

FINDING THE RELATIONS OF HUMAN AND NATURE DYNAMICS THROUGH COLLABORATIVE DATA AND INTEGRATIVE PROCESS

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Abstract

The Federal University of Santa Catarina main campus had its origins 60 years ago. From the beginning, the campus evolution was given with little emphasis on the landscape quality of its open areas, resulting in an overlap of layers, natural and built, that exposes an absence of environmental understanding and even lack of planning. Though continually neglected, campus hydrography is still responsible for the beauty of few green corridors that permeate the campus. In another layer, the campus road system prioritizes motorized vehicles, as opposed to infrastructure to provide adequate mobility to the nearly 50.000 people that circulate daily through its open spaces. Another significant layer represents the knowledge and permeates the natural and urban dialectic that inhabits the campus territory. The organizational structure of the university, in turn, also developed in a segmented way between its final activity - teaching and research - and the activities that are necessary for the good management of the university. However, the extensive background information and the built knowledge are under-utilized as tools for the university spatial management. The lack of connectivity between the various teaching and administrative departments creates a barrier that not only demarcates physical space but also bounds the real meaning of campus universality: the constant exchange of knowledge. Departing from this dialectic, Information and Communication Technologies (ICTs) is explored in the analysis of spaces, with emphasis on its potential to foster collaboration and knowledge networks through the campus mobility planning. This study has analyzed information collected from different digital methods in order to correlate the relations between human and environmental dynamics. The scope of the study and all digital data was obtained through a collaborative process of a variety of stakeholders within the university, demonstrating the potential that integrated management can promote in the construction of the quality of life within the urban and academic space.

1. Introduction

Diversified are the motivations that drive people to choose a place to live. A professional opportunity or the socio-economic conditions of a city are factors that can be determinant during the productive phases (adulthood) of an individual, but when thinking in the long

term and in the future generations, the quality of life is a term that visibly emerges in this decision-making process.

The concept of quality of life in the urban environment can often be linked to the harmonious relationship between urban design and nature, either through its green area indexes and its associated clean air, or by the possibility of natural and direct contact with the local hydrography.

Nevertheless the natural factors, another recurrent understanding that determines whether a place is good to live or not is its urban mobility. The traffic conditions of the streets, the provision of efficient and accessible public transport and, mostly, the potential of the infrastructure to walk and pedal safely through the city are factors that directly influence the health and well-being of the people and, therefore, the quality of that place.

Thus, the association of these two themes - natural conditions and road design - are the main issues for an adequate public policy targeted to the interests of its inhabitants. Today, the search for qualified spaces to live requires managers to better understand the territory under their responsibility, counting on the performance of technical collaborators of the most varied specialties that will help in the preparation of proposals that are consistent with the diverse aspirations of its population and integrated to the preservation of natural resources of that environment.

"To summarize, increased concern for the human dimension of city planning reflects a distinct and strong demand for better urban quality. There are direct connections between improvements for people in city space and visions for achieving lively, safe, sustainable and healthy cities." (Gehl, 2013, p.7)

The effective occupation of a space by its community can indicate if a project was successful or not. The urban planner, when projecting to the collectivity, must predict how this appropriation of space can happen to all in an inclusive and integrated way. This requires in advance the knowledge of the dynamics promoted by the groups of users of that place and take into account the particularities of each layer that composes the physical space, be it natural or constructed.

The analysis of the urban space - actors, means and territory - raises different questions to understand the production of the city and in order to answer these questions we need specific data (Mazenod et al., 2016). First map, raise the territory and its static configuration (road system, green areas, etc.). Next, diagnose, know how are the dynamics of use and occupation of each space (flows of people, vehicles, network operation, etc.). Finally, to do the planning itself, proposing the necessary adaptations in order to obtain well-distributed and equally used public spaces and indicating improvements to achieve the planned strategic planning for the institution, city, etc.

For this, in order to identify the relationships and forms of integration of natural and human dynamics, based on data collected by different methods and actors, this work evaluates how the physical space management process can be done by obtaining form data collaborative and integrated among the various agents involved and having as a reference the academic production linked to the administrative needs of a higher education institution. Through the methods and techniques of obtaining data regarding the flows of people in the campus, it is intended to verify the potentialities of the

information generated in it and the limitations of the collection, systematization and administration of these data.

The data and discussion presented next are the results of the collaborative process between the Federal University of Santa Catarina (UFSC) professionals responsible for the campus planning and the Citylab learning modules at the Post-Graduate Program of Architecture and Urban Design. The university technicians participation in the first module were restricted to the evaluation of student's work. Since then, architects and engineers from the Architecture and Engineering Projects Department (DPAE) have been enrolled in the learning modules, directly working with graduate and undergraduate students. The modules have presented a relevant opportunity to focus and spread discussions for the land use planning with emphasis in the association of ambient preservation and policies that prioritize non-motorized modals that represent noteworthy concerns of both groups and which originated the analyses showed on this article.

1.1. The campus

In the midst of traffic chaos and the scarcity of shortages free spaces in its urban areas, Florianópolis is still the capital with the best Human Development Index in Brazil (IBGE, 2010), attracting new inhabitants annually through the association of quality of life to its natural beauties. In addition to these factors, the city also has opportunities for excellence in education. The Federal University of Santa Catarina, founded in the city in 1960, is now the sixth best institution of Public Higher Education in the country, and the best in the state, according to the general index of courses of the Ministry of Education and Culture (MEC).

After half a century of its foundation, the Campus Prof. David Ferreira Lima UFSC, here called simply Campus Trindade, results from a complex network of ecosystems, where its components, either by an absence of environmental understanding at the time or by factors other than planning, do not dialogue with one another.

"Despite the completely unfavorable opinion of the team of architects, the state government favored the construction of the Campus in Trindade, so much so that about two years after the same opinion, on November 26, 1954, with Law No. 1,170, governor of the state reserved the lands requested by Henrique Fontes for the installation of the University in Trindade. This insistence of Sources was based on the opinion of Ernesto de Souza Campos, former Minister of Education, who visited the site of the future University in 1953, giving a favorable opinion to the sub-district." (Neckel & Kuchler, 2010, p.19)

The natural topography was maintained throughout the development of the university, differently of its vegetation cover and hydrography. Located in the Itacorubi watershed, the Campus watershed comprises the lower part of the Rio do Meio and its tributaries (Figure 1), the majority of which were rectified and channeled. Along the banks of these canals, some animal species survive amidst the sparse remaining vegetation, in an attempt to maintain the green corridors that integrate their habitat and that transpose the Campus and its surroundings.

Despite the beauty of these stationary elements (relief and vegetation) and fluids (water and fauna), the expansion of human activities insists on neglecting the natural resources

of the Campus, where the Permanent Preservation Areas (APP's), protected by law, at the water's edge are currently occupied by buildings and parking areas. Today, the Campus has a population of approximately 50,000 people who circulate daily there, most of which do not perceive this complex network of natural connections. Structured on the banks of the flow of vehicles, the infrastructure for active transport (walking or cycling) was rarely highlighted in the urban conformation of the Campus, despite its growing demand.

Thus, the basis of the internal roadway design of the Campus has hardly changed, mainly due to two traffic lanes in the East-West direction, one internal to the Campus that connects two neighboring districts, another one of municipal relevance that acts as an important axis (Figure 1). Among these, varied typologies of unplanned or inadequate sidewalks guide the passage of pedestrians and cyclists between one building and another.

This whole road system, planned or not, converges to the center of the Campus, where the Citizenship Square is located, a landscape project signed by Roberto Burle Marx in 1970. The urban landmark of the Campus, the square and the buildings that surround it forms a Central Axis where most of the events that recover to the university its character of space of exchange take place. One of the biggest buildings that illustrates this scenario is the University Library, whose main access is in front of one of the water courses of the Campus, a place where, despite the scarce urban furniture installed, it offers the opportunity of meeting and connecting people and the water.

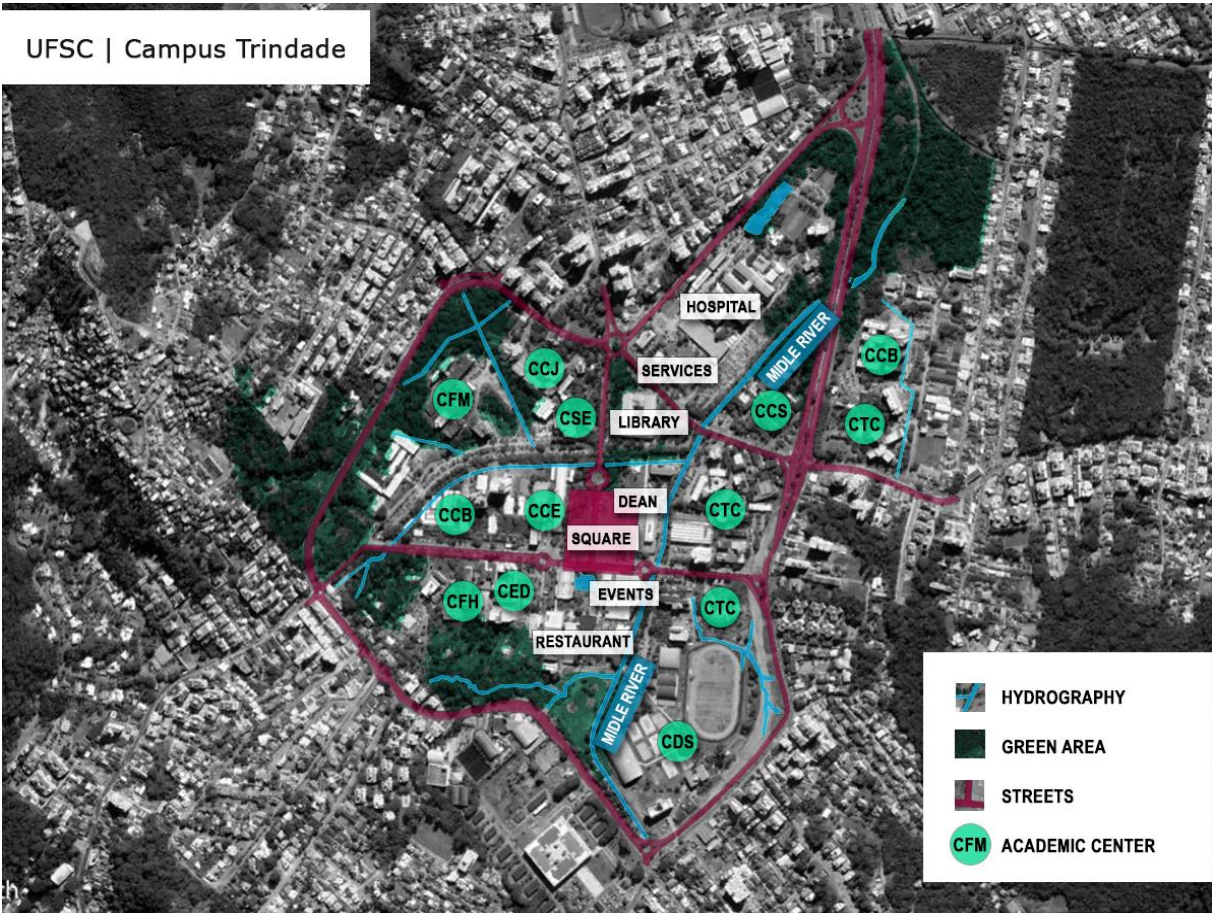


Figure 1 - Road System, Hydrography e Green area.

Outside this central axis, going towards the boundaries of the campus with the city, are the University Learning Centers distributed in the academic areas implanted between the main routes and the channels of the campus.

1.2. Human Scale

While the streams exhale a request for recovery of its banks and the roads squeak for maintenance, the human scale equally demands for its preservation as a vital system to the functioning of the organism that is a university campus and, consequently, requires its space in the political agenda of the institution.

"People and their habitat coexist. As humans multiply and their technology comes to dominate the earth, the conscious organization of the land becomes more important to the quality of life. Pollution impairs the living system, and some of our technical feats threaten all life. Careless disturbance of the landscape harms us; skilled siting enhances us. Well-organized, productive living space is a resource for humanity, just as are energy, air, and water." (LYNCH, 1984, p.378)

In the same proportion to the growth of the academic community, the demographic density of the surrounding neighborhoods has inflated to meet the housing demand surrounding the university. As a result, the flow of people from these regions, who use the campus as a place of study, work, leisure and even as a passage, has also expanded.

"The development of life in cities in recent years suggests a completely different picture. Here the indirect contacts and stream of images depicting what others have experienced in other places does not out compete life in public spaces, but rather stimulates people to join in and play an active personal role. Opportunities to be there in person, face-to-face meetings and the surprising and unpredictable character of experiences are qualities tied to city space as meeting place." (Jan Gehl, p.26)

It is also considered that the campus functions not only as an environment of academic integration, but as an environment of belonging to the entire community, including the population of adjacent neighborhoods that use the campus. Despite the evolution of educational technologies, distance learning and new virtual tools that contribute significantly to scientific advances, the values added by the opportunity for face-to-face exchange of experiences survive on the university campus as a shared environment not only in congresses and scientific events, but in all its daily atmosphere.

1.3. Integrated management

Moving beyond the management of this space, it is evident the importance of its spatial organization in the promotion of meetings for academic integration through the ease of movement of the university community, encouraging scientific and cultural exchange. To the detriment of the simple offer of spaces for classes, this academic interaction plays an essential role in the learning process, and can influence even in the organizational scenario of the university.

Divided into ten Learning Centers, the academic structure of UFSC has progressed in a segmented way. The lack of connectivity between the numerous administrative and teaching departments creates an imaginary barrier that demarcates not only the physical space, but also captures the real sense of the universality of a Campus: that of being a spring from which information flowing to the diverse ecosystems or scales of human development, generated from the exchange opportunities that occur within their dependencies. It happens, however, that this acquired knowledge is underutilized as a tool of policy and management of its own territory.

"Why do some problems come to occupy the attention of governmental officials more than other problems? The answer lies both in the means by which those officials learn about conditions and in the ways in which conditions become defined as problems. (...) Sometimes, a more or less systematic indicator simply shows that there is a condition out there. Indicators are used to assess the magnitude of the condition (e.g., the incidence of a disease or the cost of a program), and to discern changes in a condition." (Kingdon, John. 1995)

It is mandatory that the knowledge-holding forces and the decision-makers be structured to build a management process that takes into account the different actors that work inside and outside the university. Establishing a continuous process between the different levels in order that the basic information for the planning analyzes can be obtained and updated in a constant way can help to understand the dynamics of this space and to define the problems to be prioritized in the political agenda of the institution. To the triple occupation of the physical, natural, road and human space - the scale of knowledge, immaterial and intangible, is thus added, but as dense and essential as the others for the vitality of the campus.

"These collaborative arrangements arise through the development of knowledge networks. The close physical proximity of the large internal university community enables the development of new ideas through collaboration on problems that span faculties." (Curtin University, 2014)

From the connection of the different actors actions, mainly from the dynamics of the academic community and its teaching practices, to the studies of the technical body of the university, a network of information can be created that, if well structured, will give subsidies for a decision making technically feasible and cohesive to the university's political aspirations.

"With so many cyclists and pedestrians registering their routes, other opportunities began to emerge. Public managers, hitherto dependent on inferior technologies - often limited to block and pen - have begun to realize that this wealth of information could help cities improve. If searches were once limited to a few hours of observation on certain days and times, with the volume of data coming from applications it is possible to have a much more complete view of people's behavior in cities." (Felin, Bruno, 2016)

Aligning this collaborative process with the theories of Kingdon (1995), when participants identify problems or agree on certain proposals in the dynamics of public policies, technology emerges as a valuable tool for urban management, based on the experiences recorded in the integrating environment and which is the university campus.

1.4. Technology as a tool

There are several methods to obtain the information that will guide, for example, the creation of new spaces for academic integration, the revision of the pedestrian axes, the recovery of natural areas or, as we hope, all of these simultaneously.

"The era of big-data planning (the term used to define these large volumes of information) is coming and must influence decisions in all modes of transport in the coming years. With such a large volume of data in hand, the challenge is to digest everything and turn it into public policies to apply to a city drawing that benefits users." (Felin, Bruno, 2016)

With user-friendly platforms for engagement and data collection, computer tools raises as a new method of urban plan management. The use of new technologies has exponential advantages of contributing to the renewal of space, either by shortening the distances between people, or by the material by this interaction produced.

For RATTI (2017, p.77), design, innovation and technology can be used to improve people's lives, and the potential of the use of the international computer network can restore cities to their original value, to connect people and bring back their lost nature. For this, however, it is imperative to build a complex, connected and constantly updated network of databases, making monitoring accessible to all employees involved in space management processes.

"Through the analysis of data coming from base stations, urban planners can gain the ability do monitor rapidly changing urban dynamics, wich are difficult to capture by traditional surveys. With the massive spread of hand held devices in the past years, the cell phone infrastructure coul provide an unlimited source of information about the city in everfiner detail. The challeng for urban researchers is to learn how to exploit this information to gain a better understanding of the city." (Ratti, 2006, p.745)

From the creation to the full implementation of the solutions, it is necessary to know the variables that make up a given location, registering and, mainly, monitoring the dynamics of the various ecosystems within it, whether natural or projected, and information technology is growing in an aligned way to the desire to develop smart, safe and healthy cities, but, above all, to make cities more humane.

2. Research methodology and analytical tools

As contextualized, for the aimed analysis, it was considered the Trindade's Campus as case study, approaching to the direct analysis of the applications and practical consequences onto the territorial politic inside UFSC.

In order to achieve its goals, the research started from a theoretical revision, followed by a brief diagnosis of the current situation of the Campus. Conclusively the work has analyzed potentialities and limitations of the information on behalf of the dynamics of pedestrian and cyclists circulation through Campus collected by both data acquisition methods: by online survey and by access point connection records, evaluations made by two different teams – technicians and academics, respectively.

2.1. Online Survey

The results of the research “Where you go through UFSC?” were the first data used for this study. The research was conducted in 2017 by the Urban Space Planning Division of UFSC, associated to the Architecture and Engineering Project Department (DPAE), technical office of the University.

The online survey was the chosen tool in order to collect quantitative and qualitative data which allowed to outline a profile of the respondents, identify necessities, mapping tracks and entrances points and knowing the aims of the users that chose bicycles as a travel modal to and through Campus or of the people that are interested on using the modal but don't used it yet on his daily trips.

The data collection of the survey was available through a pre-set period of a month and was attended by the volunteer participation of 803 persons that informed 236 tracks (9 valid data) made by bicycle. For this data collection it was applied two systems in the same survey:

* On the online platform QuestionPro (<http://www.questionpro.com>) it was collected information about the use of bicycle such as main transportation modal used in Campus displacements, origin spots of those displacements, reasons why use the modal, why don't use the bicycle and which factors could make the user more likely to use the modal. The data of this platform are generated in .xls format, already consistent for data processing and for the dashboards generation of the main analyzed variables.

* Through the online platform which allows the elaboration of maps and geographical profiles GPS Visualizer the respondents were able to draw up to 3 of his main cycle tracks over the Campus map. The data generated by the survey were on .kml, after these data was converted in to .shp and .dxf for the processing and maps elaborations as the heatmap made using QGis, free multiplatform software of geographical information system that enable visualization, edition and analysis of geo- referenced data.

2.2. Access Point

The second method was developed through the collaboration between the Urban Ecology Lab that belongs to the Urbanism and Architecture Department and the Computer Security Lab from Statistics and Informatics Department.

For the evaluation of the Campus's dynamics it was held the demographic mapping of campus meeting points using data obtained with the connection of mobile devices of the graduation students through access points from Wi-Fi network distributed all over the University. This network is related to the Eduroam service, available to the academic community where, through authentication with pre-registration, users can access the internet automatically, freely and safety.

At UFSC, the management of the registrations is made by the team of technicians of Superintendence of Electronics and Communication and information Technology Governance (SETIC) that stores a huge data bank generated constantly along years of Wi-Fi use at the Campus. To turn this data, so far unknown, available for researches, they passed by a processing, in order to ensure students privacy, using cleansing and restoration techniques.

For the research concerned, it was registered at each 15 minutes the connections at the same access point for a period of 10 minutes minimal, on a regular school term day (Wednesday) in which was obtained a total number of 57.980 geo-referenced registers inside Campus of graduation students.

3. Analysis and results

Although for different purposes, the two methods considered the dynamics of people on campus to obtain data, both of which could guide decision-making in urban university policies. The participation of actors of different natures in each research is fundamental in the construction of this collaborative process, in order to better achieve results that satisfy the end user that is the academic community itself.

The study of the cycling system, carried out in 2017, had a voluntary action characterized by the active participation of the people in the process of building the space, bringing the inherent visual scale of those who ride bicycles. In addition, the target audience was not limited to the effective cyclists of the Campus, but the participation was increased to receive contributions of modal sympathizers, but who still do not use the bicycle to go to the UFSC, to understand their choices and to make a reading their wishes.

Through this research, it is possible to obtain subjective information not contained in UFSC database records, and thus to draw profiles of groups of users with similar characteristics, such as frequency of use of the modal, reasons that lead people to do not ride to the campus, reasons that lead them to choose another modal and, of course, reasons that make choosing the bike as a means of getting around in their day to day.

Thus, from the results of the research, presented in Figure 2, the relationship between the choice of the bicycle with health-related reasons and an environmental awareness of the participants is notorious. Reasons such as physical benefit, escape from stress, contact with nature, safety on the way and search for an alternative means to reduce pollution are the most relevant and can complement the decision making for the planning of road infrastructure of the Campus directed to the active transport.

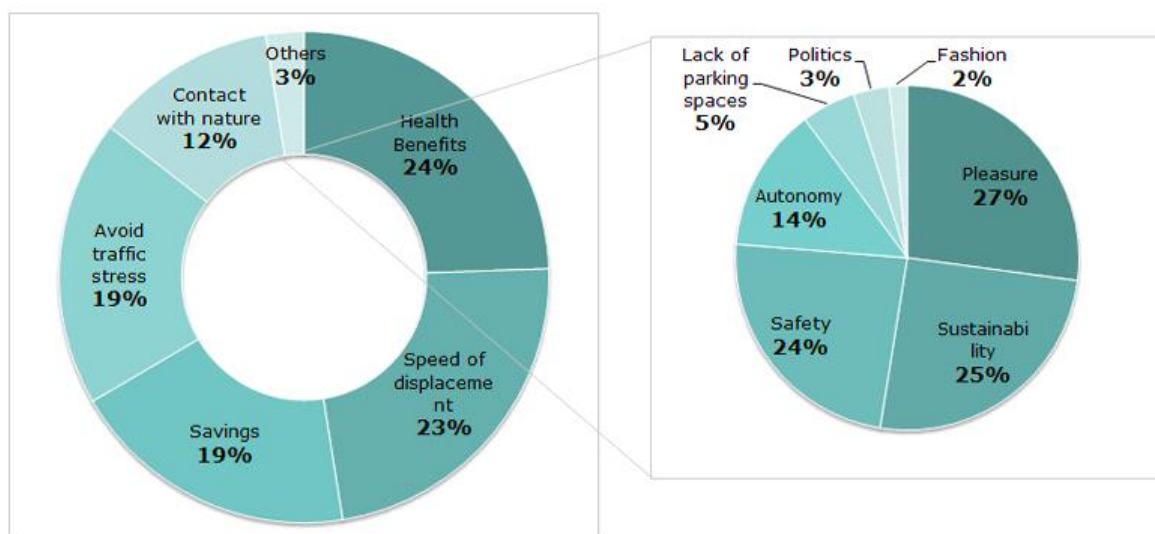


Figure 2 - Reasons to use bicycle.
From: COPLAN/DPAE/UFSC, 2017.

The study also shows that, in addition to the motivations, the main reason that people do not use the bicycle in their routes, shown in Figure 3, is the lack of public policies that prioritize the execution of infrastructure appropriate to the modal (cycle lanes or paths).

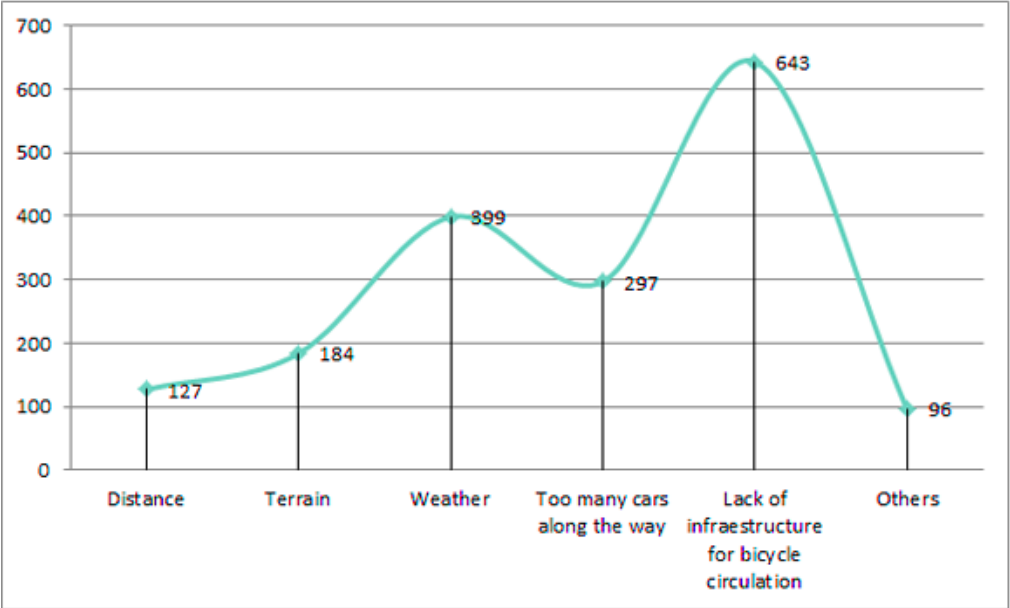


Figure 3 - Reasons why do not use bicycle.
From: COPLAN/DPAE/UFSC, 2017.

Therefore, despite verbalizing their longing for proximity to the nature and escape of traffic, cyclists are more likely to circulate where infrastructure supply is more adequate, enjoyable and secure. The actual design of the paths exposed in the heat map (Figure 4) shows that bicycle trips are given priority in the road system, composed of the existing roads and parking lots on the Campus.

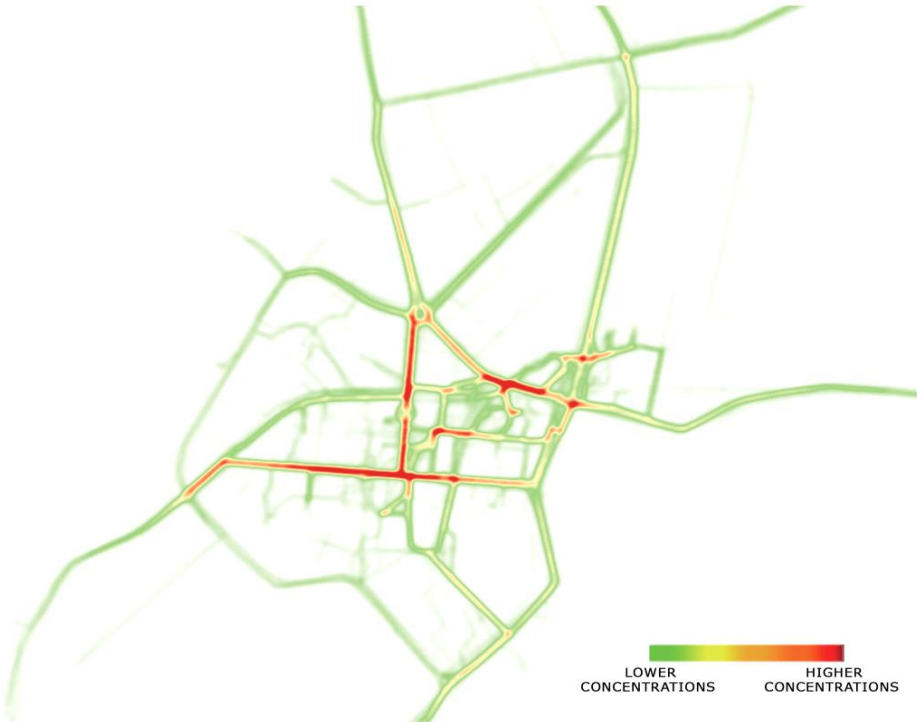


Figure 4 - Heat map indicating the cyclists tracks.
From: COPLAN/DPAE/UFSC, 2017.

While in online research one can obtain the wishes and desires of the community or, in the case of the study of bicycles, capture the perception of the suitors to the use of the modal, expanding the sample qualitatively, in the research developed from the accesses of wi-fi, participation takes place involuntarily and passively, based on the anonymous records of user group shifts, bringing real information as to the way people's movements of the campus happen in practice.

In this case, the universe is much larger and dynamic, requiring specific procedures to manage the large volume of data and research ways of visualizing these results. In addition, in order for this type of participation to be viable, a thorough work was done by the Computer Security Laboratory team to ensure the anonymity and data security of Campus users. From this study, unpublished in the UFSC and shared responsibility between different actors, a series of other researches for purposes of institutional policies can be carried out based on the information of the numerous dynamics registered with the wi-fi connections.

For access point research in particular, with a view to mapping the dynamics of interdisciplinary encounter that occur in the university, only the records of students of undergraduate courses, divided by Education Center, who were in the same place by more than 10 minutes. It occurs, however, that this population distribution in the Campus is not homogeneous, varying according to the number of courses and students linked to the ten educational centers located there.

Figure 5 graphically demonstrates this imbalance, through the height of the cylinders indicating, in each block, the number of students of the Center in relation to the total population of the Campus. The Technological Center, in orange, has a total of 14,047 students enrolled in its 15 undergraduate courses, 21.62% of the student population on the Campus, while the Sports Center, indicated in light blue, has only the Bachelor's and Bachelor's Degree in Physical Education and the 2,055 students enrolled in them represent 3.16% of the total number of students. In this sense, the dynamics of distribution in each Center becomes more evident from the evaluation of the radius of each cylinder, which indicates the number of students of the Center in each region, proportional to the total number of students of the Center throughout the Campus.



Figure 5 - Student population distributed by Education Center.
From: Urban Ecology Lab / ARQ/UFSC, 2018.

In the same way that the online survey pointed out that cyclist traffic predominates where there is adequate infrastructure, in the results of the method by the access point, the data obtained by the wi-fi connections (Figure 6) point to the Central Axis, where the buildings of multicenter use, is configured as the main space for meeting and interaction among undergraduate students from different areas of knowledge. The time of less use of the buildings is another differential that the research demonstrated, where in certain periods some areas become idle and unexplored as a meeting place.

In the clipping shown in Figures 6 and 7, it is noted how the University Library is a clear example of this interdisciplinary dynamics, especially in the interval between the morning and evening periods (1:00 p.m.). In a closer look, however, we can see the predominance of students from the Teaching Centers closer to the Central Axis, and those located in more peripheral points of the Campus end up having less representation in these exchange experiences. Another variable raised is how the distribution of hours of academic activities directly influences the dynamics of the use of installed structures, leading to periods of idleness of the building.

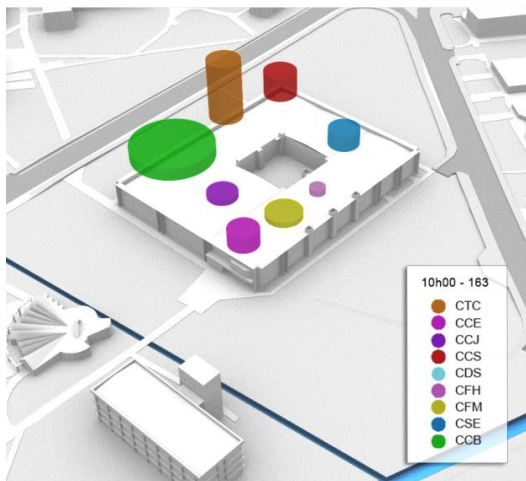


Figure 6 - Wi-Fi connections in the University Library by Education Center, at 10:00 a.m.
From: Urban Ecology Lab / ARQ/UFSC, 2018.

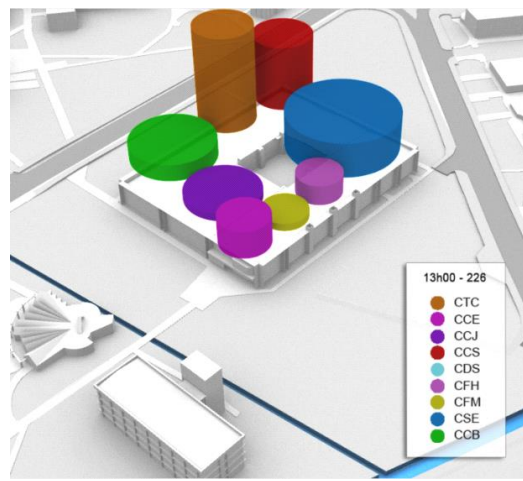


Figure 7 - Wi-Fi connections in the University Library by Education Center, at 01:00 p.m.
From: Urban Ecology Lab / ARQ/UFSC, 2018.

Although it achieves a large amount of raw data, the wi-fi connection registers are restricted to the academic community that has registered in the Eduroam network. The community outside the university, but enjoying its space can not be quantified by this method. It should also be noted that to avoid the identification of users, only groups represented by at least five students were recorded in each period, being excluded from the survey smaller groups or isolated individuals.

In this same logic, as the online research carried out had a target audience aimed at bicycle enthusiasts, some results also do not characterize the universe that makes up the university community, since it does not encompass users of other modalities. Thus, some data obtained, if not complemented with other methods and other samples, may be limited to the purposes of a given research and not giving a macro perspective of the displacements in the Campus (motorized, maintenance vehicles, pedestrians, emergency vehicles, motorcycles, bicycles, etc.). In this way, the centralized and integrated management of the information obtained in the Campus is crucial so that the wealth of data obtained in each research can be integrated into a complete and constantly updated system.

Figure 8 shows the main displacements and concentrations obtained with the data from both surveys. These spots show that the central axis has a role of urban connector of municipal relevance within the campus and it should be noted that, physically, this axis accompanies the flow of the waters of the Middle River showing the potential of utilizing the banks of this river for the purpose of integration with the users of the Campus. In the transversal sense, along the borders of one of the tributaries, the desire line of the main displacements of the active transport shows that the creation of infrastructures in this axis will reduce the distances between the surrounding neighborhoods and create the adequate infrastructure to meet the demand of the Campus being still close to nature.

With such overlap (Figure 8), it is still noticeable the importance of ensuring a good infrastructure for the Centers of Education located in the more peripheral regions to approach the opportunities of encounter that occur in these central areas.



Figure 8 - Overlapping of the Central Axis meeting areas and predominant displacement of internal cyclists on campus.

Given the above, although with the limitations of the data previously presented, the main analysis of the present study shows the potential of the use of the marginal areas to the rivers that make up the Campus Basin for the integration of nature and the University Community as a whole. The absence of bicycle lanes and sidewalks and the use of these margins for parking purposes currently leads to an underutilization of such potential and sometimes these areas are eventually hidden from people's views. This makes the watercourses, due to the low visibility they have, have low relevance in the political agenda of the institution, leading to the continued degradation of their spaces.

4. Findings or expected outcomes

In Brazil, since the publication of the National Policy of Social Participation – PNPS (Decree Nº 8.243/2014), it has been envisioned social participation as fundamental tool for the construction of public strategies, listening what population has to say about his own necessities and about his performance inside the urban scene. Starting from the construction of this dialogue, the professional responsible for the search of solutions carries a questionings framework that will serve as a base to the future city, more humane and sustainable. In addition, with the help of technologies, people are connecting themselves with his locals, knowing the surroundings, appropriating themselves of the neighborhoods and, final, filling the city.

In the university, in turn, countless data are generated from diverse sources and under the eyes of the most varied actors. However, many of these information are not compatible and integrated into a single database for the management of the university. In this work, it was possible to verify the potentialities of the construction of an integrated process to guide the managers in the decision making of a joint and shared construction (Figure 9).

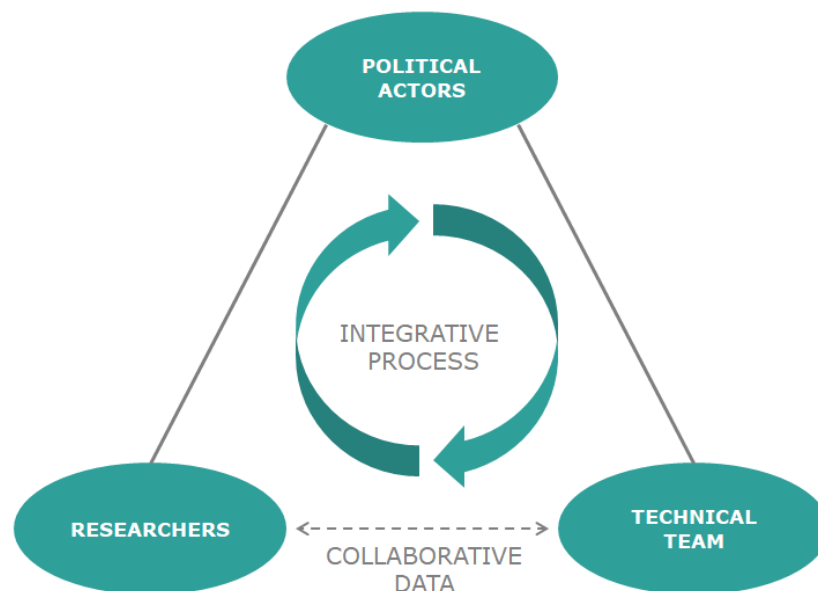


Figure 9 – Schema of proposed integrative process and collaborative data.

Linking of databases collected through both ways of surveys allowed an extended evaluation, getting to know better not only tracks of displacement but also meeting points at the Campus. That can be translated, into the planning point of view, more valuable information with more and mixed data, better analysis and therefore more effective solutions.

Notwithstanding the individual interests, this new scene has enabled the join of commons that pursue common goals on behalf of a more equitable society, revival the citizenship sense for the future. News demands requires the formulation of new spaces, and that is what society claims for the cities - meeting areas, exchange, sharing, better use of assets as yet under-utilized.

Conclusively, the present research aimed to give answers for some worries of the community related to people dynamics at UFSC, being possible to comprehend the

correlations and clarify achievable contributions with the effective materialization of the planning and management process, in order to bring closer community and natural resources inside Campus, changing paradigms of its use inside out, foster an environment of permanent exchange in the University.

It was possible to identify in this study that the use of this kind of technology and the establishment of an integrated management process can support the planning of spaces that attracts people in order to reconnect themselves with natural sources surrounding and invite them to walk and cycle across the Campus.

Promote public policies to requalify public spaces of University, in addition to guarantee the well-being of its community, generates a cycle of reciprocal investments between quality of education and quality of life, bringing even more resources to nature preservation inside Campus. The requalification of bank of rivers can encourage awareness about water dynamics, rescuing the concept of an University Campus as a huge urban scene of experiences and knowledge exchange.

5. Bibliographical references

Coordenadoria de Planejamento do Espaço Físico - COPLAN. (2017), Rede Cicloviária da UFSC – Campus Trindade - Considerações Técnicas e Diretrizes Estratégicas.

Curtin University, (2014). Greater Curtin Drivers for Change – Parte A – Creating The City of Innovation. 2nd Edition. Retrieved from https://properties.curtin.edu.au/local/docs/CurtinMasterPlan_PartA.pdf

Instituto Brasileiro de Geografia e Estatística. (2016). Pesquisa Nacional por Amostra de Domicílios Contínua - PNAD Contínua. Retrieved from ftp://ftp.ibge.gov.br/Trabalho_e_Rendimento/Pesquisa_Nacional_por_Amostra_de_Domicilios_continua/Anual/Acesso_Internet_Televisao_e_Posse_Telefone_Movel_2016/Analise_dos_Resultados.pdf.

Felin, B. (2016). Dados gerados por aplicativos podem transformar profundamente o planejamento de cidades. Retrieved from (<http://thecityfixbrasil.com/2016/05/10/>)

Gehl, J. (2013). Cidade para Pessoas. (2nd ed.) São Paulo, SP: Perspectiva.

Lynch, K. & Hack G. (1984). The Art of Site Planning; Site Planning 1–28. Massachusetts Institute of Technology.

Mazenod, F. et al (2016, December). Produção da cidade: quais dados para quais questões?. Revista do Instituto de Estudos Brasileiros. n. 65, p. 159-176.

Neckel, R. & Küchler, A. (2010). UFSC 50 anos: trajetórias e desafios. Florianópolis, SC: UFSC.

Ratti, C. et al. (2006, October). Mobile Landscapes: Using Location Data from Cell Phones for Urban Analysis. Environment and Planning B: Urban Analytics and City Science, Volume 33, 727-748.

Sharp, L. (2017). Reconnecting People and Water: Public Engagement and Sustainable Urban Water Management. New York, NY: Routledge.