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FROM AUTHORIAL DRAWINGS TO THE PARAMETRIC MODELING OF TERRITORIAL OCCUPATION: REPRESENTATION AND MODELING INFLUENCES IN THE PROCESS OF DESIGNING THE URBAN SPACE

Dos Desenhos Autoriais à Modelagem Parametrizada da Ocupação Territorial: Influências da Representação e da Modelagem no Processo de Projeto do Espaço Urbano

Ana Clara Mourão Moura & Sheyla Aguilar de Santana

Universidade Federal de Minas Gerais – UFMG
Escola de Arquitetura, Depto Urbanismo, Núcleo de Pós Graduação em Arquitetura e Urbanismo
Rua Paraíba 697, Savassi, Belo Horizonte – MG, CEP 30130-140
anaclara@ufmg.br
shesantana@hotmail.com

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ABSTRACT

The objective of this article is to argue that we are living in a new era in the drawing process of urban planning and urban management, and this change is the result of developments in the technologies of spatial representation. The era of post-modernism is being replaced by a new moment dictated by parameterization. What preceded this new condition was the significant evolution of geo-technologies, the wide dissemination of their resources and the facilitation of their usage due to the availability of data and applications on the worldwide network of computers. The laws have encouraged the access to information and defined that the urban projects, necessarily of collective interest, should be discussed and agreed with the participation of the community, which has brought as a requirement to issue the visualization of the information. To lead the discussion on the relationship between urban design and its graphical expression and mapping, it's presented a brief overview of urban history until today, to defend a proposal of a periodization in the history of urban representation, through its relationship with methodologies of urban planning. The text presents as conclusion the indication of contemporary values, which are: interoperability between systems, investment in visualization technology, integration of the community in volunteered mapping and, above all, methodological processes based on Parametric Modeling of Territory Occupation.

Keywords: Contemporary Urban Design, Parametric Modeling of Territorial Occupation, GIS.

RESUMO

O artigo tem como objetivo defender que vivemos uma nova era no processo de elaboração dos projetos de planejamento e gestão urbana, resultado da evolução nas tecnologias de representação espacial. A era do pós-modernismo está sendo substituída por novo momento ditado pela parametrização. Favorece esta nova condição a significativa evolução das geotecnologias, a ampla de difusão de seus recursos e a facilitação de seus usos devido à disponibilização de dados e aplicativos na rede mundial de computadores. As legislações favoreceram o acesso às informações e definiram que

os projetos urbanos, necessariamente de interesse coletivo, devem ser discutidos e aprovados com a participação da comunidade, o que trouxe como exigência a questão da visualização da informação. Conduz discussão sobre a relação entre expressão gráfica e cartográfica no planejamento urbano, do início das primeiras cidades aos dias de hoje, com proposta de recorte temporal pelo desenho de representação, através de sua relação com metodologias de planejamento urbano. Aborda valores contemporâneos: interoperabilidade entre sistemas, investimento em tecnologias de visualização, integração da comunidade em mapas voluntariados e, sobretudo, processos metodológicos baseados em Modelagem Parametrizada da Ocupação Territorial.

Palavras-Chave: Projeto Urbano Contemporâneo, Modelagem Parametrizada da Ocupação Territorial, SIG.

1. INTRODUCTION

The study of urban issues, understood both as the research on the forms of agglomeration and urban occupation, such as the recognition of urban morphologies proposed throughout history by the agents of transformation of the territory, is of broad interest to the areas of science which undertake representation techniques, analysis and proposition of territorial occupation.

The history of urban agglomeration is the history of the construction of cultures, once the man only performs its evolution through systems of trade and interaction, when it produces knowledge. Thus, it's of interest to propose a specific conceptual approach of the subjects on urban occupation, choosing as motivation discussion *the state of the art* of what has been produced in terms of form and function in the history of urban occupation, and at the same time to correlate *the state of design* on the representation of the territory. This is the main purpose of the article: to understand the parallel development of modes on territorial occupation and modes on representation of the forms.

By carrying out a brief description of human trajectory in occupation of the urban space, segmented into three main stages, this text leads to the reflections until the days of today and transcribes the thoughts of the authors on the current values, contemporary challenges and perspectives that can discern on new trends in geo-technologies and in the urban planning management.

The division into three great periods of urban occupation is arbitrated by its alignment with the employed forms of representation of the territory, which are: the period of general composition of cities based on the drawing of morphologies (pre-modernist); the period of decomposition of the landscape in typologies and zoning (modernist); and the period of recognition of spatial complexity and proposition of models to represent the territory (post-modernist). The text defends that we are already living in a new stage of transition, from post-modernism to a new stage, guided by the interests and reasons for parameterize, calibrating and configuring the anthropic landscape.

Some authors as Choay (1965) argue that the urban planning was born with the needs of the industrial revolution, when the chaos of the agglomeration in cities demanded the construction of new logical thoughts in order to propose alternative ways to that reality. Some other authors also separating the urban occupation to urban planning, that means the condition of territorial agglomeration, and the structuring of a thought on the ordination of the urban territory.

When we speak of urban occupation, some authors as Reis Filho (1968) argue that a settlement is defines as city itself only when there are urban framework standing. This means the presence of people who live economically in activities favored by urban agglomeration, as is the case of service providers, public officials, among others. And this also separates the urban occupation the urban planning itself, a discipline that investigates and proposes activities related with the study, regulation, planning and control of the city.

There are authors (as Choay, op. cit.) that define as "pre-urbanism" the actions of drawing of cities without the complete condition to exert regulations actions, control and management of cities. Despite our respect for authors who have preceded us, we won't exclude from the activities of urban planning those actions based on simple drawings of the territory. The option for building a text that mentions three borders for a temporal delimitation of urban studies, as explained, is justified by changes in the way of representation and proposition of territorial

occupation urban. And this representation is what is important for the research in cartography and geo-technologies.

The demarcation of space to human occupation is not recent. The more different cultures, along their trajectory on the globe, have proposed morphologies or drawings for the distribution of activities and settlements, depicting their cultural values related to the social hierarchy, the logics of social agreements, and the way to relate to their natural environments.

Since the beginning of the territorial occupation the human beings have structured forms in their settlements that fulfilled functions, said about the conditions of the site occupied and reported the cultural values of the whole community. We could present sketches of known forms of occupation and describe the significance of its functions, such as: plants of cities in the form of stars, composed of many tips and each of them with the task of being an advanced point in the observation and protection; plants of cities designed as circles with a clear hierarchy of social and functions distribution, valorizing the central place; plants in uniform reticulated with egalitarian distribution of occupations, but valuing the central *locus* where were placed the elements of greater civic value; among many others. (Figure 1).

Even in more recent times, the propositions of drawings guiding the occupation of the territory continued to be proposed as a way to materialize functions, values and ways of life, as there are the remarkable examples of Brasilia and Palmas, in Brazil. In contrast, there are countless authors that had the role of not taking care of urban form itself, since the complex reality of urban space translates to a much wider range of variables, defending that the spatial arrangement would be only a result of these many forces. Between these authors is Milton Santos (1996)

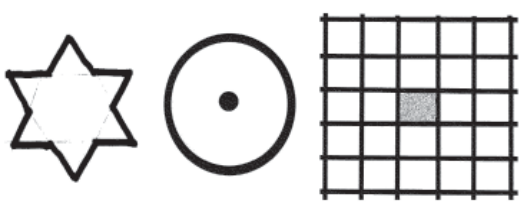

Fig. 1: Morphologies of human occupation in urban agglomerations and reflections on their meaning in the relationship of form and function.

that argued that urban occupation is the result of the interaction between fixed and flows, dictated by socio-economic interests, but others Marxist authors could be mentioned (Engels and Marx, 1948; Engels, 1975; Lojkine, 1981; Castells, 1983; Lefebvre, 1970, among others).

Nevertheless we recognize that the city is a "palimpsest" of activities and relations, term defined by Harvey (1992) as the sum of many stages of its existence, in this article we will choose the focus the materialization of human occupation in space, constituting urban spaces, by drawing or planning the human territorial occupation. It is our interest to argue about how urban agglomeration was supported by techniques of representation and map viewing. It is also an objective to investigate these principles today, and think about the role of technical, here understood as geo-technology, in the conformation and breeding of the urban space present.

The text presents the defense of the existence of three major moments in the relationship between planning and urban design and its representation, based on skills and values of cartographic representation and, in more recent periods, in geoprocessing, without the risk of rigidity of boundaries and borders. It is a cut-off that constructs a reflection, developed to understand the evolution of values and design tools. They are:

a) Pre-modernism - An art of map viewing, vision of synthesis and ability to represent the essence of territory in its *genius loci*, with authorial action in the definition of morphology of urban occupation.

b) Modernism - Rationalization in territorial occupation with inclusion of general normative which should be applied to the homogenous areas, recognized as zoning and related to rigid definition of sectors in the use of the urban soil. The thematic cartography was used to decompose the representation of the landscape into themes and identify occupation typologies to define zoning.

c) Post-modernism - Recognition of the complexity of urban reality and the planning processes in multidisciplinary and transdisciplinary groups. Geo-technologies widely disseminated and used to record information, and to develop specifications,

analyses, diagnoses, prognoses and proposals to territorial occupation. Geo-technologies and digital displays used as vehicle for communication and exchange information among the many actors involved in the planning and management of the territory. Construction of representative models of reality, according to different points of view, for decision support.

d) Contemporaneity - Parameterization, interoperability, Geodesign, integration BIM and SIG, strong investment in communication and dissemination in the network, community involvement (VGI - Volunteer - Geographic Information), legislation to support the standardization and policies to permit access to information.

2. THE PRE-MODERNISM IN THE CITIES: THE PROPOSITION OF THE FORM IN PROCESSES OF DRAWING OF THE PLANT OCCUPATION

Since the beginning of the history of human occupation of the territory, the search for forms more expressive to represent the natural and built environment is subjects of interest. There are interests to understand how to shape the perception and cognition of a territory, in order to propose codes or shared symbols to avoid gap in the communication and promote dialog with the community. The effective and eloquent representation of the territory has always been understood as a condition of strategic territorial dominance, which is why its development began associated with the military power and the tactics of war.

The architects and the urban planners always had, as an instrument of labor, the forms of graphic communication that would allow the bridge between their ideas, their mental representations, and the transfer of these ideas to the public. This way, the principles of representation of the form were always a theme of research to the architects, and the recent digital technologies have expanded the conditions to simulate the proposed, constructed and observed environments.

In the history of urbanism, the representation of the cities in zenithal view, informing urban morphology, is object of research, which aims to understand the relationship between the form of cities and the construction of mental maps, perceptions and generation of links between users and territory, what, in essence, is the culture of the place.

In the representation of view top of the city of Bologna, for example, we observe that it was bounded by walls and presented roads that give continuity to the tracks from the Roman period, as the so-called "Via Emilia". The Italian territory still keeps these records of the major roads that linked one sea to another, from one occupation to another, as the Adriatic tracks, the Apia Way, among others. Connected to the major axes, the fortified cities delimited the territory as if the city would be the reproduction of the cosmos, where everything would happen and was not required the relationship with the surroundings of its context. It was as if the city could not grow beyond those limits, did not suffer pressures of transformations, because everything was already well defined by those who proposed the form of occupation. (Figure 2).

In addition to representations of top view, there were also common the three-dimensional sketches to communicate, even in simplified form, the essence of the image that was built for the place. This is illustrated in Figure 2, in the design of Rome, and in Figure 3, the city of Palmanova, whose morphology in form of a star endorsed the promotion of many points of observation and maintenance of safety. The design of the proposition of linear city is also as an example of three-dimensional sketch with the representation of the urban form essence. (Figure 3).

The representation of the city itself, in many examples of this stage of pre-modernism, appears as an art of map viewing. In addition to the informative elements themselves, there are many other elements with aesthetics function, which occupy place and interest in the drawings, as the complex stamps and records of the author of the plan, like the project of Barcelona. (Figure 4).

What this long phase of urban design leaves as legate for the methodologies of representation and visualization of the territory is the principle of achieving to translate, in simple designs, the morphology of the occupation. The representation was profoundly inaccurate, but reflected the essence of the place. Some authors, such as Norberg-Schulz (1980), already in the

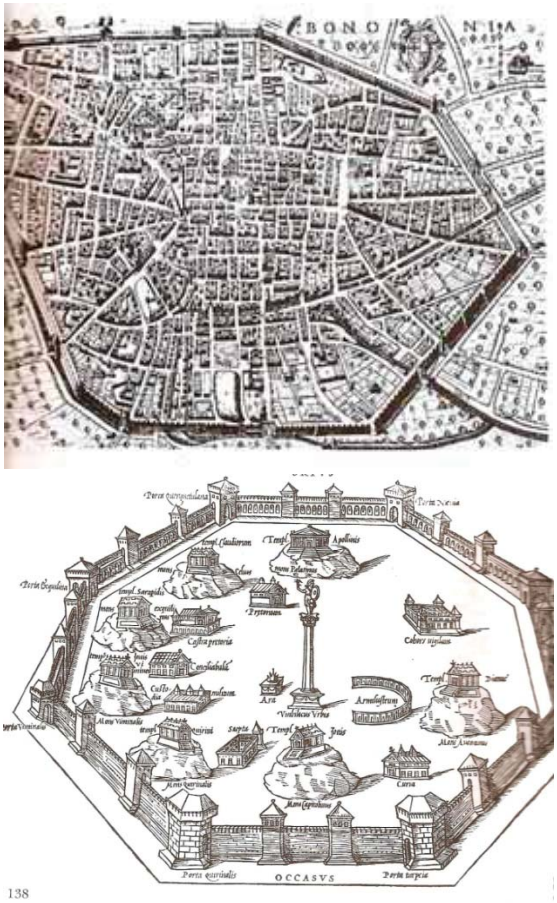

Fig. 2- City of Bologna - second half of sec. XVI, and diagram of Rome - period of Serbian Tulio, drawing from 1527.

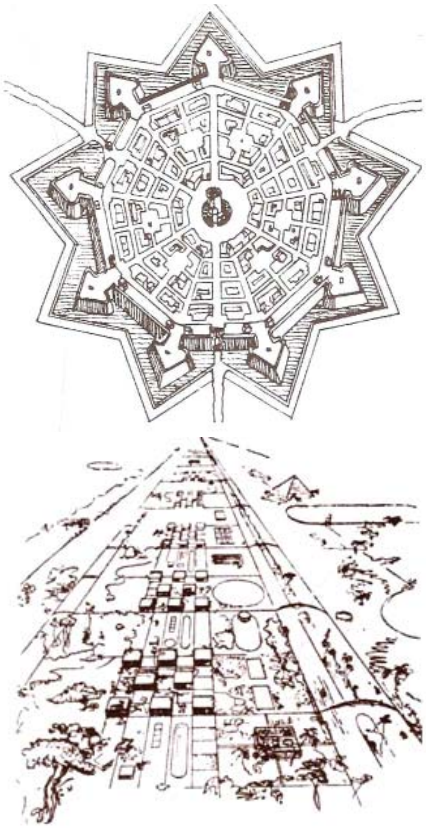

Fig. 3 - Original plan of the city of Palmanova, near Venice, 1593, and an outline of the proposed project for linear city of Magnitogorsk, in the USSR, designed by Ivan Leonidov in 1930.

post-modernist urban studies, will be interested specifically in studies that reflect the essence of the place, called *genius loci*, for which the references of image that characterize each territory were graded and used as reference in processes of spatial intervention.

And thus, we can say that the urban occupation was resulting of authorial projects, in which the agents of transformation of the territory were restricted, but there was clarity between what was proposed and what was executed. The cartographic representation reflects the essence of what should compose the urban morphology, and is performed through sketches, with expressive artistic interest.

As synthesis, one can say that in the pre-modernist period the representation of urban space was characterized by mapping inaccurate, but strong appeal of communication, by the vision of synthesis and the ability to portray the essence of the territory in its genius loci, and by the authorial design definition of morphology of

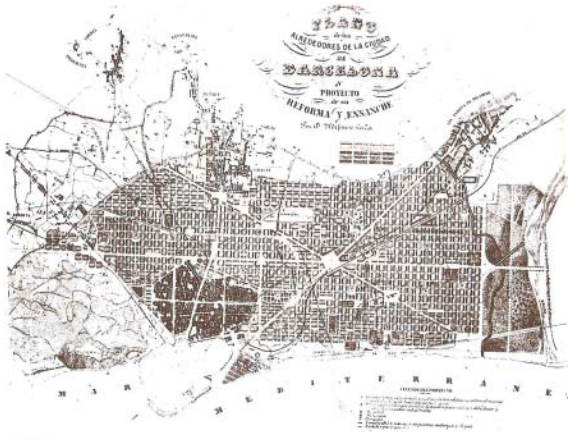

Fig. 4 - The arrangement of Barcelona, designed by Idelfonso Cerda in 1859. (Source of the image: Benevolo, 1976).

urban occupation.

3 ZONING, TYPOLOGIES AND HOMOGENEOUS AREAS

The modernism in the urban space is characterized by clear intention to ensure functionality in the use of the territory, so to make the orderly distribution of activities, in-process in

which the form followed function. It was based on the objective of the rationalization of life in the city, both of the collective and individual life. To ensure this orderly, rationalized, controlled and visibly structured occupation of the city, the modernist urban planning is based on the design of new towns or in the proposition of the zoning occupation of the city, with the tight distribution of segmented activities (Harvey, 1992).

Modernism is the result of profound transformation of society in the period of the wars, and especially in post-war, when it was necessary to rethink, rebuild, and propose a new way of living the city. The values cultivated were the generalization (proposition of a single way of living for the global scale, ignoring cultural and geographical differences), standardization (to facilitate the reconstruction and construction of new areas), and the optimization of the use and the clear distribution of resources.

A benchmark of modern urbanism was the Charter of Athens, organized by Le Corbusier (1933) as the conclusion of the VI International Congress of Architecture. At the event were discussed references to what was expected as a model for the new cities. Among the major precepts, it proposes the spatial division to the acts of work, live, recreate and circulate. As a result, the modernist city is managed in the form of zoning, where the same conditions for use and occupation of the territory are applied. These principles have guided and still guide many Brazilian master plans. (Figure 5).

As a way to support the representation and proposition of zoning and typologies of occupation, the season was marked by the use of mapping in the form of thematic cartography and decomposition of the landscape in themes.

The issue of accuracy cartography is also addressed, recognizing the importance of having a more faithful portrait of Brazilian reality. It was a period of large projects for the production of the reference mapping, which until today are the only source of information for many cities in the country.

In this period a publication had a big impact in geography and urban studies, and prepared the groundwork for the next moment, in which began to assert the logic of integration and combination of variables. It is the book "Design with nature", of McHarg (1969), which advocates a methodology of combination of layers of information, composed of thematic maps, to identify areas of greatest interest to the preservation, using as an argument that the overlap of interests for many reasons (thematic layers) would indicate a hierarchy between the interests, ranging from the blockade of the occupation the full conditions of occupation.

Using very simple resources of representation, based on analogic thematic maps, McHarg inaugurates a way to work the urban synthesis which influences the next 5 decades. The logic was decomposing to compose, disintegrate to represented different aspects of the territory, organized in thematic maps, to integrate by maps algebra, even when carried out manually. (Figure 6).

At the end of modernism, significant contributions from geography prepared the groundwork for the arrival of geo-technologies in its extensive terms of analysis, planning and land management. It is the thought of structuring models, initiated by authors of reference among which we mention Chorley and Hagget (1967). The authors defined model as the structuring of simplified representation of the reality that, supposedly, presents the most important characteristics and relationships that exists. According to them, the model can be seen as a theory, a law, a hypothesis, a structured idea, a relationship, a function or equation, a synthesis

Fig. 5 – Zoning with definition of territorial segmentation in the use of the urban soil.

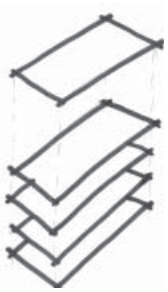

Fig. 6 - Layers of Information on processes of analogic overlay.

of data or arguments of the real world.

The modeling of environmental data is a vast field for employment of geo-technologies, especially of the geoprocessing and processes of maps algebra and the measurement of space occurrences, to support the characterization of territorial occupation. Between the modeling studies of spatial data, are very important those which aims the identification of patterns in particular spatial distribution, as well as the studies of predictive trends of occupation expansion.

At that time the tools were still incipient, but the authors have built the foundations of what would be the possible applications of Geographic Information Systems, and of systemic approach on spatial analysis.

4. MODELING, MODELS AND REPRESENTATION OF THE TERRITORY

The awareness on the complexity of territorial reality begins, and the vision post-modern inaugurates the interest in investigating the order in disorder, to identify the essence of that characterizes the urban landscapes and in understanding the territories as composed of inter-relationships between many variables and in constant change. It is the moment for the proposition of logics as Chaos Theory (the order in disorder and the dynamics of the transformation), Gaia (consciousness that all the territorial variables are inter-related) and the theories that defends the importance of initial conditions of the phenomena, as territorial occupation phenomena. (Ruelle, 1993; Gleick, 1990).

The post-modern vision brought with it a provocation in the ways of thinking about the urban, breaking with the proposals of segmentation and functional zoning. Also breaks with the authorial urban projects and replaces the city planner as the manager of collective wills, materialized in master plans and in urban redevelopment interventions, which must be approved in public hearings.

To know the territory, the scene where territorial dynamics happens, it's the most accurate way to take conscious actions to achieve the objectives defined in planning. In this sense, it is argued that the best way to analyze and produce data for a correct municipal management is the application of techniques of geoprocessing, by favoring the integration of information, the composition of variables in a systematic way, and proposition of possible scenarios and the construction of portraits of reality according to different optics and values.

About the importance of building a prior portrait, or many portraits that show the complexity of urban areas, before starting the process for the proposition of its ordination, defends Niccola (1991, p. 20): "Leggere il territorio prima di progettare, prima di programmare" (read the territory before designing, before programming.). The thought is completed by Van Der Berg and Van Der Meer (1991, p. 41) when they say that "É passato il tempo della pianificazione programmata. Si deve dare spazio ala flessibilità e alla creatività" (the time of planning programed it is past; space will be given to flexibility and creativity).

Thus, it's defended as a key point in the process of urban planning and management, the structuring of a cadaster, in the form of information systems. The collection of information about the geographical distribution of properties, people, services and other variables has always been an important part of the activities of an organized society.

Until recently, however, this was done only in analogic documents and maps, in paper, and because of that it was very difficult to produce analysis by combining several maps and data. With the simultaneous development, in the second half of the last century, of information technology, it became possible to store and represent information in computational environment, opening up space for the development of geoprocessing.

As challenges of this new stage in mode of thinking and produce the city, it's important to recognize that the capitalist mode of production, to reproduce itself, has to be always expanding the scale and embracing new sectors of production, new relationships and spheres of life. Lefebvre (1970) highlights the space domination by a capitalist process in the mid-60s and its growing and pronounced importance in the spheres of capitalist accumulation. The production of monopolistic space involves a large amount of money applied to the real estate industry, the construction of megaprojects, increasing

participation of the State in the implementation of these projects, and the production of spaces even more segregating and with few public areas, being predominant the private areas of collective consumption.

The ordination of segmented spaces and functional zoning doesn't attend anymore the speed and dynamics of territorial processing. Forward the economic crisis, the urban planning and urbanism acquire a new function, other than merely regulating the private sector. It is the promotion of economic growth and entrepreneurial action for the attraction of investments, to add dynamism to the local economy by redesigning its production chain and redefining its economic role.

According to the interest and the need to make the city a locus of economic production, the planners proposed to shape new images of the cities, within the logic of interurban competition to attracting investment. The reconstruction of the city, the design of new spaces, or the remodeling of certain sectors, transform physically the territory to which is associated with a new image, renewed, which was called by some authors as "city marketing" and "entrepreneurship" of cities. (Harvey, 1992).

The actions of city marketing are characterized by the construction and sale of an image that is associated with some quality of a territory that someone wants to sell. There are significant examples of cities that they build a simulacrum, an image (which may be of innovation, tradition, security, environmental quality, urban efficiency, pungent economy, among others) and sell the idea of this image to attract capital to the territory. (Puerto Madero in Argentina, Bilbao Museum in Spain, Pelourinho at Salvador from Bahia, and many others). The expectation is that, from urban surgeries or punctual investments, it results on the recovery of the region, and gets profit from the real estate transactions and the economic activities attracted.

These urban requalifying transformations, developed as urban surgeries, are done through specific intervention by major engineering works, on infrastructure and in territorial occupations, and in the construction of significant buildings. They are elements that act as catalysts for complex transformations in the use and occupation of the territory. This type of intervention is characterized as entrepreneurship or entrepreneurial urban, since it is commonly an association between public and private capital, with interests to both parties (Harvey, 1995).

The entrepreneurship occurs with the investment of private capital in public works, by interests of capital gain, which can be direct or indirect. The direct capital gain happens in the form of commitments by the increase of coefficient constructive or by occupation of areas through new real estate projects. The indirect capital gain occurs by the valorization of the area of intervention and consequent gain of the plus-value added to real estate resulting from the increased interest in the territory.

In the beginning, and yet in many cases, the entrepreneurship was also associated with acts of gentrification - term used by Ruth Glass (1964) and by Neil Smith (1980). The gentrification is characterized by urban ennobling, but followed by expulsion of traditional inhabitants belong to the lower classes, with the goal of recovery of real estate area and recovery of the market conditions of buildings.

The urban surgeries result in complex projects and need to be very well documented. The technologies of Geographic Information Systems are very useful in the composition of spatial analyzes that identify potential and territorial limitations.

The other axis of activity of urban planning today, which is responsible for transformations in large temporal and spatial scale, is represented by the definition of limits in conditions of territorial occupation, which means establishing urban parameters.

The parameterization itself is not an actual and new principle, but it was born in the laws of streets and blocks installation, in the master plans and their respective laws of land use and occupation, and in the buildings codes. At different scales the parameterization seeks to set limiting conditions or envelopes, both in the scale of installment payments, the occupation of lots, and the buildings constructions.

In the laws of urbanization are established parameters such as maximum dimensions and minimum lots, roads, courts, among others. In the laws of land use and occupation are established tables that established, by areas, types of

occupation and define references of setbacks, occupancy rates, coefficients of occupation, among others. In the codes of buildings are established references of minimum dimensions for various components of the building, to ensure the minimum quality for the occupation.

Thus, it is observed as values for the post-modern urban planning, the construction of forms of territorial occupation that contemplate the juxtaposition of different ways of thinking. The choice of the paths to be followed among the many possibilities is defined by community participation, leaving to planner the management of the actions and the task to meet these interests.

The master plans and the laws of land use and occupation already does not define the segmented distribution of activities in the city, but all uses, *a priori*, can happen in urban territory, if they respect the conditions of sustainability and the territorial capacity. This means, for example, to observe the localization of the lot to define its possible uses. To consider this plural look on combination of conditions, it requires the existence of basic information (cadaster) and methods and techniques of spatial analysis (geoprocessing).

The organized information, with accuracy and available, it's a strategic resource and is essential to take appropriate decisions and in a timely manner. The Geoprocessing is an important management tool, because it is a set of technologies for information processing, indispensable for spatial analysis. The use of techniques of geoprocessing helps to deals with complexity, as explains Tomlin (1990) the descriptions about "what" can be expressed in terms of comments-pattern, and more complicated measurements can be done by specific interpretations based on "how".

A great challenge of the technology applied to urban planning is the development of techniques and methodologies that are capable of adequately representing dynamic variables and create future scenarios of possible conformation of the city, for definitions of best strategies and decision making. Among these simulations, there are important studies related to the load capacity, because they respond by conditions of sustainability and dynamic balance of uses, occupations and activities in urban soil, in variables that are characterized as entities and events, in fixed and flows.

In addition to the possibility of the combination of variables, the GIS stands out by the possibility of application and construction of models, this means the identification and representation of the logics that reflected the occurrences and the territorial dynamics.

The representation of such complex realities requires the understanding that there are different perspectives and different responses to the same question, dependent on goals, values and of actors involved in research. Thus, an evolution in the use of Geographical Information System (GIS) was characterized by the proposition of models that represents the reality.

The objective of spatial modeling is to build numerical simulations of processes that are dependent on time and anthropogenic actions. In operational terms it's a mathematical representation of a process through the identification of its key components, represented by variables, factors of change and threshold of transformations.

The models produce portraits or scenes of a reality cut second spatial, temporal, methodological or conceptual criteria. They are simplified representations of reality, and to achieve a good characterization, they must be adjusted by procedures that simulate human thought. Thus, the study based on heuristic approach allows us to understand the procedures that govern the thought and the logic of knowledge about the spatial behavior, what means, allows us to understand the relationship and the hierarchy between the selected variables. According to Christofoletti (1997), the heuristic approach and an intuitive method of attempts to address a problem and arrive at a final solution by successive approximations.

In summary, the post-modernism means to recognize the complexity of territorial reality, and to propose ways of sustainable occupation according to environmental conditions and according to the values of the community. To achieve the combination of many factors, the role of geoprocessing is to make possible the composition of dataset organized as a Multipurpose Territorial Cadaster and, above all, in offering support for structuring of representative models of characteristics and territorial phenomena.

It can be concluded, therefore, that although the era of post-modernism in urban planning is still in progress, we advocate that already have begun to outline new trends in the way of designing the space, which would result in new era. The most interesting in this change that is announced, is that it is a product of the technique and, more specifically, of information technologies and geo-technologies. If the territorial and urban representation were limited to available tools, in this new time that is beginning the new tools defined the new way of thinking and projecting the urban occupation.

With the new conditions of communicability, visualization, storage and sharing of information; the processes of modeling of the urban landscape and architectural design, begins the time of drawing by definition of parameters, as advocates Schumacher (2008) which explains why the act of parameterization is the new style after the modernism, while post-modernism and the deconstructivism episodes were premature and transient.

5. CONCLUSIONS: PRODUCTION OF A CONTEMPORARY URBAN FORM THROUGH URBAN SURGERIES AND DEFINITION OF URBAN PARAMETERS

We defend that we are already experiencing a new paradigm in planning and designing the urban territory. We can't deny the influence of technical change in the new way of designing architectural and urban areas, and this significant change, which comes to a few large centers, defines the new era. The new technologies of information, the expansion of the conditions of participation of the community, the development of geo-technologies and the integration of functions of GIS and BIM create the foundations for change the way of thinking and shaping the urban territory.

It is observed that the two main forms of planning and management of the urban territory in post-modern age are still references in contemporary urban planning, which are: the urban surgeries and the application of legal references determined by planning parameters.

The urban surgeries transform the territory in short temporal and spatial scale, and change very rapidly and expressively the occupation and the image of a place, generating effects of irradiation of results.

The application of legal references by planning parameters affects the territory in temporal large-scale and in zone areas through standardization, as planned by master plans and their respective laws of land use and occupation. The action is more global, its visualization happens over time, and it defines envelopes or volumetric references for the occupation in local scale, in the unit of lot.

Thus, there are two movements in opposite directions: one that is punctual and of great impact, resulting in effects of irradiation of transformations; and the other that is global in the limits of a zone, can only be visualized in long term, because is the sum of constraints in local scale, materialized in the lots.

What differentiates the post-modern era of which we are defining as "contemporaneity", for lack of definition of new term - although some authors, such as Schumacher (2008) already speak of the time of parameterization - are that the proposed rules do not need any more to be applied in an uniform way to all components of an environment, even if they are in the same zoning. There are already legal and technical conditions for this new form of managing the urban occupation.

From a technical point of view, very interesting applications are in the process of developing, through which the users will be able to configure rules of behavior for the major variables, limits of acceptable for changing in the territory, according to standard deviations and transitional rules. Significant investments are been made in visualization, so that once created the rules, even the non-expert users will be able to perform simulations of changes in patterns of occupation and observe the results on the landscape.

This process has been employed in the production of dynamic maps, when the representation is based on cartographic or zenithal view, but also in models of dynamic three-dimensional representation, that considers the natural axes of the user visualization.

From a legal point of view, it's acceptable and desirable that each territorial unit of occupation can receive its volume conditioning by calculations of its own conditions and the conditions of its context. This means that even

within the same zoning or the same settlement of occupation, it is not mandatory that all lots have to fulfill the same coefficients and occupancy rates, the same setbacks, the same heights. Within a region, and observed the capacities, potentialities and restrictions of each sector, each individual unit can have its parameters differentiated, in accordance with the principle of searching for a dynamic balance of the whole.

What changes is that while the zoning provided parameters such as "vested rights" and uniform permission for all the units of its territory, in the new way of thinking the individual right is limited by the balance of the whole, and each unit can obtain individual response on their conditions to the use and occupation. Thus, it is possible to give different answers to different owners regarding the possibilities related to his property, without this been understood as retrenchment of law, but rather as search for balance in the occupation as a whole.

The legal basis on which this logic can support is not new, but constitutional: ownership and individual, but the use and social interest. This creates the conditions for which the owners understand that the authorizations will be differentiated by virtue of an overall balance and the supremacy of social interests on the individual ones:

"The urban property meets its social function when it answers the fundamental requirements of the ordination of the city expressed in master plan, ensuring the fulfillment of the needs of citizens as to the quality of life, social justice, and the development of economic activities, respected the guidelines provided in 2º article of this law." (Brasil, 2001, Estatuto da Cidade).

The expected flexibility in the occupation of the territory, especially in the occupation of the lots, needs to be supported by the new resources for simulating the volumetric composition of the occupation, in the process that we have chosen to call "Parametric Modeling of Territorial Occupation".

It's stand out that the technologies of spatial representation, and storage and management of territorial information, these so-called geo-technologies, are no longer used only in processes of analysis, but expands to support planning and territorial management through processes of Geodesign. Geodesign is the planned process of variable combinations, in spatial analysis models, integrating GIS with design to improve workflows in the broad use of geographic information. It´s the intelligent use of GIS because it´s important to focus on planning and provide a design framework, supported by technology, in a "metaplanning" (planning of the planning) process.

We are living in an odd time for urban spatial analysis, when information technology, and especially of georeferenced information, begins to be largely dominated by sector users, allowing us to use it, in fact, as a tool for diagnosis and application of models predictive, to support decision-making. Besides the maturation in using the tools, we are initiating a new paradigm in spatial analysis and representation, marked by the principles of interoperability between systems, strong investment in communication and provision of tools to simulate the projects in real time.

The present time is a result of the experiences in the past 25 years in urban and environmental studies using geo-technologies. Notwithstanding the use of geo-technology, through the creation of Geographic Information Systems has begun in some countries still in the 60s, we can say that the use of geoprocessing begins, indeed, more widely in Brazil in the late 80s.

The actual moment is particularly interesting because many users are already using the geoprocessing tools for the collection, storage, representation and analysis of georeferenced data. The Geographic Information Systems and their tools are now widely available and are used to support decision making. It is necessary to emphasize that GIS offer no unique answers or unquestionable results for space studies, but presents points of view, governed by different criteria, which are only to support the decisions because, ultimately, the decisions are still the responsibility of the experts who chooses and justifies his choices.

It is important to mention the significant transformation that systems BIM (Building Information Modeling) generated in the way of designing the environment. While in traditional systems the project process was dissociated from its representation, generally drawn after

the conception of the plan; in the new logic of representation the act of projecting is widely supported by systems of representation. The new technics are focused on viewing conditions, simulation and integration of information.

The processes of parameterizing in urban projects, and the development of communication technology and representation for this purpose brought, for the urban scale, the conditions for applying tools of broad support to design and planning. It is then the moment of integration of SIGs and BIMs, according to processes of Geodesign. This new era on GIS must provide tools for the "Parametric Modeling of Territory Occupation". (Figure 7).

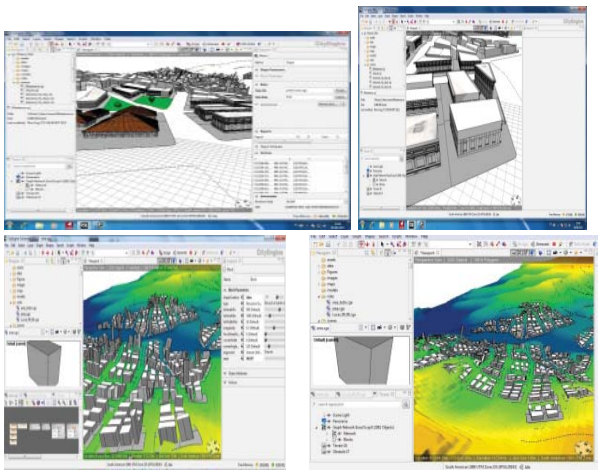

Fig. 7 – Example of urban landscape simulation resulted from the application of urban parameters.

Challenger perspectives are presented to the sciences of representation - among them the mapping and geo-technologies – as responses to new values which are consolidated in actuality:

- Interoperability between systems - the applications of GIS must consider the parameterization and need to be integrated;

- Expressive investments in visualization, since different levels of users should use the tools as forms of approval of the changes and projects in their urban landscapes. Promotion of different perspectives about the same reality, as the city is composed by many cities. The resources of geoprocessing, integrating simulation and visualization, allow the construction of different interpretations of the same reality.

- Recovery of studies on mental maps and the development of new researches, once the non- expert user in decision making is a '*sine qua non*' condition, required by law, and it's fundamental to build the bridge between space represented, real space and perception of the space.

- Provide the easier access to tools and databases in the worldwide network of computers, properly structured according to the principles of Spatial Data infrastructure (SDI), but also counting with collaborations and visions of groups of users, through applications of Volunteered Geographic I*nformation* (VGI).

The perspectives that presents nowadays are broad and stimulating, so that we are to assist the profound revolutions in methodologies ways to plan and think about the city, motivated by the development of the resources of cartographic representation, geoprocessing, parameterization and systems integration in the diffusion and involvement of new groups of users, experts and non-experts.

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