Andrade . Neder . Tostes . Wiesinieski . Aureliano . Pazos (Orgs.)

**RESIDENCY IN SCIENCE, TECHNOLOGY AND SOCIETY (CTS)**
HABITAT, AGROECOLOGY, SOLIDARITY ECONOMY AND ECO-SYSTEMIC
HEALTH: INTEGRATING POSTGRADUATE AND EXTENSION



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Brasília, 2023

Liza Maria Souza de Andrade | Ricardo Toledo Neder
Simone Parrela Tostes | Livia Barros Wiesinieski
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# PRESENTATION

This book aims to present the fundamentals and the basis of the multi professional course in CTS - Science, Technology, and Society in residency (Lato Sensu Graduation + Extension), characterized by a pedagogical practice and educational planning type PEX - research associated with teaching and integrated with extension. The proposal socially and territorially articulates three interdisciplinary themes: Habitat (Housing, Architecture, Urbanism, and Environment in the Countryside and the City); Agroecology (Food Sovereignty, Family Farm, Field, and City Integration); Health (Epidemiological Surveillance, Collective Health, Family Health, Sanitation, Ecosanitation, and Ecological Infrastructure) and a fourth transdisciplinary theme: Associated Work (Solidarity Economy, Training and Education, Occupation, Income, and Solidarity Technology).

The contents of the chapters were developed in the discipline of Special Studies in Technology, Environment, and Sustainability of the Graduate Program of the Faculty of Architecture and Urbanism of the University of Brasília (PPG-FAU/UnB), offered in 2021, integrated into the Extension Course Fundamentals in Science Technology and Society (CTS) – Habitat, Agroecology, Solidarity Economics, and Ecosystem Health, a partnership of the Science Policy Center, Technology and Society (NPCTS/CEAM/UnB) and professors of the Faculty of Architecture and Urbanism (PPG-FAU), the Faculty of Planaltina (FUP), the Faculty of Agriculture and Veterinary Medicine (FAV) and CDS/UnB, the Collective Health course of the Faculty of Ceilândia (FCE), the Faculty of Education (FE) and the Institute of Humanities (IH).

Thus, the process of construction of the Multiprofessional Residency CTS was initiated to form a transdisciplinary epistemological base in Solidarity Technoscience, inserting the University Extension in graduation studies, integrating 15 master's and doctoral students to more than 50 people from social movements, collectives, professional entities, government technicians, researchers and professors from other institutions as well as undergraduate students. The students were organized into working groups in the online meetings by the Teams platform, through which the following themes were discussed: i) solidarity technology, sociotechnical adequacy, and solidarity economy; ii) Freirean education and work; iii) territorial connections, social struggles and networks of solidarity; iv) sociotechnical adequacy for habitat production: spatial patterns in the field and the city; v) sociotechnical adequacy for agroecology and urban agriculture; and vi) ecosystem

health, sanitation, and governance, which make up the contents of the chapters of this book.

In the introductory chapter, it is detailed how the methodological process of structuring the course took place, divided into two parts: 1) theoretical-methodological foundations based on Solidarity Technoscience, forms of Technical Assistance, and the University Extension; and 2) political-pedagogical proposal of the course, including the themes, the territories surrounding the Distrito Federal that will be worked on the course, the curriculum matrix and the general functioning.Then Finally, the expected results and the developments already in progress are discussed.

The essence of the Residency consists in uniting Graduation And Extension in a trans-multi-interdisciplinary character with the vision of university public policy (opposite that of private or official philanthropy) offering vacancies for 35 trans-multi-disciplinary technical agents (managers, urban architects, lawyers, economists, sociologists, social workers, technicians, and engineers, community health agents), of which 28 will receive scholarships, and 14 territorial agents (2 agents from each of the 7 territories of the Distrito Federal and surrounding areas) able to act as multipliers of community initiatives, to provide sociotechnical advice to local entities and to articulate resources, people, entities, tools, and territorial tactics in seven territories surrounding the Distrito Federal in favor of the protagonism of subjects and groups in their daily territories.

The Lato Sensu Course and the Multiprofessional Residency Extension Program CTS – Habitat, Agroecology, Ecosystem Health, and Solidarity Health (linked to PPG-FAU/UnB and the Extension Decanery – DEX/UnB) are being sponsored by the 2021 ATHIS Notice of the Council of Architecture and Urbanism of Brazil (CAU/BR[1]) and with the parliamentary amendment of Mrs. Erika Kokay, directed to the payment of scholarships.

It also has the support of research and extensionist practices carried out by the Research and Peripheral Extension Group, emerging works within the matter of the project "Habitat production in the territory of DF and surroundings: urban and rural ecosystems and sociotechnical advice", coordinated by Professor Liza Andrade, with drone images produced by engineer Valmor Pazos Filho, as well as with project "Digital Platform Cooperativism (prototype for seven territories of the Distrito Federal), mapping of actors, agencies and sociotechnical adequacy in rural and urban territories of production of the popular circuits of the economy – a CTS approach", coordinated by Professor Ricardo Neder. Both projects are funded by the Distrito Federal Research Support Fund (FAP-DF).

Support was received from research and experiences of the Agroecology Center of

UnB, coordinated by Professor Flaviane Canavesi, of the Ecoplanetary project, coordinated by Professor Aldira Dominguez, and the Life and Water project in ARIS, coordinated by Professor Perci Coelho.

The list of modules below has the respective module: professors-coordinators and doctoral tutors of ppg/FAU/UnB of the Fundamentals extension course in science, technology and society (CTS) – Habitat, Agroecology, Solidarity Economy and Ecosystem Health.

▪**Solidarity technology, sociotechnical adequacy and solidarity economy** - Professor Dr. Ricardo Toledo Neder - FUP/UnB; Tutor - Lívia Cristina Barros da Silva Wiesinieski;

▪**Freirean education and work** - Professor Dr. Raquel de Almeida Moraes - FE/UnB; Tutor - Ana Luiza Aureliano Silva;

▪**Territorial connections, social struggles and solidarity networks** - Professor Dr. Perci Coelho de Souza - IH/UnB; Tutor - Letícia Miguel Teixeira;

▪**Sociotechnical adequacy for habitat production: spatial patterns in the countryside and in the city** - Professor Dr. Liza Maria Souza de Andrade - FAU/UnB; Tutor - Juliette Anna Fanny Lenoir;

▪**Sociotechnical adequacy for agroecology and urban agriculture - Professor Dr. Flaviane Canavesi** - FAV/UnB; Tutor - Natalia da Silva Lemos;

▪**Ecosystem health, sanitation and governance - Professor Dr. Aldira Guimarães Duarte Dominguez** - FCE/UnB; Tutor - Diogo Isao Santos Sakai; and

▪**Technical Support** - Valmor Cerqueira Pazos - FAU/UnB - master's account FE/UnB.

The course has the partnership of the Nucleation of Residency AU+E UFBA/UnB, the BrCidades Network, the Housing-Advisory Network, the MST, MTST, Fiocruz, Oca do Sol and the following associations in the territories:

- Association of Powerful Women of Santa Luzia - Estrutural City/DF;

- Association of Residents of Santa Luzia - Estrutural City/ DF;

- Association of Residents, Fighters and Supporters of Dorothy Stang Residential - ARIS Dorothy Stang - Sobradinho / DF;

- Nature House in the Sol Nacente- ARIS Sol Nascente - Ceilândia/DF;

- ASPRAFES - Association of Farmers and Farmers FA - Small Rural Settlement William - MST - Planaltina/DF;

- APRACOA - Association of Rural and Artisanal Producers of The Oziel III Settlement - Pipiripau - Planaltina/DF;

- COOPERCARAJÁS - Carajás Agroecological Production and Marketing Cooperative - Brasília/DF;

- Quilombo Mesquita Renovating Association - Quilombo Mesquita - Western City/GO;

- Preserves Serrinha - REDE Association of Preservation and Sustainable Development of Serrinha do Paranoá - Paranoá/ DF; and

- National Coordination of MTST (working in Nova Planaltina - DF) and Coletivo Negro Raiz

# SUMMARY

# Sociotechnical Adequacy For The
# Production of Habitat In The Rural and In The City



## Chapter 04

### Authors:

Liza Maria Souza de Andrade | Juliette Anna Fanny Lenoir | Camila Pithon Raynal
Bárbara Helena da Silva Montalva | Cláudia Evie Akijama Goddard
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Lélio Marcus Munhoz Kolhy | Lucas Mincaroni Neto Radatz | Luiz Souza Neto
Marina da Silva Ribeiro | Tamiris de Oliveira Machado

# SOCIOTECHNICAL ADEQUACY FOR THE PRODUCTION OF HABITAT IN THE RURAL AND IN THE CITY

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**SUMMARY:** In the context of a peripheral economy, as it is the case in Brazil, public policies for the production of habitat in the countryside and in the city do not reflect the multiple realities and are not able to meet the demand. The housing deficit and the indirect housing conditions demonstrate the need to reflect on these diverse realities and propose alternatives to restrictive housing programs. The concepts of the discipline during which this collective work was elaborated propose to bring Science, Technology and Society (CTS) to the center of housing and urban improvement practices. The participation of sociotechnical subjects in the process of elaboration and execution of projects seeks to adapt them to the various socio-environmental contexts and needs found in the territories. The case studies, presented in the second part of the chapter, allow us to see a sample of the various situations found in a country with the size of a continent such as Brazil and the possible Sociotechnical Adaptations (AST). The experiences in AST, a concept proposed by Dagnino (2019), seek the advent of an awareness about the production of the habitat as a whole, in the city and in the countryside, promoting solidarity economy initiatives, which bring an associated work dynamics and essential income, within the systemic view of habitat, also integrating food production and ecological sanitation, towards a healthy and sustainable environment.

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# INTRODUCTION

This project discusses habitat production in the light of the concepts of Sociotechnical Adequacy (AST), solidarity economy and Frereana pedagogy. These concepts are part of the paradigm shift proposed by studies in Science, Technology and Society (CTS) in the Latin American context (PLACTS).

Political issues in Science, Technology and Innovation (CTI) arise at the beginning of the 20th century when, for the war effort, they join forces from the "triple helix", that is, "the government, the private company and the university" (NEDER, 2013, p. 9). The view of the university mentioned here is one that serves a logic of entrepreneurship in which the benefits of innovation reach society through consumption and, consequently, the profit of private companies.

In the context of Latin American peripheral economies, the hegemony of the "triple" is questioned in the sense that it serves the interests of capital and has low distributive efficacy (DAGNINO, 2019). Thus, in a counterpoint of the CTI, studies in CTS bring to light the innovations and technical changes arising from society and the solidarity economy. To this end, pedagogy is rescued where dialogue is the starting point for the empowerment of the socio-technical subject.

In 2021, the technical report published by the João Pinheiro Foundation pointed to 2019 an estimated housing deficit for Brazil of 5.876 million homes, of which 5,044,000 were located in urban areas and 832,000 in rural areas. The total number, in relative terms, represented 8.0% of the total stock of permanent and improvised private homes in the country. As for the large Brazilian regions, illustrated in Figure 87, the Southeast presented the highest numbers in absolute terms totaling a deficit of 2.287 million households. Then the Northeast region, with a deficit of 1.778 million units.

In relative terms, the geographic region with the highest numbers is the North, whose housing deficit represents 12.9% of the stock of permanent and improvised private homes. Then, the Northeast appears, with 9.2%; the Midwest, with 8.4%; the Southeast, with 7.2%; and, finally, the South, with 5.6% (JOÃO PINHEIRO FOUNDATION, 2019).



Déficit Habitacional
(Nº de domicílios)
Até 100 mil
De 100 até 200 mil
De 200 mil até 500 mil
Mais de 500 mil
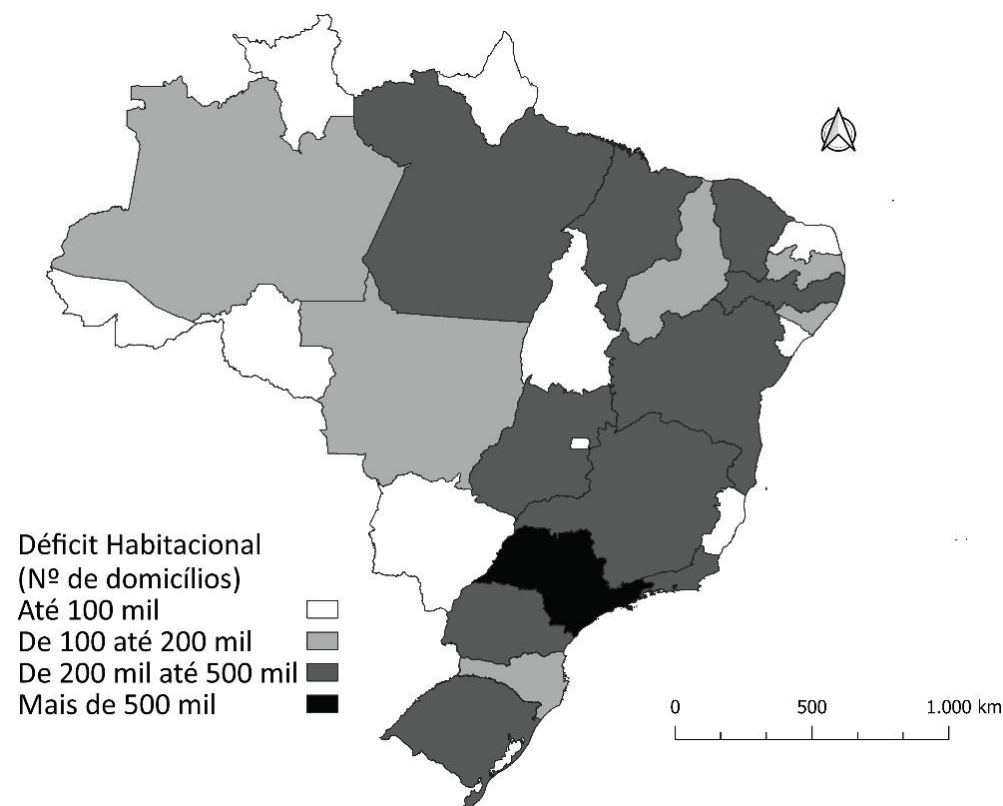
Figure 87: Total housing deficit according to federation units in 2019. Source: João Pinheiro Foundation, 2021

According to the housing deficit and its components defined by the João Pinheiro Foundation, that is, precarious housing, cohabitation, and excessive burden of urban rent, the graphs in Figure 88 show that the housing deficit affects women in a greater proportion. Compared to men, women are on average 10% to 20% more victims of excessive rent burden and live in precarious housing. Also, until 2018, there were both men and women living in cohabitation, but in 2019 there were 15% more women than men living in this situation. Regarding the racial issue, data from the 2010 Census (IBGE) show that in irregular areas 55.5% of the population is brown, 12.9% is black and 30.6% is white. These figures reveal a great asymmetry of gender and race when it comes to access to decent housing.
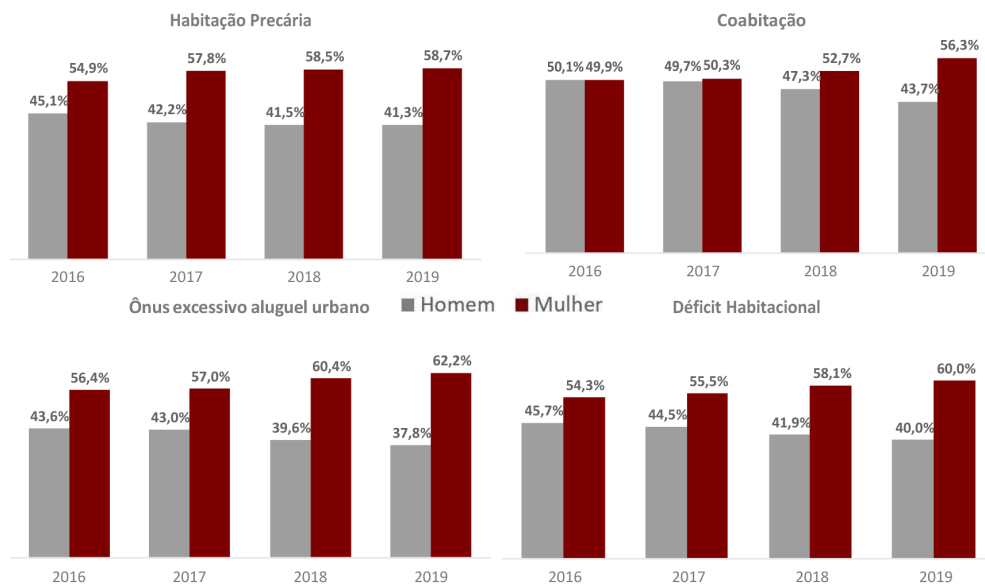
Figure 88: Graph of the second low participation of the person responsible for the homes in the components and housing deficit for Brazil between 2016 and 2019. Source: FJP (2020) based on IBGE data.

The data on the housing deficit in the country indicate the need for a reflection on the sufficiency of the existing territorial production models. The first approach of analysis in this work is to see the housing deficit not only in its quantitative dimension but also in its qualitative dimensions. The second part is to highlight what housing programs do not see as valid in their disciplinary view in which, for example, only housing built in certified materials is considered, limiting self-construction with vernacular techniques such as clay.

This chapter seeks to bring a broad reflection on the habitat in the city and in the countryside, the production and the transdisciplinary understanding of habitat. In this sense, case studies, selected in the experiences experienced or reported by the authors[14], allow to mirror practice and theory and take practice beyond what is proposed in housing programs. Self-management, self-construction, bioconstruction and the relationship between work and housing are hardly contemplated in housing programs.

In this sense, an overview of the issue of self-management in housing policy in Brazil and the theoretical concepts that guided the reflections of the Fundamentals in SC class are presented throughout the elaboration of the chapter. Next, a reflection is made on these concepts in relation to the theme of this chapter, on habitat production in the

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[14]People who participated in the extension course Fundamentals in Science, Technology and Society with the students of PPG-FAU/UnB, guided by the tutor and the teacher.

countryside and in the city. Last but not least, group members report their experiences in the territories and methodologies to promote the Socio-technical Adequacy (AST) of the projects.

## Self-management in housing policy in Brazil

Inserted in housing policy, it is understood that self-management enables the management of public resources under the guidance of future residents and the collective construction (BONDUKI, 1992). It approaches, therefore, what Lefebvre (1968) defines as "use value", when users influence and interfere in the constructed spaces in which they live and do not act according to the exchange value that seeks to increase private profits. The insertion of this possibility in housing policy was a process in which social movements were fundamental actors, but that occurred in a slow manner. It is evident that there is a lack of public support in this context, besides the attention to housing policy being closely linked to private production (RODRIGUES, 2013).

In Brazil, the housing production that allows self-management in its processes arose in a context of diverse actors and mobilizations. Latin American cooperatives of mutual aid are cited as Latin American inspiration self-management programs, for example, and in Brazil, the alternative programs incorporated into the National Housing Bank (BNH), such as the Urbanized Lot (land) Financing Program (PROFILURB), in 1975, the Program for the Eradication of Precarious Housing (PROMORAR) in 1979, and the João de Barro Project in 1984, which allowed for the first time that self-construction was possible under a federal program (CAMARGO, 2016). In addition, we mention the Basic Ecclesial Communities (CEBs) together with housing movements, land occupations in the peripheries, and politicized technical advisories linked to universities and progressive prefectures, which allowed and financed the joint battle as a possible way to build housing.

In parallel, social housing movements have participated since the Federal Constitution of 1988 in favor of urban policy present in its articles 182 and 183, the Statute of the City (2001), the creation of the Ministry of Cities (2003) and the Council of Cities (2004), in addition to the law of popular initiative (Law no. 11,124/2005) that established the National Housing System of Social Interest and the Social Interest Housing Fund, considered extremely relevant to the country (FERREIRA, 2012).

At the municipal level, there was the program that took place in the city of São Paulo from 1989 to 1992, which is seen as an example of the viability of housing with the principle of self-management: the Fund for The Care of the Population Living in Subnormal Community Housing (FUNAPS-Community or FUNACOM). Success in this program is associated with its proposal linked to a tripod of equality between the actors involved, the State, community

associations and technical advisories, as illustrated in Figure 89 (CAMARGO, 2016).
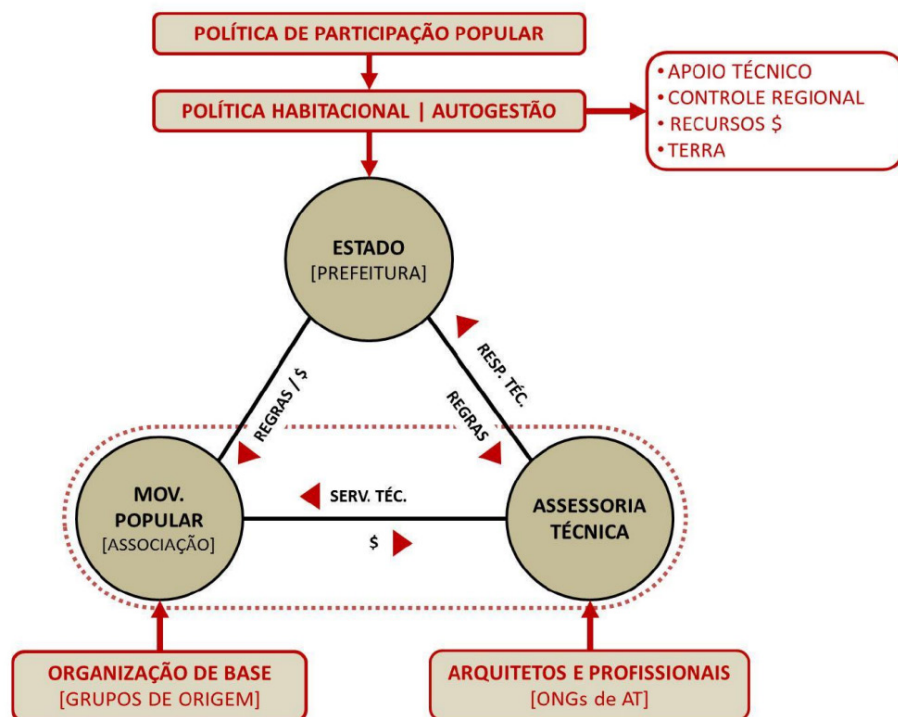


Figure 89: Self-management tripod under FUNACOM.
Source: CAMARGO (2016)

At the federal level in Brazil there were three programs that allowed self-management in their processes: (i) Solidarity Credit Program (2004-2008) which, however, due to bureaucracy, lack of funds and complexity, was extinguished; (ii) Social Housing Production Action Program (2008-2009), with only one project built (FERREIRA, 2012); (iii) Minha Casa Minha Vida (My House MY Life) Entities Program (PMCMV-E), launched in 2009. It is noteworthy that this modality of Entities was created after the mobilization and claim of housing movements because in the same year was launched the Minha Casa Minha Vida Program (PMCMV), in which entrepreneurs and investors in the area of civil construction were at the center of the debate on the formulation of this program (MARICATO, 2011). The PMCMV objective was to stimulate the economy through civil construction in the context of a global economic crisis, focusing mainly on the popular market segment (CAMARGO, 2016).

The PMCMV-E has relevance, is part of a historical claim, and meets the demands of families from 0 to 3 minimum wages, although quantitatively representing a tiny production when compared to the market production. According to Camargo (2016, p. 26), PMCMV-E is cited as "housing production self-management to the Brazilian (or its discourse)". The author explains that this modality, "dug" to enable self-management in its processes, was built based on the policy defined for the performance of PMCMV companies, being required that, to enable housing, housing movements needed to function as companies (CAMARGO, 2016; MARTINS, 2019).

In this context, the famous tripod of equality between actors, cited in the program Community Funaps, was modified in PMCMV-E and, within the matter of this program, an unequal relationship is perceived between the actors in the construction of public policy (Figure 90). Thus, the community association, here called the Organizing Entity (associations, cooperatives, unions, etc.), is responsible for most of the demands and, therefore, needs to practically professionalize to achieve the goal of enabling housing. Among its attributions are: indication and selection of families, choice of technical assistance, project contracts and negotiation of choices with future beneficiaries, responsibility for the management of the work, with the possibility of hiring construction companies or with the organization of the beneficiary families themselves organized through work in a joint effort, in addition to the purchases of materials and even the delivery of keys to families (CAMARGO, 2016).
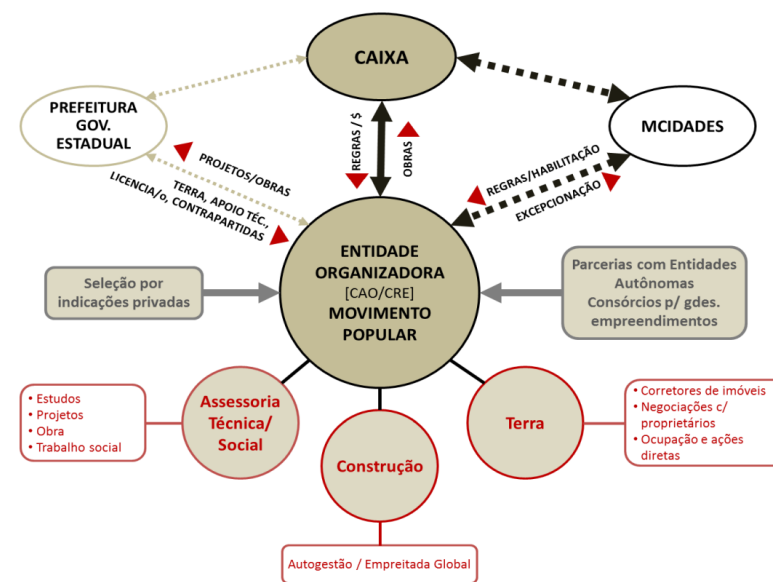


Figure 90: Explanatory scheme of self-management under the PMCMV-E at the Federal level. Source: CAMARGO (2016)

Thus, self-management in housing policy becomes extremely complex and does not meet the reality of social movements, distancing itself from the objective of these, which is the viability of housing. Making housing production possible with the principle of self-management is to enable, among several factors, that future residents participate in the process by understanding its possibilities and limitations. Requiring them to act as a company makes this possibility present in housing policy, but only as a discourse, as Camargo (2016) quotes.

With the end of the My House My Life Program, the investment in PMCMV Entities was also over, an important achievement of social movements, despite criticism. In this context, the National Union for Popular Housing and partners have developed guidelines for the implementation of the Self-Management Bill (PL No. 4,216/2021) to create the National Self-Management Housing Program. The Committee on Participatory Legislation of the House of Representatives approved the proposal, but the proposal remains unapproved in Congress.

In the self-management model, a community manages the housing solution process, participating in all stages of construction, from the selection of the land, project development, and choice of the technical team to the definition of the forms of construction. However, this practice depends on housing-related programs.

The model of housing by self-management is also defended by the Council of Architecture and Urbanism as a way to democratize the work of urban architects, remembering that in the survey conducted in 2015 by this entity, 85% of the country's houses are still built by lay people, and as previously described in the study by the João Pinheiro Foundation, 25 million dwellings are inadequate.

In this context of self-management, it is necessary to move forward in the fundamentals of Socio-technical - AST, in habitat production and solidarity economy, integrating housing to associated work and income.

## FUNDAMENTALS IN SOCIOTECHNICAL ADEQUACY AND SOLIDARITY ECONOMY

As previously introduced, the concept of Adequacy Sociotechnical (AST) proposed by Dagnino (2019) uses research in science, technology and society in the Latin American political sphere (PLACTS). AST seeks to promote an approximation of scientific and technological knowledge, taking the focus off the technical and economic issues  as a guide of the processes. The CTS relationship proposes to merge aspects that involve the survival strategies of the human being, the identity traits of the sociotechnical subject and its relationship with nature (ANDRADE et al., 2019).

AST is a social construction that can be designed, deductively, in the institutions where it is usually produced, through the politicization and internalization of alternative values and interests and the observance of precepts of plurality and internal democratic control. AST has an additional condition in this process, of the social actors directly interested in having a piece of knowledge  for the production of goods and services, consistent with their values and interests (DAGNINO, 2019).

In the context of a peripheral economy, CTS thinking places society at the foreground of production, management and fruition. Hegemonic thought creates a mythical maxim within the various sectors of society by drawing a worldview in which there is no "cornerstone" of the collective construction of objective and subjective processes. Still in our current day, thinking about the collective or planning and programming actions in a network of empathy creates strangeness and, above all, guides these actions and developments that have such guidelines, in the category of exception.

By reversing the logic of production, through insurgent practices, methods, processes, or techniques contributing to the solution of social problems, social and environmental conflicts emerge from collective knowledge and techniques in the solution of social problems, social and environmental conflicts and in the struggle for the essential rights of populations excluded from the process of planning the territory (ANDRADE et al., 2019).

According to Silva (2020), the popular economy interacts with life and not in isolation from  the production of goods and services. When the activities of the collective workers take into account care and protection, women and men find alternative ways of living and resist uncertain conditions of simple survival. They resist, therefore, oppressive relations of gender, race or class.

The solidarity economy is a space consisting of production and consumption networks based on the collective ownership of the means of production and self-management, with strong vectors of expansion, threads and overflows, acquiring sustainability within the framework of a peripheral capitalist economy (DAGNINO, 2019). It also emerges in parallel to the need to adapt cognitive processes related to the production of goods and services, to a trend that emerges as a future-carrying fact to achieve the utopia of social justice, economic equity and environmental responsibility and the willingness to face hunger, poverty and social exclusion, in order to avoid its negative implications for the planet and what lives in it.

The rescue of experiences in history – organization of the production and consumption of goods and services based on the collective ownership of the means of production and self-management – resurface in moments of capitalist crisis. The solidarity economy has been gaining strength in the international environment of politics and policy. Politics deals with "politics as a field of confrontation of world views systematized by political parties in search of governmental power", and the policy deals with "politics as a result of this confrontation legitimized by the State as public policies, plans and projects" (DAGNINO, 2020). AST is present in both systems because it has a social demand, however, we can describe it as an implicit policy because it is a demand not yet addressed.

Technoscience , as a generic term, is consistent with the action of an actor on a work process that he controls and that, due to the socioeconomic context, social agreement and productive space acting, allows a modification in the generated product, which may be appropriate regarding the interest. Furthermore, technoscience is the cognitive result of the action of a social actor on a work process that he controls and that allows a modification (qualitative or quantitative) in the generated product, which may be appropriate according to his interest (DAGNINO, 2019).

A Solidary technoscience can be understood as an open-mutant , flexible and adaptive - way of concatenating and brokering, with frequent use of the sociotechnical adequacy of capitalist technoscience, knowledge of any nature - scientific, empirical, technological, religious, ancestral - and their origins, whether in academia, in companies, native people, popular movements, excluded and social actors. It aims to appropriate a material result derived from changes in the process of production and consumption of goods and services in solidarity economy networks, respecting the values, interests and satisfaction of the collective (DAGNINO, 2020).

Social technology, as a concept surpassed by Solidarity technology, is the product, method, technique or process created to solve social problems that meet  the requirements of simplicity, low cost, easy applicability (and replicability), in addition to social impact (DAGNINO, 2019). Figure 91 illustrates the three foundations of the movement for social technology proposed by Neder (2011), in which the relationship between the three circles – sociotechnical subject, AST and self-management – is more important than the circles themselves.

One alternative technoscience, such as solidarity technoscience, can only emerge in spaces where:

> there are values and interests consistent with a style of alternative development – such as solidarity enterprises – which are by extension counter-hegemonic to the dominant ones in those environments where capitalist technoscience is generated (DAGNINO, 2019, p. 60).

Also according to the author, there must be another form of ownership, especially in the context of private ownership of the means of production. Not the state, but the collective, characteristic of the solidarity economy.
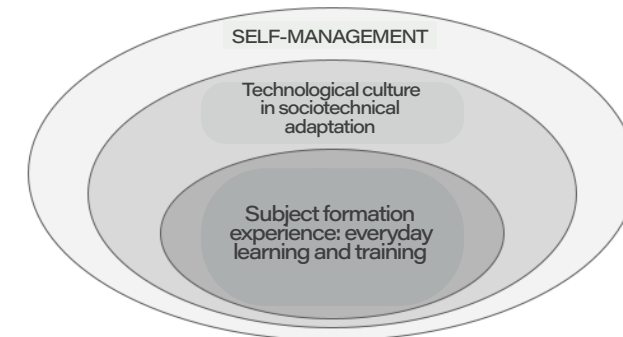


Figure 91: Diagram of the 3 foundations of the movement for social technology. Source: Lenoir, inspired by Neder (2011).

## Work, occupation and income

According to the 1st National Plan of Solidarity Economy (2015):

> It is an alternative of work and income generation through work that combines the principles of self-management, cooperation and solidarity in the performance of activities of production of goods and services, distribution, consumption and finance.

Among the actors who are included in these initiatives, family farm cooperatives, agrarian reform settlements, companies are presented as examples of self-managed by workers, solidarity finance institutions, etc., which have become fundamental not only to creating forms of survival, but also by going beyond, redesigning the social fabric (ANDRADE, 2007).

It is observed how the solidarity economy was essential for the local development of the territory, being created in opposition to economic projects coming from developed countries that did not adapt to the realities of the territories of developing countries. Local development models generate income in a more distributed way among the various actors, being a way of thinking about the territory, including the competencies of residents and valuing local values and knowledge. It also embraces the concepts, mentioned above, of self-management and cooperation among residents for activities of production of goods and services (SOLTEC/UFRJ, p. 26, 2012).

The solidarity economy movement resumed in the 1990s, in the face of the strong advance of neoliberalism in world economies, and finds in the "contradictions of capitalism new forms of economic organizations" (ESTEVES, 2017, p. 171). In Brazil, it is a movement that has had a high number of adherence followers  and has seen its application increase in the struggles for rights of the new post-democratization and post-constituent social movements (ESTEVES, 2017).

In this context, solidarity economy initiatives brought together workers from various social movements, such as land reform settlements, recovered factories, urban waste collectors, family farmers, members of traditional communities, etc. (ESTEVES, 2017). From this movement arises some social achievements that put the agenda at the institutional level of government policy, such as the creation of the National Secretariat of Solidary Economy (SENAES) in Lula's government in 2003, linked to the Ministry of Labor Employment. Despite this advance in the political sphere, the initiatives still followed as resistance practices within their territories in opposition to the advance of neoliberalism, without losing the essential characteristics of self-management, solidarity and collectivity.

In the context of social housing and habitat production, self-management enterprises within social movements – such as the Homeless Workers' Movement (MTST), The Landless Movement (MST) and the National Union for Popular Housing (UNMP) – show how they have the potential for political proposal stemming from their struggles. The production of organic food within settlements that generate income and feed the population through federal government programs, such as the National School Feeding Program (PNAE) and the Food Acquisition Program (PAA) (MST, 2021), is an example of income generation for the movement, in a fair and collective way. Self-management in these movements for housing also gives another character for self-construction. In São Paulo, when the peripheries began to grow around the 1960s, self-construction was present in dormitory towns: the worker built  his house during the weekend with the help of neighbors (KOWARICK, 1993), showing the precariousness present in these neighborhoods, which the basics were not provided by the state, but built by the hands of residents.

Homelessness is still precarious. The social movements of post-democratization have made self-construction a pillar of their struggles, and also a policy, based on the task forces (UNMP, 2019). An example is the Associação Pró-Moradia de Osasco (COPROMO), in the metropolitan region of São Paulo, where residents built a condominium with apartments according to their needs, something also claimed by social movements: "definition of the land, the project, the choice of the technical team, or the forms of construction, in addition to the control of public resources and the work by the community itself" (UNMP,  2019),

in this case, the technical advisories of professionals chosen by residents as essential in supporting the fight for decent housing.

The so-called self-production of space becomes central where workers do not separate labor and housing, driven by collective popular initiatives, called by Zerlotini as "spaces for the reproduction of life" (ZERLOTINI, 2020, p. 9), in which other uses are given for previously planned spaces to segregate the activities each in its space. In self-managed spaces, the worker has control over the process, the tools, and the resources and has the notion of the totality of his work, being able to perform it completely, and not just a fraction, with repetitive and alienating movements controlled by a boss. In the self-managed spaces, there is a new way of occupying the spaces, both in the countryside and in the city, which rescues the collective character of work and creates another way of living. An example is the occupations of abandoned buildings, which are given other uses besides housing, such as places of cultural meetings, and activities open to the public, where residents use the space to generate income to maintain families and the space itself, changing the way one inhabits the city, how work becomes a political struggle and creates collectivity and how another economy is created.

## Sociotechnical adequacy and socio-technical advice for habitat production in the countryside and in the city

The history of technology in Latin America is characterized by the import of materials, professionals, procedures, norms and typologies from central countries and which, already in the first half of the twentieth century, had become the only organizing structure of the production (called "traditional") institutionally admitted. It is observed, on the other hand, that a significant portion of the population, both urban and rural, excluded from the conditions of access to it, has been prepared to use, within its own limitations, all types of new materials and elements, used or semi-destroyed, industrial products specifically intended for construction and/or for any other purpose, as well as materials of natural origins,  such as earth, straw, bamboo, stone and logs (PELLI, 1990).

With the end of the Military Dictatorship, from the 1980s on, organized social movements returned to the political scene that, approaching architects and urban planners, and sought technical advice from professionals to assist them in their claims, especially for the problem of housing (CERQUEIRA, 2009). In the midst of many debates, the first proposals for housing programs, urbanization of slums, land purchases and construction of houses are elaborated, with the participation of users through the self-managed joint battle and

technical assistance (CERQUEIRA et al., 2018).

After two decades, some of these issues arise in the context of the reappearance of the discussion about "alternative" technologies in the midst of social movements, such as solidarity economy networks, technology incubators of popular cooperatives – which already covers almost 40 Brazilian universities – recovered factories and popular cooperatives (DAGNINO, 2008). In the context of solidarity economy, Solidarity Technoscience (TS) can be understood as a way of agency, often through Sociotechnical Adequacy (AST) of capitalist technoscience, knowledge of any nature and origin by social actors that aim at the appropriation of a material result that came from changes in the process and consumption of goods and services in networks of solidarity economy, mainly oriented to meeting collective needs and meeting public accounts (DAGNINO, 2019).

Influenced by the contribution of the critical theory of Feenberg, for whom technology is not neutral because it incorporates values of industrial society, especially from the elites capable of incorporating (or translating) their values (or claims) into technique (NOVAES; DAGNINO, 2004), AST´S proposal can only emerge in spaces where there are values and interests consistent with an alternative style of development – such as solidarity enterprises– which are, by extension, counter-hegemonic to the dominant ones in those environments where capitalist technoscience is generated (DAGNINO, 2019).

In this perspective, AST aspires to the "contamination" of the spaces where TS is dealt with by those who advocate an alternative style of development, with the values and interests of social actors, who will benefit the most from its implementation (DAGNINO, 2020). Technical Advisory Services contribute to this, which work within the notion of citizenship sociotechnical, which are based on solidarity production relationships and that assume that the practices of interactionism, originally proposed by Frerian pedagogy, are also part of the Latin American approach of AST, in which the subjects of scientific knowledge can share their technical codes with organized social subjects (ANDRADE et al., 2019).

## Topics that will be addressed in the modules of the CTS Residence

In the context of AST in the construction of the Multiprofessional Residence CTS, the understanding of the production of the human being habitat passes through the notion of Heidegger habitat (2001), the "Being-in-the-world", the way we inhabit this world in "Build, Inhabit and Think". "Inhabiting" does not simply refer to the fact of having a residence, but translates into the way man, when relating to his possibilities of "Being-in-the-world", acts on the world that surrounds him through the technology that makes it possible to build.

When we think of the word inhabit, we then associate it with the idea of construction (housing or place) in which life happens. But does the inhabiting really happen in these places? For Heidegger (2001), the understanding of inhabiting translates into the poetic way man is on Earth. In this sense, in the context of the human-nature relationship, the production of habitat in the countryside and in the city, with its similarities and differences, is reflected in the survival strategies integrated into the way of life – shelter construction, waste treatment, access to water, energy and food – which reflect the way of living in the broader sense, dimensions of sustainability in spatial planning. By grouping ourselves in towns and cities according to the capitalist type of production, labor and income dissociate themselves from living, requiring large displacements, separating housing from work and leisure, as well as from ecosystems and biogeochemical processes that sustain life in cities.

Remembering Henry Lefebvre (1968), the production of space should be regarded as historically produced by man as he organizes his society in politics and economics. Space is a social product, so it involves the contradictions of reality. The constructed spaces, within the capitalist logic, express the standardization and individualism of this rationality, and are, therefore, abstract spaces, prioritized by aesthetic reason and the force of images.

In contemporary cities, that organic order that existed in the groupings and villages was lost. Currently, in densely populated cities or planned cities of the twentieth century, these organic patterns were lost, here understood as a configuration of existing relationships between the way of life and the city's space (ANDRADE, 2014). However, in most cities in colonized Latin America, the self-production of space happens in an emerging way in popular settlements, without the intervention of the State and professionals in the area of architecture and urbanism. In the villages and slums, there are networks of solidarity or collective work, called popular economy, which come together to ensure the conditions of their existence and that end up being related to the space in which they live, opposing the social relations of oppression.

According to Zerlotini (2020), the popular economy has to do with "life", and not

only with the production of goods and services. The spaces of the work collectives can take place in small factories, houses and streets that combine social, cultural and training activities, and, in some cases, environmental activities, mainly to make the improvised sanitation of houses and even streets.

The habitat is part of the right to the city because it has its foundation in several other rights, such as the right to housing, health, mobility and leisure. Therefore, the habitat is related in all the themes addressed in the Multiprofessional Residency CTS, since the relationship between housing and work is one of the topics less contemplated in habitat production.

After 20 years of City Statute, it has not been possible to achieve urban reform, to order the territory with the master plans to meet the constitutional objective of urban policy and comply with the full development of the social functions of the city and urban property to the four groups of purposes established by law: (i) to promote the democratic management of cities; (ii) offer mechanisms for land regularization; (iii) overcome real estate speculation; and (iv) ensure the environmental, social and economic sustainability of urban centers.

It has not yet been possible to promote the general guidelines of Article 20's item I to guarantee the right to sustainable cities, such as the right to urban land, housing, environmental sanitation, urban infrastructure, transport and public services, work and leisure for present and future generations, a key condition for achieving the UN 2030 Agenda in its Sustainable Development Goals (SDGs), in particular the SDG11 "Sustainable Cities and Communities", which the main objective is to "make cities and human settlements inclusive, safe, resilient and sustainable"[15].

In Andrade's view (2014), one of the major challenges for urban space planners is to reconcile, in a systemic way, the demands for the survival of the human being: water, energy, food production, shelters and waste treatment. These demands are related to the densities of occupation and their social benefits in balance with ecosystems, landscape and natural processes, such as the urban water cycle. In addition, there are challenges that become increasingly pressing in the face of the uncertain future of scarcity of natural resources, such as drinking water on the planet, the decline of oil, climate change, the global economic crisis, the increase in social inequalities, the rise in food prices and hunger.

Mare (2008) believes that in the future, with the decline of oil as an energy source, megacities will undergo a reverse migration process with people returning to the

[15]Available in: https://brasil.un.org/pt-br/sdgs/11. Access: 04 Sep. 2022..

countryside or smaller cities due to the scarcity of natural resources. As occurred in some ancient civilizations, the movement "neo-rural" has already been visible today with the social isolation caused by the pandemic of covid-19, in which the flow of people to smaller cities and the countryside has increased.

On the other hand, the promotion of agrarian reform in Brazil faces historical, socioeconomic and political challenges to combat a scenario of strong land concentration. Agrarian reform represents the prioritization of the social function of rural property within the constitutional system that predominates the right to property, which provides, as a means of its implementation, the expropriation of large unproductive areas.

In addition to the social and environmental issue, traditionally addressed by the discussion on agrarian reform, there is a spatial scope that is little addressed, which analyzes the space resulting from the dynamics of land concentration. Currently, the largest amount of productive land in the country is intended for the production of agricultural commodities, mostly grains destined for export with hight quantity production, in properties larger than four fiscal modules (minimum area of a rural property and in which the footage varies according to the municipality). In return, the smallest share of land is destined to the production of food for human consumption in Brazil.

The incidence of these dynamics directly impacts the configuration of the rural landscape and the acceptance of a spatial dynamics that influences life in the field: difficulty in connectivity between rural center, difficulty in accessing public and community equipment, difficulty in designing and maintenance of environmental corridors, lower occurrence of productive variety in areas of intensive cultivation, compromising the genetic diversity of the environment, among others.

In the field, it is still necessary to advance the knowledge and appropriation of peasant reality, so then in universities students, teachers as well as professionals can work more appropriately with territorial planning integrated with the housing project.

In this context, AST, for the production of habitat in the Professional Residence, intends to work on social housing projects in the field and in the city, promoting the design of systems integrated by the inclusion of the concepts of ecovillages, urban ecosystems and permaculture. Also included are self-constructed knowledge and social technology in housing, which means bioconstruction practices, advances in the proposition of socio-ecological infrastructure with water-sensitive places and nature-based solutions to design healthy environments and promote environmental comfort.

The CTS Multiprofessional Residency has the experience of " socio-technical resistance" of the Research and Extension Group "Peripheral, emerging works" of FAU/

UnB, which begins with the demands and vocations raised and analysis of potentialities and problems: local identity, existing knowledge, spatial patterns and events. The patterns (parameters) are selected after a participatory diagnosis of the site in the form of affective maps, an analysis of the context that contemplates the patterns of events related to space and social expectations mapped by the analysis of the dimensions of sustainability (environmental, social, economic, cultural and affective), according to Andrade and Lemos (2015). They are important keys to thinking about the complexity of acting in the production of habitat in the countryside and in the city.

## METHODOLOGICAL PATH

This chapter is the result of the collaboration of thirteen authors, and students of the discipline of Fundamentals in Science, Technology, and Society, taught in the first semester of 2021. Coordinated by Professor Liza Andrade, the discipline had an original form, alternating a week of presentation of teachers of the future Multiprofessional Residency, and a week of internal discussions to the thematic groups. So the theme of the chapter "Adequacy Socio-technical for the production of habitat in the countryside and in the city" was discussed in parallel with the concepts and experiences presented by the teachers.

In addition, the editorial line of the discipline called for up to five habitat production experiments to be reported. The choice of these took place in a natural way, during the first thematic work meetings with the group and during which each one tried to understand the concepts presented according to his own experience: placed in the collective, doubts about theoretical concepts were mitigated.

In the choice of case studies, it was sought to tension the interaction between theory and practice, in the sense that the approximation of experiences and theoretical concepts of the discipline allowed us to reflect on the level of sociotechnical adequacy of dialogical processes. What role did the participants play during the participatory process? In which stage of the project or execution was there participation? What kind of participation, passive or emancipatory?

In order to present a wide range of habitats, according to the title of the chapter, the choice of experiences was due to territorial characteristics, that is, to have at least one experience of habitat in the countryside, of social movement origin, in the city, of association of residents origin or promoted by the Council of Architecture and Urbanism (CAU) and of the professional practice of technical assistance origin. A sample of habitat diversity was sought and then investigated the methodologies of sociotechnical adequacy

were implemented, as well as their limitations, challenges, and innovations.

What kind of problems needed to be solved and what solutions were found in that territory and period? Have the problems been posed and solved by technicians or residents? Has the demand been supported by authorities, public policies, or private initiatives?

In the Sociotechnical Adequacy process (AST), the issue of the language used for communication between technicians and residents is the question. Case studies investigate these issues to varying degrees, according to the particularities of each experience.

## EXPERIENCES IN TERRITORIES

The experiences brought by extension course members in the chosen territories reflect the course's intention to work on the approach in which the subjects are co-authors of the technical processes.

These experiences include: (i) the description and contextualization of the territory; ((ii) the presentation of good practice; (iii) the collaborations and potentialities for the understanding of the Fundamentals in CTS applied to the habitat, indicating potentialities for sociotechnical processes and methodologies that can be used in the Multiprofessional Residency CTS.

### Onze8 Association (Vitória, ES): experiences in ATHIS and the Territory of Good - Description and contextualization of the territory

With its center in Vitória, capital of the state of Espírito Santo (ES), the Onze8 Association is active and acts by the constitutional right of access to adequate housing through the popularization of architecture and urbanism services. The association was formally founded in 2019 by architects and urban planners who sought to work in the provision of Technical Assistance in Housing of Social Interest (ATHIS). Part of the founders, throughout their academic careers, worked in the Model Offices of Architecture and Urbanism (EMAUs). Thus, the members of the Onze8 Association began to approach the regions of highest socio-environmental vulnerability in the Metropolitan Region of Grande Vitória (RMGV) and civil society institutions organized to understand the reality of the daily lives of communities, their needs and act in the search for solutions.
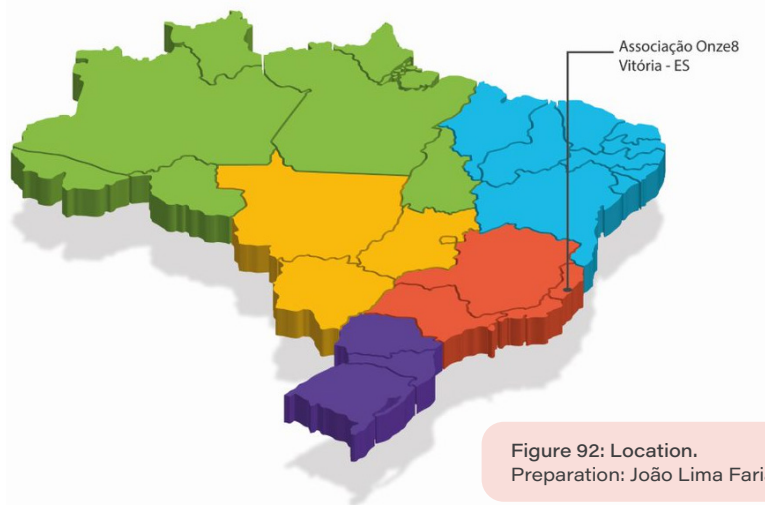
Figure 92: Location.
Preparation: João Lima Farias, 2022

Among the various institutions of organized civil society active in the territories lived by the members of the Onze8 Association, and the Associação Ateliê de Ideias predominates, formally founded in 2003 and focused on the search for community development. This is because of its relevant performance in the state of Espírito Santo and its contribution to the foundation of the community bank: Banco Bem.

The attendance to the idea of acting in the field of housing of social interest suggested by the local population and the exercise of the institution to encompass in its projects students and professionals of civil construction are other examples of how the Association Ateliê de Ideias is pertinent to the theme of this chapter.

The headquarters of Banco Bem, the Associação Ateliê de Ideias and the place where most of the Onze8 Association projects are found are located in the Territory of Good (Figure 93), more specifically in the central part of the island of Vitória, where the neighborhoods of São Benedito, Da Penha, Itararé, Bonfim, Consolação and Gurigica, in addition to the popularly known regions as Jaburu, Constantino, Forest and Engineering. According to the "Research Knowledge, Making Process and Profile of Residents of the

Território do Bem (Territory of Good)", this region is composed of 8,272 housing units and has a population of 31,011 inhabitants (Figure 94).



Figure 93: Polygonal of the Territory of Good.
Source: Google Earth Pro

It is important to highlight that this is a region of socio-environmental fragility, where its population is composed mostly of black people with a total family income of one or two minimum wages (ASSOCIAÇÃO ATELIÊ DE IDEIAS, 2019). The region has become popularly referred to as the Território do Bem throughout the implementation processes of Banco Bem, the formation of the Community Development Forum of the Território do Bem (Bem Maior Forum), due to the formation of more community leaders and the execution of various social, economic and environmental projects.
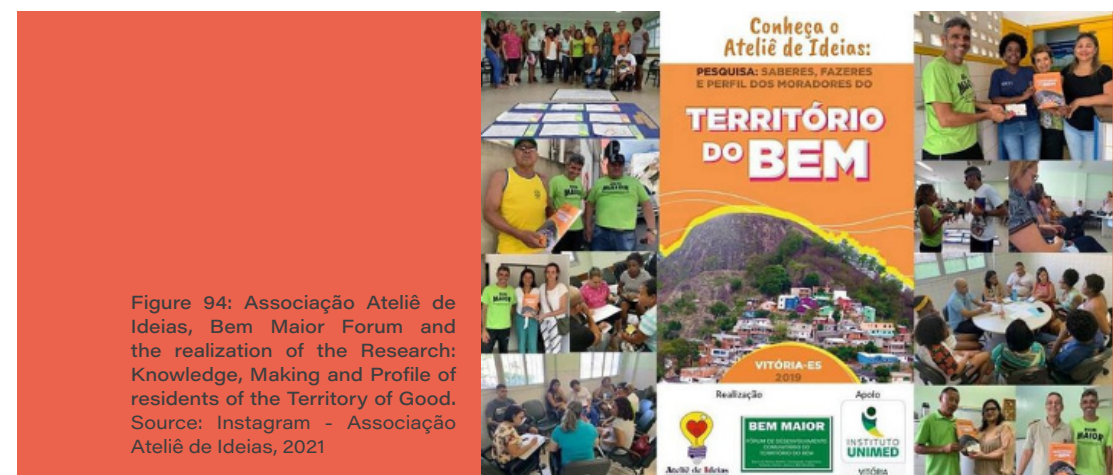


Figure 94: Associação Ateliê de Ideias, Bem Maior Forum and the realization of the Research: Knowledge, Making and Profile of residents of the Territory of Good.
Source: Instagram - Associação Ateliê de Ideias, 2021

## Presentation of good practices, collaborations, and potentialities

Throughout the years of operation of the Associação Ateliê de Ideias, actions were put in place to enhance the solidarity economy through social projects carried out together with the residents. Soon, Banco Bem's social technology activity, its credit lines, and the Network of Solidarity Digital Banks, e-money, developed as a digital social currency platform (Figures 95 and 96).



Figure 95: Trade in the Território do Bem and e-money. Source: Instagram - Associação Ateliê de Ideias, 2021

Figure 96: The Territory of Good and the Good Bank. Source: Instagram - Associação Ateliê de Ideias, 2021

Currently, at Banco Bem, three lines of credit are offered to residents of the Território do Bem: housing, productivity , and consumer services. The credit analysis is different from conventional banks: the database of the Brazil Credit Protection Service (SPC Brazil) or similar is not taken into account, but rather a closer assessment of the community, analyzing the possibilities of payment of the borrowers and their families, the different formal and informal remunerations that the applicants receive,  as well as conducting consultations with its neighbors.

The Bem Maior Forum is an important partner and consultant for the elaboration of credit analysis criteria. It may also be necessary, as a last resort in the decision-making process – when Banco Bem's credit analysis committee and credit analysis committee reach a greater impasse – that credit applicants submit to the forum to justify their credit taking at the Community bank.

The housing credit offered by Banco Bem was elaborated from the suggestion of a builder who took his inquiry to the bank's management group. According to him, it was not possible to build in the Território do Bem and in the most affluent neighborhoods of the city, because the communities did not have access to credit that would enable this type of practice. It was from this intervention of the residents of the territory itself that the housing credit line was made feasible.

With the advent of banco bem's housing credit and the creation of the Bem Morar cooperative, focused on the manufacture and sale of concrete-soil bricks and also promoted by the Community of The Território do Bem, and the Associação Ateliê de Ideias, the first tests of the provision of ATHIS aligned with the demands generated by the commercialization of bricks are provided. Between 2005 and 2017, this entire network of partnerships previously presented worked and also had the support of the University of Espírito Santo (UFES), the Government of the State of Espírito Santo, the Micro and Small Enterprise Development Agency and Entrepreneurship (ADERES), some municipalities of RMGV, companies such as Companhia Siderúrgica de Tubarão (current ArcelorMittal – Tubarão Unit), Vale, Petrobras and organized civil society entities such as the Caixa Employees Association, BrazilFoundation, The Third Sector Foundation of the State of Espírito Santo and others.

The activities of this network culminated in several attempts to practice the provision of ATHIS, resulting in approximately 15 years of experience  in ATHIS, urban interventions, participatory processes and elaboration of environmental and patrimonial projects by architects and urban planners  who today make up the founding members of the Onze Association8. In the search for discussion, the tensioning of the different spheres of public power, and by the joint articulation of activist entities and individuals in favor of the right to adequate housing and sustainable urban development, the Onze8 Association began to approach the center of BrCidades (BrCidades ES).

It is important to highlight that projects that enabled housing credit, provided by Banco Bem, were also executed, and added to the technical advice on architecture practiced by the Onze8 Association. However, it was noticed that the values practiced were insufficient to ensure a fair remuneration of the professionals involved and the monitoring of the work, the latter is a very important service to ensure the provision of assistance and the security of application of the granted credit. The interest on housing credit that could adequately remunerate the parties involved would become too costly to borrowers without external financial contributions. Thus, the offer of this service was discontinued.

Understanding the desire and the need to act, the conscious objectives of the partners of that institution became conscious objectives: the indispensability of a diffuse

process of raising financial resources – for the feasibility of the projects of the Onze8 Association – and the search for edicts and partners that could sponsor the operationalization of advisories that would ensure the development of architectural projects and the execution of civil works.

The institution mentioned above is organized in the process of political discussion about decent housing, the right to the city and the tensioning of public authorities and class entities, together with a network formed by the BrCidades ES Center, Associação Ateliê de Ideias and several actors of organized civil society, demanding appropriate public policies.

Collaborations were made in the composition of item 6, "Dignified housing and right to the city", from the document "Inclusive cities, an agenda for the elections of Espírito Santo" (Figure 97), in order to share the experiences of the Onze8 Association and generate proposals relevant to the theme, so that they could be registered in the agenda elaborated by the core of the BrCidades ES in the year 2020.



Figure 97: Inclusive cities, an agenda for the elections of Espírito Santo. Source: Site - BrCidades, 2020

## Acting in a pandemic situation

In May 2020, in the face of the global health crisis caused by covid-19, the Onze8 Association, in partnership with the Associação Ateliê de Ideias, obtained the financial and operational contribution of the Unimed Vitória Institute to implement the Housing Health project. The objective of the project was to carry out renovations in residences in the Território do Bem (Territory of Good) in order to improve the life quality of families and adapt the wet areas of the residences to better conditions in the care processes against covid-19.

The selection of beneficiaries was carried out based on families in situations of socio-environmental vulnerability, headed by women, and appointed by community leaders who made up the team of professionals participating in the project. The Housing Health was conceived in line with some of the practices of the solidarity economy, seeking the application of financial resources directly in the territory, such as hiring local labor, relocating the beneficiary families in properties of the same territory and purchase of construction materials in developments in the region.

Maria Sônia, one of the women contemplated by the project, is a black mother of three, is 38 years old and married to Benedito. Her house is ordinary and it has distances in its facades which are in the front, in the back and on one of the sides. The building consists of a living room, two bedrooms, a kitchen, a bathroom and a laundry room (Figures 98, 99 and 100). The family was selected for the high state of vulnerability in which the physical and psychological health of the mother was and by the severe condition of the wet areas of the residence. The bathroom, which was located at the back of the residence (Figure 100), had in its roof the water reservoir tank, where it was possible to notice the exposure of the hardware of the slab structure. It was possible to identify the existence of mold and humidity, in addition to the lack of proper connection of the bathroom's sanitary sewage to the sewage collection network present in the neighborhood.

During the project execution process, it was possible to create a closer relationship with the family and thus try to better understand their life dynamics. The approach was carried out in the meetings for the development of the architectural project, participation of logistics operations, monitoring of the execution of the work, process of finishing the project and delivery of the residence.

The parents presented drugs and vices, even leading one of its members to the need to move from the neighborhood. It was possible to identify the sexist environment maintained by the components of the family nucleus and the place of caregiver to which

Sonia was submitted. Being aware of this situation, the professional of The Onze8 Association responsible for the care of this family chose to focus most of the participation of the project decisions on the mother, intensifying the appreciation of it for the family and explaining that it was for her that the family had been selected to be attended by Housing Health.

The Association Ateliê de Ideias connected the family to public health services and to the network of collaborative initiatives promoted in the Territory of Good. It is noteworthy that, during the project process, the cultural vocations and productions of Augusto for rap and Hip Hop culture were identified. In the face of this scenario, the person responsible for the family service contacted the Associação Ateliê de Ideias, which, together with Varal, the communication agency of the Territory of Good, connected him with the NGO Festival, a platform to promote the creative economy.

The need for social distancing and the urgency of family care made it impossible to seek support from local groups and collectives that could contribute to the mapping of local beneficiaries and labor. It was verified, over the time of the project execution, the omission of the necessary information for the selection process by the beneficiary families, as well as the scarcity of qualified local labor.

During this project, the struggles related to the lack of urban structures and infrastructure in territories of socio-environmental fragility were even more hidden, especially because it was being



Figure 98: Front facade of Maria Sonia's residence. Source: Ivan Rocha.



Figure 99: Frontal distance from the residence of Maria Sonia. Source: Ivan Rocha.



Figure 100: Background facade of Maria Sonia's residence. Source: Ivan Rocha.



Figure 101: Front facade of Maria Sonia's residence after renovation. Source: Ivan Rocha.



Figure 102: Frontal distance from the residence of Maria Sonia after renovation. Source: Ivan Rocha.



Figure 103: Background facade of Maria Sonia's residence. Source: Ivan Rocha.

implemented during the covid-19 pandemic. The logistics of construction materials was a difficult challenge to overcome, since the projects for the sale of construction materials deliver the materials only to the roads accessible to vehicles, often distant from the construction site. Struggles were also experienced in rainy periods, because rainwater drainage infrastructure overflowed due to system clogging and irregular connection of sanitary sewage, causing strong flows of contaminated water along the length of the place´s staircases.

During the completion of the execution process of the last works, the sponsoring institution also chose to invest in the improvement of the aesthetic conditions of the houses, involving professionals outside the Territory of Good, being these individuals disconnected from the processes of approximation with the communities. It is notable that such action caused a distancing from the initial planning, focused on the hiring of local labor, generating problems with the parallel power existing in the community and distancing the families benefiting from the process as a whole.

The project was completed in March 2021, after a long process of alignment and execution between the different parties involved, causing the presence of beneficiary families that did not fit perfectly in the selection criteria and internal and external labor to the territory. Even if the teams tried to bring the beneficiary families closer to the decision-making processes, the pandemic and the

urgency of care made it impossible to practice this participation more accurately.

Throughout the course of extension Foundation in Science, Technology and Society of the University of Brasília (UnB), it became clear the need for a different form of operation with the communities in which the Onze8 Association works. However, the course provided a review of the network of existing agents and their actions on a prism that strongly signals the role of the Associação Ateliê de Ideias as an entity acting in the adequacy as a potentiator of the democratization of knowledge and emancipation of the Territory of Good.

It is necessary to access this large existing network about the joint work bias and the adequacy focusing on the central role of the territories population of activity. In this way, we value their knowledge and structures to walk together and join forces in the processes of conquest and militancy about the proper housing.

## Learning in bioconstruction:
## a case study in the Pequeno William settlement (DF)

The struggle of residents of rural settlements is predominantly a class struggle, resulting from the concentration of wealth in the countryside since the beginning of our country, being intensified from the so-called "green revolution", which led many family farmers to surrender their land to banks because of indebtedness and the fact that the cities periphery and underemployment were their destine. The difficult life in the cities and the love for the land, inherited from their parents and grandparents, led many of these children and grandchildren of peasants to join social movements fighting for "agrarian reform", creating camps on highway banks and facing all kinds of aversion by the dream of returning to produce quality food and having a decent housing for their family.

However, reality shows that after 8 or 15 years of living under a tarp (Figure 104), many of these campers die along the way or give up the dream, and those who manage to be settled continue to wait endlessly for public policies of housing, water, transportation, education, energy access to health and resources to production.

Sustainable and ecological solutions among agents responsible for the construction of public policies for housing, supply, and rural sanitation are still distant from the National Rural Housing Program (PNHR), not integrating survival strategies (shelter, water, energy, food production, and waste treatment) witnessed in rural settlements of the Distrito Federal. Such solutions represent the reality of architectural design from eco-techniques (SATTLER, 2007), as the habitat with life quality integrated into the configuration of survival relationships results in the landscape of the striking rural area in the territory.



Figure 104: Tarp shack. Source: Gustavina Alves da Silva.

On the other hand, the National Policy for Technical Assistance and Rural Extension (PNATER) still needs to advance the challenge of overcoming the interconnected challenges in the territories, and not only of a single sector, such as family farming but also rural development and in a broader society project, such as rural sanitation and housing issues, that configure the production of the habitat of peasant knowledge.

The National Rural Housing Program (PNHR), included in the Minha Casa, Minha Vida Rural (My House, My Rural Life) Program (PMCMVR), was created in 2009 with the objective of helping housing production to family farmers and rural workers. However, one of the great criticisms of the PNHR, among others, discussed at the III Habitat and Citizenship Colloquium, held in May 2015 in Brasilia, is associated with the high standardization of projects and construction systems, the lack of direct involvement of residents and the devaluation of specific characteristics of the final beneficiary, resulting in a housing of a strongly urban nature, as a consequence, also, of the lack of specialized technical assistance to communities.

## Description and contextualization of the territory

The field visits carried out by the CASAS Model Office and the FAU/UnB Peripheral Group to the mst, Pequeno William, colônia I and oziel alves III settlements, each presenting different stages of social organization and "urbanization", have been conducted in research and extension work on the production of the rural habitat of peasant knowledge since 2015, an integration of research carried out by the peasants themselves of the Landless Workers Movement (MST), scholarship holders in the matter of the graduation of the Rehabilitated Specialization course of PPG-FAU/UnB as well as experiences accumulated since 2015 in extension work carried out in agrarian reform settlements in the Distrito Federal.

Due to the bias of housing self-construction and sanitation infrastructure, the discussion involves the problems arising from the absence of public policies and technical assistance/advice of housing and sanitation for the use of social technology, which ends up creating difficulties for residents in the transition of habitations in shacks of plywood, imposing limitations on housing projects in bio-constructions and the constant lack of water for survival. The long wait for those who were selected for a housing provision policy for rural settlements ends up imposing precarious levels of housing, subjecting families to all kinds of health risks. Most houses are built with materials discarded by urban areas, such as wood, plywood, plastic tarps, old roofing materials, the rest of PVC panels, and other materials found in dumps on the outskirts of cities.

The Pequeno Willian settlement was created in 2011 and is located in the Distrito Federal, in the Planaltina Administrative Region (RA-05), next to Pedra Fundamental, the historic landmark of the creation of Brasilia, in an area of 144.17 hectares, where 22 families are settled (Figures 105 and 106).



Assentamento Pequeno Willian - DF
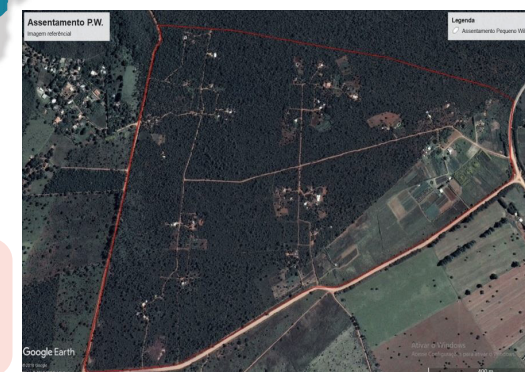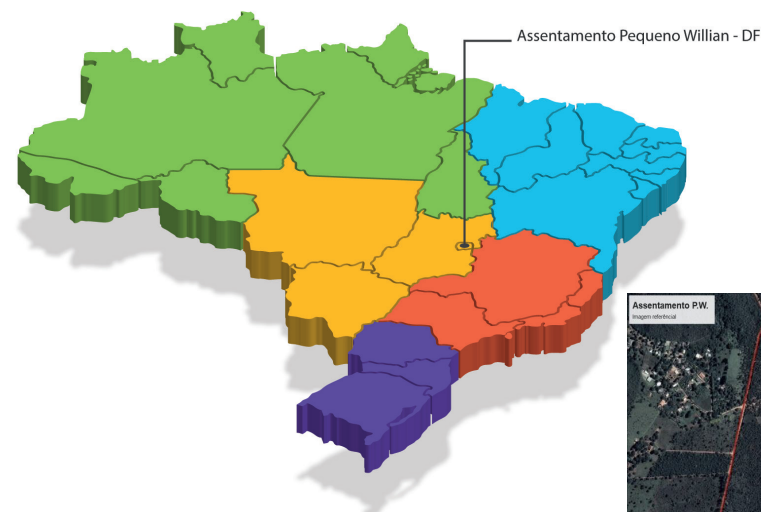
Figures 105 and 106: Pequeno Willian Settlement: Location. Preparation: João Lima Farias, 2022. Design winner of the nine draws made by the campers themselves. Source: Google Maps.

## Presentation of good practices: building with materials of nature

The research on good practices in the Pequeno William Settlement sought to present solutions developed by the peasants to meet the need for decent housing and that, at the same time, were environmentally correct, economically viable and that could be self-built. Lengen (2008) states that the choice of the material to be used needs to be in accordance with the climate of the region in order to achieve maximum comfort and harmony with minimal costs.

It presents here, therefore, the process of building a kitchen with land, since this is the most abundant material on site. The construction was made with dirt , mainly adobe and the Taipa de Pilão (rammed earth ), which exists approximately 3000 years before Christ (bc), in Mesopotamia and Egypt, even in the current farms of the Bolivian mountains, passing through the North African Kasbah of the Middle Ages and the peoples of La Meseta (ONRUBIA et al., 2003).

The construction process began with a meeting of traditional knowledge exchange in the community to rescue the ancient knowledge about the use of materials from the place for the construction. We also sought the participation of the academics (teachers and students) of IFB-Planaltina, and at these moments it was noticed that almost all of the

participants knew some technique or had lived at some point in a house built with land.

Then, the Taipa de Pilão (rammed earth) was chosen for the constructions (SILVA, 2007 apud MOURA, 2013), made in a pilled-up form after all the tests and attempts were done with the local dirt or mud . It was a wonderful experience. The lack of water at the construction site was initially resolved with the supply thanks to a tank truck and, in a second phase, with the roof ready for rainwater capture. Other techniques were used after this study, such as hand Taipa (mud with wood), COB, super-adobe and adobe.



Figures 107, 108 and 109: Pilled up made of Hand Taipa (mud with wood) wall filling. Students of UnB-Planaltina. First taipa (mud with wood) was built on the land ranch. The current house is practically completed. Source: Gustavina Alves da Silva

## Collaborations and potentialities

The interaction between peasants, students and teachers showed that the dialogue of knowledge is a way for new proposals for changes in society. Pedagogically, the objectives were achieved with the teaching-learning process that the practice provided. The construction with land, accompanied by a technical housing advisory, specialized in Housing of Social Interest, can reduce the lack and bring more comfort and dignity to the families of the settlements.

## Application of ATHIS in São Vicente with a development partnership with CAU/SP

The Council of Architecture and Urbanism of the State of São Paulo (CAU/SP), in order to promote the social function of the Architecture and Urbanism professional in the territory, and apply the Law of Technical Advice in Housing of Social Interests (Federal Law No. 11.888/2008), launched a notice to select Civil Society Organizations (CSOs) and establish a partnership through an Advancement Term for the development and execution of projects that qualify housing for low-income families. The ATHIS law ensures that these families with incomes of up to three minimum wages, settled in urban and rural areas, have access to free public technical assistance from qualified professionals when they need reforms, regularizations, expansions and other services.

The Institute Prococum, with its center in Santos, in the state of São Paulo, seeks to activate and participate in networks in which the focus is to promote social transformation. Since 2018, it has had the ATHIS working group, at LabProcomum, a citizen laboratory that offers interaction spaces and workshops, and welcomes different communities of creation and collective practices. This WG, formed by architecture and urbanism professionals, seeks to perform activities that promote ways to achieve the qualitative improvement of low-income housing.

With surveys and diagnoses obtained through the methodologies of the study groups, the ATHIS WG in Baixada identified territories that urgently need access to technical advice. In 2020, the WG focused its activities on the community of Vila Margarida and Mexico 70, in the macro-region of Baixada Santista, in São Vicente. In addition to promoting the Training Course for Professionals in ATHIS and Mobilization Seminars, already with partnerships to promote CAU/SP, the WG, after signing up for the notice 006/2020 and being contemplated in 2021, selected 60 architects from all over Brazil, through a public call, to participate in workshops and mentoring. These professionals received an aid grant in order to offer, in contrast, in this case, an architectural or urban project in co-creation with the population of Vila Margarida (São Vicente), for improvements to their homes and the neighborhood.

## Description and contextualization of the territory

According to the latest survey by the Brazilian Institute of Geography and Statistics (IBGE), conducted in 2010, the Metropolitan Region of Baixada Santista (RMBS) has

approximately 300,000 people living in subnormal clusters. Among the nine cities in the region, São Vicente is the second in the ranking of the occupation of peripheral places, besides being among the 10 cities in Brazil with the highest number of homes built as shanty boats.



Município de São Vicente - SP

**Figure 110: Location.** Preparation: João Lima Farias, 2022.

The island has sheltered some of the first urban occupations in Brazil, and therefore suffers the consequences resulting from the deformation of its watercourses and the irregular occupation of its areas of springs. Daniela Colin (2017), architect and urban planner, presents in her master's thesis the urban changes in  the water paths of The Island of São Vicente, and states:

> Its territory has a large number of water bodies, including springs, rivers and streams. Because its land is naturally flooded, it took large infrastructure works to address issues related to public health and urbanization. At the end of the 19th century, the sanitary engineer Saturnino de Brito was responsible for the infrastructure project that allowed the drainage of surface waters from the urban area of the eastern region of São Vicente Island, mainly through its drainage channels (BRITO, 1910) (LIMA, 2017, p. 14).

The sanitary infrastructure works designed by Saturnino de Brito were partially accepted by the government, which reported  budgetary losses for entire  execution drainage plan. This resulted in social and environmental problems in the western part of the Island, increasing the unhealthiness of the territory, which until today suffers from the government's  lack of caution .

Due to the lack of state responsibility, and due to the migratory movement of the 1950s, the territory began to suffer the first reflections of bad planning socio-spatial development. The abnormal clusters of Vila Margarida, considered quantitative in the housing deficit, are just some of the problems raised by architects and urban planners hired through the notice. With the listening of the community, data surveys, map production, diagnostics, and historical processes of urban occupation on the island, it was noticed that the urban network located in the west of the hills grew in a less orderly way, disregarding the water courses and mangrove areas, even causing a large number of buildings on shanty boats and dumping of effluents and domestic sewage directly on their courses (AGEM, 2005; CARRIÇO, 2015).



**Figures 111 and 112: Shanty boats de São Vicente, in São Paulo.** Source: Mariana Cosmassi

There are numerous problems found in this land, such as flood areas, scarcity of quality of public spaces – leisure, contemplation, social interaction and permanence – lack of infrastructure in general – lighting, drainage and sanitation, road pavement, waste treatment, etc.). –, resulting in an unhealthy area with poor socio-spatial adequacy, harming ecosystem health, the solidarity economy, income capture and production of decent habitat.

Ancestral knowledge and peasants are still present in the dynamics of occupation of the residents of the shanty boats. Fishing is the main source of income supply for families resisting in the territory.

## Presentation of good practices

The methodology chosen for the production of architectural or urban projects in collaborated creation with the population of Vila Margarida, for improvements in their homes and the neighborhood, in times of pandemic covid-19, was through the elaboration of the participatory process, in which it sought to approach the collective organizations that already operate in the area, mapping the most collaborative residents to approach the community,  in order to establish the so desirable  process of listening. The whole process is being carried out remotely through digital platforms.

After the process of listening and preparing the diagnoses, the needs plan is implemented together with the community, which seeks to find solutions for a possible adaptation of socio-technical aspects of the space, identifying families, places and dwellings of the extreme urgency of intervention.

## Collaborations and potentialities

Despite the territorial context that exists in Vila Margarida, it is notorious the feeling of belonging that the residents have, in addition to the collective thinking that is established every time in the meetings.

## Sociotechnical advisory of resistance in Santa Luzia, Structural, DF
### Description and contextualization of the territory

Santa Luzia, an informal settlement that emerged in the 1990s on the banks of the Structural City, on the edge of the landfill – then called "lixão da Estrutural – of the Structural Urban Park and the National Park of Brasília, lives the process of "peripherality" (ANDRADE, 2019a). Residents remain in extremely precarious conditions, aggravated by the constant threats of removal by the government, on the grounds of contamination of the soil given by the dump and the worsening risk of ecological degradation of the National Park of Brasilia (PNB).

In 2015, the Public Prosecutor's Office of the Distrito Federal proposed a Public Civil Action (ACP) calling for the reforestation of the buffer range of three hundred meters

(Complementary Law No. 530/2012) of the PNB. Due to the developments of this ACP, and due to the impasse of the environmental context, the Housing Development Company (CODHAB) presented a proposal for a linear housing complex of 3.2 kilometers for the relocation of residents of the neighborhood, totally removing the existing solidarity networks in the informal space. However, this proposal is not adequate to the reality of the families of Santa Luzia, and neither does it fit the environmental vulnerability of that area.

The goals, of  the Santa Luzia occupation, are to  propose solutions within the framework of the neighborhood plan in which the right to the city, decent housing, water and sanitation is guaranteed, and to provide subsidies for land regularization of social interest with popular participation, Reurb-S (Law No. 13,465/2017), which procedures and instruments are regulated in the Distrito Federal by decree no. 40,254/2019.
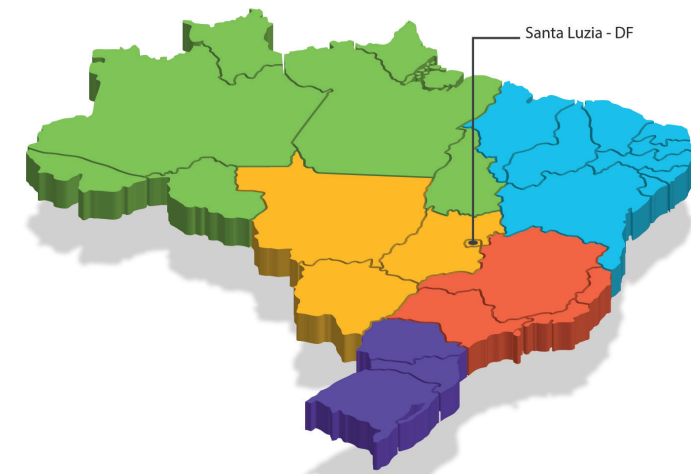


Santa Luzia - DF

Figure 113: Location.
Preparation: João Lima Farias, 2022

## Presentation of good practices: university extension in sociotechnical adequacy

Within the matter of the extension sphere of the University of Brasília (UnB) in Estrutural, the Research and Extension Groups "Peripheral, emerging works" and "Water and Built Environment", of the Faculty of Architecture and Urbanism of UnB (FAU-UnB), have been working more solidary and sustainable solutions, which take into account the informal development process. Barroso (UFBA, 2018) points out that land regularization of unusual occupations, unlike the formal development that, first, deals with the documentation of property and urban planning and then allows the occupation, it should consider the populations already established on the site.

The peripheral group's proposal is to rescue contributions from the urbanism of organic and participatory traditions based on self-organization from the bottom up, which form the basis of the sociotechnical adequacy of the group, where the subjects of scientific knowledge share their technical codes with the organized social subjects and assimilate the sociotechnical knowledge existing in the community, forming the "Freirian and sociotechnical pedagogical interactionism".

The Project Process for Suitability Sociotechnical (AST) is constructed from the demands and vocations raised and the analysis of potentialities and problems: local identity, existing knowledge, spatial patterns and events (Chart 6). The spatial and event patterns, developed by Alexander et al. (1977), and urban ecosystems, developed by Andrade (2014), are selected after a participatory diagnosis of the site in the form of affective maps, an analysis of the context that contemplates the patterns of events related to space and social expectations mapped by the analyses of the dimensions of social sustainability, cultural, emotional, economic and environmental.

These standards are systematized to establish a language with the community and increase their participation in the process, in the form of "generating codes" of solutions for the project development process (Chart 6). In each project, after the selection of standards, schemes and drawings related to each process-generating code are developed, which allows a connection between them in a systemic way, and can be presented to communities as a form of language between designers and community.
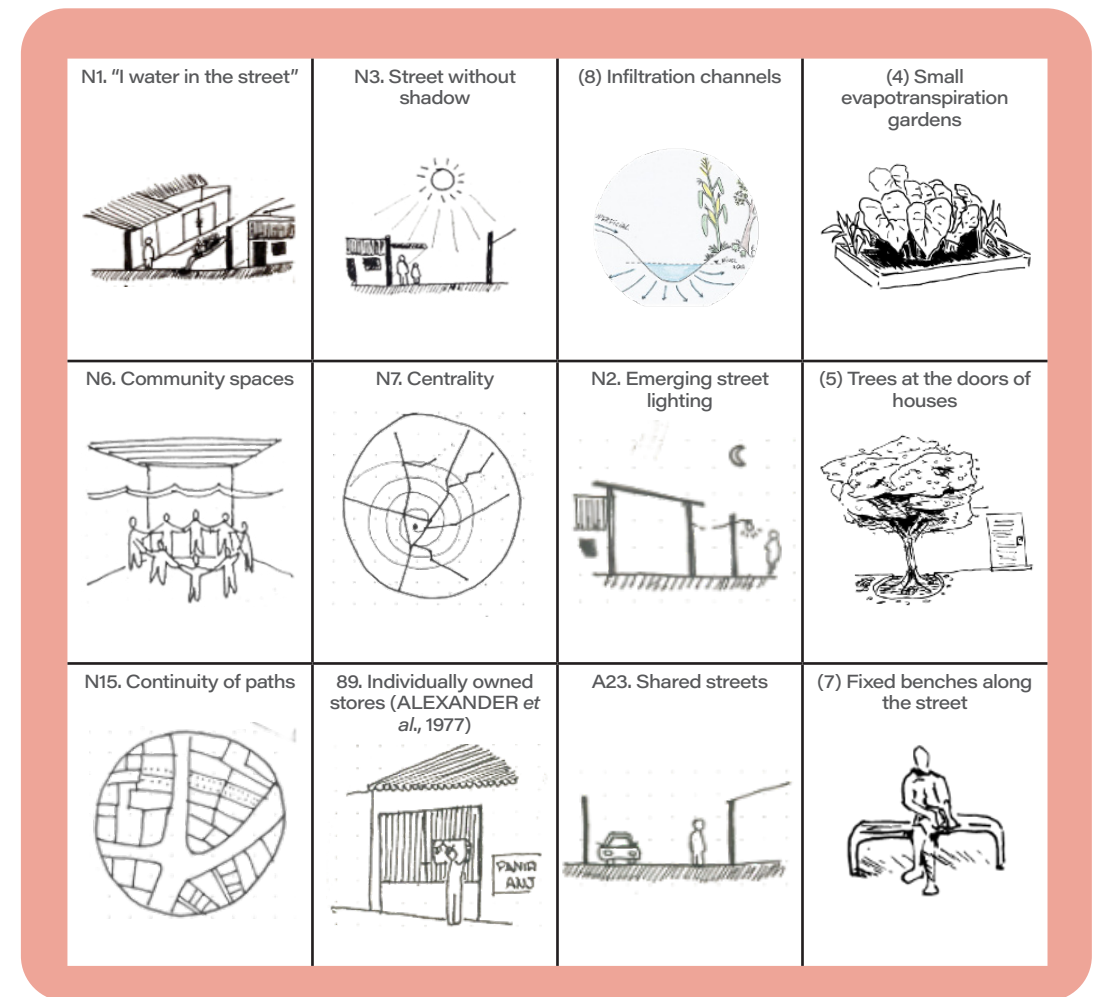


Table 6: Extract from the tables of urban patterns in the central region of Santa Luzia. Source: ANDRADE et al., 2021

The technical advisory actions of the Peripheral in Santa Luzia began at the end of 2018, with the first field visits and first contacts with the reality of the occupation. A set of interviews – with the president of the residents' association, with the coordinator of the Child Development Center and with people in the public space – brought more and more information about the health conditions, the solutions given by the residents, the absence of public services and infrastructure, among others. It was at the end of February that, in a meeting with a representative of the NGO Educamar, the physical space of the institution was obtained for the organization of the workshops. The NGO's contact network was used to apply a questionnaire and spread the next technical advisory activities.

In addition to neighborhood walks, debates and interviews, three mapping

workshops were held to achieve a diagnosis of the Santa Luzia context in the four dimensions of sustainability. The first workshop focused on the social and cultural/affective dimensions, the second on the environmental dimension and the third on the economic dimension (ANDRADE et al., 2021).

The 2019 Neighborhood Plan (Figure 114), developed by Fialho, systematizes the diagnosis and scenarios glimpsed by the residents. In addition, the work includes technical supplies related to water-sensitive planning and the adequacy of the territory with Nature-Based Solutions (SbN). We can highlight the rain gardens arranged along the most integrated roads and the design of a Linear Park that seek to maintain the percentage of permeable areas and offer green and leisure areas for the population.

In parallel to the Neighborhood Plan, which works the proportion of urban planning, the emerging project "The Dwelling of Powerful Women" brings micro-urbanism interventions in the heart of Santa Luzia. Together with the architect Portugal, the residents who participated in the workshops of the Neighborhood Plan designed their houses to adapt them to bioclimatic strategies for greater adaptation to their needs and greater environmental comfort, valuing ventilation and natural lighting in all rooms. On the facades, the railing garden walls refer to the dynamicity of the facades (Figures 115 and 116). Portugal and Rezende worked together on the urban space to open roads and design new lots for medium-sized constructions inserted in the existing fabric. This proposal allows to overcome the housing deficit and making the removal of homes for a better performance of public space worthy.
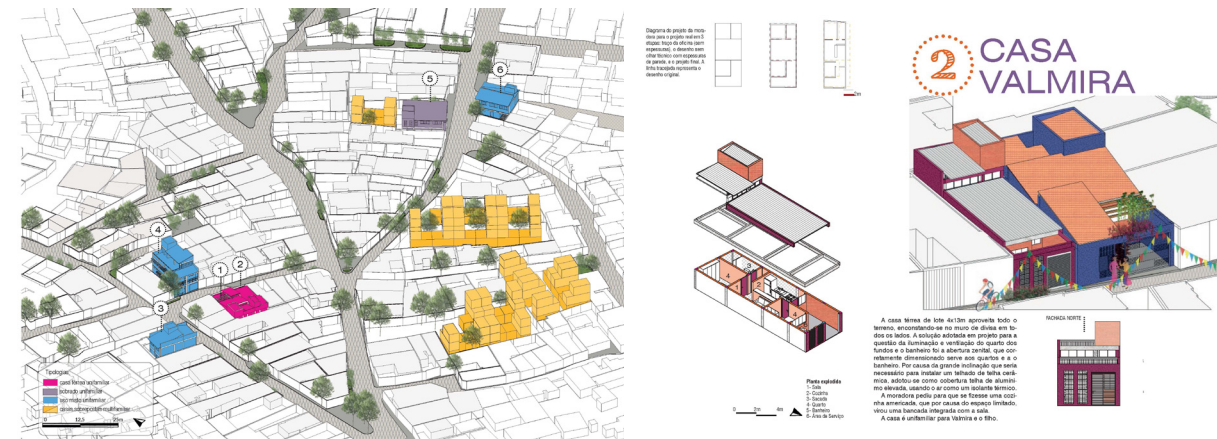


Figures 115 and 116: The Inhabit of Powerful Women: Microurbanism in the heart of Santa Luzia and Sociotechnical Assistance on the housing scale. Source: PORTUGAL in: ANDRADE et al., 2021

## Collaborations and potentialities

Throughout the work process in Santa Luzia, sociotechnical potentials were highlighted, as it is the case of the Collective of Powerful Women. The meeting with the Powerful Women's Collective took place throughout the participatory workshops, and especially on a day when only two women, Valkyrie and Rosangela, appeared in the workshop. There was no way to continue with the planned activities, so an interview was improvised in which, among other findings, it was discovered how the collective of women was constituted. Monthly, the NGO organizes a bazaar and, to get the first passwords at the opening, many women stayed all night in the street, one bringing coffee, another bread etc. This story seems anecdotal, but symbolizes very well the work process of sociotechnical assistance, emerging practices and solidary practices. Today, the Collective Association of Powerful Women is being formalized to promote the solidarity economy in Santa Luzia. It is interesting to notice how the collective has evolved from a social entrepreneurship to a solidarity enterprise in which artisanal social cooperativism, training and strengthening of the local community are promoted.

The methodology used is based on the assumption that the socio-technical subject can focus on urban planning by the Neighborhood Plan and thus seeks the empowerment of low-income populations. In order to contribute to an alternative solution to the government's proposal, the Peripheral Research and Extension Group has, since 2018, gathered a diversity of technical advisory work developed in conjunction with the population of the Santa Luzia occupation.



Figure 114: Santa Luzia Neighborhood Plan. Source: FIALHO, in: ANDRADE et al. 2021

## The Union Building
### Description and contextualization of the territory

In view of the housing deficit and the long daily displacements, initiatives arise with the objective of bringing more residents to the central areas of the city of São Paulo. The following example is the União Building, a vertical building occupied in the 1980s, located at Rua Solon, number 934, Bom Retiro neighborhood, a central region of the city of São Paulo. The morphological insertion of the building is characterized by the great concentration of textile production and commerce, which divides the space with manufacturing sheds, clothing stores, low-rise buildings and old houses, worn over time. The 8-floors, ten-meter-long building was abandoned in its construction phase. A gradual occupation made it a verticalized tenement, which in 2002 had 72 families living (GONÇALVES et al., 2015).



Edifício União, Bom Retiro - SP

Figures 117 and 118: Location Maps.
Preparation: João Lima Farias, 2022.

Edifício

### Presentation of good practices

In order to develop a social project of physical improvements, FAU-USP started the project of research and extension of services to the community. The Municipal Department of Housing of São Paulo suggested the development, offering assistance to those who agreed to leave the property. Thirty families accepted and then remained 42 families in the building.

Technical interventions, such as the installation of a new electricity grid, initiated improvements at the site. With the help of the Institute of Technological Research of São Paulo (IPT), the Fire Training course was taught to 20 residents of the building, training them in the initial attitudes in case of a fire accident. At that moment the residents organized themselves and the collective efforts solidified, like the cleaning efforts. Industry partners collaborated by donating windows and gates to the front facade of the building. The recovery of the main facade was fundamental to raising the community's self-esteem and further promoting the union of its residents. Thus was chosen the new name of the building: Union Building.



Figure 119: Before, during and after the facade renovation. Source: REHABILITATE PCC US p.

With the help of the Gaspar Garcia Center for Human Rights, the process of Collective Urban Usucapião (Adverse possession) was started. This step raised the confidence of residents, who began to improve their own apartments.

The structure, however, presented corrosion in the reinforcements (Figure 119). The age of the building was approaching the life limit – 50 years – foreseen in NBR 15,575 (ABNT, 2010). A corrective intervention project was elaborated and the residents themselves got specialized technical training to reinforce the most critical pillars. Part of the material used was given by Gerdau and MC Bauchemie. Along with the restoration of the security and stability of the building, came the social gain achieved with the technical training of residents. Figure 120 shows the fabrication of the structural reinforcement armor made by the residents. In addition to the structural reform, the main facade, roof, and internal apartments have also been improved, accommodating the 42 families with relevant comfort and environmental quality.

Figure 120: Extension of the useful life of a concrete structure from the 1960s, which houses 42 families in a vertical tenement condominium in downtown São Paulo. (OLIVEIRA et al., in: Annals of 54th Brazilian Concrete Congress). Source: IBRACON, 2012

## Collaborations and potentialities

The partnership between the population, the public authorities, the public university and the private sector form a successful work when collective work, developed through socio-technical work, is recognized.

In 2008, the Requalification Project of the Union Building received the international Award Deutsche Bank Urban Age Award, which includes creative solutions to housing problems.

The socio-technical work developed in the Union Building serves as an example to be applied in the various degraded and empty buildings existing in the centers of large cities. With the ease of infrastructure availability and the proximity of the various economic activities that the center offers, this has become an attractive potential market for housing. These are opportunities for requalification and reoccupation of buildings through social service, to fulfill the right to housing and the city.

## FINAL CONSIDERATIONS

The case studies experienced and reported by their respective authors – guided by the concepts of sociotechnical adequacy, solidarity economy and Freirean pedagogy – represent examples of self-construction, bioconstruction, sustainability and self-management within five distinct contexts. In each of the practices, it was possible to connect with the transdisciplinary theoretical references for habitat perspectives in the countryside and in the city, in addition to the proposals made by the current housing programs.

The housing programs usually run into obstacles of excessive bureaucracy, lack of resources and complexity, in addition to trying to remain the housing movements within a logic of capital, working as companies. This distances the interested communities from a pillar of self-management, in which residents are the subjects active in the process and aware of its possibilities and limitations. Sociotechnical Adequacy (AST) comes as a tool for social construction and empowerment of the subjects involved, aiming at learning and training.

The examples reported show us the importance of AST to overcome the inefficiency of the State in relation to the housing of social interest, both in the city and in the countryside. But this assistance cannot be detached from ecological responsibility, ancestral knowledge, local identity and the participation and appropriation of the community itself. The interaction between the experiences reported in this chapter and the concepts presented in the discipline demonstrated a special interest of the rapporteurs in improving the socio-technical adequacy aspects of their processes, whether regarding the relationship between housing and work, self-management or the integration of socio-technical subjects in habitat production.

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## Chapter 05

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