# Maps as spatial information, tactile and visual communication system

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Cartographic communication, spatial information, tactile maps,

Maps were created as a way of graphic communication to register important itinerary information for humankind's survival. Dots, lines, and graphic symbols used to represent and situate in space the elements chosen in reality, as it is still done nowadays. In more ancient times, maps were designed by artists specialized in cartography, being then destined to only a small portion of the population and many times kept as State secrets. Nowadays, they have become popular assets. Maps are part of our day-by-day routine, on TV, newspapers, magazines and the Internet. Other kinds of maps are not so broadcasted. They are specifically created for strategic activities in the contemporaneous society, becoming true systems of digital spatial information. Nevertheless, the graphic principles are still in effect for the confection of this information asset. What are the requirements for developing an effective cartographic visual communication in the age of digital information in order to create maps that are both an information and communication tool? How is possible to make maps “visible” for visually challenged people? This text will deal with maps as spatial information and communication system, considering the perspective of conventional maps (for people who are able to see) and tactile maps, that is, those maps designed for people who cannot see.

## 1 Getting the subject started

When reflecting about how to approach the issue of maps as an information system, many ideas emerged, and they were so many that it was actually harder to decide which one was more appropriate. Among many, it was decided to approach it analogously to the creation of a cartographic project. In this perspective, one of the first actions of a cartographer would be to verify the type of data to be mapped: qualitative or quantitative, and then, define purpose and scope, that is, in which situation the map would be used and who would be its target user.

Therefore, in this case, when it comes to the type of data that was verified, it could be faced as the theme of this article, which is: maps as an information and communication system; and the target user: laypeople in Cartography issues. Indeed, there is a specific field of knowledge that graduate professionals able to create maps in Brazil, as well as in other countries. However, there is no way to deny the relationship between the interface of map design and graphic design, for both require a great amount of knowledge to display information coherently.

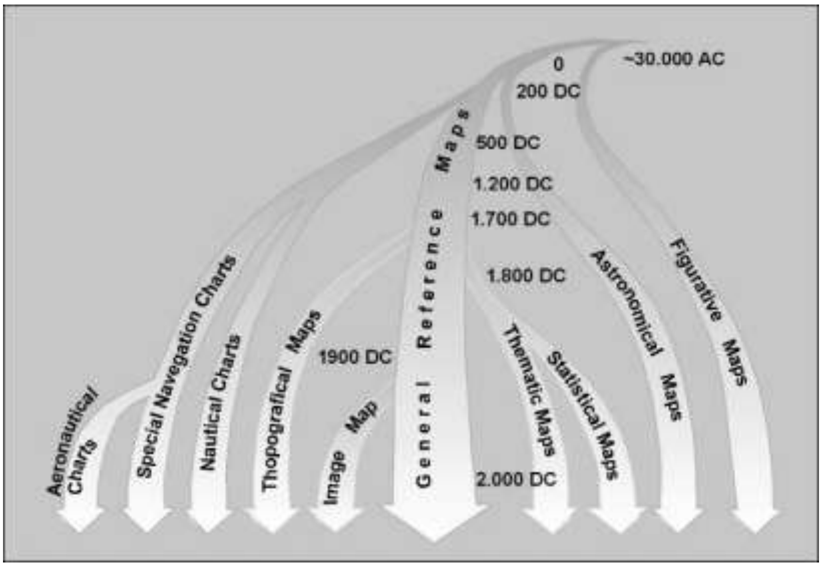
It is necessary to start the subject making a few considerations inherent to Cartography, that is, the maps which are the main product of this science and what distinguishes them from a landscape drawing. The basic property of maps in Cartography is to make geographic data available, that is, showing a target location and the characteristics (attributes) of a given phenomenon, which when interpreted by the user become information. This property is undeniable, independently from the kind of phenomenon or theme that a map represents.

As stated above, maps may represent qualitative or quantitative data relating to concrete or abstract phenomena, for all that exists in the real world can be classified by humans in one way or another. According to the type of data, there are different mapping methods. Here, the existing methods will not be addressed, because this issue concerns professional cartographers and the interface between design and cartography does not need this approach.

There are many classifications for maps. Some of them according to the map’s function; others, according to its scale; and others yet, according to the theme that they represent or the medium broadcasting them. In figure 1 is shown a classification model by Robinson et al (1995), organizing the maps according to the evolution in Cartography's timeline.

Cartographers do not mind the map classification; actually it is considered just a means to systematize the maps in texts and manuals. Therefore, it is one of the purposes of this article to present a classification intended to approach the subject “maps as an information system”. This classification is generic and, at the same time, specific, for it was created to conduct this subject to this target audience of designers. The Cartography field was divided in two great areas; one that deals with conventional maps, and other that deals with tactile maps. In fact, there is no such division in Cartography, because tactile maps always took as reference maps based on conventional cartography.

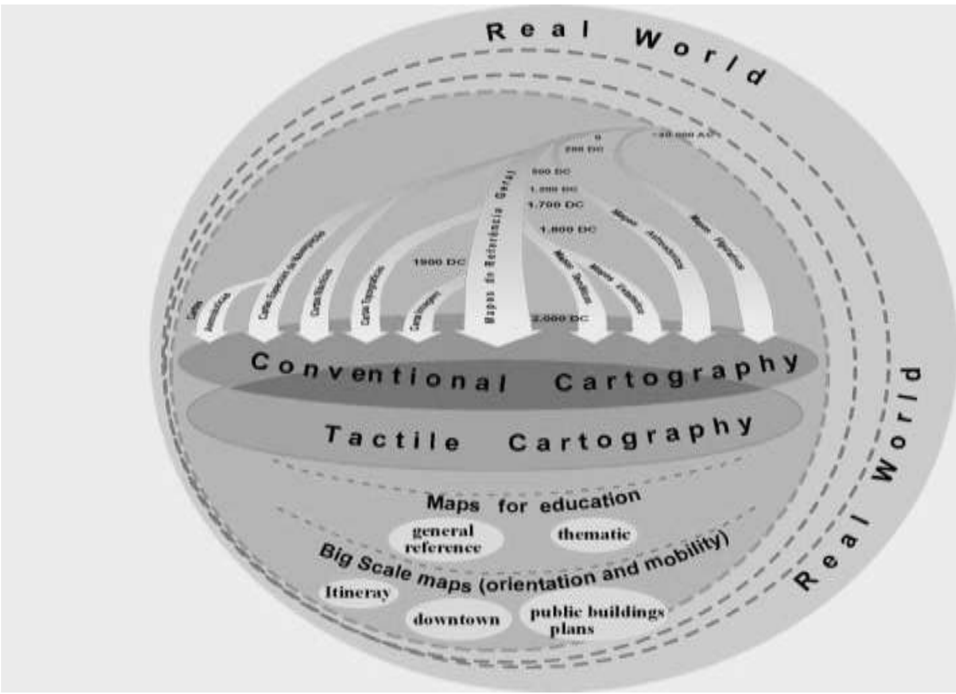
Figure 1: Types of Cartographic Maps (Adapted from Robinson et al,1995, p. 22)




## 2 Conventional maps in cartography

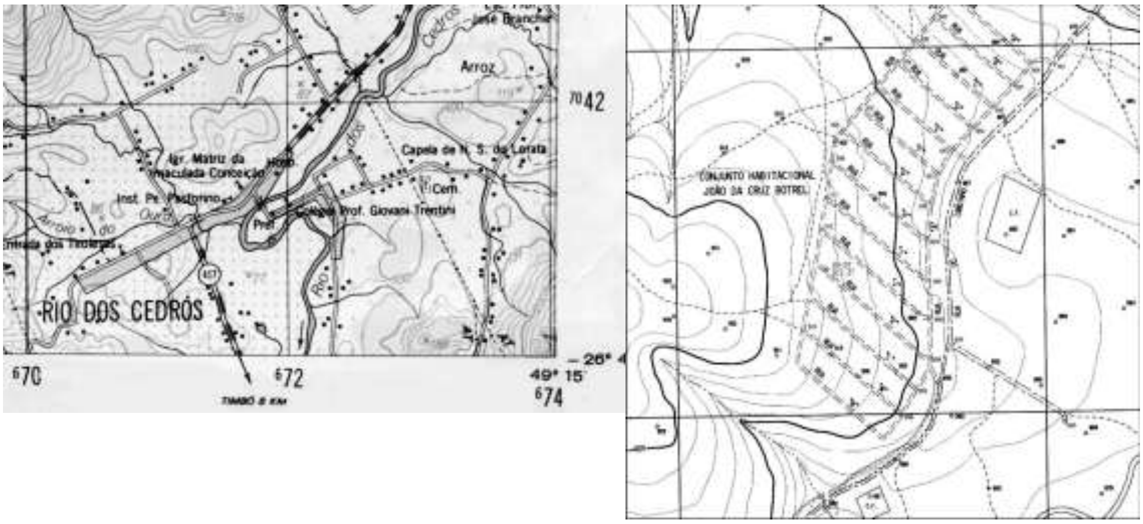
The classification of maps proposed in figure 2 does not distinguish them by being printed or digital. The maps in Conventional Cartography are the ones produced to be displayed to people who can actually see them. This category comprises all maps proposed by Robinson et al (1995). From all the types of maps pointed out by this author, only two categories can be elaborated by professionals without a basic graduation in cartography. These are the maps for general reference and the figurative maps. In order to show the diversity in the visual aspect of maps nowadays, follow a few examples.

Figure 2 – Generic classification of maps



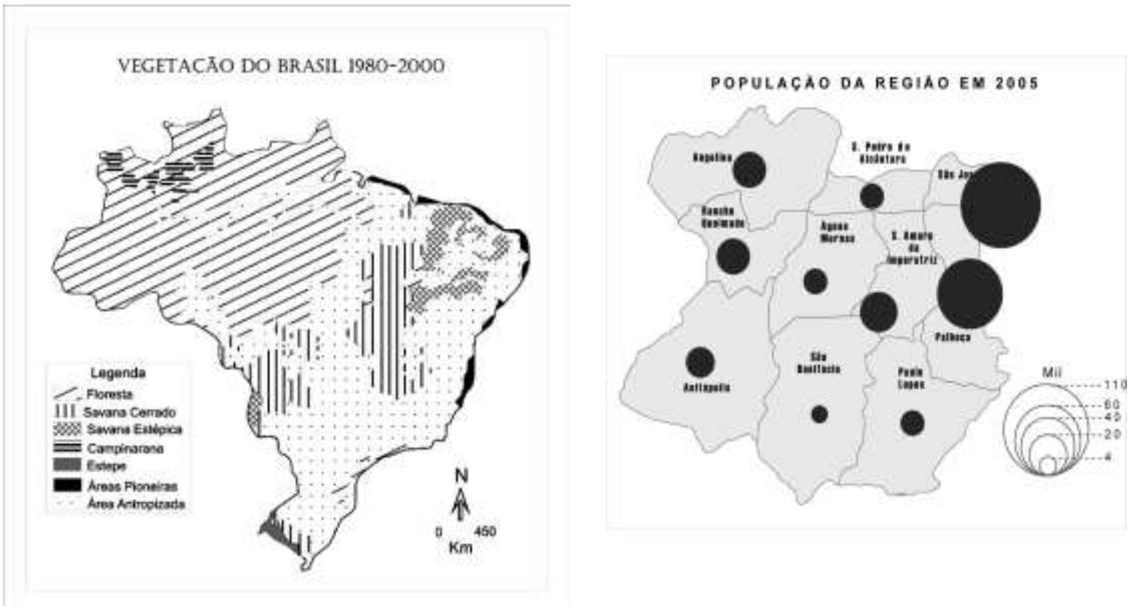
In the example in figure 3, a fragment of a topographic map is shown, against one urban map. Both mappings show details compatible with the visualization scale and data collection, and are therefore highly precise in the localization of planimetric and altimetric qualitative information. The terrain aspect is represented by contour lines and hachures.They are created to support specific strategic activities such as regional, urban or country planning, in engineering and environmental projects and use cartographic conventions established long time ago, accepted worldwide. The symbols, dots, lines and areas of these types of maps do not allow doubts in their interpretation.

Figure 3: Example of fragments from a topographic map in the original scale of 1: 50,000 and a urban map in the original scale of 1: 2,000 (Source: Nogueira, 2008)




Thematic maps, which are also created by a licensed professional, always have a specific theme, and are used for technical and scientific means; as well as, sometimes, as source of information for a wider public. To manufacture these maps it is required to have knowledge in the proposed theme area which is being represented, and also knowledge about mapping methods for Thematic Cartography. Examples of this type of maps are presented in figure 4.

Figure 4 – Example of thematic maps: Population of an interest region and Use and Soil Occupation in Taquaras, Balneario Camboriú, SC, Brazil (Source: Nogueira, 2008)



Reference maps do not necessarily need to be generated by a professional specialized in Cartography; the goal of these maps is to show specific locations as in tour maps, or even political ones, or those of routes and itineraries which can be printed or digital.

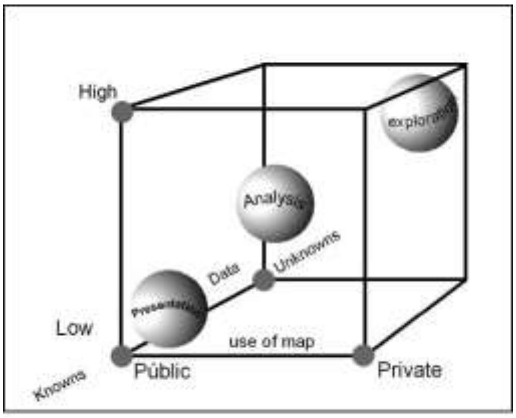
These maps will not be addressed in this article, although, as abovementioned, there might be an interface of map drawing with design. However, it is well known that, nowadays, a great share of people behind maps elaboration have never had formal preparation for such task. For this reason, it is highly important to speak of information communication through maps, emphasizing the availability of maps for users.

**Information communication and Cartographic communication**

Since the first maps created by cartographic artists (specialists in cartography) with the objective of outlining land borders, till the countless variety of maps available nowadays, created using tools like computers and disseminated on the internet, there has been significant changes in their appearance. Nevertheless, the sight is still the most important channel for acquisition of space and geographic information transmitted by maps. So, how to create a visually effective cartographic communication? What is the knowledge required to create maps that fulfill their informative role?

First of all, it has to be clear that nowadays there are basically two ways of putting maps available for public use. One of them is a static map (permanent), that is, that cannot be altered by a user. In this case, the map was produced for presenting an specific theme, a place, and most times it gives support to technical activities. The other way is to put available maps or data that can be updated or explored by the user, that is, maps that allow interaction and display customized visualization. The model in the following figure depict these two ways of creating and using maps.

Figure 5: Map usage model according to new computing technologies, achieved based on MacEacheren (1994)




The map can only be displayed on a computer screen, allowing presentation, or analysis and exploration of data. In this model, conceived as a cube, the Cartography is seen as a three dimensional attribute based on three axis: (a) map usage; (b) map objective, and (c) interactivity involved in the process. In the model, It can be observed that interactivity is the key for the map exploration process. The communication exists at any moment during the process and the user interaction varies from very low to very high (Nogueira, 2008).

However, according to Issmael and Menezes (2007), the communication of spatial data through maps started in the early 1970's, when a few cartographers developed cartographic information model with the goal of establishing a system to support Cartography as a science. Following this approach a theory of cartographic communication was developed, thus introducing the models, the semiology, and the cognition theories.

Either way, independently from discussing the new map usage approaches, it is affirmed that an effective cartographic communication happens when in reading the map the user can grab the desired information, and this information is the closest as possible to reality. In order to accomplish it, the cartographer needs to take into account in the cartographic project all the cognitive processes involved.

The graphic characteristics of the contours related to the data attributes give the idea of signs, which mark the Cartography symbolism (ZHOU et al, 2007). The symbols used to represent data in maps comprise several signs build up with lines, dots, colors, tones, patterns, and so on, as shown in figure 7. The board shows the visual variables of geo-cartographer Jaques Bertin (1986), updated by Robinson et al (1995). In this revision the primary variables are: size, color (value, matrix, and chrome) and form, and the secondary visual variables are: texture or hachures, arranges or patterns, and orientation.

Seldom the symbolism of a map will happen to be isolated and self-explanatory. Therefore, components of a conventional map such as Title, Caption, Scale, Geographic Nort and other elements (insertions) are part of the composition of any map, be it printed or electronic. The components have the purpose of decoding the cartographic symbols, identifying a location and who designed the map, an place the user in a geographic space. The disposition of these elements will depend on the type of medium in which the map will be displayed and the level of user interaction allowed.

Many cartographers consider that the majority of maps in traditional cartography (that which derives from the concepts of printed maps), are already resolved in what concerns symbolism. The computer software such as the Geographic Information Systems, or the CADs, have already established their own or allow it to be created, stored, and reproduced. The issue of geometric accuracy and information semantics displayed by a map of public use is up to the map author to decide. However, maps webcasted on the internet still have a long evolution path to follow, as will be shown next.

### Internet maps

As stated by Francisco (2009)

> "It has all migrated to hard-disks and to the internet, and now the map itself, as we knew it back in school, (almost[1]) no longer exists. It's not enough just showing continents, countries, states, cities, neighborhoods, and streets. These information alone are incomplete and almost useless. We depart from a static viewpoint to a dynamic world, in which the map on the internet is less of a map and more of a compilation of information that uses geographic representation as a background."

In this conception, maps are made for data visualization, that is, for geovisualization.

Such observation must be treated carefully, for it is observed that the maps available on the internet as an information tool were planned by their creators for different purposes: (a) those which do not allow user interaction because they were generated in digital environment to be printed, although they were also put available on the internet for onscreen visualization; (b) Those that allow a certain level of user interaction online, that is, which were generated to allow clicks on the map, also called a hypermap, and (c) maps that allow user iteration online, whose most famous representative is the Google Earth. The latter may be pointed out as an example which suits the opinion of the abovementioned author.

Let us go through the first case, then. Some might say that many of the maps that an user finds on the internet are still designed to be printed. Therefore, they do not allow user interaction; it is only possible to work with *zoom in* and *out* to have a better sight or to focus on a specific point. Even so, this process is quite limited due to the lack of quality in the matrix digitalization, which usually allows little expansion. In this case, the information available is restricted to what has been mapped, that is, to the symbols, texts and arrangement of data for communication of spatial data in a printed map format. For this reason, the major part of these maps found on the internet do not perform an adequate cartographic communication, because the medium being used to spread this information is also inadequate. The resolution of most displayers demands more complete symbols and texts, so as to allow better element visualization in this medium.

The second type of conventional map found on the internet allows some online interaction with the user. These are maps conventionalally called clickable maps, or just hypermaps, that is, the user is able to pass the mouse pointer over specific areas of the map and access documents intrinsically related to it. The "windows opened by the map" expose documents with type of text, tables, graphs, figures; or even other more conventional or more detailed maps included in the

[1] The word in parenthesis is expressing the opinion of the author of this article.

database of such map, which are all also prepared focusing on a better date visualization. On the other hand, many times this type of map is observed as inefficient, and it can be faced as an incomplete solution of digital map, for it is used as an hypertext to access documents and not as a map that provides the information required by the user on its own.

There are also the maps available in systems of geographic information, which allow the user to choose different formats for visualization and analysis of data in maps and tables searching for different themes in the database. of data in maps and tables searching for different themes in the database. Nevertheless, the access to this tool demands a certain level of knowledge about the software used to display the geographic data. This approach has been used in small scale by a few governmental and non-governmental organizations, in order to provide the general public with specialized data about issues concerning the entity.

Accessing internet addresses it can be observed that the interactivity on internet maps is still quite limited. Most of them are attempts to adapt the “traditional” to the new technologies, despite the fact that they allow much features. There’s still a long way and radical changes must occur for maps to be put available on the internet in a creative and provocative way.

Matters such as scales and symbols, and detailed information compatible with the *zoom,* must be handled in the database. Interactive cartography demands a professional team to build map servers and databases, where the work should flow in a diversified environment involving a crew of specialists in programming, information systems, designers, cartographers and geographers, for each professional has hold of an specific part of the knowledge required to make maps available on the internet. This interdisciplinarity can boost the creativity and provide higher interactivity to understand the world through maps, in a compatible way in information era.

Peterson (2008) brings to light some reflections concerning the internet maps. One of them is about the accuracy in those maps, which needs to be preserved both in geometry and in semantics; he also points out the need for constant updating the data of the maps or the map servers, reminding that most of them do not allow updating nor migrating data to other servers. He also emphasizes the Google effect on map users, for the power of this corporation cause the other map systems to look inferior (a Google user expects to see all other maps on the internet in a similar way). He also claims that hundreds of thousands youths have learned how to use maps through interactive websites.

However, as popular as maps are nowadays, and as much as they can be accessed and seen by a great share of the society in all sorts of different media, there is a smaller part of the population without the sight sense, who cannot see this conventional maps. So, how could it be possible to make maps “visible” for visually challenged people? The generic maps need be prepared somehow for tactile reading, following the example of the six dots that allow blind people to read and write. However, the concern with the production of tactile maps seems much more recent then it sounds, as will follow next.

## 3 Tactile maps

There are not worldwide accepted standards for maps or cartographical conventions in terms of tactile cartography the way same way as it can be applied to conventional cartography produced for people without any kind of vision disability. This way, it is necessary for each country to create its own standards and to establish norms for tactile cartography.

In Brazil, there are some public organs and philanthropic entities that support disabled people, such as Instituto Benjamin Constant (IBC) (Benjamin Constant Institute), in Rio de Janeiro, which is associated to the Department of Education; Fundação Dorina Nowill para Cegos (Dorina Nowill Foundation for the Blind), and Larama – Associação Brasileira de Assistência ao Deficiente Visual (Brazilian Association for the Visually Impaired) – both located in São Paulo, which produce, adapt, and distribute several materials for pedagogical activities and also for the daily life of the blind or for those who have some vision impairment. Among such materials, it is possible to find a few maps, and graphics. Besides the organs mentioned above, some initiatives to produce tactile maps in state or city organs are known and also from some researchers professors spread all over the universities in our country developing research on issues related to*cartographic desing for tacliles maps and its use.* The examples academic research in tactile maps of knowledge began in 1990 with the doctoral thesis of Regina [Araújo de Almeida] Vasconcelos (1996).

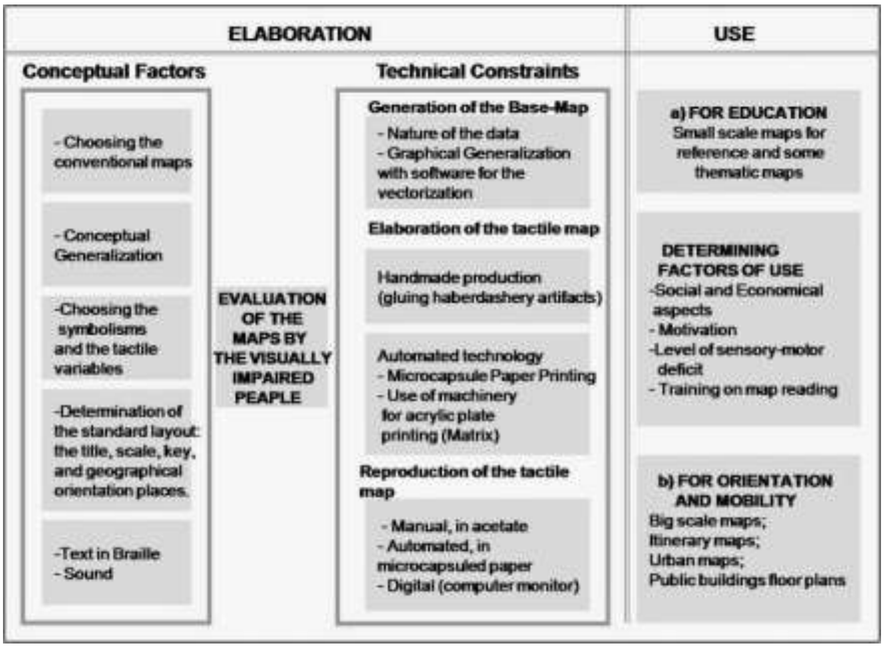
At the Federal University of Santa Catarina, more specifically in the Laboratório de Cartografia Tátil e Escolar (Laboratory of Tactile and School Cartography) (LabTATE), since 2002 there a significant amount of research in the area of tactile maps, however, only in 2006 ih happened to start received funding in order to study and propose standards for tactile maps for Brazil.

Due to the lack of knowledge and dissemination of the creation of tactile maps and even the maps themselves, especially in Brazil, in the sequence it will be show the factors considered in the design of maps in the realization of the project, the methodology and some results achieved during the two years of research and also the actual situation.

## The conception of tactile maps

In the conception of tactile maps as well as conventional maps, two moments are considered: the moment of elaboration and the moment of use. This means that some points must be taken into consideration, such as the map's purpose and target audience, that is, their users. In order to provide a better understanding of the involved factors, the most important implications to be considered in this process are presented in Figure 6. That is an attempt to show these implications synthetically, and afterwards, brief remarks are made about each one of them.

Figure 6: The conception of tactile maps (Loch, 2008).



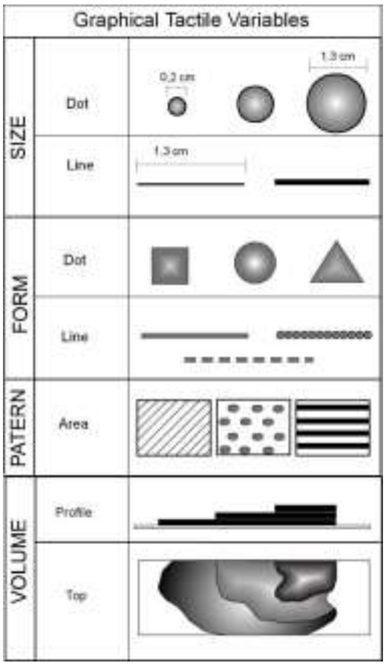

### *Conceptual Factors*

The conceptual factors which were considered in the elaboration of the tactile maps are related to Cartography per se; for instance, the choice of conventional maps which originated tactile maps and the procedures in the generalization – once not everything in a conventional map can be transcribed for the tactile reading. Determining rules is also important about how to do symbolizations considering that it is necessary to transcribe what is visual into tactile, that is, to transform the Bertin variables(Nogueira, 2008), into the graphical tactile variables (LOCH, 2008) shown in Figure 7.

Determining a standard layout is likewise important, that is, in the scale, in the title (which will indicate what the map shows) and in the geographical orientation (the mark of the north direction). The latter is extremely important for the positioning of reading of a small scale tactile map; and the graphic scale is also important, once it helps the visually impaired (VI) to imagine the dimensions or the extensions in the reality.

The texts about the map are as important in the tactile cartography as in the conventional cartography, since a map has to be understood from the texts it brings on its body and legend.

Figure 7: Graphical tactile variables for the design of tactile maps (Source: Loch ,2008)




*Technical Constraints*

The technical constraints are related to the production and reproduction of tactile maps. There are countries where people use digital technology and computerized machinery for the development and use of tactile maps, and in other countries, tactile maps still been generate an even scale.

Despite of the variation in the way that the tactile maps are produced, it is highlighted that, besides the costs which make the maps accessible to the VI, the sophisticated technology may not be the most appropriate if the maps are not easy in terms of cognition. The elaboration of tactile maps can be totally handmade, since the maps' design to make up the matrix until the making of the matrix itself, which is manually constructed by sticking different materials, such as the cork, rubbers, strings, and junk jewelry materials. It is also possible to use graphic design software to transform the conventional map (in ink) into a reference to the tactile map. The advantage of creating maps on the computer lies in the possibility of standardization of forms, sizes, themes, and layouts of maps which will be stored in digital formats and will be able to be printed anytime that one wants to design the matrix of a tactile map. In the project "Tactile Maps", the base-maps were generated by the graphic design software and manual generalization; in relation to the matrix production, it was handmade. For the production of matrix, the Thermoform machine was used, which heats an acetate sheet (*brailex* or *braillon*), and molds it with a vacuum pump in order to produce the relief map (LOCH, 2008b).

Another way to produce the tactile maps in LabTATE was to use a microcapsule paper as a means of map representation. After digital elaboration, the map is then printed on microcapsule paper (brands: Zy-tex, Flexipaper, or Piaf) by a DeskJet printer. This special paper contains on its surface some alcohol microcapsules that may create textures when heated. Thus, lines, points, polygons, and texts in Braille printed over it in black or dark-grey are heated by a special machine (*Tactile Image Enhancer*) until the explosion of microcapsules which elevate and construct relief textures, that is, the tactile map. In this method of elaboration, the map does not need a matrix. After the digitalization, it can be stored in a digital file in any interchange format Whatever is the final solution in the production of tactile maps the validation of what has been produced must be made by the visually impaired because they are the users of these products.

*The use of tactile maps*

The tactile maps are made up to accomplish two needs mainly: the education and the orientation/mobility of the visually impaired or the blind people. Thus, for the first need, the maps are those of general reference, in small scale, such as the maps for atlas, and the geographical maps for walls, as well as the maps for textbooks. In order to tackle the second need, the maps need to be made in big scales, such as the big urban centers' maps and in a bigger scale, to help with the mobility in public buildings where there is a great flow of people. So the first task in the production of tactile maps is to define what and how to translate it (generalization of what is on the map) considering the issues and tactile graphic transcription is different from that used in the visual transcription.

It is clear that such use shall be limited to the limitations of movement and sensibility of each blind people, to their training for the use of maps and their motivation, which depends a lot on the environment in which they live.

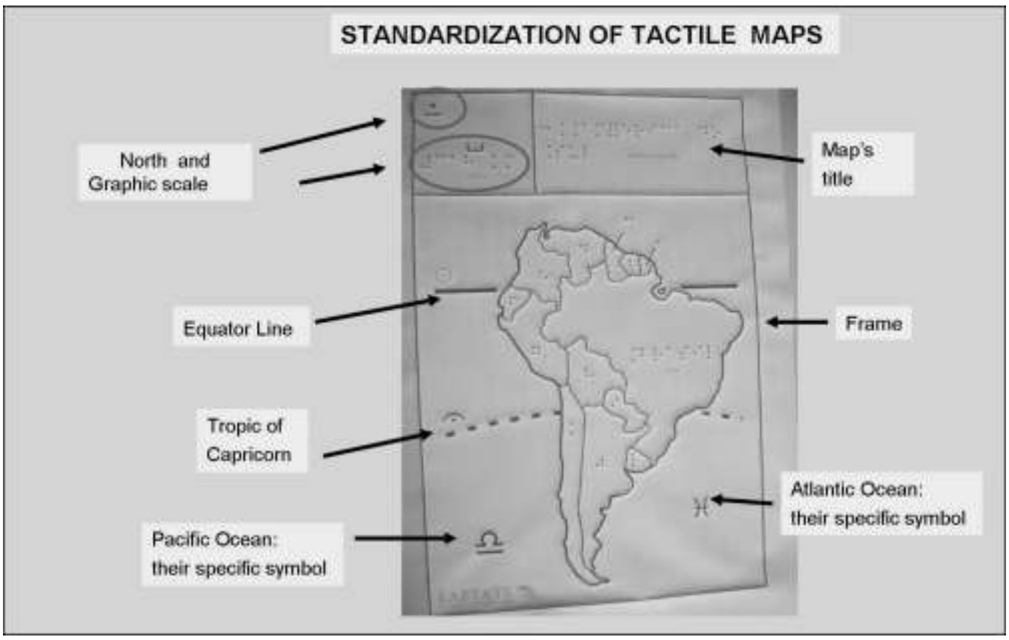
**The tactile representation to provide communication through tactile maps**

The standards proposed for Brazil, exhaustedly studied in the project "Tactile Maps…" in LabTATE concern the methodology of production and reproduction, the layout, and the symbolisms used in each of the types of tactile maps: those in small scale – for the education; and those for the orientation and mobility – tactile plans.

It is possible to observe in Figure 10 that the map and its components are contained in a frame that limits the point where the tactile map user will find information to read it. The north, standardized as a punctual element and composed by a point and a line, also assumes a standardized position on the upper-left corner to facilitate the positioning of the map. Right below the north, in the same box, it is possible to perceive the scale in graphic form that represents only a part of it, which is enough to understand the reduction that was made.

The map's title in Braille will be placed in the other box, on the left. All of these components will always be in the upper part of the sheet. Therefore, the user will position the map for the reading using the north, recognize the scale and then get to know the theme or topic the map is about and then she is able to explore the map. The legend follows a similar pattern, but it is made separately, on a separate sheet, and in the place of the scale, the word "Legend" will be written in Braille. In some cases, if the legend and the title are small, they might be placed together in the same box.

Figure 10: Standard layout for the small scale maps produced in microcapsule acetate paper and the example applied to South America in microcapsule paper, whose original size is that of a A4 paper format



This arrangement of elements follows the most ergonomic reading format – the reading of a text in western languages and also in Braille language is performed from left-right, up-down direction. Moreover, it facilitates the tactile exploration, once the VI first explores the whole map, that is, the contours of the mapped area; afterwards, with the legend's help, the user interprets the parts: the punctual elements, the internal limits that constitute areas and the linear elements, in case they are on the map. The visually impaired peaple needs help to understand how to position a map to read it and what this kind of graphic representation means; once the he/she has learned, when faced with other maps with the same configuration of elements, he/she will be able to explore it by himself/herself, departing from the north position to start the reading.

We chose to use letters or numbers to identify areas, instead of using textures, can allows us to represent all classes in the same map after they suffer widespread conceptual and graphic.

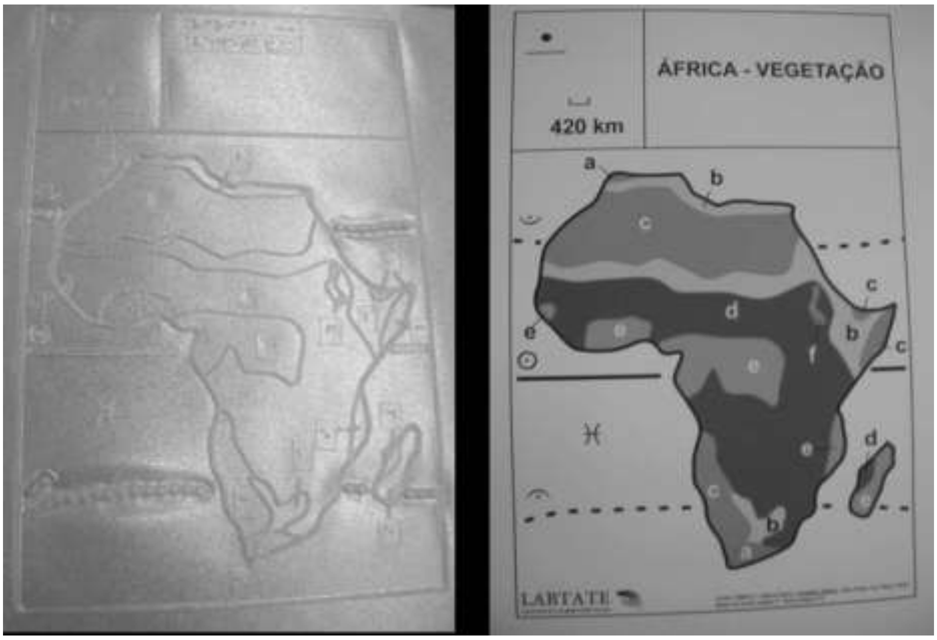
In addition to the layout standardization, other patterns were created in relation to the elements, as shown in Figure 11 and applied to South America and Africa maps (figures 10 and 12).

In the Figure 12 there is one example of the products which were crated (the legend are on separate sheets, but they are not presented here). The website www.labtate.ufsc.br can be accessed in order to get to know other standardized maps which were developed in the project.

Figure 11: Some standard symbols for small scale tactile maps ( Source: Loch, 2008b)

| Patterns created in relation to the cartographic elements | |
|---|---|
| Artic Ocean | ♌ |
| Antartic Ocean | ♒ |
| Pacific Ocean | ♎ |
| Atlantic Ocean | ♓ |
| Indic Ocean | ♐ |
| Cancer Tropic | ◡ |
| Equator | ⊙ |
| Capricorn Tropic | ◠ |
| Greennwich Meridian | λ |

Figure 12: An example of a map produced for the tactile geographic and low vision atlas (the original ones measure 25 x 35cm long; Source: LabTATE, 2008).



Following this rationale, the symbolism for tactile maps was researched in terms of public buildings and urban centers – the big scale maps. These maps are aimed at the orientation/mobility and need to have standard symbols for several public urban equipments, such as squares, streets, payphones, and other devices which VI's need to have access to, such as tactile ground surface, sinks, fliers, chairs, tickets, etc.

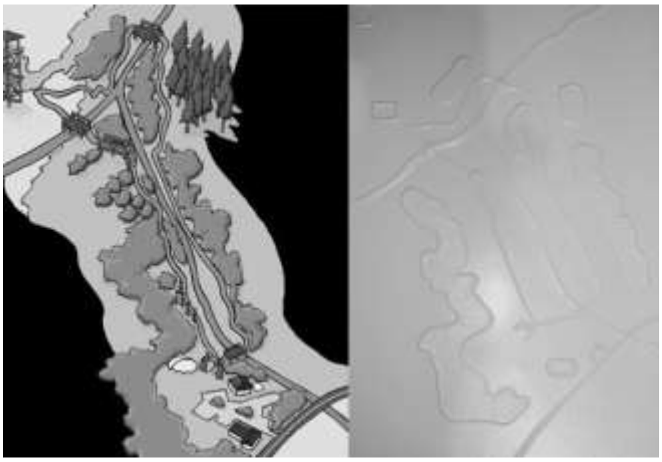
Some of the products from the project are: the tactile maps for the bus terminal, the bus station, the airport, and the downtown, all of them related to Florianópolis-SC (LabTATE's headquarter), and the tactile maps for education. A tactile geographic atlas with 34 maps, and a version for the low vision people, tactile geographic model, a tactile globe, and an accessible website were generated in the project. All of these products may be reproduced by those who access LabTATE's webpage on the Internet, by downloading the digital files of the maps and the other products which were developed, as well as the instructions which are available on the website. The website www.labtate.ufsc.br can be accessed in order to get to know other standardized maps which were developed in the project.

### Tactile Interactive Cartography

It is possible to consider the sounded tactile maps as an advancement of conventional static cartography getting to what is referred as interactive mapping. The concept of MacEacherem(1994) for cartography can be extended to Tactile Cartography as: the map built tactile physical, embossed paper or plastic, that provides key points that can be touched to provide a data type information: the name place (first touch), what is this place, for example, types of vegetation, topography and type of herbivore fauna (second touch), details on the local flora or fauna (third touch). Therefore, this map symbols in relief, coupled with a special type pad and a computer is a presentation tool, even though it may not be considered as a clickable electronic map in the conception of Kraak and Driel (2004). According to these authors, a clickable map, works as an index to other documents in the electronic database.

A model for interactive and sounded tactile maps was developed in 2008 at LabTATE UFSC, in partnership with Fundação CERTI. The project goal was to generate a system of spatial information composed of tactile maps coupled with sound device, in order to meet the needs of environmental education for the visually impaired in an accessible ecological trail. It was developed and proposed as a prototype solution for a pad that is sensible at the touch of the hand (there are tactile maps or drawings), connected to the computer that accesses a database and sound systems.

Figure 13: Map of the original track and tactile map generated in acetate (Source: LabTATE, 2008)



The project happened in an interdisciplinary way, the participation were  students of  engineer, geography; another cartographer teacher and blind people from many different backgrounds in order to build a broader and deeper knowledge in relation to universal design, engineering, mapping tactile and map reading for the visually impaired peaple. Participants visually impaired (blind) and visual volunteers walked the track, and participated in the cognitive tests with the maps.

## 4. Final Remarks

As originally proposed we briefly present the issues surrounding the maps as information systems and visual and tactile communication. We found out that maps generally are designed by specialists and there is specific training for these professionals. However, there is an interface between the design of maps and graphic design, when both require a range of knowledge to consider the perception, cognition and information processing by the human mind to make the information to be visual.

The maps of the Internet are now deserving of attention from a range of researchers, since the system Earth Google revolutionized the way to make and use maps, but it appears that there is a long way and radical changes to be made to the maps to be available in a creative and provocative on the Internet. The interdisciplinary work of experts in programming, information systems, designers, cartographers and geographers can encourage creativity for achieving high levels of interactivity for reading the world through maps on the Internet, the way that will be compatible with the information age.

However, with regards to the Tactile Mapping, it still today remains unknown to most professionals of both Cartography and others with interface in this science. We know that for that Cartography doesn’t exist, norms or standards accepted in the worldwide as with conventional Cartography, and everywhere in people had developed their own cartography Tactile based on their technological and social development.

Because of this we created the conceptual model for the realization of a project at the LabTATE, at the UFSC, whose goal was to create standards for tactile maps for Brazil. We have shown the proposed standard for tactile maps with focus in education and other prototypes developed in other projects. Specially because we continue our research in this area aiming to propose standards for Tactile Cartography, in order to assist in mobility and independence of the visually impaired. We believe that technology makes things easier for people and for people with disabilities it makes things possible. Accordingly, we verified that: if to people, maps reduce the world by assisting them in its understanding, for people with visual impairment, maps expand their conception of the world, assisting them in their autonomy.

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