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PROPOSAL FOR A TOURIST WEB MAP OF THE SOUTH AREA OF RIO: CARTOGRAPHIC COMMUNICATION AND THE ACT OF REPRESENTING THE LANDSCAPE IN DIFFERENT SCALES AND LEVELS OF ABSTRACTION

Proposta de um Mapa-Web Turístico da Zona Sul do Rio: Comunicação Cartográfica e o Ato de Representar a Paisagem em Diferentes Escalas e Níveis de Abstração

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ABSTRACT

This paper discusses the need to develop qualitative thematic maps focused on orientation in a Web environment potentially idealized to the tourism sector. Assuming that different types of users deserve different types of maps, previous theoretical methodological and empirical studies might bring to light the real importance and effectiveness of associative maps, pictorial for the area. Considering the previous discussion, current inquiries aim at working on the creation of a cartographic project of Tourist Web-Map believing that this cartographic product can offer both a set of maps at multiple scales and in different reality abstraction levels, which do not necessarily depend on a preexisting web geoservices platform. This brings to the tourist/user three main possibilities: facilitate his/her understanding (reading of the map), thanks to the use of information redundancy resource, where the same representation is offered in different cognitives degrees (more or less associative or pictorial); offer a number of information of the appropriate destination to the process of cartographic generalization by allowing the space representation at multiple scales; may also make the product more democratically available (network access to a greater number of people), beyond the user have the possibility to customize the printing of maps according to his/her interest.

Keywords: Touristic Cartography, Cognitive Transformation, Cartographic Communication.

RESUMO

Este artigo discute a necessidade em se desenvolver mapas temáticos qualitativos voltados para a orientação em ambiente Web idealizados potencialmente ao setor do turismo. Ao partir do pressuposto de que diferentes tipos de

usuários merecem diferentes tipos de mapas, estudos teórico-medológicos e empíricos anteriores puderam trazer a luz a real importância e eficácia de mapas associativos, pictóricos para o setor. Considerando-se a discussão anterior, as indagações atuais se preocupam em trabalhar na criação de um projeto cartográfico de Mapa-Web turístico por acreditar que esse produto cartográfico pode oferecer ao mesmo tempo um conjunto de mapas em múltiplas escalas e em diferentes níveis de abstração da realidade e, que não necessariamente, depende de uma plataforma de geoserviços web preexistente. Isto traz ao usuário-turista três grandes possibilidades: facilitar sua compreensão (leitura do mapa), graças ao recurso da redundância de informações, onde a mesma representação é oferecida em graus cognitivos diferentes (mais ou menos associativos ou pictóricos); oferecer um número de informações do destino adequado ao processo de generalização cartográfica, ao possibilitar a representar do espaço em múltiplas escalas; podendo ainda disponibilizar o produto de forma mais democrática (acesso pela rede a um maior número de pessoas), além do usuário poder personalizar a impressão de mapas segundo o seu interesse.

Palavras chaves: Cartografia Turística, Transformações Cognitivas, Comunicação Cartográfica.

1. INTRODUCTION

The social practice of tourism occupies a privileged position in contemporary society. This is because a junction of technical and social factors enabled that the activity could exponentially grow after the second half of the twentieth century, for example, the shortening of physical (car, train, plane) and virtual (telephone, satellite, internet) distances; struggles and labor achievements (progressive reduction of working hours, weekends, paid vacation); better levels of education and a greater number of people in the middle class, etc. (DUMAZEDIER, 1999; CAMARGO 2001).

Thus, when a person thinks about traveling is natural to make a brief survey of the place to be "explored", looking for information related to natural and cultural attractions (tangible and intangible), the facility in transportation (how to get to destination and internal mobility means), ways of accommodation, recreation and entertainment, health services, tour and agency operators, etc. In the destination, the same person will seek ways to locate and identify the sites and the most important areas, thus establishing a prioritization of visits from the pre-established time and costs. In logic, the tourist can create or enhance a roadmap to optimize his/her trip, minimizing costs and valuing his/her time at the destination.

In this context, it can be said that the touristic map is part of the Tourism System (SISTUR) prepared by Beni (1998), for directly and indirectly participate of the information and travel arrangements politics, representing the various interest elements of the tourist (and of the trade) present in geographical space.

Cartography and tourism merge in the tourist maps, which should be understood as a branch of the thematic mapping concerned with the graphical representation of tourist information, giving rise to the tourist maps of planning or guidance (FERNANDES & SALOMÃO GRAÇA, 2014). The touristic maps for the planning are developed for public and private agencies responsible for the management of touristic activity, while the guidance maps are concerned directly with the tourist displacement in the touristic area.

According to Fiori (2010), the production of thematic maps aimed at touristic guidance is established more specifically in three essential aspects: information, means of dissemination and developed to laypeople in the cartographic semantics.

Information for helping visitors to plan, localize and manage the activities in space/time by recognizing points (what is, where is, how far), which they are related, for example, to the attractions, services and equipment.

Means of dissemination to create conditions so that the user have interest and even "visit" the element(s) represented on the map before knowing them on-the-spot. This is because the thematic product targeted to leisure interests search experience sensations such as memory, will to know, spirit of adventure, fun, curiosity, among others. Therefore, it is acceptable to highlight an affective relationship and valorization of the place through the use of maps. These

cartographic products are commonly offered to tourists by the trade (on-the-spot or in travel agencies) as a means of information (general and specific) about the destination.

In general, they have as potential user laypeople in the cartographic semantics (Brazil has a great deficiency in cartography teaching), so it is necessary to design maps that are afforded much information, but which are easy to decode and emotionally include the visitors. The main key is in the perceptual process, which studies the power of communication and persuasion of the developed graphical representations from the reality.

The cartographic product for the guidance of the tourist must pay attention to essential questions like "where am I?"; "what's there?"; "where am I going?"; "how am I going?", "where to go?" and "why should I go?"

The touristic mapping is required to answer such questions simply and objectively. When reading a map, visitors must understand the image and included encodings in order to decode and record the message of what it will be find in the real world, and thus, having an instant visual feedback to meet the need of location and / or information about the destination. Thus, the notion of scale, direction and positioning, as well as a symbology capable of being assimilated, are essential requirements for any questions directed to the tourism industry.

Looking at the map, the user will find two levels of reading: the first refers to the level of detail or elementary, where you need to make the reading of signs (BOARD, 1995; MARTINELLI, 2003) to give an answer to the question "what is there in such a place"? The second occurs in the set level, in which the map is seen as a whole and its image is engraved in mind to answer questions about the whole presentation (MARTINELLI, 2003).

Added to this discussion, that the mapping, no different from other areas of knowledge in the information age, is suffering a substantial change led mainly by the technological development of computing and telecommunications. Today cartographers have a great opportunity to use new tools available from multimedia, which establishes a new and exciting way. The change allows a dynamic interaction between the user and the product never seen before.

It is undeniable that such technology favors the development of maps not limited to a sheet of paper, to provide a lot of information in text, video, graphics, illustrations, different representations for the same information (levels of abstraction), scales (dynamic) , interactive representations, animated, voiced, in different languages, etc.

The future touristic Web-Map of Rio de Janeiro will serve both tourists (domestic and international) and the city dweller who wishes to locate, but also know and learn the many leisure activities and equipment and services in the city.

2. EFFECTIVENESS OF CARTOGRAPHIC COMMUNICATION IN MAPS FOR THE TOURISTIC GUIDANCE AND ITS INTERACTION

Assuming that most of the maps of touristic guidance ignores its primary function: the act of communicate, the producer, whether a cartographer engineer, geographer, artist or tourism specialist, has as his/her primary duty the correct representation of geographical information, respecting the easy readability, clarity and objectivity.

It is therefore essential to discuss the cartographic communication in the process representation of touristic information, as a touristic map to produce the desired effect should be able to answer correctly the following question: How do I say what to whom? (KOEMAN 1995; TYNER 1992).

The "how?" refers to the mapping language to be used which involves the locating components of the mapped areas, the graphical primitives (dots, lines, surfaces and areas) related to features of the area, the visual variables, the mapping symbols, the scale of the map, generalization processes that the information is submitted, as well as projection and coordinates systems to which the representations will be associated. In conclusion the "how"? refers to the map and

cartographic transformations that will be adopted to develop it. The "I", refers to the cartographer, the manufacturer of the map who encodes the world's information in simplified model of analysis. "What?" refers to the subject, information or group of main information which will be contained in the map. And "for whom?" is the map of the user, the target audience for which the map was developed (FERNANDES & SALOMÃO GRAÇA, 2014; MENEZES & FERNANDES, 2013) - Figure 1.

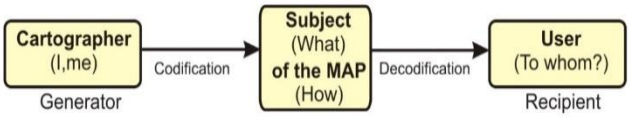

Fig. 1 - Simple model of cartographic communication composed by the four elements. Adapted source from Tyner (1992).

Currently, it is necessary to consider Peterson's perspective (1995), when discussing that the user can go beyond the mere spectator role in relation to the maps. This is because in interactive environments (controlled and provided in a cartographic project), the user can choose the scales; enable / unable, compose different thematic plans of information; introduce new data to the features of the information, etc. Such interactivity is made possible by computing platforms where the map was produced and where it is accessed.

2.1 The importance of pictography in guidance maps

The touristic Web-Map when providing different cognitive degrees of reality (conventional and pictorial maps) needs to address more especifically the use of pictorial symbols and illustrations as one of the important parts of the cartographic product proposed.

Briefly, maps denominated as conventional are composed by geometric and abstract shapes. This type of representation has more acceptance by those who are familiar with this semantics - that is taught formally, especially at school - being indispensable to resort to the legend to understand what the map has to say (KIMERLING et al., 2009).

In general, this level of abstraction provides a faster and more direct reading. Added to this, conventional products are qualified for the less visual pollution and the more frequent use of the graphic scale, showing a lower distortion of the cartographic base. Another important aspect is that much of the work has the correct indication of the Geographic North, title and better structured legends.

An important feature related to the conventional representations is highlighted by Schlichtmann (1985), when he adds that this type of graphic treatment will hardly arouse romantic dreams and / or user's imaginary, because what matters is its functionality based on a system of potentially abstract graphic symbols. Indeed, the more abstract the symbol is, the stronger must be the public education work on the meaning of representation (Dondis 1991).

The maps denominated pictorials are composed of illustrations and figurative symbols with some physical similarity (s) to the represented phenomenon, so being recognized more easily by the public in general (JOLY, 1990; MOSCARDO, 1999). Pictographic symbols, used in these maps, if well designed with regard to their referent, also reduce the need for a legend. If abstract symbols are used constant reference must be made to a legend (MORRISON & FORREST, 1995).

It is no coincidence that the touristic sector choose maps that contain a lower level of abstraction of reality. In Fiori (2005, 2010), objective empirical tests (a choice between predetermined alternatives) and dissertative tests (interviewed justifies why his/her choice) conducted with 241 interviewees (Brazil and other countries) revealed that more than 70% of interviewees prefer to take the pictorial maps on their travels, in addition, 87% believe that the pictorial maps encourage more the users to want to know the represented location (Figure 2).

Fig. 2 - Maps developed from the same cartographic base. Other maps (conventional and pictorial) can be seen at: http://srfiori.wix.com/sergiofiori#!caminhos-do-futuro/cg8d.

The most common single answers are linked to words like: beautiful, attractive, call more attention; easy to see, identify, visualize, locate; are preferred when one is already in place; detailed, complete; fun, creates more excitement and interest, holds the attention, sharpens curiosity; are good to plan the trip and want to know the place; are more colorful and suitable for tourists, etc.

The highest score of conventional maps occurs when asked which is the best product to locate and / or guide during the trip, but even so, does not exceed the preference of pictorial maps (42% choose the conventional maps and 58% choose pictorial).

However, the effectiveness of pictorial products is a major challenge because as remembered in the Internationale Tourismus Börse (1987), most of the professionals who develop these maps are, most often, graphic artists and not geographers, because the latter have difficulty to neglecting the accuracy in favor of attractiveness.

Most pictorial maps related to tourism have major structural deficiencies, such as lack of title, deficient legends, lack of scale and a guidance system. Added to the distortion of cartographic basis, and being flagrant, the omission of the most of the streets. Fernandes & Salomão Graça (2014) also emphasize that these products exaggerate too much on the size of accurate information. All these failures hinder the displacement and location of the various points of touristic destinations, not meeting one of the key objectives of this kind of cartographic product: the guidance of the tourist.

However, the pictorial touristic maps developed by Fiori (2005, 2010) have as an essential factor the users guidance, especially because the destination, as a rule, it is a space unknown by the tourist. In the study you can see that the maps even being pictorial may present title, scale, guidance system, general and specific legends to the practice of tourism (Figure 3). On the other hand, often the use of pictography requires more physical space (sheet size, computer screen) to be effectively represented than conventional maps. In the case of touristic Web-Map the problem might

be remedied through tools such as zoom, pan and pop up menus.

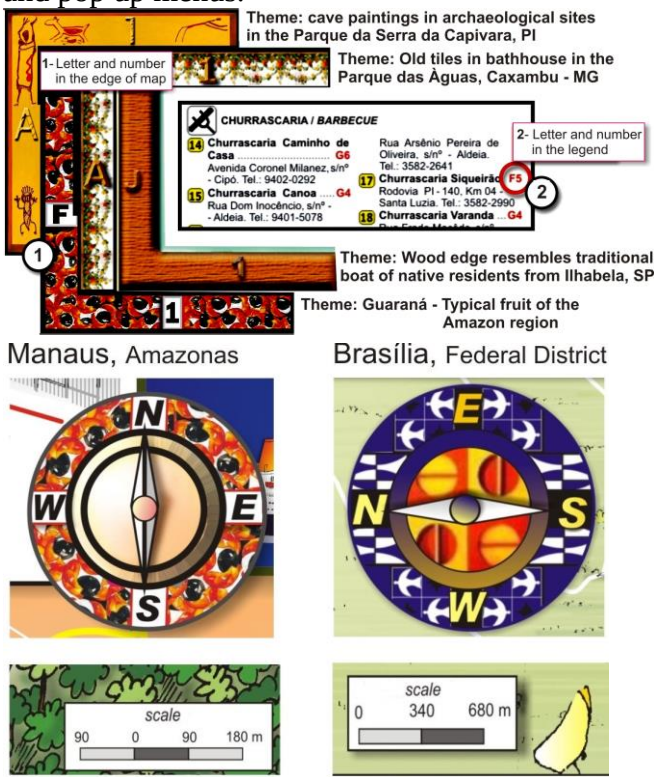

Fig. 3 – Examples of guidance system, legend, north arrow (or compass direction), and scale bar the pictorial touristic maps developed by Fiori (2005).

According to Cartwright & Heath (2002), the cartographer style must always respect the user's actual conditions, which may prefer to use different types of maps of a same destination, especially because the redundancy of information assists in the process of the represented destination. The great challenge of the interaction is to enable the user to find and react to graphical and textual information available (BROWN, EMMER & WORM, 2001).

The only certainty is that, due to the undeniable growth and importance of the use of pictography in cartographic products intended to the tourism, becomes more and more necessary the discussion of this type of graphic representation in thematic maps.

2.2 Cartographic Transformations and generalization process

Cartographic Transformations are essential for developing any type of map, whether paper, digital, publications on the Internet and other media. These transformations are applied to locative geographic data and to substantive geographic data (TOBLER, 1979). In other words, the cartographic transformations are conceptualized as the set of processes that changes the geographic information into cartographic information (TOBLER, 1979; CHRISMAN, 1997; CAUVIN, 1998; MENEZES & FERNANDES, 2013). The same concept can be applied to touristic cartographic information, which is configured as a geographical touristic information able to be represented on a map, after being submitted to the cartographic transformation process, which basically involves three types of transformations: geometrical , projective and cognitive.

The geometric transformation corresponds to the positions of the terrestrial coordinate systems and map, in addition to relate the map size with the earth's surface (rotation, translation and scale) (CHRISMAN, 1997; MENEZES & FERNANDES, 2013).

The projective transformations are characterized by the change of the three-dimensional world (earth's surface curve) in a bidimensional, flat representation. They are defined by datums and cartographic projections, each one with its own properties and characteristics that lead to the specific objectives of the representation (TOBLER, 1979).

Cognitive transformation deals with the real world modeling by the cartographer, which implies the generation of the map graphic language. In this section we work the generalization (selection, classification, simplification, displacement, highlight, exaggeration, association) and symbolization (conventional, mimetic, pictorial, illustrated). We study the perception of the user from the use of a particular graphic representation: reading, interpretation and analysis.

In the development of tourist maps, the relevance of cartographic transformations has different degrees of importance. Figure 4 shows the importance of the cartographic transformations in relation to this type of mapping.

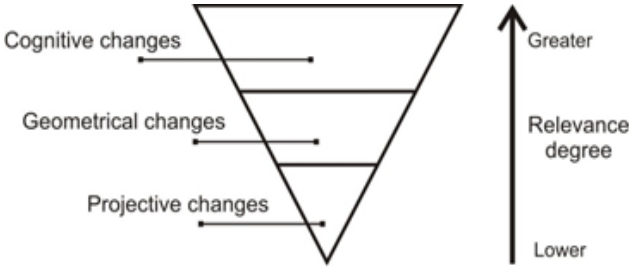

Fig. 4 – Hierarchical levels of the appropriate use of cartographic transformations for the touristic mapping (SALOMÃO GRAÇA, 2015).

Cognitive transformations must be aligned to the control elements (target audience, purpose, geographical reality, the mapping scale, technical limits) and to graphic elements of the mapping project (clarity and readability, visual contrast, picture and background, equilibrium or balance, and hierarchical organization of information).

In this context, the touristic Web-Map needs to worry about the generalization process (composition of various scales) of cartographic project, with distinct, clear and highlighted symbols in relation to the map background.

To perform a proposed generalization in computer systems targeted to the touristic cartography, a set of questions must be answered, addressing theoretical, specific computational elements (philosophical goals); the geometric conditions, spatial measures, and the operation controls (cartometric evaluation of material); and the respective geometrical (space) and content (attributes) operators to ensure an effective result, as proposed by the scheme formulated in Figure 5, from considerations of McMaster and Shea (1992).

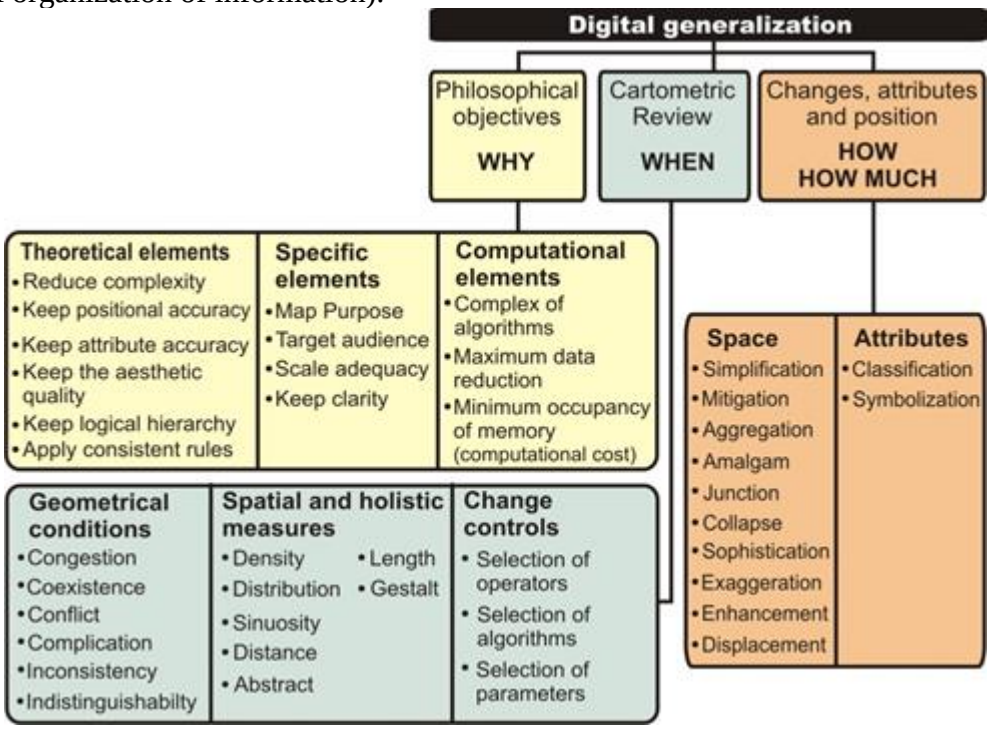

Fig. 5 - Ranking of the appropriate use of cartographic transformations for the touristic mapping (SALOMÃO GRAÇA, 2015).

The generalization process is essential for the touristic cartography because the products must have as main objective the graphic clarity enough to establish the desired cartographic communication, or in other words, the legibility of the map. Thus, the exaggerated /disproportional representation of elements, fatally damages the clarity of the document (FERNANDES & SALOMÃO GRAÇA, 2014; SALOMÃO GRAÇA, 2015).

Generalization operators are used to promote changes in geometry and content of cartographic features in order to make them lighter during the reading process, eliminating visual pollution which endangers the reader's interpretation about the information (MCMASTER & SHEA, 1992). In this

process the nature (or dimensionality) of cartographic information can be changed to meet the control elements of the new reduced map. They are then situations in which points are converted into areas (aggregation), while areas can be converted into dots or lines (MONMONIER, 1996).

The symbolization is the last of cognitive changes that are submitted to touristic information. Symbols are graphical representations of objects or facts extracted from reality and encoded in a suggestive, simplified or schematic manner (JOLY, 1990; KIMERLING et al., 2009). They are the graphic language of the map, and their selection and design ensure that much of the map's purpose will be successful (KARSSEN, 1980; TYNER, 1992). On touristic guidance maps is very common the presentation of information with nominal observation scales and specific dimensionality, forming what Martinelli (2003) calls the representations with specific demonstration.

The specific symbols can be classified from different levels of reality abstraction (Figure 6).

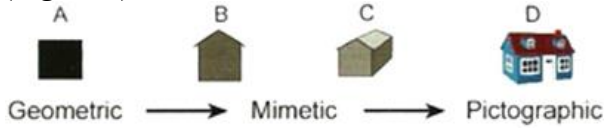

Fig. 6 - Conventional, mimetic (associative) and pictorial cartographic symbols. Source: Kimerling et al. (2009).

According Forrest and Castner (1985), the design of cartographic point symbols involves encoding attributes of the object represented that will assist map users in establishing the symbol's meaning, but also in finding it in visual search.

3. INITIAL METHODOLOGY FOR THE PROTOTYPE DEVELOPMENT OF A TOURISTIC WEB-MAP OF RIO DE JANEIRO

The methodology used is based on the acquisition of secondary sources that clarified the discussions on the development of a cartographic project leading to the building of touristic guidance maps according to Forrest and Castner (1985), Robinson et al. (1987), Menezes and Fernandes (2013), Sluter and Brandalize (2014). The acquisition of cartographic databases was held at the site of Pereira Passos Institute (IPP), of Rio de Janeiro City Hall. It is the municipal mapping formulated in 1:10.000 scale, with the CAD file in dgn. format. The plants were converted to shapefile, geometrically corrected and georeferenced using control points with known and subsequently articulated coordinates and datum SIRGAS 2000, using the software QGIS 2.8.2. (Figure 7).

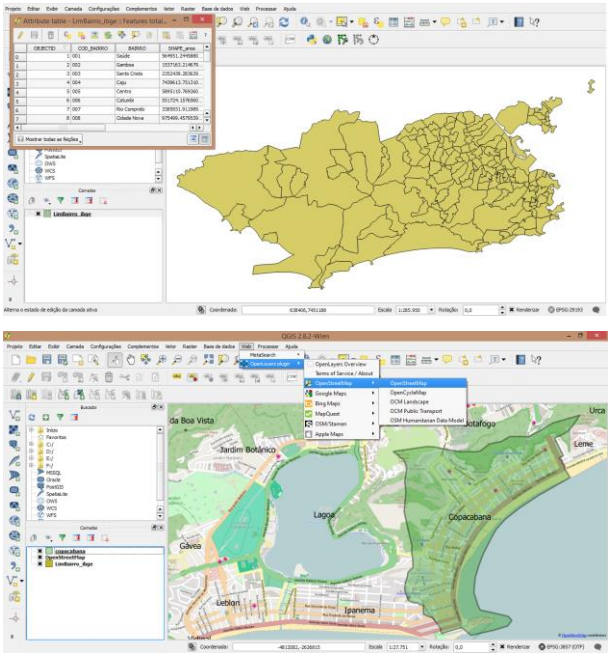

Fig. 7 – Projective and geometric transformations worked in the base map.

Subsequently, we performed the development of qualitative thematic representations through Adobe Illustrator and Photoshop software (in nominal and orderly observation scale), with cognitive transformations of generalization and symbolization (in vertical and oblique view) applied on the original cartographic base, generalized to multiple scales, as preset by the manufacturer as schematically represents the methodological diagram of Figure 8. Theoretical discussions make up much of this proposal, enabling even the initial development of a cartographic product to be adapted to the Web environment.

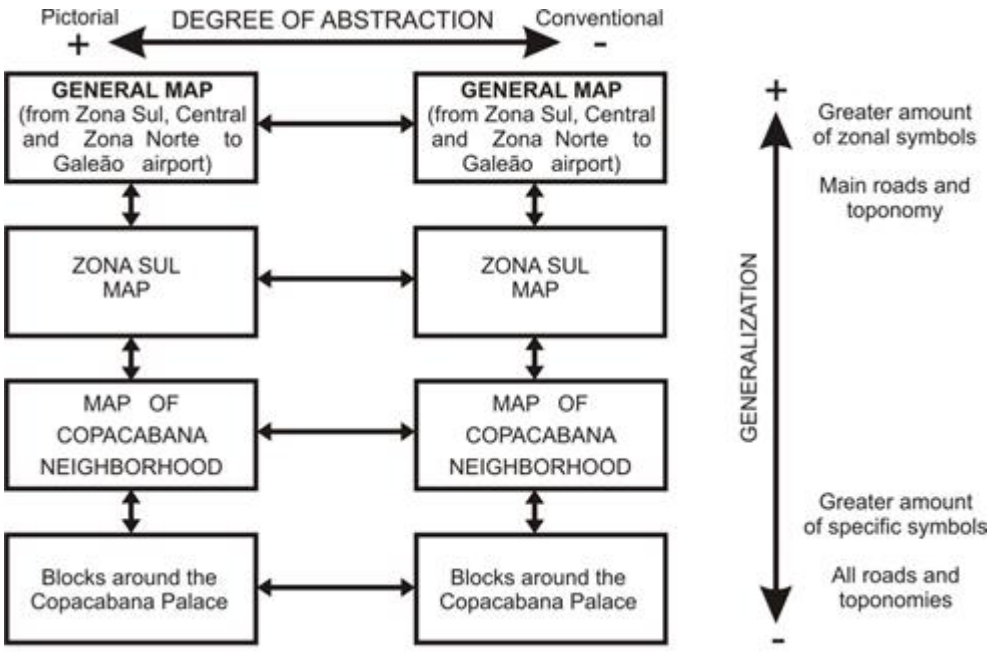

Fig. 8 - Methodological diagram for the development of Web-Map.

The reference data selected for the mapping were defined as shown in Table 1.

Table 1: Methodological diagram for the Web-Map development

Cartographic Base	Class	Space Dimension	Degree of Measure
Administrative Environment	Country, State (Region), Country	Area	Qualitative
	Country, Administrative Region, Neighborhood	Dot Area	Orderly
Coastline, Relief	Beach, Coastline, Relief morphology	Line Area	Orderly

Regarding to the thematic data, the initial concern was to define the classes of information to be grouped, for example, transport routes (stopovers, stations, bike stations), material cultural attractions (museum, cultural center, theater, cinema, historical architecture), natural attractions (parks, trails, beach), lodging (hotel, motel, hostel), catering (restaurant, snack bar, pizzeria), recreational activities (walking, sports practices outdoor), public toilets, etc. Due to the large amount of data, only the detail map - blocks around Copacabana Palace - could have such information.

After the data selection, a good decoding of cartographic information relied on domain (knowledge) in relation to the control elements directed to the mapping, in the case, touristic in Web environment. The control elements are divided into objective, reality, scale, technical limit and the target audience, and set (to a greater or lesser extent) the structural basis for handling the project elements, defining limits and tolerances at work (ROBINSON et al., 1987; MENEZES & FERNANDES, 2013).

The objective is what is expected from map-product, since it symbolic aspects to the graphic design itself. The greater the number of clearly identified objectives, greater the facility of reaching a graphic design that meets all previous desires. For this reason, the touristic map must clearly mark their proposals. In the case of digital Web-map prototype of Rio de Janeiro, the objectives relate from the integration of different levels of information, which are built on the same generalized bases.

The combination between objective and graphic representations proposed in the cartographic design make up another significant aspect, which is the overall appearance of the Web-Map. In other words, the product may have a greater or less visual pollution, it can be traditional or forefront, present an open or closed interactivity, etc. These aspects should be considered in the

evaluation process of the success of cartographic communication of a product.

The second element is the reality, which is concerned to adequately represent the geographical dimensions and other characteristics of a destination. What follows are highlighted some examples: the territories shape must be represented as similar (proportional) possible as they are known in reality (the long and narrow Chile, Italy is shaped like a boot); the Rio - Sao Paulo stretch will always have a higher population density when compared to other regions of the country; Cristo Redentor can not be smaller than the symbols of their neighbor buildings, etc. Thus, one should study a proportionality between the size and shape of pictorial symbols and the other map guidance elements such as access roads, blocks from a neighborhood and place names. Each reality sets specific limitations and injunctions, within the possibilities of the graphic design, which must be provided in the planning phase. In addition, there must be a harmonization with geometric transformations, once in touristic maps of Rio de Janeiro, has been common disregard the actual distances between the coastal areas of the South Zone of the city, the coast of West Zone and the Historical Center, thus creating the false idea of proximity between these locations.

The third element is the scale. In the Web-map the size of the scales is limited to the shape and the resolution of the screen, ie, the product has a limited viewing area. According Pires et. al. (2004), under a conceptual point of view, the scale works in a subtle way, because the less is the scale, the lower is the volume of submitted information. Naturally, one should develop the use of colors, patterns, size of letters, thickness of lines depending on the worked scale, but it must maintain a logical relationship of variation of intensity and size.

The fourth element is a technical limit that affects the graphic design in different ways, for example, use of color and size of the letters are directly attached to the exit devices of the map, namely, the size of the letters is function of the scale. Another factor is related to the color processing capacity and pixels of video cards on the market, and the robustness of the database managers, memories and operational systems to allow opening or navigation in interactive, animated or three-dimensional maps, ensuring to visualize the symbology of touristic maps on tablets, smartphones or even on the screen of a notebook, and if the map will be produced for visualization in digital still screen or touchscreen. In addition, the lighting conditions of the digital environment should be evaluated.

The fifth and final element addresses the importance of the target audience, which should be familiar with the perceptive conditions of the produced map. It means that a single set of data can be represented in different ways. Therefore, a cartographic design should promote empirical tests to evaluate the efficiency of communication between the map and its potential audience (SLUTER & BRANDALIZE, 2014). The tourist is extremely diverse, ranging in age groups, levels of computer skills, cartography (facility or difficulty in the use of maps) and familiarity with web geoservices. Are also added factors such as the preference for mass or alternate tourism, the ways of the use of means of transportion, language limitations (language). Cultural factors are also very important as familiarization with the cartographic language. For example, Brazilians have major deficiencies in its cartographic literacy when compared to the French people, who present formal training on the use of maps. However, the idea is to develop a cartographic product that can be accessible to people that have minimal computer knowledge and cartographic language.

4. CONCLUSION

The importance of tourism in recent decades is undeniable, and among many questions addressed by the relevant social practice are the maps for touristic guidance. The dissemination of such mapping product is quite significant, being used by both visitors (in the preparation of the travel and on the

spot) and the local trade as object of touristic marketing.

Previous researches of Fiori (2005, 2010) and Salomão Graça (2014, 2015) laid the groundwork for a rich and fruitful theoretical and methodological discussion on the topic, in addition to the development of a collection of printed cartographic products.

The next step is the creation of the prototype of a touristic Web-Map, which will enable the maturity of some discussion, in addition to offering in only one product maps that address the same subject at different levels of abstraction of reality, degrees of generalization due to multiple scales, etc., providing different ways of representing the same information in time/space.

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REFERENCES

BENI, M. C. **Análise Estrutural do Turismo**. São Paulo: Senac, 1998. 427p.

BOARD, C. A. Contribuição do geógrafo para a avaliação de mapas como meio de comunicação de informações. **Geocartografia**, São Paulo: Universidade de São Paulo, nº 3, 1995. 23p.

BROWN, A.; EMMER, N. & WORM, J. V. D. Cartographic design and production in the Internet Era: the example of tourist web maps. **The Cartographic Journal**, United Kingdom, v.38, n.1, 2001. 61-72pp.

CAMARGO, L. O. L. Sociologia do Lazer. In: ANSARAH, M.G.R. (Org.). **Turismo: como aprender, como ensinar**. São Paulo: Editora Senac São Paulo, 2001. 235-273pp.

CARTWRIGHT, W. & HEATH, G. Geography as seen from the window: exploration bout viewpoint-specific images of geography defined by tools of visualization. **Cartography**, v.31, n.2, 2002. 103-117pp.

CAUVIN, C. Des Transformations Cartographiques. **Mappemonde**, Nº 49 (1), 1998. 12-15pp.

CHRISMAN, N. **Exploring Geographic Information Systems**. New York: John Wiley & Sons, 1997. 298p.

DONDIS, A. D. **Sintaxe da Linguagem Visual**. São Paulo: Martins Fontes, 1991. 236p.

DUMAZEDIER, J. **Sociologia Empírica do Lazer**. São Paulo: Perspectiva, 2ª. ed., 1999. 244p.

FERNANDES, M. C. & SALOMÃO GRAÇA, A. J. Conceitos e aplicações cartográficas diante das necessidades da cartografia turística. In: ARANHA, R. C. & GUERRA, A. J. T. **Geografia Aplicada ao Turismo**. São Paulo: Oficina de Textos, 2014. 28-55 pp.

FIORI, S. R. Cartografia e as dimensões do lazer e turismo: o potencial dos tipos de representação cartográfica. **Revista Brasileira de Cartografia**, Rio de Janeiro, 62(3): pp. 527-542. 2010. Disponível em: < http://www. lsie.unb.br/ rbc/index.php/rbc/article/view/252/240>. Access in 18 janeiro 2015.

FIORI, S. R. Touristic maps: the challenge of using art in the digital era. In: **XXII International Cartographic Conference**, ICC, La Coruña, 2005. 1-10pp. Disponível em: <http://www.cartesia.org/geodoc/icc2005/pdf/oral/TEMA19/Session%202/SERGIO%20RICARDO%20FIORI.pdf>. Access in 10 de março de 2015.

FORREST, D. & CASTNER, H. W. The Design and Perception of Point Symbols for Tourist Maps. **The Cartographic Journal**. v. 22, nº 1, 1985. 11-19pp.

INTERNATIONALE TOURISMUS BÖRSE. **Maps for tourists: a systematic approach to tourist cartography**. Berlin: International Tourist Fair, 1987. 163-168 pp.

JOLY, F. **A Cartografia**. Campinas: Papirus, 8ª. ed., 1990. 136p.

KARSSEN, A. J. The Artistic Elements in Map Design. **The Cartographic Journal**. v. 17, nº 2, 1980. 124-127pp.

KIMERLING, A. J.; BUCKLEY, A. R.; MUEHRCKE, P. C. & MUEHRCKE, J. O. **Map Use: Reading and Analysis**. Redlands: ESRI Press, 6.th., 2009. 512p.

KOEMAN, C. O princípio da comunicação na cartografia. **Geocartografia**, São Paulo: Universidade de São Paulo, nº 5, 1995. 11p.

MARTINELLI, M. **Cartografia Temática: Caderno de Mapas**. São Paulo: Edusp, 2003. 160p.

MENEZES, P. M. L. & FERNANDES, M. C. **Roteiro de Cartografia**. São Paulo: Oficina de Textos, 2013. 288p.

MCMASTER, R. & SHEA, K. S. **Generalization in Digital Cartography**. Washington DC: AAG, 1992. 134p.

MONMONIER, M. S. **How to Lie with Maps**. Chicago: Chicago University Press, 1996. 207p.

MORRISON, C. & FORREST, D. A study of point symbol design for computer based large scale tourist mapping. **The Cartographic Journal**. v. 32, nº 2, 1995. 11-19pp.

MOSCARDO, G. **Making Visitors Mindful: Principles for Creating Sustainable Visitor Experiences Through Effective Communication**. Illinois: Sagamore Publishing, 1999. 132p.

PETERSON, M. P. **Interactive and Animated Cartography**. New York: Prentice Hall, 1995. 464p.

PIRES, M. I. S.; SLUTER, C. R. & VEIGA, L. A. K. Aplicação dos conceitos de generalização cartográfica em um mapa turístico para a apresentação em computadores de mão. **Boletim de Ciências Geodésicas**, vol. 10, nº1, 2004. 3-19pp.

ROBINSON, A. H.; SALE, R. D.; MORRISON, J. L. & MUEHRCKE., P. C. **Elementos de Cartografía**. Barcelona: Ediciones Omega, 1987. 543p.

SALOMÃO GRAÇA, A. J. **Cartografia Turística: Conceitos e Representação das Informações Geoespaciais**. Dissertação de Mestrado - IG-UFRJ, 2015. 142 p.

SCHLICHTMANN, H. Characteristics traits of the semiotic system "map symbolism". **The Cartographic Journal**, United Kingdom, v. 22, n.1, 1985. 61-72pp.

SLUTER C. R. & BRANDALIZE, M. C. B. Projeto cartográfico centrado no usuário dos mapas necessários à definição da estrutura do sistema viário de um Plano Dire-tor Municipal. In: **Congresso Brasileiro de Cartografia**, Gramado - RS,. 2014. 9p.

TOBLER, W. R. A Transformational View of Cartography. **The American Cartographer**. V. 6, nº 2, 1979. 101-106pp

TYNER, J. **Introduction to Thematic Cartography**. New Jersey: Prentice Hall, 1992. 299p.