International Cartographic Association
Association Cartographique Internationale

Map design of the building cultural heritage in Maputo city – Mozambique

Sérgio Comé [a,*], Claudia Robbi Sluter [b], Alexandre Zacarias Ombe [a]

[a] *Universidade Pedagógica de Maputo, Moçambique, Pós-graduação no curso de Geografia na Escola Doutoral - come.sergio@gmail.com, zuyyaombe@hotmail.com*
[b] *Universidade Federal do Rio Grande do Sul, Brasil, Pós-graduação em Sensoriamento Remoto – robbi.sluter@ufrgs.br*

* Corresponding author

Keywords: thematic map design, cultural heritage, visual perception.

Abstract:

The development of this research is motivated by the scarcity of scientific research on the map symbol design that represents the built cultural heritage in Maputo, Mozambique. Figures 1 (a) and (b) show two historical buildings.

(a)

(b)

Figure 1. Cultural heritage building in Maputo: (a) City Hall (b) Central Train Station.

Maputo has an area of approximately 347 km² and a population of 1,088,449 inhabitants, according to the 2017 Census. The National Directorate of Cultural Heritage (NDCH) is the government body responsible for cultural policies that preserve the national identity. Its mission is to coordinate the activities related to the identification, inventory, registration, preservation, and maintenance of cultural heritage (Resolution #15 of June 9^{th,} 2015). Therefore, the NDCH needs geoinformation to achieve its mission. The primary source of geoinformation is the topographic mapping of Mozambique. Although topographic mapping should be built with standardized map symbols, different public and private institutions in Mozambique have verified discrepancies in the symbols representing the cultural heritage buildings on maps. Besides the lack of standards for topographic map symbols, there are not enough thematic maps at suitable scales for managing and preserving cultural heritage buildings. Therefore, this study aims to design and generate geoinformation products according to the cartography theory for managing cultural heritage buildings.

We established the study method from an approach for designing and creating geoinformation products based on user-centered design. Because today every geoinformation product is a software engineering product, we also establish our method based on requirements engineering. In this approach, map design, as understood in the literature on cartography, is just one step of the process of the project of a geoinformation product. We defined the methodology in 6 steps: (1) understanding users' needs in the context of the building's cultural heritage maintenance; (2) establishing map elements and their meaning (semantics); (3) defining the levels of detail according to the users' needs; (4) designing map symbols; (5) generating geoinformation products; and (6) validating the product. At this moment of the research work, we developed steps 1 to 4. For the first step, we adopted the guideline for eliciting requirements for geoinformation solutions, as Sluter et al. (2017) proposed. The guideline is organized into five groups of questions

https://doi.org/10.5194/ica-abs-6-41-2023

defined according to the objectives of the requirements elicitation: (1) knowing the user activity; (2) defining the problem to be solved and the application domain; (3) establishing the geoinformation constraints; (4) determining the objectives of the geoinformation product; (5) defining the users' requirements.

To prepare for the first user interview, we studied two maps of Maputo created by the Municipal Council of Maputo (in Portuguese, *Conselho Municipal da Cidade de Maputo* – CMCM) at 1:10.000 scale and by the National Center for Cartography and Remote Sensing (in Portuguese, *Centro Nacional de Cartografia e Teledetecção* - CENACARTA). These institutions produced paper maps useful as the data source of the cultural heritage buildings. Besides those maps, we also studied an inventory in which we can find the description of every element of cultural heritage buildings of Maputo city in 2010. In the second step, we established the semantics of the map elements. The semantics consisted of determining each map element and its meaning. Knowing the meaning of every element makes it possible to group them into categories or classes according to their similarities and differences. The decision about which elements should be part of the map is based on the results of the first step in which we defined the spatial analysis necessary for fulfilling the users' needs.

In the third step, we established the minimum sizes and distances to be represented at every level of scale to define the level of detail. Knowing the classes of elements to be represented on the map and their level of detail, we could design the map symbols. We designed the map symbols based on the cartographic language theory (MacEachren, 1994) and the Semiology of Graphics (Bertin, 1983). The map production and validation steps will take place at two different moments. First, we will generate paper maps at the defined scales and prepare and run user tests with them. In the second phase of production, we will develop a web map. To do so, we will have to adapt the map symbols design for maps to be seen on a computer screen.

We can now report some of the study results since we are still developing the study work. The results are organized according to the sequence of steps of the method. The main users are the DNPC technicians, as already mentioned. To achieve its mission, the technicians need to know: (1) where are the city limits of Maputo? (2) Which districts are there in the city of Maputo? (3) Which elements should be considered a building's cultural heritage? (4) Which elements are spatially related to the cultural heritage? (5) Which characteristics of the buildings define them as cultural heritage? (6) How are the distances between those cultural heritage buildings and some points of interest in Maputo? The user should be able to answer those questions when they use the maps we are designing and constructing. On the other hand, the group of elements on the map should be sufficient and complete, besides being represented by well-designed symbols.

So far, we have decided to define two categories of elements for the thematic mapping solutions: constructions and buildings. For this study work, we define buildings as any construction with a roof. A building does not need to have walls, only a roof. Everything else is construction (National Institute of Statistics, 2004). In total, we listed thirty features grouped into those two categories.

The analysis of the level of detail resulted that the scale should be larger than 1:10.000. The dimensions of the smallest element are 40 meters by 50 meters. At a 1:10.000 scale, the smallest size of 40 m corresponds to 4 mm, which is too small for easy symbol recognition. Therefore, we proposed to design pictorial symbols based on the library of symbols presented by CENACARTA and some specifications used internationally to depict thematic maps. The next step will be preparing the user tests to verify the visual perception of the symbols. We will prepare the tests based on the levels of map reading tasks defined by the Board (1978). In the first phase of this work, we designed paper maps, although the final product will be a web map. Then, the next phase of this study is to design and test the map symbols to be depicted on computer screens.

References

Bertin, J. (1983). Semiology of graphics: Diagrams, networks, maps (W. Berg, Trans. (translation from French 1967 edition) ed.). Madison: University of Wisconsin Press.

Board, COMPLETAR

MacEachren, A. M. (1994) Some Truth with Maps: A Primer on Design & Symbolization, Washington D. C.: Association of American Geographers.

(National Institute of Statistics, 2004).

Sluter, C. R.; van Elzakker, C. P. J. M. and Ivánová, I. (2017) Requirements Elicitation for Geo-information Solutions, The Cartographic Journal, 54:1, 77-90, DOI: 10.1179/1743277414Y.0000000092