11TH CONFERENCE ON COMPETITION AND OWNERSHIP IN LAND PASSENGER TRANSPORT

Delft University of Technology (The Netherlands)
20-25 September 2009

AREA SPECIFIC BICYCLE PLANNING

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ABSTRACT

A recent challenge for the majority of Brazilian cities is to cope with the growth of car mobility and to maintain and improve the use and quality of public transport and active transport like cycling. One of the challenges is combining public transport with active transport, as a feeder mode, to provide an intermodal door-to-door alternative for the private car. However, these cities do not have experience with this kind of planning and their urban planners and technicians lack the know-how to start the process. To overcome this lack of experience, I-CE (Interface for Cycling Expertise) a Dutch NGO developed a methodology, called Area Specific Participative Planning (ASPP), for planning non-motorized transport modes and its articulation with public transport. The main focus of this work is to gather technical and area-specific knowledge of both I-CE consultants and the people living and working in cities in order to develop a bicycle network and an intervention plan, using a step by step approach. After the workshops and technical visits, the participating planners, which include bicycle users and other stakeholders, become the main supporters of the plans and incorporate the lessons in their work routine. The use of the methodology is in progress since 2006 in Resende and since 2007 in Rio de Janeiro, both cities in the state of Rio de Janeiro. The main innovation of the methodology is that it capacitates and involves the target city's technicians and civil society, in making decisions based on local habits, instead of only presenting foreign plans and standards without local participation.

INTRODUCTION

General problems

The last decades the investments in urban planning and transport can be characterized by investments that attribute great value to the use of private cars and consequently these investments have stimulated the use of motorized personal mobility. Martins et al (2004) state it as follows:

> *"As we start to adapt our cities for the use of the automobile, we forget to maintain the balance between supply and demand of transport without compromising the limits of the capacity of environmental support and financing"*.

The growth of the automobile industry, in combination with the planning model in which extension of road infrastructure is the solution to accommodate the growth of car mobility, promoted the use of the private car and in consequence, the automobile is dominating the urban space whereas the planning model allows its expansion even more.

According to Silva (2005), this context stimulates a situation in which *the rich* take more advantage of the transport infrastructure than *the poor*, just because these last ones have less possibilities – the means to purchase individual motorized mobility – to get access to the opportunities – like jobs, public services and entertainment – that the urban environment offers. The Master plan (PDTU) of the Metropolitan Area of Rio de Janeiro (2005) confirms this and shows that people who earn above twenty minimum wages – one minimum wage is equivalent to about US$ 200,- – make almost three times more trips than those who earn up to two minimum wages. The public investments in mobility have resulted in a predominantly unequal mobility distribution in which a few can travel a lot to fulfill their consumer necessities whereas many can only make a few trips since they can consume less. It will be really difficult to continue reproducing this urban productivity model that takes the motorized personal mobility as a starting point, constructing viaducts and express ways to increase the capacity of automobile traffic and thus augmenting the value of its productive chain from producers (the proper automobile) to suppliers (parts and petrol) to service providers (garage etc.). (Lentino, 2005).

In this context the measures that are presented to be solutions to deal with the mobility problems of the Brazilian cities can be considered to be palliative measures. Emergency measures – like traffic flow inversion, "green wave", increase of road capacity during rush hours, among other measures – are adopted on a daily basis in the great urban centers by the responsible traffic engineers forced to find an immediate solution for the chronicle congestion problem. Porto (2001) explains it as follows:

> "*However, isolated measures are not going to solve the problems of the Brazilian cities. It is necessary to define transport policies that prioritize the most sustainable ways of public transport, cycling and walking. Moreover, to achieve a major effectiveness of mobility it will be necessary that the interventions incorporate a new standard of land use and occupation that encourages more active – or non motorized – dislocations"*.

The integration of public transport with active transport, as a feeder mode, to provide an intermodal door-to-door alternative for the private car is considered as a feasible opportunity.

The Brazilian Association of Public Transport (ANTP, 2008) executed a research to evaluate the quality of public transit in several Brazilian cities with different number of inhabitants. For each type of city - of respectively 100.000-200.000/ 200.000-500.000/ 500.000-1.000.000/ >1.000.000 - several indicators were determined.
The number of Passengers transported per vehicle per day is identified as an indicator for the Return on Investment in the Public Transport operation (ANTP, 2008). Halfway the nineties every bus transported on average about 600 passengers per day whereas this is nowadays about 467 passengers per day although there is a slight trend of recuperation.
The availability of the public transport service is an important element in the evaluation of the quality of urban public transport. Although ideally this availability should be measured in “space accessibility” and “time accessibility” of a person to a PT service these data were not available on an aggregated level. Therefore the quantity of “PT vehicle units” available per 1000 inhabitants was used. The higher this index, the better the availability of PT services. There exists a strong correlation between the index and the population size of a city as is indicated by table
Analysis of the number of passengers per “PT vehicle unit” shows the number increases with size of the city until 623 for cities in the level of 500.000-1.000.000 inhabitants and than drops till 461 passengers in big cities. It is assumed that this is due to the low velocities and congestions that affect principally the big cities. Another explanation might be the fact that there are relatively a lot more busses per 1000 inhabitants available.

Table 1: relation between city population size and PT indicators (Source: ANTP 2008)

Population size of cities	Availability index: PT vehicle units/ 1000 inhabitants	Passengers per PT vehicle unit per day
100.000-200.000	0,34	425
200.000-500.000	0.49	466
500.000-1.000.000	0,64	623
>1.000.000	1,05	461
Total	0,47	467

From this data it can be concluded that in smaller cities the integration of public transport with active transport is feasible out of both the perspective of the customer and out of the perspective of the public transport operator. In bigger cities the integration might improve public transport service by improving the feeder trip and thus improving the competitive edge of public transport in relation to other transport modes like paratransit.

According to ITRANS (2003) most people cannot afford using private car or taxi anyway and the price of the fares in the public transport system has grown, this may be an indication that poor people lost mobility in the last decade. ITRANS (2003) observes that poor people make fewer trips and that the bus is substituted by walking. People

walk for more than an hour (one way) to avoid paying the bus fare! The ITRANS study shows that as a result, people have fewer opportunities to find work and thus do not have the opportunity to increase their income. This vicious circle may be broken when bicycle usage becomes feasible for those people.

This combination of public transport with active transport is an effective tool to stimulate social and economic inclusion, which is an important issue in Brazilian cities.
However, these cities do not have experience in this kind of planning and their urban planners and technicians lack the know-how to start the process. Silva (2005) illustrates this by indicating that in Brazilian universities the subject of urban development is still little articulated to urban mobility and leaving this matter the responsibility of urban planners (architects and engineers) with little multi disciplinary education. As a consequence, in practice the municipal public administrations continues to divide their workloads in subjects for the secretaries of transport, responsible for the efficiency of road circulation and multi modality and of the secretaries of urbanism or urban development, responsible for the land use and occupation.

To overcome this lack of intermodal planning experience, the Dutch NGO Interface for Cycling Expertise (I-CE) developed a methodology, called Area Specific Participative Planning (ASPP), in order to start the design of non-motorized transport facilities and its articulation with public transport. This ASPP method is applied in the city of Rio de Janeiro – to integrate the bicycle with a Bus Rapid Transit project (T5) – and in the midsize city of Resende in the state of Rio de Janeiro.

This article presents the Bicycle Partnership program, the case of Resende to illustrate the mobility problems that were mentioned above and are common for a lot of medium and small sized cities in which the density of public transport services is smaller then in metropolis as Rio de Janeiro and therefore offers opportunities for the integration of public transport and the bicycle. Finally the developed methodology, results and points learned in both Resende and the city of Rio de Janeiro about the workshop methodology are presented.

The bicycle partnerships program

The Bicycle Partnership Program (BPP) is an initiative of the Dutch NGO I-CE (Interface for Cycling Expertise) to support local authorities, civil society organizations and other partners in the development or increase of the use of the bicycle as a transport mode. The program understands that by promoting the bicycle use by improving cycle-inclusive urban planning, it is possible to make a significant contribution in the poverty reduction by increasing the urban low cost mobility, augmenting road safety and thus contributing to a better air quality, a more sustainable environment and a higher quality of life. The program acts in developing countries of Latin America, Africa and Asia (I-CE, 2009).
The activities of the program aim on two principal actors: cities and civil society organizations. These actors are enabled to promote policies and bicycle friendly approaches to reduce poverty. The technicians of the partner cities are enabled in bicycle friendly city planning through regular training workshops and continuous long distance support.
The main strategies of intervention are: political influence, qualification of the civil society and poverty reduction.

The political influence has to develop through the mobilization of citizens, politicians, professionals and so introduce the bicycle on the political agenda; the introduction of cycle inclusive laws and rules; and the promotion of knowledge and know-how to include the bicycle in diverse public policies.
The qualification of the civil society includes support strategies for the organizations that promote the use of the bicycle; the development of concepts and support the initiatives form the market for low cost bicycles; research and training of cycle inclusive planning and projects to facilitate bicycle use. The strategies for poverty reduction include reduction of the social and financial barriers to the use of the bicycle; safe accomplishment of innovative production of bicycles at low costs and implementation of safe cycle routes.

In Brazil I-CE is mainly active with the BPP in the cities of Florianopolis, Resende and Rio de Janeiro. The cities of Resende and Rio de Janeiro were pilot cities for the development of the methodology "Area Specific Bicycle Planning".

DIAGNOSIS: RESENDE CASE

Resende is a city of 117.391 inhabitants, according to CIDE in July 2005, located in the region South Fluminense in the State of Rio De Janeiro, 143km of its capital. Resende borders on the river Rio Paraíba in the South and is crossed by the Highway President Dutra that connects the cities of Rio de Janeiro and São Paulo. Resende is the last city you pass along the highway before you drive into the state of São Paulo. The Military Academy of Agulhas Negras (AMAN) and industries like MAN AG, a metallurgic industry, and the Nuclear Industries of Brazil (INB), responsible for the uranium enrichment for the nuclear plant in Angra Dos Reis are located in Resende.

With a fleet of 33.850 vehicles in the city (DETRAN/RJ, 2007), resulting in about one automobile per 3, 5 inhabitants, the city infrastructure and the urban planning can not deal with the normal increase of motorization and the extra increase due to investments for the implantation of the automotive metallurgic centre in the region, Resende has problems with the circulation of vehicles and a worrying amount of accidents. In relation to the car ownership, 54% of the population does not possess a private car in their family. Concerning the bicycle ownership, 25% of the interviewees do not even have at least one bicycle at home, but on the other hand this means that 75% of the households have at least one bicycle available, see table 2.

Table 2: Car & bicycle possession in Resende families (Source: Study of Urban Mobility of Resende, 2009).

Car Possession		**Bicycle Possession**	
0 car	54%	0 bicycle	25%
1 car	41%	1 bicycle	43%
2 cars	4%	2 bicycle	22%
3 cars or more	1%	3 bicycles or more	10%

Table 3: Modal Split in Resende (Source: Study of Urban Mobility of Resende, 2009).

Transport mode	**%**
Public transport (bus)	41%
Paratransit or group transport	2%
Private car	17%
motorbike	1%
Walking	28%
Bicycle	9%
Other (cab etc)	2%

Concerning the modal split a big part of the trips made by the population of Resende is made by bus (41%). The trips made by foot are also sufficiently significant in the transport matrix of Resende, being responsible for 28% of the trips. The car is responsible for 17% of the trips and the bicycle for 9%. The freight transport system is responsible for only 2% of the trips, as can be observed in table 3.
For the development of the master plan the macro zones of Resende were defined. These macro zones are territorial units for the Municipal Managing Plan, see figure 1.

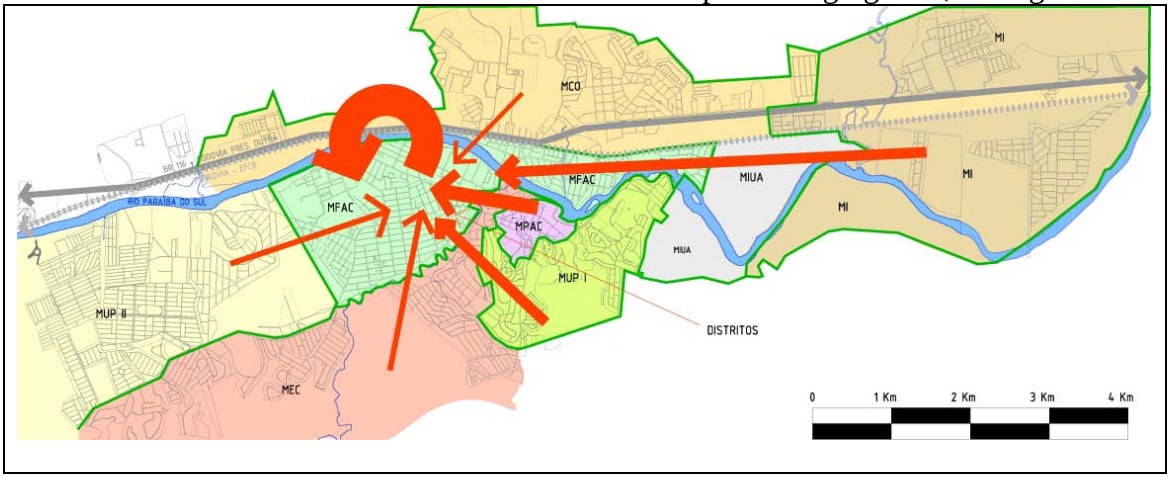

Figure 1: Macro zones of Resende (Source: Study of Urban Mobility of Resende 2009).

Table 4 presents the trip production and attraction between the macro zones. It is easy to perceive the heavy relation between all the macro zones with the central area, indicated by macro zones MPAC and MFAC.

Table 4: Production & attraction matrix of trips to work (Source: Study of Urban Mobility of Resende 2009).

WORK MOTIVE		**DESTINATION MACRO ZONE**								
		MPAC	**MFAC**	**MI**	**MUP I**	**MUP II**	**MCO**	**MEC**	**District**	**Outside the city and the industrial center**
ORIGIN MACRO ZONA	**MPAC**	40,0%	29,1%	5,5%	3,6%	3,6%	3,6%	1,8%	3,6%	9,1%
	MFAC	12,0%	55,6%	0,8%	0,4%	9,3%	6,2%	1,5%	0,4%	13,9%
	MI	50,0%	9,4%	21,9	0,0%	0,0%	3,1%	6,3%	6,3%	3,1%
	MUP I	13,6%	43,2%	1,3%	9,7%	6,5%	11,0%	4,5%	1,3%	9,0%
	MUP II	13,1%	30,0%	0,3%	0,0%	28,8%	3,8%	6,1%	3,2%	14,7%
	MCO	13,6%	28,4%	3,1%	0,0%	13,0%	29,6%	1,9%	0,0%	10,5%
	MEC	8,1%	30,7%	3,2%	1,6%	1,6%	9,7%	9,7%	3,2%	32,3%

Table 5 presents the motorization percentage (the possession of individual motorized vehicles) in the macro zones and the modal split for work trip production of the macro zones. It is interesting to observe that the percentage of motorization of the macro zones corresponds to the level of income of the population of the territorial unit.
The system of urban passenger transport, under direct responsibility of the municipal government, offers good space accessibility, offering public transport in a great part of the urbanized area. However, the system has problematic characteristics: it does not operate with fare integration, presents huge variations in frequency and thus in time availability and there is no integration with other transport modes. This encourages a vicious cycle in which the service level gets worse, resulting in long waiting times at the

bus stop in comparison to the in vehicle travel time which makes that people prefer to use the private car or bicycle or end up to make the entire trip by foot.

Table 5: Motorization modal split to work (Source: study of urban mobility of resende, 2009).*

	% MOTORIZATION	BUS	BICYCLE	CAR	FOOT	CARGO	OTHERS
MPAC	53%	19%	4%	38%	38%	0%	0%
MFAC	58%	30%	7%	41%	18%	3%	1%
MI	39%	47%	12%	24%	18%	0%	0%
MUP I	48%	39%	4%	34%	19%	0%	3%
MUP II	34%	45%	14%	18%	15%	5%	2%
MCO	43%	41%	3%	36%	17%	1%	1%
MEC	81%	25%	3%	55%	6%	9%	2%

Start situation and potential for cycling

During preparation visits to Resende and Rio de Janeiro discussions with the local city planners were held and visits to the areas that the local city planners considered potential pilot projects were made. In both cities the principal characteristics of the pilot project area were:

- car culture and huge raise of number of cars causing congestion;
- no cycling culture and limited infrastructure facilities to stimulate cycling;
- Already cyclists in the area but no hard data available about the bicycle use and potential use as well as a doubt among decision makers whether investments in bicycle infrastructure will not be a waste of money.

After presentation of table 6 a further analysis in the modal split of Resende was made making use of the average distance between the centers of the macro zones.

Table 6: Distribution of modal split per distance in the Netherlands in 2005 (Source: www.bovag.nl).

Km	0-1 km	1-2,5 km	2,5-5km	5-7,5km	> 7,5km
Car	11%	33%	55%	70%	82%
Train	0%	0%	0%	0%	7%
Public Transport (bus/tram/metro)	0%	1%	2%	4%	5%
Motorbike	0%	1%	0%	1%	0%
Bicycle	28%	45%	36%	22%	7%
Walking	61%	20%	6%	1%	0%
Ohter	0%	1%	0%	1%	0%
	100%	100%	100%	100%	100%

As can be seen in figure 2 below, the shorter the distance, the bigger walking as a mode of transport and how larger the distance, how bigger the use of public transport (PT) for trips made to work. There is not such a significant difference in relation to the modes of bicycle and car.

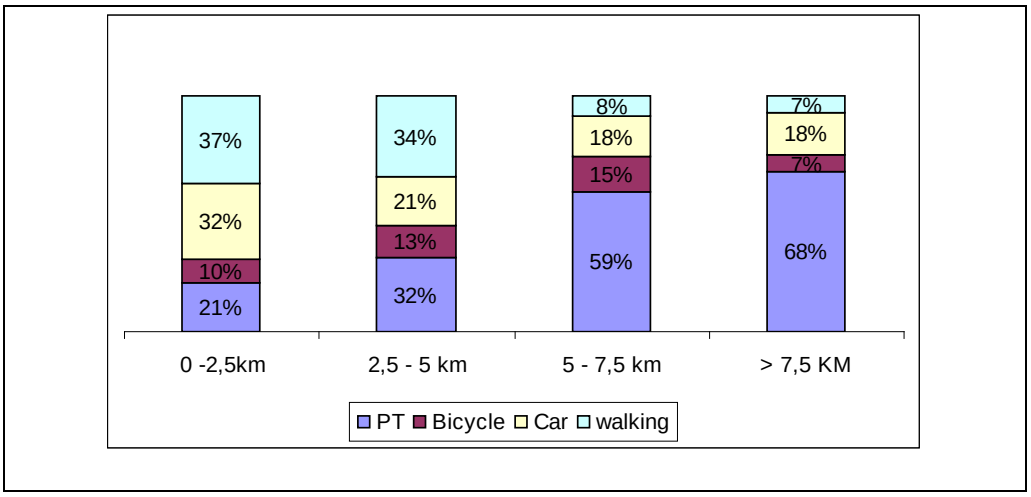

Figure 2 - Modal split to work per distance (km) in Resende (Source: City hall of Resende, 2008).

The characteristics of the city are favorable for the use of cycling as a transport mode since the majority of the trip distances are relatively short, the geography is flat, and there was already bicycle infrastructure available although this was bad signalized and not interconnected. However in the central area, there are no appropriate facilities for bicycle parking, so it is normal to find bicycles chained to the trees, poles and other elements mend for other purposes. This area is the destination of 50% of the trips to work by bicycle. In MUP II, the origin of 49% of the trips to work by bicycle, no special infrastructure for cyclists is available except from some bicycle racks in front of some small commercial buildings. Through their daily experience and the data of the domestic research the local technicians have identified a (latent) demand of people to make more use of the bicycle as a transport mode for various activities. The technicians perceived that it would be possible to diminish the car dependency in favor of more sustainable transport modes. And to contribute in this way to the social inclusion of a part of the population by offering them access to low cost mobility. The technicians recognized the need and the potential for infrastructure for non motorized transport as well as the integration with collective transport especially in the area between MUP II - MPAC/MFAC. But the local team also recognized that they did not have the expertise to accomplish these projects.

DEVELOPMENT OF ASPP

The ASPP method is based on two Dutch methodologies and contemplates adaptations for application in the Brazilian partner cities.

Participative planning: Area Specific Optimization

The Dutch method of urban planning called Area Specific Optimization (*Gebieds Gericht Benutten*) was developed to improve the road circulation, taking in consideration the lack of data, culture and the financing of the investments. This approach was developed initially for the planning of a metropolitan system of traffic control. During the process, stakeholders in the metropolitan level indicate what they want to achieve by using traffic management in the metropolitan area and what instruments will be necessary for this by making use of a step wise approach.
ASO is an appropriate approach for cooperation in a region to deal with operational traffic management and it results in a tool to manage the development and the priority

of intervention measures. The input consists of traffic models (if available) and the local and regional (tacit) knowledge of bottlenecks and traffic management measures. These are dealt with in a structured process of problem analysis, discussion and priority setting, creation of solutions and decision making.
The step wise approach consists of the start up (A), the policy statement (B), the interventions strategy (C), description of the reference situation (D), bottleneck analysis (E) and service development and intervention choices (F). In this way it is assured that the process is structured in order to optimize the traffic management.
Some distinguishing characteristics of this method are that it makes use of both hard data (traffic counts etc) and tacit data (knowledge of local experts and planners) and that it starts to address the problem in stead of the solution. Moreover every process step results in an intermediate result that has to be approved by the majority of the participants and that can be presented to decision makers. In this way the decision makers are being involved with the progress and the decisions of the project – and can give feedback or suggest changes – without actually having to participate in the planning process. Another characteristic is the development of various solutions in a short period and at a low cost making use of rapid assessment techniques.

Design principles: design for the bicycle

According to Centre for Research and Contract Standardization in Civil and Traffic Engineering (CROW), 1996, the designer of a cycle- friendly infrastructure should be familiar with the technical possibilities and limitations of cyclist and bicycle. The cyclist is driver, equilibrist and power-plant at the same time. This combination of tasks includes a number of more or less conflicting features, which give the cyclist its special position in traffic. The requirements for a good bicycle network can be summarized in five main criteria and three levels of planning.

Table 7 - Criteria for bicycle friendly planning (Source: Cycling-Inclusive Policy Development: a Handbook, 2009).

CRITÉRIUM	DESCRIPTION	PRINCIPAL CHARACTERISTICS
Coherence of the Network	the cycling infrastructure forms a coherent unit and links with all origins and destinations of cyclists	Visualization, freedom of route choice and quality of the connections.
Directness	the cycling infrastructure continually offers the cyclist a route as direct as possible in which detours are minimized	Speed, delays or waiting and deviations.
Atractiviness	the cycling infrastructure is designed and fitted in the environment in such a way that cycling is attractive	Visibility, landscape, social security.
Safety	The cycling infrastructure guarantees the road safety of the cyclists and other road users	accidents in traffic with victims and confrontations with motorized traffic
Comfort	the cycling infrastructure enables a quick and comfortable flow of bicycle traffic	declivity, quality of the pavement, blockage of traffic, possibility to stop

To achieve a comprehensive design of cycling infrastructure, an integral approach is necessary, taking into account different planning scales and levels of function of a cycle route. The different planning scales are at network level, at connecting level and at facility level. Each level has its specific project problems. The challenge for the urban planner is to find the balance in each level in accordance with form, function and use.

Network level

Integral thinking starts with the planning phase. One basic condition is that the traffic system is designed so that the right elements are deployed in the right place at the right time in order that the external costs (safety, environment) are minimized. The strength of the bicycle lies particularly in short distance journeys and in its use as a method of transport between the home and public transport stops. Analyses of trends in urban areas should show which places are worth investing time and energy in the improvement of the position of bicycles.

The planning of the main structure of the bicycle network involves the desired lines of the possible traffic of bicycles when possible. For this, it is necessary to define the origins and the destinations of the cyclists. New routes are selected from an analysis of the network with limited deviations and crossings with motorized traffic and that promote a coherent network structure.

After the analysis of the network, there is an analysis of the O/D matrix, possibly with some variations. The most used routes in the network (existing or not) must be in accordance with developed criteria concerning the priorities and quality.

During the bottleneck analysis the quality of the routes and crossings are evaluated and the facilities for the bicycle infrastructure are proposed. It is possible to verify alternative layouts. Questions about the routes in commercial streets and pedestrian streets are considered in this phase, and could cause a partial change of the plan.

Connecting level (road sections and intersections)

The system of cycle routes is part of the total traffic system. Many cyclists are travelers by choice and conscious travel consumers. They regularly choose other forms of transport, especially when directness, safety and comfort of using a bicycle are not of appropriate level. Cyclists are not weak road users but they are vulnerable if involved in a confrontation with fast-moving traffic, which requires special attention. Avoiding conflicts between different types of traffic by separating them completely is an extreme, but sometimes necessary intervention. For the road sections the interventions used are bicycle lanes, bicycle paths and mixed traffic.

To improve the quality of the elements of the network, facilities must be introduced like: moderation of the traffic, construction of passages on level, reduction of motorized traffic, construction of cycle paths, adaptation of the intersections, inclusion of roundabouts, improvement of the crossings, improvement of the pavement, construction of parking facilities for bicycles.

Integrated thinking at a facility level

The quality offered to cyclists, should be measured with the same criteria as the quality offered to other road-users. In this context, integral thinking means that traffic is seen as a combined action between parties who in principle are prepared to obey the traffic rules. A condition to avoid conflicts is, for example, that cyclists and motorists can have eye-to-eye contact. A confrontation between two road users who cannot have eye-to-eye contact is by definition unsafe. The planning of the infrastructure strongly influences on

the ability to see one another. If one plans for cyclists one should plan parking facilities as well.
Moreover the availability of safe and well maintained bicycles helps reducing traffic safety and especially the use of appropriate safety equipments like bicycle lights. Another important aspect for the integrality of the cycling policy is the fact that it is important to create awareness among politicians and create a cycling culture among both motorized and non motorized traffic users.
It is important that during the whole process one tries to find the balance between the elements of transport (signalization, traffic volumes, confrontations, priorities on the road, etc) and the characteristics of land use (environmental quality, connections with attracting areas and generators of trips, considerations how much of the roads are of commercial character).

Adaptation of method to Brazilian reality

To adapt the two proven Dutch methods to the Brazilian reality of cycle inclusive planning adjustments were made concerning:

- Shift from a metropolitan (or macro) planning level to a local (or micro) planning level;
- Make clear that the method starts addressing the problems and only then the solutions;
- Have quick results and take into account that the participants will change due to other interests.
- Keep in mind that cycle inclusive planning in urban areas is an innovation in Brazil.

RESULTING METHODOLOGY: ASPP

The result of the integration of the Dutch urban planning methods and its adaption to the Brazilian situation was an interactive series of workshops, the network planning, the intervention planning and the detailed planning. The network planning and the intervention planning are done in cooperation with local stakeholders.
The workshops series are divided in three steps preceded by an introduction day.
These workshops were organized by the City employees with technical support of the Dutch representatives. Between each workshop there was a reflection period (of about two to six months) necessary for the workshop participants to reflect on the lessons learnt and make the matter their own.

The objectives of the introduction visit or introduction period are creation of awareness, evaluation of the political willingness, definition of a preliminary project and the selection of stakeholders that will participate in the workshop.

Network planning

During the first workshop the network planning was dealt with which took two days in Resende (a smaller area) and 4 days in Rio de Janeiro, where the area under study is bigger and more complex. During this workshop the basic principles of bicycle inclusive planning were presented and discussed and the main origins and destinations, critical points and the suggestions for a network were identified. Moreover this stage consisted of technical visits and diverse interactive activities with the participants.

All steps that were executed had one of the following objectives: creation of awareness, capacity building and the design of the network including an estimation of the future demand, integration of the planned network in the existing infrastructure and the identification of the critical points of the network.

Intervention planning

The second workshop series was about the planning of the interventions that would have to be implemented to facilitate cycling in the city. This can be achieved by bicycle paths, bicycle lanes, by traffic calming interventions or by implementing interventions at intersections. This stage, with a tactical character, lasted two days and also existed of interactive technical visits and activities. In this step the creation of awareness was less important since the participants are already more aware and therefore the objectives were capacity building and to agree on the kind of the solutions for the infrastructural interventions in the network.
The second workshop started with the network created in the first workshop. This stage looked at the considerations of the decision makers, reevaluation of the network according to these considerations, definition of priorities and suggestions for the facilities. In order to prepare the participators to plan the interventions a presentation with all kind of Dutch interventions was shown. Although the participators really liked the presentation and understood why the interventions were made it was expected and perceived that the participators would have difficulties in imagining how they could implement this kind of interventions in their own city. Therefore the participators were asked to form small groups and each group developed the interventions for a few critical points. The solution of these critical points were presented and discussed by all participators and as a consequence of the diversity of the local expert group it was possible to make information explicit that is normally intangible (or in the heads of the persons) and it became clear why an intervention would have a high failure rate in one peculiar point whereas there would be no problem in another point. This demonstrated the participants that prefabricated solutions in urban planning are only recommended after a good analysis of the situation. This kind of information collection makes use of Rapid Assessment Techniques (ODA 1995) and makes it possible to obtain information in a short time frame. To obtain the same information by making use of the common data collection techniques a relative long time period involving substantial costs is necessary. In the end the project leader made a summary of the solution for all critical points and explained that the interventions would be elaborated into a detailed project plan and that the results would be presented when the detailed plans would be ready.

Detailed planning

The third workshop consists of the designing in detail of the interventions proposed in the previous steps and the check whether the proposed solutions do really fit in the existing situation. It started with the cycle routes defined by the priorities, and approved by the decision borrowers. Possibilities of layout for diverse sections including facilities have been presented and the project decisions have been made. This stage had an operational character; lasted 2 days and data of vehicle counts had been included in the project. During this step also facilitating programs like education and marketing programs can be thought of as well as the installation of parking facilities.
The planning department could detail and calculate the most important cycle routes, make cost estimations and give continuity to the process.

Lessons learned and results

The success factors of the method are the involvement of the stakeholders and the decision to release operational recourses and staff from the organization to participate in the workshops, the diversity of interested local agents and also the diverse departments of the City hall and the civil society; the previous definition of the principle object to be dealt with during the project and the limitations of the project (in the case of Resende this was cycle route MUP II - MPAC/MFAC); the long term continuity (two years) of the process during which the NGO provided a form of "long distance learning" to back up the local decision makers in their design solutions.

The strengths of the method are the important role and use of the local explicit and tacit (implicit) knowledge which guarantees the involvement of the local technicians with the process and takes partially care of the fact that a lack of transport- and traffic planning data is common in Brazilian cities. Other strength is the gradation of stages from a regional scale to a local scale; the effort to suggest various alternatives for the sections, crossings and bicycle facilities and to definition of priorities with endorsement of the decision borrowers is considered strength.

Points of attention are the duration of the bicycle project in the planning process. It was perceived that a period of two years to achieve a basic bicycle project in this participative process is not practical since the governing period of the Brazilian municipal management is four years and in the end of these periods results are required. The detailed project was developed during the re-election campaign and it was not executed. This was due to the little time remaining for lobby activities with the main decision makers and local public opinion. However, in reality three workshops of only three days each are needed for the development of a consistent bicycle network including the planning of the network and the treatment of the interventions. On the other hand, it must be stated that for the Dutch, bicycle network planning is included in urban and transport planning, whereas for the Brazilian planners, bicycle infrastructure and bicycles are principally used for leisure use. The awareness process in relation to the potential of the bicycle as a transport mode or a feeder mode for public transport required reflection periods in between the workshops.

In Resende the project plan for execution has been approved by the local decision makers and a part of the plan is being tendered while the progress of the planning process in Rio de Janeiro is on schedule and is surprising local decision makers. The project plan that finally approved by the local decision makers and I-CE experts costs only R$ 1,7 million whereas the original plan, before the participation of I-CE experts, would cost about R$ 4,5 million. This reduction in price was due to the use of bicycle lanes in stead of bicycle paths.

In Rio de Janeiro the method is used for the inclusion of the bicycle as a feeder transport mode in the project for a Bus Rapid Transit route. This exclusive two lane bus route, inspired by the Curitiba BRT system, will connect the areas of Barra and Penha. It will provide high speed public transport to high income groups (e.g. in Barra de Tijuca) and very low income groups (e.g. in Cidade de Deus). The route will have a length of 28 kilometres. There will be 38 bus stops of which 8 will be integration stations with the metropolitan train system (Supervia), the Underground (MetroRio) and feeding bus routes. The articulated busses will provide leveled access to the elevated platforms (90

cm high) at the bus stops. The bus system within the zone around the BRT route must be reorganized. Some lines will be redirected to the BRT route, while others will be transformed to feeder lines. In total, 79 lines are affected by this major operation.

The city of Rio de Janeiro recognizes that feeder bus lines alone will not be sufficient to provide enough access to the BRT busses for all people in the area. Therefore the city wanted to encourage cycling by including cycle park facilities at the bus stops and stations and safe cycle routes on access roads.
After the two years of the ASPP the result is that the principal urban city planners are capacitated, that the bicycle feeder transport network and parking integration is developed for the pilot region around Curicica. Moreover despite the last year government change the bicycle inclusion along the T5 project continues and the bicycle feeder networks are right now being planned and designed for the other eight integration stations amongst others around Penha in the densely populated North Zone of Rio de Janeiro where some 3 million people live.

CONCLUSIONS

The merit of the methodology “Area Specific Bicycle Planning” is that it structures the knowledge of the local actors and that it combines strategies that balance the demand for transport and characteristics of land use in the process of city planning. The approach with the Dutch technicians is positive and has great influence on the involvement of the Brazilian technicians that now will bring the concept of cycle paths into the Brazilian context.

The result of the use of the method is that it involves local technicians and civil society and makes them execute the network and intervention planning and give feedback on the detailed planning.
In the network planning step criteria are defined to guide cycle planning, potential routes are planned and critical points are identified. In the intervention planning choices are made about the kind of interventions like bicycle path, bicycle lane or mixed traffic, restrictions for car parking, stimulating bicycle parking, interventions at intersections and other urban design decisions. In the detail planning step the choices made are elaborated until a ready to execute project plan.

The use of the method in both Resende and Rio de Janeiro shows that the method helps achieving the chosen objectives:

- Integrate cycle planning in the municipal planning process and implement (better) cycle policies resulting in a ready to execute project plan reflecting the local influences and habits;
- Capacitate the municipal city planners with cycle inclusive planning knowledge and explain them the advantages and disadvantages of the use of the bicycle as a transport mode.

In both Resende and Rio de Janeiro the participating planners, bicycle users and other stakeholders are the main defenders of the plans and approve the method in their feedback. It is important that the Brazilian experts gain a lot of new technical expertise by participating in the stage wise process of the method and that they combine this with their knowledge of the Brazilian reality. If Brazilian cities start using the method more

frequently it should in the long run influence the planning process done by Brazilian cities.

After the successful pilot projects I-CE has decided to adopt the ASPP method as its standard planning approach for the Bicycle Partnership Program in Latin America, East and South Africa and India.

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