective, where the body ceases to be recognized as a closed system with impenetrable boundaries, and becomes part of a symbiotic system of relationships that transgress the separation between the organic and the artificial, the human and the non-human, the created and the given, nature and culture, opens new possibilities for thinking about urbanity] (Del Campo Valenzuela, 2022, p. 12).

From a complex systems perspective, the transition is proposed from a hierarchical, anthropocentric paradigm to a nonlinear socioecological model, in which interactions between species are configured as adaptive networks capable of promoting ecosystem regeneration processes in contexts of high ecological entropy. Within this framework, habitat production ceases to be exclusively human and is conceived as a multispecies assemblage where flows of matter, energy, and information co-evolve. Thus, the concept of multispecies, originating in academia, is understood as an expanded relational system that integrates human and non-human agents, implying an epistemological break with the traditional dichotomies between nature, society, and culture, and proposing a hybrid ontology based on interdependencies and emergent dynamics (Smart, 2014), and whose main premise is that species or living entities are not considered as individuals but as multiplicities that associate and interact in a given space (Van Dooren, Kirksey, & Münster, 2016).

Betting on multispecies requires polycentric strategies that promote, in practice, networks of relationships as a *species* “no sea como una categoría cerrada o acabada, ni necesariamente afin al campo de la biología, sino como un punto de partida que advierte sobre la multiplicidad de seres en relaciones de extraña cooperación y coordinaciones espacio-temporales” [not as a closed or finished category, nor necessarily related to the field of biology, but as a starting point that warns about the multiplicity of beings in relationships of strange cooperation and spatio-temporal coordinations] (Vargas García & Varela Trej, 2024, p. 161), therefore, one of the niches that articulates this relational structure is reflected in architecture.

In short, the incorporation of adaptive, multispecies, and relational approaches in architecture demonstrates the exhaustion of the anthropocentric paradigm as the guiding framework for habitat design. The growing inability of this model to respond to contemporary socio-ecological complexity compels a rethinking of the discipline from a perspective

that recognizes the interdependence between humans, flora, fauna, and environmental systems. In this transition, the Symbiocene is positioned not only as an ethical aspiration but also as an operational necessity that demands the reconfiguration of architecture as a mediator of co-evolutionary processes, rather than as an instrument of territorial domination. Under this premise, it is essential to incorporate theoretical frameworks that allow us to understand and work with this complexity, which necessarily leads to the approach of systemic complexity and socio-ecological assemblages, from which habitat can be understood as a dynamic, adaptive, and relational system in constant transformation.

Systemic complexity and socio-ecological assemblages

Systemic complexity theory offers a fundamental and necessary framework for understanding contemporary habitat dynamics. Unlike traditional linear models, complex systems are characterized by the interaction of multiple heterogeneous components, whose behaviors generate emergent properties that cannot be reduced to their individual parts. In the urban context, this implies recognizing that the city, and its architecture, is not a static object, but an adaptive system where social, ecological, technological, and cultural factors interact. From this perspective, multispecies habitats can be understood as a socio-ecological assemblage in which humans and non-humans co-configure space through dynamic and non-linear relationships, structuring a series of relationships necessary for cohabitation.

From this point, understanding systemic complexity in architecture requires focusing on the concrete interactions between humans and animal species, particularly those that cohabit directly in urban environments, such as companion animals and urban wildlife. These relationships cannot be understood as isolated links, but rather as part of complex networks involving social practices, regulations, infrastructure, and spatial dynamics that collectively shape the habitat. In this sense, animals cease to be external elements of the architectural system and become actors that actively influence the organization of space. From this perspective, the multispecies socio-ecological assemblage manifests itself in the way that everyday practices of care, mobility, recreation, and coexistence between humans and animals reconfigure built environments. Spaces such as homes, parks, streets, and urban amenities are constantly adapted, formally or informally, to respond to these interactions, demonstrating that design is not a closed process, but rather a condition in permanent transformation involving multiple agents. Thus, the presence of animals introduces dynamic variables that affect spatial configuration, land use, and social relations.

Likewise, the inclusion of animals as part of the urban system makes visible new forms of complexity related to space management, regulatory frameworks, and the construction of specific infrastructure. The need to integrate areas for transit, rest, socialization, and care for companion animals reveals the emergence of new spatial typologies and configurations that respond to this cohabitation. These transformations not only respond to functional demands but also reflect cultural shifts in how society recognizes animals as part of its social fabric.

In this context, systemic complexity not only allows us to understand these dynamics but also offers tools for designing spaces capable of adapting to them. By recognizing animals as a constitutive part of the system, architecture can move towards more inclusive and relational models, where design considers multiple scales of interaction and allows for the coexistence of diverse life forms within the same environment. In this way, the socio-ecological assemblage is consolidated as an operational category that articulates the relationship between humans and animals in the production of contemporary habitats. Recognizing the systemic complexity involved in the relationship between human beings and other species is the first step towards understanding its impact on current society and the changes this has generated in the design and construction of contemporary cities and new ways of inhabiting them, as well as the future urban and social scenarios that may emerge in relation to the interactions between the human and the non-human. Therefore, systemic complexity is consolidated not only as an analytical framework, but also as a way of making visible the relationships that shape and sustain multispecies cohabitation in contemporary environments. Through this perspective, interactions between humans and animals cease to be understood as isolated or anecdotal relationships, and are instead recognized as part of a dynamic system of interdependencies that structures the habitat. From this viewpoint, multispecies is not a condition added to the design, but an inherent quality of the very organization of space, where multiple agents coexist, interact, and continuously transform the material, social, and symbolic conditions of the built environment. Under this premise, systemic complexity allows us not only to describe these relationships but also to establish the foundations for their operationalization in architecture, paving the way for a deeper understanding of cohabitation as a socio-ecological phenomenon. Thus, the recognition of multi-species assemblages necessarily leads to exploring how these interactions translate into concrete practices of inhabiting, where the human and the non-human jointly configure shared living conditions. Consequently, it is pertinent to orient our analysis toward socio-ecological cohabitation, understood as the space where these systemic relationships materialize, are negotiated, and are projected as a fundamental part of a new paradigm of multi-species habitability.

Symbiotic socio-ecological cohabitation for multi-species relationships

One of the most significant multispecies relationships today is that between humans and sentient beings such as companion animals, primarily dogs. In Mexico, for example, approximately 70% of households include companion animals, of which 54.8% are of the species *Canis lupus familiaris* (INEGI, 2021); in Argentina, it is estimated that 80% of the population lives with pets (Voices; Research & Consultancy, 2023); in the United States, this percentage is 66% (Forbes, 2026), while in a global context it is estimated that more than 65% of the world's population lives with a pet (Avisa, 2016).

Given this reality, the idea is recognized that the cohabitation of human beings with other species is not always an incidental or circumstantial fact, but rather premeditated relationships where the aim is to create a bond and generate interspecies kinship, as is the case

of domestication, which is shown as a gradual and procedural event, rather than a specific event in the history of humanity, Acero Aguilar (2019) argues that from the material and symbolic culture represented by companion animals, as well as from different disciplines such as philosophy, science, and religion, the optimal conditions were established for the human and the non-human to be clearly differentiated, but in turn, these same conditions allowed a reconstruction of these differences through kinship and the continuity of species, thus allowing the non-human to continue its process in the conquest of the human intimate space, and in this way recognizing that the non-human is not the least intelligent, as Vázquez (2026) explains, but what is different is their way of existing, since there are species that, in addition to being socially organized and possessing sophisticated and adaptive cognitive abilities, exhibit planning behaviors, tool use, problem-solving, and cultural transmission.

This idea of the inevitable kinship between the human and the non-human is reinforced through the statements of Serpell (1986) who asserts a predisposition of dogs and cats to live with humans due to a series of biological and behavioral characteristics that facilitate the domestication process and give way to a mutual relationship; This relationship, according to Clutton-Brock (2012) and Irvine (2008), is fostered by the very incorporation of animals into society, involving biological and cultural aspects that are present only when they are incorporated into the social structure of the human group, generating a morphological transformation consequent to said incorporation into human society and thus allowing the adaptation of the animal to the material, aesthetic and ritual purposes of human communities, resulting in a constant evolution of the relationship between humans and domesticated animals that over time have generated an increasingly close familiarity. The familiarity this generates regarding unusual relationships in unexpected collaborations and combinations between the human and the non-human, according to Haraway (2019), who mentions the importance of teaming up to become mutually capable of something new in the world of multispecies relationships, proposing the category of *companion species* that inexorably become-with in a human-animal world where the human and the non-human are beings in common encounters in: the house, the park, the truck, the office, the prison, the village, the human hospital, and more; suggesting that everything exists until it is configured in an intertwined way with the world.

In this sense, the relationship between humans and dogs forms part of the category of *companion species* whose bond goes beyond the gap that exists in the social construction of man and his pet, where humans exert power over animals (Irvine, 2008), generating tangible changes in contemporary society such as the incorporation of laws and regulations that seek order in the adherence of companion animals to society; turning the companion animal into a *social actor* that creates bonds beyond a symbolic connection, weaving networks and creating systems as an assembly of the social and as a member of a society that forms societies (Latour, 2008).

The case of the *multi-species family* is an example of the networks created between companion species that form bonds and become social actors that modify the social fabric through their constant evolution, where there is no fixed rule and where human attitudes towards animals grant them moral status, rationality and the capacity to feel, generating debate in the sense of claiming equality between the place of animals and human beings

in nature, in an anti-anthropocentric fact that calls into question the human-animal distinction that positions man at the center of the universe (Acero Aguilar, 2019), and that lays the foundations of the *multi-species user* as a complex system made up of subsystems that generate kinship and accompany each other in their existence, creating affective bonds, symbolism, culture, economy, politics, ways of inhabiting and social connections configured through time, culture and routine practices between the human being and his companion animal.

The inclusion of non-human intelligences, such as companion animals, in society is not solely driven by affection and the desire for their protection. These practices also create a demand for specialized services and products for animals, intended to improve their quality of life and facilitate their care. This includes veterinary services for pets, which go beyond providing assistance to service or livestock animals. These services are offered in spaces designed with a posthuman vision, where humans and non-humans are expected to coexist harmoniously to create functionality within the space. Thus, through specialized goods and services for a new social actor with a defined role in their care and living, a new normal is established in the practice of coexisting with other species. This normality is widely accepted by society and transforms cultural practices and social networks.

The widespread integration of non-human life into society, politically, economically, socially, and culturally, creates socio-ecological societies that strive for common well-being. These societies are characterized by mutual benefit, not exclusive to humankind, enabling the development of multi-species justice and a shift from the Anthropocene, the paradigm under which society has been built, where humanity is seen as the geological force legitimizing the appropriation and transformation of the natural environment for human development and justifying ecosystem imbalances, to the Symbiocene. This new era proposes a horizon of co-evolution, interdependence, and symbiosis between human and non-human species, creating a harmonious, just, and mutually beneficial environment for all its parts.

From the perspective of living in the symbiocene, understanding the complex relationship between humans and non-humans, such as the interaction with companion animals, brings to the forefront the basic needs of these beings. Through the bond created with them, these needs become needs of human beings themselves, leading them to seek a balance in the habitat for both parties and creating new adjustments in the habitability of spaces. In this context, multispecies socio-ecological cohabitation not only redefines the relationships between humans and animals but also introduces a new way of understanding architectural projects as a system for integrating interdependent needs. Daily practices, affective bonds, and the spatial dynamics derived from this coexistence demonstrate that design can no longer be structured from a fragmented or exclusively human logic, but must instead be organized based on an understanding of complex systems where multiple agents coexist and co-produce the habitat. In this scenario, architecture faces the challenge of translating these relationships into design strategies that allow biological, social, and spatial needs to be articulated within the same operational framework, leading to the formulation of a methodology capable of integrating multi-species systemic complexity as a basis for the conception, structuring, and materialization of the architectural project.

Methodology

A systemic-relational approach, oriented towards understanding and operationalizing the integration of multispecies users in architectural design. This approach stems from the recognition of architecture as a complex system in which multiple human and non-human agents interact, and whose relationships shape the habitat. The first methodological step consists of identifying the multispecies system, understanding the user not as an isolated individual, but as an assemblage composed of humans and animals that cohabit. This system includes variables such as affective bonds, daily practices, biological needs, and spatial dynamics that structure living.

Subsequently, the relationships between humans and animals are analyzed from a systemic perspective, identifying interaction patterns such as care, mobility, recreation, rest, and socialization. These relationships allow us to understand how spatial dynamics are configured and how they influence the organization of the habitat. Based on these relationships, the needs of the multispecies system are established, not as isolated requirements, but as an interdependent set of conditions that include physical, emotional, social, and environmental aspects. This step involves recognizing that human and non-human needs are intertwined and co-defined.

The identified needs are translated into architectural variables, such as spatiality, materiality, connectivity, accessibility, environmental comfort, and space use. This process allows systemic relationships to be transformed into operational design criteria. Based on these variables, design strategies are developed that integrate multispecies users, such as shared spaces, differentiated zones, adaptive pathways, and interaction areas. These strategies aim to address the complexity of the system, enabling the coexistence of multiple ways of inhabiting the space.

The methodological model incorporates a continuous evaluation of the interactions between the various agents, considering the space's capacity to adapt to changes in the system's dynamics. This allows us to understand architecture as an open and evolving process. Finally, the methodology culminates in the construction of a systemic model that integrates the aforementioned elements into a graphic representation. This model allows us to visualize the relationships between users, needs, variables, and strategies, functioning as a tool for multispecies architectural design.

This methodological process not only allows us to structure the design from a systemic perspective, but also makes it possible to comprehensively represent the complexity of multispecies habitation. In this sense, the construction of a systemic diagram or image becomes fundamental, as it synthesizes the relationships between the different components of the system, users, interactions, needs, and strategies, allowing us to visualize architecture not as a finished object, but as a dynamic network of relationships in constant transformation.

Results

The proposed systemic graphic model is configured as an operational mental construct that allows us to understand, from a complex perspective, the relationships that structure the design of multispecies architecture. Rather than representing a static scheme, the diagram functions as a conceptual tool that organizes and makes legible the interactions between the different components of the habitat, facilitating their translation into design criteria. In this sense, the model does not seek to simplify reality, but rather to highlight its relational, dynamic, and emergent character, where architectural design is understood as the result of multiple interdependencies between human and non-human agents.

From this perspective, the diagram allows us to shift our focus from the architectural object to the system of relationships that make it possible. Thus, the habitat ceases to be conceived as a final product and is understood as an emergent condition that is configured from the interaction between society, space, practices, ways of inhabiting, and multispecies relationships. This mental construct makes it possible to identify how these interactions influence design decision-making, showing that design does not only respond to functional human needs, but to a complex framework where social, cultural, biological and ethical dynamics intervene, as shown below..

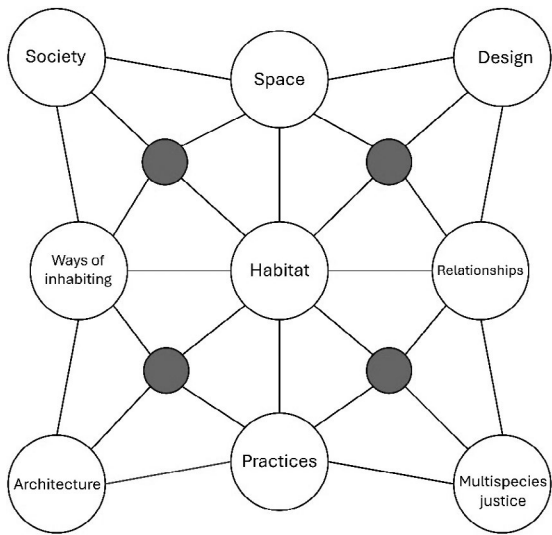


Figure 1. Systemic relationship of multi-species habitation. Source: Own elaboration.

The diagram presented here represents the systemic outcome of multispecies habitation, where the habitat emerges as the central node articulating a network of interdependent relationships. Far from being understood as an isolated entity or as the exclusive product of architectural design, the habitat appears here as a condition constructed from the dynamic

interaction between different components: *society, space, relationships, practices, and ways of inhabiting*, all connected by a network structure that highlights the system's complexity. At the top of the diagram, the nodes of *society, space, and design* form a first layer of habitat structuring, where cultural frameworks, material conditions, and design intentions are articulated. These elements do not operate hierarchically but rather interrelate directly with the habitat, demonstrating that space is not solely the result of design but also of social processes and the system's own dynamics.

In the middle section, the nodes of *ways of inhabiting and relationships* act as mediators between the upper structures and the lower dynamics of the system. These elements represent the experiential dimension of dwelling, where interactions between humans and animals manifest in concrete practices that continually reconfigure the environment. The multiple connections between these nodes reflect the nonlinear nature of the system, where each component influences and is influenced by the others.

At the bottom, the nodes of *architecture, practices, and multispecies justice* highlight the operational and ethical dimensions of the system. Architecture is presented as a component that does not determine the system, but rather integrates with it through its relationship with practices, which act as the mechanism through which the dynamics of dwelling materialize. Multispecies justice, for its part, introduces a normative and ethical dimension that guides the system's relationships toward more equitable forms of coexistence between humans and animals.

A key element of the diagram is the *intermediate nodes (represented in green)*, which function as systemic interfaces where different dimensions of the system converge. These points represent spaces of multispecies interaction, where processes of adaptation, negotiation, and cohabitation occur. Their strategic position between the main nodes indicates that dwelling does not occur at the extremes of the system, but rather in these areas of intersection where relationships are articulated and which, at some point, may potentially unite other systems of cohabitation in an emergent manner.

Taken together, the diagram's structure reveals that dwelling is a *networked, relational, and emergent phenomenon*, where no element operates in isolation. Each node is part of a larger system in which relationships are as important as the components themselves. This allows us to understand that architectural design, within this framework, cannot be reduced to the configuration of objects, but must instead be oriented toward facilitating and articulating these complex relationships.

Finally, the diagram synthesizes a central idea: the multispecies habitat is the result of a constantly transforming system, where humans and animals co-construct space through practices, relationships, and social structures. In this way, the image not only represents the system, but also becomes a conceptual tool that allows us to visualize how dwelling arises from complexity, opening the possibility of developing more integrative, adaptive, and coherent architectures aligned with a socio-ecological vision of space.

This implies recognizing that the mental structure of the system and the understanding of its relationships are part of the configuration of spaces, since "el diseño es un fenómeno emergente que puede manifestarse en sistemas no humanos, siempre que exista una interacción adaptativa con el entorno" [design is an emergent phenomenon that can manifest itself in non-human systems, provided there is an adaptive interaction with the environ-

ment] (Vázquez Rodríguez, 2026, p. 47). This helps to integrate the habitat as an emergent system, whose model allows us to recognize that the habitat is not a predetermined result of design, but rather a systemic emergence that arises from the constant interaction between multiple variables. Its central position in the diagram reflects its integrative character, where material, social, and symbolic dimensions converge.

Conclusion

Aimed at a systemic approach to multispecies architectural design, the developed graphic model suggests that contemporary living, particularly in multispecies contexts, cannot be understood through fragmented or linear approaches, but rather through complex relational structures where multiple agents interact simultaneously. In this sense, habitat is configured as a systemic emergence, resulting from the interaction between social, spatial, practical, and relational dimensions, where the presence of non-human animals is not an accessory element, but rather a constitutive one. This condition compels a rethinking of the foundations upon which architectural design has historically been conceived.

The changes in the ways of inhabiting spaces, given by this cohabitation between the human and the non-human, as is the case of cohabitation with companion animals, are determined in turn by the habitat itself, which becomes both product and producer of meanings in an interrelation between concept and practice. Its construction lies in the actions of the inhabitants in the space, transforming the ways of inhabiting, the territories, and the identity of the inhabitants and the spaces into phenomena that manifest and materialize through practices and about which there is knowledge and recognition on the part of those who inhabit it, transforming the habitat into an instrument for the continuation or interruption of practices that integrate the non-human into society, since not only do realities determine concepts, but concepts themselves are also capable of determining reality (Arboleda Guzmán, 2007).

Analysis of the diagram reveals that relationships, not objects, constitute the fundamental unit of the system. Multispecies architecture is based on networks of interaction where practices such as care, mobility, coexistence, and the appropriation of space generate constant transformations in the habitat. These relationships not only organize space but also produce ways of inhabiting that are dynamically configured over time, reinforcing the need to understand design from a relational perspective, rather than exclusively a formal or functional one.

In this context, intermediate nodes or systemic interfaces acquire a strategic role, as they represent the points where interactions between humans, animals, and the built environment materialize. These meeting spaces demonstrate that inhabiting occurs at the intersection of multiple dimensions, implying that architectural design should focus on facilitating these relationships, rather than imposing rigid spatial configurations. Thus, the architectural project shifts toward creating conditions that enable interaction and adaptation.

Within this model, architecture ceases to be a centralizing element and becomes a mediator within the system. Its function is not to determine the habitat, but to articulate the relationships that constitute it, integrating social, biological, and spatial variables within a single operational framework. This shift redefines the role of the architect, who moves from being a generator of forms to a facilitator of complex systems, capable of interpreting and translating multispecies dynamics into design strategies.

Architecture that decentralizes the human being as the sole actor and manager of the discipline possesses the capacity to act as a mediator between biological and social processes, creating cohesion and balance between the human and non-human worlds that inevitably coexist; and it is capable of proposing an ecological restoration integrated into the urban fabric. Likewise, the incorporation of multispecies justice as a structural component of the system introduces an ethical dimension that transforms traditional design criteria. The well-being of animals and their recognition as social actors implies that the architectural project must consider multiple life forms in decision-making, broadening the concept of user and questioning the anthropocentric hierarchies that have dominated the discipline. From this perspective, architectural design is configured as an open, adaptive, and evolutionary process, where everyday practices play a fundamental role in the transformation of space. Habitat is no longer understood as a final result, but as a condition in constant construction, where multispecies relationships continually reconfigure spatial dynamics. This implies that design must incorporate mechanisms of flexibility and adaptability that allow it to respond to the variability of the system.

Consequently, the need for relational structures becomes an operational principle for contemporary architecture. Design must be organized around systems of relationships that integrate multiple scales and agents, allowing for the coexistence of diverse ways of inhabiting the same environment. This approach not only expands the disciplinary field but also offers tools to address current socio-ecological challenges from a more inclusive and complex perspective.

Finally, this work opens lines of research focused on developing design methodologies based on systems thinking, the modeling of multi-species assemblages, and the integration of relational variables into the design process. These lines of research allow us to move toward an architecture that not only responds to human needs but is also capable of operating within complex socio-ecological systems, contributing to the construction of more resilient, equitable habitats that are consistent with the Symbiocene paradigm.

References

- Acero Aguilar, M. (octubre-diciembre de 2019). Esa relación tan especial con los perros y con los gatos: la familia multiespecie y sus metáforas. *Tabula Rasa*(32), 157-179. doi:<https://doi.org/10.25058/20112742.n32.08>
- Arboleda Guzmán, E. (2007). La frontera borrosa en la construcción conceptual y fáctica del habitar: relaciones centro y periferia, caso sector San Lorenzo, Medellín. Medellín, Colombia. Obtenido de <https://repositorio.unal.edu.co/handle/unal/6960>

- Avisa. (junio de 2016). *mira cuales son los paises con más mascotas en el mundo*. Obtenido de avisavenezuela.org: <https://avisavenezuela.org/mira-cuales-son-los-paises-con-mas-mascotas-en-el-mundo/#:~:text=La%20agencia%20GFK%20asegura%20a%20trav%C3%A9s%20de,cuartas%20partes%20de%20la%20poblaci%C3%B3n%20poseen%20mascotas>.
- Benjumea Mejía, D. M. (2025). Agentes y moderadores en espacios verdes urbanos: una visión multispecies. *Revista de Arquitectura (Bogotá)*, 27(1), 107-128. doi:10.14718/RevArq.2025.27.5828
- Bijari, M., Aflaki, A., & Esfandiari, M. (2025). Plants Inspired Biomimetics Architecture in Modern Buildings: A Review of Form, Function and Energy. *biomimetics MDPI*. doi:<https://doi.org/10.3390/biomimetics10020124>
- Clutton-Brock, J. (2012). Animals as domesticates: a world View Through history. *MSU Press*. doi: 10.1179/1461410313Z.00000000048
- Del Campo Valenzuela, R. (2022). *El edificio-ciudad como generador de paisajes posthumanos: refugio multispecie de Quilicura 2072*. doi:<https://doi.org/10.7764/tesisUC/ARQ/65336>
- Delgado-Serrano, M. M., Martínez-Carranza, F.-J., Cruz Piedrahita, C., Mac-Fadden, I., & Rentería Garita, C. (septiembre de 2025). nuevos enfoques teóricos y metodológicos para promover salud y bienestar urbanos inclusivos. El proyecto IN-HABIT. *cuadernos de vivienda y urbanismo*, 18.
- Di Iacovo, F. (6 de junio de 2025). IN-HABIT legacy. *People, places, possibilities; The IN-HABIT legacy*. Córdoba, España.
- Di Iacovo, F., Rovai, M., Marti, C., & Moruzzo, R. (2022). *Inclusive Transformation Plan of Lucca into a Human Smart City*. Pisa .
- Forbes. (marzo de 2026). *estadísticas de propiedad de mascotas*. Obtenido de forbes.com: <https://www.forbes.com/advisor/pet-insurance/pet-ownership-statistics/#:~:text=As%20of%202024%2C%2066%25%20of,a%20part%20of%20their%20family>.
- Grobman, Y. J., Weisser, W., Shwartz, A., Ludwig, F., Kozlovsky, R., Ferdman, A., . . . Windorfer, L. (2023). Architectural Multispecies Building Design: Concepts, Challenges, and Design Process. *Sustainability MPDI*. doi: <https://doi.org/10.3390/su152115480>
- Haraway, D. (2019). *Seguir con el problema; generar parentesco en el Chthuluceno*. Bilbao: consonni.
- INEGI. (14 de DICIEMBRE de 2021). *Sala de prensa*. Recuperado el 28 de Mayo de 2025, de INEGI- EMBIARE: <https://www.inegi.org.mx/app/saladeprensa/noticia/7021>
- IN-HABIT. (2025). *IN-HABIT Lucca results*. Obtenido de IN-HABIT: <https://www.inhabit-h2020.eu/lucca-results/>
- Irvine, L. (2008). *If you tame me: Understanding our connection with animals*. Temple University Press.
- Januszkiewicz, K., Paszkowska-Kaczmarek, N., Aduna Duguma, F., & Kowalski, K. G. (2021). Living in the “Age of Humans”. Envisioning CAD Architecture for the Challenges of the Anthropocene—Energy, Environment, and Well-Being. *Energies MDPI*. doi:<https://doi.org/10.3390/en14196093>
- Latour, B. (2008). *Reensamblar lo social; una introducción a la teoría del actor-red*. Buenos aires, Argentina: Manantial. Obtenido de <https://comycult.wordpress.com/wp-content/uploads/2018/04/latour-bruno-reensamblar-lo-social.pdf>

- Rabi, M., & Sawalmeh, N. (2025). Design-Led Innovation for Sustainable Green Indoor Environmental Quality Management in Residential Buildings. *architecture MDPI*, 5(4). doi: <https://doi.org/10.3390/architecture5040109>
- Serpell, J. (1986). In the company of animals: A study of human animal relationship. New York: Cambridge University Press.
- Smart, A. (2014). *Critical perspectives on multispecies ethnography* (Vol. 34). Canada: University of Calgary. doi:<https://doi.org/10.1177/0308275X13510749>
- Van Dooren, T., Kirksey, E., & Münster, U. (2016). Multispecies Studies: Cultivating Arts of Attentiveness. *Environmental Humanities*, 1-23. doi:<https://doi.org/10.1215/22011919-3527695>
- Vargas García, B., & Varela Trejo, D. A. (2024). Futuros multispecie: un manifiesto desde el Sur ante el Antropoceno capitalista. *Etnográfica*, 28(1), 153-169. Obtenido de <https://www.aacademica.org/aberenice.vg/18>
- Vázquez Rodríguez, G. (enero de 2026). Aprender con otras inteligencias: fundamentos para un diseño desde la complejidad. *Cuadernos del centro de estudios en diseño y comunicación*(293), 29-53. doi:<https://doi.org/10.18682/cdc.vi293.13378>
- Voices; Research & Consultancy. (agosto de 2023). Obtenido de [voicesconsultancy.com](https://www.voicesconsultancy.com): <https://www.voicesconsultancy.com/Prensa/8-de-cada-10-argentinos-vive-con-una-mascota-y-hablan-con-ella>

Resumen: La arquitectura contemporánea enfrenta una crisis epistemológica derivada del paradigma antropocéntrico, que ha privilegiado al ser humano como único actor del diseño, excluyendo la complejidad de las relaciones socioecológicas. En un contexto de crisis ambiental, urbanización acelerada y transformación de las formas de habitar, emerge la necesidad de integrar la cohabitación multispecie, particularmente entre humanos y animales, como parte constitutiva del hábitat. La problemática central radica en la ausencia de marcos teóricos y metodológicos que permitan incorporar esta complejidad sistémica en el diseño arquitectónico.

El objetivo de este trabajo es proponer un enfoque de arquitectura multispecie basado en la complejidad sistémica, que permita transitar del Antropoceno al Simbioceno mediante la integración de relaciones interespecie en el proceso proyectual. La investigación adopta una metodología cualitativa de carácter sistémico-relacional, estructurada en la identificación del usuario multispecie, el análisis de sus interacciones, la definición de necesidades interdependientes y su traducción en variables y estrategias de diseño, culminando en la construcción de un modelo gráfico sistémico.

Los resultados muestran que el hábitat no es un producto del diseño, sino una emergencia derivada de redes de relaciones entre sociedad, espacio, prácticas y agentes multispecie. El modelo desarrollado permite comprender el diseño arquitectónico como un proceso relacional, adaptativo y no lineal, donde la arquitectura actúa como mediadora de interacciones y no como entidad dominante. Se concluye que el pensamiento sistémico

constituye una herramienta fundamental para reconfigurar el diseño arquitectónico hacia modelos más inclusivos, resilientes y coherentes con el paradigma del Simbioceno.

Palabras clave: Arquitectura multiespecie - sistemas complejos - Antropoceno-Simbioceno - Cohabitación socioecológica - Diseño Arquitectónico

Resumo: A arquitetura contemporânea enfrenta uma crise epistemológica decorrente do paradigma antropocêntrico, que privilegiou o ser humano como único agente no projeto, excluindo a complexidade das relações socioecológicas. Em um contexto de crise ambiental, urbanização acelerada e transformação dos modos de vida, emerge a necessidade de integrar a coabitação multiespécie, particularmente entre humanos e animais, como parte constitutiva do habitat. O principal problema reside na ausência de referenciais teóricos e metodológicos que permitam a incorporação dessa complexidade sistêmica no projeto arquitetônico.

O objetivo deste trabalho é propor uma abordagem arquitetônica multiespécie baseada na complexidade sistêmica, possibilitando uma transição do Antropoceno para o Simbioceno por meio da integração das relações interespecíficas no processo de projeto. A pesquisa adota uma metodologia qualitativa, sistêmico-relacional, estruturada em torno da identificação do usuário multiespécie, da análise de suas interações, da definição de necessidades interdependentes e sua tradução em variáveis e estratégias de projeto, culminando na construção de um modelo gráfico sistêmico.

Os resultados mostram que o habitat não é um produto do projeto, mas sim uma propriedade emergente que surge de redes de relações entre sociedade, espaço, práticas e agentes multiespécies. O modelo desenvolvido permite compreender o projeto arquitetônico como um processo relacional, adaptativo e não linear, no qual a arquitetura atua como mediadora de interações e não como entidade dominante. Conclui-se que o pensamento sistêmico é uma ferramenta fundamental para reconfigurar o projeto arquitetônico em direção a modelos mais inclusivos e resilientes, coerentes com o paradigma do Simbioceno.

Palavras-chave: Arquitetura multiespécie - sistemas complexos - Antropoceno-Simbioceno - coabitação socioecológica - projeto arquitetônico

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