International Urban Governance Seminar.

Winter School Barcelona, Paris, Madrid, Barcelona, 14-16 February 2018.

"Security in Mobility".

Evaluation of the levels of perception of security in the Mobility networks.

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Summary of the presentation in English.

Introduction:

There is an intense relationship between the concepts of "Urban Space Management", "Sensation of Security" and "Exercise of the Right to Mobility".

In our opinion, it is totally inappropriate to propose an "Urban Model" associated with a "Mobility Model" for a specific territorial area with expectations of success in its implementation, without having previously evaluated the risks it may cause in relation to the travel that will occur in that environment, nor studied the possible alternatives based on the results obtained.

Urban planning and design, the implementation of activities, the treatment of public space, the execution of road infrastructures and transport networks determine the possibilities and options for citizens to access services and their opportunities for professional and personal development.

A metropolitan or city environment can and should also be analysed under parameters of risk ranges in relation to the constraints that may influence the accessibility, travel and stay scenarios of the citizens who inhabit it or to which they are directed.

It is therefore very necessary to have a method (based on some protocols of analysis and extraction of results and conclusions, of certain simplicity) for the parameterisation of factors that affect the formation of a "Climate of Perception of Security" in relation to Mobility.

There is an interesting and extensive academic production on mechanisms to promote street security, but relatively few texts introduce the "indirect aspects" that so influence decision-making regarding presence in public space, the selection of routes and generally the behaviour of citizens during the use of a "multimodal travel chain".

What is intended in this presentation (summary of a doctoral work on foreseeable changes in the reorganisation of public space, to be useful to the “new mobility” that we face) is to link the different perceptions of the levels of security (or insecurity) that “we feel or suffer” in the urban space, in terms of potential accidents and personal security, “safety and security”, to see how, in a comprehensive and complete vision, they affect our “sensations of security” and how these induce us to decide on certain “mobility alternatives”.

Objective of the paper:

This paper proposes a basis for the preparation of “Tools for the Evaluation of Levels of Perception of Security in Mobility Networks of Urban and Metropolitan Environments”.

From the segmentation of the universe of travel, based on the sociological characteristics of those who make up a community and their habits or availability to travel (pedestrians, drivers, public transport users, etc.), it is proposed to cross it in a matrix of modes of locomotion (walking, cycling, private vehicle, bus, metro, taxi,…) and certain factors (not always obvious) of mitigation or promotion of potential levels of risk (information and communication systems, governance strategies, design of dark spots, selection of urbanisation materials, comfort conditions, etc.).

The final result should lead us to obtain an algorithm or algorithms which we call “Index of evaluation of the level of perception of the sensation of security in Mobility” (IPS), obtained from the detection and treatment of various indicators, based on the availability of existing information and certain field studies and surveys, in order to determine the “State of Perception of Security in a Mobility Network”, the trends that are induced in this field and the evaluation of the result of the application of certain policies of promotion of sustainable, rational and efficient mobility, also in terms of security potential.

With the final goal of demonstrating that increasing the “sensation and perception of security” is much more than reducing accident rates or crime rates; it is getting people to “believe” that they can develop their life projects in a safe environment and not feel isolated, frightened or terrified at having to go out into the street, get around and relate.

It is our intention also to provide instruments to help demonstrate that this sensation, this personal affectation, is conditioned by objective, quantifiable and objectifiable factors, and therefore “measurable” and capable of being corrected, attenuated or strengthened.

Methodological scheme:

In essence, our methodological proposal consists of preparing a table of "descriptors" related to "the morphology, the state, the organisation or the operation of the transport networks, the road system and the urban space", which allows us to finally establish a protocol to determine "indicators for assessing the level of perception of the sensation of security in mobility", which can be limited to a local (restricted) area or be circumscribed to certain modes of travel, but can also be used integrally in a synthetic final index.

Types of individuals to analyse.

To do this, we must begin by identifying the types of individuals and travel scenarios we want to evaluate:

In our case, the pedestrian is analysed (because we consider that in almost all travel there is at least one stage in which the mode used is walking and that, this being the most fragile link in the travel chain, everything that is done to its benefit also benefits the remaining modes).

The cyclist, as a paradigmatic example of a change of model in the mobility habits of many of our cities).

The driver/user of a private vehicle (because it generally represents a very high percentage of the trips that are made and due to its own sociocultural connotation).

And the user of public transport (whether individual or collective, formal or informal).

Although indicators have also been studied that make it possible to assess the risk sensations of other groups (transport operators, their assets and their staff, or agents of the security forces and other public services who carry out their activities on the roads).

The packages of indicators.

For each of the groups we have defined a "package of indicators", which we have tried not to repeat mimetically. Even when the data seem to be the same, they have been analysed from a particular approach (for the importance of street lighting is not the same, for example, for a driver, who has certain autonomy, as for a pedestrian or cyclist, who are much more dependent).

Over 100 different types of indicators have been compiled and, as will be seen below, for each of them we have defined the concept to be identified, the way to quantify it (all the indicators, even the most subjective, must be measurable to be included in the calculation formula) and which weighting factors can be applied to "adjust" the obtained

values and make them proportional to the whole scope or network that is the object of the analysis.

The values thus obtained have been homogenised on a 100 basis in order to apply other weighting coefficients (e.g., the weight that each travel mode has in the modal mix of that environment or the accident rate of each group).

The weighted summation of the set of indicators for each study group (pedestrians, drivers, collective transport users, etc.) gives us a first partial index and the application of the aforementioned weighting factors to these sub-indices allows us to create the synthetic final index to which we have referred.

Tree of indicators and descriptors.

Several study blocks have been defined, grouped into subsets that open in the form of a tree up to the level of each descriptor. The structure thus defined has epigraphs like:

In the road system and public spaces, the pedestrian, the cyclist or user in friendly modes (non-motorised) and the driver or user of motor vehicles (car or motorcycle).
In the use of public transport, the user of individual transport (taxi and others) and collective transport, with the user variants of rail, metro or tram transport, and the user of surface transport (bus)
From a global approach to mobility, the capabilities, organisation and competences of the Security Forces and other Public Service bodies or the security of the Mobility Agents.
The infrastructures dedicated to travel (road and on tracks, stations, car parks, technologies, etc.).
The organisation of the urban space (diversity of activities in the same area, distribution by timeslots, presence of institutional agents).
The signs (understood as dialogue between city and citizen) and the messages in the media (with subsections such as the perception of the official communication or the view from social networks).
Education in security.

For each of the blocks, their indicators have been described with sections and subsections, descriptors, as in the case of the following example:

For the private vehicle driver (g.1.3), in the case of three or more wheels (g.1.3.1), in relation to the traffic regulation conditions (g.1.3.1.a): all crossroads with full traffic lights (g.1.3.1.a.1), percentage of two-way roads (g.1.3.1.a.2), crossroads with left turn allowed (g.1.3.1.a.3), length of roads with traffic restrictions (zones 30) (g.1.3.1.a.4), remote-controlled roads (g.1.3.1.a.5) and heavy traffic management (g.1.3.1.a.6).

Some descriptors are direct and others indirect (the more one, the less the other). It is therefore necessary to standardise them to be able to proceed with their integration, until the completion of each branch of the tree.

For this same assumption, other branches would be the conditions of preservation of the road space and signalling (level of conservation of pavements, horizontal or vertical signalling, flood areas, etc.), car park management (reservation of spaces in buildings, percentage of spaces paid with respect to the total on offer, public parking, theft and robbery, vandalisation, etc.), vehicle insurance (levels of cover, accident rate detected, price of the insurance, etc.).

As has been said, it is also essential that all the concepts that are identified as susceptible to integrate indicators can be used as descriptors, and they must therefore be quantifiable and measurable.

Let's see it in an example:

For the block of individual public transport users, some of the usable indicators can be:

Lanes reserved for the circulation of taxis (exclusive and/or shared) and stops and waiting areas for boarding. Length of streets with reserved lane with respect to the total road network, and number of stops due to authorised licences and road network length.
Accident rate in relation to the rest of the vehicle fleet Percentage (weighted by hours/km performed) of incidents that occurred in dedicated vehicles and in the general automobile fleet.
Connectivity to a fleet management centre. Proportion of the total fleet that is attached to a management centre. Waiting Factor +20% (possibility of direct communication between the passenger and the management centre).
Easy identification of driver and vehicle. Control over who provides the service. Qualitative indicator.
Service request procedures. Traceability. Existence of records of requests and number of services entrusted under control systems with respect to total services.
Conditions of comfort and cleanliness. Number of washes per week; average of the whole fleet.
Mechanical conditions of the fleet. Average age of the fleet, frequency of mandatory services and percentage of vehicles immobilised by deficiencies. Direct and inverse indicators.

Descriptor identification mechanics.

Each of the descriptors must be precisely detailed, in this case in the case of the pedestrian, and the formula for calculating the value identifying it must be defined:

Exclusive section of street. We measure the percentage of length of streets, squares and avenues that have a specifically free passing section equal to or greater than 1.50 m, which do not present obstacles (trees on the pavement, kiosks, bar terraces, street vending, vertical signage, etc.) or where, in the event that they exist, it is possible to maintain a minimum passing section of 1.50 m. The quotient of this value is divided by the total length of the road network of this study area, which we have previously tabulated. By operating with percentages, we will have a harmonised scale based on 100. It is also a direct indicator, a higher percentage of better travel conditions and greater security against risks of being run over or conflict with other pedestrians or travel modes sharing a road. A weighting factor can also be applied to the value obtained, for example, due to the "generalised" existence of physical barriers that impede the passage or parking areas of vehicles (drives) (factor up to +25%).

Protection/priority for the pedestrian. All crossings and intersections of the road network should be analysed to identify those that are traffic-lighted and those that have preferential passes for the pedestrian (zebra crossings). The indicator will be the quotient between the number of "protected" passing points and all crossing points. Again it is a direct percentage indicator (base 100). In this section, it is very important to apply a weighting factor that considers at least three aspects: the passing times on green for pedestrians at traffic lights, calculated at a speed equal to or less than 4 km/h; the existence of vertical signage warning drivers of the proximity of a pedestrian crossing, and; the state of preservation of horizontal signage correctly delimiting the protected passageway (factor up to +/-25%). The criterion for the application of the factor is derived from the percentage of passageways that each of the previous parameters meet, with a component of subjective appreciation.

Night lighting. Linear metres of pavements in streets, avenues and squares are measured (on all sides or, if they exist, also in central passageways) that have street lighting, considering that the level of lighting is correct when there are lights located approximately at distances of 20/25m and that the lighting cones only stop impacting at distances of under 2 m on the pavement. The minimum acceptable lighting intensity will be determined for each project according to the usual parameters in the area (in general, values in the range of 75% of the calculation standard will be considered acceptable). The value thus obtained will be divided by the total length of the road network (calculated by the same method: pavements on both sides of streets and, in the case of back streets, obviously roads that do not have pavements will also be included). The percentage obtained is again a base 100 scale. In this case, a weighting factor will be applied for the number of dark spots detected along pavements (sections of road in which the continuity of the lighting is interrupted due to damage or absence). The weighting factor will be up to -20% (a higher level of "black spots" will disqualify the entire section of road from its "lighting" condition).

Connectivity with other travel modes. They are identified along the corridors of traffic (with possible pedestrian travel), by sections of 1 km in length (that correspond to averages of 12/15 minutes walking, a usual and reasonable time for a pedestrian

stage), the number of facilities and stopping points identified and which meet minimal requirements (e.g. that they are lit, that there are service or surveillance personnel, the working time slot, the intensity of use, etc.). From the result of the analysis, two data will be obtained: number of average modal exchange points per kilometre of network and percentage of road sections that have the possibility of accessing other modes, in relation to the total length of the network. This second value will be the one used as a scale of validation, base 100. The first datum (which can also be weighted by the number of sections that are below the average, as an indicator of concentration of points in certain corridors and consequently too, the lack of homogeneity of the network) together with the rating (subjective and indirect) of the estimated characteristics of the various access points (those of the standard and real requirements of each detected point) will allow a weighting factor to be applied to the initial value obtained (+/-25%).

Relationship with “Surveillance Systems”. The identification of this evaluation factor is much more complex and the analysis has a strong subjective component and greater difficulties in obtaining data. It is about knowing how to detect possibilities of “drawing attention” in situations of potential risk along a pedestrian route. Again, through fieldwork, through sections of network 1 km in length, it will be necessary to count the video cameras (public and/or private, of bank institutions, shopping centres, for instance) installed along the roads, the crossings and guarded complexes, which are focused in the direction of the pedestrian route (directly or indirectly); if any, public telephones or citizens attention booths from where to call; the vigilance posts of companies and institutions (depending on their level of accessibility). Also the passing points and times (accurate or estimated), of the rounds of the police services (if any) during a time period. The sum of all these factors (and others specific to each area, if any) constitutes the “offer” of possible points per km of route. There will be a part of the road network that has no possibility or which is imperceptible, in meeting communication needs, just as there will also be oversaturated environments. We will then estimate the percentage of the whole of the road network that “lacks” (real) communication possibilities, in the event of a potential danger or the sensation that it may occur. The percentage thus obtained will be an “inverse” indicator which we will have to standardise by means of the corresponding formula and also convert to base 100. In this case, a negative weighting factor (which may invalidate the indicator itself) will also be applied as a consequence of the “effectiveness” of these measures. The number of calls received by the police forces and their origin, the response times to requests for assistance and the intervention protocols of private security services and forces will be estimated. From the levels of efficiency and effectiveness detected, this weighting factor will be drawn (which can reach -100%, if no type of communication or response to request for help is detected).

All the other blocks and branches of the indicator tree have been acted upon similarly.

Conclusions.

As it can be deduced, the process of indicator formulation is basic for the result of the work. We must be very aware of the difficulties that we ourselves may be creating, if we try to reach levels of knowledge that may require a higher dedication than the available resources.

It should be noted, on the other hand, that to a large extent this analysis is the result of applying a “more particular observation” to a reality and data with which we work constantly. Being able to “rethink” the information that we already have, or to work on it in a different way, can help us to better recognise how the environment affects our perception of security.

To try to make available to all this correctly evaluated, tested information with temporary traceability, which helps us to contextualise both conjectural episodes and deep tendencies, expressed intelligibly (also useful to the profane) with orderly guidelines that value aspects of the knowledge of the operation of the road system and of public spaces, of the buildings and facilities that surround them and of the transport networks and their equipment, has been one of the fundamental objectives of this work.

However, the methodology used to identify the indicators to be evaluated, the descriptors, the weighting factors, the synthesis criteria and the standardising weighting, which allow a Synthetic Index of Perception of Security to be achieved, is not as important, though academically interesting and perhaps even useful, as the process of parallel reflection essential to fit the first objective, about each of the concepts that influence this Mobility Model which we continuously (re)create.

In each territorial area, different factors must be used to analyse and assess the objective and subjective conditions of Security in Mobility. A study method will always be useful, but only if we are able to delve into what is not purely metric (without abandoning quantitative verification, the ability to synthesise and compare with other environments).

And if we also dare not mimetically follows standardised models and create our own evaluation tool, that which best responds to our needs for knowledge and explanation. That is why the proposed IPS model is totally open and must be able to be adapted, put into question and compared with others. Because it will only be effective if it is integrated in the context of each field of study.

On the other hand, the “communication capacity”, getting the interlocutors (of each level) to “understand” (and they will only understand if we know how to explain it) the figures and correlations that emanate from our evaluation models, is as relevant as the results themselves.

I would like to finish with some final thoughts:

Stimulating the evolution and transformation of our cities so that they become compact and multifunctional, efficient and organised metropolises capable of meeting the individual and collective needs of all their inhabitants and avoiding social inequalities, is a guarantee of reducing crime thanks to the drive that the citizens themselves will exercise on their environment.

In this context, mobility appears as an area of personal relationship and collective dialogue that allows the development of “vital projects”. A “safe” city facilitates commuting and moving “freely” is the essential condition for interacting within the Community.

Without continued institutional support, police forces and a judiciary to guarantee the observance of the law, acting in coordination with the rest of the states and organisations, and educational model that inculcates these values and means of communication and creators of opinion that “defend” the story, it will not be possible to achieve, and particularly to maintain, high levels of “trustworthiness and security” in our public space.

And only by “confirming” that even in the most “profound” aspects of the functioning of the city there is a possibility of trusting, will the objective conditions be created that allow citizens to optimise their relationship potentials.

That is why it is so necessary to propose methods of assessing the perception of the level of security which are testable and feed public confidence.